Rocket Model 204 Janus/TN3270 Debugger

User's Guide

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Notices

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Website: www.rocketsoftware.com

Rocket Global Headquarters
77 4th Avenue, Suite 100
Waltham, MA 02451-1468
USA

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Contents

CHAPTER 1 Introduction

This chapter describes how this document is organized, then provides brief product overview 2 and quick-start 7 subsections.

Note: Most cross-references in this document are underlined (hyperlinked and shown in a blue font if viewed online) and accompanied by a page icon like the following, which frames the number of the page that contains the target of the reference:

Using this document

This document assumes that you have completed the mainframe and workstation tasks described in Installation and Configuration 367.

These are the information subdivisions:

- This "Introduction," which includes an overview of the Debugger products and a "getting started" section that outlines how to begin to use the products.
- The Getting Acquainted with the Client GUI 9 and Performing Basic GUI Tasks 51 chapters are designed to orient you quickly to the Debugger Client and get you working.
- The Additional Debugger Functionality 147 chapter describes features or tasks that are not primarily concerned with the Client GUI.
- The Client Command Reference 177 chapter provides detailed descriptions of the Debugger Client commands you can use to program the Client interface controls and displays.
- The Customizing Client Operations 287 chapter describes how to modify the default arrangement of Client buttons and hot keys, as well as the colors of the text or background of Client displays.
- The Using Debugger Macros 315 chapter describes how to define scripts containing one or more of the commands that activate the various Debugger controls.
- The Problem Diagnosis 349 chapter provides a closer inspection of how the Debuggers handle errors and get and manipulate the data you see in the Client.
- The Installation and Configuration 367 chapter includes product installation and set up information, as well as information about setting up at your site a centralized distribution of updated Debugger Client replacement files.
- The Release Notes 403 provide an archive of information about features that are new or enhanced in each build of the Debugger Client.

1.1 About the Debuggers

The Janus Debugger is a tool designed for software developers who create and maintain Janus Web Server applications. With software installed on the Web Server host Model 204 Online, as well as on a workstation with a browser that can access the Web Server, the Debugger lets you examine in statement-by-statement detail the User Language code that the Web Server executes.

The TN3270 Debugger (formerly named the Sirius Debugger) is designed for developers who create and maintain Model 204 3270-screen and Batch2 applications. With software installed on the host Model 204 Online, it uses essentially the same Debugger Client as the Janus Debugger, letting you examine 3270-screen and Batch2 code.

An instance of the Debugger Client can be debugging a web application (acting as the Janus Debugger), or it can be debugging a 3270/Batch2 application (acting as the TN3270 Debugger). At any given time, however, it may only be debugging one type of application. It "knows" the type of thread being debugged (the title bar of the Client toggles to reflect the thread type) and it communicates that information to the Online (which ultimately controls the granting of permission to debug).

These subsections continue the overview of the Debuggers:

The basic operation

When you are running under the Janus Debugger, and Janus Web Server is about to run a request on your behalf, or you are running under the TN3270 Debugger and you submit a 3270-screen or Batch2 request:

1. Request source code is sent to the Debugger Client deployed on a workstation.

2. The Debugger Client displays the code, navigable to top and bottom, with search features available.

3. Program execution is paused, the Debugger awaiting the instructions you provide through the Client GUI.

Although the Janus Debugger is limited to Janus Web Server applications, the programs you debug with the Janus Debugger may be, or contain, the following:

- SOUL O-O and Janus SOAP XML applications
- Sdaemons or transactional sdaemons, including those spawned by other sdaemons or by $COMMBG requests
- Synchronous $COMMBG requests, including those spawned by other $COMMBG requests or by sdaemons
- $WEB_FORM_DONE persistent mode requests

The TN3270 Debugger is primarily for debugging SOUL programs other than web applications. These include:

- 3270 full screen applications
- Batch2 applications
- HTTP client applications that use the Janus Sockets HTTP Helper
- Any other programs run from the Model 204 command prompt, including those that do line mode input via $READ.

The feature set

Both Debuggers provide these typical debugging capabilities:

- Viewing code while running it
- Stepping through the code one statement at a time
- Examining variable values
- Using a separate "watch window" for the display of specified data items
- Setting breakpoints at which code execution pauses
- Skipping over selected subroutines

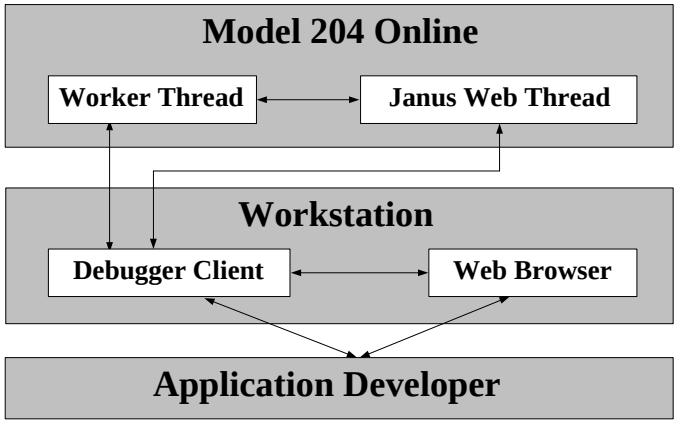
In addition, the Debuggers provide these special features:

- A compact 9 Graphical User Interface with user-configurable buttons and hot keys
- Views of the Model 204 audit trail and code executed by sdaemons
- Tracing of statements that modify variables in executed code lines, or tracing until a variable becomes a certain value
- Saving of sets of variables to be watched, which are restorable at any time
- Display of Web Server output-buffer data (Janus Debugger) and screen variables (TN3270 Debugger)
- A code line's Model 204 procedure details (subsystem, file, name, line number, text preceding dummy string substitution)

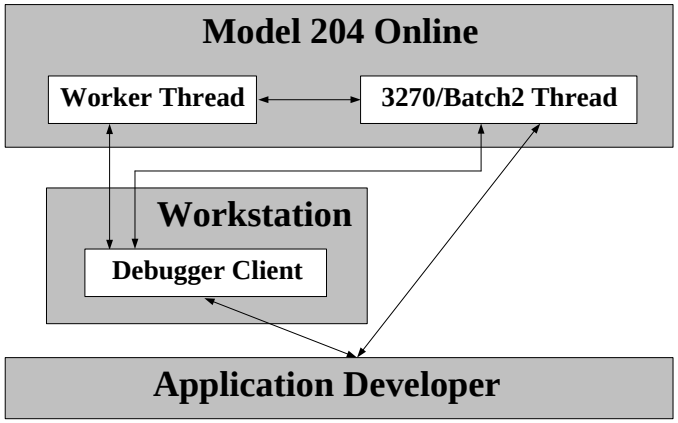
- Filtering of program code to skip over all but the Model 204 procedure you identify or the procedures you pre-selected (added to "White List")
- Stepping out of of a called subroutine, method, or daemon and continuing processing at the statement after the call to the subroutine, method, or daemon
- Examination of former-Sirius extensions to User Language (including LongStrings, $lists, objects)
- System class methods that let you insert code in User Language that runs only under the Debuggers
- Facilitated access for code editors (for example, Xtend®, UltraEdit®)

The architecture

The following figure displays the principal components in a Janus Debugger configuration:



The main components in a TN3270 Debugger configuration parallel those in the Janus Debugger configuration, the principal exception being the absence of the web browser:



Per Debugger session for a Janus Web Server or 3270/Batch2 program, these components are active in the Online and on the workstation:

Model 204 nucleus hooks

(Assembler; not shown above)

Compiler:

- Capture source lines, before and after dummy string substitution.
- Note source of line (procedure and file).

Evaluator:

- Can step one statement at a time, and can step over routines and methods.
- Can stop on breakpoints.
- Between statements, can get variable, field, and global values, to support display, trace, watch, etc.

Janus Web thread

Janus Debugger only.

3270/Batch2 thread

TN3270 Debugger only.

Worker threads

(Assembler and User Language, one each to the thread being debugged and to the Debugger Client, respectively)

For each debugging session, a “worker thread” arbitrates between the thread being debugged and the workstation-based client.

A worker thread does the following:

- Passes data between the thread being debugged and the Client.
- Controls the execution of the thread being debugged, at the behest of the Client.

Debugger Client

(WIN32 GUI, written in VB.NET)

The Debugger Client resides on the developer's workstation. It is a proxy server in a Janus Debugger session: the browser no longer directly connects to the Web Server, but instead it "sends" to and "receives" from the Client.

The Client GUI lets you control the application and view variable values, source code, traces, and for Janus Debugger sessions, the web output buffer.

Web browser

Janus Debugger only. Any web browser that allows proxy servers.

Versions and builds

First available in Version 7.0 of the Sirius Mods, the Debuggers also include features that are available only with later versions of the Sirius Mods. Those features are labeled as such in this documentation.

Independent of the version of the Sirius Mods being run on the Model 204 host machine, the Debugger Client has its own integer-numbered sequence of "builds" that contain new and updated features. From build to build of the Debugger Client, the **About** box (accessed by the **Help** menu) provides a searchable list of the principal changes in each of the previous builds of the Debugger Client.

System requirements

The Online Configuration 369 section of this document specifies the requirements for Model 204 product release levels, licenses, and maintenance, as well as Debugger product authorization. In addition are instructions for configuring a Model 204 Online that hosts the Debugger, which include User 0 parameter and TCP port definitions and increases in storage table and work area sizes for both of these:

- The worker thread that services a debugging session
- The thread on which the program to be debugged is running

Known limitations

The following are known limitations and issues concerning the Janus and TN3270 Debuggers:

- You may not use either Debugger for ***DBCS data***.
- You may use the Janus Debugger against a ***Janus Web Legacy Support*** thread if you also have a license for the TN3270 Debugger.
- The Janus Debugger **Web Buffer** tab only displays ***printable output***; binary data is not shown.
- No ***asynchronous daemon or $COMMBG requests*** may be debugged. They are simply ignored by the Debugger (and they execute normally).
- ***Windows 95, Windows 98, and Windows ME*** are not supported by the client. You must be running Windows 2000, 2003 Server, Vista, 7 or 8.
- On the workstation, you currently must ***hand-edit the debuggerConfig.xml file*** to configure it after installation or to alter the configuration.
- Both the **Execution Trace** tab (output from one trace) and the **Web Buffer** tab have ***5000-line capacities.*** If the capacity is exceeded, the last 5000 lines are shown.

1.2 Getting started

In place of a tutorial, it is recommended that you teach yourself to use the Debugger. To get started:

1. Make sure the following are true:

   - The product has successfully been installed and configured[367], on the mainframe and on the workstation that is to host the Debugger Client, recently enough that you are confident that the various port numbers and names assigned and, say, your web browser's definition of the Debugger Client as a proxy server (Janus Debugger), are still valid.

     If you are unsure, you may want to review the installation documentation and/or rerun the final installation test.[395]

   - The Debugger Server server socket port is started.[371]

   - Only for the TN3270 Debugger, the Debugger Server client socket port is started.[372]

   - The Debugger Client is started.[375]

2. Start the Debugger Server worker thread:

   - Janus Debugger: This is done automatically by the next step. Go to Step 3.

   - TN3270 Debugger: From the Model 204 command line, issue the TN3270 DEBUG ON[149] command. Your session lasts until you log off Model 204 or issue `TN3270 DEBUG OFF` or its Debugger Client-command[289] equivalent, `turnOffDebugging`.

3. Run a request you want to debug:

   - Janus Debugger: From your web browser, invoke a URL that accesses a program that is run by your Janus Web Server.

   - TN3270 Debugger: From the Model 204 command line, start a SOUL/User Language program (Include a procedure or invoke an APSY subsystem).

4. Using the Debugger Client GUI, control the execution of the SOUL/User Language code.

   You might take a few minutes with Getting Acquainted with the Client GUI[9], then try some of the operations described in Performing Basic GUI Tasks[51].

Accessing and printing Help information

For quick access to Debugger Client Help information (accessed from the **Help** menu or the F1 key), try finding in the Index the name of the GUI control (button, tab, box label) involved in the operation you want to know more about.

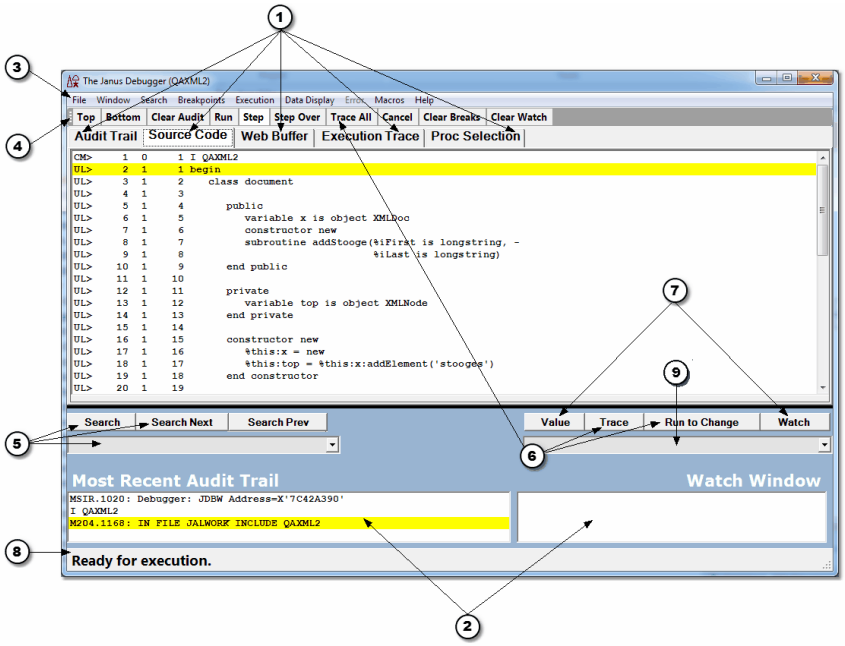
The online Help information is reproduced in PDF format (as this Janus/TN3270 Debugger User's Guide) in your Debugger Client installation folder. This PDF is immediately accessible by selecting the **View PDF Manual** option from the Debugger Client **Help** menu. It is highly recommended that you use the PDF document as the source for any lengthy Debugger Help printing.

The **Print** option that is available from the toolbar on your Microsoft HTML Help viewer gives reasonable results. To print multiple topics, select **Print** from the toolbar, then select the option to `Print the selected heading and all subtopics`.

CHAPTER 2 Getting Acquainted with the Client GUI

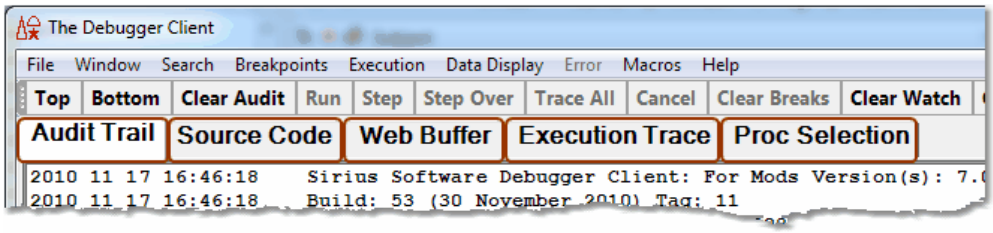
The following image of the Debugger Client (debugging a Janus Web program) has numbered labels that point to the principal areas of the Debugger, which are described in the corresponding numbered sections in the linked list below. The image is also "live": you can simply click any area of the image you want to find out about. In a TN3270 Debugger session, the **Web Buffer** tab is not present.

1. The tabbed pages 10
2. The lower windows 14
3. The menu bar 17
4. The control button bar 39
5. The search facility 44
6. The tracing buttons 47
7. The value displaying controls 48
8. The Status bar 49
9. The Entity-name input box 50



2.1 The tabbed pages

An important part of the user interface to the Janus Debugger or the TN3270 Debugger is the set of tabbed pages that use the main display window below them (the **Web Buffer** tab is not present for TN3270 Debugger sessions; Daemon tabs[139] display dynamically if the program invokes daemons):



These ***pages are resizable*** by mouse if you grab and drag the black border bar at the bottom of the main window.

The ***pages are copyable***:

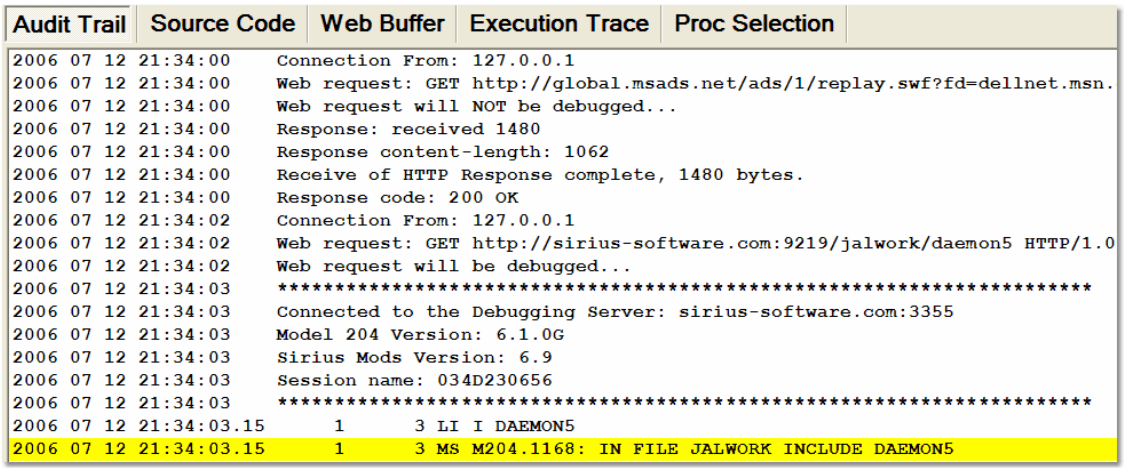
- If you press the Ctrl+C keyboard key combination or select the **Copy** option from the **Window** menu, the contents of the active (topmost) page are copied to the Windows clipboard. The number of lines copied is displayed in the Status bar[49]. Only the **Proc Selection** page is not copyable.
- If you map the viewText command[289] to a Client button or hot key, or select its equivalent from the **Window** menu, you can invoke a text viewer[147] that lets you copy, edit, print, and save text data from Client pages.

Some of the ***pages are displayable in windows outside of the Client***. These external[306] windows are easily invoked by double-clicking their tabbed page name, by selection from the Client's **Window** menu, or by mappable command[288].

Audit Trail tab

The **Audit Trail** page displays, from the beginning of the debugging session:

- The Model 204 audit trail lines produced by the online thread that is servicing web requests from your browser(s) or by the thread that is servicing your 3270/Batch2 requests
- The Model 204 audit trail lines produced by any threads that run daemons on behalf of your web or 3270/Batch2 requests
- Information about the state of the Debugger Client, such as the port on which it is listening and the port whose web server requests it is debugging
- All outgoing HTTP messages sent by your browser (passed-through by the Janus Debugger)

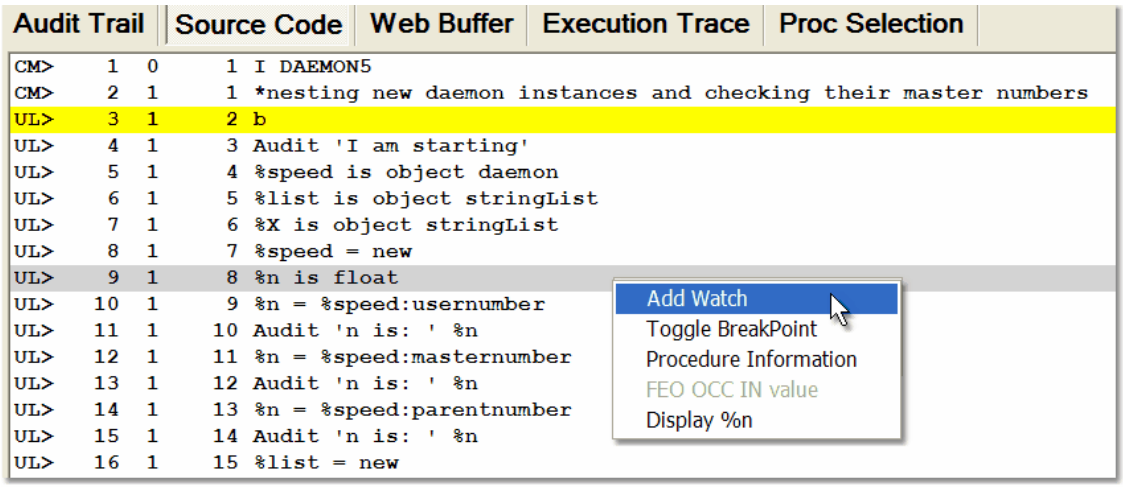


The Most Recent Audit Trail window 14 also *and only* displays audit trail lines.

The **Audit Trail** page is displayable separate from the Client in an external 306 window.

Source Code tab

The **Source Code** page displays the source code lines of the User Language request that is currently being debugged. Here is where most of your interactions with program code take place: setting breakpoints, viewing the current execution position, getting detailed information about a source code line, watching variables from a selected source code line.

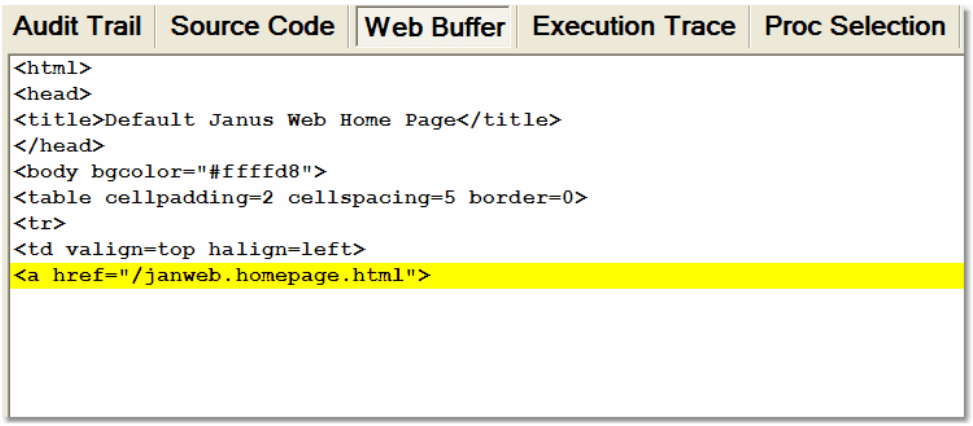


The page display format is:

Column 1	Line type: CM> — command UL> — User Language statement ER> — error message BR> — breakpoint
Column 2	Simple line number
Column 3	Include level
Column 4	Line number within include

Web Buffer tab

Not ordinarily present for TN3270 Debugger sessions, the **Web Buffer** page displays the lines the Janus Web Server application is preparing to send to the browser at the completion of the request. The page is updated in real time, each time you break execution, as you step through a code program and PRINT and HTML statements are executed. The most recent lines added to the page are highlighted, and you can watch your output HTML being built.

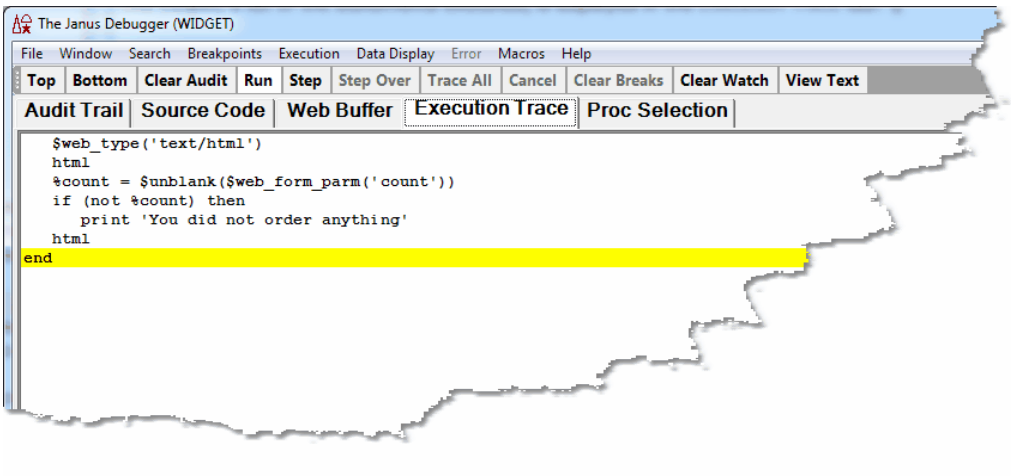


Top, **Bottom**, and search buttons are available. The page is cleared when a new request is initiated or if you clear it manually (via the **Window** > **Clear Web Buffer** button or the `clearWebBuffer` 191 command).

The **Web Buffer** page is displayable separate from the Client in an external 306 window.

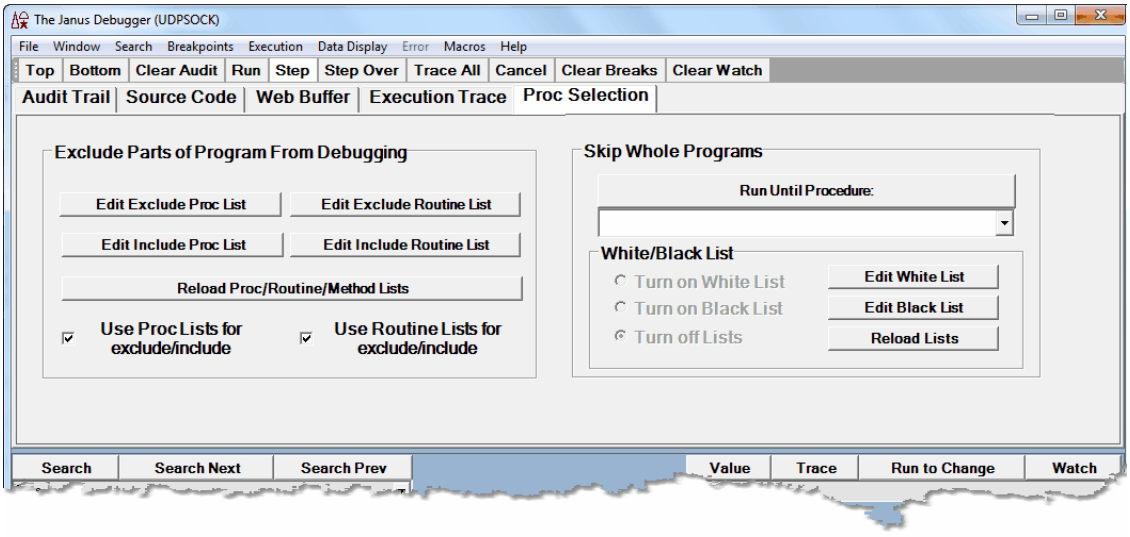
Execution Trace tab

The **Execution Trace** page displays the output of the various tracing operations. It is discussed further in Tracing program execution 127.



Proc Selection tab

The **Proc Selection** page lets you designate some sections of your program or entire programs, for debugging while omitting others. This may be for reasons of time or space economy. You can execute but not display in the Debugger Client specified sections of your code, ranging from a few lines to whole routines or inner or outer procedures.



The **Exclude Parts of Program from Debugging** section lets you specify multiple User Language methods, subroutines, or inner procedures whose source code will be executed but not shown in the Debugger Client. From this excluded source code, you can also specify methods, subroutines, or inner procedures whose code you want to be able to view.

The **Skip Whole Programs** section of the page lets you specify by name or name pattern only the outer procedures you want to debug. Those procedures not identified are executed but their code is not sent to or displayed in the Client. You can identify the procedures directly (by explicitly specifying them by name or pattern in a "white list") or indirectly (by explicitly excluding the procedures you do not want to debug by specifying them by name or pattern in a "black list").

The **Proc Selection** page options are discussed further in Excluding sections of source code from debugging. 64

See Also

Performing Basic GUI Tasks 51

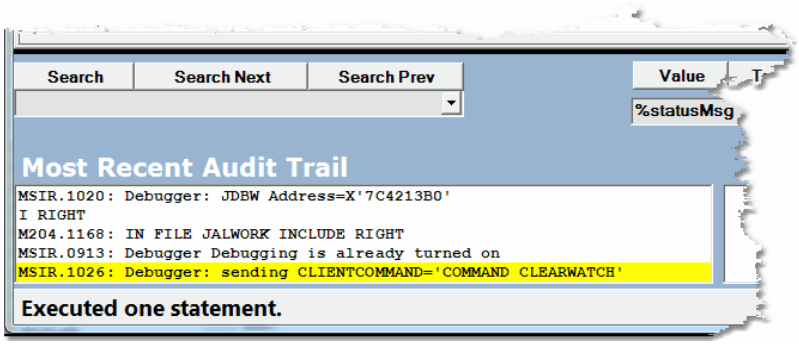
Opening an external window 306

2.2 The lower windows

The windows described here are positioned below the Client's principal display area, the main window.

The Most Recent Audit Trail window

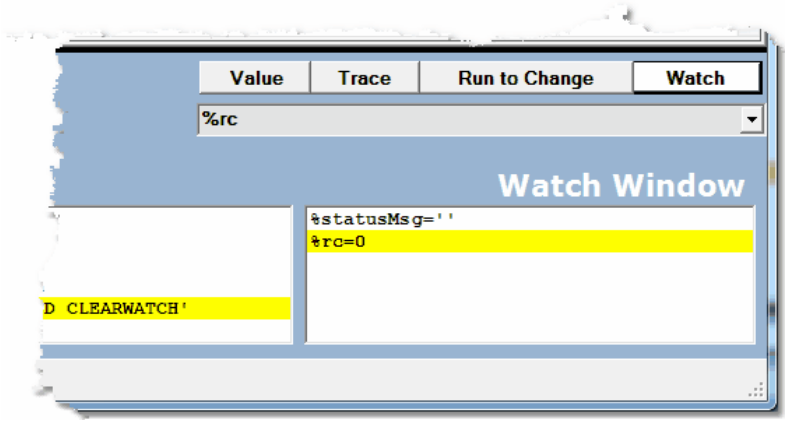
This window displays only the last few lines of the audit trail for this web user or 3270/ Batch2 thread. It displays ***no*** non-audit trail information.



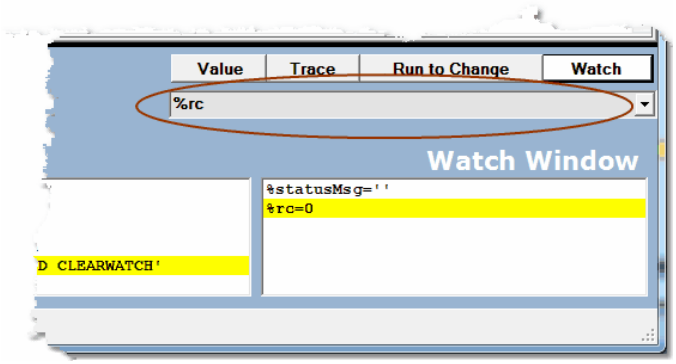
The **Most Recent Audit Trail** display is ***not*** deleted if you click the **Clear Audit** button in the button bar 39.

The Watch Window

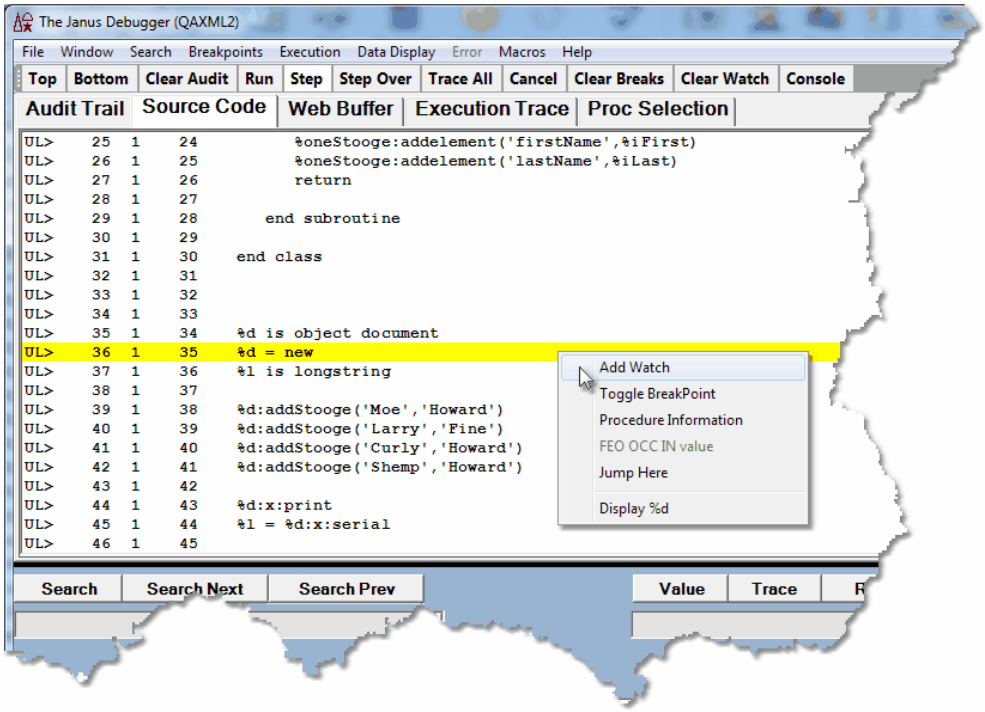
The **Watch Window** box can display the current value of one or more SOUL data items (% variables, $list items, object variables, etc.). It is updated as the program runs, each time execution is paused by the Debugger:



To add an item to the **Watch Window,** you can use the Entity-name input box below the main window:



Or you can right-click a **Source Code** line and select **Add Watch** from the context menu:



For watched variables that have large values, there are multiple display options[88] that include manually widening the the **Watch Window**, viewing the value in a tooltip box, displaying the value in a separate window, or displaying the **Watch Window** itself in a separate window[306].

See Also

Viewing the audit trail[126]

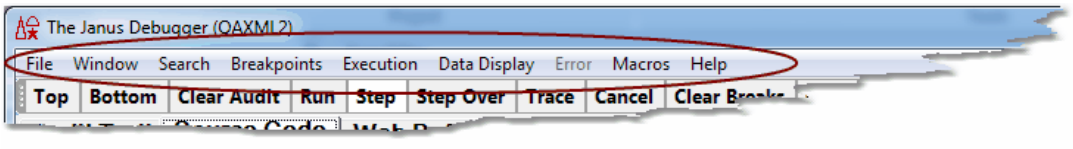
Watching program data items[85]

Opening an external window[306]

Hiding the Client's lower windows[311]

2.3 The menu bar

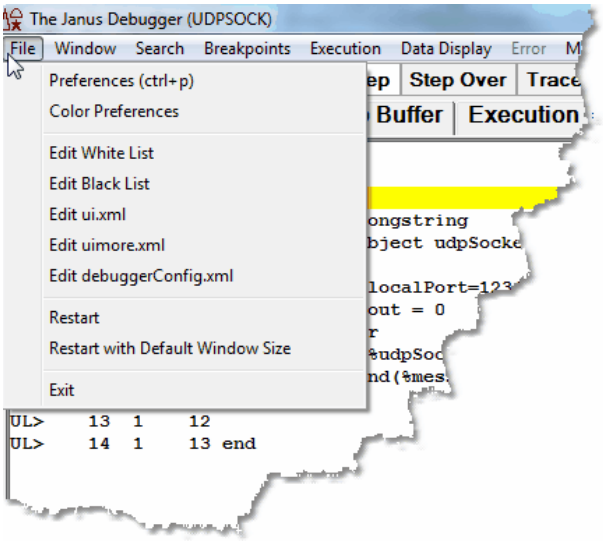
The Debugger Client has multiple menus, each of which is described in the following subsections. Many of the menu options duplicate the actions of default Client buttons and keyboard shortcuts, and most menu options are associated with Client commands.



If a hot key is mapped to a command that is associated with a menu option, the hot key is displayed in parentheses next to the menu option.

2.3.1 The File menu options

The **File** menu options are identified below:



Preferences

Also accessible (by default[295]) by using the Ctrl+P keyboard shortcut, this option opens a dialog box[239] that lets you control certain Debugger Client operating options:

Execution Options:

- **Pause at end of evaluation**

  Whether to pause at the end of the evaluation of a request[59] (to review program data as it is at the end of request processing) before sending any contents of the web output buffer[127] or any 3270/ Batch2 terminal output.

- **Run Until spans debug sessions**

  Whether Client "Run Until" processing[73] should continue searching until it finds a specified procedure, even if the program contains HTML frames, the debugging session is interrupted by a loss of the connection to the Model 204 Online, or the TN3270 Debugger is toggled off and on again.

- **Break after READ SCREEN**

  Whether the TN3270 Debugger automatically breaks execution after READ SCREEN or READ MENU statements (see Breaking at the end of READ SCREEN or READ MENU statements 60).

- **Source Preview**

  Whether the Client should initially display only a preview 83 of the entire source code program (for programs with at least 1000 lines, by default).

- **Macro Autorun**

  Whether an include of a procedure from command level will automatically invoke a macro 324 whose name matches the name of the included procedure.

IE Options:

- **IE Mode**

  Whether the Client should automatically configure and maintain proxy server settings 387 for the Internet Explorer and Chrome browsers, and whether the proxy is for all host URLs or only for a specified few. 388

  New in Build 62. Same as the `setIEmode` 263 command.

- **Clear proxy override**

  Whether the Client's browser maintenance should clear and preserve any exception URLs designated in Internet Explorer 388 to bypass the Client as proxy server.

- **Use existing proxy on not debugged URLs**

  Whether the Client should re-route exception URLs 388 (designated in Internet Explorer to bypass the proxy server) to a preexisting proxy server rather than directly to the Internet.

Display Options:

- **Show at most <x> list items**

  What the display maximum is for the number of $list, Stringlist, or Arraylist object items whose values you can view in a separate Value window 102 .

- **Restore watches on startup**

  Whether to restore this session's remaining Watch Window contents when the Client starts its next session.

- **Trim blanks from selection in View Text**

  Whether leading and trailing blanks should be trimmed from selections you copy to the Text Viewer 147.

- **History to Execution Trace**

  Whether execution history 132 data should display in the Execution Trace page instead of a separate window.

- **Show long watch values in a Tooltip**

  Whether to display in a tooltip box Watch Window items 88 that are too wide to fit within the Watch Window.

- **Use !debugger directives**

  Whether to enable Debugger directives 65, which let you exclude designated source code from the debugging session.

Web Server Selection:

- Which of the Onlines specified in the Client configuration file `(debuggerconfig.xml)` are to have their web requests debugged. For more information, see Debugging multiple Web Servers 145.

Program Titles:

- **3270 Emulator**

  Whether to bring to the top of the PC screen (when the Debugger Client pauses for user to provide external input) the 3270 emulator 60 or web browser window 142 whose title is matched by the text specified in the appropriate one of these boxes.

Open at Startup:

Whether the Client should automatically start/restart with:

- The main button bar in an external window 42.
- An extra button bar 42.
- The **Watch Window,** or the **Audit Trail**, **Web Buffer** or **Execution Trace** page, or a combination of these, opened in external windows 311.

Main Button Bar:

- **Top**, **Center**, or **Bottom**

  Whether to change the position 40 of the main (non-external) button bar from its default (**Top**), above the main window) to either just below the main window (**Center)**, or to the very bottom of the Client window (**Bottom**).

- **Extra Buttons**

  Whether extra buttons 42 defined in the `ui.xml` file should be added to the display of the main button bar (wherever it is located). If the checkbox is cleared, they display in a separate external window when invoked by menu or command.

  New in Build 57. Same as the `extraButtonBar` 205 command with the argument `main`.

Main Window Options:

- **Hide Lower Section**

  Whether to hide the lower section of the main window (everything below the tabs 10). This is useful in a multiple monitor environment where the **Audit Trail** and **Watch Window** are in separate windows on another monitor.

  New in Build 57. Same as the `hideLower` 212 command.

Color Preferences

Lets you change the color 297 of text and highlighting in the various Client windows and pages.

Edit White List

Lets you create or edit an existing `whitelist.txt` file. This file contains a list of the Model 204 procedures that you want to debug.

When white listing 77 is activated and the Debugger runs your source code, it filters procedures automatically, stopping to interactively debug only the requests that are on the white list. Other procedures execute normally, but they are not interactively debugged.

Edit Black List

Lets you create or edit an existing `blacklist.txt` file. This file contains a list of the Model 204 procedures that you want **not** to debug.

When black listing 77 is activated and the Debugger runs your source code, it filters procedures automatically, stopping to interactively debug only the requests that are *not* on the black list. Other procedures execute normally, but they are not interactively debugged.

Edit ui.xml

Lets you create or edit an existing ui.xml file 291. This file specifies modifications to the Client's default operational buttons and keyboard shortcuts. You can set the buttons to perform actions (commands), or you can set hot keys to commands.

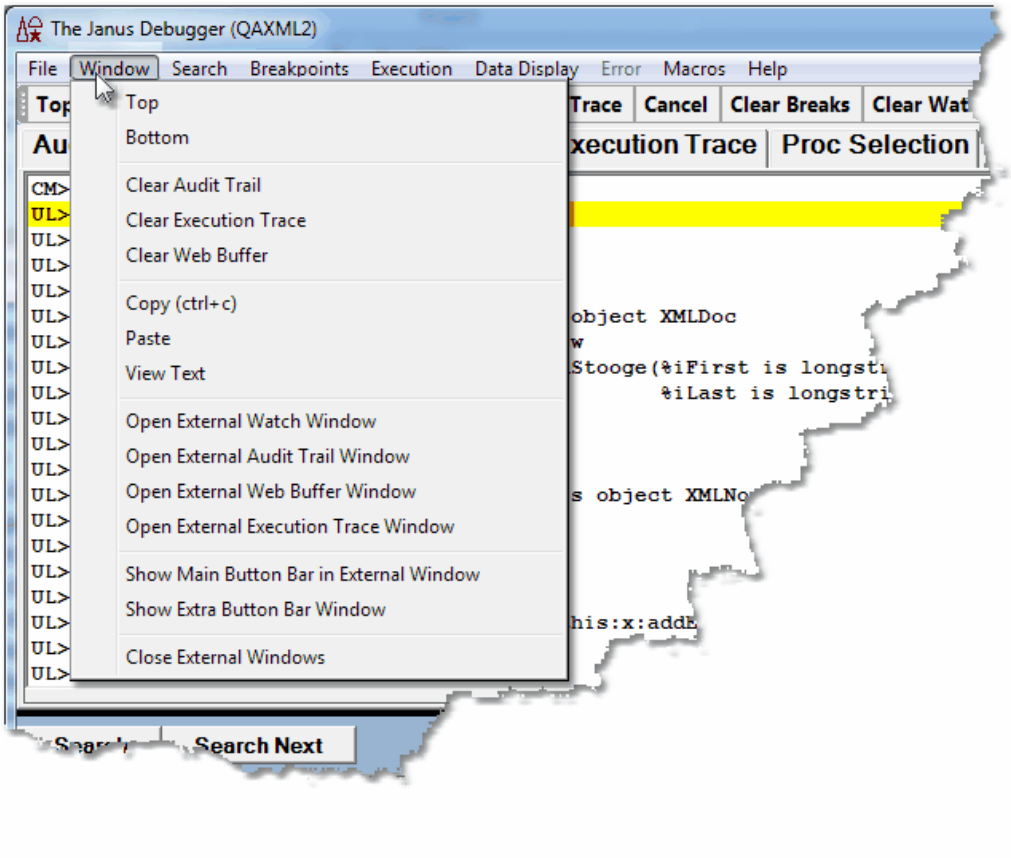
Edit uimore.xml

Lets you create or edit an existing uimore.xml file 295. This file provides the same kind of functionality as, but entirely overrides the `ui.xml` file. New in Build 57.

Edit debuggerConfig.xml	Opens the debuggerConfig.xml 378 file for viewing and editing its elements (which define Online connection parameters, file-type filtering, and local editors, among other things).
Restart	Restarts the Debugger Client. Same as the `restart` 245 command.
Restart with Default Window Size	Restarts the Debugger Client with the default size (as when initially installed) for the main window instead of the size at last exit. Same as the `restartDefault` 245 command.
Exit	Does no further processing and immediately closes the Client.

2.3.2 The Window menu options

The **Window** menu options are identified below:



Top

Scrolls to the top of the currently displayed tab. Same as the Top button 39. Comparable mappable command, top 279, can be applied to the Client window (main, external, work) that you specify.

Bottom

Scrolls to the bottom of the currently displayed tab. Same as the Bottom button 39. Comparable mappable command, bottom 181, can be applied to the Client window (main, external, work) that you specify.

Clear Audit Trail

Clears the contents of the **Audit Trail** tab. Same as the Clear Audit 126 button and the clearAudit 185 command.

Clear Execution Trace

Clears the contents of the **Execution Trace** tab. Same as the `clearExecutionTrace` 188 command.

Clear Web Buffer

Clears the contents of the **Web Buffer** tab. Equivalent mappable command is `clearWebBuffer` 191.

Copy

Copies to the clipboard the lines currently visible in the active tabbed page. Described further in The tabbed pages. 10

Paste

Pastes the current clipboard contents to the Client's **Search** text box or to the text box above the **Watch Window.**

View Text

Invokes a separate viewer 147 for copying, printing, and saving Client text data.

Open External Watch Window

Displays in an external window 306, that is, separate from the main window, the current contents of the Client **Watch Window.** Or, it brings the existing external **Watch Window** to the top of your current stack of open windows.

Same as the `openExternalWatchWindow` 235 command.

Open External Audit Trail Window

Displays in an external window 306 the current contents of the Client **Audit Trail** tab. Or, it brings the existing external **Audit Trail** window to the top of your current stack of open windows.

Same as the `openExternalAuditTrail` 233 command.

Open External Web Buffer Window

Displays in an external window 306 the current contents of the Client **Web Buffer** tab. Or, it brings the existing external **Web Buffer** window to the top of your current stack of open windows.

Same as the `openExternalWebBuffer` 235 command.

Open External Execution Trace Window

Displays in an external window 306 the current contents of the Client **Execution Trace** tab. Or, it brings the existing external **Execution Trace** window to the top of your current stack of open windows.

