



# Micro Focus RM/COBOL

Xcentrinity™  
Business Information Server  
User's Guide  
Version 12

Micro Focus  
The Lawn  
22-30 Old Bath Road  
Newbury, Berkshire RG14 1QN  
UK  
<http://www.microfocus.com>

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Revised 2020-05-07 for version 12.17

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# Chapter 1. Introducing the Business Information Server

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## Overview

The Xcentrinity Business Information Server (BIS) is a web server environment that manages application sessions and makes them available via any web browser or other web user agent that is granted access to the BIS server. BIS offers application developers a real opportunity to build state-of-the-art Service Oriented Architecture (“SOA”) applications incorporating legacy business data and logic freely mixed with the latest web languages and tools.

With BIS, remote users can access data, perform application functions and execute service programs on one or multiple servers located anywhere in the world. For example, a sales force can check order status for customers during the day and enter new orders in the evening as they travel. Emergency room doctors can read patient histories on primary care physician files in another state and primary care physicians can see insurance claim’s status. Bank customers can see account status, pay bills, transfer funds, and make investments, all from the comfort of their own homes. Taxpayers can have access to public records from anywhere. With BIS, any modern application architecture, function, and appearance is possible.

BIS has two major components:

- A **Request Handler**, a web server extension that integrates either with Microsoft Internet Information Server (IIS) or the Apache web server.
- The **Service Engine**, which executes COBOL code under the control of the Request Handler.

A **service program** is the COBOL code that is executed by the Service Engine, is application dependent, and not supplied directly by BIS.

In the simplest case, an end user enters a URL into a web browser that specifies a specific web page on a server. The web browser then formats the request using HTTP and sends the request to the server specified in the URL. If the requested page is a reference to a simple HTML file (usually denoted by a file extension of **.htm** or **.html**), the contents of the HTML file are sent to the browser without any further processing.

However, if the reference is to a BIS “stencil” file (usually denoted by a file extension of **.srf**), the file is read and processed by the server before it is sent to the browser. Specifically, BIS interprets the file, processing any **tags** embedded in the file's HTML or XML content. A tag is composed of text surrounded by **{{** and **}}** sequences, and tags may be interpreted as processing instructions or placeholders that are replaced by plain text, HTML or XML that is generated by the BIS service engine or by the BIS request handler.

Some useful definitions:

<b>User Agent / Client</b>	The program that is used to request information from a server. This program is frequently a web browser, but it could be any program on the user's machine.
<b>HTTP</b>	Hypertext Transport Protocol, a standard encoding scheme used to transmit requests to web servers and receive responses from web servers. HTTPS is a secure version of HTTP.
<b>URL</b>	Uniform Resource Locator, the location of a resource on the internet. A URL consists of a scheme (in this context, HTTP or HTTPS), the name of a machine, and a path to a file. For example, <a href="http://xcentris.org/bis/index.html">http://xcentris.org/bis/index.html</a> specifies the file named <i>index.html</i> from directory <i>bis</i> on server machine <i>xcentris.org</i> using the HTTP scheme. When this is typed into a web browser, the browser issues a HTTP GET request on this file.
<b>Request</b>	An HTTP packet that contains a command issued by the user agent. A request may simply <b>GET</b> a file from a web server, or may <b>POST</b> data (such as a form) to the server, or it may cause a program to be run on the server. <b>GET</b> and <b>POST</b> are by far the most frequently used commands.
<b>SOAP</b>	SOAP is an XML-based web protocol designed to operate on HTTP to facilitate web services. It is particularly well suited to Remote Procedure Call (RPC)-style services.
<b>Web Server</b>	<p>A program that runs on a server and listens for HTTP requests. When a request is received, the web server processes the request or sends it on to another program (such as BIS) for processing.</p> <p>The two most common web servers are Microsoft's Internet Information Server (IIS), which BIS supports on Windows, and Apache, which BIS supports on UNIX.</p>



<b>Response</b>	A HTTP packet that contains the response to the request. The response may be text, to be displayed in a web browser, or data encapsulated by SOAP for consumption by the requesting program.
<b>Session</b>	Requests are “stateless”, that is, the web server processes each request as if it had never received a previous request from the same user agent. A session is a BIS concept that allows sequential requests from the same user agent to be grouped together and preserves state information across requests on the server.

For more definitions, see the Glossary on page 141.

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## Installation on Windows

This section details installation of Business Information Server on Windows. Installation on UNIX is described in “Installation on UNIX” on page 11.

### BIS 32-bit and 64-bit Versions

BIS for Windows is available in 32-bit and 64-bit versions. The 64-bit version requires a 64-bit version of Windows; the 32-bit version may be installed on either a 32-bit or 64-bit version of Windows. Both 32-bit and 64-bit BIS versions may be installed at the same time.

### Prerequisites

These are the prerequisites for BIS for Microsoft Internet Information Server (IIS) running on Microsoft Windows:

- Microsoft Windows XP Professional with Service Pack 3 or later.  
Windows XP uses IIS version 6. A later version is strongly recommended.  
Note that the 64-bit version of Windows XP uses IIS version 5. BIS will not install or run on this version of IIS.
- Microsoft Windows 7, Windows 8.1, or Windows 10, which include IIS version 7 or later.
- Microsoft Windows Server 2008 R2, 2012, 2012 R2, or 2016, which include IIS version 7 or later
- The 64-bit version of BIS requires a 64-bit operating system. The 32-bit version may be installed on either a 32-bit or 64-bit operating system.
- Microsoft Internet Information Server (IIS) must be installed. IIS is the Microsoft web server that listens for HTTP requests by default on port 80, HTTPS requests by default on port 443, and routes BIS requests to the BIS Web Server. BIS cannot be installed unless IIS is already present.

BIS is not supported on Windows Vista, Windows 8, Windows Server 2003 and 2003 R2, and Windows Server 2008 because these operating systems no longer receive security updates and have been superseded by equivalent but superior versions of the Windows operating system. Windows 8.1 is still supported.

When BIS is installed on Windows XP, there are operating system-imposed limits on the number of connections that prevent use as a real-world web server. XP systems, however, may be used for BIS/IIS application development and testing.

## Internet Information Server (IIS)

While Windows XP installs IIS by default, on newer operating systems, IIS must be selected for installation. The default IIS installation also does not include components that BIS requires to install or to serve pages.

In most cases, this means that IIS must be configured before BIS can be installed. There are two ways to configure IIS on Windows:

- Using “**Turn Windows Features On and Off**” application in the “**Programs and Features**” control panel application.
- For advanced users or for batch installation, **IIS-Install.bat** may be run from the BIS installation directory.

### Turn Windows Features On and Off

To ensure the IIS components are installed, use Control Panel or Windows Start to launch the **Programs and Features** applet (on Windows 10, start **Apps and Features**, then click the **Programs and Features** link on that page), and then click **Turn Windows Features** on or off. Expand the following features and ensure that, at a minimum, the options below **in bold** are checked.

For a more complete IIS installation, select the options checked in “*Figure 1. IIS Configuration on Windows 10*” below.

- Internet Information Services
  - Web Management Tools
    - IIS Management Console
  - World Wide Web Services
    - Application Development Features
      - ISAPI Extensions
      - ISAPI Filters
    - Common HTTP Features
      - Default Document
      - Directory Browsing
      - HTTP Errors
      - HTTP Redirection
      - Static Content
    - Health and Diagnostics
      - HTTP Logging
      - Logging Tools
      - Request Monitor
    - Security
      - Basic Authentication
      - Request Filtering
      - Windows Authentication

In the list above, the bold options are the very minimal set required to run BIS, but are not sufficient to run the BIS samples. For example, server administration must be performed using the command line unless **IIS Management Console** is installed, static HTML pages cannot be served unless **Static Content** is selected, and IIS logging/status is not enabled unless **HTTP Logging** is checked.

It is therefore recommended that all of the above options be checked. Note that other features may also be required, depending on the workload.

To enable all salient IIS features, select the option on the right.

Note that **IIS 6 Management Compatibility** is no longer a prerequisite on IIS version 7 on Windows 7 and later.

Tip: as a shortcut, checking the most recent version of **ASP.NET** that is available on the server will select the other required options and allow **SAMPLE4** to run.

Once configuration is complete, close the Internet Information Server (IIS) Manager window, and reboot if required.

### Install-IIS.bat

IIS can also be installed and configured from the command line using the Windows servicing infrastructure. A Windows command batch file named "**Install-IIS.bat**" is included on the BIS distribution media in the "**SupportTools**" directory, and is also available on the Start menu as "**Configure IIS**". When run, this program will install and configure IIS with the features required to run both BIS itself and the BIS samples.

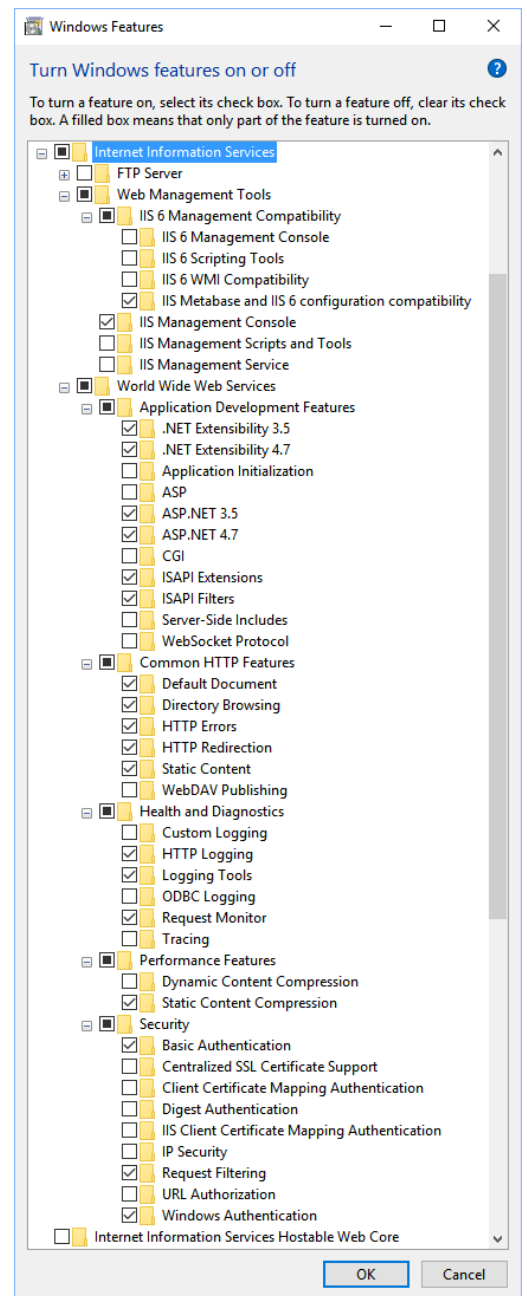


Figure 1. IIS Configuration on Windows 10

## Electronic Product Delivery

All BIS orders generate an **Electronic Product Delivery** (EPD) email that contains links to download the product. It also contains a link to download the product's **License Certificate** (also called the **License File**) for the order, which will be necessary to install the product. Finally, there are instructions about how to decompress the download file and begin the installation. This section will elaborate on the process of downloading the order and preparing to install the product.

All EDP orders contain links to download the product as a CD-ROM image, in the form of a compressed **.iso** file, and to download a smaller installation, in the form of a self-extracting compressed file. And you can also elect to have a physical CD-ROM shipped to you. (You can also use a CD-RW drive to create your own physical CD-ROM using the **.iso** file, if you do not wish to wait for it to be shipped.) The CD-ROM (both **.iso** and physical) contains installation files for all the supported platforms. The smaller self-extracting compressed file version contains only the installation purchased by the order.

(Although using the CD-ROM image is not common, this section includes a description, for sake of completeness.)

The process begins with the arrival of a Micro Focus Electronic Product Delivery email which was generated when your order was complete. There is a link in this email on which to click to browse to the Electronic Product Delivery website. Once you have clicked on that link, and the login page has appeared in your browser, login with your Micro Focus account. There will be an individual **Invoice** line for each item in your order. Locate the invoice line for the Xcentrisity Business Information Server being installed, and click on the + in the left hand column. The invoice line will expand, displaying three tabs: **Software/Licenses**, **Documentation**, and **Legal Information**, with **Legal Information** selected. After you review the **End User License Agreement** in the **Legal Information** tab, click on the checkbox in Step 2 at the beginning of the email. (This is necessary to acknowledge the acceptance of the **End User License Agreement**. You will not be able to proceed until the checkbox has been checked.) Next, select the **Software/License** tab and click on the + to the left of the serial number. You will then be presented with the lines for downloading the complete CD-ROM image (ISO), for downloading a smaller self-extracting installation file, and for downloading the license key.

At a minimum, click on the “here” in “Please click here to download your license key” to obtain the License Certificate file. This will download the certificate file to your browser's download directory with the name **liant-xx-nnnn-nnnnn-IDnnnnnn.lic**. Copy this file to a safe place in case you need to install the product again, and place it in an easily accessible location on the target machine.

The next two sections deal with downloading, decompressing and installing the desired installation media.

### Installing CD-ROM Media

If you elected to receive or create physical media, insert the media into the machine's CD-ROM drive and close the drive. Windows will automatically detect the media's presence and mount it. If the machine is configured for AutoPlay, the **RM-Install** program will begin running and start the installation. If the machine is not configured for AutoPlay, open a Windows Explorer window. In the left hand pane, under Computer, locate the entry for the CD-ROM drive (it should have the volume name **RMCOBOL12xxBIS**), and right-click on it. In the pop-up menu, select **RM-Install**. Proceed to the **Install BIS on Windows** section below.

If you elected to download the compressed ISO file, it will be compressed using *gzip* and will need to be decompressed before installation, although the Chrome browser may decompress it automatically during the download. (Click on the **Documentation** tab in your EDP order to obtain up to date details on this process. Use the “Installation Guide to Installing an ISO Image” instructions.) The downloaded file will have a name similar to **rmcobol12xx\_bis.igz**.

**Note:** The following instructions assume that the *gzip* utility has been installed on the machine and is in your PATH. (If the following instructions are unclear to you, please use the Installing from Self-Extracting Executable option below.)

From the Start menu, open a Command Prompt window, change directory to the directory where the **igz** was downloaded, and rename the file's extension from **igz** to **iso.gz**.

```
rename rmcobol12xx_bis.igz rmcobol12xx_bis.iso.gz
```

Then decompress the file with the command:

```
gunzip rmcobol12xx_bis.iso.gz
```

If this command results in an error, then the **igz** file has already been decompressed by the browser, in which case, all that needs to be done is rename the file without the **.gz** extension.

```
ren rmcobol12xx_bis.iso.gz rmcobol12xx_bis.iso
```

An ISO file is useful for burning a CD with BIS installation. Use the ISO image burning feature included with Windows 10 or later, or third-party CD-ROM Burning software, such as Nero (<http://www.nero.com>) or Roxio's Easy CD Creator (<http://www.roxio.com>), to create physical media.

On Windows 10 and later, to create physical media, open a file explorer window on the folder that contains the **.iso** image file, then right-click on the file and select "Burn Disk Image" from the menu and follow the directions. (Note that "Burn Disk Image" is not the same as burning a CD that contains the **.iso** as a file.)

After you create a CD, follow the instructions at the beginning of this section for how to start the installation.

Alternatively, on Windows 10, ISO files can also be mounted as a virtual CD. Simply open Windows Explorer, navigate to the directory containing the ISO file. Right click on the ISO file and select **Mount** from the pop-up menu. This may be done with Windows 7, but additional software will need to be installed first, such as *Virtual CloneDrive*.

After the ISO file has been mounted, follow the instructions at the beginning of this section for how to start the installation.

## Installing from Self-Extracting Executable

The most common case is to use the **.exe** file download. When downloaded, the file will have a name similar to **rmcobol12xx\_bis\_win\_zz.exe**. (Where **12xx** is the version of BIS and **zz** is either 32 or 64, depending on if the installation is for a 32-bit or 64-bit machine.) If it is not there already, copy the **.exe** file to the target Windows machine. Then double click on the **.exe** to start the installation. The file will be decompressed into a temporary directory on the target machine, and the **RM-Install** program automatically started. Proceed to the **Installing BIS on Windows** section below.

## Installing BIS on Windows

**Note:** You may also automate the installation program for Business Information Server, which allows the installation of Business Information Server to be incorporated with the installation of your application. For more information, navigate to <https://www.microfocus.com/documentation/rm-cobol>, click on your

version (or the latest version), find the *Windows Installer Guide*, and refer to the “*Xcentrisity Business Information Server (BIS) Installation Details*” section.

At this point in the installation:

- The License Certificate file has been downloaded from the EDP order and is available on the target machine.
- You have the CD-ROM (or ISO file) mounted and RM-Install is running, or you have executed the Self-Extracting Executable, it has extracted itself into a temporary directory, and **RM-Install** is running.

Next, follow the instructions below to install the Business Information Server software.

1. Follow the instructions presented on the pages of **RM-Install** and press the **Next** or **Back** buttons to advance through the various pages.
2. On the **Software License Agreement** page, you must click “**I accept the terms in the license agreement**” in order to continue with the installation.
3. On the **Customer Information** page, enter your name and organization. You can also choose whether to install for all users or only for the current user. For BIS, be sure to choose “**Anyone who uses this computer (All Users)**”.
4. On the **License Certificates** page, the license certificate file for the product being installed is displayed. Do one of the following:
  - If the license certificate for Business Information Server is present in the list area, press the **Next** button.
  - If the license certificate for Business Information Server is *not* present in the list area:
    - a. Press the **Add** button.
    - b. In the **Select License Certificates** dialog box, navigate to the directory containing the License Certificate file for Business Information Server and select the filename for the license certificate. (This license file is downloaded from the EDP page for the order.)
    - c. Press the Open button and then press **Next**.
5. On the **Installation Type** page, do one of the following:
  - Select the “**Standard Installation**” option to install immediately all components of all license certificates listed on the **License Certificates** page, using their default settings.
  - Select the “**Custom Installation**” option to select specific components of the license certificates listed on the **License Certificates** page, and install them, changing their default installation settings, as necessary.
6. Follow the custom installation instructions presented on the remaining pages. On the **Ready to Begin Installations** page, press the **Install** button.
7. When the installation for the Business Information Server component starts, follow the additional instructions presented by the installation program. (See **Custom Installation Details** below.) When either the standard or custom is complete, click **Finished** on the **Installation Status** page.

## Custom Installation Details

If a Custom Installation is selected, the following additional installation pages will appear.

### Custom Setup

This page allows you to choose the features that will be installed on your server.

There are several features that may be installed:

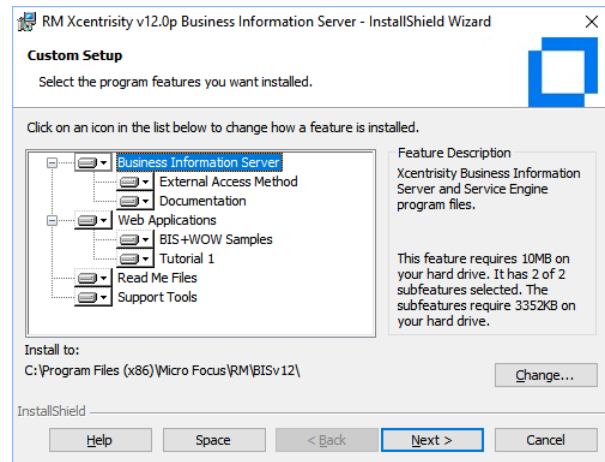
1. **Business Information Server** includes the **BIS Request Handler** and the **Service Engine**. These are required features and cannot be de-selected.
2. **Web Applications** is optional and includes several sub-features. The main Web Applications samples are installed by default into a newly created IIS application directory named **XBIS12**. These sample web applications are installed by default because they can be used to quickly verify that the BIS Request Handler is operational.

The sub-features consist of various samples.

3. **Read Me** Files include late-breaking information about Business Information Server.
4. **Support Tools** consists of programs and scripts that are installed into the **SupportTools** subdirectory. These should be used under the guidance of Micro Focus technical support.

Note that you can also:

- Change the installation location for a feature or sub-feature by pressing the **Change** button.
- Press the **Space** button to see an overview of the amount of space available on your volumes.
- Once you have selected the features that you wish to install, press **Next**.



*Figure 2. Custom Setup*



## Change Program Menu

This page allows you to change where the program menu shortcuts are installed. Select an existing menu from the **Existing Menus** list. Enter a new menu name into the **Program Menu** field. The default name is “**RM BIS v12**”.

Once you have entered the **Program Menu** that you wish, press **Next**.

## Logon Information

This page selects the **Windows logon ID** that will be used to run BIS services.

The account chosen must have sufficient privileges to access the **.COB** program files, and the data files that are required to service BIS requests.

In this page, you must do the following:

- Enter the user name (logon ID) and password that the BIS Service Engine should impersonate when running programs. The installer will validate the user name and password.
- To search for an existing user, press the **Browse** button. Enter the name of a domain, server, or press the browse button to select from a list. Then enter a user name or press the browse button to select from a list. (In a large domain, compiling the list may take some time.) Finally, press the **Ok** button to paste the result into the User Name field.
- To create a new user, press the **Create...** button. Select a domain or server, a Group, and specify a user name to create along with a password.

Once the **User Name** and **Password** have been selected, press **Next**. The installer will validate the information and report an error if the logon ID or the password is invalid.

**Note:** The logon ID can be changed at any time on the server—reinstallation is not required. See “Configuring BIS/IIS after Installation” on page 109 for more information.

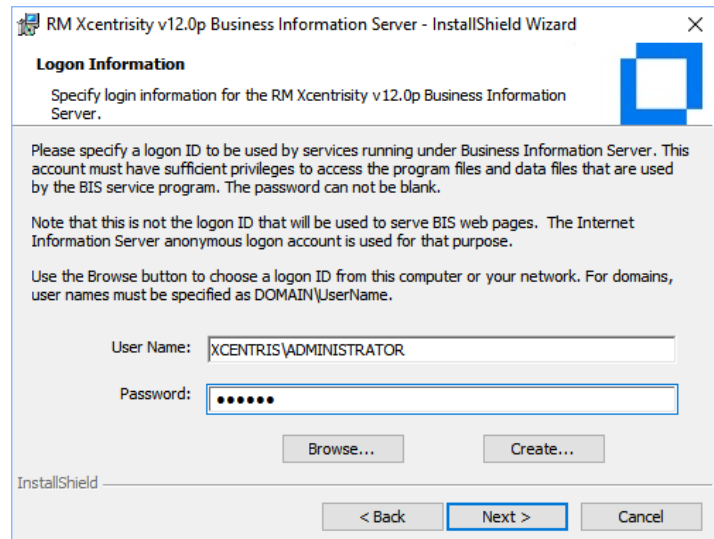


Figure 3. The Installation "Logon Information" Dialog

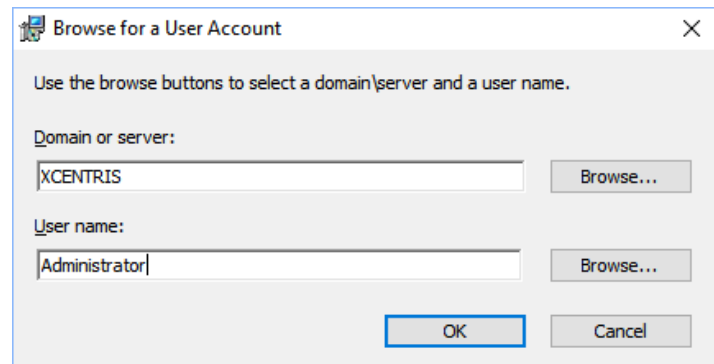


Figure 4. Installation "Browse for User" Dialog Box

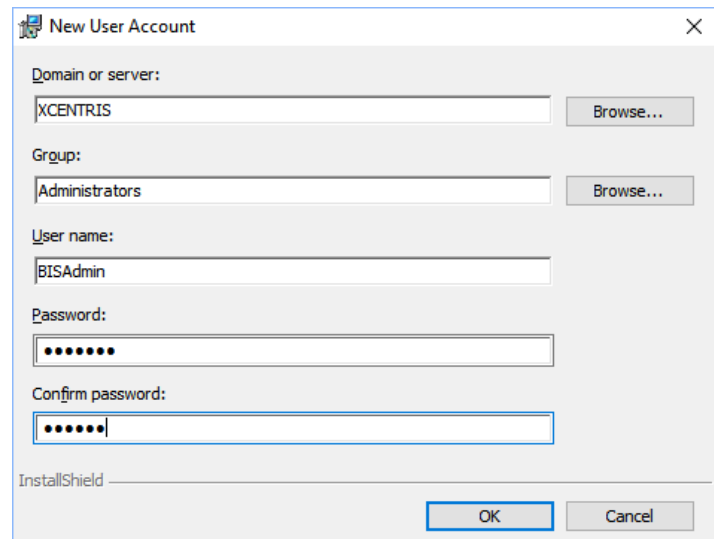


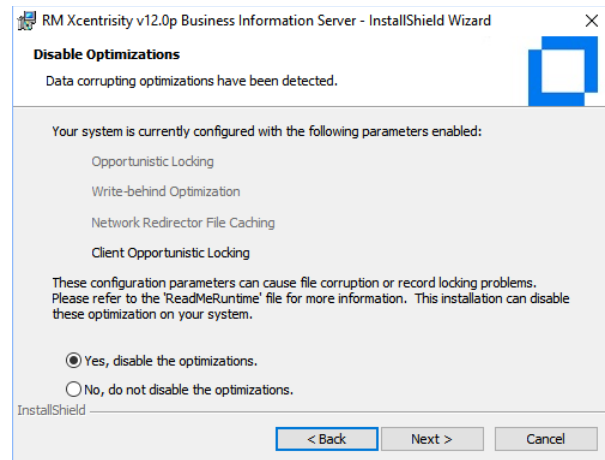
Figure 5. The Installation "Create New User" Dialog



## Disable Optimizations

This page allows you to disable dangerous disk optimizations on the Windows Server where you are installing the BIS service engine.

In general, it is not necessary or desirable to disable the optimizations on versions of Windows newer than Windows XP, Windows 2003, or 2003R2 server. However, if the BIS service engine will be accessing data hosted on one of these systems over a Windows network, then the optimizations should be disabled.



## Ready to Install the Program

At this point, the BIS installer has all the information that is required to install BIS. If you are satisfied with the preceding choices, press **Install** to begin the installation.

## Installation Complete

If you see a dialog box stating “Micro Focus Business Information Server has been successfully installed”, congratulations! You are ready to test the installation. If you receive another message, please see “BIS Troubleshooting Tips” on page 107 for assistance.

---

# Installation on UNIX

This section details installation of Business Information Server on UNIX. Windows installation is described in “Installation on Windows” on page 3.

## Prerequisites

BIS on UNIX has the following requirements:

- BIS on UNIX requires a host machine running one of the operating systems below:
  - A host machine running the Linux operating system, with a 2.6.18 kernel or later. Both 32-bit and 64-bit are supported.
  - A host machine running the AIX operating system version 7.2 and later. Both 32-bit and 64-bit are supported.
  - A host machine running Sun Solaris SPARC version 5.10 and later. Both 32-bit and 64-bit are supported.
  - A host machine running Sun Solaris for Intel, version 5.10 and later. 32-bit only is supported.
  - A host machine running HP-UX for PA-RISC, version 11.31 and later. Both 32-bit and 64-bit are supported.
- The Apache 2.4 web server must be installed. (Although Apache 2.2 is still supported on 32-bit AIX, 32-bit Solaris Intel, 32-bit Solaris SPARC, 32-bit Linux, as well as 64-bit Linux, use of this version of Apache is strongly discouraged.) Note that BIS does not support Apache 1.3 and should not be expected to work properly on that platform. Apache normally listens for HTTP requests on port 80 and for HTTPS requests 443, and when properly configured, routes BIS

requests to the BIS Request Handler. BIS will not install unless Apache is already present. On many versions of UNIX, Apache is available in a binary format that may be installed from the operating system's installation media or downloaded from the operating system's supplier. In these cases, follow the supplier's instructions for installing Apache. If your system does not have Apache installed, or you wish to download and install the latest version, go to <http://httpd.apache.org/docs/2.4/install.html> for more information.

- You will need a UNIX account under which to run BIS. This account must have rights to access the COBOL data files of the BIS application. If such an account does not already exist, one must be created.

## Electronic Product Delivery

All BIS orders generate an Electronic Product Delivery (EPD) email that contains links to download the product. It also contains a link to download the product's License Certificate (also called the license file) for the order, which will be necessary to install the product. Finally, there are instructions about how to decompress the download file and begin the installation. This section will elaborate on the process of downloading the order and preparing to install the product.

All BIS EDP orders contain links to download the product as a CD-ROM image, in the form of a compressed **.iso** file, and to download a smaller installation, in the form of a compressed **.tar** file. And you can also elect to have a physical CD-ROM shipped to you. (You can also use a CD-ROM burner drive to create your own physical CD-ROM using the **.iso** file, if you do not wish to wait for it to be shipped.) The CD-ROM (both **.iso** and physical) contains installation files for all the supported platforms. The smaller **.tar** file version contains the installation for only the platform purchased by the order.

(Although using the CD-ROM image is not common, this section will cover it, for sake of completeness.)

The process begins with the arrival of a Micro Focus Electronic Product Delivery email which was generated when your order was complete. There is a link in this email on which to click to browse to the Electronic Product Delivery website. Once you have clicked on that link, and the login page has appeared in your browser, login with your Micro Focus account. There will be an individual Invoice line for each item in your order. Locate the invoice line for the Xcentricity Business Information Server being installed, and click on the **+** in the left hand column. The invoice line will expand, displaying three tabs:

**Software/Licenses**, **Documentation**, and **Legal Information**, with **Legal Information** selected. After you review the **End User License Agreement** in the **Legal Information** tab, click on the checkbox in Step 2 at the beginning of the email. (This is necessary to acknowledge the acceptance of the **End User License Agreement**. You will not be able to proceed until the checkbox has been checked.) Next, select the **Software/License** tab and click on the **+** to the left of the serial number. You will then be presented with the lines for downloading the complete CD-ROM image (ISO), for downloading a smaller **.tar** installation file, and for downloading the license key.

At a minimum, click on the "here" in "Please click here to download your license key" to obtain the License Certificate file. This will download the certificate file on your browser's download directory with the name **liant-xx-nnnn-nnnnn-IDnnnnnn.lic**. Copy this file to a safe place in case you need to install the product again, copy it to the UNIX machine's **/tmp** directory, and give it the name **liant.lic**.

The next two sections deal with downloading, decompressing and installing the desired installation media.

### Installing CD-ROM Media

If you elected to receive physical media, insert the media into the machine's CD-ROM drive and close the drive. Most operating systems will automatically detect the media's presence and mount it. If not, follow your OS's instructions for mounting the drive. Once mounted, start a terminal session as root, and change directory to the CD-ROM's mount point. Then proceed to the **Installing BIS on UNIX** section below.

If you elected to download the compressed ISO file, it will be compressed using *gzip* and will need to be decompressed before installation, although the Chrome browser may decompress it automatically. (Click on the **Documentation** tab in your EDP order to obtain up to date details on this process. Use the “Installation Guide to Installing an ISO Image” instructions.) The downloaded file will have a name similar to **rmcobol12xx\_bis.igz**. If it is not there already, copy the **igz** file to the target UNIX machine and rename it with the following command:

```
mv rmcobol12xx_bis.igz rmcobol12xx_bis.iso.gz
```

Then decompress it with the command:

```
gunzip rmcobol12xx_bis.iso.gz
```

If this command results in an error, then the **igz** file has already been decompressed by the browser, in which case, all that needs to be done is rename the file without the **.gz** extension.

```
mv rmcobol12xx_bis.iso.gz rmcobol12xx_bis.iso
```

An ISO file is useful for burning a CD with BIS installation. Also, ISO files can also be mounted as a virtual CD on a virtual machine running the target UNIX operating system. In either case, once the CD is mounted, start a terminal session as root, and change directory to the CD-ROM’s mount point. Then proceed to the “Installing BIS on UNIX” section below.

## Installing Compressed tar Media

The most common case is to use the **.tar** file download. It will be compressed using *gzip* and will need to be decompressed before installation. (Click on the Documentation tab in your EDP order to obtain up to date details on this process. Use the “Installation Guide to Installing a *gunzip* tar file” instructions.) The downloaded file will have a name similar to **rmcobol12xx\_bis\_systemname\_zz.tgz**. (Where **12xx** is the version of BIS, **systemname** is the name of the operating system and **zz** is either 32 or 64, depending on if the installation is for a 32-bit or 64-bit machine.) If it is not there already, copy the downloaded **tgz** file to the target UNIX machine and place it into an empty directory. On many UNIX machines, the tar command already knows how to extract from a **tgz** file with the command:

```
tar xvf rmcobol12xx_bis_systemname_zz.tgz
```

If the UNIX machine’s tar command does not understand a **.tgz** file, then decompress the **.tgz** file with the command:

```
gunzip rmcobol12xx_bis_systemname_zz.tgz
```

This will result in a file named **rmcobol12xx\_bis\_systemname\_zz.tar**. Now, extract it with the command:

```
tar rmcobol12xx_bis_systemname_zz.tar
```

Once the .tar file has been extracted, start a terminal session as root, and change directory to the directory in which the .tar file was extracted. Then, proceed to the **Installing BIS on UNIX** section below.

## Installing BIS on UNIX

At this point in the installation:

- The License Certificate file has been downloaded from the EDP order and is available on the target machine, preferably in the **/tmp** directory with the name **liant.lic**.
- You have a user account under which BIS should run.
- Also, you either have the CD-ROM mounted or the tar extracted, you're logged in with root privileges, and the current directory is either the CD mount point, or the directory into which the tar file was extracted. It will contain a file named **install.sh**.

Execute the **install.sh** command with the following command:

```
sh ./install.sh
```

During the installation, the following messages prompts will be presented. For each prompt, the default will be displayed in square brackets and the end of the prompt. Press the **Enter** key to accept the prompt's default. Otherwise, type the desired value for the prompt and press **Enter**.

Be sure to select the correct Apache binary such as **/usr/local/apache2** (that is, not one from a source directory).

### Operating System and User Identification

When the UNIX BIS installation script begins, it identifies the operating system and verifies that the current user is root. The following messages are displayed:

```
Operating system detected: Large File Linux (Intel)  
Root: Yes [root/0]
```

### Specifying the License Certificate file

The License Certificate license file contains information which signifies that you have permission from Micro Focus to install this product.