Same as the `openExternalExecutionTrace` 234 command.

Show Main Button Bar In External Window

Displays in an external window 306 the current contents of the Client main button bar 39. Or, it brings the existing external **Button Bar** window to the top of your current stack of open windows.

Same as the `buttonBar show` 184 command.

Show Extra Button Bar Window

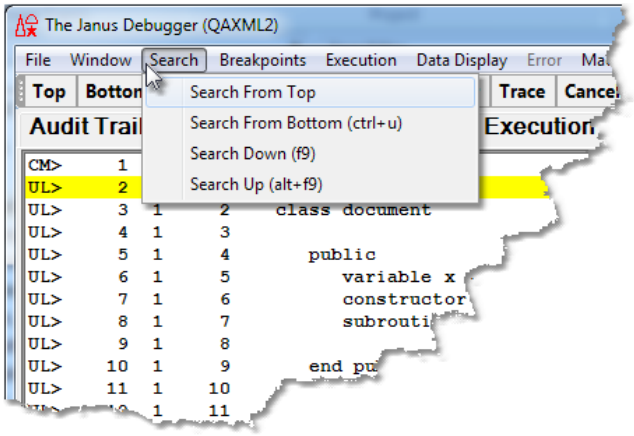
Displays in an external window 306 the current contents of the Client Extra button bar 42. Or, it brings the existing external **Extra Buttons** window to the top of your current stack of open windows.

Close External Windows

Closes all Client external windows. 306 Same as the `closeExternalWindows` 193 command.

2.3.3 The Search menu options

The **Search** menu options are identified below:



Search From Top

Searches (without regard for case) from the top of the current tab for the string you specify in the **Search** box. Same as the Search button 44. Comparable mappable command, `searchFromTop` 254, can be applied to the Client window (main, external, work) that you specify.

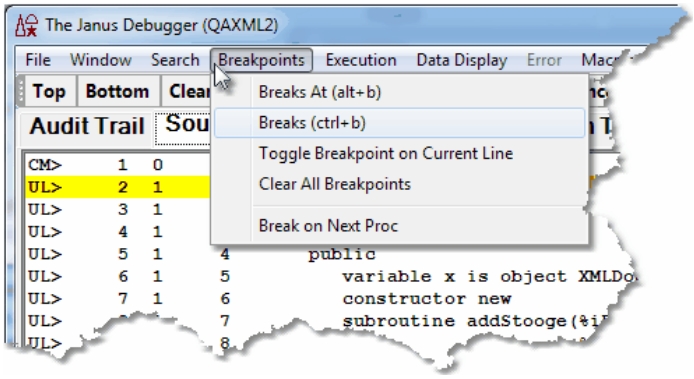
Search From Bottom — Searches (without regard for case) from the bottom of the current tab for the string you specify in the **Search** box. Same as the Alt + **Search** button combination. Comparable mappable command, `searchFromBottom` 252, can be applied to the Client window (main, external, work) that you specify.

Search Down — Searches (without regard for case) down (relative to the current line) in the current tab for the string you specify in the **Search** box. Same as the Search Next button 44. Comparable mappable command, `searchDown` 251, can be applied to the Client window (main, external, work) that you specify.

Search Up — Searches up (relative to the current line) in the current tab for the string you specify in the **Search** box. Same as the Search Prev button 46 or pressing Alt + **Search Next** button. Comparable mappable command, `searchUp` 255, can be applied to the Client window (main, external, work) that you specify.

2.3.4 The Breakpoints menu options

The **Breakpoints** menu options are identified below:

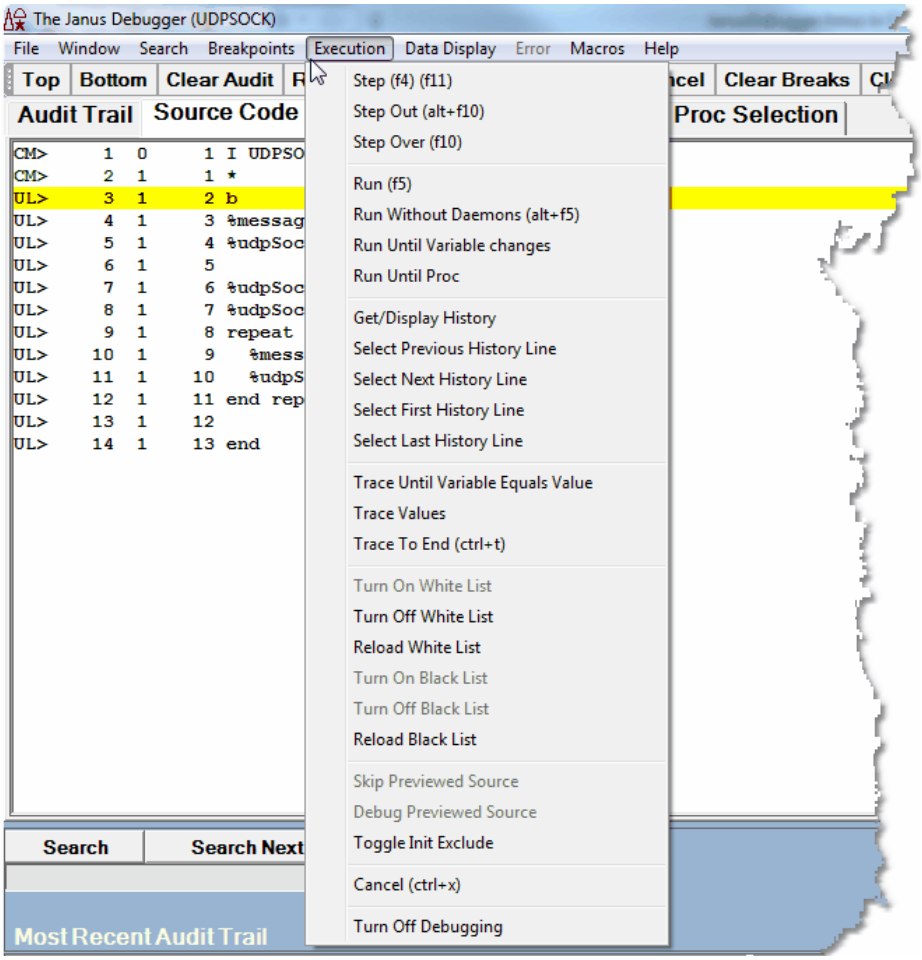


Breaks At — Sets a breakpoint on each executable line in the request (from the beginning of the request) that contains a case-insensitive match of the string or regex specified in the **Search** box. Described further in Setting multiple breakpoints at once 58.

Breaks	Sets breakpoints on lines that follow comments that have the form `*break`. Described further in Setting multiple breakpoints at once 58.
Toggle Breakpoint on Current Line	Sets or removes a breakpoint for the current **Source Code** line if the line is or starts an executable statement. Described further in Setting a single breakpoint 56. Same as the `toggleBreakpointOnCurrentLine` 277 command.
Clear All Breakpoints	Removes all breakpoints in the request. Same as the `clearBreaks` 187 command.

2.3.5 The Execution menu options

The **Execution** menu options are identified below:



Step — Executes the next executable User Language statement.

Step Out — Discontinues debugging and leaves the current simple or complex subroutine, user method, or daemon, and resumes debugging on the statement following the statement that called that subroutine, user method, or daemon. Described further in Stepping out 62.

Step Over — Executes the next executable SOUL statement, if it is **not** a simple or complex Model 204 subroutine or an O-O method. Skips to the statement *after*, if the next executable statement is such a subroutine or method invocation. Same as using the Step Over button 54.

Run	Executes User Language statements in the program being debugged until the end of the request or until interrupted by a breakpoint, program error, or sdaemon call.
Run Without Daemons	Performs the same functionality as **Run**, but unlike **Run**, is not interrupted by sdaemon code 140.
Run Until Variable Changes	Steps through the program being debugged, stopping if a statement modifies the value of the variable specified in the text box above the **Watch Window.** Displays the statement that modified the variable and the new variable value in the **Execution Trace** tab. Same as the Run to Change button 131.
Run Until Proc	Runs program code without interruption until it reaches the procedure specified on the **Proc Selection** page in the **Run Until Procedure** text box, then displays that procedure for debugging. Same as the Run to Procedure button 73.
Get/Display History	Displays a history 132 of the statements executed *thus far* during program evaluation. The history includes calls and returns for methods and subroutines (as many as 1000 statements).
Select Previous History Line	Scans chronologically backward in the statement execution history 132, then highlights *in the **Source Code** or **Daemon** tab* the statement that was executed immediately prior to the statement that is currently highlighted with the Execution Position color 298. Same as the `previousHistory` 240 command.
Select Next History Line	Scans chronologically forward in the statement execution history 132, then highlights *in the **Source Code** or **Daemon** tab* the statement that was executed immediately following the statement that is currently highlighted with the Execution Position color 298. Same as the `nextHistory` 230 command.
Select First History Line	Scans chronologically backward in the current statement execution history 132, then highlights *in the **Source Code** or **Daemon** tab* the first (earliest) statement in the history. Same as the `firstHistory` 206 command.

Select Last History Line

Scans chronologically forward in the current statement execution history[132], then highlights *in the **Source Code** or **Daemon** tab* the last (latest) statement in the history.

Same as the `lastHistory`[222] command.

Trace Until Variable Equals Value

Steps through the program being debugged, stopping if a statement modifies the value of the variable specified in the text box above the **Watch Window** so that it equals a value you specify. Displays the statement that modified the variable and the new variable value in the **Execution Trace** tab. Same as **Alt key + Run to Change**[132] button.

Trace Values

Performs the same functionality as **Run**, but also reports in the **Execution Trace** tab all statements that modify a selected variable and what value was assigned to the variable. Described further in Tracing all updates to a variable's value[130].

Trace To End

Performs the same functionality as **Run**, but also reports in the **Execution Trace** tab a list of all the statements executed. Described further in Tracing all lines executed[128].

Turn On White List

Activates White List filtering[79], which by default is not active. Same as clicking the **Turn On White List** button on the **Proc Selection** page or executing the `turnOnWhiteList`[282] command.

Turn Off White List

Deactivates White List filtering[79]. Same as clicking the **Turn off Lists** button on the **Proc Selection** page or executing the `turnOffWhiteList`[281] command.

Reload White list

Updates the existing White List with the current contents of the whitelist.txt file[77], so you can dynamically update your White List. Same as clicking the **Reload White List** button on the **Proc Selection** page or executing the `reloadWhiteList`[241] command.

Turn On Black List

Activates Black List filtering[79], which by default is not active. Same as clicking the **Turn On Black List** button on the **Proc Selection** page or executing the `turnOnBlackList`[282] command.

Turn Off Black List

Deactivates Black List filtering 79. Same as clicking the **Turn off Lists** button on the **Proc Selection** page or executing the `turnOffBlackList` 281 command.

Reload Black list

Updates the existing Black List with the current contents of the blacklist.txt file 77, so you can dynamically update your Black List. Same as clicking the **Reload Black List** button on the **Proc Selection** page or executing the `reloadBlackList` 241 command.

Skip Previewed Source

When the Source Preview feature 83 is enabled, executes the program that is being previewed but does not download the rest of the source code for viewing or controlled execution.

Debug Previewed Source

When the Source Preview feature 83 is enabled, triggers a full download of the program source code for normal debugging. If the program has compilation errors, the full compilation error listing is downloaded.

Toggle Init Exclude

Inverts the way Exclude mode 65 operates so that it initially excludes code instead of initially including code (until an explicit directive). Same as **toggleInitExclude** 278 command.

Requires at least version 7.6 of the Sirius Mods.

Cancel

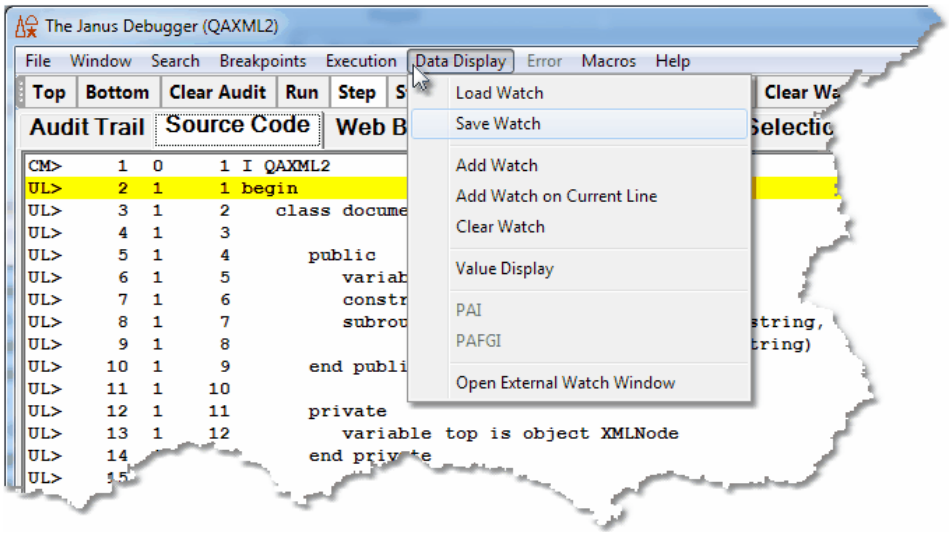
Cancels the request being debugged; same as the Cancel button 63. Described further in Cancelling execution 63.

Turn Off Debugging

Stops a debugging session if it is a TN3270 Debugger session or if the TN3270 DEBUG command is being used for a web thread. Same as **TN3270 DEBUG OFF** 152 command.

2.3.6 The Data Display menu options

The **Data Display** menu options are identified below:



Load Watch

Restores from a local file a list of items to display in the **Watch Window** 15. Same as the `loadWatch` 222 command. For more information, see Saving and restoring Watch Window contents 89.

Save Watch

Saves to a local file (for later loading) the list of items currently displayed in the **Watch Window.** Same as the `saveWatch` 250 command. For more information, see Saving and restoring Watch Window contents 89.

Add Watch

Adds to the **Watch Window** the item currently specified in the text area above the **Watch Window.** Same as the Watch button 86 or `addWatch` 177 command.

Add Watch on Current Line

Adds to the **Watch Window** any variables found in the current **Source Code** line. Same as right-clicking the current line and selecting Add Watch from the context menu 86, and same as the `addWatchOnCurrentLine` 178 command.

Clear Watch

Removes all items from the **Watch Window** and instructs the mainframe portion of the Debugger to stop collecting any watch data. Same as the **Clear Watch** button or `clearWatch` 190 command.

Value Display

Displays in a separate window the details of the value of the item currently specified in the text area above the **Watch Window.** This is one of multiple ways to display a value. 99 Same as the `valueDisplay` 284 command.

PAI

Displays in a separate window the values of all the visible fields in the current Model 204 record. This is the output of the User Language PAI (Print All Information) statement. Same as the `pai` 237 command.

Requires at least version 7.6 of the Sirius Mods and at least version 7.2 of Model 204.

PAFGI

Displays in a separate window the values of all the fields in the current or specified Model 204 field group. This is the output of the User Language PAFGI (Print All Fieldgroup Information) statement. Same as the `pafgi` 236 command.

Requires at least version 7.6 of the Sirius Mods and at least version 7.2 of Model 204.

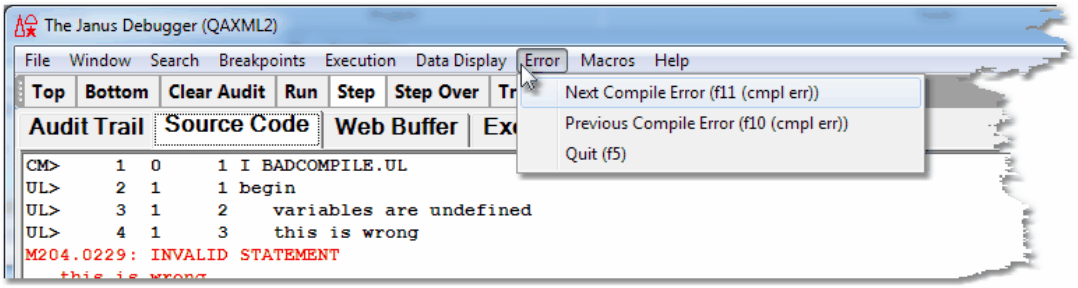
Open External Watch Window

Displays in an external window 306 separate from the main Client window the current contents of the Client **Watch Window**. Or, it brings the existing external **Watch Window** to the top of your current stack of open windows.

Same as the `openExternalWatchWindow` 235 command.

2.3.7 The Error menu options

The **Error** menu options are identified below. This menu is *not* enabled if the program you are debugging has no compilation errors.



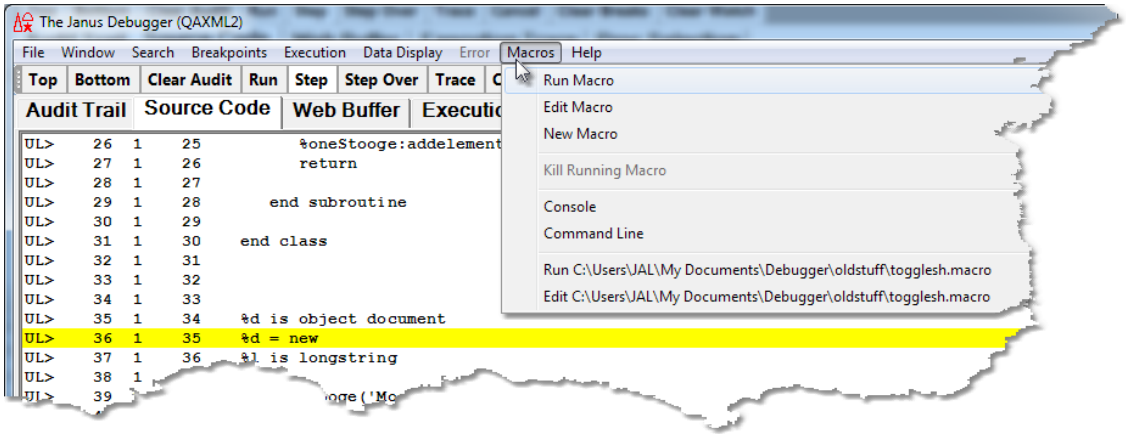
Next Compile Error — Advances to the next line that has a compilation error, if the request being debugged has more compilation errors after the current one. Described further in Viewing programs that contain coding errors 136.

Previous Compile Error — Returns to the previous line that has a compilation error, if the request being debugged has more compilation errors before the current one.

Quit — Stops processing the current request; sends the compilation error messages to the browser (if Janus Debugger) or to the terminal (if TN3270 Debugger).

2.3.8 The Macros menu options

The **Macros** menu options are identified below. Macros are discussed in Using Debugger macros. 315



Run Macro

Invokes a Windows file-selection dialog box for you to locate the Debugger macro you want to run.

`runMacroFromUISelection` 248 is the equivalent mappable command.

Edit Macro

Invokes a Windows file-selection dialog box for you to locate the macro you want to modify. Opens the file in the Windows Notepad text editor or an alternate editor specified in the Debugger configuration file 383.

New Macro

Invokes a Windows file-selection dialog box for you to identify the name and location of the new, blank macro file you are creating. Once you name the file, it is created, then opened for you in the Windows Notepad text editor. Equivalent Client command is `createMacro` 198.

This option is labeled **New Blank Macro** in Client builds prior to 53.

Kill Running Macro

Stops the execution of the macro that is running. This can be useful if a macro's execution spans more than one request.

`kill` 220 is the equivalent mappable command.

Console

Invokes a console window that displays information about the macros and commands you run. The console reports the starting and completing of the macro execution, as well as any error messages. Equivalent Client commands are macroConsole 223 and openMacroConsole 236.

This option is labeled **Macro Console** in Client builds prior to 53.

Command Line

Invokes a dialog box for you to enter the name and any parameters of the macro (or command) you want to run. The macro you identify must be located in the same folder as the Debugger Client executable file or a work folder known 303 to the Client.

Equivalent Client command is openCommandLine 233.

This option is labeled **Macro Command Line** in Client builds prior to 53.

Run

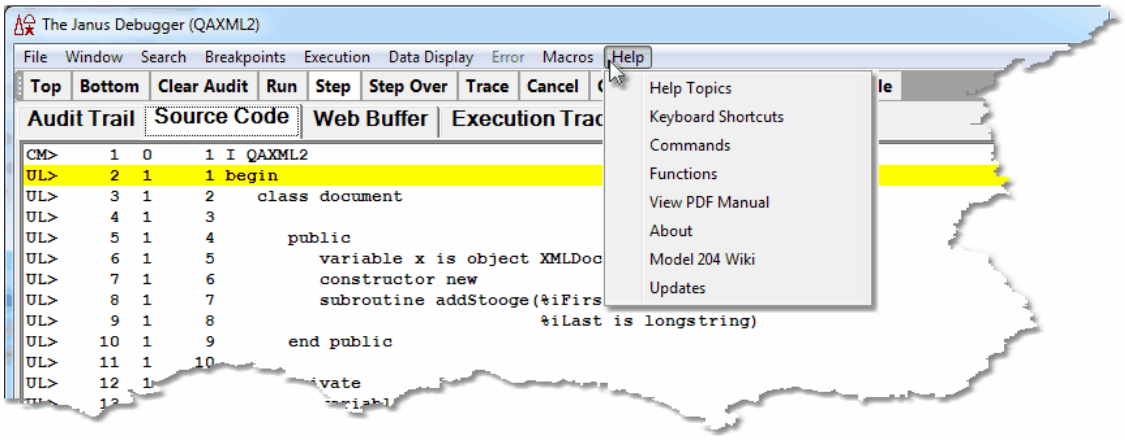
Displays the path to the macro file you last executed. Selecting this item executes the macro again.

Edit

Displays the path to the macro file you last executed. Selecting this item opens the macro for editing in the Notepad text editor.

2.3.9 The Help menu options

The **Help** menu options are identified below:



Help Topics

Displays the Windows online Help contents for the Debugger. Alternative to pressing the F1 key.

Keyboard Shortcuts

Displays the Client's current (default 295 as well as mapped) keyboard shortcuts in the **Keyboard Shortcuts** window. Equivalent mappable command is showShortcuts 273.

Commands

Displays a "quick reference" of the set of Client commands 177 in the **Commands** window. The commands are listed in alphabetical order and with simple definitions.

Its equivalent mappable command is showCommands 270.

Functions

Displays a "quick reference" of the set of Client functions 327 in the **&&Functions** window. The &&functions are listed in alphabetical order and include simple definitions. &&functions that may only be used in a macro include a `(macro only)` designation.

New in Client Build 58. Its equivalent mappable command is showFunctions 270.

View PDF Manual

Accesses the Janus/TN3270 Debugger User's Guide (in your Debugger Client installation folder). Its equivalent mappable command is manual 226.

About

Displays the contents of the Client's "About box." Its equivalent mappable command is `showAbout` 270.

Model 204 Wiki

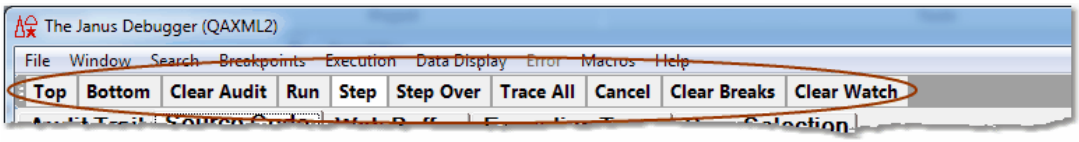
Opens your browser to the Main Page of the wiki for Model 204 documentation (by default 383). This wiki contains documentation topics and tutorials for users of Model 204 and its add-on products.

Updates

Invokes a program `(updateGet.exe)` from which you can download a new executable file `(JanusDebugger.exe)` from a central location to replace your existing Client — if this feature 398 has been set up at your site.

2.4 The button bar

Many of the Client's basic operations are controlled by the buttons arrayed in the button bar, which by default is displayed above the main window:



These same operations can also be invoked by Client menu 17 options and by keyboard shortcut. The operations are implemented by Client commands 198, of which there are many more than there are buttons. You can change the default mapping of buttons and hot keys 288 to commands to suit your preference.

The subsections below describe how:

- The buttons may be divided into function categories.
- The position of the main button bar 40 may be changed.
- You can extract the button bar 42 to a window that is external to the Client.
- You can create an extra button bar 42 if you want more than the 15 buttons that the main button bar can accommodate.

Types of buttons

The Client default buttons may be divided by function as follows:

- Page navigation

The **Top** and **Bottom** buttons operate on the currently active Audit Trail 10, Source Code 11 (or Daemon 139), or Web Buffer 12 tab. **Top** brings to the top of the page the first line of the current page. **Bottom** highlights the last line of the current page.

The mappable Client commands 289 that perform the same actions are `top` 279 and `bottom.` 181

- Program execution

  The **Step**, **Step Over**, and **Run** buttons advance the **Source Code** page (or **Daemon** page) processing position by executing one or more "executable" User Language statements. For more details, see Step, Step Over, Run. 53

  By default 295, the F5 key is equivalent to the **Run** button; F4 is equivalent to **Step** (as is F11); and F10 is equivalent to **Step Over**.

  The **Cancel** button stops the execution 63 of the current program in the **Source Code** page. You can cancel the request at any time.

  The mappable Client commands that perform these execution actions are `step` 274, `stepOver` 275, `run` 248, and `cancel.` 185

- Page clearing

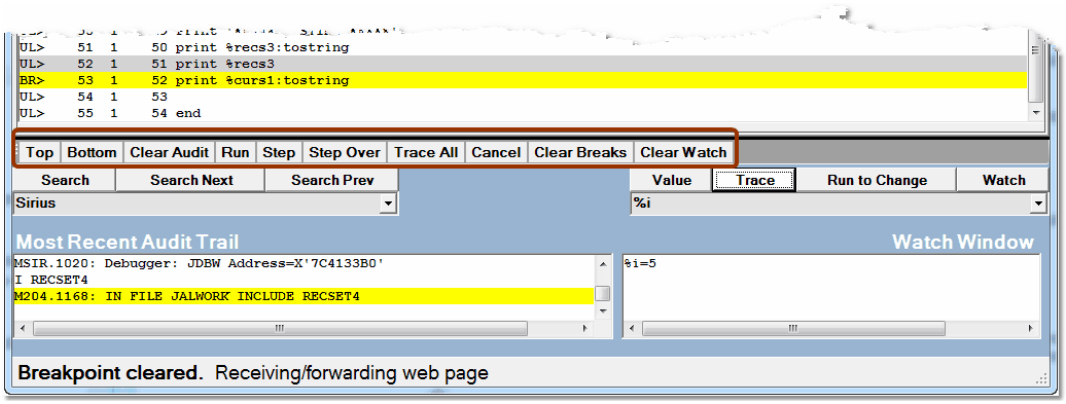
  The **Clear Audit**, **Clear Breaks**, and **Clear Watch** buttons remove entirely the contents of the Client's **Audit Trail** tabbed page, the breakpoints 55 defined in the program being debugged, and the Client's Watch Window 15.

  The mappable Client commands that perform these actions are `clearAudit` 185, `clearBreaks` 187, and `clearWatch` 190. 185

Positioning the button bar within the Client window

You can change the location of the main button bar from its default (above the main tabs) to either of these other positions in the Client window:

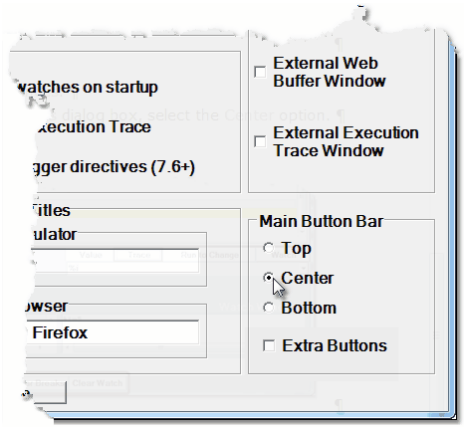
- Immediately below the main tabs (but above the search, tracing, and value displaying controls):



To move the button bar to this position:

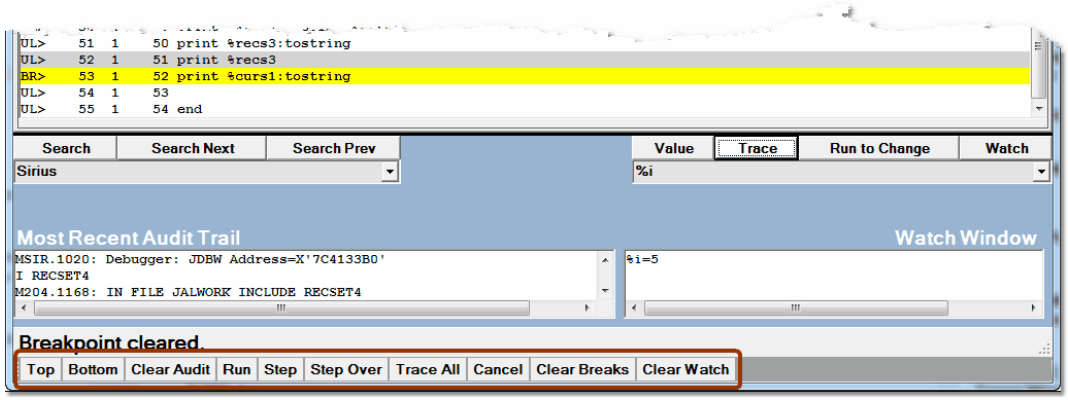
1. From the Client's **File** menu, select **Preferences**, or use the Ctl-P keyboard shortcut or the preferences 239 command.

2. In the **Main Button Bar** area of the **Preferences** dialog box, select the **Center** option:



The button bar immediately relocates.

- At the very bottom of the Client window:



To move the button bar to this position, select the **Bottom** option in the **Main Button Bar** area of the **Preferences** dialog box.

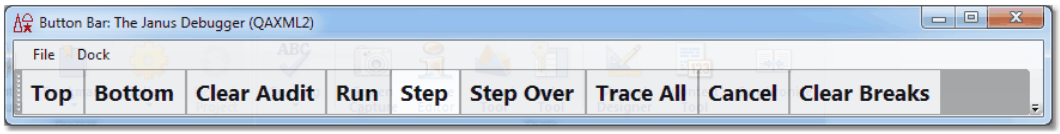
The mappable Client command 289 that positions the button bar is mainButtonBar. 225

Launching an external button bar

For your convenience, the location of the button bar is not fixed. In addition to changing its position on the main Client window as described above, you can move the main button bar to a separate window outside the Client application window. You do so in either of the following ways:

- Selecting the **Show Main Button Bar in External Window** option of the **Window** menu (prior to Client Build 56, this is the **Open External Button Window** option)
- Invoking a button, key, or macro mapped[288] to the `openExternalButtonWindow`[234] or the `buttonBar`[184] command

The resulting external **Button Bar** window shares the characteristics of the other Client external windows.[306] You can close the external window at any time by Client command (`closeExternalButtonWindow`[192]), by the **Exit** option of the button bar **File** menu, or simply by clicking the **X** button in the upper-right corner. In addition, the opened **Button Bar** window has **Dock** menu options, as described below.



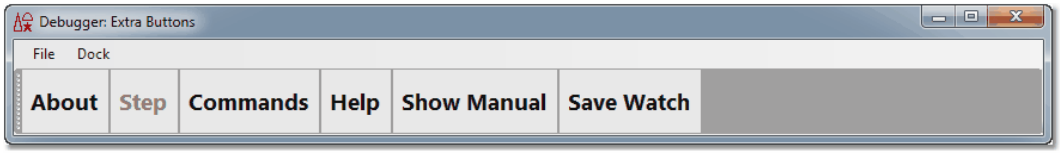
The `buttonBar` command has parameter options that let you select where on your desktop to locate the window. You can dock it, stationary, in the top or bottom left corner of the desktop, or you can simply open it, undocked, as with the launching options (menu and command) described above. Also, once opened, the **Button Bar** window **Dock** menu has **Top**, **Bottom**, and **Float** options that perform the same functions as the corresponding `buttonBar` command arguments.

Launching a second button bar

As of Client Build 56, you may open an additional button bar (in the **Extra Buttons** external window) which can contain as many as 15 buttons. Like the buttons in the main button bar, these extra buttons are mappable[289] in the `ui.xml` file or via the `mapButton`[226] command. You launch such an extra button bar by either of the following:

- Selecting the **Show Extra Button Bar Window** option of the **Window** menu
- Invoking a button, key, or macro mapped[288] to the `extraButtonBar`[205] command

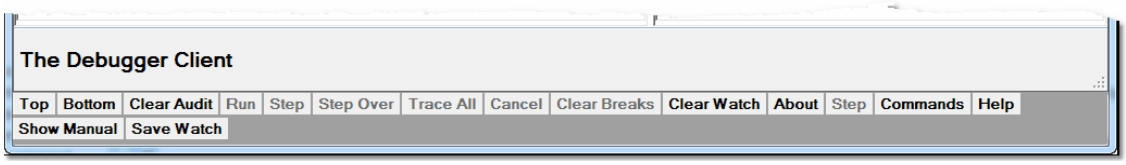
The resulting external **Extra Buttons** window is just like the external main **Button Bar** window (described above), and it shares the characteristics of the other Client external windows.[306]



As stated above, you add buttons to the extra button bar by mapping them in the `ui.xml` file to the commands you want them to execute. The mapping commands are the same as those for the buttons in the main button bar, except the buttons are named[289] `extraButton0` through `extraButton14`. For example, the buttons in the extra button bar shown above result from the following commands:

```
<mapping command="showAbout" button="extrabutton0" />
<mapping command="step" button="extrabutton1" />
<mapping command="showCommands" button="extrabutton2" />
<mapping command="help" button="extrabutton3" />
<mapping command="manual" button="extrabutton4" />
<mapping command="saveWatch" button="extrabutton5" />
```

As of Build 57, you may add your extra buttons to the existing main button bar instead of opening an additional window. For example, the following image shows the extra buttons (defined above) added to the main button bar, which is positioned at the bottom of the Client main window:



To merge extra buttons with those in the main button bar (instead of opening a second button bar), define the mapping commands in `ui.xml` as above, then do either of the following:

- Select the **Extra Buttons** checkbox of the **Preferences**[18] dialog box
- Invoke a button, key, or macro mapped to an `extraButtonBar`[205] command that specifies the position parameter `main`.

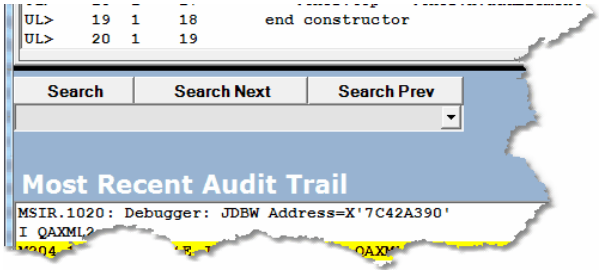
If the main and second button bars are open in separate external windows, selecting the **Extra Buttons** checkbox or invoking an `extraButtonBar main` command merges all the buttons in the primary external button bar.

Once a merged button bar exists, the extra buttons remain part of the primary button bar if it is subsequently moved to an external window from the Client, or if moved back to the Client from an external window.

To decouple a merged button bar, you can clear the **Extra Buttons** checkbox. Less directly, you can select **Window** > **Show Extra Button Bar Window;** this action simultaneously clears the **Extra Buttons** checkbox.

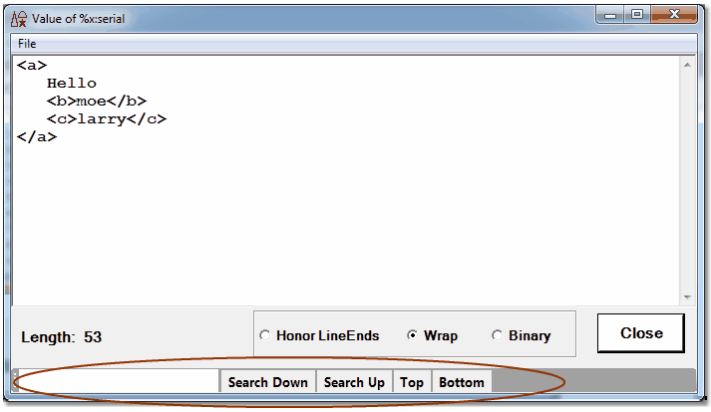
2.5 The search facility

The Client search facility is available for its main pages as well as for its many Value and work windows. The most handy search controls are the **Search**, **Search Next**, and **Search Prev** buttons that operate on the currently active page.



Comparable controls are available, alternatively, from the Search menu 26 and its analogous Client commands 289, and from the multiple hot key and key combinations (described below) that also perform these search functions.

These search functions are also provided from an on-window search bar when you choose to view the main pages as external windows 306 or when you invoke a Client **Value** or other work window (Console 322, history 132, etc.):



The search functions on these windows are subject to Client command control via an `In window` prefix for the individual search command (searchDown 251, searchFromBottom 252, searchFromTop 254, searchUp 255, top 279, bottom 181).

The Search button

Clicking the **Search** button on the main window searches the current tab from its top (first) line for the string you specify in the text box above (without regard for case).

To repeat a search from the current line, you use the **Search Next** button. As an alternative, you can also click (give focus to) the Search text box below or use the Ctrl+F key combination (which performs the same function, by default 295), then press the Enter key.

To search from the last line of the tab toward its first, you press the Alt key while clicking the **Search** button (or use the Ctrl+U key combination, which by default performs the same function). You can then use the **Search Prev** 46 button to search backwards for the next occurrence of the search string.

To repeat a search for a previous search string, click the arrow button to the right of the search box for a history of as many as twenty previous search terms.

To use regular expressions in the search string, begin the string with a tilde (~). For example, the following string matches variable declarations of format `%name IS whatever:`

```
~%\w+\s+IS
```

Note: The rules for VB .net regular expressions are observed; these differ from the rules for User Language regular expressions. For background information about regular expressions, a good resource is *Mastering Regular Expressions*, by Jeffrey E. F. Friedl, published by O'Reilly Media, Inc. (2nd edition, July 15, 2002).

To use the value of a macro variable or Client function, both of which begin with an ampersand (&), in the search string, simply specify the name as is. To search for a string that starts with an ampersand and is not a macro variable or function name, prefix the initial ampersand with a backslash character (\) to treat the the string as a literal. Similarly, specify \\ to search for a single backslash character. This backslash escape character is valid as of Client Build 58.

The **Search** button has the same effect as the **Search From Top** 26 option in the **Search** menu and as the searchFromTop 254 command. The Alt + **Search** button has the same effect as the **Search From Bottom** 26 option in the **Search** menu and as the searchFromBottom 252 command.

The Search Next button

Clicking the **Search Next** button starts from the current position and searches the current tab for the string you specify, or it repeats the previous forward search. The F9 key performs the same function (by default 295). And pressing the Enter key after clicking **Search Next** (or whenever the **Search Next** button is highlighted) repeats the **Search Next** action.

If you press the Alt key while clicking the **Search Next** button (or press Alt+F9), you search again for the current search string, but the search is backwards, towards the top from the current position. This is the same as using the **Search Prev** button, as described below.

The **Search Next** button has the same effect as the **Search Down** 26 option in the **Search** menu, as the **Search Down** button in Client external windows, and as the `searchDown` 251 command.

The Search Prev button

Clicking the **Search Prev** button starts from the current position and searches backwards (towards the top) in the current tab for an occurrence of the currently specified search string. Pressing the Enter key after clicking **Search Prev** (or whenever the **Search Prev** button is highlighted) repeats the **Search Prev** action.

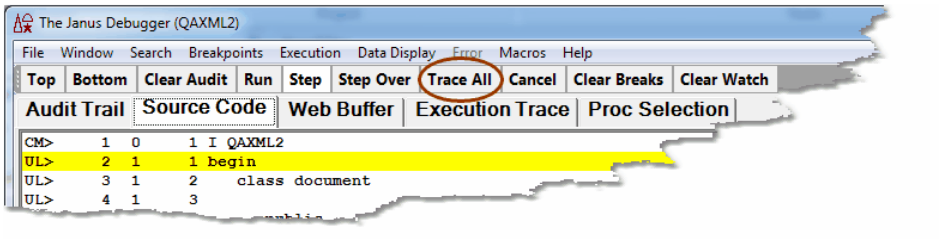
Alternatives that have the same affect as the **Search Prev** button are:

- Pressing the Alt key while clicking the **Search Next** button
- Pressing the Alt+F9 key combination, which (by default 295) performs the same function

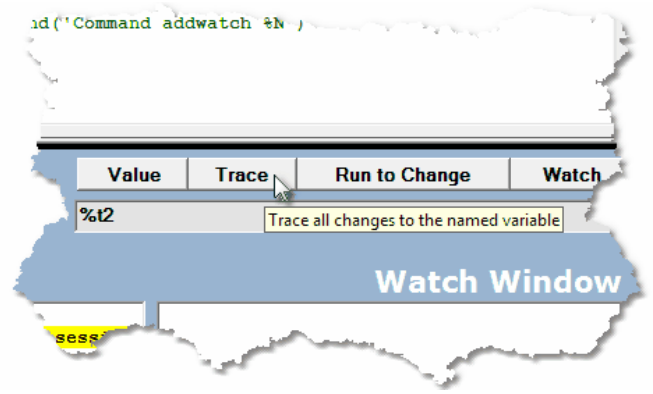
The **Search Prev** button has the same effect as the **Search Up** 26 option in the **Search** menu, as the **Search Up** button in Client external windows, and as the `searchUp` 255 command.

2.6 The tracing options

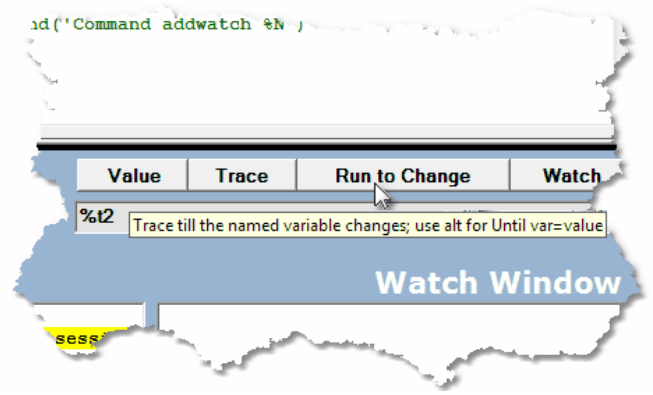
The **Trace All** control button lets you trace from the current program point to the end of the program, displaying a list of all executed statements. The Ctrl+T keyboard shortcut is equivalent (by default[295]) to clicking the **Trace** button:



The **Trace** button below the main window lets you trace all statements that modify a variable you specify, also displaying what value was assigned to the variable:



The **Run to Change** button stops program execution if the variable you specify is modified:

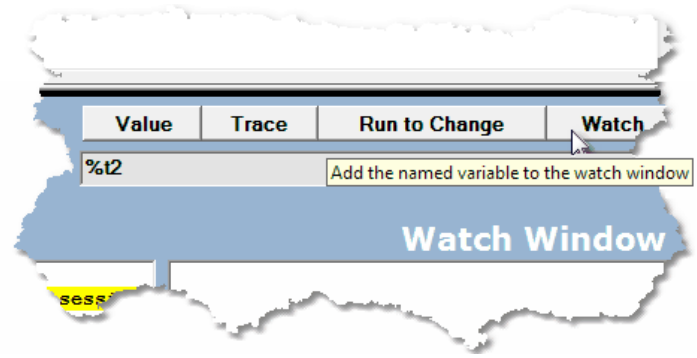


See Also

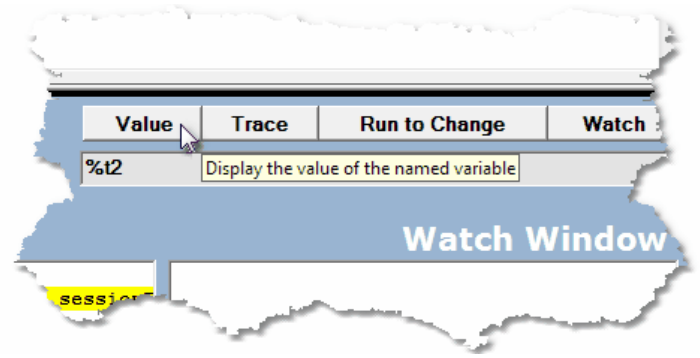
Tracing execution 127

2.7 The value displaying controls

The **Watch** button adds to the **Watch Window** the item you specify in the Entity-name input box 50 below the button:



The **Value** button displays in a separate window the value of the item you specify in the Entity-name input box:



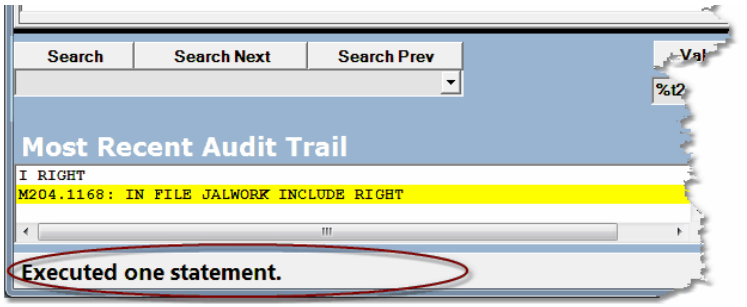
See Also

Watching program data items 85

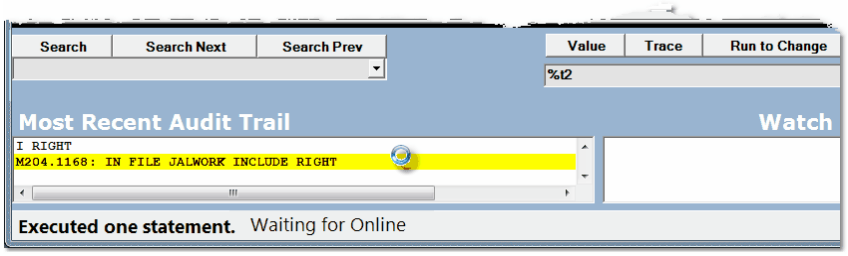
Displaying temporarily the value of a program data item 99

2.8 The Status bar

The Status bar in the Client's bottom left corner displays the state of the Debugger after each operation you invoke:

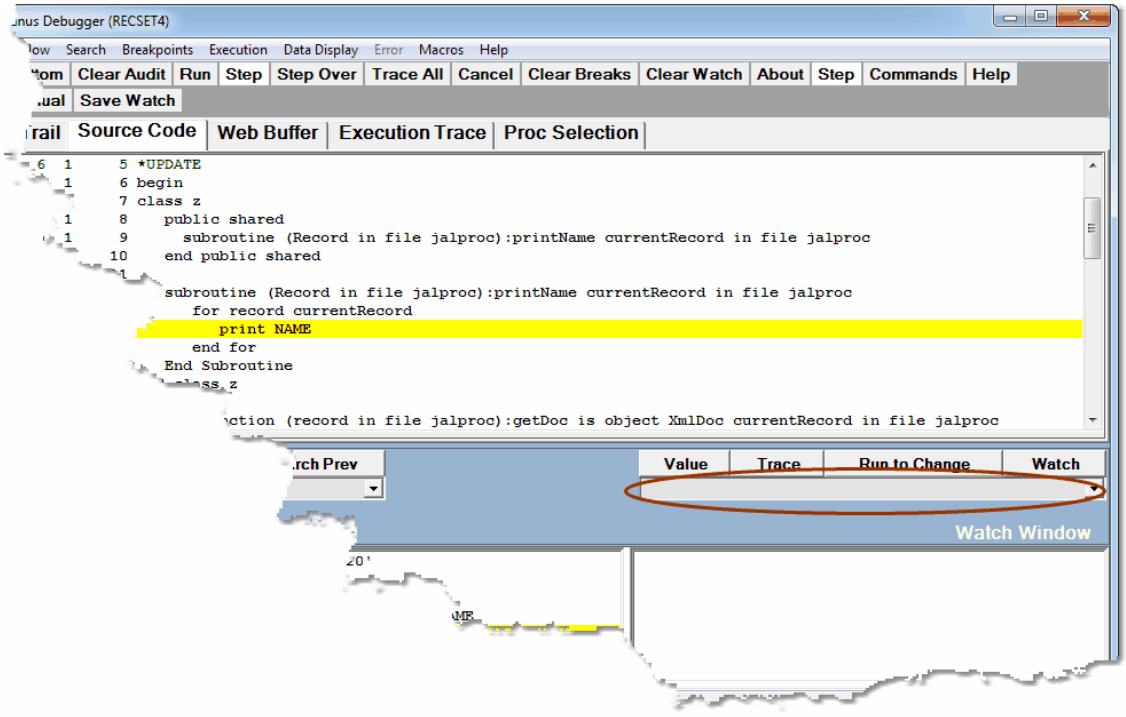


"Waiting" messages (say, for lengthy online processing or network transmissions) are also displayed along with the operational messages:



2.9 The Entity-name input box

This text box, located below the Client's main window, is used for supplying the name of any of a variety of program code entities (%variable or field, for example) to be variously traced, watched, displayed, expanded, and so on:



CHAPTER 3 *Performing Basic GUI Tasks*

These sections describe how you perform basic operations using the Debugger:

3.1 Controlling the execution of program code

This section describes how to navigate through and control the execution of the program code you are debugging.