The installation script will prompt for its location:

```
Full name of the license file? [/tmp/liant.lic]
```

Be sure to enter the **complete** pathname of the license certificate in order to proceed with the installation.

## Micro Focus End User License Agreement

The Micro Focus License Agreement is displayed using **more** and contains the terms under which you may use this product. Please review these terms carefully and then press **q** to terminate the display of the license. The following prompt will then be displayed:

```
Do you accept this license? [y]:
```

Press **Enter** to signify your acceptance of the terms of the license and the installation will proceed. Type **N** and press **Enter** to stop the installation.

## Locating the Apache Web Server

In order to properly configure the Apache web server and install the BIS Request Handler, it will be necessary to access the web server's installation. Note that this is the directory in which it was installed, not the source directory in which it was built. The installation script will display the following prompt:

```
Use the Apache installed at /usr/local/apache24/bin/httpd? [y]
```

Accept the default if this is the Apache installation in which UNIX BIS is to be installed. Otherwise, enter **N** and the following prompt will be displayed.

```
Specify the directory from which to search for the Apache httpd binary,  
or leave blank to search from /.  
Apache executable or directory:
```

While it is possible to search the entire disk for the Apache installation, it is faster to just enter the name of the Apache installation directory. For example, entering **/usr/local/apache24** results in the following messages:

```
Search [/usr/local/apache24] for httpd binaries, this could take a while.
```

There will be messages displayed as the installation script searches. If an Apache installation can't be located, the following message will be displayed:

```
No httpd binaries found, please specify or install Apache 2 now.
```

And the prompt for the Apache executable or directory will be displayed again.

If one Apache installation is found, a message will be displayed requesting permission to install BIS into it.

```
Use the Apache installed at /usr/local/apache24/bin/httpd? [y]
```

If multiple Apache installations are found, a list will be displayed of the installations:

```
Found [2] Apache binaries:
 1) 2.2.8 (/usr/local/apache22/bin/httpd)
 2) 2.4.10 (/usr/local/apache24/bin/httpd)

Which Apache would you like to use?
```

Enter the list number of the version of Apache you'd like to use.

After the version of Apache is specified, a message will be displayed that gives the complete version of the Apache Web Server in which BIS is being installed.

```
Using [Apache/2.4.10]
```

### Specifying the temporary installation directory

The BIS installation script will need a directory in which it can unpack installation files. This directory may be removed by you following a successful installation. The default for this directory is in the current user's home directory, in a directory named **bis**.

```
Where would you like to copy the installation files?
[/root/bis]:
```

Specify the desired directory and press **Enter**.

```
/root/bis does not exist; create it? [y]:
```

This message is requesting permission to create the directory. Accept the default to give permission to create the directory, or enter **N** to specify a different directory.

**Note:** In order to make the removal of the temporary files easy, specify a new directory for them. So, if you don't receive the "create it?" message, cancel the installation and start again.

If the installation must create the directory, the following message will be displayed:

```
Creating directory /root/bis... Success
```

### Specifying the installation directory

The BIS installation script will prompt for the directory in which to install the Service Engine and samples.

```
Where would you like to install BIS?
[/usr/local/liant/bis]:
```

Specify the desired directory and press **Enter**.

```
/usr/local/liant/bis does not exist; create it? [y]:
```

This message is requesting permission to create the directory. Accept the default to give permission to create the directory, or enter **N** to specify a different directory.

If the installation must create any the directories, the following message will be displayed:

```
Creating directory /usr/local/liant/bis... Success  
Creating directory /usr/local/liant/bis/bin... Success  
Creating directory /usr/local/liant/bis/bin/autoload... Success  
Creating directory /usr/local/liant/bis/xbis... Success
```

### Specifying the BIS working files directory

The BIS installation script will prompt for a directory in which to place its working files, such as logs.

```
Where would you like BIS to put files it creates (logs, socket, etc.)?  
[/var/local/liant/bin]:
```

Press Enter to accept the default or change it to the desired location and press Enter.

```
/var/local/liant/bis does not exist; create it? [y]
```

This message is requesting permission to create the directory. Accept the default to give permission to create the directory, or enter **N** to specify a different directory.

If the installation must create any the directories, the following message will be displayed:

```
Creating directory /var/local... Success  
Creating directory /var/local/liant... Success  
Creating directory /var/local/liant/bis... Success  
Creating directory /usr/local/liant/bis/bin... Success  
Creating directory /usr/local/liant/bis/bin/autoload... Success  
Creating directory /usr/local/liant/bis/SupportTools... Success  
Creating directory /usr/local/liant/bis/xbis... Success  
Creating directory /usr/local/liant/bis/mod_xbis... Success
```

### Configuring the Service Engine options

The installation will display the following prompt to give you the option to modify the default options for the Service Engine's configuration.

```
Do you want to configure BIS Service Engine options? [y]
```

Entering **N** will accept the default options and proceed with the installation. Accepting the default for this prompt will result in the following messages being displayed:

```
Current Service Engine options:
 1 User to run services as? . . . . . bis
 2 Timezone? . . . . . CST06CDT
 3 Default inactivity timeout, in seconds? 600
 4 Default service timeout, in seconds? . 30
 5 Maximum number of service processes? . 100
 6 Maximum number of request handler sessions? 200
 7 Name of temp directory? . . . . . /var/local/liant/bis
 8 Name of log files directory? . . . . none
 X Done editing the Service Engine options
```

The following prompt will then be displayed:

```
If you would like to change an option, enter its number. Press Enter to
redisplay the list of options. Otherwise, enter 'X' to continue [R]:
```

If there is an option that you wish to change, enter its number and press **Enter**. Unless the UNIX account under which BIS is to run is named **bis**, enter **1**, which will result in the following prompt:

```
User to run services as? [bis]
```

Enter the new desired value or accept the default. See “Service Engine Configuration” on page 119, for more information about configuring the BIS Service Engine. The prompt requesting the option to change will be displayed again. Enter **R** or just press **Enter** to review your changes. Enter a number to make more changes. Enter **X** to save your changes and proceed with the installation.

## Installing BIS Samples

The installation script will display the following prompt:

```
Do you want to install BIS samples? [y]
```

Accept the default to install the BIS samples. Enter **N** to bypass their installation.

## Specifying the verbosity of the Installation messages

The BIS installation will display the following prompt:

```
Do you want brief install messages? [y]
```

Accept the default to have only summary messages displayed during the installation. Enter **N** to request a more verbose installation.



## Perform installation

The installation script will now begin the installation. During the install, it may display the following prompt:

```
Warning! /usr/local/apache24/modules/mod_xbis24.so already exists, overwrite  
this file? [Y/n/b]
```

Accept the default to overwrite the file. Enter **N** to not overwrite the file and stop the installation. Enter **B** to bypass the installation of this file.

## Installation complete

At the end of a successful installation, a message similar to the following is displayed:

```
Successfully installed BIS on this system.  
Now you must either reboot or start BIS.  
  
To start the service engine:  
    /etc/init.d/xbisengd start  
  
To start or restart Apache:  
    /usr/local/apache24/bin/apachectl graceful
```

See the sections below for more instructions on starting the BIS Service Engine and Request Handler.

## Configuring Apache

If your version of the Apache installation has a **conf.d** directory, verify that the **mod\_xbis.conf** configuration file was successfully placed into this directory. If your version of Apache does not use a **conf.d** directory, verify that the installation edited the main **httpd.conf** configuration file to include the following line:

```
Include conf/mod_xbis.conf
```

Any changes to the configuration of the Apache portion of BIS should be made to the **mod\_xbis.conf** configuration file.

At this point refer to the appendix chapter “Configuring Apache” on page 119 for more information on configuring the Apache Request Handler.

## Starting Apache and BIS

Use the following command to start the BIS service engine on systems other than AIX and HP-UX:

```
/etc/init.d/xbisengd start
```

Use the following command to start the BIS service engine on HP-UX:

```
/sbin/init.d/xbisengd start
```

Use the following command to start the BIS Service Engine on AIX:

```
startsrc -g xbis
```

Use the following command to start or restart the Apache server. Use the actual location of Apache if it is different from this.

```
/usr/local/apache2/bin/apachectl graceful
```

---

## Testing the Installation

The samples are the best way to verify that BIS was successfully installed. There are two ways to launch the samples on the server:

- For BIS installed on a Windows system, click **Start**→ **RM BIS v12**→ **Xcentrisity BIS Samples**.
- For BIS installed on either Windows or UNIX, start a web browser and enter the following URL:

```
http://127.0.0.1/xbis12/samples/default.srf
```

**127.0.0.1** is the loopback address that refers to the current machine. If you installed BIS on a different machine, replace this address with the name of the Windows or UNIX machine running the BIS server on IIS or Apache. If the web browser is running on the same machine as IIS or Apache, then **localhost** refers to the current machine and may be used as the host name instead of **127.0.0.1**.

You should see the “**Welcome to the BIS Samples**” page, as illustrated in Figure 1-6.

As an additional test, click on the link to the first sample, **verify**. The BIS Verify sample page will be displayed, which is running the **VERIFYBIS** service program. Follow the instructions on this page to complete the verification.

---

## Uninstalling BIS for IIS

To uninstall BIS/IIS, use either the **Add or Remove Programs** (on Windows XP) or the **Programs and Features** (on Windows 7 and later) control panel applet:

- Click **Start→Control Panel** and select either **Add or Remove Programs** or **Programs and Features**.
- Click on the version of **Xcentrisity Business Information Server** that you wish to remove.
- Click the **Remove** button.

If you restart the **Business Information Server** installation program and BIS is already installed, the installer will offer to **Modify**, **Repair**, or **Remove** the server. Selecting **Remove** is equivalent to removing BIS with the **Add or Remove Programs** control panel applet.

## Removing Only the Web Application Samples

To remove the samples from a Windows IIS web site after installation, log onto the server and then:

1. Click **Start → Control Panel → Administrative Tools → Internet Information Services**.
2. Expand **Web Sites**, then **Default Web Site** (or your web site, if renamed).
3. Right-click on **XBIS12** and select **Delete** from the popup menu.

On IIS version 7 and later (all Windows versions newer than XP), deleting the web virtual directory/application will not remove the physical folder. To complete the removal, delete the **XBIS12** physical directory (usually found under **c:\inetpub\wwwroot**) using Windows Explorer or the **DEL /S** command on the Windows command line. Administrative privileges may be required.

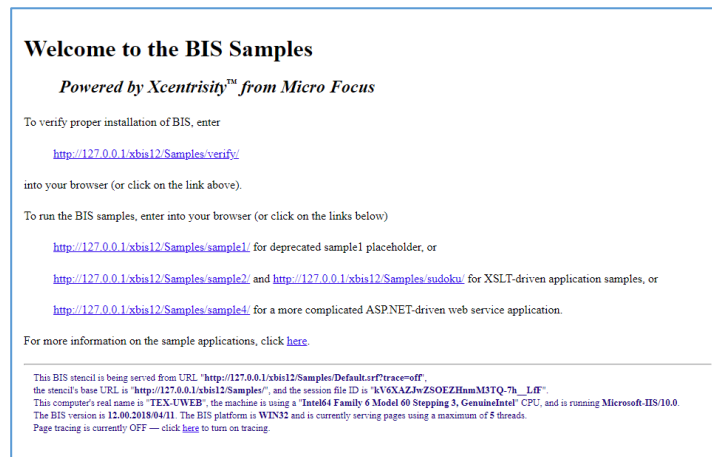


Figure 1-6. The BIS Samples Page.

## Uninstalling BIS for UNIX

To uninstall BIS for UNIX, log in as root, and perform the following steps:

1. Stop the currently running Service Engine by executing one of the following commands:

- On AIX:

```
stopsrc -g xbis
```

- On HP-UX:

```
/sbin/init.d/xbisengd stop
```

- On all other UNIX operating systems:

```
/etc/init.d/xbisengd stop
```

2. Change directory to the directory in which BIS was installed:

```
cd /usr/local/liant/bis
```

3. Execute the following command:

```
sh ./uninstall.sh
```

## Chapter 2. Using the Business Information Server

BIS is a web server extension, providing additional capabilities—namely, the ability to render and serve **.srf** stencil files, and the ability to quickly make both new COBOL programs and legacy COBOL programs available on the Web.

In order to understand how COBOL programs and the Web interoperate, some web concepts must also be understood. These are described in the next sections.

---

### Web Protocols: Requests and Responses

Web clients and servers communicate by using a request/response protocol called **HTTP**, which is an acronym for **Hypertext Transfer Protocol**. HTTP includes two methods for retrieving and manipulating data: **GET** and **POST**.

<b>GET</b>	Retrieves data from the server. The target of the request (referred to as a <b>resource</b> ) is specified as a <b>URI (Uniform Resource Identifier)</b> . This is usually (but not always) an absolute reference to a file on the server and is referred to as a <b>URL (Uniform Resource Locator)</b> when used in this context. Additional parameters, called <b>Query Parameters</b> , can also be specified.
<b>POST</b>	Posts data back to the server. In addition to a URL and query parameters, a POST request includes a <b>payload</b> . The payload is usually form data, the aggregated contents of the various fields (also called <b>controls</b> ) that were in the response.

There are other methods (**HEAD**, **PUT**, **DEBUG**), but the above two are the ones used by BIS.

The general form of a URL is familiar to anyone who has used a web browser:

```
http[s]:// host [:port] / [absolute_path [ ? query_parameters ] ]
```

where:

<b>http://</b> <b>https://</b>	Indicates that the <b>Hypertext Transfer Protocol</b> is being used to make the request. In a URI, this is referred to as the <b>scheme</b> . BIS supports two schemes: <b>http</b> and <b>https</b> (secure http).
<b>host</b>	The name or location of the computer that will receive the request.
<b>port</b>	An optional integer that specifies the port on the server that will receive the request. If omitted, this defaults to “80” for the <b>http</b> scheme, and “443” for the <b>https</b> scheme.  The combination of <b>host</b> and <b>port</b> (along with “host headers”, which is a scheme that allows a single host to serve multiple domains) specifies a unique web server.

<b>absolute_path</b>	The absolute location of the resource being requested on the host. This is frequently (but not always) the name of a file. Note that the base directory is not the root directory of the file system, but the root directory of the web tree that is being served by the host on the specified port.
<b>query_parameters</b>	Optional parameters that are made available to the web server and to the service program.

To summarize, a client (web browser or program using SOAP) sends an HTTP request to the web server. The request contains a method (GET or POST), a URI that specifies the file or resource that is being requested, optional query parameters, and optional form data (if a POST).

If the resource being requested is a resource that is associated with BIS by the web server, for example, a **.srf** file (sometimes also called a “stencil”), then all of the above information (request type, URI, query parameters, form data) is passed to the BIS Request Handler, which then renders (that is, executes) the tags in that file. If BIS renders a **StartService** tag, a COBOL service program is started. If BIS subsequently renders an **XMLExchange** tag, the request is sent to the COBOL program, and the COBOL program’s response is rendered into the HTTP response text that is returned to the user agent (browser, SOAP consumer, etc.).

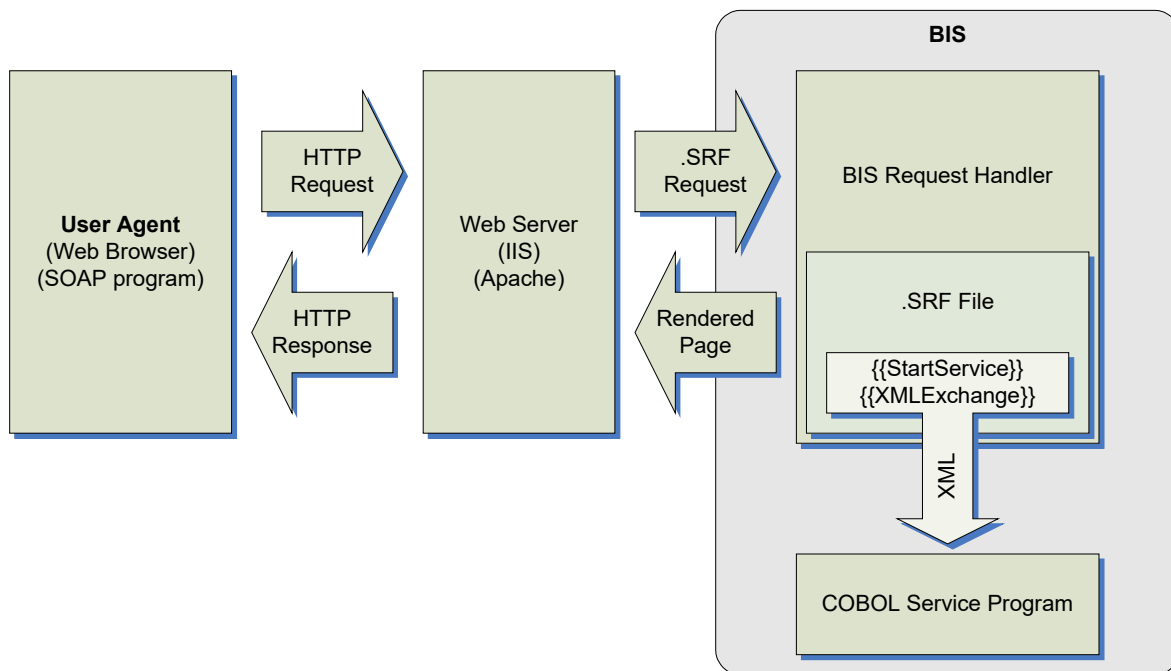


Figure 2-1. BIS Block Diagram.

## Sessions

HTTP requests are innately “stateless” — the web server does not provide any built-in mechanism to group consecutive requests together. However, once a service program is started, subsequent requests from the same user agent should be routed to the same service program. To make this possible, BIS creates a container on the server called a **Session**. A session is automatically created when a request first arrives from a particular user agent. The Session contains information that BIS uses to recognize requests as belonging to a sequence, and associates requests with persistent data and services.

A Session is automatically created when BIS receives a request that cannot be associated with an already existing session. Once a Session is created, it survives until:

1. The Session is complete: this can be requested by either the service program or by a special handler tag—the **SessionComplete** tag.
2. A predetermined but adjustable amount of time passes without an additional request from the user agent—referred to as the **Inactivity Timeout** period.

Active Sessions use server resources, and if a service program is waiting for a request, this can be significant. Because site visitors may simply close the browser window without performing any action that indicates that they are finished with the application, BIS will free those sessions and resources after a predetermined period of inactivity.

---

## Tracking Sessions

There are three common ways for servers to implement session tracking:

1. A unique ID may be placed into the URL of subsequent pages.
2. A unique ID may be placed in the query parameter of subsequent pages.
3. The server sends a “cookie” that contains a unique identifier with the response. The user agent saves the cookie, and then includes the cookie with the next request.

BIS uses the third method, cookies, to identify sessions.

---

## Cookies

When a client sends a request to the server, by default, BIS looks for a **Cookie** in the request to locate a session created by a previous request from the same user agent. The cookie contains a specially named value that BIS includes with each response from the server to the user agent, and the user agent will normally send the cookie in the next request to the same web server. When BIS receives a request containing the specially-named cookie, it uses the contents of the cookie to search for an existing session. If the session is located, BIS services the request using that session. If the session is not located, a new session is created for the request and the new session’s cookie is included with the response.

The disadvantage of using cookies is that some user agents purposely disable cookies for privacy reasons: unscrupulous web sites can use permanent cookies to track the user agent’s repeat visits over a long period of time. BIS uses only session cookies—a type of cookie that is automatically deleted when the user agent terminates—to avoid these concerns. It is also possible to configure a user agent to ignore session cookies. This will, unfortunately, prevent BIS applications from working with that user agent.

---

## The Session Root Path and Session Scope

As stated above, when a session is created, the BIS server will include a **Session Cookie** that uniquely identifies the session with the response. The user agent saves the cookie, and includes the cookie with subsequent requests. The BIS server uses the cookie to associate requests with sessions.

Cookies are shared by all instances of a particular user agent. This makes it difficult for a particular user agent to gain access to more than one session on the server—if multiple browser windows on the same client machine request the same page, each window will send the same cookie, BIS will see the requests as originating in a single window, and will not create additional sessions. Multiple sessions are desirable if the end user wishes to run multiple BIS applications hosted by the same server in separate windows, or

the application developer wishes to include multiple applications in a browser window by using HTML **<OBJECT>** or **<IFRAME>** tags.

Fortunately, there is a solution: the scope of a particular session cookie can be restricted to particular URL paths on the server. The user agent will only include the session cookie with a request URL that is as specific as, or more specific than the path that was specified when the cookie was stored in the user agent.

By default, the BIS session cookie uses the path of the URL that caused the session to be created. This can be overridden with the **SessionParms(Path)** tag at the time when the session is created.

Please see “The `{{SessionParms}}` Tag” on page 36 for more information.

---

## Timeouts

BIS supports two kinds of timeouts:

- Session Inactivity Timeouts
- Service Timeouts

These timeouts are described in detail in the following sections.

### Session Inactivity Timeout

Session inactivity timeouts are used to detect abandoned sessions and free server resources by deleting those sessions. For example, each active service program counts against the BIS Service Engine use count. If abandoned sessions are allowed to idle for an excessively long time, there may be a number of idle service programs consuming resources that could be recycled to handle new requests. The purpose of the session inactivity timeout is to free those resources.

To detect abandoned sessions, BIS stores the time the most recent request was received in the session. At various intervals, BIS determines if a session has been inactive longer than the timeout period set for the session. If so, the session is released.

There are two ways to indicate proactively that a session is complete and may be released:

- On the page: embed the **SessionComplete** tag.
- From a service program: call **B\$WriteResponse** and specify **BIS-Response-SessionComplete** as the optional parameter.

In all cases, the session is not released until it is inactive; that is, all services within the session have ended and there are no active requests using the session.

### Setting the Session Inactivity Timeout

The default inactivity timeout value for a BIS session is 600 seconds (10 minutes). However, the inactivity timeout value can be changed in several ways:

- The timeout value may be globally set for all BIS sessions on the server with the **BIS\_SESSION\_INACTIVITY\_TIMEOUT** environment variable on BIS/IIS and the Service Engine **InactivityTimeout** option keyword on BIS/Apache. The value must be specified in seconds.

For example, on Windows:



```
BIS_SESSION_INACTIVITY_TIMEOUT=600
```

This environment variable sets the timeout to 600 seconds (10 minutes). See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows, and “Service Engine Configuration” on page 119 for information on configuring BIS on UNIX.

- The timeout for the current session may be set from within a `.srf` file by using the `SessionParms(InactivityTimeout=seconds)` tag (see Section 0 on page 36). Note that this parameter is specified in seconds and takes effect as soon as the tag is rendered.
- The service program may set the timeout with the `B$SetInactivityTimeout(seconds)` call. Note that this call does not take effect until the next time the service program interacts with the BIS Request Handler; that is, the service calls `B$ReadRequest` or `B$Exchange` and BIS renders an `XMLExchange` tag.

Of these, the `BIS_SESSION_INACTIVITY_TIMEOUT` variable and `InactivityTimeout` option keyword have the lowest priority and are overridden by either `SessionParms` tag or the `B$SetInactivityTimeout` call. The largest value that the session inactivity timeout interval can be set to is 1,000,000 seconds (about 11 days).

---

## Service Timeouts

When the BIS Request Handler passes a request to a service program, page rendering is suspended while the program performs the required processing. The service timeout value sets an upper bound on the amount of time that page rendering will be suspended.

The default service timeout is 30 seconds. This value can be changed in the following ways:

- The service timeout value may be globally set for all BIS sessions on the server with the `BIS_SERVICE_TIMEOUT` environment variable on BIS/IIS and with a Service Engine `ServiceTimeout` option keyword on BIS/Apache. The value must be specified in seconds. For example, on BIS/IIS:

```
BIS_SERVICE_TIMEOUT=30
```

This environment variable sets the timeout to 30 seconds. See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows and “Service Engine Configuration” on page 119 for information on configuring BIS on UNIX.

- The timeout may be set from within a `.srf` file by using the `SessionParms(ServiceTimeout=seconds)` tag. Note that this parameter is specified in seconds and takes effect as soon as the tag is rendered.
- The service program may set the timeout with the `B$SetServiceTimeout` call. Calling this function with a parameter of `0` restarts the timer without changing the current value. This is useful as a “keep-alive” function when performing lengthy processing.

Of the above, the `BIS_SERVICE_TIMEOUT` variable and `ServiceTimeout` option keyword have the lowest priority and are overridden by either `SessionParms` tag or the `B$SetServiceTimeout` call.

Also note that a web browser or web client program also normally have inactivity timers. For web browsers, this is typically 60 seconds before the browser disconnects with an error message. While it is not good practice to have an application become unresponsive for a significant time, if lengthy server

processing without interaction is unavoidable, then Javascript client code can be used to display a progress bar or “Please wait” type message in the browser, while also extending the period the browser will wait for a response.

## Chapter 3. Server Response Files

---

### Overview

The **Server Response File** is the key control mechanism of BIS and BIS-enabled web applications and services. Each web application and service will contain at least one unique Server Response File, identified by the extension “.srf”. A Server Response File is also sometimes referred to as a “**stencil**,” since it acts as a stencil during the process of composing the content of an HTTP response to a request from a User Agent.

Server Response Files are often regular HTML files augmented by additional information to control dynamic (program generated) content. In these cases, there are two differences between Server Response Files and regular HTML files:

- When the user agent (usually a web browser) requests a **.srf** file that is contained within a directory served by BIS, the web server automatically loads and activates the **BIS Request Handler** to serve the file. A **Request Handler** is a component invoked by a web server such as Internet Information Server (IIS) or Apache to service a particular type of request; in this case, a request for a Server Response File.
- Server Response Files will normally contain additional, non-HTML **Rendering Tags** that direct BIS to perform various kinds of processing and substitution while the page is being used to render the response content. This process usually includes execution of, and interaction with, RM/COBOL-based service programs whose execution is controlled and synchronized by BIS.

---

### Rendering Tags

Rendering tags are text strings embedded in the server response file HTML source code. A rendering tag has this general form:

```
{{ tag }}  
{{ tag (parameter-list) }}
```

Rendering tags always begin with “{{” and end with “}}” sequence and the tag itself is not case-sensitive, although parameters within the tag may be case-sensitive. Spaces are used in the examples to increase readability but are not required.

The optional parameter list may be formatted in a number of ways:

- As a comma-separated list of tokens:

```
{{ StartService ( samp03, mylibrary.cob ) }}
```

- As a comma-separated list of key-value pairs:

```
{{ SessionParms( InactivityTimeout=600, ServiceTimeout=30 ) }}
```

Except where specified, tokens may be enclosed in double or single quotation marks. This is required if a token contains spaces or a comma.

Under Windows, the total length of a tag (from the opening brace to the closing brace) may not exceed 4096 characters.

**Important:** Both the opening "{{" and the closing "}}" tag delimiters must be contained on a single line; that is, a tag may not contain embedded newline characters. Use caution when creating tags with HTML editors that reformat HTML and make sure that any reformatting does not split tags across multiple lines. Some strategies to avoid line wrapping problems:

- Turn off line and word wrapping in your HTML editor for **.srf** files. Note that Visual Studio 2003, 2005, and 2008 properly handle tags within the HTML editor.
- Embed non-rendering tags (that is, tags that do not produce HTML output) in HTML comment sequences, as HTML editors will preserve formatting within comments. For example:

```
<!-- {{ StartService( MyVeryLongProgramName -c MyLongConfigFile.cfg ) }} -->
```

You may still have to disable word-wrapping and reformatting for **.srf** files to prevent reformatting, or create tags that do not contain spaces.

---

## The Rendering Process

When the user agent requests a page from the web server, and the page designates a Server Response File (that is, the file is in a directory associated with BIS and has a **.srf** suffix), the page is automatically served by the BIS Request Handler. The page is processed from top to bottom and tags are rendered as they are encountered.

There are two basic kinds of rendering tags:

- **Processing Control Tags** are tags that are completely removed from the final rendered content.
- **Substitution Tags** are completely replaced in the final content by new (possibly empty) text.

If a tag is not recognized, it is rendered literally—that is, the tag appears in the output unchanged.

**Note:** Tags are order-dependent. A particular tag may affect how subsequent tags are rendered; for example, the **StartService** tag specifies the service that the **XMLExchange** tag uses. In addition, the **Handler** tag must be the first non-comment tag in every file, and it must appear within the first 4096 characters of the file.

### Processing Control Tags

**Processing Control Tags** control how the page is processed by the BIS Request Handler. There is a tag that specifies the name of the service program to run to serve the page, tags that set processing options, and tags that allow for conditional processing (for example, parts of the page may be skipped).

Processing control tags are always removed from the rendered response.

## Substitution Tags

**Substitution Tags** are replaced with new literal text, HTML, or XML. These tags are replaced by output from the RM/COBOL service program or by the BIS Request Handler directly without program interaction.

---

## Tag Options and Parameters

A particular tag may have one or more options or parameters. If this is the case, the options are specified in parenthesis after the tag name, except for the Handler and Include tags.

### Pathnames

There are two kinds of pathnames used within tags:

- A fully qualified pathname begins with a slash. On BIS/IIS, the slash may optionally be preceded by a drive letter specification.
- A relative pathname is any pathname that does not follow the above rules.

Relative pathnames are interpreted relative to the **current directory**. Under BIS, the current directory is the directory that contains the **.srf** file being processed.

The current directory for the BIS Service Engine is set when the **StartService** tag is executed. If a **.srf** file is subsequently served from a different directory, the current directory of the already-started Service Engine is not changed. However, any relative pathnames in the new **.srf** file are still interpreted relative to the directory that contains that **.srf** file.

On BIS/IIS, pathname resolution within the BIS service program is affected by the **RunPath** tag and the **EXPANDED-PATH-SEARCH**, **RESOLVE-LEADING-NAME**, and **RESOLVE-SUBSEQUENT-NAMES** runtime configuration options. These may be used to great effect in service programs in conjunction with the **SetEnv** tag.

### Referencing Files in System Locations

Several techniques are provided that allow files in system locations to be referenced from within a **.srf** file.

Under BIS/IIS, the following environment variables are useful in pathnames. Note that **RESOLVE-LEADING-NAME** must be set in the service configuration file for these to be useful.

Variable	Description
<b>ProgramFiles</b>	The location of the Windows <b>Program Files</b> directory.
<b>SystemRoot</b>	The drive and directory containing the Windows operating system.
<b>TEMP</b> <b>TMP</b>	The fully qualified path to the directory containing temporary files for the current process. Note that <b>TMP</b> and <b>TEMP</b> normally refer to the same directory, but this is not required.
<b>USERPROFILE</b>	The user's home directory.
<b>WINDIR</b>	Same as <b>SystemRoot</b> .

Variable	Description
<b>AllUsersProfile</b>	The home directory for “All Users”.

On BIS/IIS, you can also define synonyms on the server using the **RMCONFIG** program, or directly define environment variables using the **SYSTEM** control panel applet:

Start → Control Panel → System → Advanced → Environment Variables

For example, if you add **MyPrograms=“c:\My Programs”** to the environment, and have **RESOLVE-LEADING-NAME=@** in your configuration file, then you can refer to the file “**abc.cob**” by specifying a path of “**@MyPrograms/abc.cob**”. See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows.

On UNIX, use the **xbis.conf** configuration file to define BIS environment variables. See “Configuring Apache” on page 119 for details.

## Predefined BIS Environment Variables

BIS adds the following variables to the environment under both IIS and Apache. Note that these variables are dynamically set during execution and are only available in the service program. They will not be visible in your shell environment or in the **.srf** file.

Variable	Description
<b>BIS_PROGRAM_DIR</b>	The directory from which the BIS Service Engine is loaded. On Windows, this will normally be the <b>XBIS.EXE</b> program in “ <b>c:\program files\Micro Focus\RM\BISv12</b> ”.
<b>BIS_FILENAME</b>	<p>The fully qualified name of the temporary file created for this session that will be used to exchange data between the BIS Request Handler and the COBOL service program.</p> <p>When the RM/COBOL service program calls <b>B\$WriteResponse</b> or <b>B\$Exchange</b>, the BIS Web Server reads this file to obtain the content (XML, HTML or plain text) that will replace the <b>XMLExchange</b> tag in the response.</p> <p>When the <b>B\$Exchange</b> call returns or the service program calls <b>B\$ReadRequest</b>, the current web request document (XML) is written into this file. This includes any content such as the POSTed-back form variables, the request variables, and server variables, all encoded as an XML document.</p> <p>By default, this file is created in the Windows <b>TEMP</b> or the UNIX <b>/tmp</b> directory. Both the <b>BIS Request Handler</b> and the <b>BIS Service Engine</b> must have permission to create, read, and write files in this directory. The BIS installation procedure adds the required permissions to this directory.</p>

## The RUNPATH Environment Variable

If a relative filename is specified, the BIS service attempts to locate the file by searching the directories specified by the **RUNPATH** environment variable. For full details of how the BIS service program locates files, please see “Locating RM/COBOL Files” on page 2-9 of the *RM/COBOL User’s Guide*. Note that

the **RunPath** tag may be used to insert additional directories before the default **RUNPATH** from the environment.

## Troubleshooting Tags

If a tag is not performing the expected function, the tag may be malformed or may have been altered by an HTML editor. The following steps can help isolate this problem:

### Is the tag itself visible in your web browser?

This indicates that BIS is not recognizing the tag. Check the spelling of the tag and be sure that the HTML editor did not split the tag across multiple lines—tags may not contain line break characters or span lines (you'll have to use the browser's **View→Source** to examine the raw HTML to be sure). On UNIX, enabling tracing (see below) and setting the **BISStencilDebug** configuration option will cause the generation of a trace message with the reason why a tag was rejected.

### Did the tag fail to perform the requested function?

If a malformed tag is embedded in an HTML comment (see the example on page 30), the tag may fail to render but not be visible in the rendered output. To see such tags, use your web browser's **View→Source** command. Tags should never appear in the raw HTML that is sent to the web browser.

### Does the tag appear in the trace output?

Enable tracing and examine the trace output. If you have access to the **.srf** file, to quickly enable tracing, insert this tag after the **Handler** tag:

```
{{ Trace(start,page) }}
```

Then request the page using your web browser. This will cause trace output to be appended to the end of the current page. The trace output indicates when most tags are rendered and the results of the rendering.

On BIS/IIS, to direct trace output to a file, replace **page** with **file** (or specify both using **page,file**). This will direct all trace output for the session into a file in the server's temporary directory (normally **C:\Windows\Temp**), or the directory specified in the trace **dir=** parameter. If you use this type of tracing, be sure to occasionally delete these files from the temporary directory.

The trace files use the following naming convention:

```
BIS-ssss-trace.txt
```

Where **ssss** are the initial characters from the session identifier. The first four non-slash characters of the session identifier are always used; if a file of that name already exists, BIS will continue to add characters from the session ID until the filename is unique.

On UNIX, trace output is directed to a file if tracing is enabled. A separate trace file is created for each session and is placed in the UNIX **/tmp** directory unless the **BISTraceDirectory** configuration option is specified or redirected with the trace **dir=** parameter. So on UNIX, **Trace(start)** is sufficient to create a trace file.

Note that on UNIX, the **BISMasterTrace** configuration option must be enabled before any tracing can occur. See "Configuring Apache" on page 119, for details about setting or clearing this option.

Tracing is the most useful of the above techniques and should be enabled during the development process.



## Chapter 4. Replacement Tag Reference

This section presents and discusses each tag that is implemented in Server Response Files.

Here is an example of a basic `.srf` file. Tags are highlighted in red.

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">
<!-- BIS control tags (removed when page is rendered) -->
<!-- {{ handler * }} -->
<!-- {{ StartService(samp03 -v,xmlif) }} -->
<!-- {{ Trace(queryparam=trace) }} -->
<html>
<head>
  <META http-equiv="Content-Type" content="text/html; charset=UTF-8">
  <title>Micro Focus RM/COBOL Web Server Demonstration Page</title>
</head>
<body>
  <div align="center">
    <h3>Micro Focus RM/COBOL Web Server Demonstration Page</h3>
  </div>
  <p>--- Begin Application-Generated XHTML ---</p>
  <div>
    {{ XMLExchange(OnExit="goodbye.srf") }}
  </div>
  <p>--- End Application-Generated XHTML ---</p>
  {{ TraceDump }}
</body>
</html>

```

Note that the first three tags in this example are embedded in HTML comments. This is not strictly necessary from an operational standpoint (and may be undesirable because empty comments will be sent to the browser), but useful to keep an HTML editor like *Microsoft FrontPage*, *Microsoft Expression Web*, *Microsoft Visual Studio* or *Adobe Dreamweaver* from reformatting the text in the `handler` tag, or possibly splitting the tag across multiple lines.

---

### The {{Handler}} Tag

This tag must appear at or near the beginning of every server response file that is to be processed by BIS. It indicates that this particular `.srf` file contains Xcentrity BIS rendering tags.

```
handler *
```

The `handler` tag's parameter indicates the name of the handler to be invoked to render the tags within the stencil, with `*` indicating the default tag handler. In this release of BIS, the only supported handler tag is the default, so `{{ Handler * }}` is the recommended format of this tag.

Future versions of BIS may support additional handlers.

## Notes

- The **handler** tag must appear in every **.srf** file, including **.srf** files included in other **.srf** files.
- The **handler** tag must precede all other non-comment tags, and must appear within the first 4096 characters of the file. (Note that BIS/IIS allows **include** tags to precede the **handler** tag.)
- Only one **handler** tag in each **.srf** file is permitted. On BIS/Apache, multiple **handler** tags are allowed, but only the first encountered in the file is relevant.

---

## The {{ContentType}} Tag

This tag sets the content type for the HTML response.

```
ContentType ( value )
```

BIS does not attempt to interpret the *value*, which encompasses the entire parameter, including commas and any quotes.

## Examples

```
1. {{ ContentType(text/html; charset=utf-8) }}  
2. {{ ContentType(text/xml) }}
```

## Notes

- If not specified, the default content type is “**text/html; charset=utf-8**”. On BIS/Apache, if the content type of the request message indicates an XML message, the default content type of the response is “**text/xml; charset=utf-8**”.
- If **ContentType** is specified multiple times on a page, the last instance is used.

---

## The {{SessionParms}} Tag

This tag allows various session attributes to be set:

```
SessionParms( InactivityTimeout= seconds | DEFAULT,  
              ServiceTimeout= seconds | DEFAULT,  
              Path = DEFAULT | path,  
              Scope = ALL | ISOLATE )
```

where:

<b>InactivityTimeout</b>	Determines how long a session survives without user interaction.	
	<u>DEFAULT</u>	Resets the timeout to the default setting: 600 seconds (10 minutes).

	<i>seconds</i>	An integer that specifies the number of seconds before the session terminates. The minimum value is 10 seconds (useful for testing) and the maximum value is 1,000,000 seconds (about 11 days).
<b>ServiceTimeout</b>		Determines the maximum length of time the Service Program may run when a request is received.
	<b><u>DEFAULT</u></b>	Resets the timeout to the default setting: 30 seconds.
	<i>seconds</i>	An integer that specifies the number of seconds before Service Program termination processing begins. The minimum value is 10 seconds (useful for testing) and the maximum value is 3,600 seconds (one hour).
<b>Path</b>		Specifies the root path of the current session. This parameter is ignored unless the page being served is the initial session page.
	<b><u>DEFAULT</u></b>	The session root path is set to the path of the current request. See “The Session Root Path and Session Scope” on page 25 for more details.

	<p><i>path</i></p>	<p>Explicitly sets the session root path to <i>path</i>. The <i>path</i> may be specified as a relative or an absolute URL path and must specify a path segment contained in the URL path of the initial page.</p> <p>In addition, under IIS, the specified <i>path</i> must contain at least as many path segments as the application root path (the base directory for the BIS application)—that is, the path cannot be closer to the root of the web than the BIS virtual directory.</p> <p>For example, if the requested page is</p> <p style="text-align: center;"><b><a href="http://xcentris.org/xbis/apps/states/texas/default.srf">http://xcentris.org/xbis/apps/states/texas/default.srf</a></b></p> <p>the default session path will be</p> <p style="text-align: center;"><b><a href="/xbis/apps/states/texas">/xbis/apps/states/texas</a></b></p> <p>These paths may be specified to set the session root path to <b>xbis/apps</b>:</p> <p style="text-align: center;"><b>Path="/xbis/apps"</b> <b>Path=../..</b></p> <p>These paths set the default session path to the directory containing the requested object:</p> <p style="text-align: center;"><b>Path=DEFAULT</b> <b>Path=.</b> <b>Path="/xbis/apps/states/texas"</b></p> <p>These paths are invalid and will be reported as being invalid in the trace file:</p> <p style="text-align: center;"><b>Path=/xbis/apps/states/california</b> <b>Path=../florida</b></p> <p>These directories are not contained in the path.</p> <p>In addition, for IIS servers, the path cannot be closer to the root than the application base path (the path that describes the virtual directory that contains the BIS server).</p>
<p><b>Scope</b></p>	<p>Determines the scope of the current session. This parameter may be specified at any time and is not inherited by new sessions.</p>	<p><b><u>ALL</u></b></p> <p>All pages served from the session base directory and subdirectories of the session base directory are served as part of the current session. This option is the initial default for all new sessions and is appropriate for most applications.</p>

	<b>ISOLATE</b>	<p>Only pages served from the session base directory are included in the current session. A new, non-isolated session is started when a page is requested from a subdirectory of the session base directory.</p> <p>The <b>ISOLATE</b> option allows a single user agent to use more than one BIS session as long as the sessions are based in separate directories on the server.</p>
--	----------------	--

## Notes

- All parameters are optional, but at least one parameter must be specified for this tag to be useful.
- A change to the timeout takes effect as soon as either timeout parameter is parsed and the timer is restarted at that point.
- It is strongly recommended that the inactivity and service timeout intervals are kept as short as possible. Setting the session inactivity limit to the maximum will keep sessions from automatically terminating when browser sessions are abandoned; this can result in a large number of orphaned BIS sessions that will not be cleaned up for over a week. It is better to set the inactivity timeout to 10 minutes and use a META REFRESH or a JavaScript timer to pull content from the BIS session every few minutes to keep the session active only while the browser window remains open.
- Setting the service timeout interval too high can also have detrimental effects if a service programs unexpectedly runs away. Such a program can use 100% of the available CPU, preventing any other programs from starting or running effectively. The default setting of 30 seconds will terminate any run-away program within this reasonable amount of time.
- The session scope determines if pages served from subdirectories of the session base directory are executed in new sessions. For example, if this page created the initial session:

<http://xcentris.org/xbis/apps/states/default.srf>

and the application contains a link to this page, located in a more specific directory:

<http://xcentris.org/xbis/apps/states/texas/default.srf>

- If **SessionParms(Scope=All)** is in effect, the subordinate page will be served from the same session as the initial page. However, if **SessionParms(Scope=Isolate)** is in effect, a new session will be created for the subordinate page.
- For a description of the proper usage of the session base and session scope options, see “The Session Root Path and Session Scope” on page 25 for more details.

---

## The `StartService` Tag

This tag starts the execution of a service program. Options and the names of one or more libraries to be used by the service can also be specified.

```
StartService ( program [parms] [,library1 [,library2]...] )
```

where:

<b>Program</b>	The name of the service program to run. If a relative path is specified, the path is relative to the directory that contains the <code>.srf</code> file. If no directory is specified, the <b>RUNPATH</b> is searched (see below).
<b>Parms</b>	Optional Service Engine parameters. Any text starting at the first non-blank between <b>program</b> and the first comma or closing parenthesis is interpreted as a Service Engine option and is passed to the Service Engine without further interpretation. Some useful options include:
	<b>-v</b> Causes additional trace information to be emitted if tracing is enabled. The additional information includes the names of autoloaded DLLs.
	<b>-k</b> Suppresses the banner in trace information.
	<b>-c</b> Specify configuration files. Note that if a configuration filename is specified without path information, BIS will search the <b>RUNPATH</b> for this file. <b>-x</b>
<b>Library</b>	A comma-separated list of service libraries. Do not include <b>-L</b> . If no extension is specified, under Windows, BIS will append <code>.dll</code> and on UNIX, BIS will append <code>.so</code> . Note that this command line portability is an advantage in enumerating the libraries separately instead of with <b>-L</b> .

BIS only allows one service program to be active in a session. Note the following:

- If no service program is currently running, the new service is started.
- If the specified service program is already running, this tag is ignored.
- If a service program is running, and **program** specifies a different service, the currently running service program is stopped (as if a **StopService** tag had been specified) and the new service program is started.

When a service program is started, BIS saves the name of the program. When another service program is started, BIS compares the new program name against the name of the program currently running. If there is an exact match (ignoring differences in letter case), the service is the same. If there is any difference, the new **StartService** tag refers to a different service and the currently running service program is stopped.

Once the service program is started, page rendering resumes. Rendering and the service program run in parallel.

Examples:

```

1. {{ StartService ( myapp ) }}
2. {{ StartService ( myapp, mylibrary.cob ) }}
3. {{ StartService ( myapp.cob, xmlif.dll, mylibrary.cob ) }}
4. {{ StartService ( myapp -V -C rmtcp32.cfg, xmlif.dll ) }}

```

In the examples above, the `.COB`, `.DLL`, and `.CFG` files must be in the **RUNPATH**.

1. Starts the program in file **myapp.cob**.
2. Attempts to start program **myapp** after loading the **mylibrary.cob** service library. If the library contains a program called **myapp**, it is run from the library. If the program is not in the library, then the first program in **myapp.cob** is started.

3. Starts the program in **myapp.cob** after loading **xmlif.dll** and **mylibrary.cob**.
4. Starts program **myapp.cob** after loading **xmlif.dll**. The **-V** option causes extra information about loaded programs to be emitted after the banner is emitted into the trace file. The **rmtcp32.cfg** file is processed when the Service Engine is loaded.

The **StartService** tag follows all the regular Service Engine program loading rules, including the **RMAUTOLD** directory. See the *RM/COBOL Users' Guide* for a detailed description.

Note that example 4 demonstrates a program that uses RM/InfoExpress®. The **rmtcp32.cfg** file (which can have any name) should contain a line like this:

```
EXTERNAL-ACCESS-METHOD NAME=rmtcp32
```

On Windows, this causes **rmtcp32.dll** to be loaded when the Service Engine is loaded. This DLL implements the *RM/InfoExpress* file access method.

## Accessing the REQUEST from the Service Program

In many cases, the service program will require access to the information transmitted in the HTTP request message. This information is passed in the BIS Request XML document that is made available by a call to **B\$ReadRequest** or **B\$Exchange** within the service program.

## Notes

- A given server response file can have multiple **StartService** tags. An additional **StartService** tag is ignored if it specifies a service that is already running. If it specifies a difference service, the service started by the previous tag is stopped before the new service is started.
- The **StartService** tag must precede any tags that depend on the service program being active. Such tags currently include **XMLExchange**.

---

## The `{{RunPath}}` Tag

This tag is used to modify the **RUNPATH** environment variable that is passed to the Service Engine. The BIS Service Engine uses the **RUNPATH** to locate service program files and libraries.

```
RunPath ( [ dir [,dir]... ] )
```

## Notes

- This tag causes the specified list of directories to be prefixed before the contents of any existing **RUNPATH** environment variable that is inherited from the system environment. Any number of directories may be specified, separated by commas or semi-colons (however, note that colons are not separators). If any *dir* contains spaces characters, it must be surrounded by double quotes. Directory names may not contain commas or semicolons.
- This tag is a session attribute and remains in effect until the session ends or another **RunPath** tag is encountered, which will replace the directory list set by the previous **RunPath** tag. To clear the

run path, specify `{{ RunPath() }}`. Note that the `.srf` directory cannot be removed from the `RUNPATH` sent to the service program.

- This tag must precede the `StartService` tag or it will be ignored by the application.
- Relative directories in the list are interpreted to be relative to the directory that contains the `.srf` file for the page being processed. This is the current directory that is set when the Service Engine begins to execute.
- To explicitly reference the directory that contains the current `.srf` file, add “.” (that is, “current directory”) to the path.
- See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows.

---

## The `{{SetEnv}}` Tag

This tag is used to set a variable in the service program’s environment. Environment variables are treated as **synonyms** by the Service Engine.

```
SetEnv ( name[=value] )
```

### Examples

```
{{ SetEnv ( printer=lpt1 ) }}  
{{ SetEnv ( myfile="c:\temp\scratchfile.tmp" ) }}
```

### Notes

- The `SetEnv` tag affects only the Service Engine’s environment and not the BIS Request Handler’s environment. The `Value(variable,ENV)` tag will **not** retrieve variables set by this tag.
- Multiple `SetEnv` tags may be specified in a `.srf` file and are processed in the order in which they occur. Note that these tags must precede the `StartService` tag.
- On BIS/IIS, the scope of a `SetEnv` tag is the current request, not the current session. On BIS/Apache, the scope of the `SetEnv` tag is the current session.
- To unset an environment variable, omit the `=value`. Note that an unset variable is different from a variable that has a blank (or empty) value.
- All characters to the right of the equal sign up to the first space before the right-most parenthesis are stored as the value. If the value is quoted as in the example above, quotes will also be set in the environment.

---

## The `{{XMLExchange}}` Tag

This tag causes the web server to request an XHTML form or table from the currently running RM/COBOL service program. The XHTML form or table generated by the COBOL program replaces the `XMLExchange` tag in the output stream.



```
XMLExchange  
XMLExchange ( OnExit=url )
```

The optional **OnExit** parameter determines the action that BIS takes if the service program is not active or terminates while the **XMLExchange** is being processed. It causes BIS to return an HTTP return code of **302 (HTTP\_REDIRECT\_FOUND)** to the client. This causes the client to reissue the GET request for the specified URL.

## Notes

- Do not use **OnExit** with SOAP requests. SOAP clients may not be able to interpret the 302 error that is returned.
- On BIS/IIS, the **OnExit** in the first **XMLExchange** tag following a **StartService** tag is ignored. This allows any service startup errors to be reported and corrected.

## Recursive Tag Processing in `XMLExchange`

Beginning in version 10, BIS recursively processes tags in the service program's response output, as if the response output was a stencil. Tag substitution occurs as the service output is written to the response page (replacing the **XMLExchange** tag), and substitution is performed in the context of the page that contains the **XMLExchange** tag.

This behavior allows the service program to dynamically generate tags, thereby using BIS tag substitution features in the HTML, XHTML or XML produced by the service program. For example, if the generated HTML contains URLs in links, the **Value** tag can be used to process those URLs in the context of the requested page, and make the URLs absolute, based on the URL of the original request. Another example: the service program can also change the content type or character set of the response by generating a **ContentType** tag.

The **FormActionTarget** tag discussed in the next section is a tag that is specifically intended to be included in generated **XMLExchange** output. BIS allows any tag to be embedded in the output—even another **XMLExchange**.

## The `FormActionTarget` Tag in `XMLExchange`

This tag is replaced by a URI referencing the current page and includes a query parameter that will be automatically checked by BIS to ensure proper sequencing of requests. BIS will check any requests to the current session and will reject (and display an error page) any request that does not contain the query parameter served by the **FormActionTarget** tag. By using this tag, the service program may assume that any requests that return control to the service are in the sequence expected by the program.

The **FormActionTarget** tag should normally only be used as the value of the “action” attribute of an HTML `<form>` element. In any case it must be used in such a way that the next expected request will be directed to the URI represented by the tag.

If a response page rendered by BIS does not contain the **FormActionTarget** tag, no sequence checking will be performed by BIS. The service program may, of course, perform its own checking using other means, such as hidden fields, if required.

---

## The `StopService` Tag

This tag terminates the execution of the service program that is attached to the session.

## StopService

### Notes

- If the service program is not awaiting a request when this tag is rendered, the program must call **B\$ReadRequest** or **B\$Exchange** within *ServiceTimeout* seconds. The call then returns with the **BIS-Fail-ProgramTerminated** return code. At that point, the program is granted an additional *ServiceTimeout* seconds to terminate.
- If the program is still running when either *ServiceTimeout* period expires, a termination signal is sent.
- Once the **StopService** tag is rendered, the service program is immediately disconnected from the session. For example, an **XMLExchange** tag immediately after a **StopService** tag is invalid and, if present, the **OnExit** parameter in that tag will be processed.
- The **StopService** tag may be immediately followed by a **StartService** tag. In this case, a new service program is started. Once the **StopService** tag is rendered, the service program is considered terminated even if it needs a few additional seconds to actually stop.
- This tag is ignored if there is no service program attached to this session.

---

## The `{{SessionComplete}}` Tag

Indicates that the current session is complete and may be released. The session cookie will be deleted when the response for the current page is sent to the client.

## SessionComplete

### Notes

- If a BIS service program is currently active, this tag implicitly performs a **StopService** at the point this tag is rendered. See the description of the **StopService** tag for details about how the service program is informed the session is ending, and the sequence of events that transpire. Note, however, that the current or next call to **B\$ReadRequest** returns the **BIS-Fail-SessionTerminated** result code instead of **BIS-Fail-ProgramTerminated**.
- This tag is most useful on a “goodbye” page, but is optional because sessions are automatically terminated after a period of inactivity. However, explicitly ending a session can be used to release system resources, or to force a new session to be started for the active client when the next page is requested.

---

## The `{{Value}}` Tag

This tag looks up a value on the server and the tag is replaced with that value.

Value (variable|"variable" [, source] [,operations]...)

By default, **variable** is a server variable or a special variable (described below). However, options can direct that the value be obtained from the environment, the server configuration, a submitted form, a cookie, or a query parameter.

On BIS/IIS, if **variable** is enclosed in quotes, the variable name is treated as a literal string and is not resolved further unless one of the **source** options below is specified.

On BIS/Apache, if **variable** begins with a quote, it is treated as a literal and no **source** option is permitted.

Either single or double quotes may be used as delimiters, and a delimiting quote may be embedded in the string by specifying the quote twice: "abc"def" becomes abc"def.

The **source** option determines from where the **variable** value is obtained. If specified, the **source** must be the second parameter.

<b>SERVER</b>	Specifies that <b>variable</b> is a server variable. This is the default if none of the other sources below are specified and if the string is not quoted. Under BIS/Apache, <b>ENV</b> and <b>SERVER</b> are identical.
<b>CONFIG</b>	Specifies that <b>variable</b> is a special server configuration value. A list of <b>CONFIG</b> variables appears at the end of this section.
<b>COOKIE</b>	Specifies that <b>variable</b> is a cookie.
<b>ENV</b>	Specifies that <b>variable</b> is an environment variable instead of a server variable. Note that, on BIS/Apache, <b>ENV</b> and <b>SERVER</b> are identical. See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows.
<b>FORM</b>	Specifies that <b>variable</b> is a <b>&lt;form&gt;</b> variable.
<b>QUERYPARAM</b> <b>QP</b>	Specifies that <b>variable</b> is a URL query parameter. <b>QP</b> is accepted as an alias for <b>QUERYPARAM</b> .

These **operations** modify the retrieved value and are applied from left to right and may be applied multiple times.

<b>DEFAULT=value</b>	<p>Specifies a default value for <b>variable</b> if the <b>variable</b> is empty. This option has no effect unless the <b>variable</b> is empty at the point the <b>DEFAULT</b> operation is performed.</p> <ul style="list-style-type: none"> <li>• If the <b>variable</b> is empty when the end of the entire operations list is reached, the Value tag is simply removed from the output stream.</li> <li>• If <b>DEFAULT</b> is encountered and the <b>variable</b> is empty, the tag is replaced by <b>value</b>. If there are additional operations to the right of the <b>DEFAULT</b> operation (that is, <b>GETDIR</b>, <b>TOUPPER</b>, <b>URLENCODE</b>), these are performed on the new defaulted <b>value</b>.</li> </ul>
<b>GETDIR</b>	Same as <b>GETPATH</b> (see below), except only the directory portion of the pathname is extracted. This is the part of the pathname that

	follows the scheme and hostname up to the last slash in the pathname. Note that if <b>variable</b> is a pathname that contains a drive letter, the drive letter is also returned. The extracted pathname never ends in a slash.
<b>GETQUERYSTRING</b> <b>V10</b>	If <b>variable</b> is a URL, returns the query string. If not present or if <b>variable</b> is a pathname, an empty string is returned.
<b>GETHOST</b> <b>V10</b>	If <b>variable</b> is a URL, extracts the hostname. If <b>variable</b> is a pathname, or no host name is present, an empty string is returned.
<b>GETNAME</b>	Same as <b>GETPATH</b> , except only the filename portion of the pathname is extracted. This is the part of the pathname that follows the last slash but excludes the <b>#fragment</b> , <b>?querystring</b> , and <b>;parameters</b> .
<b>GETPATH</b> <b>V10</b>	If <b>variable</b> is a URL, extracts the path portion of the URL. This is the portion of the URL that excludes the scheme, the hostname, and the query string. If variable is a pathname, it is unchanged.
<b>GETSCHEME</b> <b>V10</b>	If <b>variable</b> is a URL, extracts the scheme. This will normally be <b>http</b> or <b>https</b> without the terminating colon or slashes. If <b>variable</b> is a pathname or a URL without a scheme, an empty string is returned.
<b>SUBSTITUTE=</b> <i>/pattern/replacement/</i>  <b>SUB=</b> <i>/pattern/replacement/</i>	Allows you to substitute all occurrences of <i>pattern</i> in the value with a replacement pattern. The operation is performed on the current value after all transforms to the left have been performed. Processing continues with the modified value. <b>SUB</b> is accepted in place of <b>SUBSTITUTE</b> for brevity. Both <i>pattern</i> and <i>replacement</i> are regular expressions. (For more information, see “Regular Expression Syntax” on page 95).
<b>TOUPPER</b>	Converts the value to all upper-case characters. Equivalent to <b>SUBSTITUTE="/.*\/\U&amp;/"</b> .
<b>TOLOWER</b>	Converts the value to all lower-case characters. Equivalent to <b>SUBSTITUTE="/.*\/\L&amp;/"</b> .
<b>URLDECODE</b>	Decodes a string that has been URL-encoded. This is primarily useful when retrieving a server variable.
<b>URLENCODE</b>	Encodes a string for reliable HTTP transmission from the web server to a client as a URL. For example, <b>"This is a &lt;Test String&gt;."</b> will be encoded as: <b>"This%20is%20a%20%3cTest%20String%3e."</b>
<b>HTMLDECODE</b>	Decodes a string that has been HTML-encoded. This is primarily useful when retrieving a server variable.
<b>HTMLENCODE</b>	Encodes a string for reliable HTTP transmission from the web server to a client as HTML. For example, <b>"This is a &lt;Test String&gt;."</b> will be encoded as: <b>"This is a &amp;lt;Test String&amp;gt;."</b>

<b>MAKEABS</b> <b>V40</b>	<p>Assumes that the string is a relative URL, and makes the URL absolute, using the location of the stencil that was requested by the client as the base URL (see <b>REQUEST_URL</b> in “<b>Error! Reference source not found.</b>” for details). If the string is not a URL, it is not altered. If the input string is an absolute URL, it is cleaned up (that is, redundancies such as “<b>dir/./</b>” are removed) but is otherwise unchanged.</p> <p>See <a href="#">RFC 3986</a> for details about how relative URLs are resolved by this operation.</p>
------------------------------	---

Processing stops when the following option is encountered and the tag always renders as an empty string.

<b>MATCH=regexp</b>	<p>Applies the regular expression against the current value and returns true if it matches and false if it does not match but does not return any text for rendering. This allows <b>Value</b> to be used in <b>If</b> tags. See Appendix D, “Regular Expression Syntax” beginning on page 95.</p>
---------------------	--

For example, the tag:

```
{{ VALUE (HTTP_URL, GETDIR, TOLOWER, URLENCODE) }}
```

is replaced by the directory that contains the page that is currently being served. The name of the directory is converted to lowercase and the directory name is URL-encoded (for example, recommended if the value will be substituted into an **HREF** attribute). **HTTP\_URL** is a server variable, but it is not necessary to specify the **SERVER** source parameter because this is the default.

On Windows XP, the tag:

```
{{ VALUE (PROCESSOR_IDENTIFIER, ENV, DEFAULT="Unknown", HTML ENCODE) }}
```

is replaced by the contents of the **PROCESSOR\_IDENTIFIER** environment variable. If this variable is not defined, the text **Unknown** (without quotes) is output instead. The output is HTML-encoded so any ‘<’ or ‘>’ characters in the environment variable are properly converted.

## Notes

- The **Value** tag can be referenced in an **If** tag if the **MATCH** operation is used, but cannot be nested within any other tags. It can, however, appear anywhere else in the HTML as long as it follows the **Handler** tag. This tag can therefore be used to provide content for any HTML element.
- When used in an **If** tag without the **MATCH** option, the condition is **TRUE** if **Value** evaluates to a non-empty string; otherwise, **FALSE**.
- Regular expressions must be delimited. The first nonblank character after the ‘=’ is the delimiter for the regular expression. The expression begins at the character following the delimiter and extends up to, but not including the next occurrence of that character.

Single or double quotes are common delimiters, but the delimiter may be any character.

Examples:

```
1. {{ VALUE (QUERY_STRING, SERVER, MATCH="?userid=fred\s") }}
2. {{ VALUE (QUERY_STRING, SERVER, MATCH="/?userid="fred\s"/) }}
```

(Note that **QUERY\_STRING** is a server variable that contains the query string part of the URL.)

The second regular expression includes quotes, so a delimiter (“/”) was chosen that does not occur in the expression.

Another way to accomplish the above is to use the **QUERYPARAM** source option:

```
{{ VALUE(userid, QUERYPARAM, MATCH="fred\s", URLENCODE) }}
```

- Commas cannot occur inside delimited or quoted strings because commas always separate parameters. If a comma is required, use “%2c” and **URLDECODE** the string to convert the “%2c” to a comma.

## Configuration Variables

In addition to server variables and environment variables, some special variables are supported. These variables may not be implemented on all platforms.

<b>HOSTSERVER</b>	Returns “ <b>IIS</b> ” or “ <b>Apache</b> ”. Note that under IIS, the <b>SERVER_SOFTWARE</b> server variable can be used to retrieve the version number. However, this server variable may be undefined under Apache.
<b>MAXTHREADS</b> <b>IIS</b>	Resolves to the number of threads configured in the BIS thread pool. This is the number of threads that are available for requests. Under Apache, this is undefined (use <b>DEFAULT=1</b> if portability is desired).
<b>REQUEST_URL</b> <b>V10</b>	Retrieves the completely qualified URL of the stencil ( <b>.srf</b> ) file that was requested by the client. This includes the scheme, hostname, port number (if non-standard), path, and parameters, query string, and fragment (if specified).
<b>REQUEST_BASE_URL</b> <b>V10</b>	Retrieves the completely qualified base URL of the current stencil ( <b>.srf</b> ) file that was requested by the client. This includes the scheme, hostname, port number (if non-standard), and the path (which always ends in a slash).  The base URL is defined as the directory that contains the stencil that was requested by the client.
<b>STARTSERVICE</b>	Returns the entire argument list of the currently active <b>StartService</b> tag, including commas. If there is no active service program, the value is considered undefined and may be overridden with the <b>DEFAULT</b> operation.

<p><b>SCHEME</b> <b>V40</b></p>	<p>Returns the scheme that was used to request the current page: currently returns either <b>http</b> or <b>https</b>. Note that the <code>://</code> delimiter that follows the scheme is not included. This is useful for constructing URLs:</p> <pre>&lt;a href="{{ Value(SCHEME, CONFIG) }}:// {{ Value(HTTP_HOST,URLENCODE) }} {{ Value(HTTP_URL,GETDIR,URLDECODE,URLENCODE) }}/default.srf"&gt;</pre> <p>(Note that the above must be on a single line, or spaces will be inserted.)</p> <p>Under BIS/IIS, the scheme is derived from the <b>SERVER_PORT_SECURE</b> server variable, where a value of 0 indicates http and nonzero indicates https.</p>
<p><b>SERVICENAME</b></p>	<p>Retrieves the name of the currently active service program. If there is no active service program, the value is considered undefined and may be overridden with the <b>DEFAULT</b> operation.</p>
<p><b>VERSION</b></p>	<p>Retrieves BIS version information. The format of the version number is <b>aa.bb.cc.yyyy/mm/dd</b>, where <b>aa.bb.cc</b> indicates the numeric major/minor/patch level version, and <b>yyyy/mm/dd</b> is the build date.</p>

## The `Trace` Tag

Enables or disables trace logging for the current session.

```
Trace ( options )
```

The options in the table below control the internal accumulation of trace information on UNIX. Windows always accumulates trace information and these options are ignored.

<p><b>START</b> <b>STOP</b></p>	<p>Starts/stops the accumulation of <b>TRACE</b> information. <b>START</b> causes BIS to begin accumulating trace output. <b>STOP</b> causes BIS to stop accumulating trace output. If tracing has been started, <b>START</b> has no effect. If tracing has not been started, <b>STOP</b> has no effect.</p>
<p><b>OFF</b></p>	<p>Turns tracing off. Equivalent to <b>STOP,NOPAGE,NOFILE,NOTAG,NOEXCHFILES,NOQUERYPARAM,NOIP</b>.</p>

The options in the table below determine where the **TRACE** output is emitted. They are independent of each other.

<p><b>PAGE</b></p>	<p>Indicates that the trace is emitted at the end of the page.</p>
<p><b>NOPAGE</b></p>	<p>Disables end of page trace output.</p>
<p><b>FILE</b></p>	<p>Indicates that the trace is written to a file in directory indicated by the <b>DIR</b> option.</p>

<b><u>NOFILE</u></b>	Disables trace output to the file.
<b>TAG</b>	Enables the <b>TraceDump</b> tag and therefore determines if trace output is written when this tag is rendered.
<b><u>NOTAG</u></b>	Causes <b>TraceDump</b> tags to be ignored.
<b>EXCHFILES</b>	Enable saving a copy of the XML Exchange request/response files for each session in the trace directory.
<b><u>NOEXCHFILES</u></b>	Disables the tracing of XML Exchange request/response files.

If the **FILE** option is in effect, these options determine how the TRACE output is written to a file.

<b><i>DIR=dir</i></b>	<i>dir</i> specifies the directory that will receive trace output if <b>FILE</b> is in effect. If no <i>dir</i> is specified, this option has the same effect as <b>NODIR</b> . If a relative directory is specified for <i>dir</i> , output is written into a directory relative (on BIS/IIS) to the Windows temporary directory or (on BIS/Apache) to the <b>/tmp</b> directory. If an absolute path is specified for <i>dir</i> , output is written into that directory. On BIS/IIS, this directory must exist or the trace file will not be written. On BIS/Apache, the specified directory will be created if it does not exist.
<b><u>NODIR</u></b>	Disables the trace directory specified by <b>DIR</b> . If file output is enabled with either <b>FILE</b> or <b>EXCHFILES</b> then all trace output is written (on BIS/IIS) into the Windows temporary directory, or (on BIS/Apache) into <b>/tmp</b> .

The options below allow tracing to be controlled using a query parameter:

<b><u>QUERYPARAM=value</u></b> <b><u>QP=value</u></b>	<b>QUERYPARAM</b> and <b>QP</b> are synonymous and select a query parameter that can be used to dynamically specify the options above. Trace options set in the URL have the highest priority. Note that, for security, the query parameter cannot be used to set or clear IP restrictions or set the trace output directory.
<b><u>NOQUERYPARAM</u></b> <b><u>NOQP</u></b>	Disable the query parameter set by <b>QUERYPARAM</b> or <b>QP</b> .



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<p><b>IP=xx.xx.xx.xx</b> [-x.xx.xx.xx]</p>	<p><b>IP</b> allows trace output to be restricted to requests originating at one or more IP addresses. If an IP restriction is in effect, trace output is restricted exclusively to requests from those particular IP addresses. A comma-separated list of IP addresses or ranges may be specified. The list of IP restrictors is processed from left to right.</p> <p>Note that specifying <b>127.0.0.1</b> will allow access from a web browser running on the host's console. In this case, access the pages using <b>localhost</b> as the name of the host.</p> <p>Starting with BIS version 12, on BIS/IIS, IPv6 addresses may be specified instead of IPv4. For example, "<b>::1</b>" specifies the IPv6 loopback address, and on Windows Vista and Windows 2008 server, <b>localhost</b> resolves to this IPv6 address, while on older versions of Windows, <b>localhost</b> resolves to <b>127.0.0.1</b>. IPv6 and IPv4 addresses may be mixed in a single IP statement, but not in a single range.</p> <p>For portability between Apache and IIS, if either an IPv4 or IPv6 loopback address is specified (that is, "<b>127.*.*.*</b>" or "<b>::1</b>"), the setting applies to both IPv4 and IPv6 loopback addresses.</p>
<p><b>NOIP</b></p>	<p>Disables the restriction of IP addresses.</p>

## Notes

- The default trace state is **OFF**. Note that if **Trace(Start)** is specified, trace accumulation begins/continues but trace information is not output until one or more output destinations (that is, **PAGE, FILE, TAG, EXCHFILES**) are specified.
- The trace mode is part of the session and is "sticky". This means that the trace setting persists in the session until it is changed by either another **trace** tag or a query parameter (if enabled). So if you have more than one page in your application, the **trace** tag is required only on your initial page.
- Only **.srf** files may be traced. If you follow a link to an **.htm** or **.asp** page, those pages will not be traced. If those pages link back to a **.srf** file in this application's virtual directory, then tracing will once again resume as long as the session is still active.
- Be cautious when enabling tracing in a way that exposes the trace information to site visitors. Trace information will reveal some information about your system that may be useful to intruders. The **QUERYPARAM** is configurable to help secure your web by allowing tracing to be turned on and off using a keyword that is not easily guessed by intruders.

## Examples

```
{{ trace(page, file, notag, dir=bistrace, ip=127.0.0.1) }}
```

This **Trace** tag directs that trace output will be appended to every HTML page, and will also be written to the trace file in a directory named **bistrace**—note that, on Windows, this directory is relative to the Windows temporary directory, and must exist. The **notag** option causes **DumpTrace** tags in the stencil

file to be ignored and page trace output is only performed if the request originates on the server running BIS via the `localhost` alias (always `127.0.0.1`).

Note that specifying “`127.0.0.1`” (or any IPv4 loopback address) on BIS/IIS also enables tracing from “`::1`” (the IPv6 loopback address), and vice-versa.

## The `{{Trace}}` Query Parameter

If the query parameter has been enabled for this session, the presence of the query parameter on a subsequent URL acts to change the trace options at the time the request is processed.

## The `BIS_TRACE_SUFFIX` Environment Variable

On BIS/IIS, the `BIS_TRACE_SUFFIX` environment variable and, on BIS/Apache, the `BISTraceSuffix` configuration parameter allows trace parameters to be injected into every trace statement. While this requires administrative access to the web server, this is useful for globally providing specific clients access to trace information.

For example, if your trace statements look like this:

```
{{ trace(page, noip) }}
```

and you wish to view trace data from the machine at `192.168.3.54`, and control such tracing with the `MySecretTrace` query parameter, place this into the server environment:

```
BIS_TRACE_SUFFIX=ip=192.168.3.54,queryparam=MySecretTrace
```

- This will effectively append these parameters to every `Trace` tag executed on the server without requiring the actual `.srf` file to be edited. Note that the `.srf` files must contain a `Trace` tag for this feature to take effect.
- See “Setting Environment Variables” on page 116 for information about setting and modifying environment variables on Windows.

---

## The `{{TraceDump}}` Tag

This tag directs BIS to output the contents of the trace buffer.