GUI buttons, menus, and commands let you execute a User Language request all at once, or let you advance execution in increments (by pausing after executing individual statements, optionally bypassing the code display from calls to subroutines and methods).

You can explicitly set "breakpoints" in a request before which program execution is to pause, and you can toggle defaults a) to pause or not at the end of the evaluation of a request, and b) to pause or not after processing READ SCREEN statements.

You can discontinue the debugging of all or part of a request called by your program, skipping the execution of the entire request or of the remaining part of the request.

You can continue code execution without interruption until a procedure you identify by name or pattern is reached. And you can jump out of the normal flow of code execution, executing the statement to which you jump, but not executing the intervening statements.

These subsections follow:

3.1.1 Step, Step Over, and Run

These three action options (activated by same-named control buttons, commands, or menu item) advance the **Source Code** page (or Daemon page 139) processing position by executing one or more "executable" User Language statements:

A statement is executable if it produces a run-time action. Neither a variable declaration statement nor a SOUL class definition statement, for example, is executable in this sense.

When no executable code operations remain, these buttons are dimmed.

When a button is highlighted (color is white, border is bold), the action it invokes can be executed by pressing the Enter key.

Step

Step executes a single User Language statement. When the statement has executed:

- `Executed one statement` is displayed in the Status box 49.
- The next line to be executed is highlighted.

If you click **Step** and the current statement (a subroutine call, for example) invokes other statements in the program, the Debugger first "executes" the call statement itself by moving to and highlighting the first of the executable subroutine statements. With each subsequent click of **Step**, the Client steps through the subroutine, executing one statement at a time.

If you are at the end of a request (the `End` statement is highlighted) and click **Step**, `Evaluation successfully completed` is displayed in the status box, and execution pauses (by default 59), giving you a final review. If you click **Run**, the Debugger Client sends any contents of the web output buffer 127 to the browser, or it sends any 3270/ Batch2 terminal output to the terminal; then it advances execution to the next request, if any more requests are queued.

Note: Pressing the F4 key or the F11 key is the same as clicking **Step** button (unless you have reconfigured 288 your hot keys).

Pressing the Enter key after clicking **Step** (or whenever the **Step** button is highlighted with a white background) repeats the **Step** action.

The other **Step** button equivalents are the `step` 274 command and the **Step** option of the **Execution** menu.

Step Over

Step Over functions like **Step** with one important difference: it skips subroutines and methods. If the execution position is immediately before an invocation of a SOUL method or a simple or complex Model 204 subroutine, clicking **Step Over** advances the execution position to immediately before the statement ***after*** the subroutine or method invocation. No debugging is done in the stepped-over subroutine or method, nor in any code or daemons that it might call.

Step Over is useful if you know a particular subroutine or method works and you do not want to interactively execute it.

Note: Pressing the F10 key is the same as clicking the **Step Over** button (unless you have reconfigured 288 your hot keys).

Pressing the Enter key after clicking **Step Over** (or whenever the **Step Over** button is highlighted with a white background) repeats the **Step Over** action.

Pressing the Alt key while clicking **Step Over** invokes a Step Out 62. Pressing the Alt+F10 key combination has the same effect.

The other **Step Over** button equivalents are the `stepOver` 275 command and the **Step Over** option of the **Execution** menu.

Run

The **Run** button “resumes execution” of the program. The User Language statements execute normally, until one of the following events occurs:

- End of request (the final end statement is highlighted, and `Evaluation successfully completed` is displayed in the status box)
- A cancelling error such as subscript out of range, or a null object reference (the line that raised the error is highlighted)
- A breakpoint 55 (the line containing the breakpoint is highlighted)
- Code that an sdaemon executes is called

Once the end of a request is reached, execution pauses (by default 59), giving you a final review. You must click **Run** again for the Debugger to send any contents of the web output buffer 127 to the browser or any 3270/Batch2 terminal output to the terminal, and advance execution to the next request, if any more requests are queued.

If no further requests are queued, the **Run** button is disabled.

Note: Pressing the F5 key is the same as clicking the **Run** button (unless you have reconfigured 288 your hot keys).

Pressing the Enter key after clicking **Run** (or whenever the **Run** button is highlighted with a white background) repeats the **Run** action.

The other **Run** button equivalents are the run 248 command and the **Run** option of the **Execution** menu.

3.1.2 Using breakpoints

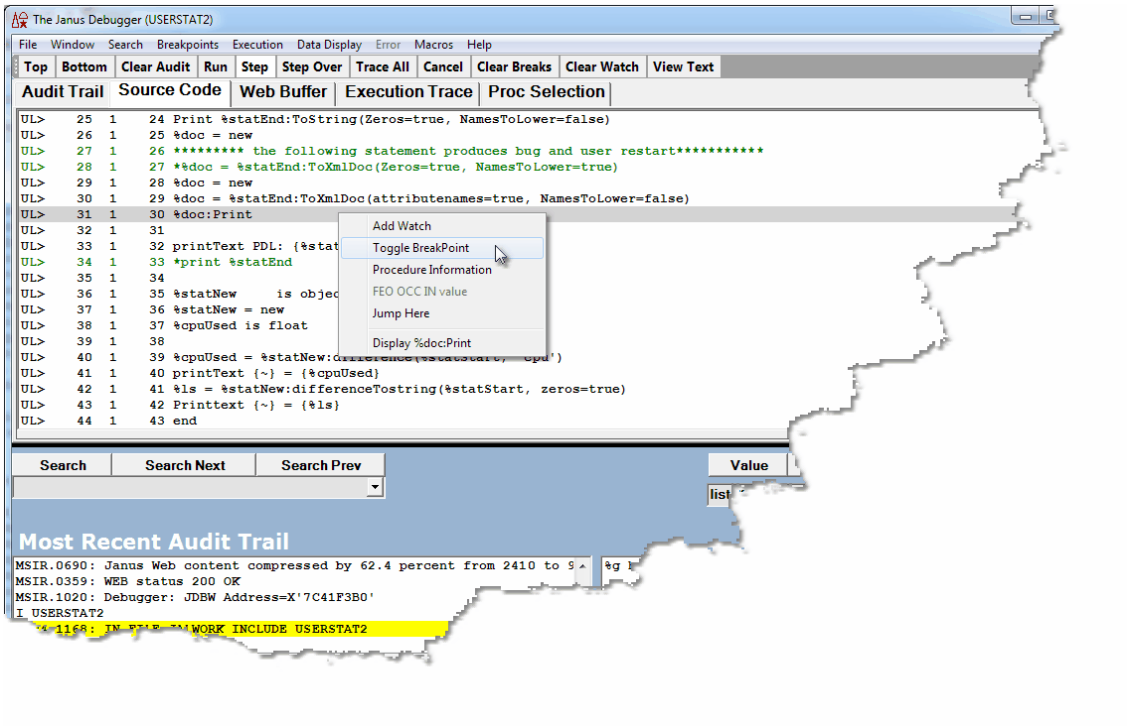
If you set a **breakpoint** on a line on the **Source Code** tab (or Daemon tab 139), then run the program, program execution is paused just before that line is to be executed (if that line is to be executed). When you set a breakpoint:

- Execution will be paused immediately before the execution of the line for which the breakpoint is set.
- The line with the breakpoint is highlighted.
- `Breakpoint set` is displayed in the status bar.

These subtopics follow:

Setting a single breakpoint

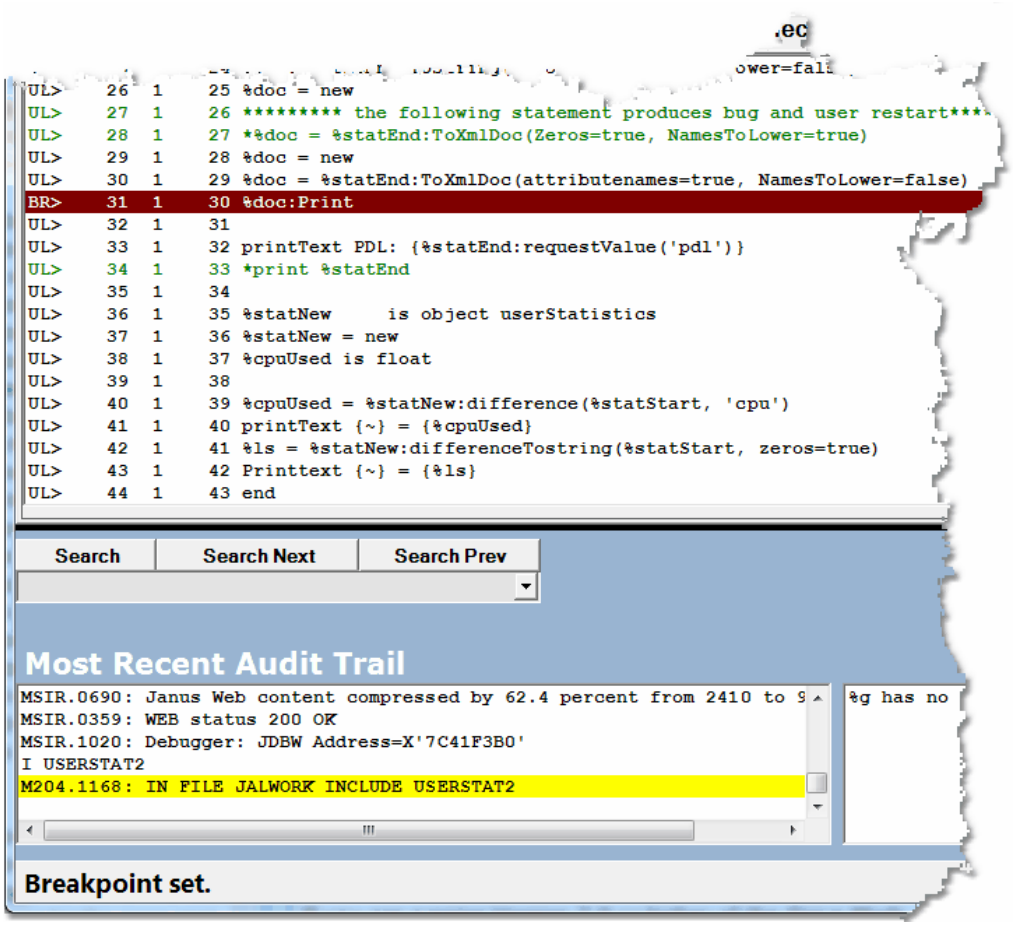
To set a breakpoint on a line, you can simply double-click the desired line. Alternatively, you can right-click the line and select **Toggle BreakPoint** from the context menu:



Other ways to set this breakpoint are:

- Select **Toggle Breakpoint on Current Line** from the **Breakpoints** menu.
- Use the setBreakpointOnCurrentLine 262 or the toggleBreakpointOn 277 mappable 289 Client command.

Once a breakpoint is set, the UL> at the beginning of the source code line changes to BR>, the highlight color changes, Breakpoint set is displayed in the status bar 49, and the Debugger Client is made the topmost window on the browser screen:



Only executable statements may be breakpoints: if you try to make a non-executable statement a breakpoint, the Debugger sets the breakpoint on the next executable statement below the line you selected.

You can set as many as 1000 breakpoints in a single User Language request. Attempting to set more than the maximum is not allowed (results in an error message display).

Setting multiple breakpoints at once

You can set multiple breakpoints at once, using either of two approaches:

- With a search string, set breakpoints on all matching lines
- With a Ctrl+B keystroke (if using the default assignments 295), set breakpoints on executable statements that follow "*Break" comment lines in the source code

Using a search string:

1. In the Search text box 39, specify a search string or a regular expression 45 (regex).
2. Press the Alt+B key combination (if using the default assignments), or use the **Breakpoints** menu **Breaks At** option.

   A breakpoint is set on each executable line in the request (from the beginning of the request) that contains a case-insensitive match of the string or regex.

   No Breakpoints are set in code that is not currently displayed in the **Source Code** page (for example, in daemons called by the current request).

   Your current execution point in the request is not affected.

The mappable Client command that sets multiple breakpoints based on a search string is `breaksAt.` 183

Using Ctrl+B:

When you click the Ctrl+B key combination (if using the default assignments), or when you use the **Breakpoints** menu **Breaks** option, the Debugger Client scans the current User Language request from the beginning to the end of the request for lines beginning with the string `*Break`. Whenever such a line is found, a breakpoint is set on the next line if it is an executable statement.

No breakpoint is set after an occurrence of `*Break` unless the following is true:

- `*Break` (case not important, but no intervening blanks allowed) must be the first non-blank characters on the line. Any other characters may follow.
- The line immediately following the `*Break` comment must be an executable statement.

The mappable Client command that sets multiple breakpoints based on `*Break` is `breaks.` 182

Clearing a breakpoint

To remove a single breakpoint, do any of the following:

- Double-click the line.

- Right-click the line and select **Toggle Breakpoint**.
- Select **Toggle Breakpoint on Current Line** from the **Breakpoints** menu.
- Use the `clearBreakpointOnCurrentLine` 186 or the `toggleBreakpointOnCurrentLine` 277 mappable Client command.

As a result, the `BR>` indicator changes back to `UL>` to indicate successful removal, the highlight color changes, and `Breakpoint cleared` is displayed in the status box.

Clearing all breakpoints

To clear all the breakpoints that are set, click the **Clear Breaks** button or use the **Breakpoints** menu **Clear All Breakpoints** option. All breakpoints get cleared, and all breakpoint indicators in the source display are changed back.

The mappable Client command that clears all breakpoints is `clearBreaks.` 187

See Also

Break method 160

Running to a specific procedure 73

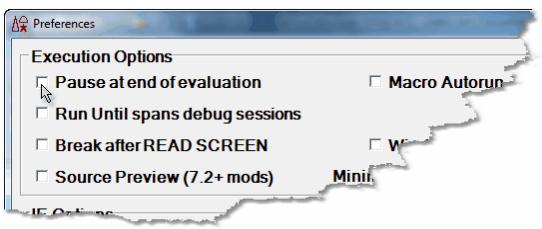
Stepping out 62

3.1.3 Suppressing the break at the end of request evaluation

By default, the Debugger Client pauses at the end of the evaluation of a request before it sends any contents of the web output buffer 127 or any 3270/Batch2 terminal output. This lets you review program data as it is at the end of request processing.

If you prefer to have processing continue without stopping at this point, you can suppress the pause, as follows:

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).
2. In the **Preferences** dialog box, clear the **Pause at end of evaluation** checkbox, then click **Done:**



Pausing can be restored at any time by selecting the checkbox again.

Note: The Client `setPreference` 265 command has an option that lets you toggle the **Pause at end of evaluation** checkbox.

The **Pause at end of evaluation** setting that exists at the end of the Debugger Client session persists to the next run of the Client.

3.1.4 Breaking after READ SCREEN or READ MENU statements

Normally, the Debugger Client for the TN3270 Debugger pauses at a READ SCREEN or READ MENU statement (displaying a `Full Screen Read Pending` message in the Status bar 49), waiting for input from the Online user. Once you complete the input, the Client evaluates your response, displays a `READ SCREEN Completed` message in the Status bar, and continues (without pause, by default) processing statements until it reaches a breakpoint or the end of the request.

These events are reported in a sequence of lines in the Client **Audit Trail** page like the following:

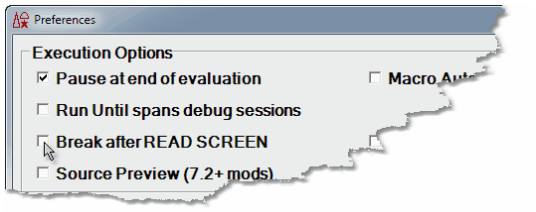
```
... 10:01:48.27      2     20 LI I SCREENO
... 10:01:48.27      2     20 MS M204.1168: IN FILE GWDEB INCLUDE SCREENO
... 10:02:10    Full Screen Read Pending
... 10:02:22    READ SCREEN completed
```

If you want to examine how the program handles the user response to the READ SCREEN or READ MENU, for example, you can do either of the following:

- Explicitly set a breakpoint 56 after the READ SCREEN or READ MENU statement.
- Have processing automatically paused by default *after* the user interaction following READ SCREEN or READ MENU.

To invoke the second of the preceding options:

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).
2. In the **Preferences** dialog box, select the **Break after READ SCREEN** checkbox (it is clear by default), then click **Done:**



After the Online user replies to the next READ SCREEN or READ MENU statement, the Debugger will pause at the statement following the READ SCREEN or READ MENU, and **READ SCREEN completed** will display in the Status bar.

Running without a break after replying to READ SCREEN or READ MENU can be restored at any time by clearing the **Break after READ SCREEN** checkbox.

Note: The Client setPreference 265 command has an option that lets you toggle the **Break after READ SCREEN** checkbox.

The **Break after READ SCREEN** setting that exists at the end of the Debugger Client session persists to the next run of the Client.

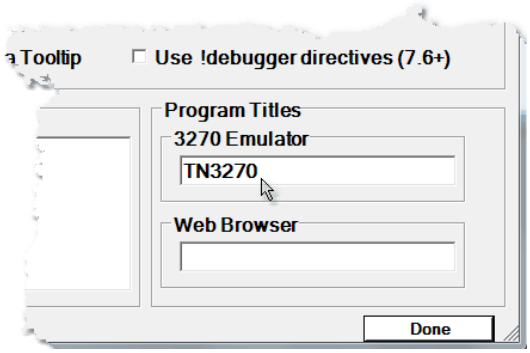
Note: As a convenience, the Debugger can bring your 3270 emulator application to the top on your PC screen when the Client pauses for the READ SCREEN or READ MENU.

To invoke this feature:

1. Select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).

2. In the **Preferences** dialog box, locate the **3270 Emulator** text box (in the **Program Titles** section) and provide a text string that matches some or all of the title that displays at the top of the emulator window.

   The characters in your matching string can be any case and match anywhere in the title. Any trailing blanks you enter are preserved.



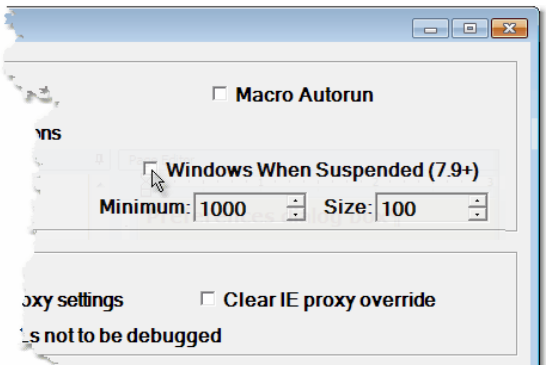
Note: If you are working with READ SCREENs or READ MENUs in a Janus Web Legacy Support application, your browser is the tool with which you respond. Therefore, to have the Debugger pop up your browser window when the Client pauses for the READ SCREEN or READ MENU, provide a browser-name-matching string in the **Web Browser** text box instead of in the **3270 Emulator** text box.

3. Click **Done.**

The feature takes effect at the next execution of a READ SCREEN or READ MENU. The **3270 Emulator** (or **Web Browser**) setting that exists at the end of the Client session persists to the next run of the Client.

Note: By default, this feature does not take effect if the Client is not debugging the part of a program that contains the READ SCREEN or READ MENU. For example, these statements might be in code selected to be excluded from debugging.64

However, if in addition to a **Program Titles** value you also select the **Windows When Suspended** option in the **Preferences** dialog box (**Execution Options** section), the feature will apply whenever these statements occur, even in code the Debugger is not actively executing. This will apply whether or not you have selected the **Break after READ SCREEN** checkbox.



3.1.5 Stepping out

If for any reason you no longer want to continue debugging or examining the subroutine, user-written SOUL method, or daemon139 that you are currently stepping through, you can discontinue debugging and leave ("step out" of) the subroutine, method, or daemon code and resume debugging on the statement following the statement that originally called the subroutine, method, or daemon.

This would be equivalent to having set a breakpoint56 on the statement after the subroutine, method, or daemon call, then clicked the **Run** button. You might also view it as a "pop" out of the level of code you are debugging and to the level of the calling code.

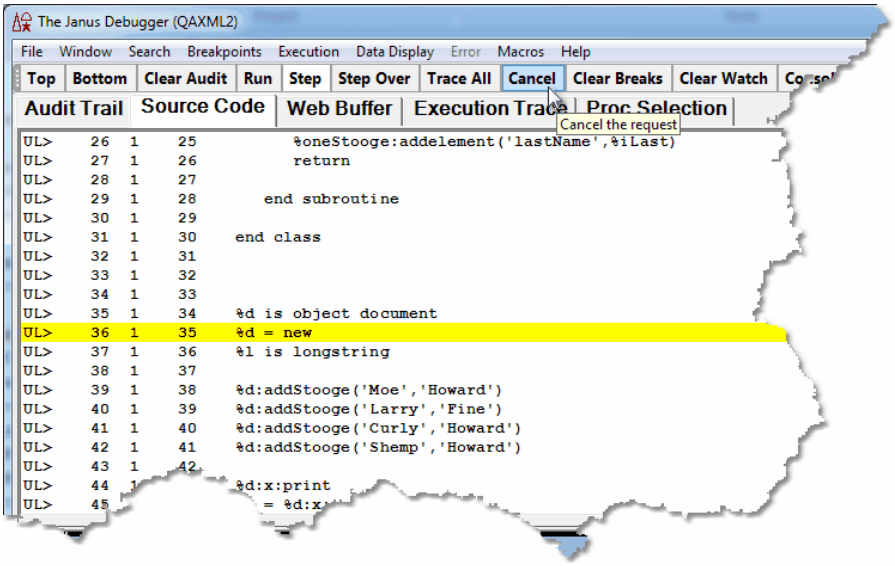
To execute a Step Out from within a simple or complex subroutine, a SOUL user-written method, or a daemon, select **Step Out** from the **Execution** menu, or use `stepOut`275, the command equivalent.

If you step out from mainline code (that is, not a subroutine, method, or daemon), execution simply completes normally, as if you had clicked the **Run** button.

If you press the Enter key immediately after executing a step out, another step out is executed (as of Client Build 57) if program execution has not completed.

3.1.6 Cancelling execution

When you run a request that includes User Language, the Debugger Client displays the program in the **Source Code** tab, prior to the execution of any program statements. At this point or at any point after you begin to execute the code, you can terminate the execution of the program by clicking the **Cancel** control button.



When you click **Cancel**, you receive a "do you really want to" message because the operation is not reversible. You can view the remainder of the current program but cannot subsequently execute any of that code, unless you invoke it for debugging again.

If you click the **Cancel** button, you receive a `Do you really want to cancel?` prompt because the operation is not reversible. If you click Yes for the prompt:

- `Cancelled on request` is displayed in the status box.
- You can view the remainder of the current program but cannot execute any of it.
- The Client takes no further action until you click the **Run** button, which finishes the request (omitting the execution of the statements from the point at which you click **Cancel** until the request `End` statement). A cancellation message is then issued:

  For a web request, the Debugger sends the browser a message like the following:

For a 3270 request, a message like the following is sent to the terminal:

```
***  MSIR.0943: Request cancel performed from debugger
```

Note: The Ctrl+X key combination (by default[295]) is equivalent to clicking the **Cancel** button.

3.1.7 Excluding sections of source code from debugging

Debugging a large application may involve the scanning of a large volume of code to get to the parts of the program that you need to debug. It can be cumbersome and time consuming to ship so much code to the Debugger Client and/or to inspect so many pages of code. To gain some time and space economy, the Debugger lets you debug some sections of your program while omitting others.

Two Debugger features let you exclude code from debugging:

- **Exclude/Include directives** let you mark blocks of code of any length to be excluded from display and debugging — but not from execution. You explicitly mark the beginning and ending of such blocks, or if they are procedures, SOUL methods or subroutines, you specify them by name or by name pattern, and you can provide them by list. You can also similarly identify blocks of code within these excluded blocks that will **not** be excluded from display.

- **"Run Until" processing** operates on procedures only. You can have the Debugger run your program code without interruption until it reaches a procedure you want to display for debugging. You can identify this procedure by name or name pattern, and you can provide a list of such procedures in a "white list" or a "black list."

Run Until procedure processing differs from Exclude directive processing of procedures in that Run Until excludes complete programs, while Exclude directives (explicitly or implicitly) exclude parts of programs (those called by "inner procedures"). An inner procedure is within a Begin/End block, invoked by a SOUL INCLUDE ***statement***. A procedure invoked by a command-level INCLUDE is an "outer" procedure. Once a procedure is running in the Debugger and a request Begin is seen, Run Until procedure detection does not stop until after the End of the request. It ignores inner procedures and looks only for outer procedures.

The **Proc Selection** page in the Client contains most of the controls for both types of code exclusion techniques.

Exclude and Include directives are described in:

Selectively excluding source code blocks 65

Run Until processing may be invoked once for a single specified procedure, or it may be applied to any of multiple procedures specified in a list. Run Until processing is described in:

Running to a specific procedure 73

Running only to listed procedures 77

3.1.7.1 Selectively excluding source code blocks

The User Language Macro Facility statements called **Debugger directives** let you exclude one or more blocks of source code or entire procedures, methods, or User Language "complex" subroutines from interactive debugging.

“Excluding” code from interactive debugging means:

- The excluded code is *not* displayed in the Debugger **Source Code** tab, nor are the excluded source code lines sent from the mainframe to the client.
- You may *not* step through or set breakpoints in the excluded code.
- Excluded statements are *not* shown in the results of Debugger execution tracing or statement history displays.
- However, the excluded code *is* executed normally (there is no difference in the runtime evaluation of the request), and the Janus Debugger **Audit Trail** and **Web Buffer** tabs will show output from excluded statements.

This feature is useful both for tidying your source code display (removing non-pertinent sections of code) and for decreasing the download time of source code sent from the mainframe to the Client.

The Debugger directives have the following format:

```
!debugger directive
```

Where *directive* may be one of the following:

```
exclude on
exclude off
exclude proc pname_or_pattern
exclude routine rname_or_pattern

include on
include off
include proc pname_or_pattern
include routine rname_or_pattern
```

Within excluded code you can specify blocks of lines that will **not** be excluded and will be presented for debugging; for example, an important subroutine or method. You indicate such non-excluded blocks by `Include` directives.

As described in Using the code-exclude feature in its normal mode 66, Debugger Exclude and Include directives are also implied and invoked if you use the buttons in the **Exclude Parts of Programs from Debugging** section on the **Proc Selection** page to specify lists of procedures or lists of subroutines or methods to exclude/include.

As described in Using Init Exclude mode 72, another approach to debugging a small block of code within a larger excluded block is to invert the way the code-exclude feature operates: Instead of including all code from the beginning of the request until an Exclude directive, the "Init Exclude" variation of the feature initially excludes all code from the beginning until an Include directive. You invoke Init Exclude mode from a Client menu item or command (or mapped button or hot key).

User Language Macro Facility statements, which start with an exclamation character (!), are described in the Model 204 wiki at `http://m204wiki.rocketsoftware.com/index.php/User Language Macro Facility`.

Using the code-exclude feature in its normal mode

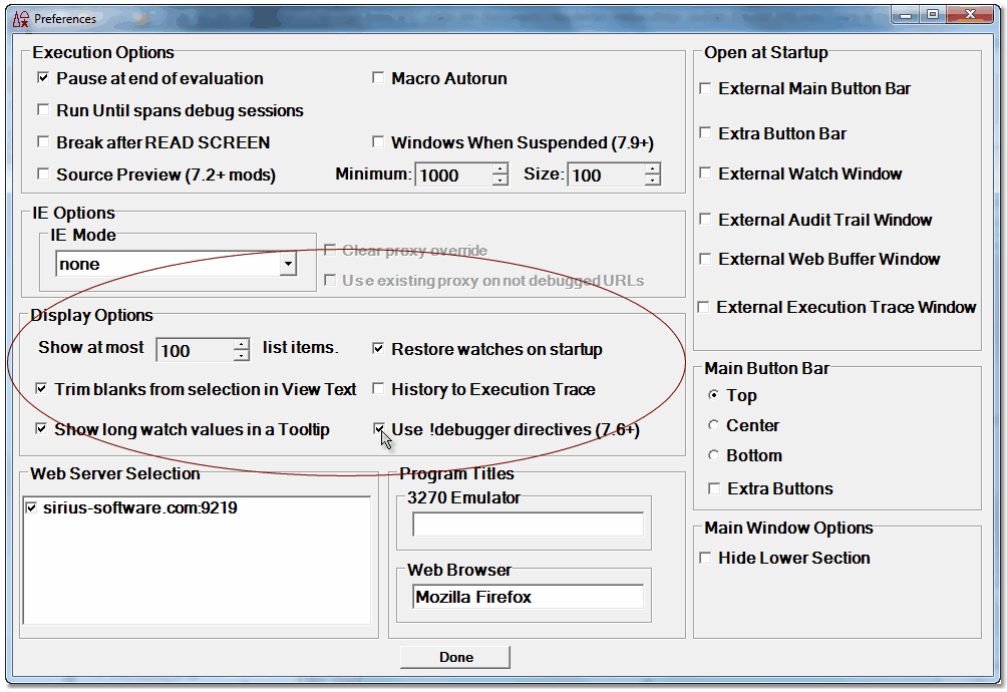
In any single compilation unit (BEGIN statement to END), you may exclude as many as 300 blocks of code from debugging, and within excluded blocks, you may designate as many as 300 blocks of code that will not be excluded. (The block limits are 40 if Sirius Mods version is 7.8; 20 if prior to 7.8.) A block may be a designated group of code lines or a named routine or procedure.

To exclude code:

1. Enable Debugger directives. By default, the feature is not enabled (no code is excluded from debugging).

   a. From the Client **File** menu, select the **Preferences** option.

b. In the **Display Options** section of the **Preferences** dialog, select the **Use !debugger directives** option:



2. In your source code, specify an Exclude directive to indicate the code to be excluded from debugging:

   - To exclude any block of consecutive lines, indicate the beginning of the block to be excluded:

     ```
     !debugger exclude on
     ```

     This statement must appear between a BEGIN and END statement — it may not be used at command level.

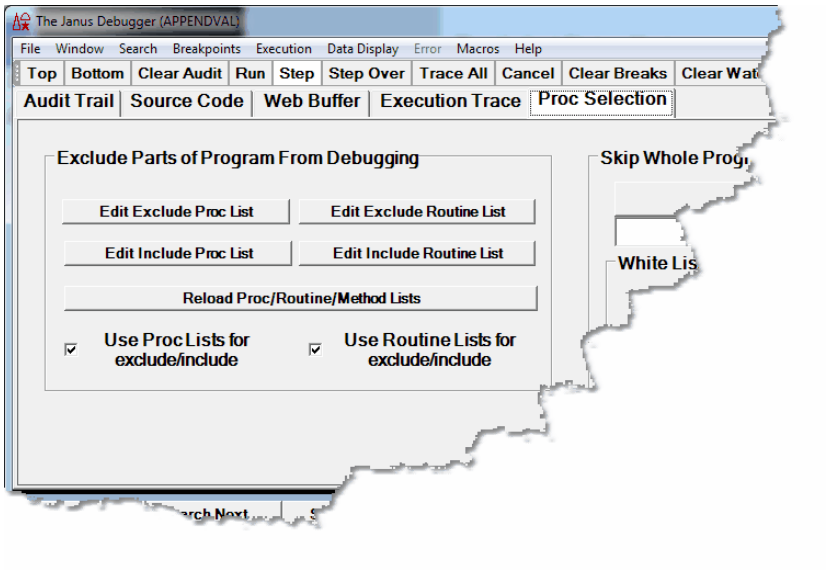
   - To exclude a particular procedure, or the code that defines a method or subroutine:

     - Use the appropriate keyword and case-insensitive name in the directive. You can also use wildcards (described below 68) to form a name pattern. Also, for a method or User Language subroutine, use `routine`:

       ```
       !debugger exclude proc MyProc*
       !debugger exclude routine MyMethod
       ```

Or:

- Use the **Edit Include Proc List** or **Edit Include Routine List** buttons on the **Proc Selection** page to provide a list of the procedures or a list of the routines you want to exclude:



These buttons open a blank `excludeProc.txt` or `excludeRoutine.txt` file in Microsoft's Notepad or in your local editor[164]. In the files, you specify the items you want to exclude, observing the following syntax rules:

- One entry per line
- Leading and trailing blanks are ignored
- Case matching is insensitive
- Wildcard matching using asterisk (*), question mark (?), and double quote (") is allowed (see Shortcuts for procedure names[74])
- Blank lines are ignored
- Any line starting with a number sign (#) is treated as a comment

After you save and Exit the file(s), click the **Reload Proc/Routine/Method Lists** button to make the file content known to the Client. Equivalent to using this button is the `reloadLists`[242] Client command.

The **Use Proc Lists for exclude/include** and **Use Routine Lists for exclude/include** checkboxes enable and suspend the feature. They are selected by default. For earlier builds, only the **Use !debugger directives** option on the **Preferences** dialog box controls the feature. If you are running under a Sirius Mods version lower than 7.9, you must select one or both of the **Proc Selection** page checkboxes as well as the **Use !debugger directives** option; under 7.9 or higher, the **Proc Selection** page checkboxes alone are sufficient to control the feature.

Note: Whether or not you select these checkboxes does **not** affect Debugger recognition of any !debugger directives you specify in source code outside of these lists. Such directives are controlled only by the **Use ! debugger directives** option.

Your checkbox selections are remembered in subsequent Client sessions.

3. If excluding a block of lines (that is, not a named procedure or routine), indicate the last line to exclude.

   From the `exclude on` directive, source code lines are excluded until the first of the following is encountered:

   - A `!debugger exclude off` statement
   - The end of the compilation (END statement is reached)
   - The end of the procedure that contains the starting `exclude on` directive
   - An Include directive (described next)

4. Indicate (with Include blocks) any lines *within the excluded code* that you do **not** want to be excluded:

   If a (non-named) block of lines:

   a. Specify an `include on` directive to indicate the beginning of a section of code you want to be included in debugging:

      ```
      !debugger include on
      ```

   b. Indicate the last line to include.

      From the `include on` directive, source code lines are included for debugging until the first of the following is encountered:

      - A `!debugger include off` statement
      - The end of the Exclude block that contains the starting `include on` directive
      - The end of the compilation (END statement is reached)
      - The end of the procedure that contains the starting `include on` directive

   If a named procedure or routine:

   - Specify after the Exclude directive and before the procedure or routine an `include proc name_or_pattern` or `include routine name_or_pattern` directive to indicate the code you want to be included in debugging.

   Or:

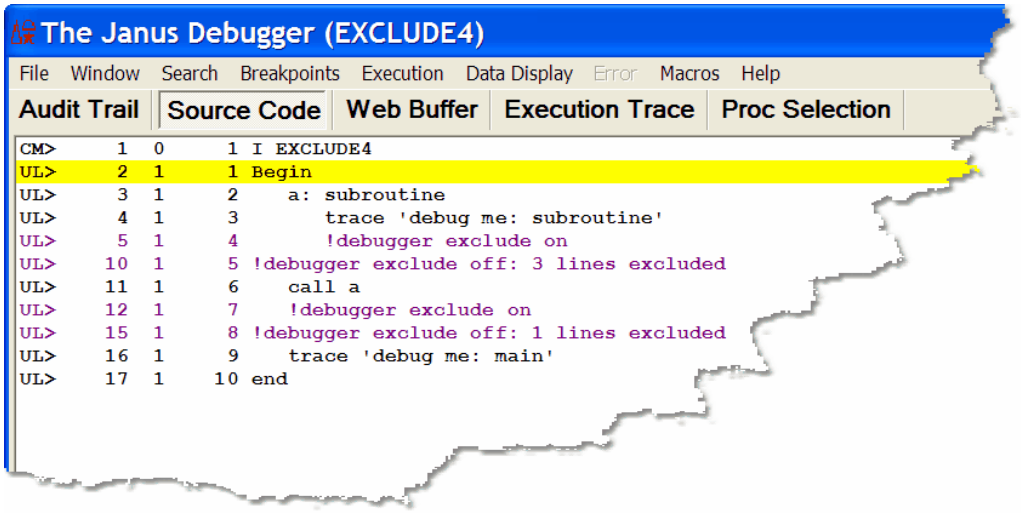
- Specify the procedures or routines in a list file you access via the **Edit Include Proc List** or **Edit Include Routine List** buttons on the **Proc Selection** page (see image and description above).

  In the file, specify the items you want to include (that are located within code you are excluding).

  After you save and Exit the files, click the **Reload Proc/Routine/Method Lists** button (or use the `reloadLists` command) to make the file content known to the Client.

5. Invoke and debug the code.

   In place of the excluded lines, the Debugger inserts a comment to the `exclude off` directive in the Client **Source Code** display that specifies the number of lines excluded. Any lines within the excluded block that contain Include directives are also denoted. All directive statements are shown in purple text by default:297



Usage notes:

- If you define more than 300 Exclude blocks, or more than 300 Include blocks, an error is issued. (These block limits are 40 if Sirius Mods version is 7.8; 20 if prior to 7.8.) A block may be a designated section of consecutive code lines or a named routine or procedure.
- Until an **`exclude on`** directive ends, subsequent **`exclude on`** statements are ignored. This is also true for the implied **`exclude on`** created by Init Exclude mode (described in the subsection below).

- A `!debugger include on` directive has an effect only within an Exclude block. For example:

```
!debugger exclude on
... lots of code that is not debugged
  !debugger include on
  ... an important subroutine that needs debugging
  !debugger include off
... lots more code that is not debugged
!debugger exclude off
```

- Dummy string substitution is done on !debugger directives **before** they are parsed and processed. This lets you build a directive conditionally, perhaps to keep code compatible with Sirius Mods versions earlier than 7.6.

  For example:

```
begin
   trace $sirver
   if ($sirver >= 706) then
      $setg('COMMENT','')
   else
      $setg('COMMENT','*')
   end if
end
begin
   * Code to debug
   trace 'Debug me'
   ?&COMMENT !debugger exclude on
   * Code not to debug
   trace 'Do not debug me'
   ?&COMMENT !debugger exclude off
end
```

- When you compile a program that contains Exclude blocks or Exclude and Include blocks, Model 204 writes a summary of the exclusions to the Audit Trail at the end of compilation:

```
MS MSIR.1003: 2 Debugger Exclude block(s) defined
MS MSIR.1004: Lines 5-9 excluded from the debugger
MS MSIR.1005: Quads 24-135 excluded from the debugger
MS MSIR.1004: Lines 15-18 excluded from the debugger
MS MSIR.1005: Quads 160-271 excluded from the debugger
```

- The Client `setPreference` 265 command has options that let you toggle the **Use ! debugger directives**, **Use Proc Lists for exclude/include**, and **Use Routine Lists for exclude/include** checkboxes.

Using Init Exclude mode

By default, starting from your program's Begin statement, the code-exclude feature preserves for your debugging all the code lines that you do not explicitly exclude via directives. However, you may have cases where it would be advantageous to invert the default behavior, that is, starting from the Begin statement, to exclude all the code from debugging except the blocks you explicitly preserve via directives. "Init Exclude" mode provides such an inversion of the default.

Init Exclude mode is the equivalent of explicitly specifying **`!debugger exclude on`** immediately following your program's BEGIN statement. It changes nothing else about the operation of the code-exclude feature. All program code lines are excluded from debugging until one of the following directives is encountered explicitly or is encountered implicitly via specification of an Include Proc or Include Routine list (**Proc Selection** tab):

```
!debugger include on
!debugger include proc
!debugger include routine
!debugger exclude off
```

Subsequent code is then included until the first of one of the following:

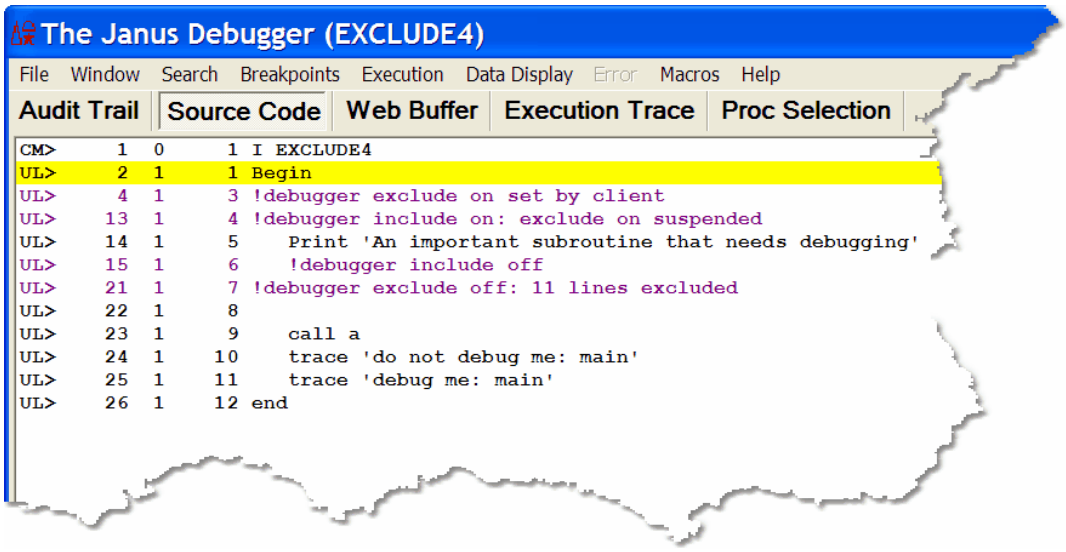
- A **`!debugger include off`** or a **`!debugger exclude on`** statement
- A **`!debugger exclude proc`** or a **`!debugger exclude routine`** statement (explicit, or implicit via **Proc Selection** page button)
- The end of the compilation (END statement is reached)
- The end of the procedure that contains the starting **`include on`** directive

To invoke Init Exclude mode:

1. Enable Debugger directives by selecting the **Use !debugger directives** option from the Client **File** menu, **Preferences** option.
2. Do either of the following:
   - Select **Toggle Init Exclude** from the Client's **Execution** menu.
   - Select the Client button, hot key, or macro you configured 289 to execute the `toggleInitExclude` 278 command.

   An `Init Exclude mode is on` message in the Client's Status bar 49 as well as a checkmark next to the **Toggle Init Exclude option** in the **Execution** menu confirm that Init Exclude mode is on.
3. Run the program you want to debug.

A "!debugger exclude on set by client" comment in the code indicates that lines were excluded from the beginning of the program:



To leave Init Exclude mode, you repeat step 2, above.

See Also

Running to a specific procedure 73

Running only to listed procedures 77

3.1.7.2 Running to a specific procedure

You can direct the Debugger to run an application's code without interruption until it reaches a specific outer, command-level, procedure, and then to display that procedure for debugging.

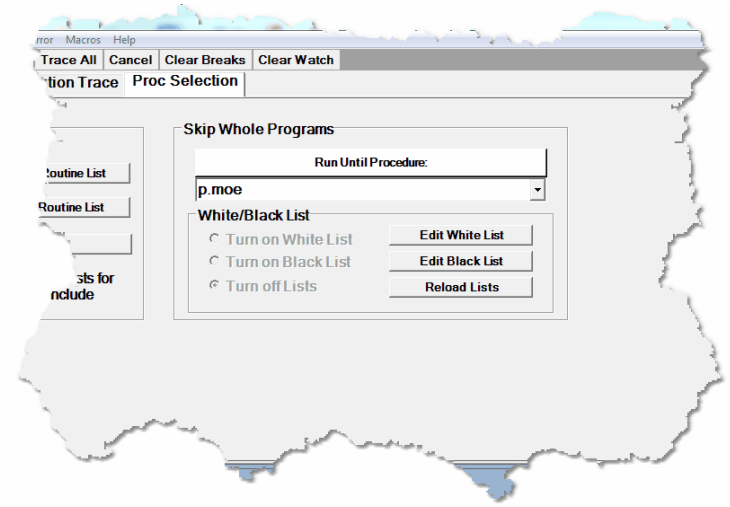
Note: As of version 7.6 of Model 204 and Client Build 63, the Debugger also stops at procedures that are included from an sdaemon 139 thread.

For example, you are having a problem with the procedure P.MOE, but the normal flow of the application moves through procedures LARRY, SHEMP, and CURLY prior to P. MOE. The three preceding procedures are known to work fine, and you don't want to interactively debug them.

To run the application normally, executing the preceding procedures, but stopping at P. MOE to begin debugging:

1. Beginning with your application program displayed in the **Source Code** page, select the **Proc Selection** tab.

2. In the text area below the **Run Until Procedure** button in the **Skip Whole Programs** area, specify the name of the procedure at which to begin debugging (this input is *not* case sensitive).



3. Click **Run Until Procedure.**

   The application executes until it reaches the specified procedure, then the **Source Code** page highlights the first executable User Language statement in that procedure. You are ready to debug.

You can also execute Run Until processing by using:

- The **Execution** menu **Run Until Proc** option, which will run immediately, using the procedure name currently specified on the **Proc Selection** tab
- The mappable 289 Client command `runUntil` 249
- A white list, as described in Running only to listed procedures. 77 Run Until for a specific procedure is the same as a white list that contains a single procedure.

Shortcuts for specifying procedure names

Instead of specifying the whole procedure name in the **Run Until Procedure** text box:

- You may be able to find the name you want by clicking the arrow to the right of the **Run Until Procedure** text box.

  This reveals a drop-down list of the names of as many as the last twenty procedures you entered (for this and from previous sessions). These names are also saved in the `until.txt` file.

- You can also use leading, trailing, or intermediate wildcards to form a name pattern to stop the Debugger on the first procedure that matches the pattern:

  - An asterisk (*) represents any string of characters.

    `*.M*` would stop the code execution at procedure `ACC.MOE`, or `HOME.MARY`, or `P.MOO`., and so on.

  - A question mark (?) represents any single character.

    `?.*` matches `P.MOO`, but not `ACC.MOE`.

  - A double quote (") escapes wildcard translation of the asterisk or question mark that follows it.

    `?."*` matches `P.*`, but not `P.MOO`.

  Prior to Sirius Mods version 7.9, only an asterisk wildcard is allowed.

  Note: The Model 204 LAUDPROC (Length of Audit Procedure Names) User 0 parameter (default: 21) must be set to the size of the largest procedure name that will be filtered. Otherwise, name matching is done against truncated procedure names.

Precedence and scope for Run Until

As described for the Break method 160, the "run until" processing takes precedence over any Break method calls that may be present in your procedures. Run Until ignores such calls.

Run Until also continues without interruption past any persistent-session suspend/ resume sequences.

The default boundaries beyond which Run Until does *not* continue processing are these:

- The end of the debugging session

  Once a session ends, either normally or through a lost connection, and Run Until searching is interrupted before it finds a specified procedure, a restarted Client does not automatically resume its search.

- The end of an HTTP request (Janus Debugger)

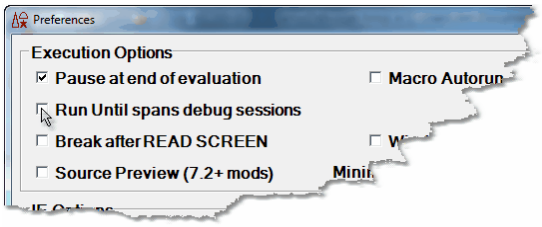
  If the current HTTP transaction completes and the Debugger does not encounter the target procedure, it does not continue its search for the target into subsequent HTTP requests. This is ordinarily not an issue.

It may be the case, however, that you want the Debugger *not* to respect these boundaries. You do not want to have to repeatedly invoke Run Until for the same procedure. For example, you are working with HTML frames, where each frame and frameset is a separate HTTP transmission to the browser, and you want Run Until to span all these HTTP requests rather than stopping for each frame that involves User Language.

To change the span of Run Until:

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).

2. In the **Preferences** dialog box, select the **Run Until spans debug sessions** checkbox (which is clear by default), then click **Done**.



Now, with a single invocation of Run Until, you can be sure to display the procedure you want. If, for example, the TN3270 Debugger was turned off and then on again, the Client will resume an incompleted Run Until search. Or in the case where you are debugging a request that satisfies an individual frame or frameset, the Client will continue (with no other execution breaks) through the code for subsequent frames until it finds the specified procedure.

This setting takes effect immediately, and it persists over multiple runs of the Client.

Interrupting Run Until processing

Run Until processing is manually interruptable: the mappable Client command `breakOnNextProc` lets you override a Run Until to interactively debug the next included procedure.

To use a manual interrupt for Run Until processing:

1. Map the `breakOnNextProc` command to a Client button or hot key (as described in Setting up the ui.xml file) 291 or in a macro (as described in Using Debugger macros 315).

2. While debugging an application where Run Until processing is active, invoke the button or hot key or macro.

   `Break on next proc set` displays in the Client's Status bar 49 to indicate the command has been successfully issued, and the next procedure included at command level (or from APSY) will be debugged, even if the Run Until would normally ignore it.

   You cannot invoke an interrupt while debugging sdaemon code.

In the same way you interrupt Run Until processing, you can also interrupt White List procedure processing. 80

See Also

Selectively excluding source code blocks 65

Locating and editing procedure source files 124

3.1.7.3 Running only to listed procedures

From a large domain, you may only want to interactively debug a particular set of procedures, say the procedures for which you are responsible. "Run Until Procedure" processing 73 lets the Debugger run through code until it reaches a procedure whose name matches a name or pattern you specified. But it may be simpler to forego the repeated specifying of individual names and instead to debug just the procedures pre-specified in a list. In the Debugger, this is "White List" processing. Alternatively, it might be easier to pre-specify in a "Black List" the procedures you do *not* want to debug.

To enable White or Black List processing, you:

1. Provide a file that contains either the names of the procedures to be debugged or a file that contains the names of the procedures *not* to be debugged.

2. Invoke the feature in the Client GUI.

Black List processing is new in Client Build 62.

Enabling and updating white or black list processing is discussed further in the following subsections:

Setting up a White or Black List file 77

Invoking White or Black List processing 79

Updating a White or Black List file 80

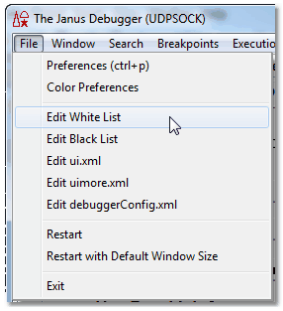
Setting up a White or Black List file

You must create a simple ASCII text file named `whitelist.txt` or `blacklist.txt`. In `whitelist.txt`, you list the Model 204 procedures that you want to debug; in `blacklist.txt`, you list those you do not want to debug. The Debugger Client will create these files for you (using MicroSoft's Notepad, as described below). Or, you can create "manually" the file you want, in the same folder as the Debugger Client executable file (JanusDebugger.exe), using any text editor.

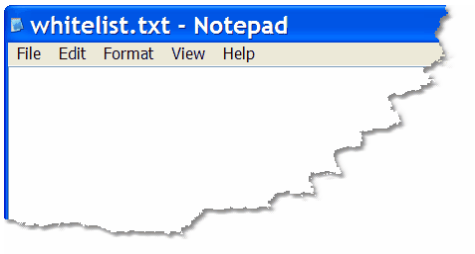
If you provide no `whitelist.txt` or `blacklist.txt` file, the user interface for White List or Black List invocation is disabled.

In the Debugger Client:

1. From the **File** menu, select **Edit White List** or **Edit Black List** (or, as mentioned below, use the **Edit White List** or the **Edit Black List** button in the **White/Black List** box in the **Proc Selection** page).



A blank Notepad `whitelist.txt` or `blacklist.txt` file is opened for you. (If such a file already exists, that file is opened.)



2. If a `whitelist.txt` file, specify the procedures you want to debug; if a `blacklist.txt`, specify those you don't want to be debugged. As of version 7.6 of Model 204 and Client Build 63, you can also list procedures that are included from an sdaemon 139 thread.

   Note the following syntax rules:

   - One entry per line
   - Leading and trailing blanks are ignored
   - Case matching is insensitive
   - Wildcards 74 are allowed
   - Blank lines are ignored
   - Any line starting with a number sign (#) is treated as a comment

   Here is an example of a valid file specification:

```
# white list the three stooges
  p.moe
  p.larry
  p.shemp
```

3. Save and Exit the file.

Invoking White List or Black List processing

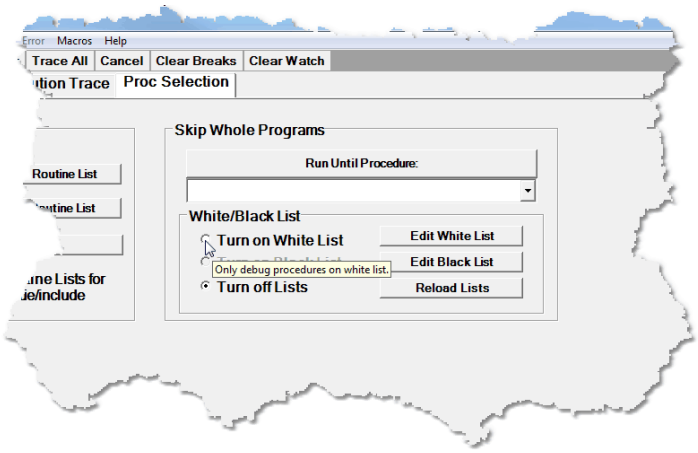
If the Debugger Client detects a valid White List or Black List file, it enables the option to turn the appropriate feature on or off.

To invoke white or black list filtering at any time (it is off by default):

1. Select the Client's **Proc Selection** tab.

2. If the Client was already started before you created or updated the `whitelist.txt` or the `blacklist.txt` filefile, click the **Reload White List** or **Reload Black List** button so the Client can detect the file. This enables the button that invokes White List or Black List processing, and it also reports the file's contents to the Client log file (`log.txt`).

3. In the **White/Black List** box in the **Skip Whole Programs** area, click the **Turn on White List** or **Turn on Black List** button.



Once you click the **Turn on White List** button, for example, `White list is active` displays in the Status bar[49], and white list filtering is enabled for the session until you turn it off by clicking the **Turn off Lists** button. As of Client Build 62, your filtering selection persists over runs of the Client until you undo it.

The Client's **Execution** menu also has **Turn On White List** and **Turn Off White List** and **Turn On Black List** and **Turn Off Black List** options that have the same effect as the **Proc Selection** tab buttons.

When white or black listing is on, the Debugger filters outer procedures automatically, stopping to interactively debug only the requests that are on the white list or not on the black list. A procedure not on the white list or on the black list still executes normally, but it is not interactively debugged, and the Client's **Audit Trail** displays are immediately refreshed to specify that such a procedure has been "skipped."

As of version 7.6 of Model 204 and Client Build 63, you can also list procedures that are included from an sdaemon 139 thread.

You can also enable and disable White List or Black List processing by using the mappable Client commands 289 that are equivalent to the above steps. The commands are `turnOnWhiteList`, `turnOnBlackList`, `turnOffWhiteList`, and `turnOffBlackList`.

Interrupting White List processing

Once White List or Black List processing is invoked, it continues in effect unless you explicitly turn it off or until you exit the Client. It is manually interruptable, however: the mappable Client command `breakOnNextProc` lets you override the White List or Black List to interactively debug the next procedure.

To use a manual interrupt for White List or Black List processing:

1. Map the `breakOnNextProc` command to a Client button or hot key (as described in Setting up the ui.xml file) 291 or in a macro (as described in Using Debugger macros 315).

2. While debugging an application where White List or Black List processing is active, invoke the button or hot key or macro.

   `Break on next proc set` displays in the Client's Status bar 49 to indicate the command has been successfully issued, and the next procedure included at command level (or from APSY) will be debugged, even if the active White List or Black List would normally ignore it. When this next procedure is debugged, the **Audit Trail** will display, for example, "White list accepted: *procedurename*."

   The interrupt applies only to a single procedure, and you must manually invoke it again for each subsequent procedure you want to exclude from White List or Black List processing.

   You cannot invoke an interrupt while debugging sdaemon code.

In the same way you interrupt White List or Black List processing, you can also interrupt Run Until procedure processing. 76

Updating a White List or Black List file

To update a White List, for example, at any time, from the Debugger Client:

1. Select either of the following two options (which let you update and save in Notepad the current `whitelist.txt` file)

   - The **Edit White List** button in the **White List** box in the **Proc Selection** page
   - The **Edit White List** option of the **File** menu

2. On the **Proc Selection** page, click the **Reload White List** button (or execute the `reloadWhiteList` 241 command).

   After a successful reload, `White list reloaded` displays in the Status bar 49.

Alternatively, you can use your text editor to modify a White List or Black List file at any time, after which you click the **Reload White List** or the **Reload Black List** button on the Debugger Client **Proc Selection** page.

See Also

Selectively excluding source code blocks 65

Locating and editing procedure source files 124

3.1.8 Altering the flow of execution

When debugging, you might want to test a code fix by resetting a variable's value and then re-executing one or more statements. Or you might want to alter the flow of control in the program to ensure that hard-to-reach code is tested, such as error paths. You can accomplish these tasks using the Debugger's Jump feature.

The Jump feature lets you transfer control to a statement and then execute that statement. The target statement may be earlier or later in the request than the current statement.

You invoke a jump by right-clicking a line in the **Source Code** window or by using commands 82. The commands offer additional functionality: jumps to a line number, jumps that are a number of lines relative to the current line, and jumps to lines that contain specified strings.

Manually executing a jump

To perform a jump from a **Source Code** line to a statement you manually select:

1. Right-click the target line to which you want to transfer program execution.

   If the target is the first line of an executable statement, the context menu will contain a **Jump Here** option.

2. Select **Jump Here**.

   The Debugger validates this target line, using the rules described below in Jump validation rules. 82

   If the target is valid:

   a. Control is immediately transferred to the target statement (intervening statements are not executed).

b. The target statement executes.

c. The next executable statement after the target is highlighted, and program execution pauses.

If the target is not valid: control is *not* transferred, and an `Invalid Jump` message is displayed in the status bar 49.

Note: Be aware that the execution of a statement you validly jump to may result in an unexpected request error because the jump bypassed the execution of statements that were logically-necessary predecessors to the target statement.

Invoking a jump from a macro or mapped command

The `jumpToLine` 217 and `jumpToMatch` 219 commands let you add a jump to a macro or Client button or hot key. With these commands, since you cannot manually select the line to which to jump, you select the target lines by number or by matching a string.

Jumping to a target line by absolute or relative line number

Like a manually-executed jump, the `jumpToLine` command transfers control to a specified request statement within the **Source Code** page, then executes that statement. You identify the target statement by supplying a keyword or a number:

```
jumpToLine [current | number]
```

For further information about specifying the command, see `jumpToLine.` 217

Jumping to a target line by matching a string

The `jumpToMatch` command transfers control to a request statement within the **Source Code** tab that contains a specified matching string, then it executes that statement. The target statement is the first statement *from the top* (first) line in the **Source Code** page that contains a match for the string you provide.

For further information about specifying the command, see `jumpToMatch.` 219

Jump validation rules

A jump operation is allowed if it follows these rules:

- You must have executed at least one statement in the request.
- Jumps are confined to the current nesting level. You may jump within but not into or out of nested code, which includes the following SOUL constructs:

  Loops (For, Repeat)
  Subroutines (both simple and complex)
  O-O methods
  On units (all types)

For example, once the Client's current-line indicator moves from the statement that calls a user-defined method into the code that defines the method, any attempted jump to a statement outside the method definition is invalid. And any attempted jump into the definition code from the method-calling statement (or from any statement outside the method definition) is invalid.

Note: Although you may not jump out of nested code, you can step out 62 of the current level and resume debugging on the statement following the original call of the nested code.

- The `jumpToLine` and `jumpToMatch` commands transfer control only to target statements that are executable.

- The `jumpToLine` command indicates the target statement absolutely by statement line number 11 or relatively by a number of lines forward or backward from the current line. It is an invalid jump if you absolutely specify the statement line number of an empty line, but it is valid to jump relatively to an empty line (in which case, the jump attempts to go to the line following the empty line).

3.1.9 Previewing program code

If you work with User Language programs that require an appreciably long time to download for debugging, due to their size alone or to a slow network connection or high network traffic, you may prefer to use a Debugger feature that lets you inspect a small "chunk" of the beginning of the program to decide whether to download the entire program for debugging or just to run it.

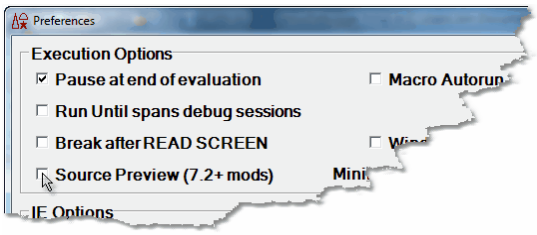
The Source Preview feature lets you download a program's initial 100 lines (at minimum). After inspection of this code chunk, you can download the entire program as usual or you can simply run the program without downloading it.

Enabling Source Preview

To enable the Source Preview feature (which is disabled by default):

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).

2. In the **Preferences** dialog box, in the **Execution Options** section, select the **Source Preview** checkbox (it is clear by default).



3. The **Minimum** value (to the right of the **Source Preview** checkbox) is the default for the minimum length a source program must be in order to be previewed. No programs less than 1000 lines may be previewed. Modify this setting (increments of 1000; maximum of 100,000) if you want previewing available only for longer programs.

4. The **Size** value (to the right of **Minimum**) is the default for the size of the preview code chunks. Modify this setting (increments of 100; maximum of 10,000) if you want larger chunks.

5. Click the **Done** button to save your settings and enable the feature.

Operating in preview mode

When Source Preview is enabled and you encounter a program with a number of lines greater than or equal to the Source Preview **Minimum** setting, the following happens:

1. As many as Source Preview **Size** lines of the program are sent to the Client **Source Code** page.

2. The Status bar 49 confirms that you are in preview mode and informs whether the source program compiles. It displays either `Preview: good compile` or `Preview: bad compile.` Even if the program does not compile, you will still have the option to download and view the entire program and its embedded compilation error messages.

3. You inspect the preview and decide whether to download the entire program for debugging or to skip the debugging of the program. Or, if the program did not compile, you decide whether to download and view the entire program or to skip it.

   - To download the entire program for debugging:

     Select the **Debug Previewed Source** option from the **Execution** menu, or use a button or hot key you mapped to the `skipPreview` 273 command, or click the Client's **Step** button or perform a **Source Code** text search.

   - To download the entire program to view compilation error messages:

     Select the **Debug Previewed Source** option from the **Execution** menu, or use a button or hot key you mapped to the **`debugPreview`** 199 command.

   - To skip the program:

     Click the Client's **Run** button, or select the **Skip Previewed Source** option from the **Execution** menu, or use a button or hot key you mapped to the **`skipPreview`** command.

3.2 Viewing and modifying program elements

The Debugger Client provides two principal ways of examining the values of individual items in your source code:

- The **Watch Window** shows you the current values of as many items as you add to the window. If these values are changed by your code, their updated values are shown in the **Watch Window** the next time the Debugger execution pauses.
- The quick-display **Value** window shows you the current value of the single item you are selecting by a right-click on the line of code that contains it. Alternatively, the Client **Value** button displays in a Value window the value of the item you explicitly enter in the text box above the **Watch Window.**

You can use either of these approaches for most of the code elements whose values are viewable.

These sections are included:

Watching program data items 85

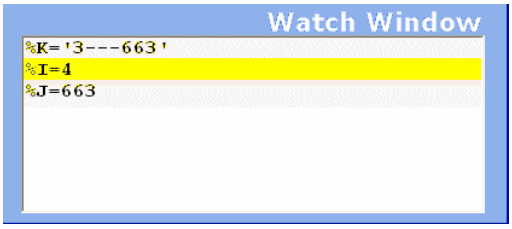
Displaying temporarily the value of a program data item 99

Setting the value of a variable 122

3.2.1 Watching program data items

The **Watch Window** box can display the current value of one or more program code data items. It is located in the lower right corner of the main window, unless it is opened in a separate window 306 external to the Client.

The **Watch Window** is updated as the program runs, each time execution is paused by the Debugger. If the value of a watched item is changed by the last statement execution, it is highlighted:



The following types of items can be “watched”:

- %variable scalar values (for example: %x, %y)

- Elements of %variable arrays (for example: `%names(%I), %names(34)`)
- Image items (including image array elements) (for example: `%input:name`)
- Global variables
- Database fields
- Model 204 parameters
- Elements of $lists and Stringlist and Arraylist objects
- Counts of items in a $list or Stringlist or Arraylist
- Certain $function calls: $STATUS and $STATUSD, $CURREC, $FIELDGROUPID, and $FIELDGROUPOCCURRENCE
- SOUL O-O structure elements (for example: `%address:city`)
- SOUL O-O object variables (for example: `%xmlInput:serial`)
- SOUL O-O user-defined class member variables

Note: If any of the above items has subscripts or parameters within parentheses (for example, a %variable or $list array item or a parameter in a SOUL O-O class method) that are *not* simple variables or constants, the item *cannot* be watched in the Debugger.

These subsections follow:

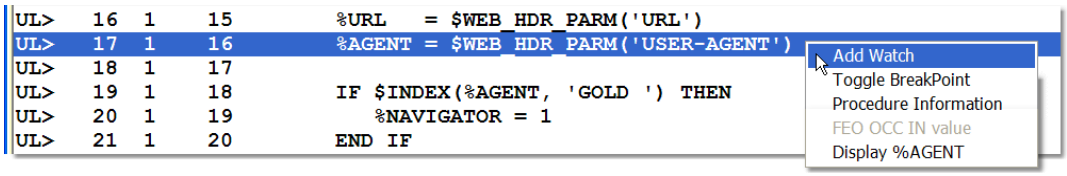
3.2.1.1 Adding and removing Watch Window items

You explicitly add to and remove from the **Watch Window** the items whose values you want to view.

Displaying items

These are the simplest ways to add an item to the **Watch Window**:

- In the **Source Code** display, right-click a program line that contains variables, and select **Add Watch** from the context menu. All variables on that line are added to the **Watch Window**.



  The mappable[289] Client command that performs the same action is `addWatchOnCurrentLine.`[178]

- For the program line in the **Source Code** display that is highlighted to indicate it is *in the current execution position*, an alternative to right-clicking the current line is to select **Add Watch on Current Line** from the Client's **Data Display** menu. All variables on the line are added to the **Watch Window.**

- Type the name (case is not important) of the item in the Entity-name input box[50], then click the **Watch** button (or select the **Data Display** > **Add Watch** menu item):

  The mappable Client command that performs the same action is `addWatch.`[178]

- For these types of items, you must specify more than just the item name in the text box:

  Model 204 fields[93]

  User Language global variables[94]

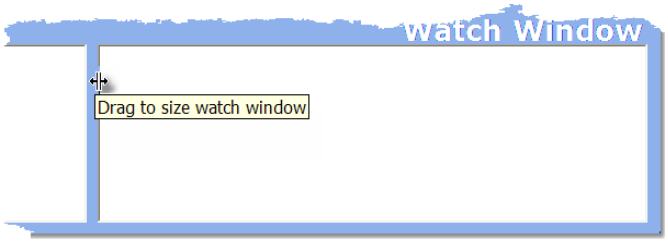
  SOUL O-O shared object variables[95]

  $lists[96]

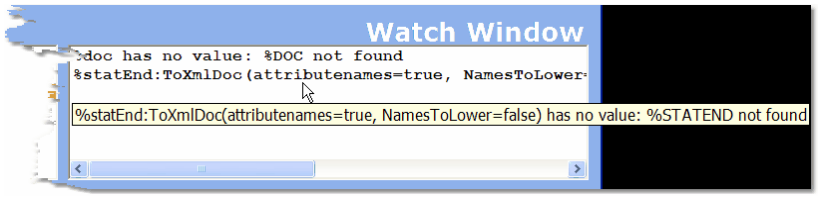
Viewing long items

To display lengthy values, you can do one of the following:

- Expand the **Watch Window** by dragging its left edge to the left:



- Hover your mouse over the item to display it entirely in a tooltip box:

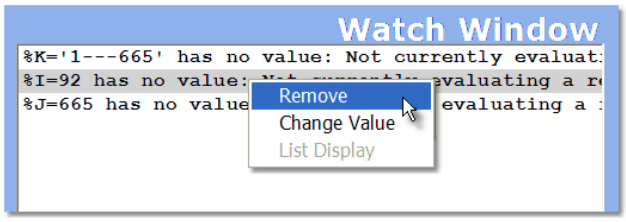


  This feature is enabled by selecting the **Show long watch values in a Tooltip** option in the Client's Preferences box 18 (it is off by default).

- Double-click the value to display it in a Value window 91.
- Display the entire **Watch Window** in a window that is external to the Client. 306

Removing items

To remove a single item from the **Watch Window**, right-click the item and select **Remove** from the context menu:



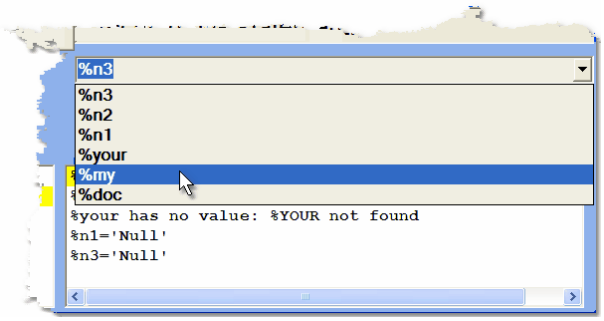
The mappable Client command that performs the same action is `removeCurrentWatch.` 243

To remove all items from the **Watch Window**, click the **Clear Watch** button, below the main window. This button empties the **Watch Window** and instructs the mainframe portion of the Debugger to stop collecting any watch data.

The mappable Client command that removes all **Watch Window** items is clearWatch. 177

Redisplaying items

Each item you add to the **Watch Window** is also added to a drop-down list you can view in the Entity-name input box 50 by clicking the arrow at the right. To redisplay an item you previously removed from the **Watch Window**, simply select from the drop-down list the item you want to watch again:



The items in the drop-down list persist across Debugger Client sessions. The contents of the **Watch Window** itself are redisplayed in subsequent Client sessions *by default*. If you do not want the **Watch Window** contents to persist across Client sessions, clear the **Restore watches on startup** checkbox accessed from the **Preferences** option in the **File** menu.

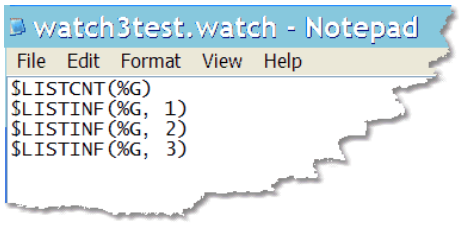
3.2.1.2 Saving and restoring Watch Window contents

If you anticipate watching the same or many of the same items in subsequent debugging sessions, you can save to a local file the entire list of items displayed in the **Watch Window**, then restore those items to the **Watch Window** whenever you want. This may significantly minimize the effort of repopulating the **Watch Window**.

For example, say you are watching the function specifications `$LISTCNT(%G)`, `$LISTINF(%G, 1)`, `$LISTINF(%G, 2)`, and `$LISTINF(%G, 3)`. To save them for later use:

1. Select **Save Watch** from the Debugger Client **File** menu.
2. Specify a workstation folder location and a name for the storage file.

The list of watched items (only) is stored in a text file with a `.watch` file name extension:



Alternatively, you can run the `saveWatch` 250 command from a mapped 289 Client button, key, or macro that has the same effect as the above two steps.

Restoring

To restore (at any time) to the **Watch Window** these or other items from any `.watch` file (including any you create independently):

1. Select **Load Watch** from the **File** menu.

2. Locate and select the `.watch` file in the Windows **Select Watch File** dialog box.

   By default 303, the search for the `.watch` file begins with the folder specified in the `stateFileFolder` element in the debuggerConfig.xml file.

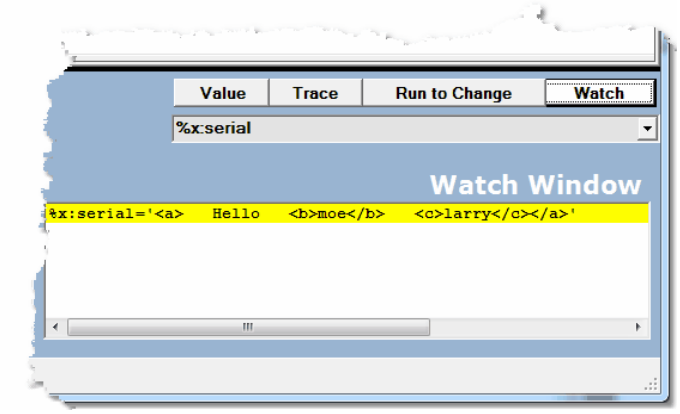
   The file's contents are added to the **Watch Window** display with whatever current value they may have in the current source code.

Again, as an alternative, you can run the `loadWatch` 222 command from a mapped 289 Client button, key, or macro that has the same effect as the above two steps.

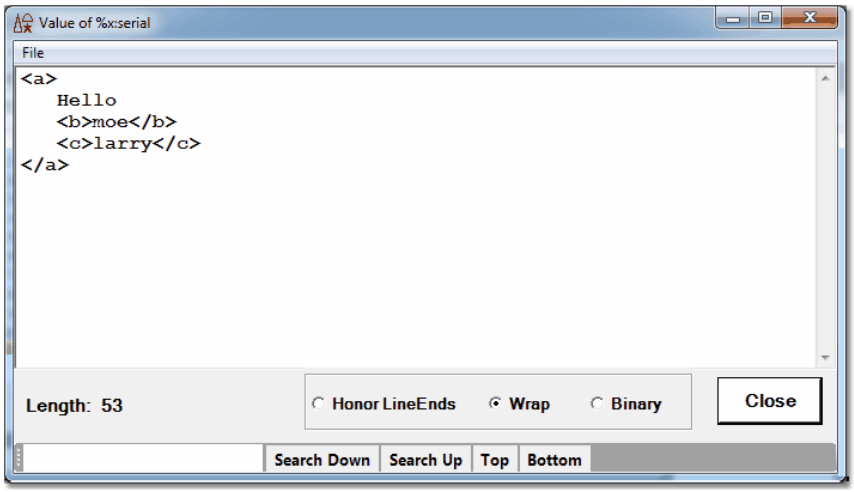
You can save as many watched lists as you like.

3.2.1.3 Getting a detailed view of the value of a watched item

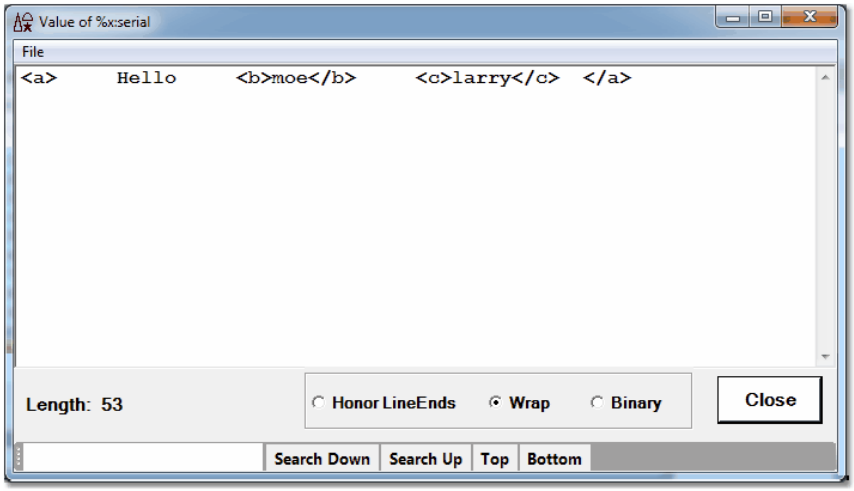
You can double-click an item in the **Watch Window** to display a detailed value window. For example, if you double-clicked `%X:SERIAL` (whose value is a single string that may include line-ends) in the **Watch Window** box shown below:



The value is displayed in a separate window:



By default, any line-end characters in the value are honored in this **Value** window, and the value is broken into lines accordingly. To see the value unbroken at line ends, you click the **Wrap** radio button:



From wrap-view mode, you can always revert to line-end mode by clicking the **Honor Line Ends** button.

To see the hexadecimal values of the data, click the **Binary** button.

To print or save the value, use the **Print** or **Save** options of the **File** menu. The **Save** option saves the file in the window's current display format (ordinary text or hexadecimal digits). To search the value display, use the search bar on the bottom of the window.

Note: As an alternative way to get the same detailed view of a variable that double-clicking it in a **Watch Window** provides, you can specify the variable name in the text box above the **Watch Window,** then click the **Value** button below it. As described in Displaying temporarily the value of a program data item 99, a variation of this alternative approach is also the way to get detailed views of the values of $list, Stringlist object, and XmlDoc object variables — which you **cannot get** by double-clicking them in the **Watch Window**.

See Also

Adding and removing Watch Window items 86

Displaying temporarily the value of a program data item 99

3.2.1.4 Watching Model 204 fields

When the program you are debugging is in a Model 204 record context, you can view the value of any visible database field in that record by explicitly adding the field name to the **Watch Window.** The field name requires a special prefix, as described below.

If a field name is referenced within an expression in an HTML or TEXT block in your code, you can also add it to the **Watch Window** (or display it in a **Value** window) by right-clicking the code line that contains it, as described below.

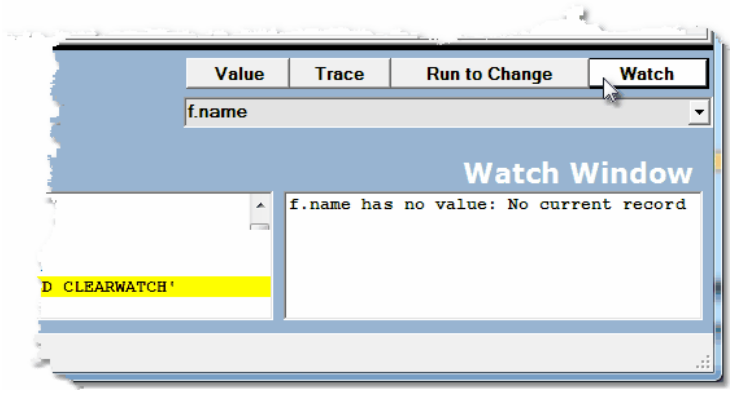
In addition, if a multiply occurring field is in a FOR EACH OCCURRENCE loop, you can display its occurrence number[114]. You can also display the values of all the fields in the current record[115] or in the current field group[118].

Adding fields to the Watch Window

To watch the value of a Model 204 field:

1. Type its name preceded by `F.` or `f.` (for example, `f.name`) in the Entity-name input box[50].

2. Click **Watch**:



By default, the value of the first occurrence of the field is shown in the **Watch Window;** however, you may select later occurrences by subscripting the field name. For example: `f.name(2)` watches and displays the second occurrence of the field name, while `f.name` is equivalent to specifying `f.name(1)`.

Watching fields that belong to field groups

If you are using the Model 204 field group feature under version 7.6 or higher of the Sirius Mods, you can watch or display the value of fields in the current field group by preceding their name by F. or f.

The execution context must be a current field group (that is, within an FEO FieldGroup loop).

Watching fields specified within HTML or TEXT blocks

You can view the value of a Model 204 field that is specified as an expression within a User Language HTML or TEXT statement block. In such blocks, the Client detects a field name enclosed by opening and closing braces (for example, `{FIELDNAME}`), and it shows you the field value if you select the **Add Watch** or **Display** right-click option for a line that contains the expression.

See Also

Displaying the current occurrence value in an FEO loop 114

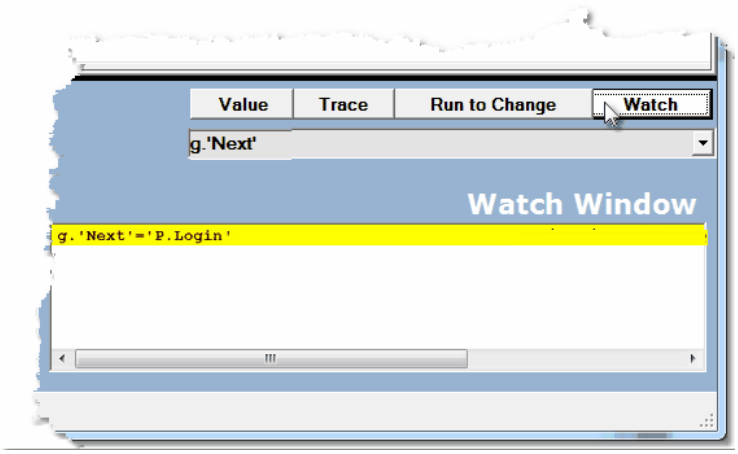
Displaying all fields in a record 115

3.2.1.5 Watching global variables

Like Model 204 fields, watched global variables must be specified using a prefix. To watch a global variable:

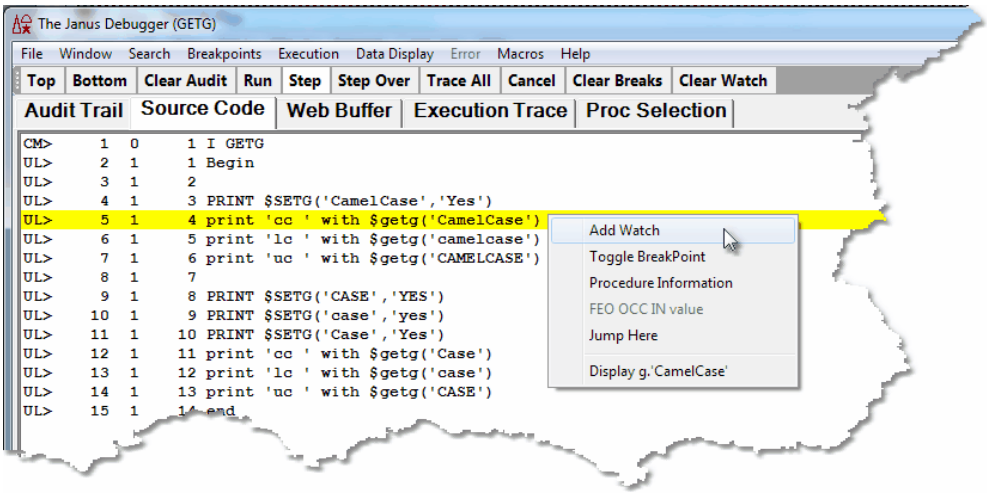
1. In the Entity-name input box 50, specify `G.` or `g.` followed by the variable's name within single quotation marks. For example: `g.'Next'`
2. Click the **Watch** button.

   The current value of the variable is displayed in the **Watch Window**:



Note: For global variables whose names are all uppercase, you can omit the single quotation marks enclosing the name. In this case, the Debugger searches for (only) the variable with the all-uppercase form of the name. Whether you specify `g.next` or `g.Next` or `g.NEXT`, the value of only the global variable `NEXT` is displayed.

For a global variables that is referenced by a $GETG call in a source code statement, you can also right-click its program line and select **Add Watch** from the context menu.



The global variable is added to the **Watch Window** and its current value is displayed.

To view the variable value without adding it to the **Watch Window**, you can right-click the program line and select the **Display** option. The value is shown in a separate **Value** window.

Note: Just as it recognizes $GETG calls, the Client also recognizes and evaluates $STATUS, $STATUSD, and $CURREC calls as of Sirius Mods 7.6.

See Also

Watching Model 204 fields 93
Viewing dummy string variables 125

3.2.1.6 Watching object variables

You add a SOUL object variable to the **Watch Window** using either of the ways described earlier 86: right-click the line of code in which it's contained and select the **Add Watch** option, or type its name in the text box above the **Watch Window** and click the **Watch** button.

But for shared objects, class variables within a class definition, and Stringlist and XmlDoc objects, you need to use variations of these techniques. Otherwise, for Stringlist and XmlDoc objects, the Debugger only informs you whether or not the object has content. And for shared objects, the Debugger may fail to "find" the object.

Handling shared objects and class variables are described below. Stringlist objects are discussed in Watching $lists and Stringlists 96, and XmlDoc objects are discussed in Displaying Janus SOAP XML document objects 104.

Watching shared objects

The simplest way to add a shared object variable to the **Watch Window** is to right-click its source code line and add it. When you do so, the class-name qualifier is automatically added as a prefix for the variable. For example, if the line you select on the **Source Code** page is:

```
Print %(tester):sharedPubNum
```

The variable that appears in the **Watch Window** is `%(tester):sharedPubNum`, and you can successfully watch the shared variable's value as you step through the program.

However, if you choose to add the shared variable by first typing its name in the Entity-name input box 50, you must be sure to prefix the variable with its class name, explicitly specifying:

```
%(tester):sharedPubNum
```

If you specify only the variable name (`%sharedPubNum`), the variable is added to the **Watch Window** as is, with no `%(tester)` class name prefix. The Debugger does not recognize this as the shared variable in your program, and a "not found" message eventually displays in the **Watch Window**.

See Also

Displaying temporarily the value of a program data item 99

3.2.1.7 Watching $lists, Stringlists, and Arraylists

To inspect $lists, Stringlists, and Arraylists, you apply additional $functions or object methods to the $list, Stringlist, or Arraylist variable in the text box above the **Watch Window**. Otherwise, the Debugger will merely report whether or not these variables have content.

This section describes how to watch individual list items or list counts. Using a related technique 102, you can display all the list items and their values at once.

To watch $lists, Stringlists, or Arraylists:

- For $lists, specify either of these $functions in the Entity-name input box[50]:

`$listcnt(listID)`	Gets the number of items in the list
`$listinf(listID,subscript)`	Gets the value of a particular list item.

  Where:

  - *listID* is a $list identifier, most often a Float variable. It must be a simple variable or a constant; it may *not* be an image item or a %variable array item, for example.
  - *subscript* is a 1-based list-item subscript that identifies the item to watch.

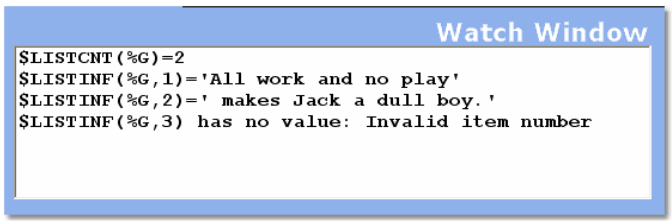
- For Stringlists or Arraylists, specify either of the following in the Entity-name input box for the *%list* Stringlist or Arraylist object variable:

`%list:count`	Gets the number of items in the list
`%list:item(num)`	Gets the value of a particular list item.

  Where:

  - *%list* is a Stringlist or Arraylist object variable.
  - *num* is a 1-based positive integer that identifies the item to watch. It must be a simple variable or a constant; it may *not* be an image item or a %variable array item, for example.

For example, here are the results of watching the function specifications `$LISTCNT(%G)`, `$LISTINF(%G, 1)`, `$LISTINF(%G, 2)`, and `$LISTINF(%G, 3)`:



The contents of the **Watch Window**, above, result from evaluating the following test program:

```
INCLUDE LISTTEXT
b
  %i is float
  %g is float
  %g = $listnew
  %i = 777
  $listadd(%g, 'All work and no play')
  $listadd(%g, ' makes Jack a dull boy.')
  $list_print(%g)
end
```

3.2.1.8 Watching class member Variables

In much the same way as for ordinary %variables, you can use the Client's watch or display[99] facilities for viewing class member Variables (that is, a variable that is a member of a class, not an instance of a class). If you right-click a code line that is outside the definition of the class, and you use the **Add Watch** or **Display** options, the Client shows the class Variable *and* the object to which it is applied in the **Watch Window** or the **Value** window's title.

If you choose to add the Variable to the **Watch Window** by first specifying it in the text box above the **Watch Window**, you must precede the Variable name by the object variable to which it is applied.

The Client also has a related feature[109] that lets you display at once the names and current values of all the Variables in a given class.

Watching Variables within a class definition

To watch the value of a class Variable within a method *within* the class definition, it may be necessary to add it via the Entity-name input box[50], rather then by right-clicking its source code line.