```
TraceDump
```

### Notes

- This tag is ignored (that is, removed from the output) if tracing is not being performed.
- Because trace information is accumulated as the page is rendered, it is most useful for the `TraceDump` tag to be specified near the end of the page.
- If this tag is omitted and page tracing is enabled, BIS/IIS appends trace output to the end of the response (that is, after the `</html>` tag).

- `DumpTrace` is a deprecated alias for `TraceDump`.

V12  
IIS

## The `Debug` Tag

This tag enables or disables service engine debugging for the current session. The `Debug` tag has no effect unless CodeWatch is monitoring the BIS/IIS web server.

The `Debug` tag performs the following functions:

Determines if debugging will be enabled or disabled

Optionally determines the Debug IDs that are eligible to debug this session.

Optionally specifies the addresses of the clients that are allowed to debug this session.

Please see the *Micro Focus RM/COBOL Xcentrity Business Information Server CodeWatch Supplement for Version 12*, which contains detailed information about debugging BIS services.

**Important:** debugging is currently only supported by BIS/IIS. The `Debug` tag is ignored by BIS/Apache.

The syntax of the `Debug` tag:

```
Debug ( ON|OFF... [ , ID=namelist ]... [ , IP=restriction|NOIP ]
```

Options:

<p><b>ON</b> <b>OFF</b></p>	<p>Enables or disables service program debugging in this session.  <b>ON</b> allows service programs that are subsequently created in the current session to be debugged.  <b>OFF</b> prevents service programs created in this session from being debugged and clears the list of ID strings and IP restrictions.            If a service program is running when the <code>Debug</code> tag is processed, neither <b>ON</b> nor <b>OFF</b> have any effect on that program or the current session. This function only affects whether future service programs will be debugged.</p> <p>To enable debugging and clear all IDs and IP restrictions that may have been previously set for the current session, specify <code>Debug(OFF,ON)</code>.</p>
<p><b>ID=namelist</b></p>	<p>Specifies a list of one or more <b>Debug IDs</b> that are allowed to debug service programs that run in this session. The ID is a list of case-sensitive names consisting of the letters A-Z, a-z, digits 0-9, and underscore and may each contain up to 31 characters.</p> <p>Multiple Debug IDs are separated by spaces and are processed from left to right. Alternatively, multiple <b>ID</b> attributes may be used.</p> <p>For example, if <b>ID="TOM BOB BILL"</b> (or the equivalent <b>ID="TOM ",ID=BOB, ID=BILL</b>) is specified, and a CodeWatch session for a debug ID named <b>BOB</b> has been established, then <b>BOB</b> will be able to debug this session. If <b>TOM</b> subsequently starts a session, <b>TOM</b> has priority over <b>BOB</b> and will debug the next request.</p> <p>Note that the Debug ID is case-sensitive: <b>TOM</b> is not the same as <b>Tom</b>.</p> <p>If the <b>OFF</b> action is specified, but <b>ID string</b> and/or IP restrictions are also specified, those are stored for the next <b>ON</b> action.</p>

<p><b>IP=<i>n.n.n.n</i> [-<i>n.n.n.n</i>]</b>  <b>IP=<i>n.n.n.n</i> / <i>n</i></b>  <b>IP=<i>ipv6</i> [- <i>ipv6</i> ]</b>  <b>IP=ANY   ALL</b></p>	<p>Allows debugging to be restricted to requests originating from one or more IP address. If an IP address restriction is in effect, debug requests will only be accepted from clients that have IP addresses assigned within the restricted range. A space-separated list of IP addresses or ranges may be specified. The list of IP restrictors is processed from left to right.</p> <p>If <b>ANY</b> or <b>ALL</b> is specified, requests from any IP may be debugged.</p> <p>Note that specifying either <b>127.0.0.1</b> or <b>::1</b> will allow access from a web browser running on the host's console. In this case, access the pages using <b>localhost</b>, <b>127.0.0.1</b>, or <b>[::1]</b> as the name of the host.</p> <p>If the <b>OFF</b> action (above) is specified, the IP restriction list is cleared (same as <b>IP=ANY</b>), but any IP restrictions specified in the same or later tags will be processed and stored.</p> <p>Note that IPv6 support is only available in BIS/IIS. To enhance portability, specifying <b>127.0.0.1</b> (which is recognized by all BIS versions) also enables <b>::1</b> in BIS/IIS.</p>
<p><b><u>NOIP</u></b></p>	<p>Same as <b>IP=ANY</b>.</p>

## Using the DEBUG\_BISKIT Cookie

The **Debug ID** value may also be specified in a browser cookie named **DEBUG\_BISKIT**. If a cookie with this name is sent with the request, the request handler implicitly performs the following operations while processing the **Handler** tag:

Debugging is enabled as if **Debug(ON)** was specified.

The Debug ID is set to the value of the **DEBUG\_BISKIT**.

The Debug IP is restricted to the host that sent the request containing the **DEBUG\_BISKIT**.

When CodeWatch launches a browser in response to a **Run→Start** command, the **DEBUG\_BISKIT** is automatically set to the Debug ID that was specified when the workspace was created. This allows server response files that do not contain **Debug** tags to be debugged.

## Notes

- The **Debug** tag is always removed from the rendered page. If this is the last tag on the line, a newline will be output unless this tag is immediately followed by a comment tag. See the Notes section in “`{{//}}` Comment Tags” on page 59.
- The **Debug** tag only affects service programs that have not yet been started. Any service programs that are already running in the **session** are not affected in any way by this tag.
- **Debug** tags are processed in the order that they are encountered during rendering. This means that, in this example:

```

{{ Debug( ON, ID=ArgleBargle, IP=127.0.0.1 ) }}
{{ Debug( OFF ) }}
{{ StartService( MAINPROGRAM ) }}

```

- Debugging of **MAINPROGRAM** will be disabled. However, in this case:

```

{{ Debug( ON, ID=ArgleBargle, IP=127.0.0.1 ) }}
{{ StartService( MAINPROGRAM ) }}
{{ Debug( OFF ) }}

```

- Debugging of **MAINPROGRAM** will be enabled and will occur if CodeWatch is attached with a Debug ID of **ArgleBargle**. Subsequent programs will not be debugged unless an intervening `Debug(ON)` is rendered and a new **ID** and optional **IP** restriction is set.

## Choosing a Debug ID

The Debug ID is the key to debugging BIS service programs. The ID may be the same as your login name, but it must have the following properties:

- Consist only of alphanumeric ASCII characters (A-Z, a-z, and 0-9), along with the following characters: +, =, /, \, -, \_, and \.
- Be unique among all users on the server.
- For security, it should be difficult to guess, as it can be specified in a **DEBUG\_BISKIT**. Note that specifying a **DEBUG\_BISKIT** with a random or a valid **Debug ID** is not in itself hazardous to the server, but could be dangerous if an attacker is also an authenticated user on the server. Of course, in this case, the server is already compromised.

## How it Works

1. CodeWatch attaches to the server using a Debug ID. The Debug ID may be generated by CodeWatch or may be an ID that you entered into the workspace wizard.
2. Depending on the session type, you select **Run Program** to launch a web browser, or select **Attach to Server** to debug a web service.
3. At some time in the future, a BIS session is created as the result of a HTTP request.
4. If all of the following conditions are true:
  - Debugging is enabled for the server and the session
  - CodeWatch is waiting for debugging to begin (that is, not disconnected nor already debugging another program)
  - The HTTP request arrived from an IP in the restricted range
  - The session has a Debug ID that matches the CodeWatch Debug ID

CodeWatch attaches to the session and waits for a service to begin.

The CodeWatch Debug ID is set in the CodeWatch Workspace. The BIS session Debug ID is obtained from one of these locations:

- The **DEBUG\_BISKIT** cookie. If present, this performs a `{{ Debug(ON) }}` before page rendering begins.
- The ID specified in a `{{ Debug(ON,ID=id) }}` tag, somewhere on the page before the `{{ StartService }}` tag.

## Chapter 5. Control Flow Tags

Control flow tags determine how Business Information Server processes a particular server response (.srf) file. These tags are similar to the “C” `#if/#else/#endif` and `#include` preprocessor macros.

There are two control flow tags:

- **If/Else/Endif** that may be used to prevent a section of the file from being rendered.
- An **Include** tag that can be used to embed one stencil or into another.

---

### The `{{If}}` / `{{Else}}` / `{{EndIf}}` Tags

These tags can be used to conditionally prevent sections of the stencil file from being rendered.

```
{{ if Value(parameters) }}  
    if-content  
{{ else }}  
    else-content  
{{ endif }}
```

#### Notes

- The Value parameters list has the same syntax as the parameters list for the **Value** tag: see “The `{{Value}}` Tag” on page 44. However, note that the parameters list must result in a TRUE/FALSE result, and must therefore contain a **MATCH** operation.
- The definition of *content* includes both HTML and replacement tags.
- Any HTML code in a skipped section is ignored and is not transmitted to the user agent. Server response file tags in a skipped section are ignored and are not evaluated.
- No special flow layout is implied by this tag: the **If**, **Else**, and **EndIf** tags can be on one line, or can span multiple lines.
- Blocks may be nested but must be completely nested. It is not permissible to place a **While** tag in an **If** block and have the **EndWhile** tag in a different block.
- To render on an inverted condition, just omit the if-content:  
`{{ if tag }}{{ else }}content{{ endif }}`.
- If the **If / Else / EndIf** tag is the last tag on a line, a newline will be added. If this tag is the only tag on the line, a blank line will be output. To avoid this, place a comment tag at the end of the line. For example, `{{ EndIf }}{ //{//}}`.

---

### The `{{While}}` / `{{EndWhile}}` Tags

This tag can be used to omit or duplicate a section of HTML code.

```
{{ while Value (parameters) }}  
    content  
{{ endwhile }}
```

## Notes

- The Value parameters list has the same syntax as the parameters list for the **Value** tag: see “The `{{Value}}` Tag” on page 44. However, note that the parameters list must result in a TRUE/FALSE result, and must therefore contain a **MATCH** operation.
- The definition of *content* includes both HTML and replacement tags.
- No special flow layout is implied by this tag: the **While** and **EndWhile** tags can be on one line, or can span multiple lines. These blocks can also be nested.
- A **While** block must be completely enclosed within another **While** block, or the true or false section of an **If** block. It is not permissible to use an **If** block to conditionally render an **EndWhile** tag unless the **While** tag is in the same block.
- If the **While / EndWhile** tag is the last tag on a line, a newline will be added. If this tag is the only tag on the line, a blank line will be output. To avoid this, place a comment tag at the end of the line. For example, `{{ EndWhile }}{ //{//}}`.

---

## The `{{Include}}` Tag

This tag is replaced by the contents of the specified file.

```
include filepath
```

Where *filepath* is the path to a target file whose contents, when rendered, will replace the **include** tag. You may specify an absolute path or a path relative to the physical location of the **.srf** file that contains the **Include** tag.

If the target file is a server response file, and contains a handler tag, the target file is independently processed (rendered) in its own context, and this is recursively repeated for any **Include** tags in the target file. When rendering is complete, the rendered output replaces the **Include** tag.

If the target server response file does not contain a **Handler** tag, it is treated as a text file and replaces the **Include** tag without further processing. Any unresolved tags will not be processed, but will remain in the final response.

## Notes

- Relative pathnames in *filepath* are interpreted as relative to the location of the **.srf** file that contains the **include** tag. This is also true for any additional nested **Include** tags: the path is always relative to the server response file that is being processed.
- If an included **.srf** file contains a **StartService** tag, the service program’s working directory is the directory that contains the **.srf** file that rendered the tag.
- The included file does not need to be a **.srf** file. For example, an **.html** file, a **.css** (cascading style sheet) file, or a **.js** (JavaScript) file can also be included, and in this case, the **Include** tag is simply replaced by the content of the specified file.



- On BIS/IIS, an **include** tag can appear anywhere in a **.srf** file—even before the **handler** tag.
- If an **Include** tag is the last tag on a line, it will be followed by a newline unless immediately followed by a comment tag.

---

## {}/{/} Comment Tags

This tag is ignored and is simply removed from the output. Comment tags differ from HTML comments, which remain in the output and can be viewed with the browser's **View → Source** command.

There are two ways to specify a BIS comment:

```
{ / comment }
```

```
{ !-- comment }
```

## Notes

- A comment tag can appear anywhere in a server response file—even before the **Handler** tag.
- If a comment tag is immediately followed by the end-of-line character, the newline character is removed with the comment tag. This is useful when placing tags into a file where white space is significant. For example, the **default.srf** file in the **SAMPLE2** application is coded like this:

```
{//There must be no whitespace rendered before the exchange tag, }
```

```
{// hence the newline-eating comment tags }
```

```
{ Handler * }{//}
```

```
{ Trace(start,queryparam=trace,ip=127.0.0.1) }{//}
```

```
{ RunPath(bin,../common) }{//}
```

```
{ StartService(webapps-sample2 -v) }{//}
```

```
{ XMLExchange(OnExit="gotit.srf") }
```

Here, the comment tags and the **Handler**, **Trace**, **RunPath**, and **StartService** tags are completely removed from the output, while the **XMLExchange** tag is replaced by the XML produced by the COBOL program. However, the new line character that follows each of these tags would remain in the output, resulting in six blank lines before the start of the XML produced by the **XMLExchange** tag.

To avoid this in this sample, the non-comment **Handler**, **RunPath**, and **StartService** tags are followed by empty comments, which suppress the newline characters. The **XMLExchange** tag is not followed by a newline-consuming comment because a newline is desirable before the end of the file and, in this case, the emitted XML does not contain any newline characters.



## Chapter 6. Service Programs

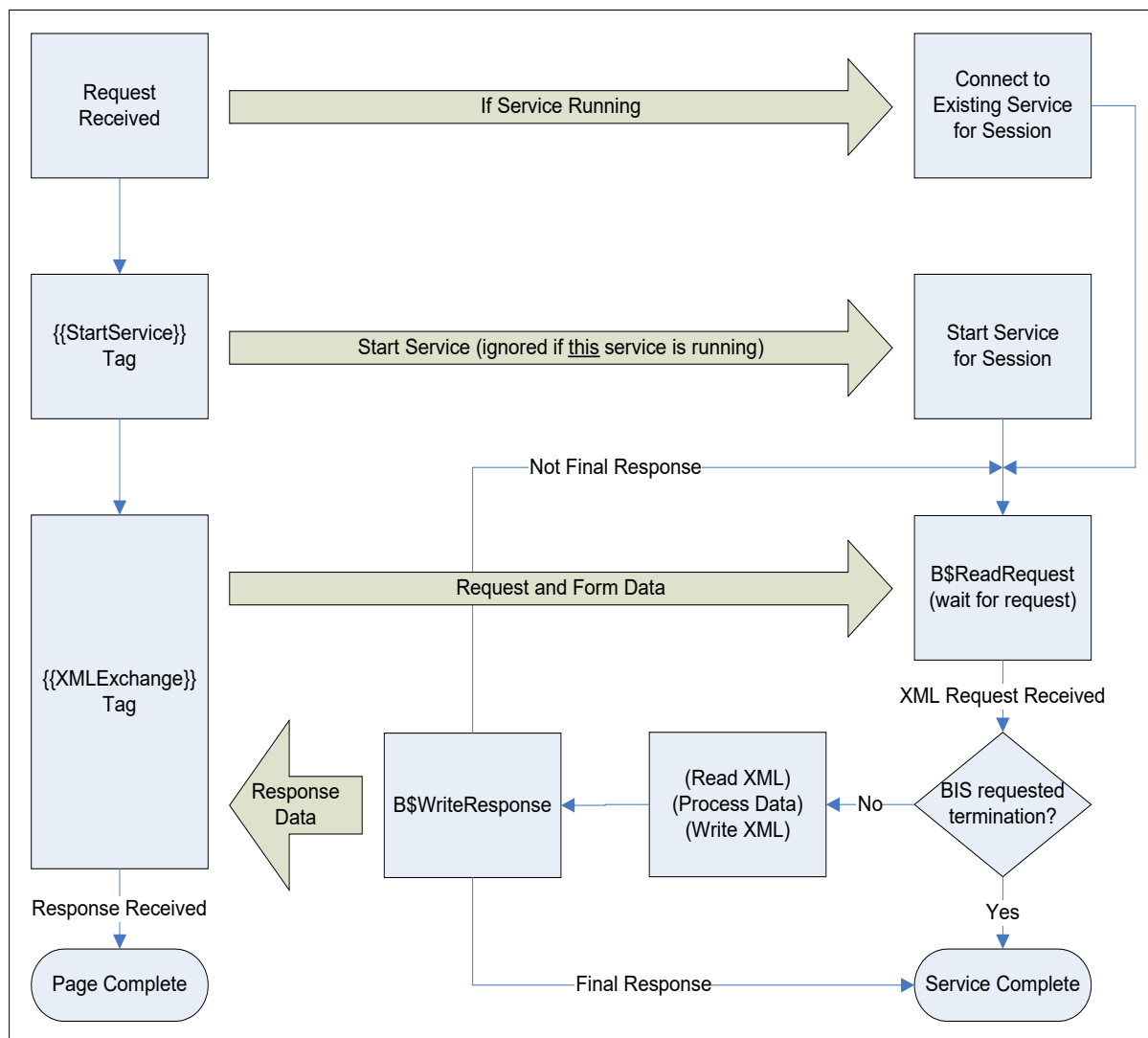
### Introduction

The **Service Engine** is the BIS component that starts and runs service programs in response to requests. Currently, all BIS service programs are RM/COBOL programs.

The Service Engine is started when a BIS **StartService** tag is rendered, and runs asynchronously from the BIS web components. BIS and the Service Engine synchronize when:

1. BIS renders an XMLExchange tag, and
2. The Service Engine calls either B\$ReadRequest or B\$Exchange.

The simplified flow of control is depicted below.



**Figure 6-1. BIS Control Flow.**

The BIS Request Handler and the BIS Service Engine synchronize when the Request Handler renders an **XMLExchange** tag and the Service Engine calls either **B\$ReadRequest** or **B\$Exchange**. Ideally, the

Service Engine will be waiting at a synchronization point when the BIS Request Handler is ready to provide a request. To avoid deadlocks, once BIS begins to process the **XMLExchange** tag:

- The service program must call either the **B\$ReadRequest** or **B\$Exchange** function within *ServiceTimeout* seconds.
- Alternatively, the program may request additional time by calling **B\$SetServiceTimeout** using 0 to reset the timer.

Once the Service Engine has accepted the request, it is granted a new *ServiceTimeout* interval to read the XML request, compute the response, write the XML response, and call **B\$WriteResponse** or **B\$Exchange**. Alternatively, the service program can terminate, which will cause the BIS Request Handler to redirect if an **OnExit** parameter was specified in the **XMLExchange** tag. If the response cannot be provided within this interval, the service program must request more time as described above.

When the BIS Request Handler receives the response, it is placed into the page output stream and processing continues. At this point, the Service Engine may:

- Wait for the next request for the current session by calling **B\$ReadRequest** or **B\$Exchange**.
- Terminate (for example, with **STOP RUN**.)

If neither of the above two events occurs, the BIS Service Engine will terminate the service program.

---

## Service Program Lifetime

A service program is started when BIS processes a **StartService** tag on a **.srf** page. A service program is considered to be finished when:

- The program terminates by executing a **STOP RUN** (or equivalent).
- The program responds to a request by calling **B\$WriteResponse** with an “end program” or “end program and session” disposition parameter (described in detail in “BIS Return Codes”, below).
- A **StopService** tag is rendered. The service program is disconnected from the session, so a subsequent **StartService** can be processed on the same page.
- A **SessionComplete** tag is rendered. The service program and session both end when the page is complete. Note that a **StopService** can also be specified if the service program must stop immediately.
- The number of seconds specified in the *InactivityTimeout* pass without a request. Both the service program and the session are terminated.
- An **XMLExchange** tag is rendered and the number of seconds specified in the *ServiceTimeout* interval pass without a response from the service program. If a service program needs a longer amount of time to complete processing, it should lengthen the *ServiceTimeout* interval by calling **B\$SetServiceTimeout()**, or call this function with a parameter of zero to reset the timer.

The following general rules apply to service programs:

- A given BIS session may have only one active service program at any time.
- When a service program enters the termination state, it is immediately disconnected from the session but is given 30 seconds to clean up and perform a **STOP RUN**. If the program is still running when the timer expires, BIS requests that the program stop at the next statement boundary and the service program is granted another 30 seconds to terminate. If, at the end of the allotted time the program has still not terminated, the process is forcibly terminated and unloaded from memory.

A new service program may be started as soon as the current service program is disconnected from the session. In other words, `{{StopService}}` `{{StartService(...)}}` is allowed.

## ACCEPT and DISPLAY Statements

**DISPLAY** statements are allowed in service programs and the data that would normally be displayed on the console is instead placed into the BIS trace output. This is a useful way to debug the service program but this technique cannot be used to communicate with clients.

Because the service program does not have access to the console or the Windows desktop, **ACCEPT** statements are treated as if the console operator pressed the Return or Enter key without actually entering any data. Otherwise, the service program would stop on an **ACCEPT**, waiting for a response that cannot come.

Note that it is still possible for a service program that uses **ACCEPT** statements to hang, if the program loops back to repeat the **ACCEPT** upon receiving a zero-length response. For this reason, it is best to add code to skip around **ACCEPT** statements if the program is running under BIS.

If a program does become unresponsive because it is looping, awaiting a response to an **ACCEPT**, BIS will terminate the program after the service timeout interval expires as described above unless a call to **B\$ReadRequest** or **B\$SetServiceTimeout** is included in the loop. Also, to avoid the creation of very large trace files, BIS/IIS will eventually suspend the tracing of **DISPLAY** statements for the remainder of the request.

## Windows Message Boxes and Dialog Boxes

Because the service program does not have access to the Windows desktop, it is not appropriate to display a message box or a dialog box. If the service program did attempt to interact with the user in this way, it will suspend waiting for a response that cannot ever come. To avoid this problem, BIS detects that the service program is attempting to create a dialog or message box and denies the request.

---

## The XML Exchange File

The Service Engine is started with a special parameter that specifies the name of the file that will be used for all XML exchange operations. BIS takes the current request, encodes it using XML, and places the request into this file when the service program calls **B\$ReadRequest** or **B\$Exchange**.

**Important:** The file is not created until one of the above two functions is called.

BIS places the fully qualified name of this file into the **BIS\_FILENAME** environment variable when the Service Engine is started. The filename, therefore, is accessible to the RM/COBOL program via the **C\$GetEnv** function:

```

01 BIS-Exchange-File-Info.
   05 BIS-Exchange-File-Result    PIC 9 BINARY.
   05 BIS-Exchange-File-Name.
      10 FILLER                    PIC X OCCURS 200 TIMES.

CALL "C$GetEnv" USING "BIS_FILENAME",
                    BIS-Exchange-File-Name,
                    BIS-Exchange-File-Result.
    
```

On BIS/IIS, the value of this variable is the fully qualified pathname of the file and the filename has this form:

```

XMLExchange-hhhhhhhh-hhhh-hhhh-hhhh-hhhhhhhhhhhh.xml
    
```

The file is created in the Windows **TEMP** directory. The **h** characters are replaced by hexadecimal digits, and the name is guaranteed to be globally unique.

On BIS/Apache, the value of this variable is the fully qualified pathname of the file and has this form:

```

bisiiiiiiiiiiiiiiiiiiii-ssss.xml
    
```

The file is created in the directory indicated by the Service Engine’s **TempDir** configuration keyword. The **i** characters are replaced by the session’s identifier and the **s** characters are replaced by a decimal number representing the number of the service within the session.

**Notes:**

- You do not provide this environment variable. BIS will automatically create this file and set the environment variable when a service program is started.
- A separate file is created for each service program, and the same file is used by
- **B\$ReadRequest** to receive requests from BIS.
- **B\$WriteResponse** to transmit responses to BIS.
- **B\$Exchange** to both receive requests and write responses.
- While the filename is already known when the service engine is started, the file itself is not created until **B\$ReadRequest** or **B\$Exchange** is called for the first time by the service program.

---

## BIS Return Codes

Here are the return codes for the **B\$** functions. These codes are defined in the **bisdef.cpy** COPY file provided in the **samples/common** directory. Note that the severity of an error condition increases with the value of the return code.

<b>00-09</b>	Success! For <b>B\$ReadRequest</b> and <b>B\$Exchange</b> , the request data is available in the XML exchange file. For <b>B\$WriteResponse</b> , the response was accepted by the Request Handler.	
	<b>00</b>	<p><b>BIS-Success</b></p> <p>The data transfer succeeded and the XML file contains the result of the operation.</p>
<b>10-19</b>	A non-fatal event occurred, and recovery is possible. While no such conditions currently exist, these codes are reserved for future use.	
<b>20-29</b>	A failure occurred but the program should be able to recover. The states of the service program and request handler have not been affected by this operation.	
	<b>20</b>	<p><b>BIS-Warn-RequestTimeExpired</b></p> <p>A timeout parameter was specified on the <b>B\$ReadRequest</b> or <b>B\$Exchange</b> call and the timeout expired. To avoid a potential race condition, the service program should not terminate when this occurs—instead, it can do some work and then reissue the request.</p>
	<b>21</b>	<p><b>BIS-Warn-RequestOutstanding</b></p> <p>A request has already been received by <b>B\$ReadRequest</b> and the service program has not responded.</p> <p>This code is only returned by BIS/Apache; BIS/IIS recreates the exchange file and returns <b>BIS_Success</b> each time that <b>B\$ReadRequest</b> is called for the same request.</p>
	<b>22</b>	<p><b>BIS-Warn-ResponseUnexpected</b></p> <p>The service program called <b>B\$WriteResponse</b> without a pending request.</p>
	<b>23</b>	<p><b>BIS-Warn-CallNotImplemented</b></p> <p>A function was called that is not implemented in this version of BIS.</p>
	<b>30-49</b>	A failure occurred. The service program may attempt to recover, correct the problem and retry the operation. The state of the service program and request handler have not been affected by this operation.
<b>30</b>	<b>BIS-Fail-FileOpen</b>	BIS could not open the XML Exchange file.
	<b>31</b>	<b>BIS-Fail-FileRead</b>
<b>32</b>	<b>BIS-Fail-FileWrite</b>	BIS could not write the XML Exchange file.
	<b>33</b>	<b>BIS-Fail-FileClose</b>

	<b>34</b>	<b>BIS-Fail-FileSize</b>
		The XML Exchange file size is too large to load into memory.
	<b>39</b>	<b>BIS-Fail-FileTraceFileIO</b>
		BIS could open or write the trace file.
	<b>49</b>	<b>BIS-Fail-FileFormat</b>
		The XML Exchange file format is invalid.
<b>50-79</b>	A failure or possible planned session/service expiration event occurred and the program cannot continue. The XML exchange file was not updated and the program should terminate as soon as possible or BIS will terminate the program after the service timeout interval expires.	
	<b>50</b>	<b>BIS-Fail-SessionAbandoned</b>
		The session timed out.
	<b>51</b>	<b>BIS-Fail-SessionComplete</b>
		The user logged out or ended the session. Note that this does not necessarily indicate a failure—a <b>SessionComplete</b> tag may have been processed.
	<b>52</b>	<b>BIS-Fail-ServiceComplete</b>
		The user logged out or ended the session. Note that this does not necessarily indicate a failure—a <b>StopService</b> tag may have been processed.
<b>80-99</b>	A serious error occurred. The XML exchange file was not updated and the program must terminate as soon as possible or BIS will terminate the program after the service timeout interval expires.	
	<b>80</b>	<b>BIS-Fail-ServerUnavailable</b>
		The service program is not running in the BIS server environment.
	<b>81</b>	<b>BIS-Fail-ServerUnspecified</b>
		An unspecified error occurred while the service program was communicating with the BIS Request Handler.
	<b>88</b>	<b>BIS-Fail-ServerInternalError</b>
		An internal error occurred while the service program was communicating with the BIS Request Handler.
	<b>89</b>	<b>BIS-Fail-ServerMemoryManagement</b>
		A memory management failure occurred in the BIS service program.
	<b>90</b>	<b>BIS-Fail-ServerBadMessage</b>



		An internal error occurred while the service program was communicating with the BIS Request Handler.
<b>91</b>	<b>BIS-Fail-ServerBadLength</b>	An internal error occurred while the service program was communicating with the BIS Request Handler.
<b>92</b>	<b>BIS-Fail-ServerBadParameter</b>	An internal error occurred while the service program was communicating with the BIS Request Handler.
<b>93</b>	<b>BIS-Fail-ServerWrongMsg</b>	An internal error occurred while the service program was communicating with the BIS Request Handler.
<b>99</b>	<b>BIS-Fail-ServerConnectionLost</b>	The connection between the BIS service program and the BIS Request Handler failed.

---

## Service Program Functions

The following COBOL-callable functions may be used in BIS service programs to communicate with BIS.

- **B\$ReadRequest**
- **B\$WriteResponse**
- **B\$Exchange**
- **B\$SetInactivityTimeout**
- **B\$SetServiceTimeout**

These functions are detailed in the following sections.

### B\$ReadRequest

This function call retrieves the current BIS request for processing by the service program. The syntax of this function call is:

```
Call "B$ReadRequest" [using TimeoutInSeconds] giving BIS-Status.
```

When this function is called, execution of the service program is suspended until one of the following events occurs:

Event	Action
The BIS Request Handler renders an <b>XMLExchange</b> tag for the current session	This tag causes the current request data to be encoded into XML and placed into the file specified by the <b>BIS_FILENAME</b> environment variable.
The BIS Request Handler renders a <b>StopService</b> or <b>SessionComplete</b> tag for the current session	This indicates that the service is no longer required. The service program should terminate and is granted <i>ServiceTimeout</i> seconds to do so.
The optional <b>TimeoutInSeconds</b> parameter expires	This timeout allows the BIS service program to regain control and perform some work. When complete, the program should call <b>B\$ReadRequest</b> again.
The <i>InactivityTimeout</i> period expires	This indicates that the end user has abandoned the session. The service program should terminate and is granted 30 seconds to do so.

The most common result codes are as follows (see “BIS Return Codes” on page 64 for a complete table):

BIS-Status Code	Event Description
<b>BIS-Success</b>	A valid request was received.
<b>BIS-Warn-RequestTimeExpired</b>	The <b>TimeoutInSeconds</b> parameter was specified and no request was received before the time elapsed.
<b>BIS-Warn-RequestOutstanding</b>	A request is outstanding. The service program must write a response before another request can be received.  This code is only returned by BIS/Apache; BIS/IIS recreates the exchange file and returns <b>BIS_Success</b> each time that <b>B\$ReadRequest</b> is called for the same request.
<b>BIS-Fail-SessionAbandoned</b>	Service termination is being requested because the BIS session inactivity time has elapsed without a request.
<b>BIS-Fail-SessionComplete</b>	Service termination is being requested because a <b>StopService</b> tag was rendered.
<b>BIS-Fail-ServiceComplete</b>	Service termination is being requested because a <b>SessionComplete</b> tag was rendered.

(These values are defined in file **bisdef.cpy**). Other codes may also be returned—see “BIS Return Codes” on page 64.

When execution resumes and the result code is **BIS-Success**, the file specified by the **BIS\_FILENAME** environment variable contains the request in XML format. The exact format of the request is described in Appendix B, “XML Exchange Request File Format” beginning on page 85.

## Notes

- The BIS Service Engine starts the service timer when this function returns. The program is then given *ServiceTimeout* seconds to process the request and perform one of these actions:
- Call **B\$WriteResponse**
- Call **B\$Exchange** (a shorthand way of calling **B\$WriteResponse** followed by a call to **B\$ReadRequest**)
- Call **B\$SetServiceTimeout**. In particular, a parameter of **0** will reset the timer, and start another *ServiceTimeout* interval.
- Terminate the program.

If the service program processes for more than the *ServiceTimeout* interval without performing one of the above functions, the BIS Service Engine assumes the service program is lost and begins termination processing (as if a **StopService** tag had been rendered).

- If the optional **TimeoutInSeconds** parameter is specified, and a request does not arrive within the specified amount of time, the function returns with a **BIS-Warn-RequestTimeExpired** status code. The program can then perform some processing and either exit or reissue the **B\$ReadRequest**.

Note that specifying a timeout of **0** causes this function to return immediately unless a request is waiting. The routine use of a timeout value of **0** to poll for requests is strongly discouraged as it may significantly impact server performance.

- If **TimeoutInSeconds** is not specified, this function does not return until one of the other termination events occur (that is, the default timeout is infinite).

## B\$WriteResponse

This function call transmits a response to the BIS Request Handler to be inserted into the output stream, replacing the **XMLExchange** tag in the output stream. The response must be written into the request file (specified by the **BIS\_FILENAME** environment variable) before **B\$WriteResponse** is called.

The response file will typically contain an HTML or XHTML block to be inserted into the **.srf** file that was requested but it may also contain a SOAP result or anything else that is meaningful to the HTML client program that issued the request.

The syntax of this function call is:

```
Call "B$WriteResponse" [using ProgramDisposition] giving BIS-Status.
```

If this is the final call to **B\$WriteResponse** by this service, the optional **ProgramDisposition** parameter may be used to indicate that the service program is finished and optionally if the session should be destroyed. Here are the values:

78 BIS-Response-Normal	Value	0. *	> Default: normal response
78 BIS-Response-ServiceComplete	Value	1. *	> End program only
78 BIS-Response-SessionComplete	Value	2. *	> End program and session
*78*BIS-Response-RecycleService	Value	3. *	> RESERVED FOR FUTURE USE

The most common result codes are as follows (see “BIS Return Codes” on page 64 for a complete table):

<b>BIS-Status Code</b>	<b>Event Description</b>
<b>BIS-Response-Normal</b>	The default is that BIS makes no assumptions about what the service program will do next. However, the service program is granted only 30 seconds to exit or to read the next request.
<b>BIS-Response-ServiceComplete</b>	<p>Indicates the service has completed processing, cannot accept any additional requests, and is about to terminate. The XML output is written to the output stream, completely replacing the <b>XMLExchange</b> tag. The service program is then disconnected from the session and allowed to run to completion in the background. If the service program subsequently calls <b>B\$ReadRequest</b> or <b>B\$Exchange</b>, it receives a <b>BIS-Fail-ServiceComplete</b> error status.</p> <p>Note that the session is not destroyed, and if a <b>StartService</b> tag is executed before the session expires, the new service program will run under the current session.</p> <p>This is logically the same as processing a <b>StopService</b> tag in the <b>.srf</b> file.</p>
<b>BIS-Response-SessionComplete</b>	<p>Indicates that the both the service and the session are complete and cannot not accept any additional requests. The XML output is written to the output stream, completely replacing the <b>XMLExchange</b> tag. The service program is disconnected from the session and allowed to run to completion in the background. If the service program subsequently calls <b>B\$ReadRequest</b> or <b>B\$Exchange</b>, it receives a <b>BIS-Fail-SessionComplete</b> error status.</p> <p>Note that, in this case, the session is destroyed, and a new session is created if another <b>.srf</b> file is requested.</p> <p>This is logically the same as processing a <b>StopService</b> tag in the <b>.srf</b> file.</p>
<b>BIS-Response-RecycleService</b>	Reserved for future use.

The **BIS-Status** result field and the result codes are defined in **bisdef.cpy**. Here are the most common return codes:

<b>BIS-Status Code</b>	<b>Event Description</b>
<b>BIS-Success</b>	The BIS Request Handler accepted the response. This does not mean that it was delivered to the user agent. However, the service program should presume success and resume processing.
<b>BIS-Warn-ResponseUnexpected</b>	There is no pending request to respond to.

## Notes

- Unlike **B\$ReadRequest**, this call returns as soon the BIS Request Handler accepts the output file. This function call does not block waiting for a response from BIS.
  - After writing a response, the service program will normally either call **B\$ReadRequest** or terminate.
  - The BIS Service Engine starts the service timer when this function returns. The program has 30 seconds to perform one of these actions:
    - Call **B\$ReadRequest**.
    - Call **B\$Exchange**.
    - Call **B\$SetServiceTimeout**. A parameter of **0** will restart the service timer.
    - Terminate.
- If the service program processes for more than 30 seconds without performing one of the above functions, the BIS Service Engine assumes the service program is lost and begins termination processing (as if a **StopService** tag had been rendered).
- Other codes may also be returned, but that normally indicates a serious problem has occurred.

## B\$Exchange

This function call is equivalent to calling **B\$WriteResponse** immediately followed by **B\$ReadRequest**. This function should be used only for the simplest programs because it is not possible to specify the program disposition parameter.

The syntax of this function call is:

```
Call "B$Exchange" using TimeoutInSeconds giving BIS-Status.
```

This is logically equivalent to this sequence:

```
call "B$WriteResponse" giving BIS-Status
if BIS-Status = BIS-Success or BIS-Status = BIS-Warn-ResponseUnexpected then
  call "B$ReadRequest" using TimeoutInSeconds giving BIS-Status
endif
```

If only **B\$Exchange** calls are used in a service program, the first call to **B\$WriteResponse** will be performed in the absence of a request and an error will be returned. This error is ignored and the result code of the call to **B\$Exchange** reflects the result of the **B\$ReadRequest**.

See the description of **B\$ReadRequest** on page 67 for a table of result codes and their interpretation.

## B\$SetInactivityTimeout

This function allows the service program to control the length of time that BIS waits for a request before considering a session to be abandoned.

A timer is started in a session when each request is processed for that session. If a new request is not received before the timer elapses, any active services in that session are terminated and the session is terminated.

If a request is subsequently received for a terminated session, BIS creates a new session.

The syntax of this function call is:

```
Call "B$SetInactivityTimeout" using TimeoutInSeconds giving BIS-Status.
```

where **TimeoutInSeconds** may be:

- The actual number of seconds this session will wait for a new request. Note that the value may range from 10 to 3600 seconds (1 hour). All values out of this range other than **0** are treated as if **-1** was specified.
- **0** to restart the inactivity timer without changing the number of seconds allowed between requests.
- **-1** to reset the timeout value to the default value of **600** seconds (10 minutes).

The **BIS-Status** result field and the result codes are defined in **BISDEF.CPY**. Here are the most common return codes:

BIS-Status Code	Event Description
<b>BIS-Success</b>	The call was successful.
<b>BIS-Fail-SessionAbandoned</b>	Service termination is already being requested because the BIS session inactivity timeout period has elapsed without a request. This function call had no effect.
<b>BIS-Fail-SessionComplete</b>	Service termination is already being requested because a <b>SessionComplete</b> tag was rendered. This function call had no effect.
<b>BIS-Fail-ServiceComplete</b>	Service termination is already being requested because a <b>StopService</b> tag was rendered. This function call had no effect.

## Notes

- The default inactivity timeout period is **600** seconds (10 minutes). The section entitled “Session Inactivity Timeout” on page 26 describes how the default may be changed for all BIS sessions on this server.
- The inactivity timeout may also be set in a **.srf** file with the **SessionParms** tag.
- All calls to this function will restart the timer. Specify **0** to restart the timer without changing the value currently in effect.
- BIS/IIS defers processing of this function until an **XMLExchange** tag is processed. The main implication of this restriction is that if the client starts the program and then browses pages that do not include an **XMLExchange** tag while the program calls **B\$SetInactivityTimeout()** followed by **B\$ReadRequest()**, the updated inactivity timeout interval will not take effect until an **XMLExchange** tag is processed. This is an unlikely scenario because there is no reason to start a service program if an **XMLExchange** tag is not imminent.

## B\$SetServiceTimeout

This function allows the service program to control the length of time that the service program is permitted to run without interacting with BIS.

The service timer is reset when:

- The service program is started.
- The service program calls any **B\$** function.

If the timer elapses, the service program is terminated. The default service timeout interval is **30** seconds.

The syntax of this function call is:

```
Call "B$SetServiceTimeout" using TimeoutInSeconds giving BIS-Status.
```

where **TimeoutInSeconds** may be:

- The actual number of seconds allowed between calls to BIS **B\$** functions. Note that the value may range from 10 to 3600 seconds (1 hour). All values out of this range other than **0** are treated as if **-1** was specified.
- **0** to restart the service timer without changing the number of seconds allowed between calls to **B\$** functions.
- **-1** to reset the timeout value to the default value of **30** seconds.

The **BIS-Status** result field and the result codes are defined in **BISDEF.CPY**. Here are the most common return codes:

BIS-Status Code	Event Description
<b>BIS-Success</b>	The call was successful.
<b>BIS-Fail-SessionAbandoned</b>	Service termination is already being requested because the BIS session inactivity time has elapsed without a request. This function call had no effect.
<b>BIS-Fail-SessionComplete</b>	Service termination is already being requested because a <b>SessionComplete</b> tag was rendered. This function call had no effect.
<b>BIS-Fail-ServiceComplete</b>	Service termination is already being requested because a <b>StopService</b> tag was rendered. This function call had no effect.

### Notes

- The default service timeout period is **30** seconds. The section entitled “Service Timeouts” on page 27 describes how the default may be changed for all BIS services on this server.
- The service timeout may also be set in a **.srf** file with the **SessionParms** tag.
- All calls to this function will restart the timer. Specify **0** to restart the timer without changing the value currently in effect.

- BIS/IIS defers processing of this function until an **XMLExchange** tag is processed. The main implication of this restriction is that if the client starts the program and then browses pages that do not include an **XMLExchange** tag while the program calls **B\$SetServiceTimeout()** followed by **B\$ReadRequest()**, the updated service timeout interval will not take effect until an **XMLExchange** tag is processed. This is an unlikely but possible scenario because there is no reason to start a service program if an **XMLExchange** tag is not imminent.



## Appendix A. Server Variables Reference

The following table describes the server variables that may be inspected with the **Value** tag. Note that the descriptions are taken from Microsoft's IIS SDK documentation and not all server variables are displayed in the TRACE output if empty.

Variable	Platform	Description
<b>ALL_HTTP</b>	IIS	All HTTP headers sent by the client.
<b>ALL_RAW</b>	IIS	Retrieves all headers in raw form. The difference between <b>ALL_RAW</b> and <b>ALL_HTTP</b> is that <b>ALL_HTTP</b> places an <b>HTTP_</b> prefix before the header name and the header name is always capitalized. In <b>ALL_RAW</b> the header name and values appear as they are sent by the client.
<b>APP_POOL_ID</b>	IIS	Returns the name of the application pool that is running in the IIS worker process that is handling the request.
<b>APPL_MD_PATH</b>	IIS	Retrieves the metabase path for the <b>Application</b> for the BIS server
<b>APPL_PHYSICAL_PATH</b>	IIS	Retrieves the physical path corresponding to the metabase path. IIS converts the <b>APPL_MD_PATH</b> to the physical (directory) path to return this value.
<b>AUTH_PASSWORD</b>	IIS	The value entered in the client's authentication dialog box. This variable is available only if Basic authentication is used.
<b>AUTH_TYPE</b>	IIS	The authentication method that the server uses to validate users when they attempt to access a protected script.
<b>AUTH_USER</b>	IIS	The name of the user as it is derived from the authorization header sent by the client, before the user name is mapped to a Windows account. This variable is no different from <b>REMOTE_USER</b> . If you have an authentication filter installed on your web server that maps incoming users to accounts, use <b>LOGON_USER</b> to view the mapped user name.
<b>CERT_COOKIE</b>	IIS	Unique ID for the client certificate, returned as a string. This can be used as a signature for the whole client certificate.

Variable	Platform	Description
<b>CERT_FLAGS</b>	IIS	Bit 0 set to 1 if the client certificate is present.  Bit 1 is set to 1 if the certification authority of the client certificate is invalid (that is, it is not in the list of recognized certification authorities on the server).
<b>CERT_ISSUER</b>	IIS	Issuer field of the client certificate (O=MS, OU=IAS, CN=user name, C=USA).
<b>CERT_KEYSIZE</b>	IIS	Number of bits in the Secure Sockets Layer (SSL) connection key size. For example, 128.
<b>CERT_SECRETKEYSIZE</b>	IIS	Number of bits in server certificate private key. For example, 1024.
<b>CERT_SERIALNUMBER</b>	IIS	Serial number field of the client certificate.
<b>CERT_SERVER_ISSUER</b>	IIS	Issuer field of the server certificate.
<b>CERT_SERVER_SUBJECT</b>	IIS	Subject field of the server certificate.
<b>CERT_SUBJECT</b>	IIS	Subject field of the client certificate.
<b>CONTENT_LENGTH</b>	All	The length of the content as given by the client.
<b>CONTENT_TYPE</b>	All	The data type of the content. Used with queries that have attached information, such as the HTTP queries <b>GET</b> , <b>POST</b> , and <b>PUT</b> .
<b>DOCUMENT_ROOT</b>	Apache	Contains the local directory from which the server is serving pages.
<b>GATEWAY_INTERFACE</b>	All	The revision of the CGI specification used by the server. The format is <b>CGI/revision</b> . Example: <b>CGI/1.1</b> .
<b>HTTP_HeaderName</b>	All	The value stored in the HTTP header <i>HeaderName</i> . Any header other than those listed below must be preceded by " <b>HTTP_</b> " in order for the <b>Value(variable, Server)</b> collection to retrieve its value. This is useful for retrieving custom headers.  The server interprets any underscore ( <code>_</code> ) characters in <i>HeaderName</i> as dashes in the actual header. For example, if you specify <b>HTTP_MY_HEADER</b> , the server searches for a request header named <b>MY-HEADER</b> .
<b>HTTP_ACCEPT</b>	All	Returns the value of the <b>Accept</b> header. For example, " <b>image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/vnd.ms-excel</b> ".

Variable	Platform	Description
<b>HTTP_ACCEPT_CHARSET</b>	IIS	The raw contents of the <b>Accept-Charset</b> header: contains a list of character sets that are acceptable in the response. For example, “ <b>iso-8859-5, unicode-1-1;q=0.8</b> ”
<b>HTTP_ACCEPT_ENCODING</b>	All	The raw contents of the <b>Accept-Encoding</b> header: contains a list of accepted encoding types, for example, “ <b>gzip, deflate</b> ”.
<b>HTTP_ACCEPT_LANGUAGE</b>	All	The raw contents of the <b>Accept-Language</b> header
<b>HTTP_AUTHORIZATION</b>	IIS	The raw contents of the <b>Authorization</b> header.
<b>HTTP_CACHE_CONTROL</b>	All	The raw contents of the <b>Cache-Control</b> header.
<b>HTTP_CONNECTION</b>	All	The raw contents of the <b>Connection</b> header.
<b>HTTP_CONTENT_LENGTH</b>	IIS	The raw contents of the <b>Content-Length</b> header.
<b>HTTP_CONTENT_TYPE</b>	IIS	The raw contents of the <b>Content-Type</b> header.
<b>HTTP_COOKIE</b>	All	Returns the cookie string that was included with the request.
<b>HTTP_DATE</b>	IIS	The raw contents of the <b>Date</b> header.
<b>HTTP_EXPECT</b>	IIS	The raw contents of the <b>Expect</b> header.
<b>HTTP_FROM</b>	IIS	The raw contents of the <b>From</b> header.
<b>HTTP_HOST</b>	All	Returns the name of the web server. This may or may not be the same as <b>SERVER_NAME</b> , depending on type of name resolution you are using on your web server (IP address or host header).
<b>HTTP_IF_MATCH</b>		
<b>HTTP_IF_MODIFIED_SINCE</b>	IIS	The raw contents of the <b>If-Modified-Since</b> header.
<b>HTTP_IF_NONE_MATCH</b>	IIS	The raw contents of the <b>If-None-Match</b> header.
<b>HTTP_IF_RANGE</b>	IIS	The raw contents of the <b>If-Range</b> header.
<b>HTTP_IF_UNMODIFIED_SINCE</b>	IIS	The raw contents of the <b>If-Unmodified-Since</b> header.
<b>HTTP_MAX_FORWARDS</b>	IIS	The raw contents of the <b>Max-Forwards</b> header.
<b>HTTP_PRAGMA</b>	IIS	The raw contents of the <b>Pragma</b> header.
<b>HTTP_PROXY_AUTHORIZATION</b>	IIS	The raw contents of the <b>Proxy-Authorization</b> header.

Variable	Platform	Description
<b>HTTP_RANGE</b>	IIS	The raw contents of the <b>Range</b> header.
<b>HTTP_REFERER</b>	All	<p>Returns a string that contains the URL of the page that referred the request to the current page by using an HTML &lt;A&gt; tag. Note that the URL is the one that the user typed into the browser address bar, which may not include the name of a default document.</p> <p>If the page is redirected, <b>HTTP_REFERER</b> is empty. <b>HTTP_REFERER</b> is not a mandatory member of the HTTP specification and some clients allow the end user to disable this information.</p> <p>Note that, in this case, <b>REFERER</b> is spelled with a single <b>R</b>.</p>
<b>HTTP_TE</b>		The raw contents of the <b>TE</b> header.
<b>HTTP_TRAILER</b>		The raw contents of the <b>Trailer</b> header.
<b>HTTP_TRANSFER_ENCODING</b>		The raw contents of the <b>Transfer-Encoding</b> header.
<b>HTTP_UPGRADE</b>		The raw contents of the <b>Upgrade</b> header.
<b>HTTP_URL</b>	All	<p>Returns the raw, encoded URL. Example: <code>"/xbis/default.srf?query"</code>. Note that the scheme and host name are not part of this URL. On Apache, this does not include the query portion.</p>
<b>HTTP_USER_AGENT</b>	All	Returns a string describing the browser that sent the request.
<b>HTTP_VERSION</b>	IIS	The raw contents of the <b>Version</b> header.
<b>HTTP_VIA</b>	IIS	The raw contents of the <b>Via</b> header
<b>HTTP_WARNING</b>	IIS	The raw contents of the <b>Warning</b> header
<b>HTTPS</b>	All	Returns <b>ON</b> if the request came in through a secure channel (for example, SSL); or it returns <b>OFF</b> , if the request is for an insecure channel.
<b>HTTPS_KEYSIZE</b>	IIS	Number of bits in the SSL connection key size. For example, <b>128</b> .
<b>HTTPS_SECRETKEYSIZE</b>	IIS	Number of bits in the server certificate private key. For example, <b>1024</b> .
<b>HTTPS_SERVER_ISSUER</b>	IIS	Issuer field of the server certificate.
<b>HTTPS_SERVER_SUBJECT</b>	IIS	Subject field of the server certificate.

Variable	Platform	Description
<b>INSTANCE_ID</b>	IIS	The ID for the IIS instance in textual format. If the instance ID is <b>1</b> , it appears as a string. You can use this variable to retrieve the ID of the web server instance (in the metabase) to which the request belongs.
<b>INSTANCE_META_PATH</b>	IIS	The metabase path for the instance of IIS that responds to the request.
<b>LOCAL_ADDR</b>	IIS	Returns the server address on which the request came in. This is important on computers where there can be multiple IP addresses bound to the computer, and you want to find out which address the request used.
<b>LOGON_USER</b>	IIS	The Windows account that the user is impersonating while connected to your web server. Use <b>REMOTE_USER</b> , <b>UNMAPPED_REMOTE_USER</b> , or <b>AUTH_USER</b> to view the raw user name that is contained in the request header. The only time <b>LOGON_USER</b> holds a different value than these other variables is if you have an authentication filter installed.
<b>PATH</b>	Apache	Contains the Apache Server's PATH environment variable.
<b>PATH_INFO</b>	IIS	Extra path information, as given by the client. You can access scripts by using their virtual path and the <b>PATH_INFO</b> server variable. If this information comes from a URL, it is decoded by the server before it is passed to the CGI script.
<b>PATH_TRANSLATED</b>	IIS	A translated version of <b>PATH_INFO</b> that takes the path and performs any necessary virtual-to-physical mapping.
<b>QUERY_STRING</b>	All	Query information stored in the string following the question mark (?) in the HTTP request.
<b>REMOTE_ADDR</b>	All	The IP address of the remote host that is making the request.
<b>REMOTE_HOST</b>	IIS	The name of the host that is making the request. If the server does not have this information, it will set <b>REMOTE_ADDR</b> and leave this empty.
<b>REMOTE_PORT</b>	All	The client port number of the TCP connection.

Variable	Platform	Description
<b>REMOTE_USER</b>	IIS	The name of the user as it is derived from the authorization header sent by the client, before the user name is mapped to a Windows account. If you have an authentication filter installed on your web server that maps incoming users to accounts, use <b>LOGON_USER</b> to retrieve the mapped user name.
<b>REQUEST_METHOD</b>	All	The method used to make the request. For HTTP, this can be <b>GET</b> , <b>HEAD</b> , <b>POST</b> , and so on.
<b>REQUEST_URI</b>	Apache	The complete URI of the request.
<b>SCRIPT_FILENAME</b>	Apache	The complete file name of the script being executed.
<b>SCRIPT_NAME</b>	All	A virtual path to the script being executed. This is used for self-referencing URLs.
<b>SERVER_ADDR</b>	Apache	The IP address to which the request was sent.
<b>SERVER_ADMIN</b>	Apache	Contains the email address of the server's system administrator. (This is contents of the ServerAdmin configuration record.)
<b>SERVER_NAME</b>	All	The server's host name, DNS alias, or IP address as it would appear in self-referencing URLs.
<b>SERVER_PORT</b>	All	The server port number to which the request was sent.
<b>SERVER_PORT_SECURE</b>	IIS	A string that contains either <b>0</b> or <b>1</b> . If the request is being handled on the secure port, then this is <b>1</b> . Otherwise, it is <b>0</b> .
<b>SERVER_PROTOCOL</b>	All	The name and revision of the request information protocol. The format is <i>protocol/revision</i> . Example: <b>HTTP/1.1</b> .
<b>SERVER_SIGNATURE</b>	Apache	The name and version of the Apache web server, plus the network name and port number on which the web server is running. Example: <b>Apache/2.0.55 (Unix) mod_ssl/2.0.55 OpenSSL/0.9.8a Server at arokh.xcentris.org Port 80&lt;/address&gt;</b>
<b>SERVER_SOFTWARE</b>	All	The name and version of the server software that answers the request and runs the gateway. The format is <i>name/version</i> . Example: <b>Microsoft-IIS/5.0</b>

Variable	Platform	Description
<b>SESSION_ID</b>	All (v12.15 or later)	This is the session ID that is sent in the <b>BISKIT</b> cookie. This string of characters uniquely identifies the currently active on this server. The string consists of characters in the “Base64” character set as defined in RFC 4648 without padding, and may therefore contain ‘/’ and ‘+’ characters.
<b>SESSION_FILEID</b>	All (v12.15 or later)	<p>This is a translated, but still unique, version of the <b>SESSION_ID</b> that may be used for URLs and filenames. It uses the “Base64 for URL” character set variant also defined by RFC 4648, where ‘+’ (plus) characters are replaced with ‘-’ (dash) and ‘/’ (forward slash) characters are replaced with ‘_’ (underline).</p> <p>The <b>SESSION_FILEID</b> may be safely used in the client program to create names for temporary files, and those names may be referenced either in the XML exchange file or embedded in the rendered response by using <code>{{Value(SESSION_FILEID)}}</code>. By using the session ID for such filenames, limiting access to the files by using ACLs, and restricting the lifetime of the files offers some security, as the names are difficult to guess.</p> <p>Note that there is no automatic cleanup for such temporary files, so the program must track and remove such files when they are no longer needed.</p>
<b>SSL_CIPHER</b>	Apache HTTPS	The name of the SSL cipher in use. Example: <b>RC4-MD5</b>
<b>SSL_CIPHER_EXPORT</b>	Apache HTTPS	Contains <b>true</b> if the cipher is an export cipher and <b>false</b> otherwise.
<b>SSL_CIPHER_ALGKEYSIZE</b>	Apache HTTPS	The maximum number of bits permitted in the cipher’s. Example: <b>128</b>
<b>SSL_CIPHER_USEKEYSIZE</b>	Apache HTTPS	The number of bits actually in use in the cipher. Example: <b>128</b>
<b>SSL_CLIENT_A_KEY</b>	Apache HTTPS	The signature algorithm used in the client key. Example: <b>rsaEncryption</b>
<b>SSL_CLIENT_A_SIG</b>	Apache HTTPS	The signature algorithm used in the client certificate. Example: <b>sha1WithRSAEncryption</b>
<b>SSL_CLIENT_I_DN</b>	Apache HTTPS	The client certificate issuer distinguish name subject. Example: <b>/CN=neo</b>

Variable	Platform	Description
<b>SSL_CLIENT_I_DN_CN</b>	Apache HTTPS	The computer name of the client certificate issuer distinguish name subject. Example: <b>neo</b>
<b>SSL_CLIENT_M_VERSION</b>	Apache HTTPS	The client certificate's version. Example: <b>3</b>
<b>SSL_CLIENT_M_SERIAL</b>	Apache HTTPS	The client certificate's serial number. Example: <b>1DFD431800000000015</b>
<b>SSL_CLIENT_S_DN</b>	Apache HTTPS	The client certificate distinguished name subject. Example: <b>/C=US/ST=TX/L=Austin/O=Xcentris/OU=R&amp;D/CN=Mike Schultz/emailAddress=m.schultz@xcentris.org</b>
<b>SSL_CLIENT_S_DN_C</b>	Apache HTTPS	The country of the client certificate distinguished name subject. Example: <b>US</b>
<b>SSL_CLIENT_S_DN_CN</b>	Apache HTTPS	The contact of the client certificate distinguished name subject. Example: <b>Mike Schultz</b>
<b>SSL_CLIENT_S_DN_Email</b>	Apache HTTPS	The email address of the client certificate distinguished name subject. Example: <b>m.schultz@xcentris.org</b>
<b>SSL_CLIENT_S_DN_L</b>	Apache HTTPS	The location of the client certificate distinguished name subject. Example: <b>Austin</b>
<b>SSL_CLIENT_S_DN_O</b>	Apache HTTPS	The organization of the client certificate distinguished name subject. Example: <b>Micro Focus</b>
<b>SSL_CLIENT_S_DN_OU</b>	Apache HTTPS	The organization unit of the client certificate distinguished name subject. Example: <b>R&amp;D</b>
<b>SSL_CLIENT_S_DN_ST</b>	Apache HTTPS	The state of the client certificate distinguished name subject. Example: <b>TX</b>
<b>SSL_CLIENT_VERIFY</b>	Apache HTTPS	Contains <b>SUCCESS</b> if the client verification was successful.
<b>SSL_CLIENT_V_END</b>	Apache HTTPS	The client certificate's validity end time. Example: <b>Dec 16 20:27:44 2006 GMT</b>
<b>SSL_CLIENT_V_START</b>	Apache HTTPS	The client certificate's validity end time. Example: <b>Dec 16 20:17:44 2005 GMT</b>
<b>SSL_PROTOCOL</b>	Apache HTTPS	The version of the SSL protocol. Example: <b>SSLv3</b>
<b>SSL_SERVER_M_VERSION</b>	Apache HTTPS	The server's certificate's version. Example: <b>1</b>



Variable	Platform	Description
<b>SSL_SERVER_M_SERIAL</b>	Apache HTTPS	The server's certificate's serial number. Example: <b>00</b>
<b>SSL_SERVER_S_DN</b>	Apache HTTPS	The server certificate distinguished name subject. Example: <b>/C=US/ST=Texas/L=Austin/O=Micro Focus/OU=Development/CN=arokh.xcentris.org/emailAddress=m.schultz@xcentris.org</b>
<b>SSL_SERVER_S_DN_C</b>	Apache HTTPS	The country of the server certificate distinguished name subject. Example: <b>US</b>
<b>SSL_SERVER_S_DN_CN</b>	Apache HTTPS	The computer name of the server certificate distinguished name subject. Example: <b>arokh.xcentris.org</b>
<b>SSL_SERVER_S_DN_Email</b>	Apache HTTPS	The email address of the server certificate distinguished name subject. Example: <b>m.schultz@xcentris.org</b>
<b>SSL_SERVER_S_DN_L</b>	Apache HTTPS	The location of the server certificate distinguished name subject. Example: <b>Austin</b>
<b>SSL_SERVER_S_DN_ST</b>	Apache HTTPS	The state of the server certificate distinguished name subject. Example: <b>Texas</b>
<b>SSL_SERVER_S_DN_O</b>	Apache HTTPS	The organization of the server certificate distinguished name subject. Example: <b>Micro Focus</b>
<b>SSL_SERVER_S_DN_OU</b>	Apache HTTPS	The organization unit of the server certificate distinguished name subject. Example: <b>Development</b>
<b>SSL_SERVER_I_DN</b>	Apache HTTPS	The server certificate issuer's distinguished name subject. Example: <b>/C=US/ST=Texas/L=Austin/O=Micro Focus/OU=Development/CN=arokh.xcentris.org/emailAddress=m.schultz@xcentris.org</b>
<b>SSL_SERVER_I_DN_C</b>	Apache HTTPS	The country of the server certificate issuer's distinguished name subject. Example: <b>US</b>
<b>SSL_SERVER_I_DN_CN</b>	Apache HTTPS	The computer name of the server certificate issuer's distinguished name subject. Example: <b>arokh.xcentris.org</b>
<b>SSL_SERVER_I_DN_Email</b>	Apache HTTPS	The email address of the server certificate issuer's distinguished name subject. Example: <b>m.schultz@xcentris.org</b>
<b>SSL_SERVER_I_DN_L</b>	Apache HTTPS	The location of the server certificate issuer's distinguished name subject. Example: <b>Austin</b>
<b>SSL_SERVER_I_DN_O</b>	Apache HTTPS	The organization of the server certificate issuer's distinguished name subject. Example: <b>Micro Focus</b>

Variable	Platform	Description
<b>SSL_SERVER_I_DN_OU</b>	Apache HTTPS	The organization unit of the server certificate issuer's distinguished name subject. Example: <b>Development</b>
<b>SSL_SERVER_I_DN_ST</b>	Apache HTTPS	The state of the server certificate issuer's distinguished name subject. Example: <b>Texas</b>
<b>SSL_SERVER_A_KEY</b>	Apache HTTPS	The signature algorithm of the server's key. Example: <b>rsaEncryption</b>
<b>SSL_SERVER_A_SIG</b>	Apache HTTPS	The signature algorithm of the server's certificate. Example: <b>md5WithRSAEncryption</b>
<b>SSL_SERVER_V_END</b>	Apache HTTPS	The server certificate's validity end time. Example: <b>Jan 13 08:13:27 2006 GMT</b>
<b>SSL_SERVER_V_START</b>	Apache HTTPS	The server certificate's validity start time. Example: <b>Dec 14 08:13:27 2005 GMT</b>
<b>SSL_VERSION_INTERFACE</b>	Apache HTTPS	The version of the SSL interface. Example: <b>mod_ssl/2.0.55</b>
<b>SSL_VERSION_LIBRARY</b>	Apache HTTPS	The version of the SSL library. Example: <b>OpenSSL/0.9.8a</b>
<b>UNMAPPED_REMOTE_USER</b>	IIS	The name of the user as it is derived from the authorization header sent by the client, before the user name is mapped to a Windows account. This variable is no different from REMOTE_USER. If you have an authentication filter installed on your web server that maps incoming users to accounts, use LOGON_USER to view the mapped user name.
<b>URL</b>	IIS	Gives the base portion of the URL.

## Appendix B. XML Exchange Request File Format

Here is a sample request, as written to the file specified by the **BIS\_FILENAME** environment variable. The request is transmitted in XML and is wrapped in the following top-level element:

```
<?xml version="1.0" encoding="UTF-8" ?>
< bis:request xmlns:bis=http://www.xcentricity.com/2003/bis/request >
  content, cookies, queryparams, server variables
</ bis:request >
```

The *content*, *cookies*, *queryparams*, *server variables* contains the four elements described in the following table:

<pre>&lt; bis:content &gt;   payload data &lt;/ bis:content &gt;</pre>	Contains the content part of the request (such as form variables POSTed back to the server). This element will be empty if there is no content data in the request—as is typically true of the first (GET) request.
<pre>&lt; bis:cookies &gt;   &lt; bis:cookie name=name &gt;     cookie data   &lt; /bis:cookie &gt;   ... &lt;/ bis:cookies &gt;</pre>	Contains an attributed <b>&lt;bis:cookie&gt;</b> element for each cookie that was transmitted with the request.
<pre>&lt; bis:query-params &gt;   &lt; bis:query-param name=name &gt;     parameter data   &lt;/ bis:query-param &gt;   ... &lt;/ bis:query-params &gt;</pre>	Contains an attributed <b>&lt;bis:query-param&gt;</b> element for each query parameter that was transmitted with the request.
<pre>&lt; bis:server-variables &gt;   &lt; bis:server-variable name=name &gt;     server variable data   &lt;/ bis:server-variable &gt;   ... &lt;/ bis:server-variables &gt;</pre>	Contains an attributed <b>&lt;bis:server-variable&gt;</b> element for each server variable associated with this request.

The content of a sample request file is below. Note that this is also visible in the trace output, if tracing is enabled. Also note that the **<bis:content>** section is application-dependent. This particular example is from the <http://localhost/xbis12/samples/sample1> application with the following data entered into the form fields:

Containing Element	Element	Attribute	Value
<b>bis:content</b>	<b>firstname.Q12</b>		<b>John</b>
	<b>lastname.Q20</b>		<b>Smith</b>

	<b>email.Q33</b>		<b>J.Smith@xcentrinity.org</b>
	<b>gender.Q52</b>		<b>Male</b>
<b>bis:cookies</b>	<b>cookie</b>	<b>Name="BISKIT"</b>	<b>VH9rQjrTe1b54iQ2vnTkS898YaF7</b>
<b>bis:query-params</b>	<b>query-param</b>	<b>Name="__xmlch"</b>	<b>HQaD</b>

The form fields are stored directly into elements contained in the **<bis:content>** element, while the cookies and query parameters are stored as attributed elements into the **<bis:cookies>** and **<bis:query-params>** sections, respectively. Finally, all server variables are output into the **<bis:server-variables>** section (not depicted above). Using RM/COBOL XML Extensions and XSLT, the service program can selectively extract any or all of these elements and ignore elements that are not important to the application.

Here is the complete XML exchange file for this example. Note that the XML tags are indented to make the example easier to read.