The following example of a **Source Code** program helps to demonstrate how to work with `%this` in Sirius Mods 6.*x* versions of the Debuggers. In more recent Debugger versions, class Variables are detected as such, and their value is displayed in the **Watch Window** whether or not you have explicitly preceded the variable name with `%this.`

In the example, the `celsius` variable is referenced in the `fahrenheit` property definition. The class definition is valid and works as intended: both `%celsius` and `%this:celsius` are valid formats for referencing `celsius` in this class definition context.

```
Begin
class thermometer
  public
    variable celsius is float
    property fahrenheit is float
  end public

  property fahrenheit is float
    get
      return (1.8 * %celsius) + 32
    end get
    set
      %this:celsius = (%fahrenheit - 32) / 1.8
    end set
  end property fahrenheit
end class

%temp is object thermometer
%temp = new
%input is float
%input='33'
%temp:fahrenheit = %input

print 'Temperature fahrenheit: ' %temp:fahrenheit
print 'Temperature celsius: ' %temp:celsius
End
```

In the Client, you can right-click and select the **Add Watch** menu option to add both `%celsius` and `%this:celsius` to the **Watch Window.** However, as you step through the program, the pre-Mods-7.0 Debuggers will only find and display the value for `%this:celsius.`

In cases like this where class definition code does not explicitly specify `%this`, you must provide the `%this` explicitly yourself by typing it in the Entity-name input box followed by a colon, followed by the class variable name. Then you click the **Watch** button to add the variable to the **Watch Window.**

See Also

Displaying all Variables of an object's class 109

3.2.2 Displaying temporarily the value of a program data item

While the Debugger Client is evaluating program code in the **Source Code** tab, you can view the value of a code variable or field (one time), without adding it to the **Watch Window** for continuous watching. You use either of the following ways:

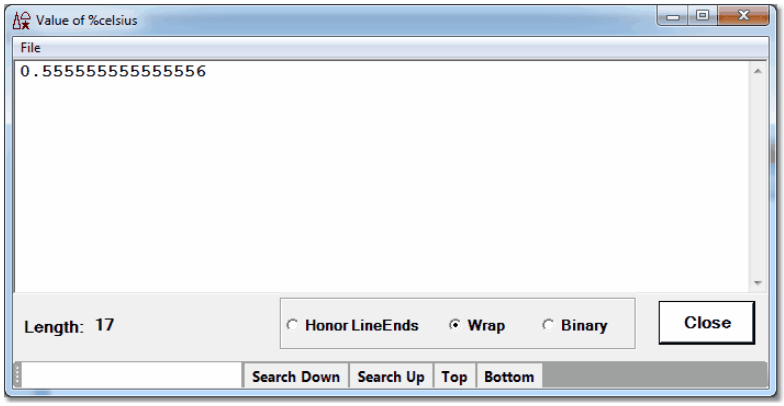
- Right-click the **Source Code** line in which the variable (say, *%var*), is referenced or declared, then select the resulting "Display *%var*" menu option.

Or:

- Type its name in the Entity-name input box below the main window; then click the **Value** button.

  Note: For some types of variables, you also need to type the name of special Client functions that produce the appropriate display. Such variables include $list[102], Stringlist or Arraylist object[102], and XmlDoc object[104]. And for class member Variables[109], you select a right-click option from the **Watch Window.**

Either of the preceding approaches displays the *%var* variable value in a separate **Value of %var** window:



Note: If you have the console[322] open, the value is displayed there instead of in a **Value** window. To override this default, use the `valueDisplayOnConsole` option of the Client `setPreference`[265] command.

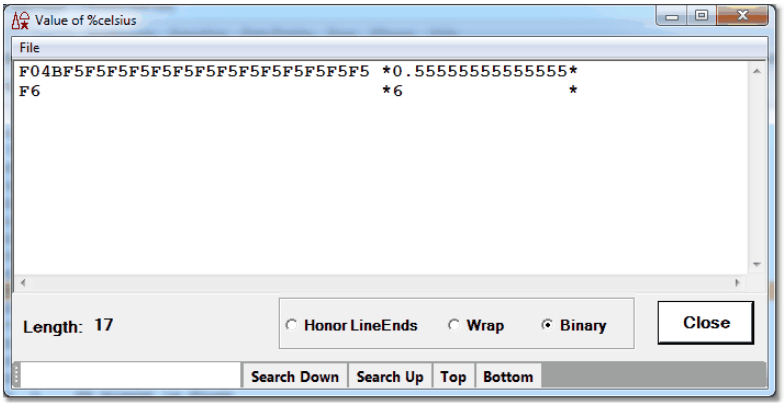
By default, any line-end characters in the value are honored in the **Value** display window, and the value is broken into lines accordingly.

- To see a value unbroken at line ends, you click the **Wrap View** button. From wrap-view mode, you can always revert to line-end mode by clicking **Honor Line Ends**.

- To see the raw binary representation of the value (16 bytes per line), click the **Binary** button.

  This option is useful if the data is not printable (for example, whitespace characters), or if you simply want to see the pre-translation EBCDIC values of the data (since the Debugger Client normally converts strings to ASCII for display).

  The binary display shows any printable characters to the right of the hex data, enclosed by asterisks. Non-printable characters are represented by periods:



Clicking either **Honor Line Ends** or **Wrap** restores the original ASCII representation.

- To print or save the value, use the **Print** or **Save** options of the **File** menu. The **Save** option saves the file in the Value window's current display format (ordinary text or hexadecimal digits) in the location you select. To search the value display, use the search bar controls on the bottom of the window.

Note: The `valueDisplay` 284 mappable Client command has the same effect as the **Value** button for the value in the **Watch Window** text box.

See Also

Getting a detailed view of the value of a watched item 91

Displaying $lists, Stringlists, and Arraylists 102

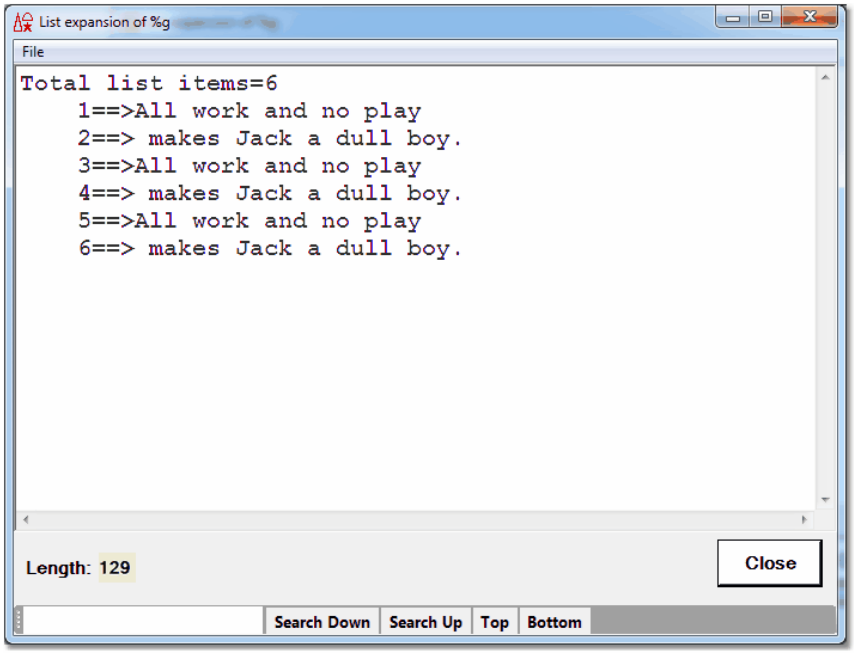
Displaying Janus SOAP XML document objects 104

Displaying all Variables of an object's class 109

Displaying the current occurrence value in an FEO loop 114

3.2.2.1 Displaying $lists, Stringlists, and Arraylists

You can use the Client's display 99 or watch 96 facilities for $lists, Stringlist objects, or Arraylist objects to view or watch an individual item or the count of items. However, when a quick view of the entire $list, Stringlist, or Arraylist is important, you can access a special type of **Value** window display to see all the list items and their values at once. For example:



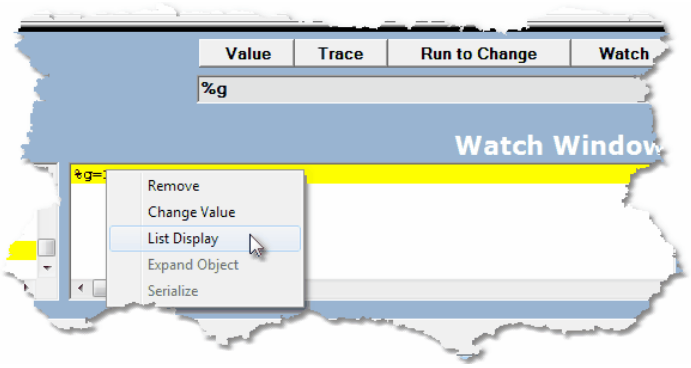
You can also print the window's contents by accessing the **File** menu's print options, and a search bar on the bottom of the window provides controls for searching the window content.

To access the **Value** window from the **Watch Window**:

1. Add 86 the variable to the **Watch Window**.

2. In the **Watch Window**, right-click the variable.

If this is a list variable and its value is currently non-Null, the **List Display** context menu option is enabled:

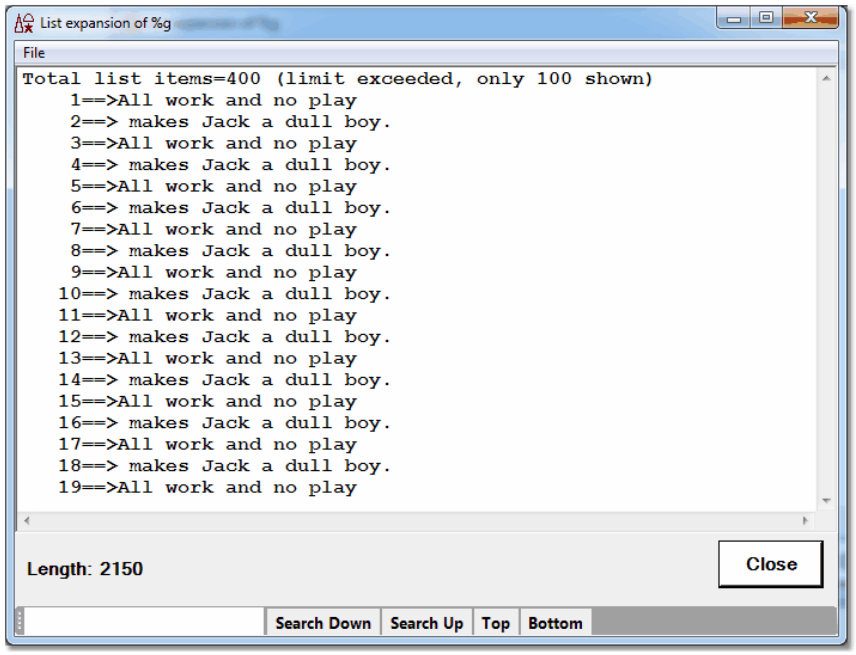


3. Select **List Display**.

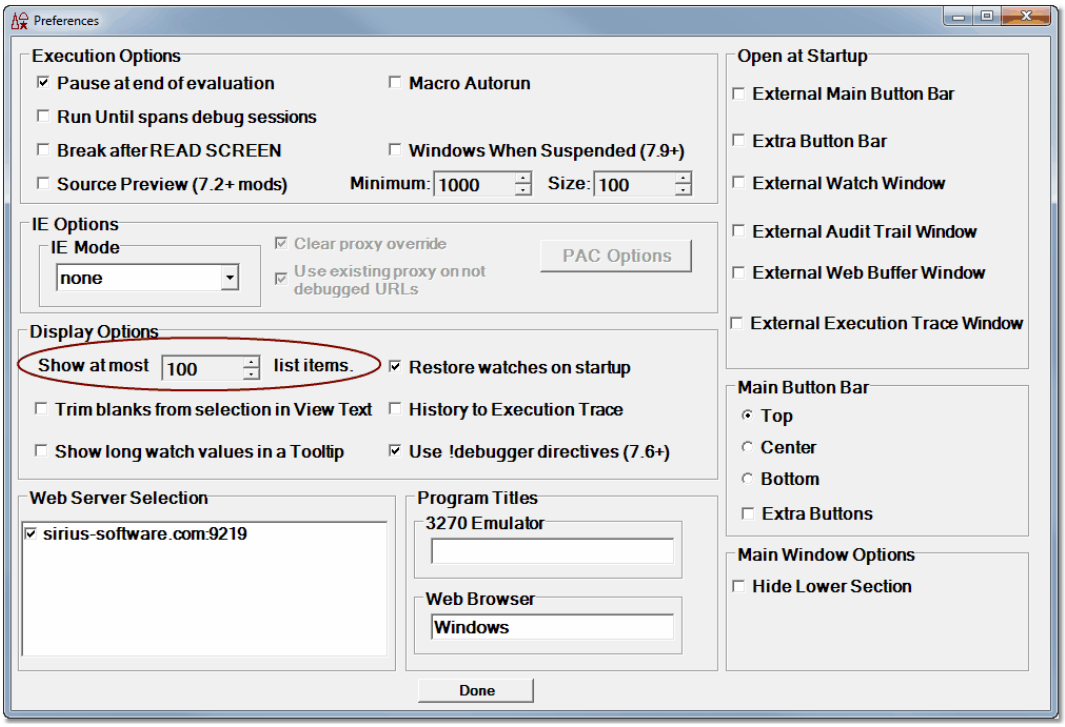
Note: For this feature, subscripted references are allowed for $list variables. For example, to display $list item `i` in array `%L`, add `%L(%i)` to the **Watch Window.**

Note: The `expandList` mappable Client command[289] has the same effect for its argument as clicking **List Display** for a watched item.

By default, a limit of 100 items is enforced. If there are more items than the limit, this is noted in the "Total list items" line, and only the first 100 are displayed, as shown below:



If the limit of 100 is too low, you can reset it in the **Display Options** area in the **Preferences** dialog box (accessed via the **Preferences** option of the **File** menu):



The limit may be set in the range from 100 to 10,000, in increments of 1000.

See Also

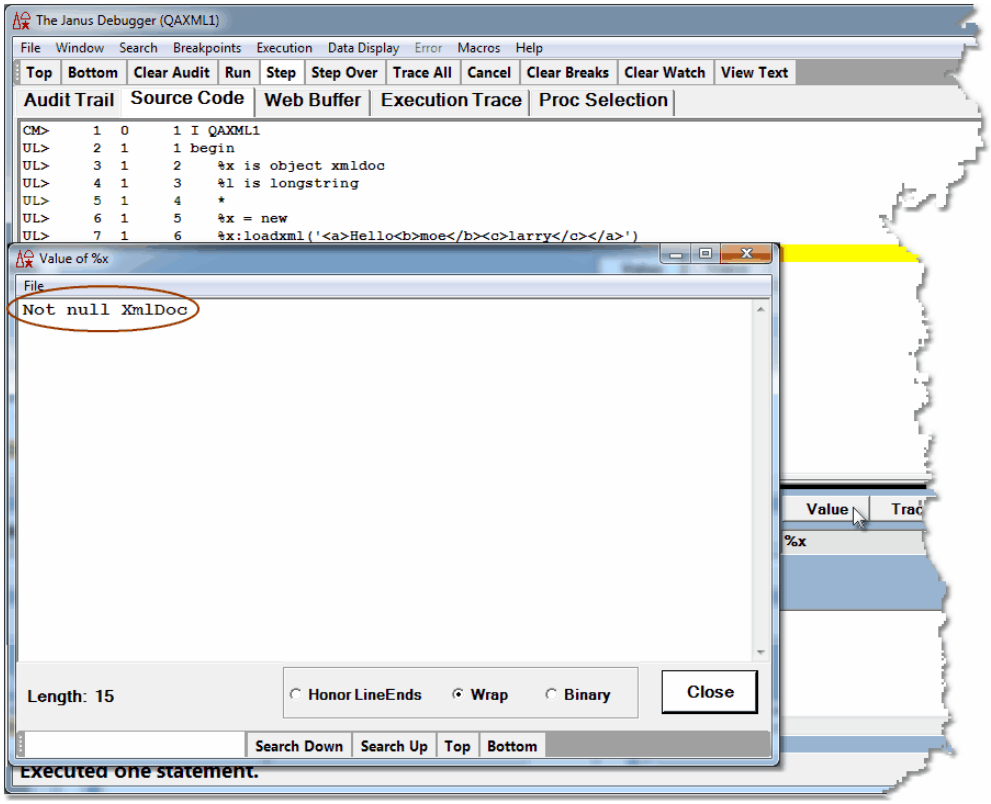
Watching $lists, Stringlists and Arraylists 96

3.2.2.2 Displaying Janus SOAP XML document objects

Applications using Janus SOAP XML document objects are an increasingly common type of Janus Web application. Ordinarily, however, to inspect the contents of an XmlDoc or XmlNode object, it must be serialized by one of the XML document serializing methods like Serial, WebSend, Xml, or Print. And in either the Janus Debugger or the TN3270 Debugger, if you are debugging a request in which a line like the following is executed:

```
%x:loadxml('<a>Hello<b>moe</b><c>larry</c></a>')
```

Requesting 99 the value of %x merely reports *whether* the object has content:



If the program in the preceding example contained a subsequent assignment statement to a string variable like the following, you could display the XmlDoc content by watching for or requesting the value of `%longstring`:

```
%longstring = %x:serial(,'EBCDIC')
```

For parts of the code where no such serializing statement is present, however, the Debugger **Serialize** feature lets you implicitly call the Janus SOAP XML document Serial method to view the contents of an XmlDoc or or XmlNode object variable.

You can invoke the feature multiple ways for XmlDoc variable %doc:

- Display the expanded value of %doc:serial in a **Value** window.

  a. Enter `%doc:serial` in the Entity-name input box below the main window.

  b. Click the **Value** button.

  Or:

  a. Add %doc to the **Watch Window** (by right-clicking the **Source Code** line containing `%doc` and selecting the **Add Watch** option, or by entering %doc in the text box above the **Watch Window** and clicking the **Add Watch** button).

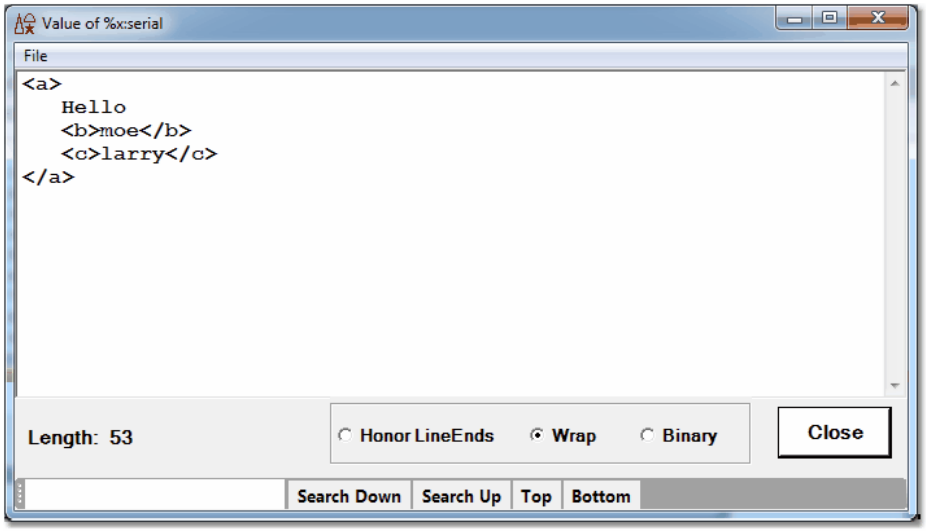
b. Right-click %doc in the **Watch Window** and select the **Serialize** option.

- Display the non-expanded value of %doc:serial in the **Watch Window:**

a. Enter %doc:serial in the Entity-name input box.

b. Click the **Watch** button.

For the example code above, if you specify %x:serial in the Entity-name input box and click the **Value** button (at any point after the execution of the %x:loadxml statement cited at the beginning of this section), the following **Value** window displays:



The Debugger Serialize feature formats the return value of the Serial call as if you specified the following form of the method (which calls for a single string with EBCDIC characters, added carriage-return/line-feed character sequences, and added three-blank character sequences for the indent of nested elements):

```
Serial(, 'EBCDIC CRLF Indent 3')
```

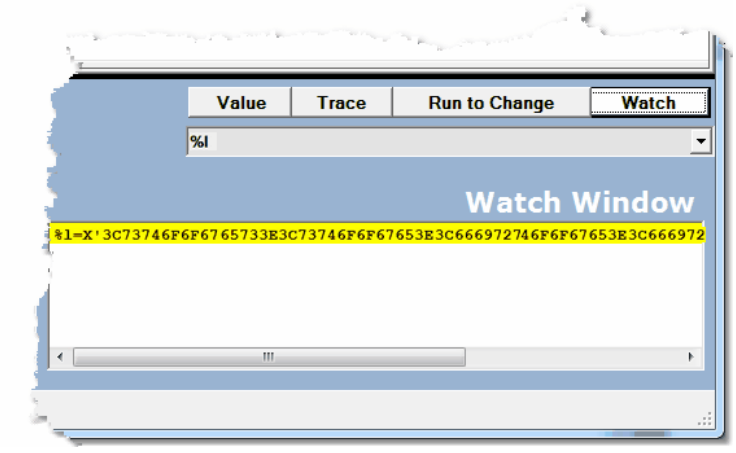
The Serial method defaults are UTF8 instead of EBCDIC, and no added line-end or indentation characters. So for user convenience, the Debugger is internally providing its own Serial method defaults (which you can adjust, as described in the "Serial method formatting defaults" 104 subsection).

Debugger Serial method compared to source code Serial methods

The Debugger's internal Serial method handling is independent of Serial method calls actually specified in the source code you are debugging. For example, in the following excerpt, the User Language object pointed to by `%d` (of type `document`) contains a variable member named `x` that is an XmlDoc:

```
class document
   public
      variable x is object XmlDoc
      constructor new
      subroutine addStooge(%iFirst is longstring, -
                           %iLast is longstring)
   end public
 ...
%d is object document
%d = new
%l is longstring

%d:addstooge('Moe", 'Howard')
 ...
%l = %d:x:serial
 ...
```

If you are watching `%l`, which is not an object variable, you find that its value is shown as an Unicode binary string when the `%l = %d:x:serial` statement in the request is executed:

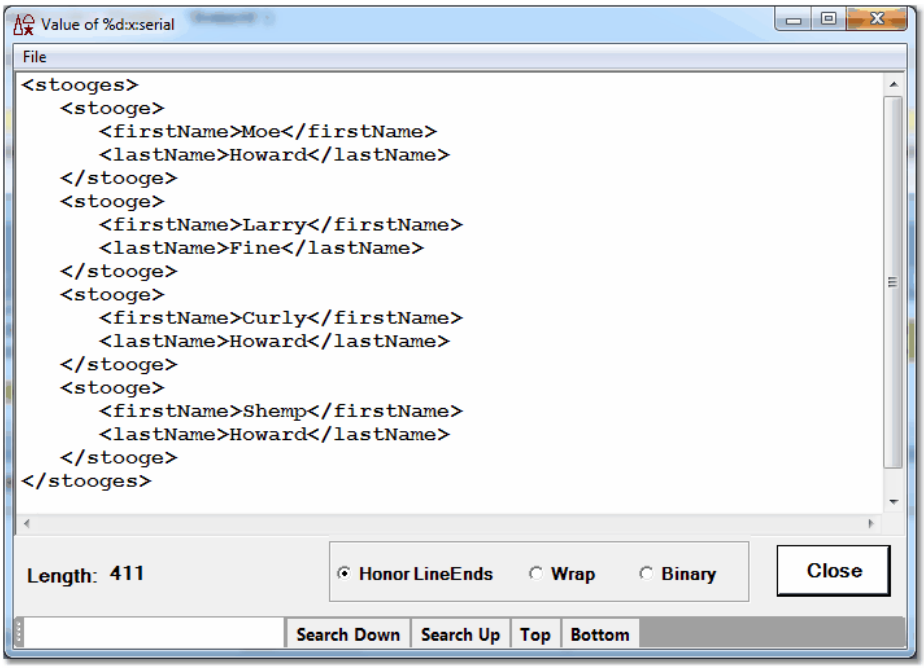


However, you can use the Debugger's Serial method feature and request a detailed view of the XmlDoc object variable `x`:

1. Specify `%d:x:serial` in the Entity-name input box below the main window.

2. Click the **Value** button.

   You see the serialized form of the XmlDoc in the **Value** window:



Serial method formatting defaults

The preceding **Value** window display also shows again the effect of the implicit Debugger Serial parameters CRLF and Indent 3. These formatting defaults (for XmlDoc and XmlNode objects) are specified in the Debugger Client configuration file 378 (debuggerConfig.xml):

```
<serialParms>CRLF INDENT 3</serialParms>
```

You can change this formatting, for example, to increase the indentation:

```
<serialParms>CRLF INDENT 10</serialParms>
```

To suppress this feature (never have the Debugger add parameters to serial), specify no value:

```
<serialParms></serialParms>
```

See Also

Watching object variables 95

3.2.2.3 Displaying all Variables of an object's class

Although you can view the contents of SOUL Stringlists and XmlDocs, the Debugger cannot display the entire contents of most SOUL system objects. However, you can display for a given object variable the names and values of the Variables (public and private) or Variable-like members defined for its class.

For user classes, members defined as Variables are displayed. For system classes, members that are similar to Variables, that is, that take no arguments (certain Functions and Properties) and return simple values (names, counts, positions, etc.), are displayed.

This feature is supported for SOUL system classes (including system exception classes) and for user-defined classes, *excluding* these classes:

System and Subsystem
DebuggerTools

For any class, the display does *not* include class methods (Functions, Subroutines, Properties, or Constructors).

The Variable-like members you can display for the SOUL system classes are summarized 111 later in this section.

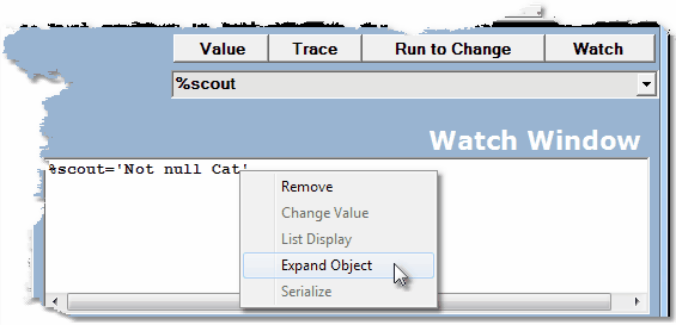
The `expandObject` mappable Client command 289 also invokes this feature, and the `getVariablesForClass` command invokes a variant of the feature that retrieves variable names but not values.

To display the member variables in the class represented by a particular object variable:

1. Add 86 the object variable to the **Watch Window**.

2. In the **Watch Window**, right-click the object variable.

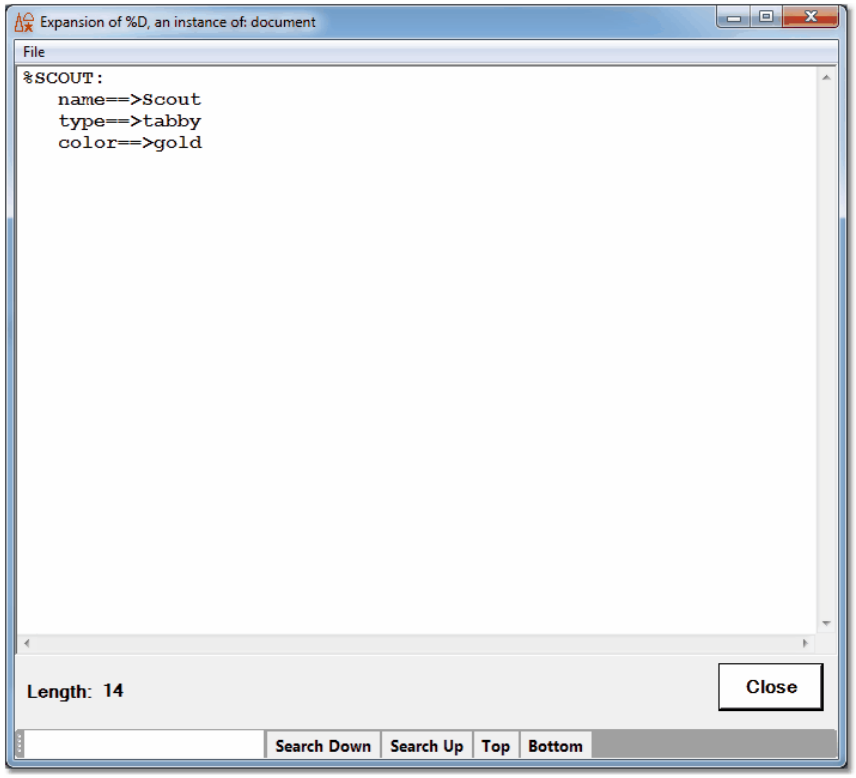
   If this is indeed an object variable and its value is currently non-null, the **Expand Object** context menu option is enabled:



   If the object variable's value is `Not-null`, its class name is automatically displayed as well. If the current object variable value is other than `Not-null`, no class name appears and the **Expand Object** option is not enabled.

3. Select **Expand Object** if the object variable's value is `Not-null`.

   A **Value** window opens, displaying the names and current values of the member variables in the class. For example, a window like the following displays:



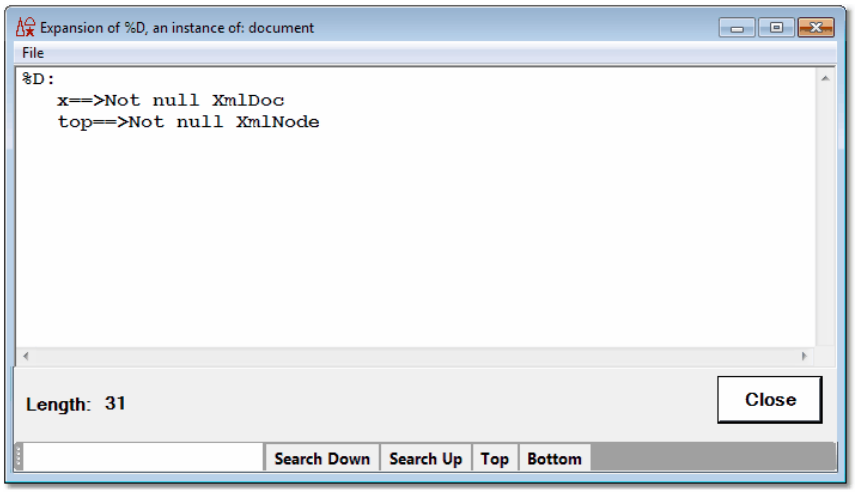
   This is the class definition for the variable display above:

```
class cat
   public
      variable name is longstring
      variable type is longstring
      variable color is longstring
      constructor new (%iName is longstring)
      subroutine talk
   end public

   constructor new (%iName is longstring)
      %this:name = %iName
   end constructor new


   subroutine talk
      print %this:name ' says Meow'
   end subroutine talk
end class cat
```

   At the same time the Variables are displayed, a status bar[49] message reports the number of Variables in the class. For this example: `Found 3 variables in CAT`.

Note: If the Variables of a class are themselves objects, the only displayable information about their values may be that they are "Not null."

For example, for %d, an instance of a user-defined Document class that contains a Janus SOAP XmlNode variable and an XmlNodelist variable, the class Variable display is similar to this:



Summary of variable members in SOUL system classes

If the object variable you expand (as described above) is an instance of a SOUL system class, the members that display are summarized in the table below.

Class	Viewable members
Arraylist	Count LastItem
CharacterMap	*none suitable*
CharacterTranslationException	BytePosition CharacterPosition Description HexValue Reason
Dataset	State
Daemon	AmDaemon HaveDaemon MasterNumber ParentNumber
DaemonLost	*none suitable*

Class	Viewable members
Email	GetReplyCode GetReplyText Host Port
FastUnloadTask	State (Sirius Mods 7.6+)
FloatNamedArraylist	Count Default UseDefault
HttpRequest	Fieldcount Headercount Host Httpversion Maxredirects Page Port Protocol Proxy Timeout Url
HttpResponse	Code Content HeaderCount Message StatusLine Success Url
InvalidBase64Data	Position
InvalidHexData	Position
InvalidRegex	Code Description Position
JSON (Model 204 V7.6+)	Type ToString Count
Ldap	ErrorNumber ErrorText
MaxDaemExceeded	*none suitable*
NamedArraylist	Count Default UseDefault

Class	Viewable members
NoFreeDaemons	*none suitable*
RandomNumberGenerator	*none suitable*
Record	FileName (Sirius Mods 7.6+) LockStrength RecordNumber (Sirius Mods 7.6+)
Recordset	IsEmpty LockStrength
RecordsetCursor	FileName (Sirius Mods 7.6+) LockStrength LoopLockStrength (Sirius Mods 7.6+) RecordNumber (Sirius Mods 7.6+) State (Sirius Mods 7.6+)
Screen	ActionKey Columns Rows
ScreenField	Column Invisible ItemId Modified Numeric Protected Row Value Width
Socket	Errinfo('CODE') Errinfo('SOCKNUM') Errinfo('FUN') Info('REMOTE') Info('STAT')
SortedRecordset	IsEmpty
StringTokenizer	AtEnd (Sirius Mods 7.6+) CurrentQuoted (Sirius Mods 8.0+) CurrentToken (Sirius Mods 8.0+) NotAtEnd (Sirius Mods 7.6+) String (Sirius Mods 8.0+) StringLength (Sirius Mods 8.0+)
Stringlist	Count LastItem MaxItemLength

Class	Viewable members
UnicodeNamedArraylist	Count Default UseDefault
UnknownStatistic	Name
UserStatistics	LoginToString (Sirius Mods 7.6+) RequestToString (Sirius Mods 7.6+) ToString (Sirius Mods 7.6+)
XmlDoc	DefaultURI Length LocalName Prefix Qname Type URI Value
XmlNode	DefaultURI Encoding InvalidChar Length LocalName Prefix Qname Type URI Value XpathOrder
XmlNodelist	Count

3.2.2.4 Displaying the current occurrence value in an FEO loop

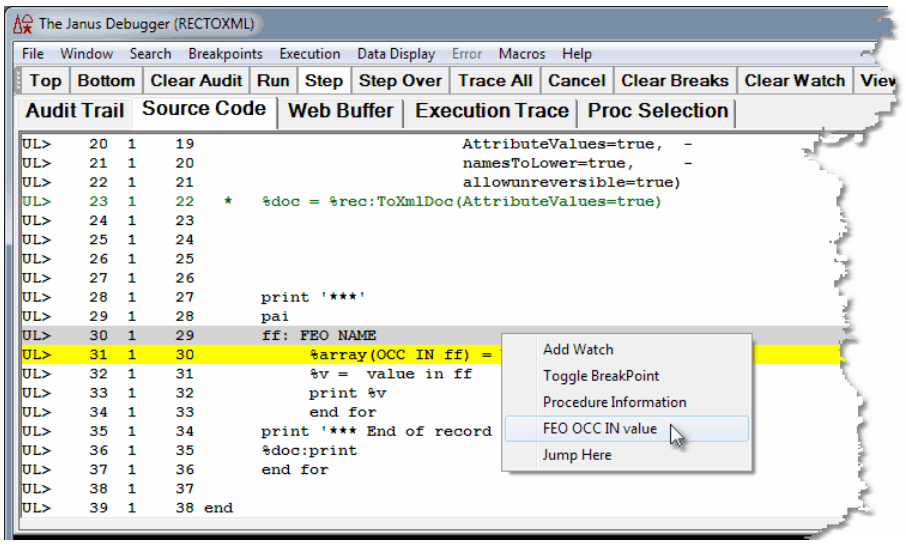
In User Language, the OCC IN phrase lets you refer back to the label of a FOR EACH OCCURRENCE OF (FEO) statement to get the number of the current field occurrence in the loop. For example:

```
ff: FEO MISCINFO
     %array(OCC IN ff) = VALUE IN ff
      ...
```

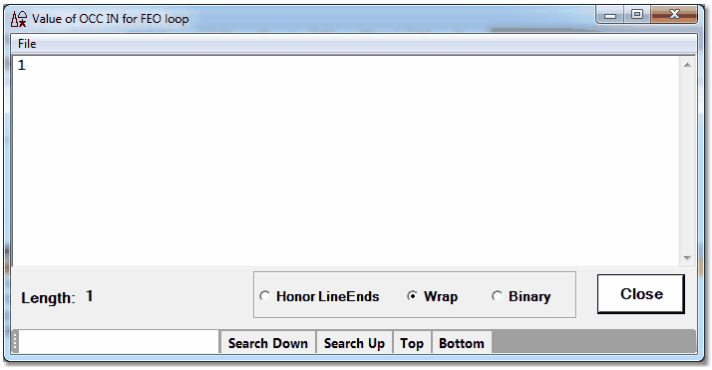
If you are debugging a request that contains FEO loops, you can easily display the current occurrence number value in the Debugger Client:

1. In the **Source Code** page, right-click on a line that contains an FEO statement.

2. Select **FEO OCC IN value** from the context menu:



The occurrence value displays in the **Value of OCC IN for FEO loop** window:



The Client feoDisplay 206 command performs the same operation.

3.2.2.5 Displaying all fields in a record

The User Language PAI (Print All Information) statement displays the values of all the visible fields in a given Model 204 record. You can get this same display from within the Debugger by using the `pai` command.

The pai 237 command is a Debugger Client command 289 you specify in a macro 315 or you map to a Client button or hot key. If you then issue the command while debugging at an execution point where there is a current record (for example, inside of a record oriented FOR loop), the Client generates a display of the record's fields that is the same as that of the User Language PAI statement.

A typical scenario for using the `pai` command might include these steps:

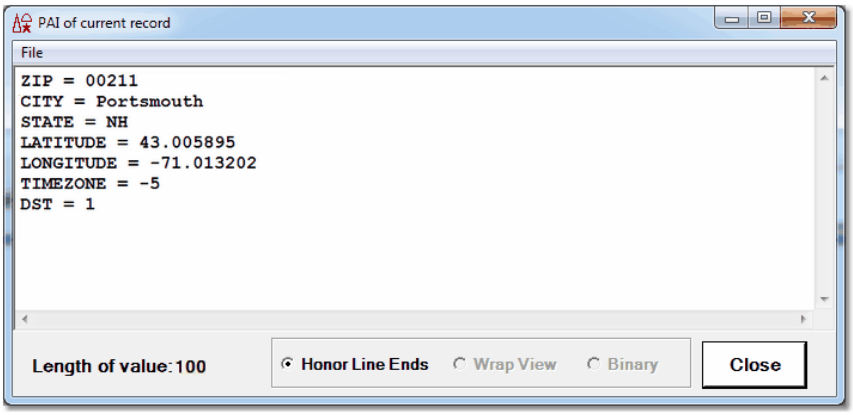
1. You map the command to a Client hot key.

   In a ui.xml file[291], you specify the following to set up ctrl-a as a hot key to issue a `pai` command:

   ```
   <mapping command="pai" key="a" keyModifier="ctrl"/>
   ```

2. While debugging a request, you press ctrl-a when you are in a record context.

   In a **Value** window, you see a PAI-style display of the current record:

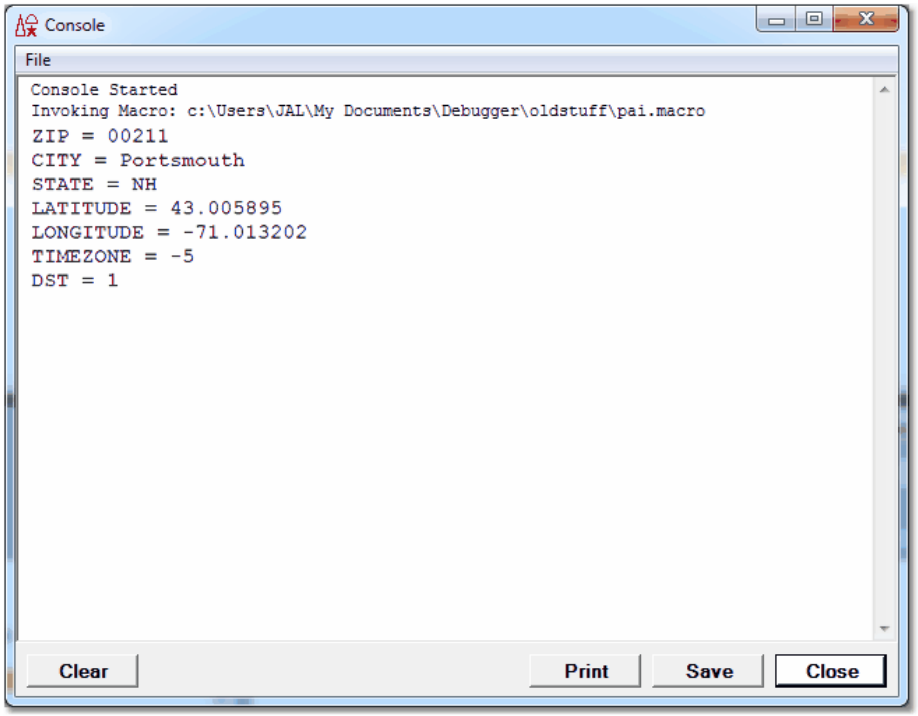


   A Value window display is the default. As shown below, the output may also be displayed in the macro console window.

Alternatively, you can use the pai[237] command in a Debugger macro or from the command line[322]. For example, say your macro is a `pai.macro` text file that has the single statement:

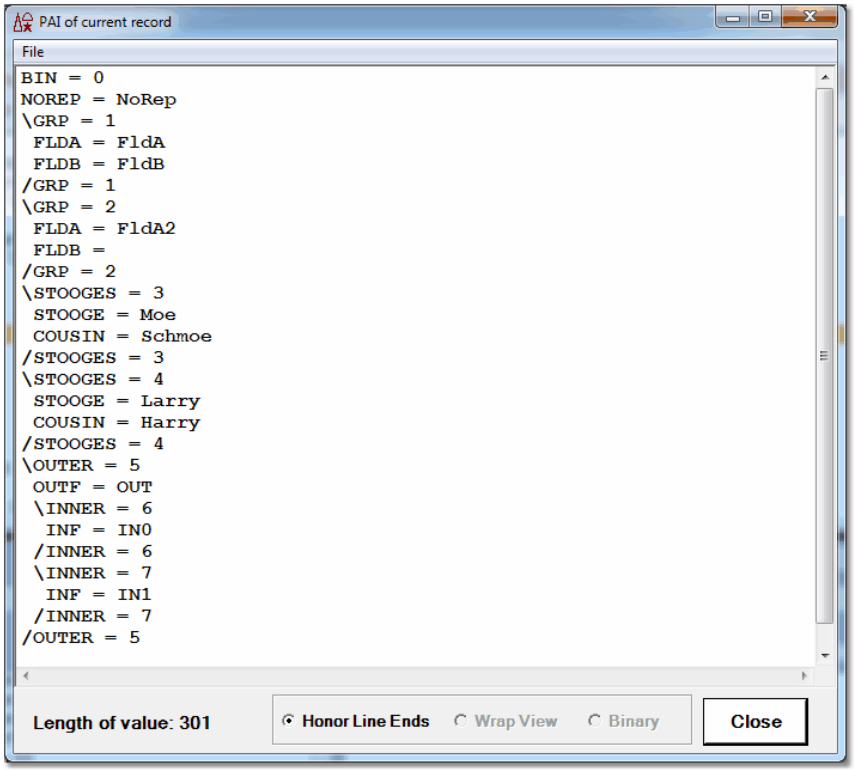
```
pai
```

You run the macro[315] at a debugging execution point where there is a current record, and although it is not required, you have the macro console[322] open. The record's PAI output displays on the console:



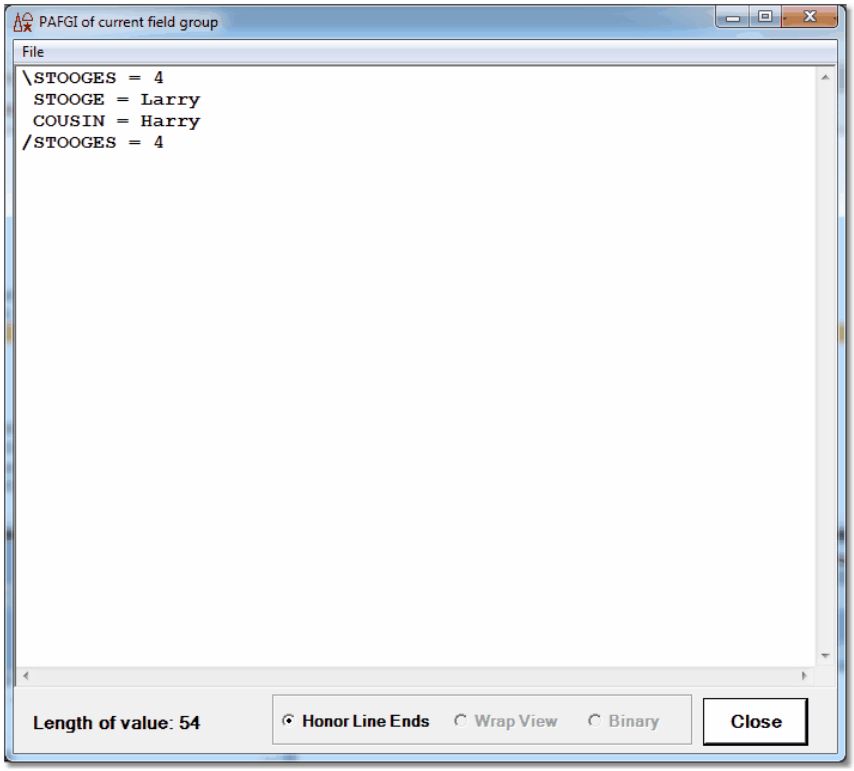
Displaying a record's field groups

If you are using Model 204 V7R2 or better, and you are debugging a request against a file in which field groups are defined, the `pai` command display of a record also includes the field group occurrences, each beginning with a backward slash (`\`) and ending with a forward slash (`/`):



To display only the fields in the current or specified field group, you use the `pafgi` command, which produces the same output as the User Language PAFGI (Print All Fieldgroup Information) statement. The discussion above about ways to map and use the `pai` command applies entirely to the `pafgi` command as well.

Invoking the `pafgi` command while within field group context produces a display of the fields in the current or specified field group. For example, for the STOOGES field group in the same request and record as in the preceding example, this is the `pafgi` display:

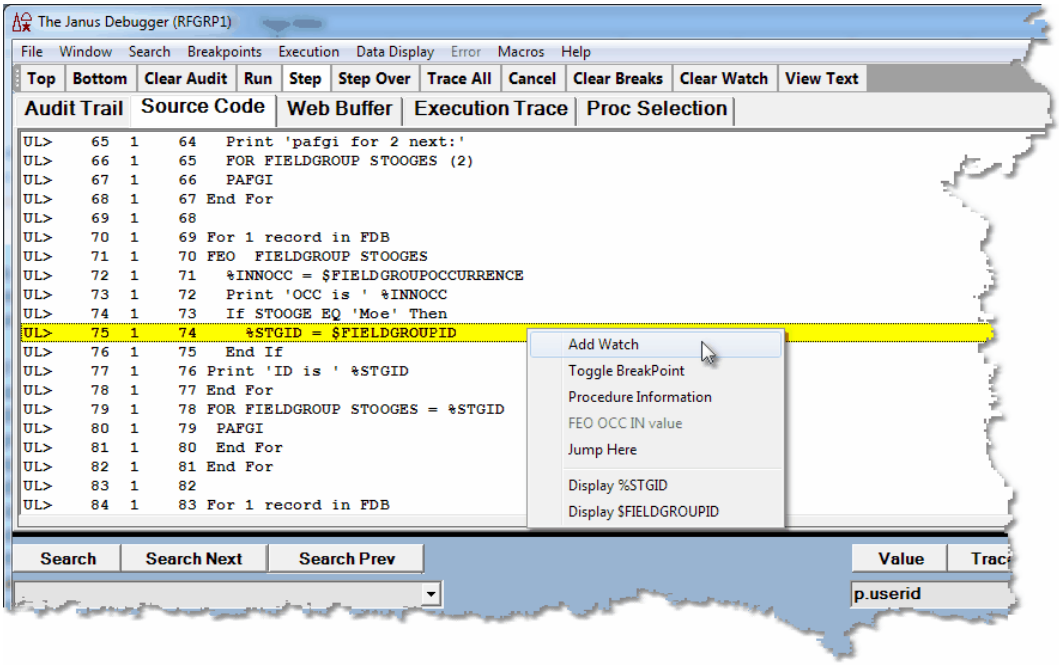


Field group $functions

The Debugger recognizes and evaluates User Language $FieldGroupID and $FieldGroupOccurrence function calls. These functions are useful for operating selectively on field group instances.

$FieldGroupID returns the unique numeric identifier that Model 204 assigns to each field group in a record. $FieldGroupOccurrence returns the current occurrence number of an occurrence of a repeating field group.

To view the value of either $function, you can right-click its program line in the **Source Code** page and select **Add Watch** from the context menu.



The $function is added to the **Watch Window** and its current value is displayed whenever the current program context is a field group. The function value subsequently displays when the program execution point is in any field group.

To view the $function value without adding it to the **Watch Window**, you can right-click a program line that explicitly contains it and select the **Display** option. The value is shown in a separate **Value** window.

3.2.2.6 Displaying Model 204 parameters

You can use the Client's display or watch facilities to view the value of any legal Model 204 parameter:

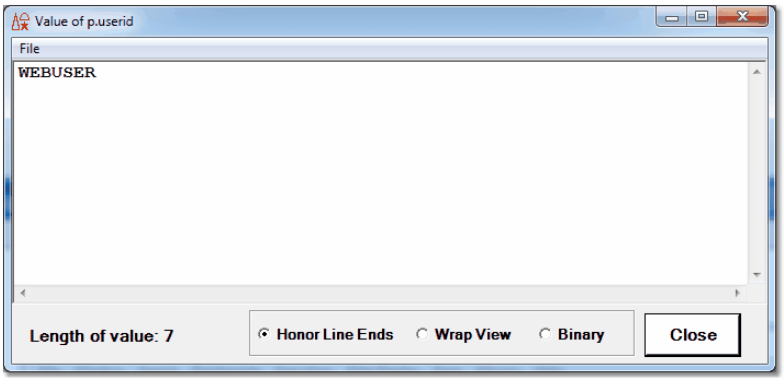
1. In the Entity-name input box below the main window, specify `p.` followed by the parameter's name. For example:

   ```
   p.userid
   ```

   Case does not matter, nor do leading or trailing blanks.

2. Click the **Value** button above the **Watch Window**.

The parameter value displays in a separate **Value of p.*parm*** window:



Note: If the parameter is a file parameter, the value of that parameter is returned for the current file. If there is no current file, an error is returned.

If the parameter is a User parameter, the value returned is that for the current web thread (if Janus Debugger) or for the current Online user (if TN3270 Debugger).

An alternative path to the same Value window is via the **Watch Window**:

1. In the Entity-name input box, specify `p.` followed by the parameter's name.
2. Click the **Watch** button above the text box to add the parameter to the **Watch Window.**
3. In the **Watch Window**, double-click the parameter name.

3.2.2.7 Displaying the Universal Buffer content

You can use the Client's display or watch facilities to view the current content of the user's Universal Buffer. The Model 204 Universal Buffer is used used to transport Large Object data and with the MQ/204 interface.

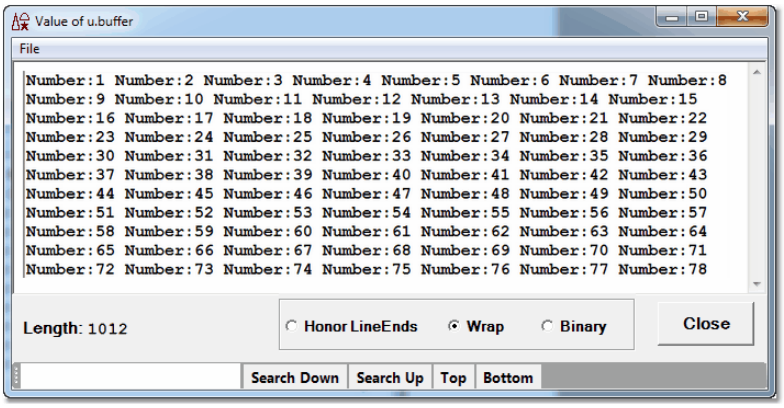
1. In the Entity-name input box 50 below the main window, specify the following:

   ```
   u.buffer
   ```

   Case does not matter, nor do leading or trailing blanks.

2. Click the **Value** button above the text box.

The buffer content displays in a separate **Value of u.buffer** window:



Features of the window include:

- A **Wrap** button to see a value unbroken at line ends (from which, you can revert to line-end mode by clicking **Honor Line Ends)**
- A **Binary** button to see the raw EBCDIC/binary representation of the value (16 bytes per line)
- Familiar Windows **Print**, **Page Setup**, and **Print Preview** dialog boxes accessible from the viewer's **File** menu
- Buttons to search within the displayed value, as well as buttons to move to the top or bottom of the value.
- Standard mouse-based copying of text data (but altering or deleting text is **not** allowed)

An alternative path to the same Value window is:

1. In the Entity-name input box, specify: `u.buffer`
2. Click the **Watch** button above the text box to add the buffer to the **Watch Window.**
3. In the **Watch Window**, double-click the `u.buffer` string.

3.2.3 Setting the value of a variable

You may set or update the value of certain types of variables with the Janus and TN3270 Debuggers. The following types of variable values may be modified:

- String %variables (255 character limit)
- Unicode %variables (UTF-16 bytestreams)
- Float %variables

- Fixed %variables
- Longstrings (255 character limit)
- Global variables
- Screen and Image items
- SOUL O-O Boolean enumeration variables (as of Version 7.7 of the Sirius Mods; only True and False [case not important] are valid values)

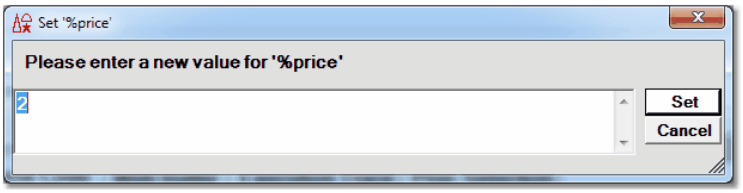
Currently, only scalar variables may be set; array elements may not be set. In addition, most object variables may *not* be set.

To set the value of a variable with the Debugger:

1. Add 86 the variable to the **Watch Window**.
2. In the **Watch Window**, right-click the variable.

   If this type of variable can be set, and it is settable at this point in the execution of the program, the **Change Value** context menu option is enabled.
3. Select **Change Value**.

   A **Set %var** dialog box like the following displays, where *%var* is replaced by the variable you are modifying, and the variable's current value is displayed:



4. Specify the new variable value, and click **Set** or press the Enter key.

   The **Watch Window** is refreshed with the new value, `Variable Set` displays in the Status bar 49, and the new value becomes the current value of the variable *in the program* at the current point of program execution.

The `setM204Data` 265 command is equivalent to right-clicking a **Watch Window** item and selecting **Change Value**.

Note: Setting a new value in the Debugger follows the rules of User Language assignment. For example, specifying a text value for a float variable results in setting the variable to zero.

See Also

Watching program data items 85
Displaying temporarily the value of a program data item 99

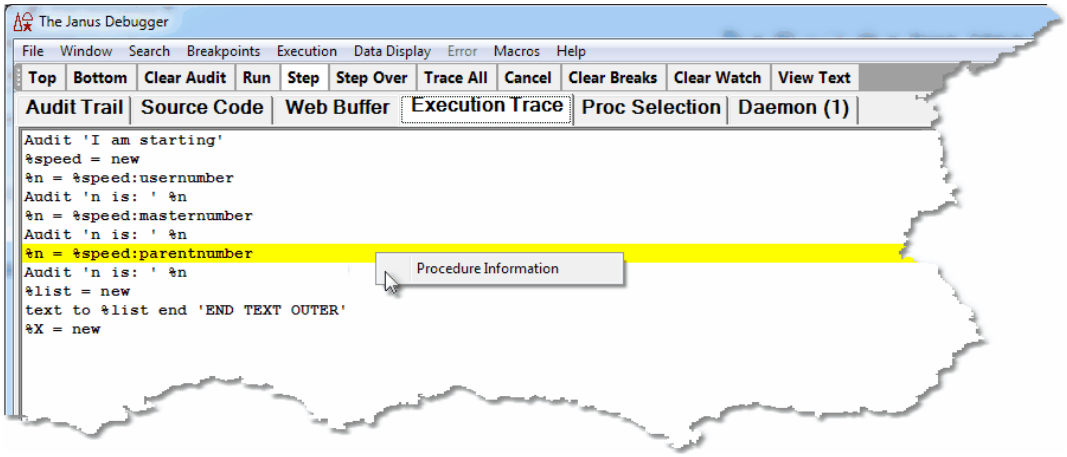
3.3 Getting source file, audit trail, and web buffer information

These sections are included:

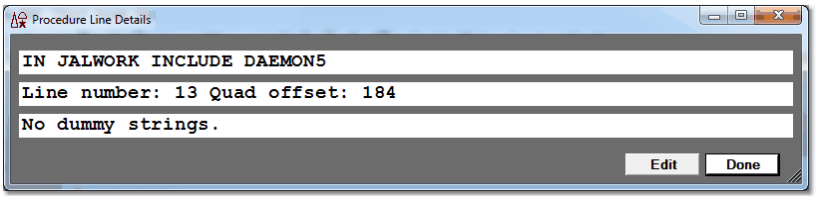
3.3.1 Locating and editing procedure source files

If your application has a complex structure of nested procedure includes, the Model 204 procedure that contains a particular source code line may not be apparent. The Debugger Client provides a simple way to determine this information:

1. Right-click a code line in the **Source Code, Execution Trace,** or a **Daemon** tab to display the context menu's **Procedure Information** option:



2. Select **Procedure Information** to display a **Procedure Line Details** dialog box like the following:



The top line of the dialog box, which identifies the procedure file and procedure name, also identifies the APSY subsystem within which the procedure was invoked, if any.

The middle line in the dialog box identifies the statement's line number within the procedure, and the bottom line in the dialog box displays the original dummy string variables if the statement is the result of a dummy string substitution.

If you click the **Edit** button on the **Procedure Line Details** dialog box, you invoke a local text editor (if you have configured 164 a Rocket-supported editor). You then can edit the procedure, and save it back to the Online.

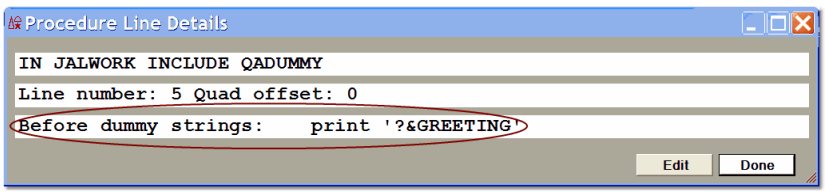
3.3.2 Viewing dummy string variables

If you invoke 124 a source code line's procedure details, and the line had ?& (global variable) dummy string substitutions, the text of the original line, *prior* to the substitution of the global variable value for the dummy string, is displayed.

For example, a statement you suspect to have contained a dummy string variable is displayed in the **Source Code** page as:

```
print 'Hello'
```

When you select **Procedure Information** after right-clicking the code line, you see a **Procedure Line Details** display like the following, which identifies the source procedure and shows the dummy string variable name:



If subsequently you want to watch 85 the values of this dummy string variable, you must specify it explicitly with a "g." prefix 94 (omitting the ?& characters) and add it to the **Watch Window**.

Note: To view dummy string substitutions in Model 204 commands, you must be running at least version 7.6 of the Sirius Mods.

See Also

Locating and editing procedure source files 124

Watching global variables 94

Source Code tab 11

3.3.3 Viewing the audit trail

Model 204 audit trail information is available in two places in the Debugger Client:

- The **Audit Trail** tabbed page
- The **Most Recent Audit Trail** window

The Audit Trail tab

This tab displays the Model 204 audit trail lines produced by the thread that is servicing your web request or executing your 3270/Batch2 request, and by any threads that run daemons on behalf of either of these types of thread. In addition, this page displays information about the state of the Debugger Client, such as the port on which it is listening, and for the Janus Debugger, about incoming connections to the web server from other web browsers.

To see audit trail lines that are no longer displayed on the page:

- Click the **Top** button (below the page) to display the beginning of the audit trail, or click the **Bottom** button to display the end of the audit trail.
- Use the scroll bar (to the right of the page), drag a highlighted line toward the top or bottom of the page, or use the **Search**, **Search Next**, and **Search Prev** buttons.

  By default 295, the F9 key is equivalent to the **Search Next** button. **Search Prev** (or pressing the Alt key while clicking either the **Search** or **Search Next** button) makes the search operate backwards, that is, from bottom to top (the Ctrl+U key combination has the same result).

  Pressing the Enter key after clicking **Search Next** (or whenever the **Search Next** button is highlighted) repeats the **Search Next** action. To get this same result you can also press the Ctrl+F key combination (to give focus to the Search text area), then press the Enter key.

To clear the **Audit Trail** display, click the **Clear Audit** button, below the page. The lines from the entire session are removed. Subsequent actions update the display — recording from the moment of the action and not from the beginning of the session, however.

The Most Recent Audit Trail window

This window displays only the last few lines of the audit trail for this web user or 3270/ Batch2 thread. It displays ***no*** non-audit trail information.

The **Most Recent Audit Trail** display is ***not*** deleted if you click the **Clear Audit** button, above the page.

See Also

Audit Trail tab 10

3.3.4 Viewing the web output buffer

Always available for Janus Debugger sessions, the **Web Buffer** tab displays a program's web output buffer lines: the lines the Web Server application is preparing (in CCATEMP) to send to the browser at the completion of the request. Since the page is updated in real time as you step through a code program and PRINT and HTML statements are executed, you can view the **Web Buffer** page to watch your output HTML being built.

The page is cleared after the current request output is sent and the next web request is ready for execution.

The **Web Buffer** tab displays printable characters only. Binary and non-text content is not represented. Line-end characters *are* printable characters, though they may be represented by blanks.

The **Web Buffer** tab is also available when the TN3270 Debugger is used to debug web threads 155.

See Also

Controlling the execution of program code 52

3.4 Tracing program execution

When debugging code, you may not want to step one statement at a time, nor to set a

breakpoint on a line and run until you hit it. You may want to run the program without breaking, collecting data (such as the lines that were executed and the value of a variable) as it changes. To do so, the Debugger provides several options for tracing execution. In all cases, the results of tracing are displayed in the **Execution Trace** tab.

To get information on any line in the execution trace, you double-click it, or right-click it and select **Procedure Information** from the context menu (described further in Locating and editing procedures 124).

If you invoke one of these tracing options after you have begun to debug a program, the tracing starts from the current execution point in the program. Statements executed prior to this point are not recorded. If you want to determine how you got to the current point (especially if complicated logic or several layers of calls were involved), the Debugger also provides an option for examining a history of the statements that already executed.

These subsections follow:

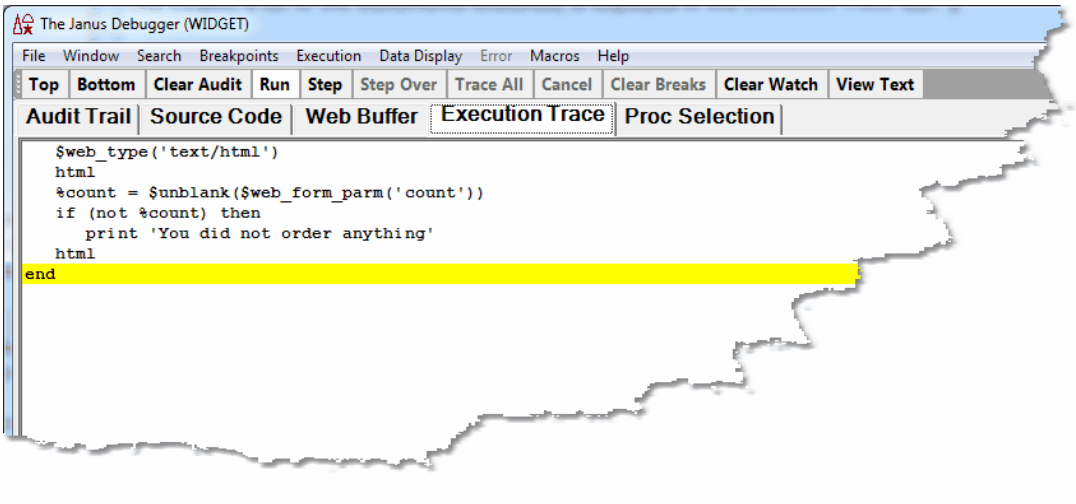
3.4.1 Tracing all lines executed

The simplest form of tracing starts from the current execution point and notes which lines were executed. You invoke this feature by clicking the **Trace All** button on the button bar 39 (or by pressing the Ctrl+T keyboard combination (by default 295), or by selecting the **Trace To End** option in the Client's **Execution** menu).

The tracing continues until one of the following events:

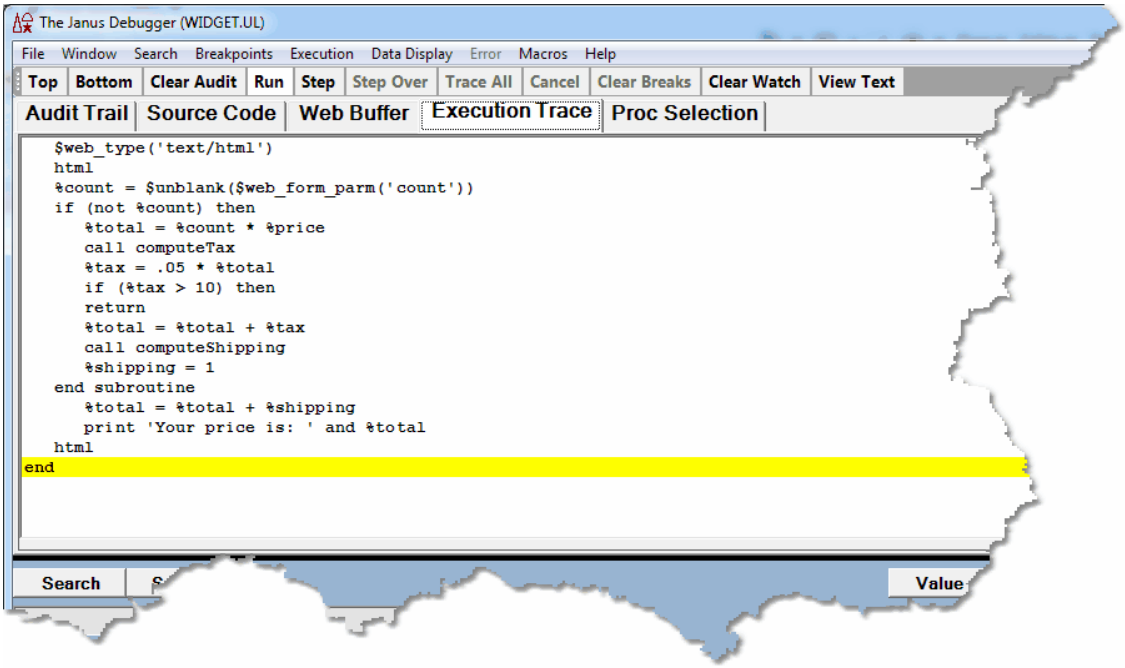
- The request ends
- A breakpoint is hit
- A cancelling error occurs
- A daemon is entered

The output, a list of the statements executed, is displayed in the **Execution Trace** tab:



If tracing was interrupted by a breakpoint or by daemon code, you can continue tracing by clicking the **Trace All** button again or by pressing the Enter key.

The **Execution Trace** tab display can help you with testing. You can see from the code in the example trace, above, that the execution path hit only the case where no orders are made. Contrast this with a trace of the same program where something was ordered:



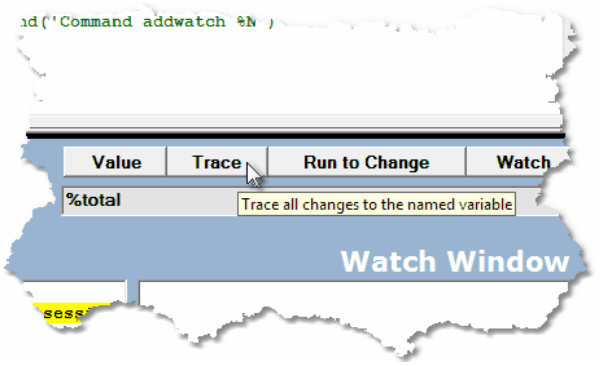
3.4.2 Tracing all updates to a variable's value

Another type of tracing is to note all statements that modify a selected variable or data item and what value was assigned to the variable or item. To do this:

1. Enter a variable or data item name in the Entity-name input box below the main window.

   Note: Items like global variables or Model 204 fields or parameters require the additional prefixes before their names that are described in Viewing and modifying program elements. 85

2. Click the **Trace** button:

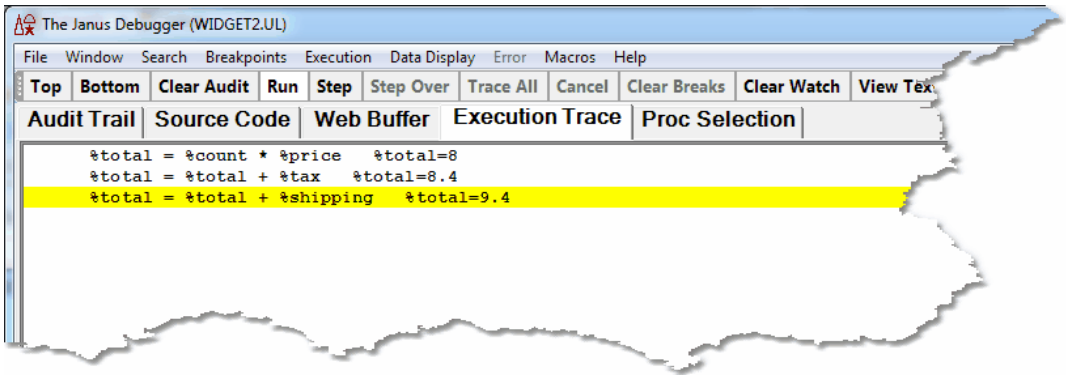


   The `traceValues` mappable 289 command and the **Trace Values** option in the Client's **Execution** menu have the same effect as the **Trace** button.

   The trace continues until one of the events listed in Tracing all lines executed 128 occurs.

3. View the result in the **Execution Trace** page.

   Only lines that modified the variable are shown, along with the new value:



4. If tracing was interrupted by a breakpoint or by daemon code, you can continue tracing by clicking the **Trace** button again or by pressing the Enter key.

3.4.3 Tracing until a value change or until a value match

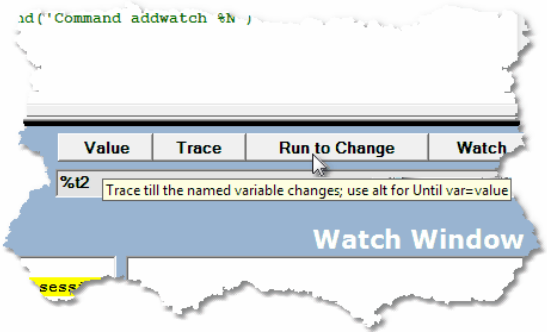
Another tracing option lets you step through a program, stopping on each statement that changes a specified data item. In this case, both the statement that modified the item and the resulting value are shown in the **Execution Trace** tab.

To trace until a variable value changes:

1. Enter a variable or data item name in the Entity-name input box[50] below the main window.

   Note: Items like global variables or Model 204 fields or parameters require the additional prefixes before their names that are described in Viewing and modifying program elements.[85]

2. Click the **Run to Change** button:



   The request runs until the specified item is modified.

   If the value of the item does not change, execution runs until the end of the request or one of the events listed in "Tracing all lines executed."[128]

3. View the result in the **Execution Trace** page.

   If the request contains further changes to the value, you can click the **Run to Change** button again, or you can press the Enter key (which repeats the **Run to Change** action whenever the **Run to Change** button is highlighted.

   The `runUntilVariableChanges`[249] mappable command and the **Run Until Variable Changes** option in the Client's **Execution** menu have the same effect as the **Run To Change** button.

A variation of the "tracing until" technique lets you continue a request's execution until a selected item's value is equal to a value you specify. For example, you may want to use this feature to verify that a variable does not ever become a certain value.

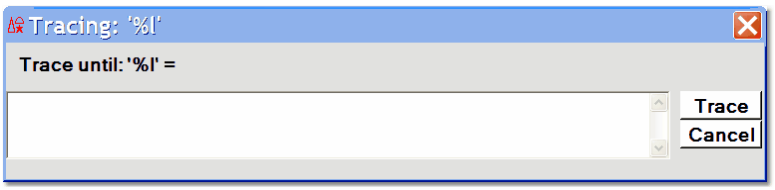
To trace until a particular data item value:

1. Enter the item name (prefixed if necessary) in the Entity-name input box.

2. Press the Alt key while clicking the **Run to Change** button.

   The `traceUntilVariableEqualsValue` 280 mappable command and the **Trace Until Variable Equals Value** option in the Client's **Execution** menu have the same effect as Alt + the **Run To Change** button.

3. In the **Tracing** dialog box, specify the value of the variable at which tracing will stop:



4. Click the **Trace** button, at the right.

   The request will run until the statement that makes the value of the selected item equal to the value you just specified, or the request will run until the end of the request or one of the events listed in "Tracing all lines executed" 128.

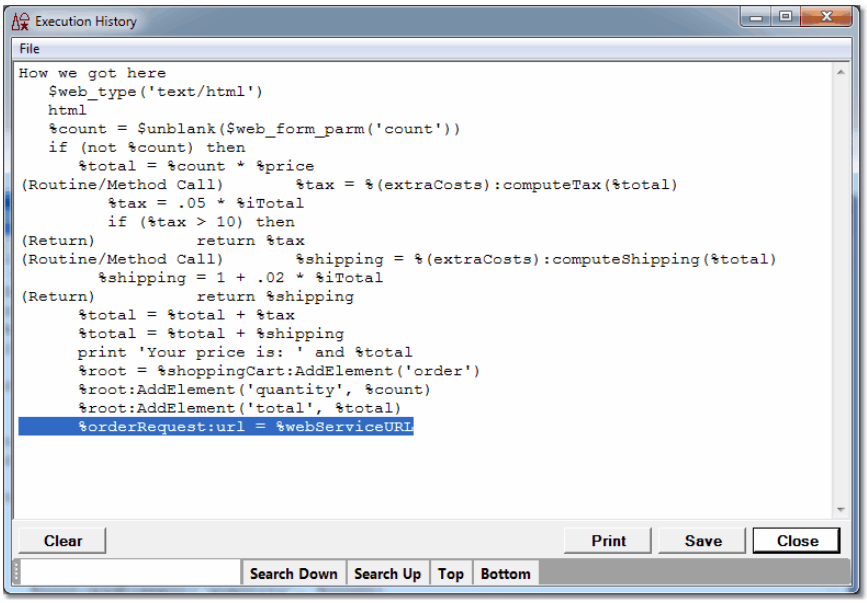
3.4.4 Displaying a statement history

If you are in the middle of debugging a lengthy or complicated program, and you have not invoked tracing, you can produce a display of all the statements that have *already* executed. Perhaps you got an unexpected runtime error or hit a breakpoint you set, and you want to review how you got to this point in the program.

To display a history of statement execution:

1. In the Client's **Execution** menu, select the **Get/Display History** option.

The **Execution History** window displays a history of statements executed up to the program's current execution point:



The execution history is as many as the last 1000 statements executed. Calls and returns for methods and subroutines are labeled:

- For a call, a `(Routine/Method Call)` indicator precedes the User Language statement.
- For a return, a `(Return)` indicator precedes the User Language statement.

While the **Execution History** window is open, you can interact with the main Client window, and any hot keys defined for the Client will work when the history viewer has focus.

2. Use the **Clear**, **Print**, **Save**, and **Close** buttons as necessary. And the search bar on the bottom of the window provides controls for searching the history.

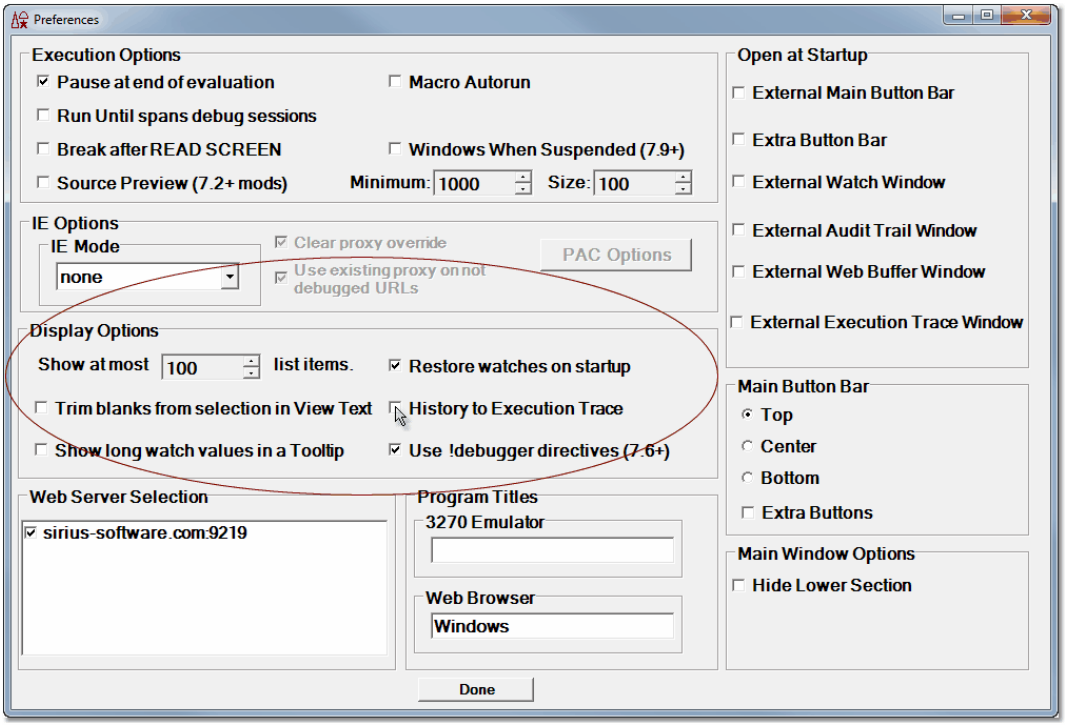
You can also invoke this feature with the `getHistory` 209 mappable command, clear the window with the `clearHistory` 188 command, and close the window with the `closeHistory` 193 command.

Using the Execution Trace tab

You can arrange to view the statement history in the **Execution Trace** page instead of in the **Execution History** window:

1. Select **Preferences** from the **File** menu.

2. In the **Display Options** section of the **Preferences** dialog box, enable the feature by selecting the **History to Execution Trace** checkbox (it is clear by default), then click **Done.**



Note: The Client setPreference 265 command has an option that lets you toggle the **History to Execution Trace** checkbox.

3. Invoke a statement history as usual from the **Execution** menu.

Using the Source Code tab

You can review the statements in the execution history in their actual context, that is, highlighted in the program in the **Source Code** tab (or **Daemon** tab). Four **Execution** menu options (or corresponding Client commands) let you select which executed statement(s) to view: the first or the last (that is, the statement at the beginning or the end of the history), or the previous or the next executed statement, relative to the currently highlighted line.

To inspect *in the program code* a previously executed statement:

1. At any point during the debugging of a request after some statements have been executed, either:

   a. Open the **Execution** menu, and click one of the history-selection options: **Select Previous History Line** 30, **Select Next History Line** 30, **Select First History Line** 30, **Select Last History Line.** 31

Or:

b. Run (mapped to a button or key, or via macro or command line) one of the Client commands that corresponds to the above-mentioned menu options: previousHistory 240, nextHistory 230, firstHistory 206, lastHistory. 222

You do **not** have to use the **Get/Display History** option to open the normal **Execution History** window, as described earlier in this section.

The Client responds by moving the current line to the executed statement you selected — in the **Source Code** or **Daemon** page that contains the statement.

2. Continue reviewing the executed statements by using the **Execution** menu history options or their command counterparts.

   The Client locates and highlights the statement you select, and it removes the highlighting from the statement you viewed in the previous step.

   Note: Although each history statement you view gets highlighted as if it were the current execution position, the actual execution position, the statement to be executed next if you invoke a debugging Step or Run operation, remains (non-highlighted) where it was when you began reviewing the statement history.

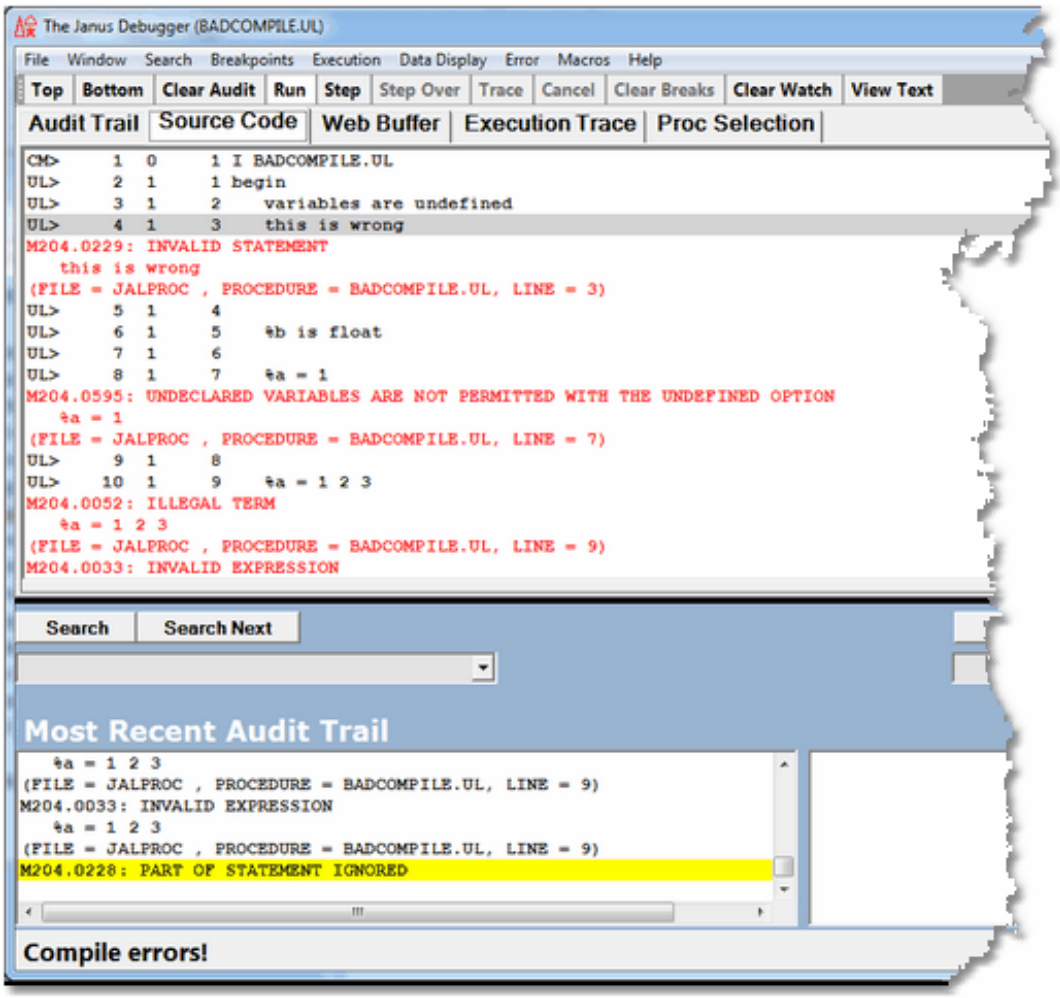
3. Resume normal debugging operations.

3.5 Viewing programs that contain coding errors

Debugger Client handling of programming errors differs according to the type of error: compilation errors or request-cancelling errors.

Compilation errors

If a program contains a compilation error, you can still use the Debugger to view the source code, along with the Model 204 error messages embedded (highlighted and prefixed with `ER>`) after the program statements that caused them:



As shown above, the Client status strip displays a `Compile errors!` message, and the **Run** button is the only program execution operation available.

- You can move to the next program statement that did not compile, if any, by pressing the F11 key (by default 295), by selecting the **Error** > **Next Compile Error** menu item, or by using a button to which you have mapped 294 the `nextCompileError` 230 command.

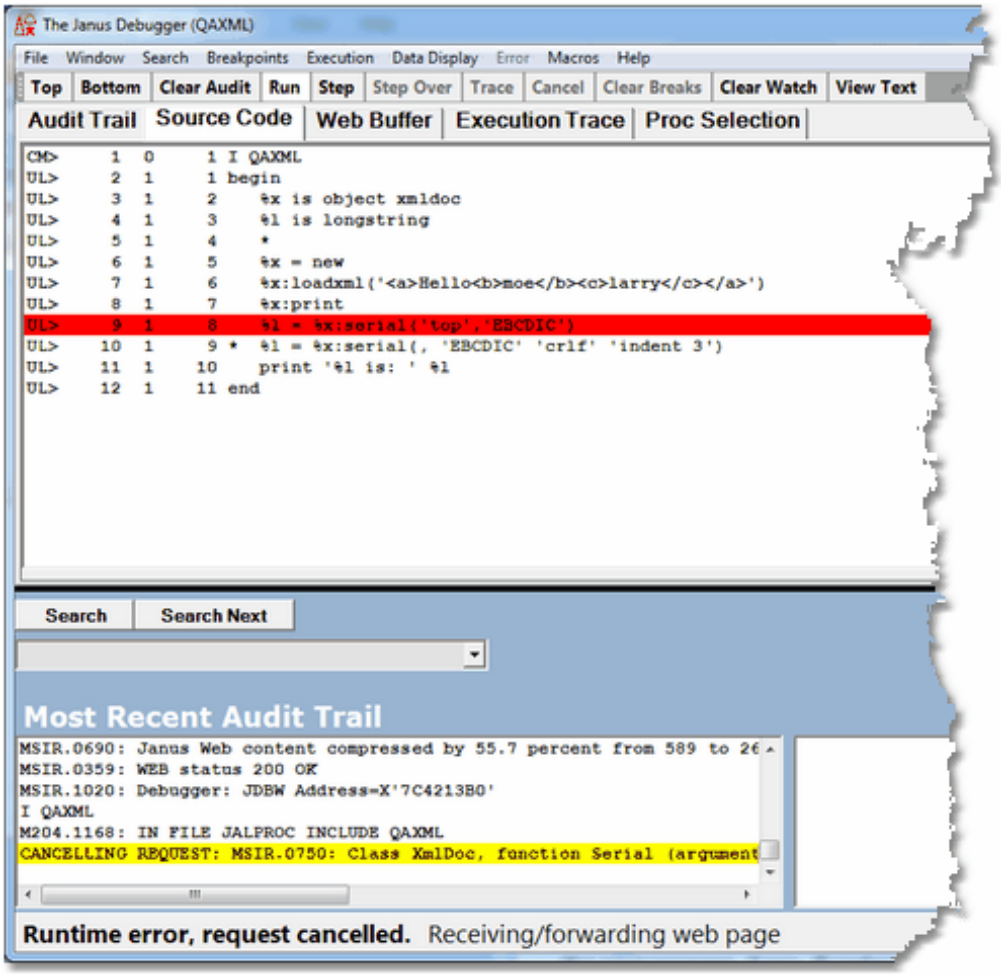
- You can move to the previous statement that did not compile, if any, by pressing the F10 key, by selecting the **Error** > **Previous Compile Error** menu item, or by using a button to which you have mapped the previousCompileError 240 command.

Clicking **Run** (or selecting **Error** > **Quit**) invokes no further operation on the code, and (if Janus Debugger) the Web Server sends the compilation error messages to the browser, then advances to the next program, if any. If under the TN3270 Debugger, the compilation error messages are sent to the terminal.

Request cancellation errors

If the program you are debugging contains a request-cancelling error, the Debugger lets you step through the program until you execute the statement that causes the error, or if you clicked **Run**, executes until the point of the error. At this point, the Client:

- Displays the source code (highlighting the line that has the error)
- Reports the values of any watched variables at the point of the error
- Reports the cancelling error message in the Client's audit trail displays
- Lets you inspect in the **Web Buffer** the results of statements that executed successfully prior to the error, if debugging a web request.



Furthermore, except in the case described below, the Client does not let you continue stepping through the request (Step buttons become unavailable). If you now click the **Run** button:

- If the Janus Debugger, the Debugger sends the cancelling error message to the **Web Buffer**, and it also sends an "internal server error" message to the browser.
- If the TN3270 Debugger, the Client sends to the terminal the the cancelling error message as well as the results of any statements you executed successfully before the error.

An exceptional case is a cancelling error of the following type, which occurs within a User Language ON UNIT:

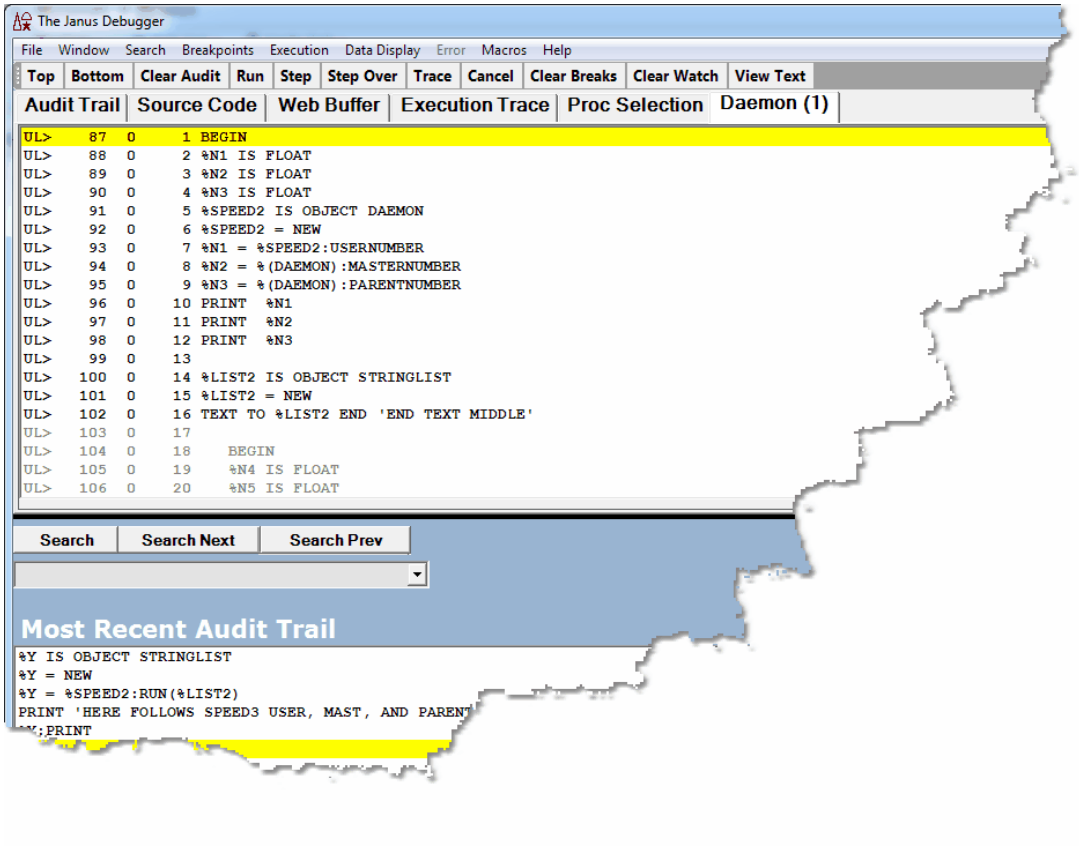
```
M204.1982: ILLEGAL JUMP ATTEMPTED OUT OF COMPLEX SUBROUTINE
           ON UNIT
```

If this error occurs, debugging is allowed to continue: you are *not* prevented from continuing to step through the request. This exception is designed for the debugging of ON UNIT code.