```

<?xml version="1.0" encoding="UTF-8" ?>
<bis:request xmlns:bis="http://www.xcentrisity.com/2003/bis/request">
  <bis:content> <email.Q33__1>
    <![CDATA[
      J.Smith@xcentrisity.org
    ]]>
  </email.Q33__1>
  <firstname.Q12>
    <![CDATA[
      John
    ]]>
  </firstname.Q12>
  <gender.Q52>
    <![CDATA[
      Male
    ]]>
  </gender.Q52>
  <lastname.Q20>
    <![CDATA[
      Smith
    ]]>
  </lastname.Q20>
</bis:content>
<bis:cookies>
  <bis:cookie name="BISKIT">1
  <![CDATA[
    pR+APfDpGuK1+ZuSMAD5zLas/MZ3
  ]]>
</bis:cookie>
  <bis:cookie name="BISKIT">
  <![CDATA[
    VH9rQjrTelb54iQ2vnTkS898YaF7
  ]]>
</bis:cookie>
</bis:cookies>
<bis:query-params>
  <bis:query-param name="__xmlench">
  <![CDATA[
    HQaD
  ]]>
</bis:query-param>
</bis:query-params>
<bis:server-variables>
  <bis:server-variable name="ALL_HTTP">
  <![CDATA[
    HTTP_ACCEPT:image/gif, image/x-xbitmap, image/jpeg, image/pjpeg,
    application/x-shockwave-flash, application/vnd.ms-excel, application/vnd.ms-
    powerpoint, application/msword, */*
    HTTP_ACCEPT_LANGUAGE:en-us
    HTTP_CONNECTION:Keep-Alive
    HTTP_HOST:localhost
    HTTP_REFERER:http://localhost/xbis12/samples/sample1/default.srf?trace=page,ex
    chfiles,file
    HTTP_USER_AGENT:Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET
    CLR 1.1.4322; InfoPath.1; .NET CLR 2.0.50727)
    HTTP_COOKIE:BISKIT=VH9rQjrTelb54iQ2vnTkS898YaF7;
    BISKIT=pR+APfDpGuK1+ZuSMAD5zLas/MZ3
    HTTP_CONTENT_LENGTH:90
    HTTP_CONTENT_TYPE:application/x-www-form-urlencoded
    HTTP_ACCEPT_ENCODING:gzip, deflate
  ]]>

```

---

<sup>1</sup> The **BISKIT** cookie appears twice because a new session for the **SAMPLE1** program was created when this sample was run from the main menu. The session created for the main menu continues to run, as it is isolated from the **SAMPLE1** session.

```

HTTP_CACHE_CONTROL:no-cache
]]>
</bis:server-variable>
<bis:server-variable name="ALL_RAW">
<![CDATA[
Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/x-
shockwave-flash, application/vnd.ms-excel, application/vnd.ms-powerpoint,
application/msword, */*
Accept-Language: en-us
Connection: Keep-Alive
Host: localhost
Referer:
http://localhost/xbis12/samples/sample1/default.srf?trace=page,exchfiles,file
User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR
1.1.4322; InfoPath.1; .NET CLR 2.0.50727)
Cookie: BISKIT=VH9rQjrTelb54iQ2vnTkS898YaF7;
BISKIT=pR+APfDpGuK1+ZuSMAD5zLas/MZ3
Content-Length: 90
Content-Type: application/x-www-form-urlencoded
Accept-Encoding: gzip, deflate
Cache-Control: no-cache
]]>
</bis:server-variable>
<bis:server-variable name="APPL_MD_PATH">
<![CDATA[
/LM/W3SVC/1/Root/xbis12
]]>
</bis:server-variable>
<bis:server-variable name="APPL_PHYSICAL_PATH">
<![CDATA[
d:\dev\BIS12.00\rmc85\bis\
]]>
</bis:server-variable>
<bis:server-variable name="AUTH_PASSWORD" />
<bis:server-variable name="AUTH_TYPE" />
<bis:server-variable name="AUTH_USER" />
<bis:server-variable name="CERT_COOKIE" />
<bis:server-variable name="CERT_FLAGS" />
<bis:server-variable name="CERT_ISSUER" />
<bis:server-variable name="CERT_KEYSIZE" />
<bis:server-variable name="CERT_SECRETKEYSIZE" />
<bis:server-variable name="CERT_SERIALNUMBER" />
<bis:server-variable name="CERT_SERVER_ISSUER" />
<bis:server-variable name="CERT_SERVER_SUBJECT" />
<bis:server-variable name="CERT_SUBJECT" />
<bis:server-variable name="CONTENT_LENGTH">
<![CDATA[
90
]]>
</bis:server-variable>
<bis:server-variable name="CONTENT_TYPE">
<![CDATA[
application/x-www-form-urlencoded
]]>
</bis:server-variable>
<bis:server-variable name="GATEWAY_INTERFACE">
<![CDATA[
CGI/1.1
]]>
</bis:server-variable>

```

```

<bis:server-variable name="HTTP_ACCEPT">
  <![CDATA[
image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/x-shockwave-
flash, application/vnd.ms-excel, application/vnd.ms-powerpoint,
application/msword, */*
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_ACCEPT_ENCODING">
  <![CDATA[
gzip, deflate
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_ACCEPT_LANGUAGE">
  <![CDATA[
en-us
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_CACHE_CONTROL">
  <![CDATA[
no-cache
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_CONNECTION">
  <![CDATA[
Keep-Alive
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_CONTENT_LENGTH">
  <![CDATA[
90
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_CONTENT_TYPE">
  <![CDATA[
application/x-www-form-urlencoded
  ]]>
- <bis:server-variable name="HTTP_COOKIE">
  <![CDATA[
BISKIT=VH9rQjrTelb54iQ2vnTkS898YaF7; BISKIT=pR+APfDpGuK1+ZuSMAD5zLas/MZ3
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_HOST">
  <![CDATA[
localhost
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_REFERER">
  <![CDATA[
http://localhost/xbis12/samples/sample1/default.srf?trace=page,exchfiles,file
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_URL">
  <![CDATA[
/xbis12/samples/sample1/default.srf?__xmlexch=HQaD
  ]]>
</bis:server-variable>
<bis:server-variable name="HTTP_USER_AGENT">
  <![CDATA[
Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR 1.1.4322;
InfoPath.1; .NET CLR 2.0.50727)
  ]]>

```



```

]]>
</bis:server-variable>
<bis:server-variable name="HTTP_VERSION">
<![CDATA[
HTTP/1.1
]]>
</bis:server-variable>
<bis:server-variable name="HTTPS">
<![CDATA[
off
]]>
</bis:server-variable>
<bis:server-variable name="HTTPS_KEYSIZE" />
<bis:server-variable name="HTTPS_SECRETKEYSIZE" />
<bis:server-variable name="HTTPS_SERVER_ISSUER" />
<bis:server-variable name="HTTPS_SERVER_SUBJECT" />
<bis:server-variable name="INSTANCE_ID">
<![CDATA[
1
]]>
</bis:server-variable>
<bis:server-variable name="INSTANCE_META_PATH">
<![CDATA[
/LM/W3SVC/1
]]>
</bis:server-variable>
<bis:server-variable name="LOCAL_ADDR">
<![CDATA[
127.0.0.1
]]>
</bis:server-variable>
<bis:server-variable name="LOGON_USER" />
<bis:server-variable name="PATH_INFO">
<![CDATA[
/xbis12/samples/sample1/default.srf
]]>
</bis:server-variable>
<bis:server-variable name="PATH_TRANSLATED">
<![CDATA[
d:\dev\BIS12.00\rmc85\bis\samples\sample1\default.srf
]]>
</bis:server-variable>
<bis:server-variable name="QUERY_STRING">
<![CDATA[
__xmlench=HQaD
]]>
</bis:server-variable>
<bis:server-variable name="REMOTE_ADDR">
<![CDATA[
127.0.0.1
]]>
</bis:server-variable>
<bis:server-variable name="REMOTE_HOST">
<![CDATA[
127.0.0.1
]]>
</bis:server-variable>
<bis:server-variable name="REMOTE_PORT">
<![CDATA[
1908
]]>

```

```

</bis:server-variable>
<bis:server-variable name="REMOTE_USER" />
<bis:server-variable name="REQUEST_METHOD">
<![CDATA[
POST
]]>
</bis:server-variable>
<bis:server-variable name="SCRIPT_NAME">
<![CDATA[
/xbis12/samples/sample1/default.srf
]]>
</bis:server-variable>
<bis:server-variable name="SERVER_NAME">
<![CDATA[
localhost
]]>
</bis:server-variable>
<bis:server-variable name="SERVER_PORT">
<![CDATA[
80
]]>
</bis:server-variable>
<bis:server-variable name="SERVER_PORT_SECURE">
<![CDATA[
0
]]>
</bis:server-variable>
<bis:server-variable name="SERVER_PROTOCOL">
<![CDATA[
HTTP/1.1
]]>
</bis:server-variable>
<bis:server-variable name="SERVER_SOFTWARE">
<![CDATA[
Microsoft-IIS/5.1
]]>
</bis:server-variable>
<bis:server-variable name="SESSION_ID">2
<![CDATA[
pR+APfDpGuK1+ZuSMAD5zLas/MZ3
]]>
</bis:server-variable>
<bis:server-variable name="SESSION_FILEID">2
<![CDATA[
Pr-APfDpGuK1-ZuSMAD5zLas_MZ3
]]>
</bis:server-variable>
<bis:server-variable name="UNMAPPED_REMOTE_USER" />
<bis:server-variable name="URL">
<![CDATA[
/xbis12/samples/sample1/default.srf
]]>
</bis:server-variable>
</bis:server-variables>
</bis:request>

```

<sup>2</sup> **SESSION\_ID** and **SESSION\_FILEID** require BIS for RM/COBOL version 12.15 and later.

## Appendix C. Windows/UNIX Portability Considerations

BIS is designed to allow web applications and services to be portable between Windows and UNIX-based web servers and operating systems. This means that, with some care, the developer can produce stencils (that is, **.srf** files) and service programs that do not depend on platform-specific features or characteristics and are, thus, portable. If a portable application is the goal, the following issues must be considered.

- The **Handler** tag is required for all platforms; however the parameter has no effect when rendered on UNIX. For portability, specify `{{ Handler * }}`.
- Pathnames referenced by stencils and service programs are subject to the differences between Windows and UNIX file naming conventions/rules. If portability is an objective, they must be chosen carefully. In particular, UNIX file naming is case-sensitive, and Windows is not. This means that a portable application should be consistent in its use of case within file names, and the files themselves should be named in accordance with that consistent use.

If there is any possibility that a BIS application will be moved between UNIX and Windows, it is a good practice to restrict filenames to all lower-case names without any embedded spaces.

- Pathnames are also subject to the different conventions regarding the directory edge-name separator (“/” vs. “\”). In order to enable portable **.srf** files, BIS allows the “/” to be used on both Windows and UNIX everywhere except in the **Handler** tag. If portability is the goal, the “\” character should not be used as a pathname separator.
- There are a few features that are implemented in BIS/IIS on Windows, but have not yet been implemented on UNIX. These are called out with the **IIS** icon in the section of this document where the feature is described.
- Newer versions of BIS support tags that may not be recognized by older versions.

No application should be assumed to be portable unless it has been tested in every environment to which it is expected to be deployed.



## Appendix D. Regular Expression Syntax

Regular expressions may be used in the **MATCH** and **SUBSTITUTE** parameters of the **Value** tag.

### Metacharacters

This table lists the metacharacters that may be used in `{Value(...MATCH= regex)}` and `{Value(...SUBSTITUTE= regex)}`.

Metacharacter	Meaning
.	Matches any single character.
[ ]	Indicates a character class. Matches any character inside the brackets (for example, <code>[abc]</code> matches "a", "b", and "c").
^	If this metacharacter occurs at the start of a character class, it negates the character class. A negated character class matches any character except those inside the brackets (for example, <code>[^abc]</code> matches all characters except "a", "b", and "c"). If ^ is at the beginning of the regular expression, it matches the beginning of the input (for example, <code>^[abc]</code> will only match input that begins with "a", "b", or "c").
-	In a character class, indicates a range of characters (for example, <code>[0-9]</code> matches any of the digits "0" through "9").
?	Indicates that the preceding expression is optional: it matches once or not at all (for example, <code>[0-9][0-9]?</code> matches "2" and "12").
+	Indicates that the preceding expression matches one or more times (for example, <code>[0-9]+</code> matches "1", "13", "666", and so on).
*	Indicates that the preceding expression matches zero or more times.
??, +?, *?	Non-greedy versions of ?, +, and *. These operators match as little as possible, unlike the greedy versions which match as much as possible. Example: given the input " <code>&lt;abc&gt;&lt;def&gt;</code> ", <code>&lt;.*?&gt;</code> matches " <code>&lt;abc&gt;</code> " while <code>&lt;.*&gt;</code> matches " <code>&lt;abc&gt;&lt;def&gt;</code> ".
()	Grouping operator. Example: <code>(\d+)*\d+</code> matches a list of numbers separated by commas (such as "1" or "1,23,456").
{ }	Indicates a match group.
\	Escape character: interpret the next character literally (for example, <code>[0-9]+</code> matches one or more digits, but <code>[0-9]\+</code> matches a digit followed by a plus character). Also used for abbreviations (such as <code>\a</code> for any alphanumeric character; see the table below). If \ is followed by a number <i>n</i> , it matches the <i>n</i> th match group (starting from 0). Example: <code>&lt;{.*?}&gt;.*?&lt;/\0&gt;</code> matches " <code>&lt;head&gt;Contents&lt;/head&gt;</code> ".

Metacharacter	Meaning
\$	At the end of a regular expression, this character matches the end of the input. Example: <b>[0-9]\$</b> matches a digit at the end of the input.
	Alternation operator: separates two expressions, exactly one of which matches (for example, <b>T the</b> matches "The" or "the").
!	Negation operator: the expression following <b>!</b> does not match the input. Example: <b>a!b</b> matches "a" not followed by "b".

---

## Abbreviations

Abbreviations such as **\d** instead of **[0-9]** are allowed. The following abbreviations are recognized:

Abbreviation	Expansion	Matches
<b>\a</b>	<b>([a-zA-Z0-9])</b>	Any alphanumeric character
<b>\b</b>	<b>([ \t])</b>	White space (blank)
<b>\c</b>	<b>([a-zA-Z])</b>	Any alphabetic character
<b>\d</b>	<b>([0-9])</b>	Any decimal digit
<b>\h</b>	<b>([0-9a-fA-F])</b>	Any hexadecimal digit
<b>\n</b>	<b>(\r (\r?\n))</b>	Newline (both Windows and UNIX)
<b>\q</b>	<b>(\"[^\"]*" '[^']*')</b>	A quoted string (either single or double quotes)
<b>\w</b>	<b>([a-zA-Z]+)</b>	A simple word
<b>\z</b>	<b>([0-9]+)</b>	An integer

---

## Comparison to RM/COBOL LIKE Condition Regular Expressions

Forms that are common to both Windows expressions and RM/COBOL LIKE expressions are as follows:

Use of "." for matching any character. There may or may not be a difference here. In Windows expressions, it simply says "any character", but they probably intended to exclude newline and possibly return. In RM/COBOL LIKE expressions, "." is actually an abbreviation for the class "[^\r\n]", that is, any character except newline or return.

Simple forms of class expressions using brackets, with or without negation using the "^" and with sequences specified with a joining "-".

Repetition operators "?", "+", and "\*" are the same and have the same effect in both kinds of expressions.

Use of the "\" as an escape for characters that would otherwise be operators and to introduce class abbreviations.

Grouping using parentheses.

Alternatives using “|”.

The class abbreviation “\d” for decimal digits is common.

The class abbreviation “\n” (newline), but the definitions differ. In Windows expressions, it means “(\r|(\r?\n))”, where “r” is undefined but is probably 0x0d (return) and “\n” is recursive but in this context is probably simply 0x0a (newline). In RM/COBOL LIKE expressions, “\n” is simply 0x0a (newline).

Forms in Windows expressions that are not in RM/COBOL LIKE expressions are as follows:

Use of “^” or “\$” to match the beginning or end of an expression. RM/COBOL LIKE expressions (from XML Schema) must match the entire string, so these are neither needed nor supported.

The non-greedy operators using “??”, “+?”, and “\*?”.

Match groups specified in braces. This form conflicts with the repetition operator in braces in RM/COBOL LIKE expressions.

Use of “\” followed by one or more digits for referencing a previously specified match group value, that is, the value captured by the specified match group.

The negation operator “!”.

The abbreviations “\a” (alphanumeric), “\b” (white space), “\c” (alphabetic), “\h” (hexadecimal digit), “\q” (quoted string), “\w” (simple word), “\z” (integer). Note that “\c” and “\w” are in RM/COBOL LIKE expressions, but have conflicting meanings.

The order of precedence of operators is not described and thus may differ from RM/COBOL LIKE expressions.

Forms in RM/COBOL LIKE expressions that are **not** in Windows expressions are as follows:

Class expressions, that is, the ability in a class to subtract another class to form a result class that is the difference of two classes.

The repetition operator using braces and counts. This conflicts with match groups in Windows expressions.

Recognition of XML entities such as “&” and character references such as “&#xh”, where *h* represents one or more hexadecimal digits, although these may have already been resolved by their appearance in XML pages for BIS purposes.

Regular expression single-character escape sequences (called abbreviations in Windows expressions) “\r” (return) and “\t” (horizontal tab).

Multi-character escapes (called abbreviations in Windows expressions) “\s” (white space), “\S” (not white space), “\i” (initial name characters of XML), “\I” (not initial name characters of XML), “\c” (name characters of XML), “\C” (not name characters of XML), “\w” (all characters except punctuation, separator, symbol and other characters), “\W” (punctuation, separator, symbol and other characters). Note that “\c” and “\w” are in Windows expressions but have conflicting meanings.

Category escapes that match sets of characters based on their Unicode category (“\p{X}” and “\P{X}”, where *X* represents a Unicode character property designator; for example, L for letters, Lu for uppercase letters, and so forth; or a Unicode character block, for example, IsBasicLatin.





## Appendix E. Log Files

In order to provide usage information over a long period of time, BIS keeps a set of log files in a specific directory. The log files can also be used by the web server administrator or BIS application developer to determine usage patterns of web applications on a BIS server system. The BIS log files consist of variable-length records comprised of space-separated fields. If a field contains spaces or special characters, the field is quoted. If a field is omitted, it is replaced by a dash (-) character.

---

### Log File Location

Under IIS, the log files are written to the BIS application data directory, normally:

```
C:\Documents and Settings\All Users\Application Data\Micro Focus\RM\BIS\LogFiles
```

Each log file has the following name, composed from the UTC time when the log file was created:

```
yyyyMMddhmmss.log
```

On UNIX, the log files are written to the directory specified by the **LogDirectory** (or **LogDir**) directive in the **/etc/xbis.conf** file. This is usually a subdirectory of the configured “temp” directory, such as:

```
/var/tmp/bislogs
```

Each log file has the following name, composed from the date portion of the UTC time when the log file was created:

```
yyyyMMdd.log
```

---

### Log File Format

Each record begins with a timestamp followed by a record type. The content of the record varies and is dependent on the record type. The general format of each log record is:

```
timeStamp recordType field1 field2 field3..
```

where:

<b>timeStamp</b>	The UTC time when this record was created. The format is  <b>yyyyMMddhhmmss</b>  This format can be sorted. Note that the <b>loggerBegin</b> record contains a <b>timeLocal</b> local time field, and this may be used to determine the UTC offset.
<b>recordType</b>	A single character that encodes the record type. See the table below.
<b>Fields</b>	One or more space-separated, variable length fields. The type and order of the fields varies with <b>recordType</b> . If a field contains spaces, the field will be surrounded by double quotes. An embedded double quote character is coded with two consecutive double quotes. A single dash replaces any field with an undefined or unknown value. Numeric values have leading and trailing insignificant zeroes suppressed.

The following table lists the record types, the log level of that type, and the values that each record of the specified type contains. The value codes are defined below.

Code	Level	Record Type	Fields
<b>L</b>	1	<b>loggerBegin</b>	<b>versionBIS, versionLog, timeLocal</b>
<b>S</b>	2	<b>sessionBegin</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA</b>
<b>V</b>	3	<b>serviceBegin</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA, idService, nameService</b>
<b>R</b>	4	<b>serviceRequest</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA, idService, lengthRequest</b>
<b>r</b>	4	<b>serviceResponse</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA, idService, lengthResponse</b>
<b>v</b>	3	<b>serviceEnd</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA, idService, tallyRequests, tallyLengthReq, tallyLengthResp, timeCPU, histIO</b>
<b>s</b>	2	<b>sessionEnd</b>	<b>idSession, countUses, ipUA, idUA, typeIdUA, tallyRequests, tallyLengthReq, tallyLengthResp, timeCPU, histIO</b>
<b>l</b>	1	<b>loggerEnd</b>	<b>tallyRequests, tallyLengthReq, tallyLengthResp, timeCPU, histIO</b>
<b>Z</b>	-	<b>licenseInfo</b>	<b>idBaseLicense, idSerialNumber, nUseCount, strLicenseKey</b>

where:

<b>Code</b>	A character that indicates the record type.
<b>Record Type</b>	The type of record. Each type is discussed in the table below.
<b>Level</b>	The level of this record type. Future versions of BIS will allow logging to be restricted by level.

<b>Fields</b>	The fields that appear in this type of record. The fields are described in the table below.
---------------	---

The record types are nested: there will normally be a matching **sessionEnd** record for each **sessionBegin** record. The **licenseInfo** record is an exception: this record will occur by itself. For BIS/IIS, the **licenseInfo** record is written after BIS is loaded and the first service is started. Because much of the BIS subsystem is unloaded after a period of idle time and automatically reloaded on demand, this record may occur more than once in a given log file.

## Log Record Types

Here are complete definitions of the various record types:

Record Type	Field	Description
<b>loggerBegin</b>	<b>versionBIS</b>	The BIS version number, set to <b>08.02.00</b> for the first release
	<b>versionLog</b>	The version number of the log. Set to <b>1</b> for the first release
	<b>timeLocal</b>	The local time, in <b>yyyyMMddhhmmss</b> format
<b>sessionBegin</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or "-" in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> = <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> = <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
<b>serviceBegin</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)

Record Type	Field	Description
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or - in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
	<b>idService</b>	ID distinguishing different service instances within the current session
	<b>nameService</b>	Service program name
<b>serviceRequest</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or - in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
	<b>idService</b>	ID distinguishing different service instances within the current session
	<b>lengthRequest</b>	Length (in bytes) of the BIS exchange file passed by <b>B\$ReadRequest</b> or <b>B\$Exchange</b>
<b>serviceResponse</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)

Record Type	Field	Description
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or - in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
	<b>idService</b>	ID distinguishing different service instances within the current session
	<b>lengthResponse</b>	Length (in bytes) of the BIS exchange file passed by <b>B\$WriteResponse</b> or <b>B\$Exchange</b>
<b>serviceEnd</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or - in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
	<b>idService</b>	ID distinguishing different service instances within the current session
	<b>tallyRequests</b>	The number of requests processed by the service
	<b>tallyLengthReq</b>	Total length (in bytes) of the BIS exchange files passed by <b>B\$ReadRequest</b> or <b>B\$Exchange</b>
<b>tallyLengthResp</b>	Total length (in bytes) of the BIS exchange files passed by <b>B\$WriteResponse</b> or <b>B\$Exchange</b>	

Record Type	Field	Description
	<b>timeCPU</b>	Total CPU time in milliseconds used by this service or “-”, if not available
	<b>histIO</b>	IO request counts used by this service represented by three integers: # of open operations, # of read operations, # of writes/rewrites/delete operations
<b>sessionEnd</b>	<b>idSession</b>	The cookie value of the session
	<b>countUses</b>	The current use count
	<b>ipUA</b>	The IP address of the user agent in dotted quad notation (normally the same as the <b>HTTP_REMOTE_ADDR</b> server variable)
	<b>idUA</b>	An MD5 digest of user entity identification information ( <b>CERT_SUBJECT</b> , <b>AUTH_USER</b> , or - in order of preference, see <b>typeIdUA</b> )
	<b>typeIdUA</b>	A two digit code that indicates the degree of authentication/specificity of the user ID, as follows: <b>00</b> No <b>AUTH_USER</b> and no <b>CERT_SUBJECT</b> <b>10</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>off</b> ) <b>20</b> <b>AUTH_USER</b> and ( <b>HTTPS</b> == <b>on</b> ) and no <b>CERT_SUBJECT</b> <b>30</b> <b>CERT_SUBJECT</b> and no <b>AUTH_USER</b> <b>40</b> <b>CERT_SUBJECT</b> and <b>AUTH_USER</b>
	<b>tallyRequests</b>	The number of requests processed by the session
	<b>tallyLengthReq</b>	Total length (in bytes) of the BIS exchange file passed by <b>B\$ReadRequest</b> or <b>B\$Exchange</b> since the start of this session
	<b>tallyLengthResp</b>	Total length (in bytes) of the BIS exchange file passed by <b>B\$WriteResponse</b> or <b>B\$Exchange</b> since the start of this session
	<b>timeCPU</b>	Total CPU time in milliseconds used by services since the start of this session or “-”, if not available
	<b>histIO</b>	IO request counts accumulated since the start of this session represented by three integers: # of open operations, # of read operations, # of writes/rewrites/delete operations
<b>loggerEnd</b>	<b>tallyRequests</b>	The number of requests processed since the start of this log
	<b>tallyLengthReq</b>	Total length (in bytes) of the BIS exchange file passed by <b>B\$ReadRequest</b> or <b>B\$Exchange</b> since the start of this log
	<b>tallyLengthResp</b>	Total length (in bytes) of the BIS exchange file passed by <b>B\$WriteResponse</b> or <b>B\$Exchange</b> since the start of this log

Record Type	Field	Description
	<b>timeCPU</b>	Total CPU time in milliseconds used by services since the start of this log or “–”, if not available
	<b>histIO</b>	IO request counts accumulated since the start of this log represented by three integers: # of open operations, # of read operations, # of writes/rewrites/delete operations
<b>licenseInfo</b>	<b>idBaseLicense</b>	The base license ID from the Service Engine license file.
	<b>idSerialNumber</b>	The serial number from the Service Engine license file.
	<b>nUseCount</b>	The use count from the Service Engine license file.
	<b>strLicenseKey</b>	The contents of the <b>WebServer</b> license key.





## Appendix F. BIS Troubleshooting Tips

This Appendix outlines the symptoms of some common abnormal conditions, and provides insight as to the possible cause(s) and corrective action(s).

Before troubleshooting, if you are using Internet Explorer, be sure that the **Show Friendly HTTP error messages** option is not checked. This option can be found in **Tools → Internet Options → Advanced → Browsing** in either Internet Explorer or **Control Panel → Internet Options**.

- Symptom:

```
Server Error in Application "Default Web Site/XBIS12"

HTTP Error 500.0 - Internal Server Error
Description: Handler "AboMapperCustom-24582078" has a bad module
    "IsapiModule" in its module list
Error Code: 0x8007000d
Notification: ExecuteRequestHandler
Module: IIS Web Core
Requested URL: http://localhost:80/xbis12/samples/default.srf?trace=page
Physical Path: C:\inetpub\wwwroot\XBIS12\samples\default.srf
Logon User: Anonymous
Logon Method: Anonymous
Handler: AboMapperCustom-24582078
```

- **Possible Cause:** Indicates that IIS ISAPI extension support is not installed.
- **Suggestion:** In Windows Vista or Windows 2008 Server, start **Programs and Features** in the Windows control panel, and ensure that **ISAPI Extensions** are enabled (that is, the option is checked) under **Internet Information Services → World Wide Web Services → Application Development Features**.
- **Symptom:**

```
Micro Focus RM/COBOL Business Information Server Error
An error occurred while BIS was processing your request. Additional
information is below.
XMLExchange failed: the service program returned error
"80004004", which is "Operation aborted". The session has ended.
```

- **Possible Cause:** Indicates that there was a problem starting the Service Engine.
- **Suggestion:** To narrow the problem, turn on tracing by adding this tag to your **.srf** file:

```
{{ Trace(start, page) }}
```

Then, refresh the page. You should now see a table headed *Request Details* at the end of the page. Scroll down to *Trace Information* and look for *Service* in the left-most column.

The BIS samples are pre-configured for tracing and tracing may be turned on and off with a query parameter defined in the **Trace** tag. For example, if the problem occurred running the **VERIFYBIS** program, log into the server running BIS and use this URL:

<http://localhost/xbis12/verify/default.srf?trace=page>

Trace output will appear at the bottom of the page, and this will include the BIS Service Engine startup messages that should reveal the problem.

- **Symptom:** An error 500 occurs.
- **Possible Cause:** A replacement tag precedes the **Handler** tag.
- **Suggestion:** The only tags allowed before the **Handler** tag are comment tags. Move all tags that precede the **Handler** tag to follow it.
- **Symptom:** One of the following error messages is reported:

```
Cannot create the trace file for session "nH6shZykCtbZmdDZHo0LhJhiVSq5" (the last attempted filename is "D:\Documents and Settings\UserID\Local Settings\Temp\BIS-nH6s-trace.txt"). The last error code was 80070005
```

```
Cannot reopen the trace file for session "nH6shZykCtbZmdDZHo0LhJhiVSq5" (the last attempted filename is "D:\Documents and Settings\UserID\Local Settings\Temp\BIS-nH6s-trace.txt"). The last error code was 80070005
```

```
Could not write the trace file to the directory "D:\Documents and Settings\UserID\Local Settings\Temp\": the error code was 80004005.
```

- **Suggestion:** To correct this error, give the IWAM\_\* account write access to this directory. See the “Troubleshooting” appendix in the User’s Guide for more information.
- **Symptom:** The following error message appears in the web browser:

```
Server Error
LoadLibrary failed.
```

- **Possible Cause:** The **Handler** tag is missing, invalid, or refers to a missing or invalid library.
- **Suggestion:** Make sure that your **.srf** page has a **Handler \*}}}** tag, and that this tag is the first non-comment/non-include tag in the file. For Windows, it must also appear in the first 4096 characters of the **.srf** file.

## Appendix G. Configuring BIS/IIS after Installation

The Business Information Server Service Engine must be registered with Windows. If it becomes necessary to re-register the server, registration can be performed:

- By invoking Start, then “**Configure XBIS Identity**” under **RM BIS v12** and **RM BIS v12 (64-bit)**. Note that if both the 32-bit and 64-bit versions of BIS are installed, each version of BIS can have a separate identity.

When invoked, the dialog described in “*Configuring the Run-As Logon ID*” below appears.

- By reinstalling BIS/IIS (choose the “Repair” option), or
- Using the command line.

This appendix describes how to configure the BIS/IIS Service Engine from the command line.

---

### Command Line Configuration

BIS is self-registering. Registration is performed by the **XBIS.EXE** program, which can be found in the installation directory (normally **C:\Program Files (x86)\Micro Focus\RM\BISv12** or, for 64-bit programs, **C:\Program Files\Micro Focus\RM\BISv12-64**). Registration includes these three steps:

- The BIS Service Engine contained in **XBIS.EXE** is registered.
- The runtime system controlled by **RMCL12R.DLL** is registered.
- The *Run As* identity, that is, the identity that will be used to execute service programs, is set.

The server registration syntax is:

```
XBIS registration-options
```

The registration options are detailed below:

- |                     |  |
|---------------------|--|
| <b>/REGSERVER</b>   | Registers the Service Engine. Also registers the runtime system located in the same directory as <b>XBIS.EXE</b> . |
| <b>/UNREGSERVER</b> | Unregisters the BIS Service Engine and the runtime system.   |
| <b>/SHOWSERVER</b>  | Displays a dialog box that shows the location of the currently registered BIS and Service Engine.                  |

The server registration option has three additional variations:

- |                     |   |
|---------------------|---|
| <b>/REGSERVERQ</b>  | Quietly registers the BIS Service Engine and the runtime system located in the same directory as <b>XBIS.EXE</b> . No confirmation dialog box is displayed.   |
| <b>/REGSERVERO</b>  | Only registers the BIS Service Engine. The runtime system registration remains unchanged. This is useful if you want to install the runtime system in a directory separate from the BIS Service Engine. |
| <b>/REGSERVERQO</b> | Combines the above two options.   |

The **/REGSERVER** and **/REGSERVERQ** options have an additional optional parameter: the pathname of the runtime system or the directory containing the runtime system. It is specified as in these examples:

1. **/REGSERVER:pathname**
2. **/REGSERVERQ:pathname**
3. **/REGSERVER:directory**
4. **/REGSERVERQ:directory**

If the pathname or directory is specified, the specified file or the server in the specified directory is registered and BIS does not search for the runtime system in the path.

If a directory is specified, it may end with a trailing backslash to differentiate it from a filename. Also note that if the specified name contains spaces, it must be surrounded by single or double quotes.

## Configuring the Run-As Logon ID

To execute service programs, Business Information Server must assume the identity of a user authorized to run the programs and access data files and possibly network resources required by the programs. This is accomplished by specifying a Logon ID during installation, reinstallation, or server registration.

The *Run As* identity may be configured during registration interactively with a dialog box, or by specifying options on the command line.

Note that the **/RUNAS** options below must be specified along with one of the **/REGSERVER** options described above.

If none of the options in the table below are specified, the server displays the *Run As* configuration dialog box on the right even if **/REGSERVERQ** (“quiet mode”) is specified.

The *Run As* dialog box has three options that determine the context in which BIS will execute:

**/RUNASI**  
**/RUNASIP**

Causes the server to run as the “**INTERACTIVE USER**”. This is the identity of the user that is logged on to the server’s console. This is most useful for developers but cannot normally be used for deployment or production.

Note: if your BIS server runs fine while you are logged into the console, but stops working once you log out, the problem is usual caused by configuration as the “Interactive User”. In this case, you can enter your credentials or the credentials of another security principal that has the proper permissions to execute COBOL programs on the BIS host machine.

If the **P** (prompt) suffix is specified, BIS prompts for credentials using the dialog box if an error occurs.

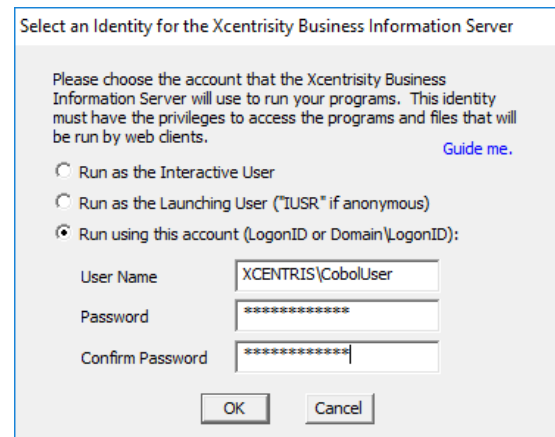


Figure 9. Configure Run-As Logon ID

**/RUNASL  
/RUNASLP**

Runs the server under the identity of the launching (usually anonymous) user.

On IIS version 6, this will normally be the account named **IUSR\_***machinename*, where *machinename* is the name assigned to the machine.

For example, if your machine is named **HILO**, the anonymous user's name is **IUSR\_HILO**. It is possible for a system administrator to change this, either for all IIS accounts or for just the BIS. If the name of the machine was changed after IIS was installed, this will be the original name of the machine, not the current name. In this case, please see "Manual Configuration", below.

On IIS version 7 and later, the identity is associated with the IIS application pool. The application pool is created when BIS is installed, or by the BISMKAPP utility program and will have a name like:

```
Xcentrinity BIS for RMCOBOL 12 32-bit Pool
Xcentrinity BIS for RMCOBOL 12 64-bit Pool
```

A separate pool is created for each installed version of BIS. The identity associated with a given application pool is set with the Advanced Settings property window on the application pool, as described here:

<https://docs.microsoft.com/en-us/iis/manage/configuring-security/application-pool-identities>

Note that these accounts usually have very limited privileges and BIS will not even be able to start unless you give the account write permission in the BIS installation directory. BIS will not be able to access files in other directories, unless you grant access to those directories, and will not be able to access files on any network volumes unless your machine is joined to a domain and the name is known to the domain server. However, running BIS applications like this results in enhanced security, as the program will only have very basic privileges other than those that are explicitly granted. See your system administrator for details.

If the **P** (prompt) suffix is specified, BIS prompts for credentials using the dialog box if an error occurs.

**`/RUNAS:id,pw`**  
**`/RUNASP:id,pw`**

Runs the server using the specified identity. This is the recommended option. *id* is the login ID and *pw* is the password. The password is encrypted by Windows, is stored in the registry, and is not retrievable as plain text once the server is registered. However, caution is required when embedding a clear-text password in a batch file that issues the **`/RUNAS`** command.

If an *id* is specified without a *pw*, the program prompts for the password. This may be a good compromise between convenience and security.

Either the *id* or the *pw* may be quoted with single or double quotes (required if either contains spaces). The entire parameter string may also be quoted.

Examples:

```
/RUNAS:myuserid, mypassword
/RUNAS:"my user id", "my password"
/RUNAS:"my user id,my password"
/RUNAS:"INTERACTIVE USER"
```

As a special case, the special logon ID of “**INTERACTIVE USER**” is recognized and handled as if **`/RUNAS`** were specified. Any password is ignored, and quotes are required due to the embedded space.

If the **P** suffix is specified, BIS prompts for credentials using the dialog box if an error occurs.

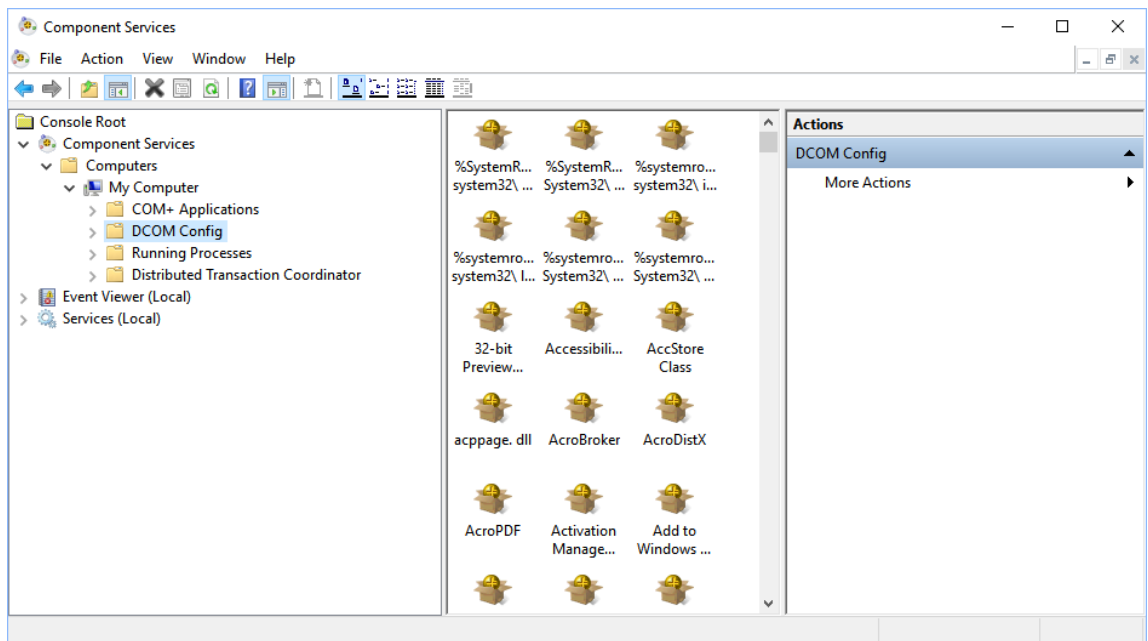
---

## Retrieving or Changing the Configured Identity

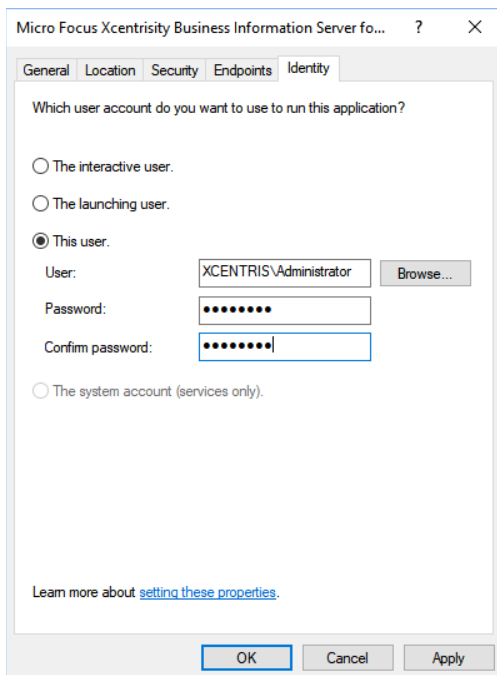
The Microsoft Windows Component Services configuration utility may also be used to examine and change the Business Information Server service engine configuration.

There are two ways to start the utility:

- Select **Start → Control Panel → Administrative Tools → Component Services**. (Alternatively, select **Start → Run**, enter **dcomcnfg** in the “Open” box, and click the OK button.)
- Select **Start → Control Panel → Administrative Tools → Component Services**. The program should appear similar to this example:



1. Expand **Console Root** → **Component Services** → **Computers** → **My Computer** → **DCOM Config** and locate **Micro Focus Xcentrity Business Information Server for RM/COBOL** in the list, right-click, and select **Properties** from the popup menu.
2. Click on the **Identity** tab. The property sheet dialog depicted below displays the current *Run As* configuration.



Note that you can change the identity and/or the password that BIS/IIS uses to run service programs here.

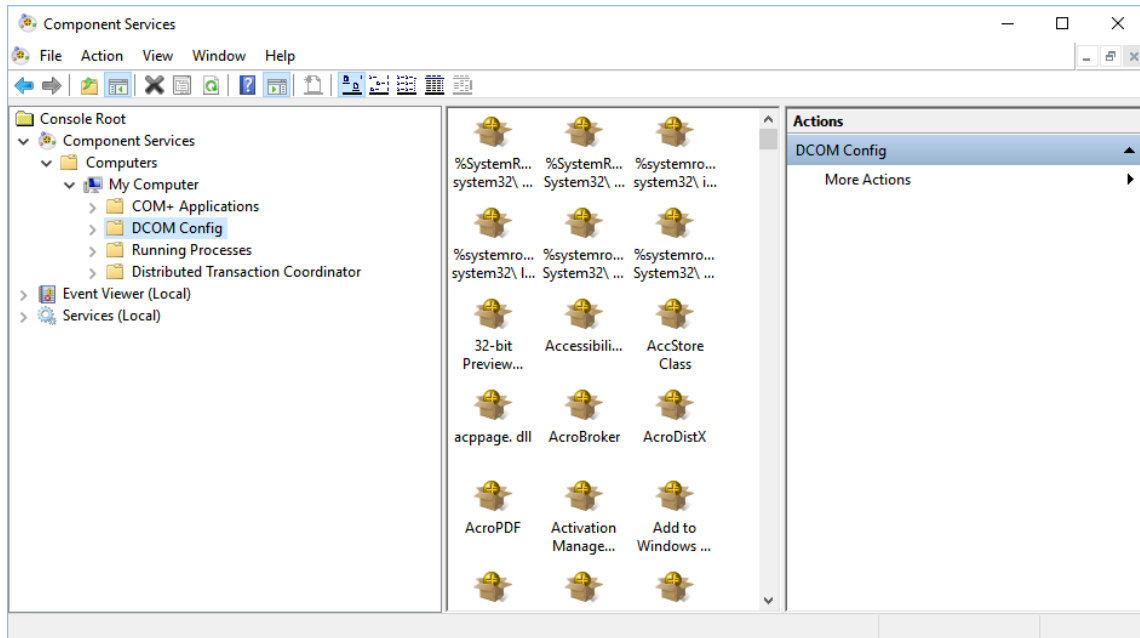
## Manual Configuration

To manually change the user ID and password that the Service Engine uses to execute programs, follow these steps after completing the installation:

1. Select **Start→Control Panel→Administrative Tools→Component Services**.

Alternatively, select **Start→Run**, enter **dcomcnfg** in the “Open” box, and click the OK button.

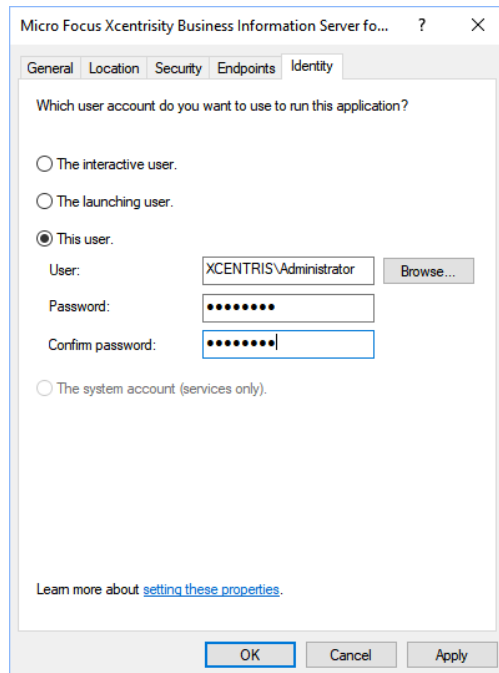
2. Expand **Console Root → Component Services → My Computer → DCOM Config**. The program should look like this:



3. Locate **Micro Focus Xcentrity Business Information Server for RM/COBOL** in the list, right-click, and select Properties from the popup menu.



- Click the **Identity** tab, then select **This user**. Enter the user ID and the password that you want to use to run service programs under Business Information Server. Then click the **Apply** button.



- Click the **Security** tab and under **Launch Permissions**, click **Customize** and then click **Edit**. Click **Add** and enter the name of your anonymous internet account (see below). Click the **Add** button; make sure **Allow** is checked next to **Launch Permission** and click **OK**. Then click **Apply**.
- Still on the Security tab, repeat the above step for **Access Permissions**.
- You do not need to change **Configuration Permissions**. Click **OK** to close the dialog box.

On IIS version 6, the name of your anonymous internet account is normally **IUSR\_machine**, where *machine* is the original hostname assigned to your machine. On IIS version 7 and later, groups are used instead of, or in addition to users, and the group name is **IIS\_IUSR**. However, the system administrator can change the name of this account, and this is common if you are running more than one web site.

To determine the name of your anonymous internet account or group:

- Select **Start → Control Panel → Administrative Tools → Internet Information Services**.
- Expand **Internet Information Services → Local Computer → Web Sites → Default Web Site**. Replace the last node with your site if IIS is serving multiple web sites).
- Find the virtual directory that was created to contain the BIS service program. This will be **XBIS12** for the sample program. Right-click on that node and select **Properties**.
- Click **Directory Security**, then **Edit**.
- The **User Name** box contains the name of the anonymous account that you can enter above.

Note that the above configuration is very flexible. You can control what users will have access to the COBOL program on a site-by-site, or even a directory-by-directory basis on your web site.

Alternatively, instead of specifying **IUSR\_machine**, you can specify **GUEST**, or any other group that contains all your anonymous access accounts. However, be cautious before granting too many privileges to too many anonymous processes.

On IIS 7, you can also create a user, add the user to the **IIS\_IUSR** group, and selectively grant that user the permissions that are needed to run service programs.

## Setting Environment Variables

Some BIS settings are set from the server environment. To set a BIS environment variable:

- Log in as **Administrator**, or an account that is a member of the **Administrators** group.
- Click **Start** → **Control Panel** → **System**.
- Click the **Advanced** tab.
- Click the **Environment Variables** button.
- Under **System Variables**, click the **New** button. Alternatively, if the environment variable has already been set, click the variable name in the list box and then click the **Edit** button.
- Enter the variable name and the value and select **OK**.
- When done, click **OK** to dismiss the dialog box.

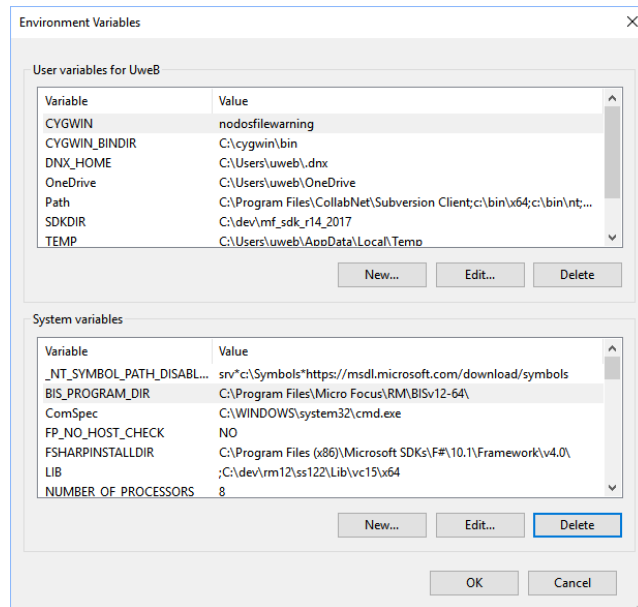


Figure 6-3. The Environment Variables Dialog

The changes take effect the next time the request handler recycles, after 20 minutes of inactivity. To force it to immediately recycle, run these commands from an elevated (administrative) command prompt:

```
NET STOP W3SVC
NET START W3SVC
```

Note that this will reset any active sessions.

## Setting the Maximum Thread Count

BIS uses a system resource called a **Thread** to render pages. For efficiency, BIS maintains an internal pool of threads, and when a request for a BIS page arrives, a thread from the pool is dispatched to serve the page. When the page is completely rendered, the thread returns to the pool to await the next request.

If there are no available threads in the pool, the request must wait for a thread to become available. A request will wait for some period of time (normally about 60 seconds) before being denied with a “server too busy” error page.

BIS pages that do not communicate with the Service Engine execute very quickly. However, if a page contains an **XMLExchange** tag, the BIS thread serving that page must wait until the Service Engine provides the replacement text for the **XMLExchange** tag. If this is a lengthy process, it is conceivable that BIS will not have enough threads to serve all pending requests. In this case, it may be desirable to increase the size of the BIS thread pool so more services can be run simultaneously.

The **BIS\_MAX\_THREADS** environment variable may be used to increase (or decrease) the size of the thread pool. The syntax is:

```
BIS_MAX_THREADS=value
```

where:

<i>n</i>	Is an integer that specifies the number of threads that will be used by BIS to service requests.
----------	--

---

## Notes

- Since each BIS thread requires system resources, even when idle, it is not desirable to set this value to a large number. The default value, 5 threads, is sufficient for a moderately busy server and should only be increased if requests are being denied or users are waiting for their requests to be serviced.
- BIS dynamically creates additional threads for each Service Engine started by the **StartService** tag. These Service Engine threads do not count against the **BIS\_MAX\_THREADS** value.
- The **BIS\_MAX\_THREADS** option is only examined when the BIS Request Handler is loaded. The handler is loaded on demand, for example, when the first BIS request arrives after a server restart, and then the handler is automatically unloaded after about 20 minutes of inactivity. To force the BIS server to recycle, run these commands from an elevated (administrative) command prompt:

```
NET STOP W3SVC
NET START W3SVC
```

Note that this will reset any active sessions.

- The current setting can be retrieved with **Value(MaxThreads, Config)**. On UNIX, this always returns "1".



## Appendix H. Configuration after Installation (UNIX/Apache)

---

### Configuring Apache

The Apache configuration file for BIS is named **mod\_xbis.conf** and is included in the Apache server configuration by an **Include** directive placed in the main **httpd.conf** configuration file.

```
Include conf/mod_xbis.conf
```

Or, if available, the **mod\_xbis.conf** may be placed in the **/etc/httpd/conf.d** directory, which will circumvent the necessity of editing the main **httpd.conf** configuration file.

This isolates all Apache configuration changes for BIS to **mod\_xbis.conf**, which is described below.

The BIS configuration file contains several sets of Apache configuration directives. The first set of directives configures Apache direct requests to the BIS Request Handler module.

```
LoadModule xbis_module modules/mod_xbis2.so
AddHandler bis-stencil srf
AddType text/html srf
AddType text/x-component .htc
```

The **LoadModule** directive is required and should not be changed. It causes Apache to dynamically load the shared object containing the BIS Request Handler when Apache starts.

The **AddHandler** directive causes all URIs that request files ending with **srf** to be processed by the BIS Request Handler. If it is desired to have the Request Handler process requests with other file extensions, add additional **AddHandler** directives.

The **AddType** directive causes the default content type of a response for a URI ending with **srf** to be **text/html**. An **AddType** directive should be added for each **AddHandler** directive added to serve additional file extension.

The **AddType** directive for the **.htc** extension is necessary to cause Apache to serve HTML Components files (a Microsoft extension) with the correct content type.

```
BISTraceDirectory /var/tmp
BISTraceFile trace.log
BISKeepTraceFiles Off
BISTruncateTraceFile Off
BISTraceSuffix Page
BISMasterTrace On
BISMainDebug On
BISStencilDebug On
BISSEDebugLevel 0
```

These directives affect the amount and location of trace information produced by BIS.

The **BISTraceDirectory** directive indicates the directory where trace files are to be written. The default for this directive is **/tmp**. If this directive does not specify an absolute path, it is assumed to be relative to **/tmp**.

The **BISTraceFile** directive indicates the name of the trace file. This directive should only be used when all tracing for all requests are to be written to the same file. If this directive does not specify an absolute path, it is relative to the directory specified by **BISTraceDirectory**.

The **BISKeepTraceFiles** directive controls if trace files are to be kept after a session completes. The value of **Off** is the default, and it will cause trace files to be deleted, unless a FILE Trace tag option requests that they be kept. The value of **On** will cause trace files to be retained regardless of the presence of a FILE trace option.

The **BISTruncateTraceFile** directive controls if trace files are to be truncated at the beginning of each request. The value of **Off** is the default and will cause all requests of a session to be placed in the trace file. The value of **On** will cause only the last request of the session to be placed in the trace file.

The **BISTraceSuffix** directive adds additional options to **Trace** tag whenever one is processed. The value of this directive is processed after the options specified in the **Trace** tag, but before the options specified in the trace query parameter. There is no default for this directive. The options are described in the **Trace** tag section. All **Trace** tag options are allowed.

The **BISMasterTrace** directive is a master switch that controls all tracing activity. The value of **Off** is the default and will prevent all tracing. This is the appropriate value for a production environment. The value of **On** allows tracing to occur.

The **BISMainDebug** directive controls tracing of tags as they are executed. The value of **Off** is the default and will prevent trace messages. The value of **On** allows trace messages during execution of the stencil. This tracing approximates the tracing performed by BIS/IIS.

The **BISStencilDebug** directive controls tracing tags as they are parsed. The value of **Off** is the default and will prevent trace messages. The value of **On** will cause trace messages diagnosing syntax errors in tags to be produced.

The **BISSEDebugLevel** directive controls tracing of the BIS Service Engine. The values are 0, 1, and 2. 0 is the normal level of tracing and is appropriate for seeing DISPLAY statements from the service program. 1 and 2 supplies additional tracing and should only be used when directed by customer support.

```
BISRefreshDirectory /var/tmp/xbis.refresh
```

The **BISRefreshDirectory** directive names a directory where server responses are stored temporarily that may be needed if the client agents (web browsers) request a refresh. (See the XMLExchange tag.) The indicated directory should have permissions which permit create, reading, write, and delete access by the Apache child process. If no directory is named, or if this directive is omitted, the BIS Request Handler will not attempt to provide correct responses to refresh requests which will lead to unnecessary session sequence errors.

```
BISErrorMessage ErrorName Error Text
```

The **BISErrorMessage** directive allows the text for the BIS Request Handler's error messages to be overridden, changing it to support a language besides English. The first operand of the directive is the name of the error to be overridden. The remainder of the directive is the new text to be displayed when **ErrorName** is encountered. The current set of the Request handler's error names and their text are present within **mod\_xbis.conf** as commented out **BISErrorMessage** directives.

```
BISSESDaemonKey xxxxxxxx
```

The **BISSESDaemonKey** directive allows the shared memory key with which to contact the Service Engine to be specified. This directive should only be used when it is desired to run multiple Service Engine daemons on the same UNIX server. The value is an 8-hex digit value that must match the **SharedMemory** option keyword of the configuration of the Service Engine to use.

```
BISQueueRequests On
```

The **BISQueueRequests** directive controls the behavior of BIS if a request is received for a session that is already processing a request. The value of **On** is the default, and it will cause the request to wait until the session completes the current request. The value of **Off** causes BIS to return an error 14 and abort processing the request. (Note that the **Off** behavior was the default behavior of BIS before the introduction of the **BISQueueRequests** in BIS 12.08.)

```
Alias URL-Path Directory-Path
```

This standard Apache directive allows stencils (as well as other documents) from directories outside of the Apache web server's document root. The **URL-Path** value is a string that is to be matched to the leading edge of the path of desired URLs. When a match occurs, it is removed and replaced with the **Directory-Path** value to produce the actual file name of the document. When an **Alias** directive is used, create a **Directory** directive to specify additional configuration directives for **Directory-Path**.

```
<Directory Directory-Path>
  SetEnv BIS_ROOT_PATH /xbis12/samples
  DirectoryIndex default.srf
</Directory>
```

This set of standard Apache directives demonstrates tailoring Apache directives to document directories. The **Directory-Path** value contains the directory to which the directives apply.

The **SetEnv** directive demonstrates setting a server environment variable to be passed to the service program.

The **DirectoryIndex** directive specifies the name of the default document to serve if only the directory name is specified in the URL.

---

## Service Engine Configuration

The BIS Service Engine runs as a UNIX daemon process and one or more service processes which the daemon creates, as needed. There are always one or more idle service processes waiting for the Request Handler (the Apache part) to process a **StartService** tag.

Because the Service Engine runs as daemon, it normally starts when the operating starts, without any direct user interaction. It gets all of its options from a configuration file, its command line and its environment. The configuration file is usually named **/etc/xbis.conf**, but this can be changed by the **-f** command-line option. Each line in the configuration file is either a blank line, comment line or an option line. A comment line is a line in which the first nonblank character is a “#” character. On an option line,

the line begins with a keyword, which is followed by one or more spaces or tabs and then by the option value. A “#” character may follow the option value to introduce an in-line comment.

The configuration file option keywords are:

<b>BinDir</b>	Specifies the name of the directory where the BIS binary executable files are located. There is no reason for a user to alter this parameter after installation.
<b>InactivityTimeout</b>	Specifies the default inactivity timeout in seconds. This is normally set to 600.
<b>LogDir</b>	Specifies the name of the directory where the BIS log files are placed.
<b>MaxChildren</b>	Specifies the maximum number of service (child) processes. This is normally set to <b>250</b> .
<b>MaxSessions</b>	Specifies the maximum number of BIS sessions. It defaults to twice the <b>MaxChildren</b> value.
<b>PageSize</b>	Specifies the amount of space allocated in the Sessions file for each session. This holds the information about a session between requests. It must be a power of two and it must be at least 512 but no more than 16384. It defaults to 2048, which should be sufficient unless your stencils define unusually long paths or a large number of environment variables.
<b>SaveFiles</b>	If specified, copies of all request and response files are saved in the temporary directory. This is a debugging tool, typically used during development of a web site.
<b>ServiceTimeout</b>	Default service timeout, in seconds. This is the preferred way to set the default service timeout. If <b>BIS_SERVICE_TIMEOUT</b> is set in the Apache configuration file for BIS ( <b>bis.conf</b> ), the Request Handler uses that value to override the value of the <b>-T</b> option. Doing so delays the start of each service program slightly.
<b>SharedMemory</b>	If present, specifies the shared memory key that the Service Engine is to use. This directive should only be used when it is desired to run multiple Service Engine daemons on the same UNIX server. The value is an 8-hex digit value that must be matched by the value <b>BISSESDaemonKey</b> directive in use by the Request Handler. Only specify this keyword option when directed by Micro Focus Technical Support.
<b>Socket</b>	Specifies the name of the socket used by the Request Handler to communicate with the Service Engine daemon. There is no reason for a user to alter this parameter after installation.
<b>TempDir</b>	Specifies the name of the directory where temporary files are created.
<b>UserName</b>	Specifies the UNIX user name used by each service (child) processes. Although the Service Engine daemon process runs as <b>root</b> , each of the child service processes runs as the user specified by this option. This determines the files that a service process can read and write, as well as the home directory of each service process.

Options on the Service Engine daemon’s command line may modify the configuration as determined by the configuration file and the built-in defaults. On systems other than AIX, the command-line options are in a string that is assigned to an environment variable named **OPTIONS**. All of the Service Engine’s environment variables, including **OPTIONS**, are set in a file named **/etc/sysconfig/xbis**. This file is created during the install of BIS.

On AIX systems, the Service Engine runs as a SRC subsystem. The command-line options are stored in an ODM object created by the **mkssys** command during the install of BIS. Additionally, the **startsrc** command which starts the Service Engine may specify command-line options and environment variables. A **startsrc** command is inserted into the **/etc/inittab** file during installation.



The command-line options are:

<b>-f file</b>	Specifies the name of the Service Engine configuration file. If this option is present, it must be the first option on the command line. If omitted, the configuration file name defaults to <b>/etc/xbis.conf</b> .
<b>-c count</b>	Specifies the maximum number of service (child) processes. This is normally set to <b>9999</b> to indicate that the number of service processes is limited only by the license, but it may be set to a smaller value as a “throttle.”
<b>-i count</b>	Specifies the number of idle service (child) processes. This is normally set to <b>1</b> but a small increase in this may improve response time on a server which receives many requests in rapid succession.
<b>-T timeout</b>	Default service timeout, in seconds. This is the preferred way to set the default service timeout. If <b>BIS_SERVICE_TIMEOUT</b> is set in the Apache configuration file for BIS ( <b>bis.conf</b> ), the Request Handler uses that value to override the value of the <b>-T</b> option. Doing so delays the start of each service program slightly.
<b>-u user</b>	Specifies the UNIX user name used by each service (child) processes. Although the Service Engine daemon process runs as <b>root</b> , each of the child service processes runs as the user specified by this option. This determines the files that a service process can read and write, as well as the home directory of each service process.
<b>-t dir</b>	Specifies the name of the directory where temporary files are created.
<b>-r</b>	If specified, copies of all request and response files are saved in the temporary directory. This is a debugging tool, typically used during development of a web site.
<b>-A</b>	If specified, the name of the temporary file is passed to the service program in the LINKAGE SECTION, just as if the A parameter were included in the <b>StartService</b> tag. This is an obsolete option which will be removed in a future release. The <b>BIS_FILENAME</b> environment variable is now used for this purpose.
<b>-L file</b>	Specifies the name of the Service Engine event log file. The Service Engine records certain important events in this file. This is a debugging tool.
<b>-s file</b>	Specifies the name of the socket used by the Request Handler to communicate with the Service Engine daemon. There is no reason for a user to alter this parameter after installation.
<b>-U file</b>	Specifies the name of a file used by the Service Engine daemon to communicate with the Request Handler. There is no reason for a user to alter this parameter after installation.

If the BIS Service Engine options need to be changed, the configuration file (**/etc/xbis.conf**) may be edited or (on systems other than AIX) the file **/etc/sysconfig/xbis** may be edited. If the configuration file is changed, the Service Engine can be instructed to reread it by using a **kill** command to send the Service Engine daemon a **SIGHUP** signal. On AIX, a **refresh** command may be used for the same purpose. However, the Service Engine does not read **/etc/sysconfig/xbis** directly. Instead, the shell script which starts the Service Engine reads this file. For any changes to take effect, the Service Engine must be restarted, either by restarting the operating system, by changing the runlevel, or by executing the shell script which starts the Service Engine (**/etc/init.d/xbisengd** or **/sbin/init.d/xbisengd** on HP-UX). This script accepts one parameter, which must be one of the following:

<b>Start</b>	Starts the BIS Service Engine.
<b>Stop</b>	Stops the BIS Service Engine.
<b>Restart</b>	Stops the BIS Service Engine, and then starts it again.
<b>Condrestart</b>	If the Service Engine is running, stop it, and then start it again. Otherwise, do nothing.
<b>Status</b>	Displays the status of the Service Engine.

Note that stopping the Service Engine stops all of the service processes immediately, terminating any running service programs. This should not be used when users are connected to the server.

---

## xbisctl Utility

The **xbisctl** utility can be used by a root user to control the Service Engine and the BIS Session/Logging daemon. It can also display the BIS sessions and, if necessary terminate a session. The **xbisctl** utility may be copied or linked to a directory in the user's path; it is located in the **bin** subdirectory of the directory where BIS was installed. If the default directory was selected, this is **/usr/local/liant/bis/bin**.

The **xbisctl** utility may be run in one of two ways. If no parameters are specified on the command line, it reads commands from standard input. Alternatively, a single command may be specified on the command line. The following table lists the commands that **xbisctl** recognizes:

<b>start</b>	Starts the Service Engine and the Session/Logging daemon.
<b>stop</b>	Stops the Service Engine and the Session/Logging daemon.
<b>status</b>	Displays a one-line status for Service Engine and the Session/Logging daemon.
<b>refresh</b>	Refreshes the Service Engine and the Session/Logging daemon. This tells the BIS daemons to reread their configuration file.
<b>sessions</b>	List the current sessions.
<b>kill</b>	Terminate a session.
<b>exit</b>	Stop reading standard input. Alternatively, press ctrl-D to end input.

Status information can be displayed in a browser window. At the end of the supplied `mod_xbis.conf` file, there are two `ScriptAlias` directives. Uncomment one or both of these to enable this feature. The path may be changed to suit your needs. These run a shell script that executes the **xbisctl** utility with the **status** command on the command line.

---

## SRC Commands

On AIX, the Service Engine and the BIS Session/Logging daemon run as SRC subsystems. This table summarizes the various SRC commands. The Service Engine is a subsystem named "**xbisengd**." The Session/Logging daemon is a subsystem named "**xbissesd**." The pair of them are usually started and stopped together, so they defined as a subsystem group named "**xbis**."

On the following commands, the **-s** parameter specifies the subsystem name (**xbisengd** or **xbissesd**). The **-g** parameter specifies the subsystem group (**xbis**).

<b>startsrc</b>	Starts a subsystem.
<b>stopsrc</b>	Stops a subsystem. The <b>-f</b> parameter causes a forced (quick) stop.
<b>refresh</b>	Refreshes a subsystem. This tells the BIS subsystem to reread its configuration file. It is usually best to use the <b>-g</b> parameter and specify the <b>xbis</b> group.
<b>lssrc</b>	List the status of a subsystem. The <b>-l</b> parameter requests a long (detailed) status. The <b>-a</b> parameter specifies all subsystems.

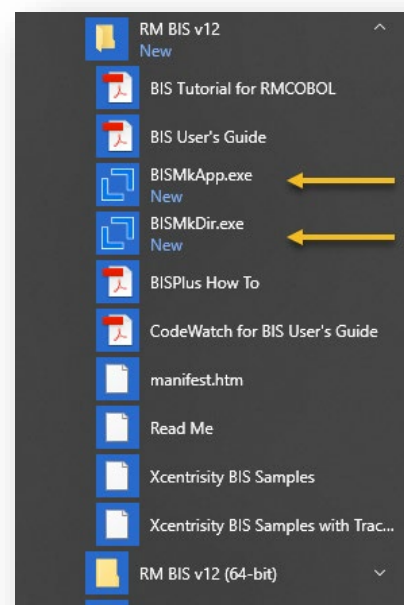
## Appendix I. Creating a BIS/IIS Application

BIS for IIS includes two programs that can be used to create BIS application directories on a server:

- **BISMkApp** creates BIS applications on IIS v7 and later. This is preferred, as **BISMkApp** supports features that are not available in earlier versions of IIS.
- **BISMkDir** creates BIS virtual directories on IIS v6 (that is, Windows XP, and Windows Server 2003 and 2003R2). **BISMkDir** can also create virtual directories on IIS v7 and later if the “IIS6 Metabase and IIS 6 configuration compatibility” IIS feature is installed.

Only **BISMkDir** is installed on systems with IIS v6.

Both **BISMkApp** and **BISMkDir** are installed with BIS on IIS v7 and later, and may be launched from the Start menu or from a command line.



### Running BISMKAPP on IIS v7+

To launch this program, press the Start button, navigate to **RM BIS v12** or **RM BIS v12 (64-bit)** and select **BISMkApp.exe**. You can also navigate to the BIS installation directory in “**Program Files (x86)**” or “**Program Files**” and launch **BISMkDir.exe** from File Explorer or from the command line.

When execution begins, you will see the dialog box depicted to the right. Three steps are required to create a virtual directory:

- 1) Set the Web Application Name and Location
- 2) Set the Web Application Properties
- 3) Create the Application

#### Step 1: Web Application Name and Location

These fields specify where the web application is created.

##### ➤ Server Name

In this release, this field is not editable and always contains **localhost**. Note that **BISMkApp** must be executed on the system that contains the IIS server. Remote configuration is not supported.

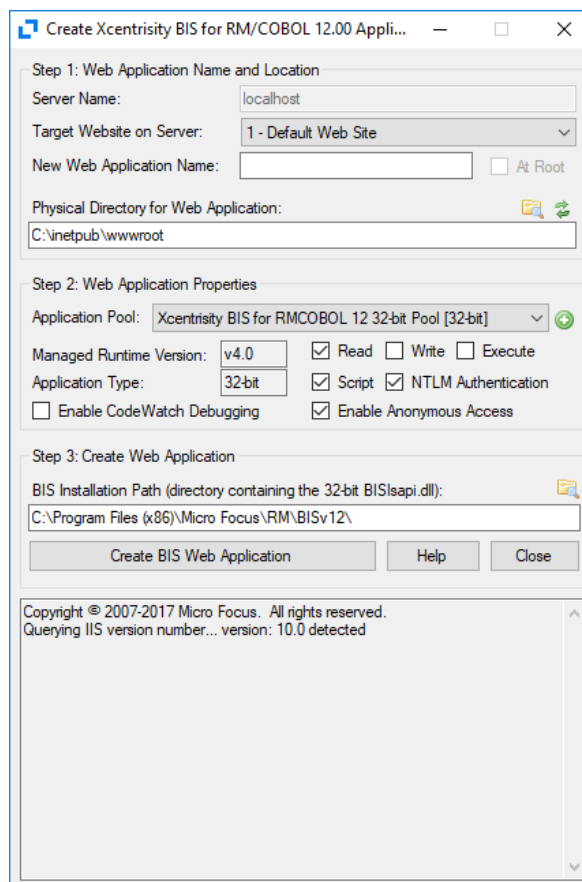


Figure 11. The BISMKAPP Program

➤ **Target Website on Server**

Select the website on the server that will contain the new BIS application directory.

➤ **New Web Application Name**

Enter the name of the application that you wish to create. This is the name that will be used in the URL. For example, the BIS installer creates an application named XBIS12, which is referenced by this URL: <http://server/xbis12/>

The “**At Root**” checkbox is reserved for future use and is currently disabled.

➤ **Physical Directory for Web Application**

Enter the pathname of the physical directory that will contain the files that are served when the user issues requests using the application name. By default, the name of the directory is the same as the name of the application, but this is not required.



Browses for a directory; also allows a directory to be created.



Refreshes the path using the name of the directory using the application name

For example, when BIS is installed in the default location and you request this page:

```
http://localhost/xbis12/samples/default.srf
```

The requested content is served from this file:

```
C:\inetpub\wwwroot\xbis12\samples\default.srf
```

This is because the BIS installer creates a physical directory named **XBIS12** under **wwwroot** (the default website), and copies the sample programs into this directory. The installer then creates an application named **XBIS12**, configures it to serve BIS applications (see below) and points it at the previously created physical directory.

Notes:

- If the physical directory does not exist, **BISMkApp** will offer to create it.
- The physical directory must also have the appropriate permissions (for example, anonymous user read access) or BIS will not be able to serve files from this directory.
- It is usually convenient to create the physical directory in the default web tree (for example, **c:\inetpub\wwwroot**) because the physical directory will inherit the permissions from the IIS parent directory. Otherwise, IIS will only manage the virtual directory permissions (read, write, execute), and the physical directory permissions must be separately managed.


## Step 2: Web Application Properties

These are the properties of the application that is being created.

## ➤ Application Pool

In IIS version 7 and later, each application runs in an **Application Pool** – a process that contains zero or more applications. A given application pool can host any number of BIS applications and determines the identity that is used to run the applications. This allows you to determine the permissions that are used to run an application with a fine level of control, and also isolate applications from each other.

For more details about application pool identities, visit this page: <https://docs.microsoft.com/en-us/iis/manage/configuring-security/application-pool-identities>.

When BIS is installed, it creates a default application pool that uses the same architecture (32-bit or 64-bit) as the installed BIS. The names configured application pools can be viewed and selected in the drop-down combo box; you can also select or even create additional pools by clicking on the  icon:

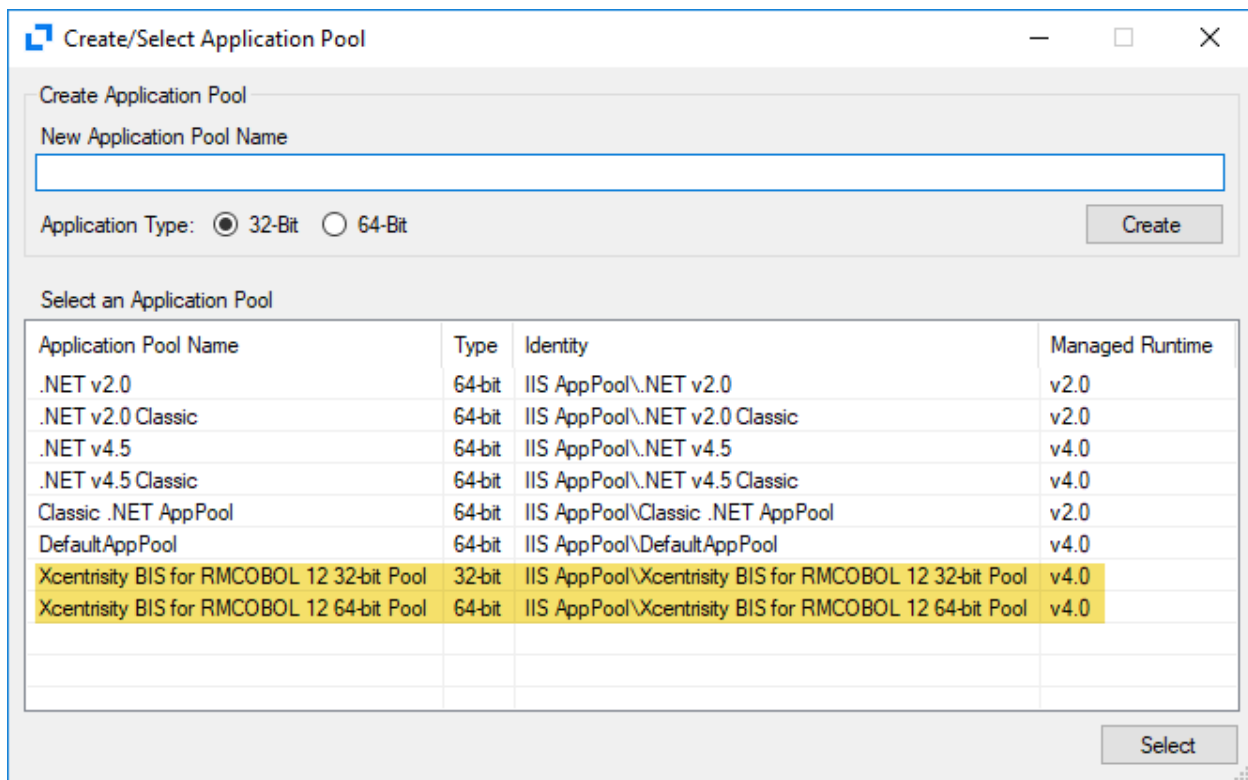


Figure 5. Create or Select an Application Pool.

The installation-created pools are highlighted. In this case, both 32-bit and 64-bit BIS was installed, otherwise there would be only one pool.

The only option that is available is the type of pool: 32-bit or 64-bit. However, once a pool is created, it can be modified in the **Internet Information Services (IIS) Management Console** as described later in this appendix.

It's important to note that the architecture (32-bit or 64-bit) of the application pool must match the architecture of the BIS applications you are configuring. 64-bit versions of Windows can run 32-bit or 64-bit application pools; 32-bit versions are limited to 32-bit applications.

For your BIS applications, you can use the default application pool or create new pools as described above – normally, the “best practice” is to create a pool for each separate application to guarantee isolation. Each application pool is hosted by a built-in Windows process, usually a program named “**w3wp.exe**” (short for “www worker process”). The process is automatically started when a request

arrives for an application that is in the pool (as determined by how the URL is routed), and automatically terminates after 20 minutes of inactivity. These properties can be set in the IIS Administrator for each pool. There are also options for occasionally recycling the pool after a certain period of time, which consists of creating a new process for new requests, while letting the current process wind down as sessions in the pool expire.

### ➤ **Managed Runtime Version**

This non-editable setting is the version of the managed runtime that will be used in the application pool. This only affects ASP.NET programs used in conjunction with BIS in the current application pool.

To change the managed runtime version, edit the properties of the application pool in the IIS Administration Console.

### ➤ **Application Type**

This non-editable setting is the architecture (32-bit or 64-bit) of the applications that can run in the pool. If this does not match the version of BIS you are configuring, or the BIS application, you can create another pool with the correct setting, or change this setting for the current pool in the IIS Administration Console. If you do change the setting, be sure to change the name to reflect the architecture of the pool (or omit this entirely).

### ✓ **Checkboxes**

The checkboxes control how the virtual directory is created.

- **Read** determines if web clients will have read permission to this virtual directory. This must be checked if BIS programs will be run in this directory.
- **Write** determines if web clients will be able to write to this virtual directory. **Note:** This should be enabled only for special purposes, as it is a security risk.
- **Execute** determines if programs can be executed in this virtual directory. This should not be enabled unless you are also using this directory as a CGI-type directory and plan to run programs out of this virtual directory on the web server.
- **Script** determines if scripts can be executed in this virtual directory. This must be checked if BIS programs will be run in this directory.
- **NTLM Authentication** should be checked to use this kind of authentication in this directory. In general, this box should be checked.
- **Enable Anonymous Access** should be checked to serve pages to unauthenticated internet users. If not checked, users will be prompted for credentials.
- **Enable CodeWatch Debugging** should be checked only in development builds. This causes a secondary virtual directory named `_cw` to be created that is used as an endpoint by the CodeWatch debugger in conjunction with the `{{Debug}}` tag.

After creation, the virtual directory's properties can be edited in the IIS Administration Console.

## Step 3: Create Web Application

Creates the actual application.

## ➤ BIS Installation Path

This is the path to the BIS server program directory – the directory that contains **BISIsapi.DLL**. This field is preset to the directory where BIS was last installed. You can override this by pressing the **Browse** button and browsing to a new directory; by typing a directory name; or by typing the full path where **BISIsapi.DLL** can be found.

If CodeWatch debugging is enabled, this path must also contain **BISMonitor.dll**.

It is required that the architecture (32-bit or 64-bit) of the BIS installation matches the architecture of the application pool. **BISMkApp** will enforce this.

## Creating the Application

When all of the above fields are filled, press the **Create BIS Web Application** button to begin the process of creating the application. Please be patient—it can take a few seconds to create and configure the application. Once the program finishes, status messages will appear in the box at the bottom of the dialog. At that point, you can create another application or close the program.

## Testing the New Application

To determine if the newly created directory is functional, create a text file named **default.srf** in the physical directory that you specified above. The file should contain this text:

```
<html>
  {{handler *}}
<head>
</head>
<body>
  You requested page:
  http://{{Value(HTTP_HOST,HTMLENCODE)}}{{Value(HTTP_URL,URLDECODE,HTMLENCODE)}}
</body>
</html>
```

Then enter the following URL into your web browser:

```
http://localhost/appname
```

(replace *appname* with the name of your web application).

Your browser should display this text:

```
You requested page: http://localhost/appname/
```

Notice how the **Value** tags were replaced with the server variables. If the **Value** tags were properly substituted, BIS is operational in this directory.



## Changing Application Properties

To change the properties of an application after creation, or to delete an application, use the Internet Information Services (IIS) Manager.

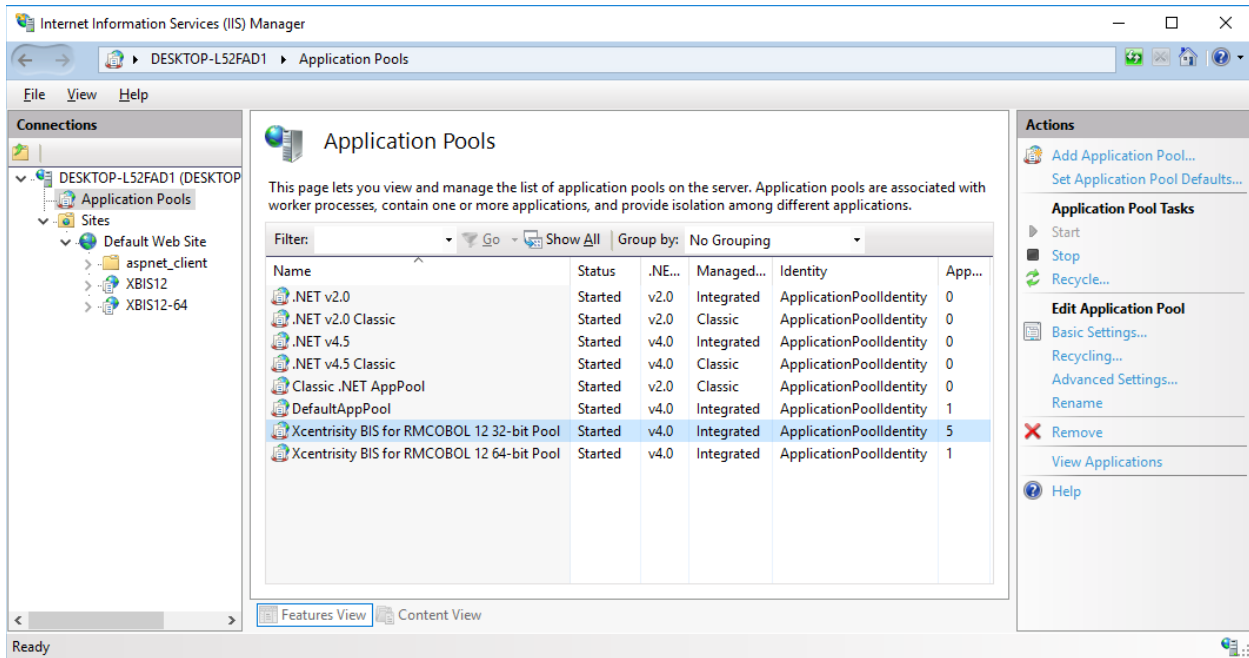


Figure 6. The Internet Information Services (IIS) Administration Console.

Click on Application Pools in the left window to see a list; to change the properties of a pool (including the identity used to serve applications in the pool), use the menu on the right. More information is available in the section entitled *Windows Security and Authentication*, below.

After creation, to change the application pool for an application, in the IIS administrator, select the application and select “Basic Settings”. The “Edit Application” dialog will appear, like this:

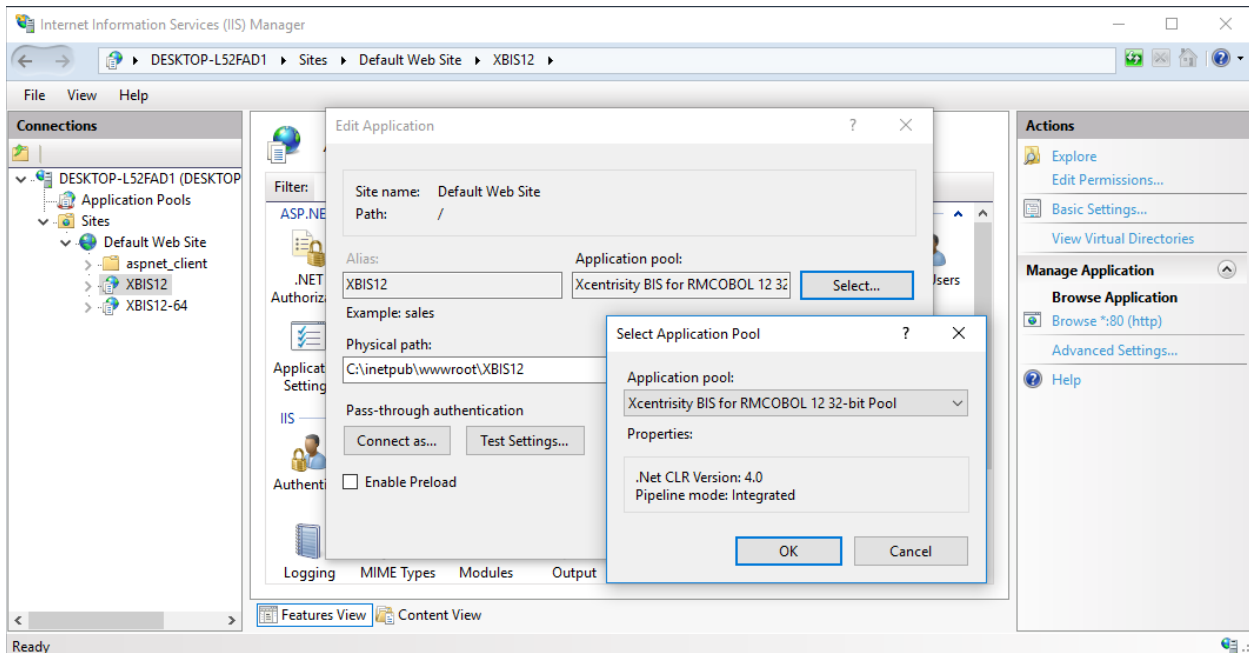


Figure 7. Selecting an Application Pool in IIS



## Windows Security and Authentication

In a Windows Internet Information Server (IIS) environment, the security for your BIS web application and its program (service) and data files is provided by the built-in security mechanisms of IIS and Windows. BIS uses two separate identities to secure your website and applications:

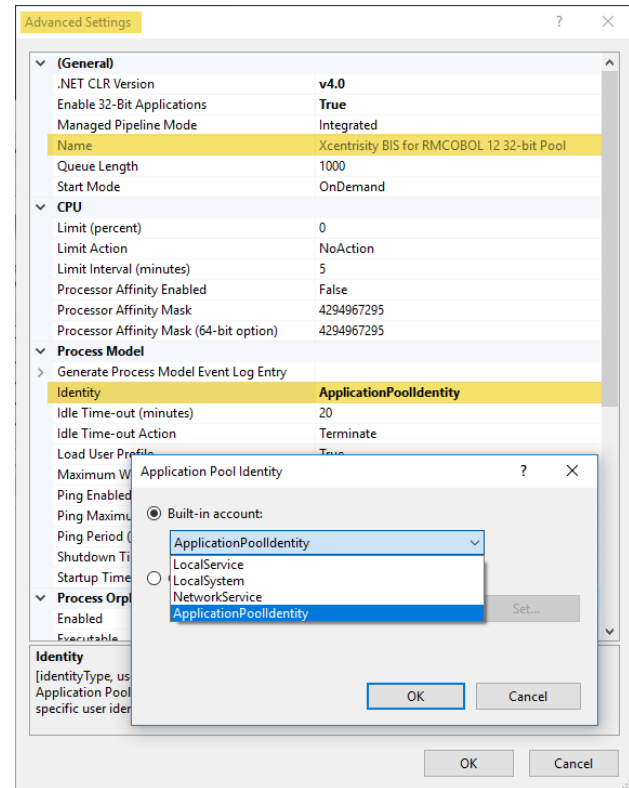
- The identity associated with the application pool that contains the BIS application is used to compose and serve web pages. The default is “**Application Pool Identity**”, which is a security principal created with the application pool. This security principal has each pool that has the same name as the pool when originally created, and is not renamed if the pool is renamed.

It is important that this identity be granted very limited capabilities: this identity must never be granted permissions that allow it to create or modify files or directories but must have permission to read .SRF files and other objects that are required to service requests.

The identity and other application pool settings can be changed in the “Advanced Settings” dialog of the IIS Administration Tool as depicted on the right. You can also change the permissions on the physical directory with the Windows File Manager to ensure that the application pool identity is granted only read permissions.

- The identity associated with the BIS service engine (**XBIS.EXE**) is used to execute COBOL programs. This identity needs a wider range of permissions, as most COBOL programs will need to read, write, and sometimes create files and will likely require permission to access the network.

XBIS program configuration is covered in Appendix G. Configuring BIS/IIS after Installation on page on page 109.



**Figure 15. Advanced Application Pool Settings in the IIS Administration Tool**



## Running BISMkDir on IIS v6

To launch this program, press the Start button, navigate to **RM BIS v12** or **RM BIS v12 (64-bit)** and select **BISMkDir.exe**. You can also navigate to the BIS installation directory in **"Program Files (x86)"** or **"Program Files"** and launch **BISMkDir.exe** from File Explorer or from the command line.

**IMPORTANT:** **BISMKDIR** should only be used with BIS installed on Windows XP, and then only for development use. It is not recommended that Windows XP be used for production because of built-in networking limitations that prevent Windows XP from acting as a general purpose server. These limitations were removed with Windows 7, and **BISMKAPP**, described in the previous section should be used for configuration instead of **BISMKDIR**.

When execution begins, you will see the dialog box depicted to the right. This dialog box has the following fields:

➤ **Server Name**

In this release, always contains **localhost**. Note that this program currently has to be run on the system that contains the IIS server.

➤ **Target Website on Server**

Select the website on the server that will serve the new virtual directory.

Note that **1-<Unknown Error (0x80005000)>** indicates that "IIS6 Metabase and IIS 6 configuration compatibility" is not installed. Please use BISMKDIR instead on IIS v7 and later (Windows Vista and later, and Windows 2008 Server and later).

➤ **Virtual Root Name**

Enter the name of the virtual directory that you wish to created. For example, the default installation creates a virtual directory named **XBIS12**.

The **"At Root"** checkbox is reserved for future use and is always disabled.

➤ **Physical Folder for Virtual Root**

Enter the pathname of the physical directory that will contain the files that are served when the user issues requests against the Virtual Root Name.

For example, when BIS is installed in the default way and you request this page:

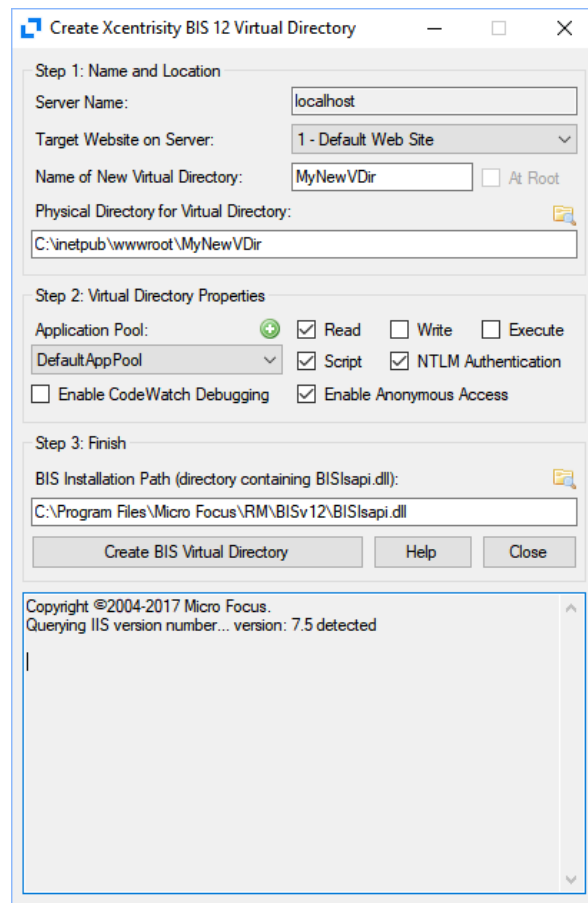


Figure 16. The BISMKDIR Program

```
http://localhost/xbis12/samples/default.srf
```

The requested content is served from:

```
C:\inetpub\wwwroot\xbis12\samples\default.srf
```

This is because the BIS installer creates a physical directory named **XBIS12** in the default web tree, and copies the sample programs into this directory. The installer then creates a virtual root directory named **XBIS12**, configures it so it runs a BIS application (see below) and points it at the previously created physical directory.

Notes:

- The physical directory is **not** created if it does not exist.
- The physical directory must also have the appropriate permissions (for example, anonymous user read access) or BIS will not be able to serve files from this directory.
- It is usually convenient to create the physical directory in the web tree (for example, **c:\inetpub\wwwroot**) because the physical directory will inherit the permissions from the IIS parent directory. Otherwise, IIS will only manage the virtual directory permissions (read, write, execute), and the physical directory permissions must be separately managed.
- You may use the **Browse** button to browse for the directory.

### ➤ Application Isolation Mode

The content of this drop-down list depends on the version of Windows that you are running. For IIS version 6, you may choose from the following options:

- 0 - In-Process (low isolation)
- 1 - Out-of-Process (high isolation)
- 2 – Pooled (medium isolation)

In-process means that the BIS request handler will run within the IIS process, along with all other in-process applications. This results in the best performance, but applications can interfere with each other, and if an application crashes, all applications are affected.

Out-of-process runs each application in a separate process. Each BIS virtual directory will run in a separate process; BIS cannot interfere with other applications and other application failures will not affect BIS. This is the recommended isolation mode for BIS development.

Pooled runs all applications designated as “pooled” together. Pooled applications can only interfere with other applications in the same pool. This is a compromise between the efficiency of in-process applications and the safety and reliability of out-of-process applications.

Note that IIS 7 eliminates the in-process and out-of-process options and provides multiple application pools. This option is described below.

### ➤ Application Pool (32-bit only)

The content of this drop-down list depends on the version of Windows that you are running. For versions of IIS that support application pools, this drop-down contains a list of application pools that were found on the server. The name of the application pool will be suffixed with “(32-bit)” or “(64-bit)”.

Note that BIS version 12 only supports 32-bit application pools. If the host is running a 64-bit version of Windows and no 32-bit application pool is found, a warning is issued and the virtual directory cannot be created until a 32-bit application pool is created.

### ✓ Checkboxes

The checkboxes control how the virtual directory is created.

- **Read** determines if web clients will have read permission to this virtual directory. This must be checked if BIS programs will be run in this directory.
- **Write** determines if web clients will be able to write to this virtual directory. **Note:** This should be enabled only for special purposes, as it is a security risk.
- **Execute** determines if programs can be executed in this virtual directory. This should not be enabled unless you are also using this directory as a CGI-type directory and plan to run programs out of this virtual directory on the web server.
- **Script** determines if scripts can be executed in this virtual directory. This must be checked if BIS programs will be run in this directory.
- **NTLM Authentication** should be checked to use this kind of authentication in this directory. In general, this box should be checked.

### ➤ BIS Installation Path

This is the path to the BIS server program directory (the directory that contains **BISISAPI.DLL**). This field is preset to the directory where you last installed BIS. You can override this by pressing the **Browse** button and browsing to a new directory; by typing a directory name; or by typing the full path where **BISISAPI.DLL** can be found.

## Creating the Directory

When all of the above fields are filled, press the **Create BIS Virtual Directory** button to begin the process of creating the virtual directory. Please be patient—it can take 30 seconds to create the directory. Once the program finishes, messages will appear in the box at the bottom of the window. At that point, you can create another directory or close the program.

## Testing the New Directory

To determine if the newly created directory is functional, create a text file named **default.srf** in the physical directory that you specified above. Type the following:

```
<html>
  {{handler *}}
<head>
</head>
<body>
  You requested page:
  http://{{Value(HTTP_HOST,HTMLENCODE)}}{{Value(HTTP_URL,URLDECODE,HTMLENCODE)}}
</body>
</html>
```

Then enter the following into your web browser:

```
http://localhost/vdir
```

(replacing **vdir** with the name of your virtual directory).

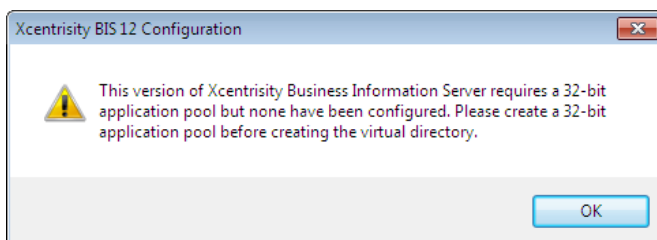
You should see a page containing only this text:

```
You requested page: http://localhost/vdir/
```

Notice how the **Value** tags were replaced with the server variables. If the **Value** tags were properly substituted, BIS is operational in this directory.

## 64-Bit Windows Considerations

On 64-bit versions of Windows that run Internet Information Server version 7 or later, BIS for RM/COBOL must be configured to run in a 32-bit application pool. If a 32-bit application pool is not detected when BISMKDIR is launched, the following dialog will be displayed:



If you receive this warning, please use the IIS administrator to create a new application pool, and then use the “Advanced Settings” dialog for the new application pool and set “Enable 32-bit Applications” to True.

## Windows Security and Authentication

In a Windows Internet Information Server (IIS) environment, the security for your BIS web application and its program (service) and data files is provided by the built-in security mechanisms of IIS. These are based on the Virtual Directory system maintained by IIS and can be manipulated by any user with sufficient Administrator privileges. For this Appendix, Windows Server 2003 is assumed to be the host system, although the procedures for Windows Server 2000 and Windows XP Professional are very similar.

Within the IIS 6.0 Help system, go to Internet Information Services | Server Administration Guide | Security section. There you will find an extensive description of the Windows web security mechanism.





## Appendix J. Building and Running BIS Samples

The BIS Samples include an installation verification application and several simple applications that illustrate the major Xcentrity techniques for constructing web applications and services using BIS. These samples include complete source code as well as all of the XSLT transforms necessary to run them. In addition, each includes a batch file (or shell script) that will build the operational web application from source. This is convenient if you wish to experiment with modifications to the samples, or if you want to use the samples as the basis for your own web application.

If you choose to build a sample from source you must be sure that the environment variable **RM\_PROGRAM\_DIR** is set to the directory on your machine containing the RM/COBOL development system (with XML Extensions) that you wish to use. This is usually *not* the same directory as the one BIS is installed into. This environment variable may be set by the RM/COBOL installation process, or it might have to be set manually prior to building the sample BIS application.

After verifying and setting **RM\_PROGRAM\_DIR** if necessary, be sure that a command prompt is present and the current directory is the **src** directory for the sample you are building. At this point the sample may be built by typing (for BIS/IIS):

```
build.bat
```

or (for BIS/Apache):

```
build.sh
```

After the processing has been completed and a command prompt appears, you will have rebuilt the sample and generated new files in the **bin** directory.



## Appendix K. Glossary

**Application Root Path.** A URL path that groups all of the pages of a BIS application. Under IIS, this is the URL path of the virtual directory that was specified during installation, or was created with the BISMKDIR utility.

**BIS Request Handler.** The BIS components activated when a Stencil (Server Response File) is the target of an HTTP request. The BIS Request Handler performs the processing of the Stencil, including the management of Sessions and the creation and destruction of Service Instances.

**HTTP.** HyperText Transport Protocol, a standard protocol and encoding scheme used to transmit requests to web servers and receive responses from web servers. HTTPS is a secure version of HTTP.

**Response Content.** The data included in the content area of an HTTP Response message.

**Request Content.** The data included in the content area of an HTTP Request message.

**Request Document.** An XML document produced by the BIS Web Server and including the information contained in an HTTP Request message as well as various values indicating the user agent and server environment in which the request was issued and is being processed.

**Server Response File.** A file, usually with the extension **.srf**, which is used to direct the BIS Web Server in responding to a request. Also referred to as a **Stencil**.

**Service Engine.** The BIS components responsible for performing the execution of a user-supplied Service Program and the synchronization and interaction between the Service Program and the BIS Web Server.

**Service Instance.** An execution of a Service Program within a particular Session.

**Service Program.** A user-supplied RM/COBOL program object file that is invoked by the BIS Request Handler and executed by the BIS Service Engine.

**Session.** A “stateful” sequence of HTTP request/response interactions between a web user agent (for example, browser) and a BIS Request Handler. The session identification is preserved in the user agent by means of a session cookie provided in the response to the first request of the session. All subsequent requests containing that cookie are assumed to be for the designated session.

**Session Root Path.** The URL path that contains the object that caused the current session to be created. For example, if the requested URL is <http://xcentris.org/xbis/default.srf>, the session root path is **/xbis**. By default, all pages that contain the session root path in their URL path will be served using the same session. This can be overridden by specifying **Scope=ISOLATE** in a **SessionParms** tag.

**Stencil.** A file, usually with the extension **.srf**, which is used to direct the BIS Request Handler in responding to a request. Also referred to as a Server Response File.

**URI.** A Uniform Resource Identifier, the naming convention for objects on the Internet. A URI consists of a *scheme*, followed by a colon, followed by a scheme specific name. A URI can be further classified as a Locator, or a Name, or both. The term "Uniform Resource Locator" (URL) refers to the subset of URI that identify resources via a representation of their primary access mechanism (e.g., their network "location"), rather than identifying the resource by name or by some other attribute(s) of that resource. The term "Uniform Resource Name" (URN) refers to the subset of URI that are required to remain globally unique and persistent even when the resource ceases to exist or becomes unavailable.

**URL.** A Uniform Resource Locator, the location of a resource on the internet. A URL is a type of URI (Uniform Resource Identifier), and consists of a *scheme* (in this context, HTTP or HTTPS), the name of a *machine* (sometimes also called the *authority*), and a *path* to a resource (for example, a file). For example, <http://xcentris.org/bis/index.html> specifies the file named *index.html* from directory *bis* on

server machine *xcentris.org* using the HTTP scheme. When this is typed into a web browser, the browser issues an HTTP **GET** request on this resource.

**URL Path.** The path portion of a URL—that is, the part after the server identifier up to the end of the URL, the query string, or fragment (whichever comes first). For example, in the URL <http://xcentris.org/bis/default.srf?query=yes#top>, the URL path is [/bis/default.srf](#).

## Appendix L. Change History

The change history is described in the supplement document/README in the installation directory.