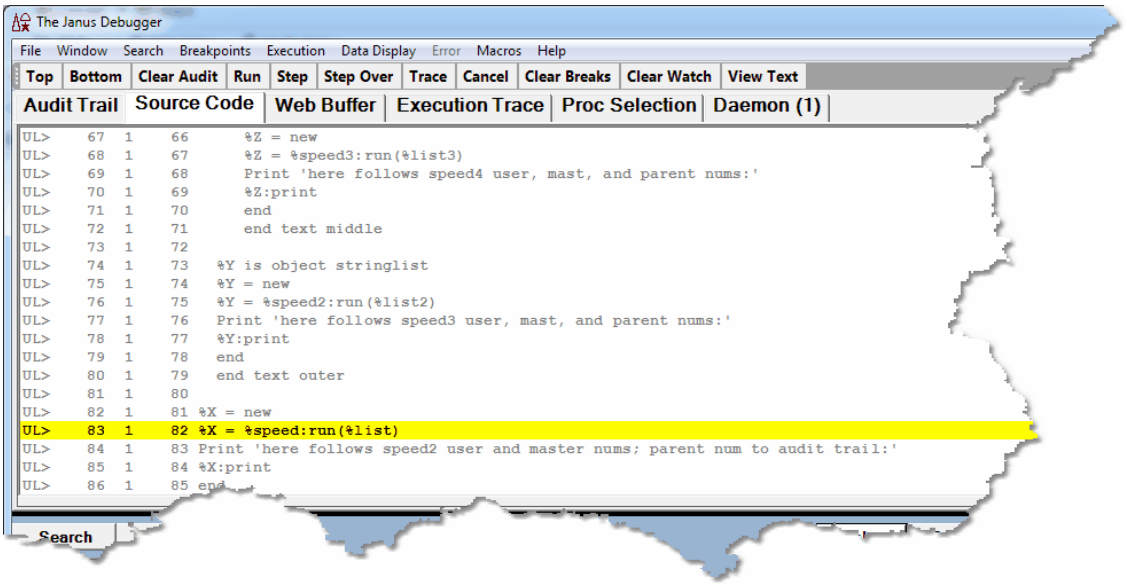
3.6 Debugging requests that spawn daemons

If the application you are debugging spawns an sdeamon in either of the following cases, the sdaemon code is displayed in a dynamically created **Daemon** tab:

- A SOUL Daemon object Run method for an sdaemon or transactional sdaemon (shares record sets with the spawning thread, maintaining one logical unit of work)
- A synchronous $COMMBG request (an output $list parameter is specified for the function)



While the code in the **Daemon (1)** tab has focus, the current program in the **Source Code** tab waits for the sdaemon code to execute. The code line that spawned the sdaemon is highlighted, while the remaining **Source Code** lines are dimmed as a reminder that this code is not executable (the **Run, Step,** and **Step Over** buttons apply to the active code in the **Daemon (1)** tab). The **Source Code** lines are scrollable, however.



Commands you invoke, like **Step** or **Run**, execute for the code on the **Daemon (1)** tab. When the sdaemon execution is complete, the spawning program regains focus and the **Daemon (1)** tab is removed.

Multiple sdaemons

If your program has sdaemons that call additional sdaemons, the Debugger will display their code on a separate tab, dynamically spawning more Daemon tabs (**Daemon (2)**, **Daemon (3)**, and so on up to 5). Each new Daemon page will get focus and respond to the code execution buttons, while the **Source Code** page and preceding Daemon pages will wait for the current sdaemon execution to complete. After the current sdaemon code runs to completion, its tab will be removed, `Daemon thread completed` will be displayed in the Status bar, and the preceding Daemon page will regain focus.

Discontinue Daemon debugging

You can optionally have the Debugger run in a mode that does not display sdaemon code in the Debugger Client. In this mode, the Debugger runs all other code as usual 54 but suspends the display (but not the execution) of sdeamon code.

To enter this mode, from the **Source Code** page at any point during program execution, you simply press the Alt key and click the **Run** button (the Alt+F5 key combination is also equivalent, by default 295). Equivalent alternatives are the `runWithoutDaemons` 250 command and the **Run Without Daemons** option of the **Execution** menu.

Once this mode is entered, all debugging of Daemons is suspended:

- Subsequent sdaemon code executes normally but is not displayed

- No **Daemon (1)** tab is shown in the GUI
- No sdaemon source code is sent from the mainframe to the PC

As in normal running mode, this "discontinue-Daemon-debugging" mode stops on breakpoints. For example, if you have a program that spawns five daemons, only the last of which you want to debug, you could:

1. Put a breakpoint 56 on the line that invokes the fifth daemon (or just before it).
2. Simultaneously press the Alt key and click the **Run** button.
3. Click the **Run** button.

   The Debugger Client will skip over the first four daemons but stop on your breakpoint.

Debugging an interactive daemon

An sdaemon you have spawned with a SOUL Daemon class `Run` method (or `RunAsynchronously` or `RunIndependently`) might temporarily return control to its master thread by issuing a `ReturnToMaster` method. The master thread may do further processing and then return control to the sdaemon by issuing a `Continue` method (or `ContinueAsync` or `ContinueIndependently`). There may be multiple such exchanges of control.

This interactive processing is captured in the Debugger by:

1. Keeping a tab (**Source Code**) open for the code of the master thread and a tab (**Daemon**) open for the sdaemon, as usual.
2. Giving focus to the tab whose code is executing, and dimming the code in the other tab.

   If a master thread issues a `ContinueAsync` or `ContinueIndependently` call, however, the focus does not shift to the **Daemon** tab (though its code remains available for inspection).

See Also

Controlling the execution of program code 52

Source Code tab 11

3.7 Debugging Web Server persistent sessions

You can use the Janus Debugger to debug Janus Web Server "persistent session" applications. These are applications in which Online program execution is suspended while a browser user returns data to the program, whereupon the program continues. The Debugger supports two such types of Web Server programs:

- HTML form processing using the $Web_Form_Done function
- Janus Web Legacy Support, which processes User Language 3270-screens in a web browser

$Web_Form_Done sessions

Using the $Web_Form_Done function, a User Language procedure can serve an HTML form, suspend execution until the form is submitted, then resume executing the program at the point where it was suspended.

To debug a $Web_Form_Done application:

1. Invoke the program from your browser; then, in the Debugger Client, step through the program as usual.
2. When a $Web_Form_Done executes, the execution of the User Language program pauses, and `Session awaits browser` displays in the Status bar [49].
3. Move from the Debugger Client to your web browser, respond to the directives in the HTML form, and submit the form.
4. Return to the Debugger Client, where `Persistent Session Resumed` displays in the Status bar, and continue debugging.

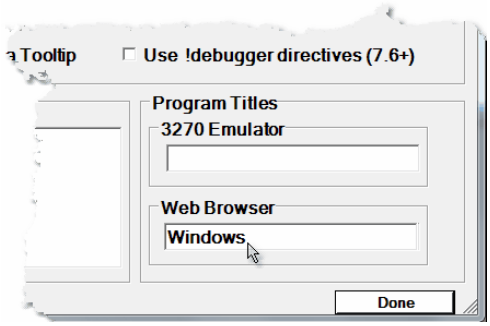
Note: As a convenience, the Debugger can make your web browser window the topmost on your PC screen when the Client pauses as it processes the $ Web_Form_Done call.

To invoke this feature:

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).

2. In the **Preferences** dialog box, locate the **Web Browser** text box (in the **Program Titles** section) and provide a text string that matches some or all of the browser-identifying title that displays at the top of the browser window.

   The characters in your matching string can be any case and match anywhere in the browser title. Any trailing blanks you enter are preserved.

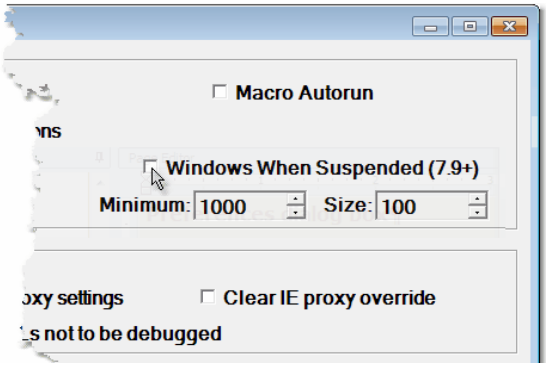


3. Click **Done.**

   The feature takes effect at the next execution of a $Web_Form_Done statement. The **Web Browser** setting that exists at the end of the Debugger Client session persists to the next run of the Client.

   Note: By default, this feature does not take effect if the Client is not executing the part of a program that contains the $Web_Form_Done. For example, the statement might be in code selected to be excluded from debugging. 64

   However, if you also select the **Windows When Suspended** option in the **Preferences** dialog box (**Execution Options** section), you can make the feature apply whenever this statement occurs, even in code the Debugger is not actively executing.



Legacy Support sessions

By automatically converting 3270 screens to HTML, the Janus Web Legacy Support feature lets you run under the Janus Web Server applications that do 3270 full screen reads. You can debug such an application with the Janus Debugger only if you also license the TN3270 Debugger and you are running under Version 6.9 of the Sirius Mods or higher.

To debug a Legacy Support application:

1. Invoke the User Language program from your browser, and in the Debugger Client, step through the program as usual.

2. When a READ SCREEN executes, the execution of the program pauses, and `Session awaits browser` displays in the Status bar 49.

   If you have not also purchased the TN3270 Debugger, the web thread is softly restarted and the debugging session is terminated.

3. Move from the Debugger Client to your web browser, respond to the screen (now HTML form) prompts, and submit the form by clicking the Enter button or a PF key button.

4. Return to the Debugger Client, where `Persistent Session Resumed` displays in the Status bar, and continue debugging.

These events are reported in a sequence of lines in the Client **Audit Trail** page like the following:

```
2010 11 08 10:01:48.27   2   20 LI I SCREENO
2010 11 08 10:01:48.27   2   20 MS M204.1168: IN FILE GWDEB INCLUDE SCREENO
2010 11 08 10:02:10    Full Screen Read Pending
2010 11 08 10:02:22    READ SCREEN completed
```

Note: As described above for $Web_Form_Done applications, the Debugger can bring your browser to the top on your PC screen when the Client pauses for the READ SCREEN.

To invoke this feature:

1. Select **Preferences** from the **File** menu.

2. In the **Preferences** dialog box, locate the **Web Browser** text box (in the **Program Titles** section) and provide a text string that matches some or all of the title that displays at the top of the browser window.

   The characters in your matching string can be any case and match anywhere in the title. Any trailing blanks you enter are preserved.

3. Click **Done.**

3.8 Debugging multiple Web Servers

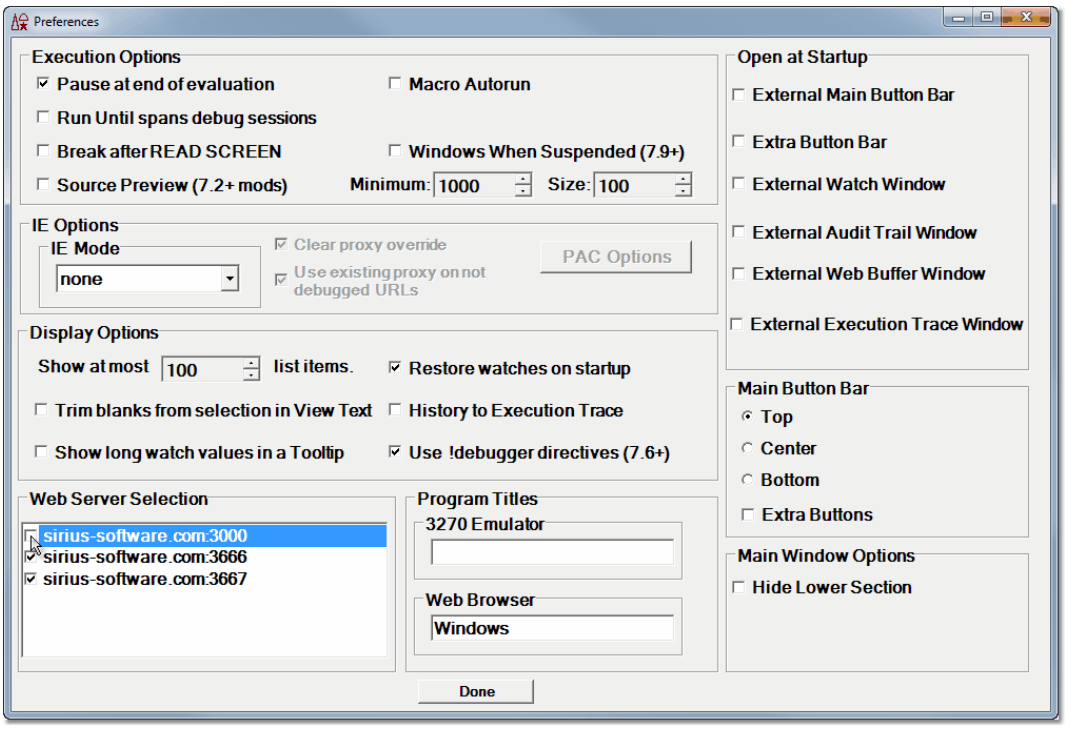
You can configure the Janus Debugger to debug applications that run on any of multiple Janus Web Servers. By default, a browser request sent to any of these web servers is intercepted by the Debugger Client proxy for the purpose of debugging. If you want to temporarily turn off debugging of one or more of these web servers, you can do so dynamically in the Debugger Client.

You configure the Janus Debugger to debug any of multiple Janus Web Servers by manually editing the `debuggerConfig.xml` file, as described 378 in the product installation information.

To disable the debugging of web requests for a particular Web Server:

1. In the Client, select **Preferences** from the **File** menu (or use the Ctrl+P keyboard shortcut).

2. In the **Preferences** dialog box, in the **Web Server Selection** list, clear the checkbox next to the entry for the web server you want to disable, then click **Done**.



Browser requests for this Web Server will no longer be debugged. This setting takes effect immediately, and it persists over multiple runs of the Debugger Client.

Disabling the debugging of a server does not remove it from the `debuggerConfig.xml` file. You can re-enable the debugging of a server by marking its **Web Server Selection** checkbox.

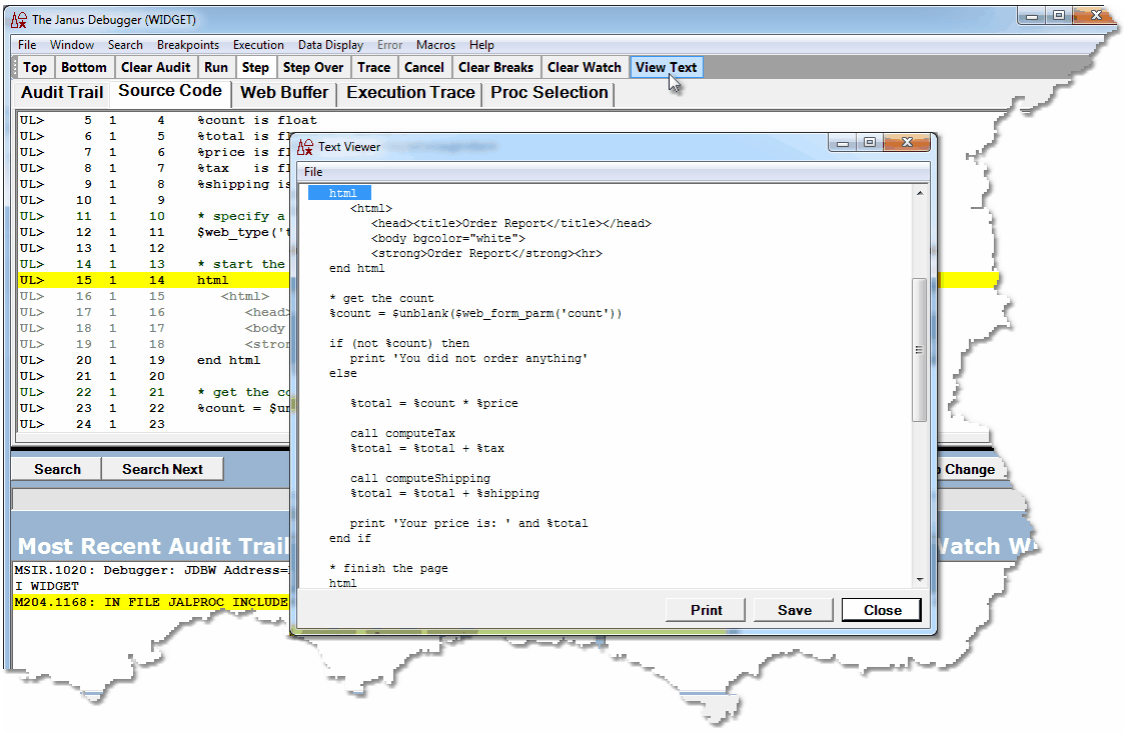
CHAPTER 4 Additional Debugger Functionality

These sections are included:

4.1 Copying, printing, or saving text

You can invoke a separate text viewer window in which you can display, copy, print, and save the text data contained in a Client tabbed page.

The viewer copies the contents of the current Client tab when you click the button or press the hot key to which you have assigned the `viewText` command (as described below):



The scrollable, expandable **Text Viewer** window displays just the text content of the currently active tab (excluding, for example, the additional line numbers and identifying information that the Client automatically adds to the **Source Code** page display). The viewer scrolls to and highlights the current line from the page that is copied. As many as one thousand lines of the tabbed-page text, starting from the top, are copied.

Other features include:

- The viewer works with lines from any Client tab except the **Proc Selection** tab.
- The viewer has **Print** and **Save** buttons, which act on the entire copied content, whether currently visible or not.
- Familiar Windows **Print**, **Page Setup**, and **Print Preview** dialog boxes are accessible from the viewer's **File** menu.
- Standard mouse-based copying of text data is enabled, but altering or deleting text is **not** allowed.
- You can automatically remove any leading and trailing blanks from selections you copy.

To enable the **Text Viewer** window:

1. Create a text file named `ui.xml` in the folder where the `JanusDebugger.exe` file is installed, or edit the existing ui.xml file.

2. In the ui.xml file, map the `viewText` 286 command to a Client button or keyboard shortcut, as described in "Setting up the ui.xml file" 291.

   For example, this mapping associates a `viewText` command with `button5`:

   ```
   <mappings useDefaults="true">
      <mapping command="viewText"  button="button5"/>
   </mappings>
   ```

3. Save the ui.xml file, and restart 18 the Debugger Client.

4. If you want to enable automatic trimming of leading and trailing blanks from data you copy to the Text Viewer:

   a. Select **Preferences** from the Client **File** menu.

   b. In the **Display Options** area, mark the **Trim blanks from selection in View Text** checkbox.

   c. Restart the Debugger Client.

5. Select the Client tab whose text you want to copy, and click the **View Text** button, press the key you assigned to the `viewText` command, or select the **View Text** option of the **Window** menu.

4.2 Using the TN3270 DEBUG command

Unlike the Janus Debugger, the TN3270 Debugger is started and stopped by a command switch, the TN3270 DEBUG command. The name of this command, as well as the name of this Debugger, are new as of Model 204 version 7.6 and Build 63 of the Debugger. The command name is a synonym for the SIRIUS DEBUG command, which is an exact equivalent and continues to be available.

The command, which can be issued from the Model 204 command prompt or in a procedure, has these mutually exclusive subcommands:

```
{TN3270|SIRIUS} DEBUG { [ON|OFF] [SUSPEND|RESUME] [CLIENTCOMMAND] [
```

As described below:

- The ON 150 subcommand starts a TN3270 Debugger session (it requires additional parameters). It can also be used for debugging Janus Web threads 155.

- The OFF 152 subcommand stops a debugging session.
- The SUSPEND 153 and RESUME 154 subcommands discontinue and continue a debugging session.
- The CLIENTCOMMAND 153 subcommand sends a command to the Debugger Client.
- The STATUS 154 subcommand gets a status report about the worker threads for the Janus Debugger, the TN3270 Debugger, or both.

The TN3270 DEBUG commands that change the Debugger's state from on to off or from suspended to resumed may interchangeably be issued from the command line or within a procedure. You can control the Debugger's state entirely from the command line, entirely through one or more procedures, or from a combination of both places.

TN3270 DEBUG commands issued from a procedure must *not* be placed between explicit procedure BEGIN and END statements.

TN3270 DEBUG ON

To initiate a TN3270 Debugger session, you issue the TN3270 DEBUG ON command from the Model 204 command prompt or within a BATCH2 input stream or procedure. The command requires the parameters described below that identify the network ports and the workstation used in your debugging session. The values of these parameters are established during product installation:

```
TN3270 DEBUG ON [janClientPort] [pcHost] [pcPort] [workerPort]
```

where:

janClientPort — The name of the Janus client socket port that is defined 372 for the TN3270 Debugger to use to contact the Debugger Client workstation.

As of Sirius Mods version 7.9, the default value is an asterisk (*), which means to use a Janus port whose definition includes the MASTER parameter. Such a port can be accessed on a Debugger connection request without specifying its port name on the TN3270 DEBUG ON command.

This port must be started.

pcHost — The workstation running the Debugger Client. This may be an IP number or a DNS name, as described 375 during product installation.

As of Sirius Mods version 7.9, the default value is a period (.), which means to use the IP address of the machine from which the TN3270 session was initiated.

pcPort The workstation port number on which the Debugger Client is listening. As described[374] during product installation, this is typically 8081.

The Model 204 User 0 parameter SDEBGUIP sets the default value of this port. Valid values for this parameter, which is also resettable by the system manager, range from 0 to 65535. If 0, no default is set, and the parameter's value must be explicitly specified in the TN3270 DEBUG ON command. A `VIEW SDEBGUIP` command returns the current setting of SDEBGUIP.

Note: As shown in an example below, to omit an explicit specification of *pcPort* (letting it default to the setting of SDEBGUIP) but still provide an explicit value for *workerPort*, use an asterisk (*) for the missing *pcPort* specification to indicate the respective position of the parameter values.

workerPort The port number in your Online that is defined[371] for worker threads. This can be the same port number that provides worker threads for the Janus Debugger, as well.

The Model 204 User 0 parameter SDEBWRKP sets the default value of this port. Valid values for this parameter, which is also resettable by the system manager, range from 0 to 65535. If 0, no default is set, and the parameter's value must be explicitly specified in the TN3270 DEBUG ON command. A `VIEW SDEBWRKP` command returns the current setting of SDEBWRKP.

For example:

```
TN3270 DEBUG ON DEBCLIENT 198.242.244.235 8081 3226
```

After issuing the command, you receive a message similar to this:

```
*** MSIR.0915: Debugging is on; client is 198.242.244.235 port 8081,
    sessionID: 00000069D812279
```

If you had set the workstation and worker port numbers with the SDEBGUIP and SDEBWRKP User 0 parameters, as revealed by a VIEW command:

```
VIEW SDEBGUIP,SDEBWRKP

SDEBGUIP 8081 TN3270 DEBUG DEFAULT GUI PORT NUMBER
SDEBWRKP 3226 TN3270 DEBUG DEFAULT WORKER PORT NUMBER
```

The previous DEBUG ON command could be simplified:

```
TN3270 DEBUG ON DEBCLIENT 198.242.244.235
```

In this case, you receive different confirmation messages:

```
***  MSIR.0942: TN3270 Debugger GUI port defaulted to 8081
***  MSIR.0942: TN3270 Debugger Worker port defaulted to 3226
***  MSIR.0915: Debugging is on: client is 198.242.244.235 port 8081,
      sessionID: sessionID: 00000069D812279
```

You can also use asterisks to indicate that the port defaults are to be taken. These two commands are equivalent:

```
TN3270 DEBUG ON DEBCLIENT 198.242.244.235 * *

TN3270 DEBUG ON DEBCLIENT 198.242.244.235
```

You receive an error message if you use either of the above commands without having set the default port values. To take the GUI port default but specify a value for the worker port, you must use an asterisk in the GUI port position:

```
TN3270 DEBUG ON DEBCLIENT 198.242.244.235 * 3226
```

You can further simplify the connection command by taking advantage of the *janClientPort* and *pcHost* parameter defaults (added in Sirius Mods 7.9). If the DEBCLIENT port is defined with the MASTER parameter, and SDEBGUIP and SDEBWRKP are as above, these commands are equivalent:

```
TN3270 DEBUG ON * .

TN3270 DEBUG ON
```

On the Debugger Client, `Connection from Online` displays in the Status bar[49] after the DEBUG ON command is issued. This indicates that the Debugger is "on" and awaiting the next program to debug.

After the command runs successfully, any User Language program you initiate from the Model 204 command line will appear in the **Source Code** tab of the Debugger Client GUI for debugging.

TN3270 DEBUG OFF

TN3270 DEBUG OFF stops a debugging session. The command is issued as is from the Model 204 command prompt (or from your BATCH2 stream or a procedure); it has no additional parameters.

After issuing the command, you should receive this response in Model 204:

```
***  MSIR.0913: TN3270 Debugger is now off
```

On the Debugger Client, `Online has disconnected` displays in the Status bar.

You can also turn off the TN3270 Debugger by logging off of Model 204 (any logoff is an implied TN3270 DEBUG OFF).

Note: Explicitly turning off the Debugger is necessary if you are using the Janus Debugger as well as the TN3270 Debugger for the same Online and worker port. To switch from a TN3270 Debugger session to a Janus Debugger session, you must explicitly drop the TN3270 Debugger session. The Janus Debugger automatically closes its connections and does *not* require an explicit notification to switch or end a session.

The `turnOffDebugging` mappable command[289] for a Client button, hot key, or macro is equivalent to TN3270 DEBUG OFF. This alternative lets you turn off the Debugger at any time during the debugging of a program, and it provides even more flexibility than using a procedure to issue TN3270 DEBUG OFF.

TN3270 DEBUG SUSPEND

TN3270 DEBUG SUSPEND immediately discontinues the debugging of the current request, but preserves the connection from the Online thread to the Debugger Client (that is, debugging is inactive but in a state where it can be readily reactivated). Debugging can continue if a TN3270 DEBUG RESUME command is issued from the command line or in an included procedure.

Issuing TN3270 DEBUG SUSPEND has no effect and receives a harmless error message in either of these cases:

- Debugging is not currently active for this thread (via TN3270 DEBUG ON or TN3270 DEBUG RESUME).
- Debugging is already suspended (via TN3270 DEBUG SUSPEND).

Once you suspend debugging, the current program (if any) executes immediately, and the Debugger continues in the suspended state until you issue a TN3270 DEBUG RESUME or a TN3270 DEBUG OFF command. While debugging is suspended, you can execute Model 204 commands from the command line as usual; the difference between debugging being suspended and being off is that the Client remains in a "waiting" state.

Note: TN3270 DEBUG OFF turns off debugging for a thread for which debugging is suspended, but TN3270 DEBUG ON does **not** resume debugging a thread for which debugging is suspended.

TN3270 DEBUG CLIENTCOMMAND

Available as of version 7.8 of the Sirius Mods, TN3270 DEBUG CLIENTCOMMAND lets you send a command[177] or macro[315] to be invoked by the Debugger Client. The single parameter of TN3270 DEBUG CLIENTCOMMAND is the command or macro you want to send, specified without regard for case:

```
{TN3270|SIRIUS} DEBUG CLIENTCOMMAND [COMMAND | MACRO] command
```

If *command* is preceded by a keyword or followed by its parameter(s), such a "clause" must be quoted. See the examples below.

If *command* is not qualified by the keyword `Command` or `Macro`, the Debugger Client searches first for a macro named *command*, then for a Client command named *command*. You can use the `Command` or `Macro` keyword to search exclusively for a specified command or exclusively for a specific macro. The macro search is restricted to the Client installation folder or the designated 303 macro folder.

Three examples follow:

```
TN3270 DEBUG CLIENTCOMMAND clearWatch

TN3270 DEBUG CLIENTCOMMAND 'Addwatch %watchthis'

TN3270 DEBUG CLIENTCOMMAND 'Macro mymacro %s'
```

If the TN3270 Debugger is not currently in a session, issuing TN3270 DEBUG CLIENTCOMMAND has no effect and receives a harmless error message.

You can also execute Client commands and macros from the ClientCommand 162 and Command 162 methods of the DebuggerTools class.

TN3270 DEBUG RESUME

TN3270 DEBUG RESUME lets you resume debugging that was previously suspended with TN3270 DEBUG SUSPEND. When you issue TN3270 DEBUG RESUME (from the command line or in a procedure) while debugging is suspended, the Debugger immediately returns to normal debugging mode.

Issuing TN3270 DEBUG RESUME has no effect and receives a harmless error message in either of these cases:

- Debugging is already active for this thread (via TN3270 DEBUG ON or TN3270 DEBUG RESUME).
- Debugging is currently off (via TN3270 DEBUG OFF or because it has yet to be initiated for this thread via TN3270 DEBUG ON).

You can use TN3270 DEBUG OFF (or the `turnOffDebugging` 281 mappable Client command) to turn off debugging for a thread for which debugging is resumed.

Note: After a successful TN3270 DEBUG RESUME, the Client restores any White List 77 or Run Until 73 processing that was active prior to the TN3270 DEBUG SUSPEND.

TN3270 DEBUG STATUS

TN3270 DEBUG STATUS provides a simple status report about the worker threads for TN3270 Debugger sessions, Janus Debugger sessions, or both for a given Model 204 Online.

The command is issued as is from the Model 204 command prompt (or at the end of your BATCH2 stream); it has no arguments. After issuing the command, you receive a display like the following:

```
***  Janus/TN3270 Debugger status: Total workers=12
***  Janus/TN3270 Debugger status: Janus Debugger Sessions=3
***  Janus/TN3270 Debugger status: TN3270 Debugger Sessions=1
***  Janus/TN3270 Debugger status: Total Active Sessions=4
***  Janus/TN3270 Debugger status: Draining=0
***  Janus/TN3270 Debugger status: Available=8
***  Janus/TN3270 Debugger status: Janus Debugger Session HWM=5
***  Janus/TN3270 Debugger status: TN3270 Debugger Session HWM=1
```

where:

Total workers	The number of workers created with the DEBUGMAX 370 User 0 parameter
Janus Debugger Sessions	Worker threads currently being used for Janus Debugger sessions, if any
TN3270 Debugger Sessions	Worker threads currently being used for TN3270 Debugger sessions
Total Active Sessions	Janus Debugger Sessions + TN3270 Debugger Sessions
Draining	Workers that are transitioning from Active to Available
Available	Total workers - (Total Active Sessions + Draining)
Session HWM	The greatest value that the number of concurrent users has reached, per Debugger product (Janus Debugger and TN3270 Debugger) since the Online was started.

4.3 Using the TN3270 DEBUG command for web threads

If you license the Janus Debugger, you can use the TN3270 DEBUG command to invoke the debugging of programs served by Janus Web Server threads. This may be useful if you need to avoid changing the proxy server settings on your web browser, for example.

You invoke a Janus Web procedure from your browser, a `TN3270 DEBUG ON` command you embedded in the procedure starts the Debugger, and you work with your source code in the Debugger Client as usual. The thread you are debugging counts as one of your Janus Debugger authorized "seats." 369

Using the TN3270 DEBUG command to invoke debugging requires no additional configuration 367 of the Debugger. You must make sure, however, that no proxy server is defined for the browser with which you send a request to the Janus Web Server.

To debug a Janus Web thread:

1. In the Janus Web program you want to debug, insert a TN3270 DEBUG ON command 150 to invoke the Janus Debugger.

   The command must **not** be placed between explicit BEGIN and END User Language statements.

2. Start the Debugger Client.

3. Make sure the Client is **not** automatically maintaining a proxy server for you:

   a. From the **File** menu, select **Preferences.**

   b. Make sure the **Automatically Maintain IE proxy settings** checkbox is clear.

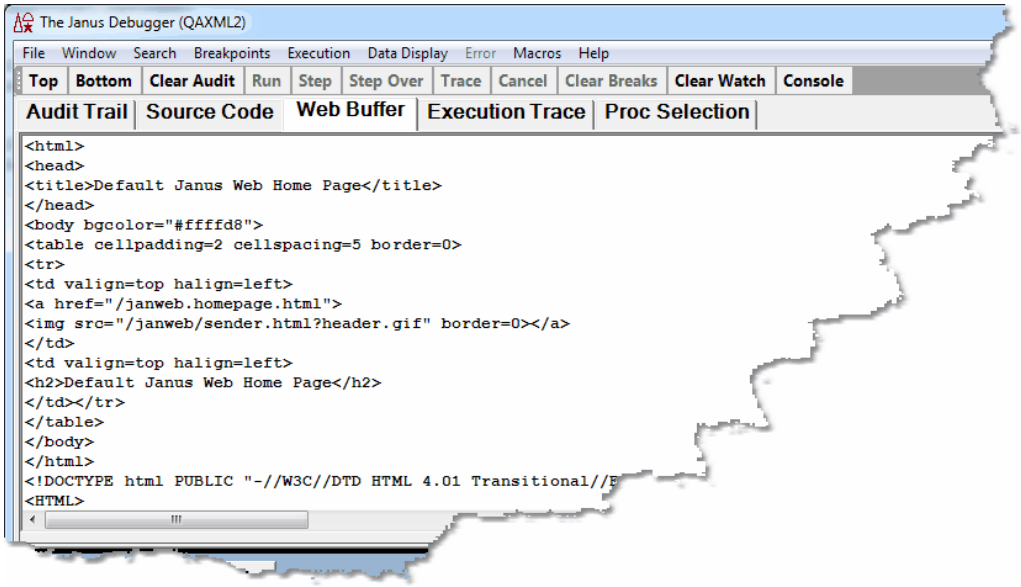
4. In the browser you use to invoke debugging, confirm that the Debugger Client is not defined as a proxy server 385.

5. From your browser, invoke the URL for the web program that contains the `TN3270 DEBUG ON` command.

   The browser pauses in a loading state, and the web program is sent to the Debugger Client **Source Code** page.

6. Work with the procedure code in the Client as usual.

As the code is evaluated, output destined for a web page[127] goes to a **Web Buffer** page in the Client:



When code execution completes, output (including error messages and Web Buffer contents) is sent to the browser instead of to the Model 204 "terminal." At this point, the connection to the web thread is closed and the debugging session ends. It is not necessary to provide an explicit `TN3270 DEBUG OFF` command.

You can also embed TN3270 DEBUG SUSPEND and RESUME[153] commands in the procedures that are included in your program to take advantage of those features. And you can similarly embed a `TN3270 DEBUG OFF` command or invoke its equivalent programmable command `turnOffDebugging`[281] from a Client button or hot key.

Once debugging is on and the Client has the web thread source code, TN3270 DEBUG command input from the command line at the Model 204 host has no effect on debugging — the command line thread is separate from the web thread.

4.4 Debugging SSL applications

If you are using Janus Network Security, you may want to debug User Language programs that run on a secure Web Server (normally accessed with URLs beginning with "https").

The Janus Debugger manages SSL applications by maintaining an unencrypted connection between the web browser and Debugger Client, and a secure connection between the Debugger Client and the secure Web Server. This lets the Client examine the HTTP request and response in unencrypted form, while all data to and from the Web Server travels the network in encrypted form.

To use the Debugger with a secure Web Server, you must "inform" the Debugger Client that it must connect to the Web Server using the Secure Sockets Layer (SSL) protocol. You do this simply by adding a line (an empty `ssl` element) to the Client configuration XML file for each secure server you debug, as described 378 in the installation documentation.

Then, in the URL to access the secure site, you use **http://** instead of `https://`.

A Short SSL Example

If you use `https://secureapp.myhost.com:123` to access your secure Janus Web application, do the following to debug this application with the Janus Debugger:

1. In the `serverList` element in the debuggerConfig.xml file (located in the same directory as JanusDebugger.exe), add a `server` element (as described 378 in the installation instructions) that includes an empty `ssl` sub-element (which you can specify either as `<ssl/>` or as `<ssl></ssl>`:

   ```
   <serverList>
      <server>
         <host>secureapp.myhost.com</host>
         <webPort>123</webPort>
         <workerPort>321</workerPort>
         <ssl></ssl>
      </server>
   </serverList>
   ```

2. Point 385 your web browser at the Debugger Client.

3. Start, or restart, the Debugger Client.

4. From your browser, access your application with this URL:

   ```
   http://secureapp.myhost.com:123
   ```

   Note: HTTPS is **not** specified in the URL.

4.5 Debugging Web Service applications

While the Janus Debugger is designed for debugging HTTP server applications whose client is a web browser (that is, Janus Web Server applications), the TN3270 Debugger also lets you debug an HTTP server application whose client is a User Language HTTP socket program written with the Janus Sockets HTTP Helper. This Debugger versatility is possible because the Debugger Client functions as a proxy server, and the HTTP Helper can use a proxy server.

To debug a User Language Web Service client:

1. Install and configure the TN3270 Debugger normally.

2. Point the HTTP Helper application code to the Debugger Client.

   Add code like the following to your HTTPRequest object code:

```
%HTTPReq is object HttpRequest auto new
%HTTPReq:URL = 'http://mywebservice
if (%(DebuggerTools):AmDebugging) then
  %HTTPReq:Proxy = http://workstation:port
end if
```

   where:

   - AmDebugging is a DebuggerTools class 159 shared method that queries whether or not the program is being run under the Debugger.
   - *workstation* is the IP address of your Debugger Client workstation, and *port* is the workstation listening port number you specified in the Debugger configuration file 373.

     One way to get the workstation IP number is to use the `IPConfig` command at the MS DOS prompt on your workstation. For example:

```
C:\Documents and Settings\username> ipconfig
```

     The response will show your port number:

```
Windows IP Configuration

Ethernet adapter Wireless Network Connection:
  Media State . . . . . . . . . . . : Media disconnected

Ethernet adapter Local Area Connection:
  Connection-specific DNS Suffix  : hsd1.ma.comcast.net.
  IP Address. . . . . . . . . . . . : 192.168.1.104 <== you want this
  Subnet Mask . . . . . . . . . . . : 255.255.255.0
  Default Gateway . . . . . . . . . : 192.168.1.1
```

4.6 Using the DebuggerTools class methods

You can use methods from the DebuggerTools system object in your User Language code to aid in the debugging process in either the Janus Debugger or the TN3270 Debugger.

You can use these methods without error in SOUL code running in Model 204 Onlines not licensed for the Debugger, as long as those Onlines are version 7.5 or greater or licensed for the Janus SOAP product.

The following methods are available:

- AmDebugging 160

- Break 160
- ClientCommand 162
- Command 162
- DebugOff 163
- StatusMessage 164

AmDebugging method

The AmDebugging shared method queries whether or not a User Language program is being run under the Janus Debugger or the TN3270 Debugger.

The method takes no arguments, and it returns a numeric result:

```
%num = %(DebuggerTools):AmDebugging
```

where:

%num is a numeric variable that can be either of these:

0 The program is not running under either Debugger. This includes the case where the program runs after debugging is suspended by a TN3270 DEBUG SUSPEND 153 command.

1 The program is running under the Janus Debugger or under the TN3270 Debugger.

AmDebugging lets you insert code that runs only when debugging, as in the following example:

```
b
   if (%(DebuggerTools):AmDebugging) then
      print 'extra debugging information'
   end if
   * normal processing .....
```

Break method

The Break shared method pauses execution on the statement that follows the Break method specification. If your User Language request is not being run under the Debugger, the Break method does not act — which lets you leave it in code. It essentially has the same effect as using the Debugger Client to put a breakpoint on the statement that would follow the Break method call.

The Break method has one, optional, argument:

```
[%statusMsg] = %(DebuggerTools):Break[(command)]
```

where:

%statusMsg is a string that contains the message in the Client status bar 49 that results from the execution of *command.* If the request containing the method is not running in the Debugger, *%statusMsg* contains a "break is ignored" message.

command is a string expression (case not important) that contains the Client command 177 or macro 315 to be executed immediately following the break in execution. The command or macro in the string may be preceded by the keyword `Command` or `Macro`. This option requires at least version 7.8 of the Sirius Mods.

If *command* is not qualified by the keyword `Command` or `Macro`, the Debugger Client searches first for a macro named *command*, then for a Client command named *command*. You can use the `Command` or `Macro` keyword to search exclusively for a specified command or exclusively for a specific macro. The macro search is restricted to the Client installation folder or the designated 303 macro folder.

The Break method will **not** break execution in the following cases:

- If it is invoked in a routine or method that you have elected to step over 54
- If you have issued a Run Until Procedure 73, and the Break call is encountered in a procedure that precedes the "Run Until" procedure
- If a white list 77 is enabled, and the Break method is contained in a procedure that is not on the white list

This code fragment includes a Break method invocation:

```
%status is longstring
%status = %(DebuggerTools):break('clearWatch')
* Break, execute the clearWatch command, and pause
* (awaiting instruction to execute the next statement)
%x = 666
```

When a Break method pauses execution, `DebuggerTools:break hit` is displayed in the Status bar 49 of the Debugger Client (except, if Break executes a command, the effect of the command is displayed). Also, unlike Client-set breakpoints, the `UL>` at the beginning of the source code line does *not* change to `BR>`, and no red color highlighting is applied to the line.

You can also use the DebuggerTools ClientCommand method to execute a Client command; it does so without an execution break.

For more information about breakpoints, see Using breakpoints 55.

ClientCommand method

The ClientCommand shared method lets you execute a Client command 177 or macro 315 from within a User Language request. If your request is *not* being run under the Debugger, the ClientCommand method harmlessly takes no action. The method requires version 7.8 or higher of the Sirius Mods.

The ClientCommand method takes one argument and returns a string value:

```
%status = %(DebuggerTools):ClientCommand([Command | Macro] command)
```

where:

%status is a string that contains the message in the Client status bar 49 that results from the execution of the *command* parameter.

command is a string expression (case not important) that identifies the Client command or macro to execute, and it includes any parameters of the command or macro. If *command* is not qualified by the keyword `Command` or `Macro`, the Debugger Client searches first for a macro named *command*, then for a Client command named *command*. You can use the `Command` or `Macro` keyword to search exclusively for a specified command or exclusively for a specific macro. The macro search is restricted to the Client installation folder or the designated 303 macro folder.

For example:

```
%statusMsg is longstring
%statusMsg =  %(DebuggerTools):clientCommand('Addwatch %x')
%statusMsg =  %(DebuggerTools):clientCommand('Macro mymacro %i')
```

After execution of the above statements, *%statusMsg* contains the string "1 watch item added".

Note: ClientCommand does **not** pause request debugging execution before (or after) it executes a Client command. If you want to produce a debugging execution pause before command exection, use the Break 160 command with a command parameter.

Command method

The Command shared method lets you effectively execute a TN3270 DEBUG 149 command within a User Language request, that is, as a statement.

The Command method takes one argument and returns a numeric value:

```
%rc = %(DebuggerTools):Command(string)
```

where:

%rc is a numeric variable that can be either of these:

0	The command/method succeeded.
<>0	The command/method failed.

string is a quoted string that specifies which TN3270 DEBUG subcommand to execute. It may be in one of the following forms:

- The term OFF, SUSPEND, RESUME, or STATUS.
- The term ON, followed by the additional parameters required by the TN3270 DEBUG ON command.
- The term CLIENTCOMMAND, followed by a blank, followed by its argument "clause," which consists of a Client command 177 or macro 315 and any parameters it requires, optionally preceded by a Command or Macro keyword:

  'CLIENTCOMMAND [Command | Macro] *command* **[***cmdparms***]'**

  If *command* is accompanied by a preceding Command or Macro keyword or by a following value for *cmdparms*, then such a clause must itself be enclosed in quotes (as shown in the second example below).

  Without a qualifying Command or Macro keyword, the Debugger Client searches first for a macro named *command*, then for a Client command named *command*. The Command or Macro keyword lets you search exclusively for a specified command or exclusively for a specific macro.

  Macro searches are restricted to the Client installation folder or the designated 303 macro folder.

  The CLIENTCOMMAND option requires version 7.8 or higher of the Sirius Mods. It is likely to be simpler to use the DebuggerTools ClientCommand method than to use the CLIENTCOMMAND option of the Command method.

In the following example, the Command method turns debugging on for the next procedure that runs; the Janus client port and Debuggger client workstation are specified:

```
%rc = %(DebuggerTools):command('ON DEBSOCK 198.242.444.234')
```

In this example, Command sends a user interface command to the Client:

```
%rc = %(DebuggerTools):command('CLIENTCOMMAND ''AddWatch %i''')
```

DebugOff method

The DebugOff shared method turns off debugging for a thread for which debugging was turned on with a TN3270 DEBUG ON 149 command. It is thus a way to issue a TN3270 DEBUG OFF command via a method call.

The DebugOff method takes no arguments and returns a numeric result:

```
%num = %(debuggerTools):DebugOff
```

where:

%num is a numeric variable that can be either of these:

- **0** TN3270 Debugger debugging was not on when the DebugOff method was invoked.
- **1** TN3270 Debugger debugging was on and is now turned off.

When debugging is on and a DebugOff method executes, debugging stops immediately, the Client/Online connection is broken, `Online has disconnected` is displayed in the Status bar[49] of the Debugger Client, and the request completes at the Online thread.

StatusMessage method

The StatusMessage shared method contains the message in the Client Status bar[49] that results from the last interaction with the Client. The method requires Version 7.8 or higher of the Sirius Mods.

The StatusMessage method returns a string value:

```
%status = %(DebuggerTools):Statusmessage
```

4.7 Using a local editor

As described in this section, you can use a local editor to view and modify most of the small text files that the Debugger Client provides for its various purposes. You can also use a local editor to interactively modify your source code procedure files.

Editing small text files

The Debugger configuration file (`debuggerConfig.xml`) contains an element with which you can specify a non-default text editor to work with the various small text files employed by the Debugger Client. As described in this step[383] in the configuration of `debuggerConfig.xml`, you use the `notepadReplacement` element to select your own local editor to replace the Client default MicroSoft Notepad editor.

Editing procedure files

The **Procedure Line Details** 124 dialog box in the Debugger Client provides detailed information about a source code line, such as the name of the procedure and procedure file from which it comes. You can configure the **Edit** button on the **Procedure Line Details** dialog box to copy the procedure code to an editor on your workstation.

From the editor, you can change and save the the code, and the saved file is immediately returned to the Online to replace the original procedure. To see if the change had the desired results, you re-issue from the browser the call that produced the original procedure code.

Currently, two editors are supported:

- Xtend® from Yoda Software (http://yoda-software.com.au)

  Xtend is a GUI-based editor designed specifically to edit procedures written in Model 204 User Language. It is aware of User Language syntax.

  Xtend transfers files to and from the Model 204 Online using the HTTP protocol, and you must either define a Janus Web Server port or set up an RCL Connect* connection to use it. This document describes only the Web Server connection (which requires Janus Web Server authorization). For information about using RCL Connect*, you must see the Xtend documentation.

- UltraEdit® from IDM Computer Solutions, Inc. (http://ultraedit.com)

  UltraEdit is a GUI-based text editor that is designed to edit program source code from a wide variety of languages.

  UltraEdit transfers files to and from the Model 204 Online using the FTP protocol, and you must define a Janus FTP Server port to use it. This means you must be authorized for Janus Sockets.

These sections follow:

Using Xtend with the Debugger 166

Using UltraEdit with the Debugger 170

4.7.1 Using Xtend with the Debugger

To use Xtend as an adjunct to your debugging, you set up a Janus Web Server port and an APSY subsystem in the Model 204 Online, as well as configure the Xtend GUI and the Debugger Client on your workstation. Once this configuration is complete, you can use Xtend with the Debugger, as described above in Using a local editor 164.

Note: You must use version 2.11 or higher of Xtend. The set up details provided below are for version 2.11.

Also, as stated in in Using a local editor 164, RCL Connect* is an alternative to Janus Web Server, but this document describes only the Web Server connection.

The configuration steps below are described in this section. They assume the Debugger installation has been completed and tested, as described in Product Installation 367. Much of the Xtend product installation and set up is also documented in greater detail in Help files provided with the product.

1. Install and set up Xtend in your Model 204 Online 166
2. Install and set up the Xtend GUI 167
3. Update the Debugger Client configuration file 168
4. Test the configuration 170

Install and set up Xtend in your Model 204 Online

Skip to the next subsection (Install and set up the Xtend GUI 167) if Xtend is already installed at your site.

1. From http://www.yoda-software.com.au, download to your workstation two Windows installation files (one for the Xtend GUI and one for the Model 204 subsystem and web port).
2. Set up a Model 204 subsystem (XTEND) to control Xtend processing.

   Notes for doing this are provided in the `XtendInstall.HLP` file in the XtendInstall folder. See the "Xtend Apsy" section.
3. From the PC, run the Xtend installer executable (`XtendInstall.exe`), which will populate the XTEND subsystem files.
4. In the Online, run the XTEND.JANUS.DEFINE procedure in the XTENDPRC procedure file to start the Xtend Janus Web port.

   The default port number for the non_SSL port is `7878`; for the secure port it is `7879`. Change these numbers if necessary for your site.

Install and set up the Xtend GUI

1. If you will use Janus Debugger and have set up a proxy server for the Internet Explorer browser, update the proxy settings to provide a bypass for connections to the Xtend web port.

   a. From the **Tools** menu, select **Internet Options**; then select the **Connections** tab, and click the **LAN Settings** button.

   b. Locate the **Proxy Server** area, and click the **Advanced** button.

   c. In the **Exceptions** area, in the list box labeled "Do not use proxy server for addresses beginning with," specify the URL of the Xtend web server port you defined 166.

   d. Click **OK** as needed to close the multiple dialog boxes.

2. Set up a remote connection to Model 204 from the Xtend GUI.

   a. Open the Xtend GUI executable file (`Xtend.exe`), and select **Options** from the **View** menu.

   b. In the **Options** dialog box, select the **Remote** tab.

   c. In the grid in the main work area, specify a name for this connection and supply a Model 204 user ID, host name, and the web server port you defined 166, and click the **Apply** button.

   d. If you will use TN3270 Debugger, select the name (Caption) of the remote connection you just defined from the `Default edit online when using TN3270 Debugger` drop-down list, then click the **OK** button.

   e. Optionally, review and update the settings in the other **Options** tabs.

3. Add the names of the procedure files (and their privileges) whose procedures you will be editing with Xtend.

   a. Select **Administrator Functions** from the **Admin** menu; then select the **Files** tab.

   b. In the **File** columns, name the procedure files that contain the procedures you want to make accessible from Xtend; in the **Privileges** column, select a privilege level.

      This information can alternatively be specified in the XTEND subsystem itself.

   c. Click the **Save Details** button, followed by the **Close** button.

Note: For procedure files that have explicit passwords, you must either add the file name to the XTEND subsystem files listed in the Subsystem File Use screen in the Model 204 Subsystem Management facility, or you must modify a subroutine in the XTENDPRC procedure file (as described in the `XtendInstall.HLP` file).

4. Test your connection.

   a. In the **Procedure List** dialog box, select the tab that is labeled with the name of your remote connection.

      A list of your procedures is retrieved and displayed.

   b. Display a test procedure's code (double-click the procedure name), make some update, then save the updated procedure by clicking the Save File icon on the toolbar.

   c. In your Online, check that the updated procedure has replaced the original.

   d. If your connection test is successful, close Xtend.

Update the Debugger Client configuration file

Once Xtend is installed and configured for debugging, you enable the Debugger(s) to invoke it by adding an entry to the Debugger Client configuration file (`debuggerConfig.xml`). This file is installed in the same directory as the Debugger Client executable file, and it is initially configured 378 as part of the Debugger Client installation.

To update the file:

1. Open the `debuggerConfig.xml` file in a text editor.

2. Add an `<editor>` element (bounded by an `<editor>` start tag and an `<\editor>` end tag) at the same level (as a sibling of) the existing `<serverList>` element.

Include these <editor> sub-elements, and specify values for them as described in the Comment section below:

Sub-element	Comment
<program></program>	The identifier of the Xtend program executable file (case does not matter). For example: <program>xtend</program>. **Note:** If the Windows system variable Path does not include the folder path that points to the Xtend executable (for example, C:\Program Files\Xtend), either add it to the Windows variable now, or specify the folder path before the executable file name in the <program> value. To locate the Path variable specification on a Windows 7 workstation, find the Control Panel (say, Start menu > Settings > Control Panel), then select System > System advanced settings > Advanced tab > Environment Variables button > System variables > Path, then click Edit to see the full specification of the Path variable.

When complete, your configuration file should have a structure like the following:

```
<debuggerConfig version="1.0">
   <serverList>
        .
        .
        .
   </serverList>
   <proxy>
        .
        .
        .
   </proxy>
   <editor>
      <program>xtend</program>
   </editor>
        .
        .
        .
</debuggerConfig>
```

3. Save and close the file.

Test the configuration

In the Debugger Client, edit a procedure.

1. Restart the Debugger Client.
2. Load a procedure in the **Source Code** tab of the Debugger Client:
   - Janus Debugger: From your web browser, invoke a URL that includes a procedure.
   - TN3270 Debugger: Issue the TN3270 DEBUG ON 149 command; then include a procedure from the Model 204 command line.
3. Right-click a line of code, select **Procedure Information** from the context menu, then click the **Edit** button on the **Procedure Line Details** dialog box.

   Xtend should open, displaying in its working area the procedure that contains the code line that you right-clicked. If it fails to do so, and you verified earlier that, by itself, Xtend successfully transfers files from the Model 204 Online, begin your troubleshooting in the Debugger Client `debuggerConfig.xml` file settings for the `<editor>` element.

4.7.2 Using UltraEdit with the Debugger

To use UltraEdit as an adjunct to your debugging, you must set up a Janus FTP server in the Model 204 Online as well as configure UltraEdit and the Debugger Client on your workstation. Once this configuration is complete, you can use UltraEdit with the Debugger, as described above in Using a local editor 164.

Note: You can use any version of UltraEdit that supports FTP Open. The set up details provided below are for version 12.10b and later.

The configuration steps below are described in this section. They assume the Debugger installation has been completed and tested, as described in Product Installation 367.

1. Set up a Janus FTP server in the Model 204 Online 170
2. Set up UltraEdit 171
3. Update the Debugger Client configuration file 173
4. Test the configuration 175

Set up a Janus FTP server in the Model 204 Online

You must have the Janus Sockets product enabled, and you should refer to the "Janus FTP Server" chapter in the *Janus Sockets Reference Manual.*

The following steps provide a simple example of JANUS commands you can use to set up a Janus FTP Server configured to access the procedures in the MYPROCFILE file:

1. Create an FTP Server port with the JANUS DEFINE command:

```
JANUS DEFINE FTPULTRA portnum FTPSERVER 8  -
    AUDTERM                                -
    BINDADDR xxx.xxx.xxx.xx
```

   where *portnum* will be the TCP port number for accessing your FTP Server, and *xxx.xxx.xxx.xx* is the IP address on your Model 204 host to which the port is bound.

2. Create a mapping that provides FTP Write access to the procedure file.

   The following example gives Write access to the file to all users, for the port defined in the previous step. The JANUS FTP command is described in the *Janus Sockets Reference Manual*.

   In this example, MYPROCFILE is made the home folder, although it need not be (for example, if you already have a home folder set to something else).

```
JANUS FTP FTPULTRA ASSIGN /MYPROCFILE TO FILE MYPROCFILE
JANUS FTP FTPULTRA HOME   /MYPROCFILE TO ALL
JANUS FTP FTPULTRA ALLOW  /MYPROCFILE WRITE TO ALL
```

3. Start the FTP Server port:

```
JANUS START FTPULTRA
```

4. Issue the following command, and verify that your port is defined and started:

```
JANUS STATUS
```

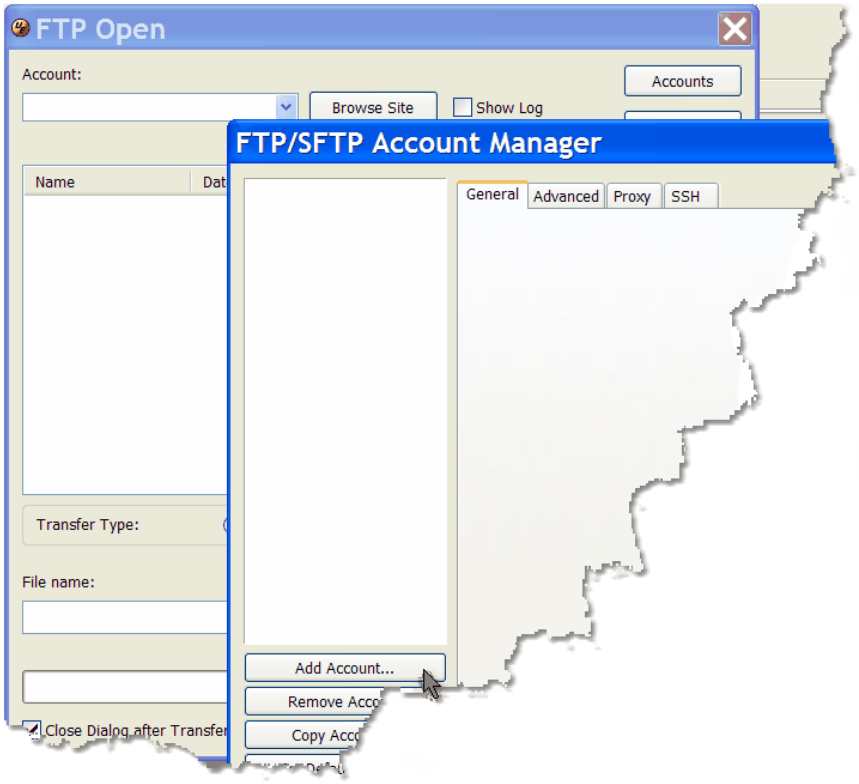
Set up UltraEdit

1. Download and install a copy of UltraEdit on the workstation that hosts the Debugger Client.

2. Start UltraEdit, and in the **File** menu, select **FTP**, then **Open from FTP**.

3. From the **FTP Open** dialog box, set up an account that contains the information UltraEdit needs to access your procedure file via the Janus FTP Server you set up:

a. Click the **Accounts** button, and in the **FTP/SFTP Account Manager** dialog box, click the **Add Account** button:



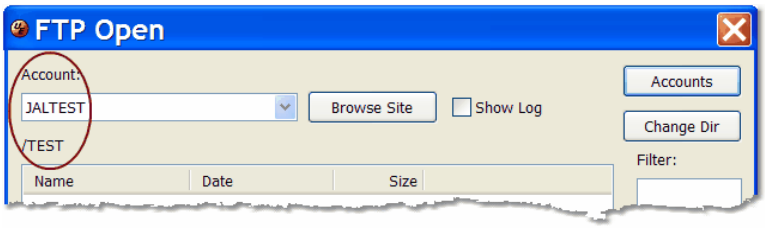
b. Provide values for the fields that are displayed in the **General** tab:

Account	Identifies this set of FTP connection values to UltraEdit, and you must also specify this value in the Debugger Client configuration file.
Protocol	Leave the default value, `FTP`.
Server	The DNS name of the Model 204 Online's host machine, or the IP address on your Model 204 host to which the Janus FTP port is bound (BINDADDR in the Janus FTP Server port definition 170).
Port	Replace the default value (21) with the port number you specified in the Janus FTP Server port definition 170.
Username	UltraEdit accesses Model 204 with this user ID and the `Password` value, below. Case does not matter.
Password	The password for `Username`, above. Case does not matter.
User Account	Any value specified here, or no value, is ignored by the Janus FTP Server.

Initial Directory Your initial location upon connecting to the FTP Server. This must correspond to a folder you specified — including the forward slash (/) separator that precedes it — in a JANUS FTP *pname* ASSIGN command in the set up[170] of your Janus FTP Server. Case does not matter.

c. Click the **Apply** button, then click the **OK** button.

On the **FTP Open** page, your Account name displays in the **Account** drop-down list, and your Initial Directory value displays below that list.



d. Test your FTP connection: select the **Show Log** checkbox, then click the **Browse Site** button.

The files in your procedure file should display in the central list box.

The FTP functions represented by the various buttons on the right side of the **FTP Open** dialog box are all operational (except for **Create Dir** and **Permissions**, which Janus FTP does not support), so be cautious if you experiment further in this dialog box. For more information about what these buttons do, see the UltraEdit online Help.

e. Select a default **Transfer Type** option — it will be associated with this account — then click the **Cancel** button to exit.

4. Close UltraEdit.

Update the Debugger Client configuration file

Once UltraEdit is installed and configured for debugging, you enable the Debugger(s) to invoke it by adding an entry to the Debugger Client configuration file (`debuggerConfig.xml`). This file is installed in the same directory as the Debugger Client executable file, and it is initially configured[378] as part of the Debugger Client installation.

To update the file:

1. Open the `debuggerConfig.xml` file in a text editor.

2. Add an `<editor>` element (bounded by an `<editor>` start tag and an `<\editor>` end tag) at the same level (as a sibling of) the existing `<serverList>` element.

Include these <editor> sub-elements, and specify values for them as described in the Comment section below:

Sub-element	Comment
<program></program>	The identifier of the UltraEdit program executable file (case does not matter). For example: <program>uedit32</program>. **Note:** If the Windows system variable Path does not include the folder path that points to the UltraEdit executable (for example, C:\Program Files\Ultra-Edit-32), either add it to the Windows variable now, or specify the folder path before the executable file name in the <program> value. To locate the Path variable specification on a Windows 7 workstation, find the Control Panel (say, Start menu > Settings > Control Panel), then select System > Advanced system settings > Advanced tab > Environment Variables button > System variables > Path, then click Edit to see the full specification of the Path variable.
<account></account>	The name of the UltraEdit account you set up[171] to connect to the Janus FTP Server folder that contains the procedures you will be debugging. For example: <account>JALTEST</account>. **Note:** This value **is** case-sensitive; it must exactly match the value specified in UltraEdit.

When complete, your configuration file should have a structure like the following:

```
<debuggerConfig version="1.0">
   <serverList>
        .
        .
        .
   </serverList>
   <proxy>
        .
        .
        .
   </proxy>
   <editor>
      <program>uedit32</program>
      <account>JALTEST</account>
   </editor>
        .
        .
        .
</debuggerConfig>
```

3. Save and close the file.

Test the configuration

1. Restart the Debugger Client.
2. Load a procedure in the **Source Code** tab of the Debugger Client:
   - Janus Debugger: From your web browser, invoke a URL that includes a procedure.
   - TN3270 Debugger: Issue the TN3270 DEBUG ON[149] command; then include a procedure from the Model 204 command line.
3. Right-click a line of code, select **Procedure Information** from the context menu, then click the **Edit** button on the **Procedure Line Details** dialog box.

   UltraEdit should open, displaying in its working area the procedure that contains the code line that you right-clicked. If it fails to do so, and you verified earlier that, by itself, UltraEdit successfully transfers files from the FTP Server, begin your troubleshooting in the Debugger Client `debuggerConfig.xml` file settings for the `<editor>` element.

   Note: UltraEdit 12.10**a** versions open the procedure to line 1 in your procedure code. 12.10**b** and later versions, as well as 12.0*x* versions, open the procedure to the same line number as that from which you invoke the edit in the Debugger Client.

CHAPTER 5 The Client Command Reference

Client commands are the operations that you invoke from Client menus and can assign to a Debugger Client button, keyboard shortcut, or macro. It is intended that there be a command available for any Client operation you want to automate.

The following subsections describe individually the available commands, which are specified without regard for case.

Later sections in this document describe ways to use the commands:

- Reconfiguring GUI buttons and hot keys 288 describes how you can map any command to a Client button or hot key.
- Default settings of buttons and hot keys 295 lists the default hot keys and buttons with which some of these commands are associated.
- Using Debugger Macros 315 describes how you can use script multiple commands to run consecutively.

A very few of the commands are **macro-only**: commands that may be used only in a Debugger macro. The descriptions of these commands include a **Scope** section that reminds of this restriction.

As a quick means of testing what a command does, you can open the **Command Line** 323 tool and run your command from there (specifying a qualifying `Command` keyword if a same-named macro command exists). For informational, error, and trace messages from the command, you can use the Console 322 tool.

You can also execute a command from within a User Language request by using the `ClientCommand` method of the DebuggerTools 159 class.

5.1 addWatch command

Action: Adds to the Watch Window 86 the item currently specified in the Entity-name input box 50.

Syntax:

```
addWatch [item]
```

where *item* is the name of the item to be added (one of these 85). In a macro, this argument is required.

Client menu: **Data Display > Add Watch**

Introduced: Build 26

5.2 addWatchOnCurrentLine command

Action: Adds to the Watch Window 86 any variables found in the current **Source Code** line.

Syntax:

```
addWatchOnCurrentLine
```

Client menu: **Data Display > Add Watch on Current Line**

Introduced: Build 28

5.3 assert command

Action: Performs an equality or inequality comparison between a) the value of program data or a macro variable 325 or Client function 327, and b) a constant or the value of a macro variable or macro function. For example:

```
assert %i=666
```

This command lets you create simple testing macros that ensure that key elements in your code have the values you expect. If the comparison expression you construct with `assert` is not logically true, you receive a failure message. If true, you receive no confirmation.

`assert` failure messages are displayed in the console[322], if it is open. Otherwise, they are displayed in a Windows message box. They have the following format:

```
Assert failed: failing_assert_statement
```

For example:

```
Assert failed: assert &b = "no way"
```

The `assert` command syntax follows:

```
ASSERT &var | %xxx | g.xxx | f.xxx | $listcnt(x)
       | $listinf(x,y) | &&function
       = | <>
         string | [-]nnn | &var | &&function
```

where:

- &*var* is a previously defined macro variable.
- *%xxx* is a mainframe variable.
- g.*xxx* is a Debugger global variable reference[94].
- f.*xxx* is a Debugger field reference[93], possibly with a subscript.
- $listcnt/$listinf are the Debugger functions for viewing $list counts and elements.[96]
- &&*function* is a macro function.
- <> is an inequality operator (as of Client Build 59).
- *string* is a quoted string constant (double-quotes or single quotes are valid).
- [-]*nnn* is an integer constant with an optional leading minus sign.

Here are examples of valid `assert` statements:

```
assert g.JACK = "No play makes Jack a dull boy."

  ASSert   %s='Hey Moe'

ASSERT $listcnt(%g)=2

ASSERT $listinf(%g,2) = " makes Jack a dull boy."
```

```
assert &this = 'that'

assert &this <> &that
```

Notes:

- The &&assertFailureCount[330], &&assertSuccessCount[331], and &&assertStatus[330] Client functions, as well as &&globalAssertFailureCount[336], &&globalAssertSuccessCount[337], and &&globalAssertStatus[337], report `assert` command results.
- If you are specifying a Client mapping command[292] and your assertion includes an ampersand character (&) or the not-equal operator (<>), you must XML entity-encode the character. For example, to map the command `assert &i<>6`, you specify it like this:

```
<mapping command="assert &amp;i&lt;&gt;6" button="button9"/>
```

For Client builds before 54, **assert** is allowed only in Debugger macros[315] and is not available as a mappable Client command.

Client menu: —

Introduced: Build 28

5.4 bottom command

Action: Scrolls to the bottom of the current tab; has no effect if the **Proc Selection** 13 page is being displayed.

Optionally, scrolls to the bottom of *the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] bottom
```

where:

window is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

about 39
auditTrail
commands 38
console
executionHistory 132
executionTrace
keyboardShortcuts 38
source
textviewer 147
value 99
watchWindow
webBuffer

Client menu: **Window > Bottom**

Introduced: —

5.5 breakOnNextProc command

Action: Interrupts White List 80 or Run Until 76 processing. The next procedure will be debugged.

Syntax:

```
breakOnNextProc
```

Client menu: —

Introduced: Build 29

5.6 breaks command

Action: Sets breakpoints on lines after comments that have the form `*Break` (see Setting multiple breakpoints at once 58).

Syntax:

```
breaks
```

Note: The search for the `*Break` lines begins from the current line, so you probably should precede the `breaks` command by a `top` 279 command if used in a macro.

Client menu: **Breakpoints > Breaks**

Introduced: —

5.7 breaksAt command

Action: Sets breakpoints on lines that match a search string (see Setting multiple breakpoints at once 58).

Syntax:

```
breaksAt [string]
```

where *string* is the search string or regular expression. 45 The default is to use the value in the Search text box. 39

Note: The search for the lines on which to set breakpoints begins from the current line, so you probably should precede `breaksAt` by a `top` 279 command if used in a macro.

In a macro (only), you must explicitly specify the string at which `breaksAt` is to break.

Client menu: **Breakpoints > Breaks At**

Introduced: —

5.8 buttonBar command

Action: Opens and determines the position of the Client's main button bar[39] in a Client external window.[306] To locate the button bar within the Client main window, use the `mainButtonBar`[225] command.

Syntax:

```
buttonbar [position]
```

where *position* is one of these options that control the disposition of the external button bar (the **Button Bar** window):

- **`top`** docks the window (places it, immobile) at the top left corner of the desktop.
- **`bottom`** docks the window at the bottom left corner of the desktop.
- **`float`** places the window centrally and non-docked (mobile) on the desktop.
- **`hide`** closes the window.
- **`show`** opens the window and restores the previous dock mode, if any.
  - If the main button bar is not currently an external window, `show` makes it external and restores its previous dock mode, if any, or uses `float` as the default mode.
  - If the main button bar is already in an external window, `show` has no effect.

The `show` parameter, new in Build 56, is the default.

Client menu: **Window** > **Show Button Bar in External Window**

Introduced: Build 55

5.9 cancel command

Action: Cancels 63 the User Language request that is being, or about to be, debugged. Gives a "do you really want to" prompt.

Syntax:

```
cancel
```

Client menu: **Execution** > **Cancel**

Introduced: —

5.10 clearAudit command

Action: Clears the **Audit Trail** display.

Syntax:

```
clearAudit
```

Client menu: **Window** > **Clear Audit Trail**

Introduced: —

5.11 clearBreakpointOnCurrentLine command

Action: Clears a breakpoint 58 on the currently selected line in the **Source Code** (or Daemon 139) page; if the currently selected line is not an executable statement, clears a breakpoint on the next executable line after the currently selected line.

Syntax:

```
clearBreakpointOnCurrentLine
```

Notes:

- If you have not explicitly selected a code line, the current line is the highlighted code line in the current execution position.
- If you execute this command for a line that already has no breakpoint set, no additional action is taken.

For code lines for which a breakpoint is set, the `toggleBreakpointOnCurrentLine` 277 command has the same effect as the `clearBreakpointOnCurrentLine` command.

To set a breakpoint on the current line, you can use the `setBreakpointOnCurrentLine` 262 command or the `toggleBreakpointOnCurrentLine` command.

To clear all breakpoints, you can use the `clearBreaks` 182 command.

Client menu: —

Introduced: Build 57

5.12 clearBreaks command

Action: Removes all previously set breakpoints 55.

To remove an individual breakpoint, you can use the `clearBreakpointOnCurrentLine` 186 command.

Syntax:

```
clearBreaks
```

Client menu: **Breakpoints > Clear All Breakpoints**

Introduced: —

5.13 clearButton command

Action: Removes all previously set mappings 289 for a particular Client button.

Syntax:

```
clearbutton buttonName
```

where *buttonName* is one of:

- `button0`, `button1`, ... `button14`, the names of the main button bar 39 buttons
- `extraButton0`, `extraButton1`, ... `extraButton14`, the names of the extra button bar 42 buttons

After you execute the command, the button is removed immediately from the button bar to which it applies but **not** from the button-mapping file (`ui.xml` or `uimore.xml`) if it was specified there. A restart of the Client restores any mappings you remove with `clearButton`, if they were in the `ui.xml` or `uimore.xml` file.

See also the `mapButton` 226 command.

Client menu: —

Introduced: Build 57

5.14 clearExecutionTrace command

Action: Clears the Execution Trace 13 display.

Syntax:

```
clearExecutionTrace
```

Client menu: **Window > Clear Execution Trace**

Introduced: Build 37

5.15 clearHistory command

Action: Clears the Execution History window. 132

Syntax:

```
clearHistory
```

Client menu: —

Introduced: Build 50

5.16 clearKey command

Action: Removes all previously set mappings 289 for a particular Client keyboard-key combination.

Syntax:

```
clearKey key
```

where *key* is a keyboard key: a single letter or digit, or one of `F2` through `F12` (the function keys)

Immediately after you execute the command, the keyboard shortcut loses effect but its mapping is **not** removed from the button-mapping file (`ui.xml` or `uimore.xml`) if it was specified there. A restart of the Client restores any mappings you remove with `clearKey`.

See also the `mapKey` 228 and **`clearbutton`** 187 commands.

Client menu: —

Introduced: Build 57

5.17 clearMacroConsole command

Action: Clears the Console window. 322

Syntax:

```
clearMacroConsole
```

Client menu: —

Introduced: Build 50

5.18 clearStatus command

Action: Clears current message (error or informational), if any, from the Client Status bar 49.

Syntax:

```
clearStatus
```

This command be useful to reduce confusion when developing macros: at the start of the macro, you can clear any earlier messages, so you will know that any subsequent messages are from the macro under development.

Client menu: —

Introduced: Build 58

5.19 clearWatch command

Action: Removes 88 all watched items from the Watch Window.

Syntax:

```
clearWatch
```

Client menu: Data Display > Clear Watch

Introduced: —

5.20 clearWebBuffer command

Action: Clears the Web Buffer page 12.

Syntax:

```
clearWebBuffer
```

Client menu: Window > Clear Web Buffer

Introduced: Build 43

5.21 closeCommandLine command

Action: Closes the Command Line dialog box 323 (entitled **Macro Command Line** prior to Client build 53), which lets you run a macro by entering its name and any parameters.

Syntax:

```
clearCommandLine
```

See also openCommandLine 233.

Client menu: —

Introduced: Build 53

5.22 closeExternalAuditTrailWindow command

Action: Closes an external Audit Trail window. 306

Syntax:

```
closeExternalAuditTrailWindow
```

Client menu: —

Introduced: Build 50

5.23 closeExternalButtonWindow command

Action: Closes an external Button Bar window. 42

Syntax:

```
closeExternalButtonWindow
```

Client menu: —

Introduced: Build 54

5.24 closeExternalExecutionTraceWindow command

Action: Closes an external Execution Trace window. 306

Syntax:

```
closeExternalExecutionTraceWindow
```

Client menu: —

Introduced: Build 50

5.25 closeExternalWatchWindow command

Action Closes an external Watch Window. 306

Syntax:

```
closeExternalWatchWindow
```

Client menu: —

Introduced: Build 50

5.26 closeExternalWebBufferWindow command

Action Closes an external Web Buffer window.306

Syntax:

```
closeExternalWebBufferWindow
```

Client menu: —

Introduced: Build 50

5.27 closeExternalWindows command

Action: Closes any open Client external Windows.306

Syntax:

```
closeExternalWindows
```

Client menu: **Window > Close External Windows**

Introduced: Build 50

5.28 closeHistory command

Action: Closes the Execution History window.132

Syntax:

```
closeHistory
```

Client menu: —

Introduced: Build 50

5.29 closeMacroConsole command

Action: Closes the macro console[322].

Syntax:

```
closeMacroConsole
```

See also openMacroConsole.[236]

Client menu: —

Introduced: Build 53

5.30 closeValueDisplay command

Action: Closes the current Value window[99], if any; takes no action if no Value window is open.

Syntax:

```
closeValueDisplay
```

A Value window is used by multiple Client operations and commands to display or expand values (for example, the expandList[203], expandObject[204], pafgi[236], pai[237], and valueDisplay[284] commands).

Client menu: —

Introduced: Build 50

5.31 continueIf command

Action

Determines whether the processing of a Debugger macro 315 may continue. If the state ("True" or "False") of a specified command argument (macro variable 325, client function 327, or constant) is `True`, the macro continues. As of Build 62, `continueIf` can evaluate the truth of an expression (equality or inequality) involving macro variables, client functions, or constants.

If the state of the `continueIf` argument or comparison expression is `False`, the macro containing this command ***and any macro(s) within which this macro is contained*** terminate (without error). This behavior contrasts with that of the `continueMacroIf` 196 command, which exits only the macro containing the `continueMacroIf` command.

Syntax:

```
continueIf test
```

and prior to Build 62 *test* is:

```
&var | &&function | const
```

and as of Build 62 *test* is:

```
&var | &&function | const [ = | <> &var | &&function | const ]
```

Where:

- *&var* is a macro variable that may or may not already exist.
- *&&function* is a Client function. Requires Build 58 or higher.
- *const* is a constant. Requires Build 58 or higher.
- = and <> are equality and inequality operators, respectively.

Notes:

If `continueIf` is used with a single argument and that argument is `0` or a zero length (null) string, or if it is undefined, its state is considered to be `False`. For all other values, its state is considered to be `True`.

In an equality comparison, a null string compared to a null string is `True`, and any undefined item makes an equality comparison `False`. Each of these truth outcomes is reversed in an inequality comparison.

Example:

```
# Execute Step and optionally update history
nospan
step
continueIf &historyWanted
getHistory
...
continueIf &testMe <> &testMe2
```

Scope: Allowed only in Debugger macros; **not** available as a mappable Client command

Client menu: —

Introduced: Build 37

5.32 continueMacroIf command

Action: Determines whether the processing of the Debugger macro 315 that contains this command may continue. If the state ("True" or "False") of a specified command argument (macro variable 325, client function 327, or constant) is `True`, the macro continues. As of Build 62, `continueMacroIf` can evaluate the truth of an expression (equality or inequality) involving macro variables, client functions, or constants.

If the state of the command argument is `False`, the macro terminates (without error). This behavior contrasts with that of the `continueIf` 195 command, which exits not only the macro containing the `continueIf` command but also any macro(s) within which that macro is contained.

Syntax:

```
continueMacroIf test
```

and prior to Build 62 *test* is:

```
&var | &&function | const
```

and as of Build 62 *test* is:

```
&var | &&function | const [ = | <> &var | &&function | const ]
```

Where:

- *&var* is a macro variable that may or may not already exist.
- *&&function* is a Client function. Requires Build 58 or higher.

- *const* is a constant. Requires Build 58 or higher.
- = and <> are equality and inequality operators, respectively.

Notes:

If `continueMacroIf` is used with a single argument and that argument is `0` or a zero length (null) string, or if it is undefined, its state is considered to be `False`. For all other values, its state is considered to be `True`.

In an equality comparison, a null string compared to a null string is `True`, and any undefined item makes an equality comparison `False`. Each of these truth outcomes is reversed in an inequality comparison.

Example:

```
# See if it is watched, done if not
in watchWindow searchFromTop &argstring
continueMacroIf &&searchSuccess
#
# It was watched, remove and tell what we did
removeCurrentWatch
echo &&concatenate("removed watch ", &argstring)
...
continueMacroIf &testMe = 1
...
continueMacroIf &&blackOrWhiteList <> 'black'
```

Scope: Allowed only in Debugger macros; **not** available as a mappable Client command

Client menu: —

Introduced: Build 57

5.33 copy command

Action: Copies to the clipboard the lines currently visible in the active tabbed page 10.

Syntax:

```
copy
```

Client menu: **Window** > Copy

Introduced: —

5.34 createMacro command

Action: Lets you name (via a Windows dialog box) and edit (via Windows Notepad) a new blank Debugger macro 315 file.

Syntax:

```
createMacro
```

Client menu: **Macros** > **New Macro**

Introduced: Build 26

5.35 debugPreview command

Action: When the Source Preview feature 83 is enabled, triggers a full download of the program source code for normal debugging. If the program has compilation errors, the full compilation error listing is downloaded.

Syntax:

```
debugPreview
```

Client menu: **Execution > Debug Previewed Source**

Introduced: Build 30

5.36 decrement command

Action: Decreases the value by 1 of a specified numeric macro variable 325. If the macro variable is non-numeric or is undefined, an error is issued.

Syntax:

```
decrement &var
```

where *&var* is a macro variable that may or may not already exist.

The inverse of this command is increment. 217 A related Client function is &&sum 345.

Client menu: —

Introduced: Build 57

5.37 disableButton command

Action: Disables the (currently enabled) button bar button 39 that you specify. A disabled button performs no action and has gray text. You might want to disable a button to simplify the button bar display for a particular context.

Syntax:

```
disableButton buttonName
```

where *buttonName* is `button0, button1,` etc; that is, the name of a currently mapped 289 button.

If the command executes successfully, you receive a `Disabled button: buttonName` message, and the button's label changes from black text to gray.

See also the `enableButton` 202 command.

Client menu: —

Introduced: Build 62

5.38 echo command

Action: Displays a message to the user.

Syntax:

```
echo message
```

where *message* is one of these:

- A non-quoted string that contains the message.
- A Client function 327. The result of the function execution is displayed as the message.

The message string starts with the first non-blank character after the `echo` keyword, and it continues as far as the end of the line. For example:

```
echo Have a nice day!
```

The message is normally displayed in a standard Windows informational box (entitled **Macro message**). If the macro console 322 is open, however, the message is sent to the console instead.

Note: If you are specifying a Client mapping command 292 and your message includes an ampersand character (&), you must XML entity-encode the character. For example, to map the command `echo &foo`, you specify it like this:

```
<mapping command="echo &amp;foo" button="button13"/>
```

Client menu: —

Introduced: Build 27

5.39 editMacroFromUISelection command

Action: Lets you select and open for editing (via Windows file-selection dialog) an existing Debugger macro 315 file.

Syntax:

```
editMacroFromUISelection
```

Client menu: **Macros** > **Edit Macro**

Introduced: Build 53

5.40 enableButton command

Action: Enables the (currently disabled) button bar button 39 that you specify. A disabled button performs no action and has gray text.

The **enableButton** command affects only buttons that are disabled because they were specified in a previous disbleButton 200 command. If a button is disabled because its action is not appropriate in the current debugging context, **enableButton** does **not** enable the button. For example, after you cancel a request, the **Cancel** and **Clear Breaks** buttons are disabled, and an **enableButton** command for one of these buttons has no effect: the button remains disabled and no return message is displayed.

Syntax:

```
enableButton buttonName
```

where *buttonName* is `button0, button1,` etc; that is, the name of a currently mapped 289 button.

If the command executes successfully, you receive an `Enabled button: buttonName` message, and the button's label changes from gray text to black.

Client menu: —

Introduced: Build 62

5.41 evaluate command

Action: Constructs and runs a Client command. The `evaluate` argument values are concatenated into a single string and run as a Client command.

Syntax:

```
evaluate {&var|'string1'|"string2"} ...
```

where:

- *&var* is a previously defined macro variable 325.
- *string1* and *string2* are single- or double-quoted string literals.

No blanks are placed between the argument values when they are concatenated, so you may have to provide for them within quoted string values. If a macro variable is not defined, or if the string that is built is not a valid command, an error is issued.

Here is a macro definition that makes heavy use of the `evaluate` command:

```
# histButtons.macro: Assign extrabutton<extrBtn>-<extrBtn+3>
# for history traversal
# Usage: macro historyButtons <extrBtn>
extraButtonbar main
set &bnum = &argstring
evaluate 'mapButton extrabutton' &bnum ' previousHistory'
increment &bnum
evaluate 'mapButton extrabutton' &bnum ' nextHistory'
increment &bnum
evaluate 'mapButton extrabutton' &bnum ' firstHistory'
increment &bnum
evaluate 'mapButton extrabutton' &bnum ' lastHistory'
evaluate 'echo buttons ' &argstring '-' &bnum ' set for history'
```

Client menu: —

Introduced: Build 57

5.42 expandList command

Action: Displays 102 in a **Value** window the list items in the $list, Stringlist, or Arraylist referenced by the variable specified as the command argument.

Same as the **List Display** context menu option for **Watch Window** items, including how to control the number of items displayed.

For example:

```
expandList %ls
```

If the command argument does not reference a $list, Stringlist, or Arraylist, you receive an error message.

If issued by a macro, *and* the Macro Console 322 is open, then the value is displayed in the **Macro Console** window.

Client menu: —

Introduced: Build 43

5.43 expandObject command

Action: Displays 109 in a **Value** window a list of the class Variable names and values of its required object instance argument. Same as the **Expand Object** context menu option for **Watch Window** items.

For example:

```
expandObject %scout
```

If the command argument does not reference an object, or if the object does not have class variables, you receive an error message.

If issued by a macro, *and* the Macro Console 322 is open, the value is displayed in the **Macro Console** window.

Client menu: —

Introduced: Build 43

5.44 extraButtonBar command

Action: Opens and determines the position of a Client's extra button bar 42. Command options locate the bar in an external window 306 or on the Client main window, merged with the main button bar.

Syntax:

```
extraButtonbar [position]
```

where *position* is one of these options that control the disposition of the extra button bar (the **Extra Buttons** window):

- `top` docks the window (places it, immobile) at the top left corner of the desktop.
- `bottom` docks the window at the bottom left corner of the desktop.
- `float` places the window centrally and non-docked (mobile) on the desktop.
- `main` adds the extra buttons to the main button bar, immediately following the last main button. Available in Client build 57. This is equivalent to selecting the **Extra Buttons** option in the **Preferences** 18 dialog box.
- `hide` closes the the **Extra Buttons** window.
- `show` opens the window and restores the previous dock mode, if any, or uses `float` as the default mode.

  If the **Extra Buttons** window is already open, `show` has no effect.

The `show` parameter is the default.

Client menu: **Window** > **Show Extra Button Bar Window**

Introduced: Build 56

5.45 feoDisplay command

Action: Displays FOR EACH OCCURRENCE OF (FEO) statement information[114] (current OCC subscript value) for the current source line (if it is an FEO statement). If the current source line is not an FEO statement, an error is issued.

This command is equivalent to right-clicking a source line and selecting **FEO OCC IN Value** from the context menu.

Syntax:

```
feoDisplay
```

Client menu: —

Introduced: Build 58

5.46 firstHistory command

Action: Scans chronologically backward in the current statement execution history[132], then highlights *in the **Source Code** or **Daemon** tab* the first (earliest) statement in the history.

Syntax:

```
firstHistory
```

Client menu: **Execution** > **Select First History Line**

Introduced: Build 54

5.47 focusToSearchBox command

Action: Gives the input focus to the Search text area 44. Once that area has focus, pressing the Enter key invokes the `searchDown` 251 command, so you can repeat a search using only the keyboard.

Syntax:

```
focusToSearchBox
```

By default, the Ctrl+F key combination also gives focus to the Search text area.

Client menu: —

Introduced: Build 29

5.48 generatePac command

Action: Generates a PAC (Proxy Auto Config) JavaScript file from the Debugger configuration settings in `debuggerConfig.xml`. If this file is defined to the Internet Explorer browser, IE will use the Debugger Client as a proxy *only* for requests for the hosts (Onlines) specified 378 in `debuggerConfig.xml`.

The IE browser does this host filtering if the PAC file location is specified for it in the **Address** value in **Tools** > **Internet options** > **Connections** > **LAN settings** > **Use automatic configuration script.**

By default, `generatePac` merges the code it generates with that of an existing PAC file (if such a file is already specified in the Internet Explorer configuration options).

Syntax:

```
generatePac [file [overwrite|nomerge]]
```

Where *file* is the name of a file which, if not specified, defaults to `debuggerInternalPac.js`. The generated file is placed by default in the Client work-file folder 303. If no such work folder is configured, the Client installation folder is used.

If you specify a *file* value:

- You can use quotation marks to indicate an absolute or relative Windows file-system path:
  - If quoted (for example, `generatePac "c:\pac\debuggerPac.js"`), the file value is treated as an absolute file path.
  - If not quoted (for example, `generatePac foo.js`), the value is treated as a path relative to the work-file folder.
- You can also use a file URL (for example, `file://c:\xxx\yyy.js`) to specify the file.

If a file with the same name as *file* already exists, it will not be overwritten, unless you specify `overwrite.` If you use `overwrite`, the *file* value must be explicitly specified.

Note: If your *file* specification contains an error (typo, incorrect file or path name, etc.), the Internet Explorer browser ignores the command and does not inform you of the error.

When `generatePac` runs, it reports its activity in the Debugger Client console 322. For example:

```
Command: generatePac foo.js overwrite
Generated New Pac file: foo.js
Added: 5 web servers from the configuration.
Generated Pac File:
// foo.js generated by debugger client on: 2013 05 23 15:59:20
function FindProxyForURL(url, host) {
   urlLc = url.toLowerCase();
   isDebuggable = (
      (shExpMatch(urlLc, "http://sirius-software.com:3666/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:9219/*"))
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:3667/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:3000/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:80/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com/*")
   );
   if (isDebuggable) return "PROXY 127.0.0.1:8081;DIRECT";
   return "DIRECT";
}
```

The quoted host URLs above are copied from the `debuggerConfig.xml` file. The last of them (with no explicit port number appended) is generated when a port 80 specification is present in `debuggerConfig.xml`.

See also the setIEmode 263 command, which combines the generatePac functionality with automatic specification and removal of the PAC file in the IE configuration settings when the Client starts and closes.

Client menu: —

Introduced: Build 62

5.49 getHistory command

Action: Displays a history 132 (in an **Execution History** window or in the **Execution Trace** page) of the statements executed thus far during program evaluation. The history includes calls and returns for methods and subroutines (as many as 1000 statements).

Syntax:

```
getHistory
```

See also the previousHistory 240, nextHistory 230, firstHistory 206, and lastHistory 222 commands, which let you view highlighted history statements within the program in the **Source Code** tab (or **Daemon** tab).

Client menu: **Execution** > **Get/Display History**

Introduced: Build 34

5.50 getVariablesForClass command

Action: Displays 109 a list of the names (not values) of the variable members in the system or user class that is specified as the command argument.

Similar to expandObject 204, but does not scan the code for the values of a particular object instance.

For example:

```
getVariablesForClass cats
```

If the class in the command argument is not found, or if the class does not have member variables, you receive an error message.

If issued by a macro, *and* the Macro Console 322 is open, then the value is displayed in the **Macro Console** window.

Client menu: —

Introduced: Build 43

5.51 help command

Action: Displays the Debugger's Windows Help file, or as of Builds 59 and 60, displays a brief description of a specified Client command 177 or function 327, or displays a list of the available user preference options or of the file types that the Debugger ignores (that is, does not display for debugging).

Syntax:

```
help [command | function | preference | ignoredFiles]
```

Where these are the parameter options:

- Specify a Client command or function (without regard for case).
- Specify `preference` to display the user preferences available to you as options of the `setPreference` 265 command. This option is available as of Build 60.
- Specify `ignoredFiles` to display a list of the filtered file types 380. This option is available as of Build 60.

If you issue `help preference`, output like the following is displayed:

```
Targets for setPreference:

breakAfterReadScreen
caseSensitiveAssert
debuggerDirectives
historyToTrace
ignoredFileTypeList
ignoreMacroErrors
initExclude
macroAutorun
pauseAtEndEval
stopOnAssertFailure
useProcLists
useRoutineLists
valueDisplayOnConsole
```

If you issue `help ignoredFiles`, output like the following is displayed:

```
Ignored file types (if ignoredFileTypeList is on):
css,gif,htc,ico,jpeg,jpg,js,png,xml,xsl
```

Client menu: **Help** > **Help Topics**

Introduced: —

5.52 hideLower command

Action: Hides the lower section 311 of the Client main window. This is useful where the **Audit Trail** and **Watch Window** are in separate windows on the same or another monitor.

This command is equivalent to selecting the **Hide Lower Section** option of the **Main Window Options** section of the **Preferences** 18 dialog box.

Syntax:

```
hideLower
```

`hideLower` has no effect if the lower windows are hidden when the command is issued.

See also:

- The `toggleLower` 278 command also hides the lower windows if they are *not* hidden when the command is issued, but which restores the windows if they were hidden.
- The `restoreLower` 246 command restores the lower windows if they were hidden.
- The `openExternalWatchWindow` 235 command lets you access the **Watch Window** if the lower section of the main window is hidden.

Client menu: **File** > **Preferences** > (**Main Window Options**) **Hide Lower Section**

Introduced: Build 57

5.53 httpGet command

Action: Attempts to execute an HTTP GET file download for the file whose URL you specify as the command parameter. Useful for testing the Proxy Auto Configure (PAC) file 388 feature and as needed. Bypasses current settings in the Client's **Preferences** 18 window.

Syntax:

```
httpGet file_url
```

If the GET succeeds, the Client Status bar 49 displays a message like:

```
HTTP GET completed.
```

You can use the Client console 322 to view the content of the file you download.

See also `httpPutFile` 214 and `retryHttpPac` 247.

Client menu: —

Introduced: Build 63

5.54 httpPutFile command

Action: Attempts an HTTP PUT file upload of the file you specify to the URL you specify.

Useful for testing the Proxy Auto Configure (PAC) file 388 feature. Bypasses current settings in the Client's **Preferences** 18 window.

Syntax:

```
httpPutFile file url
```

where the Client searches first for *file* in the Client's work files 382.

For example:

```
httpPutFile debuggerInternalPac.js
http://sirius.sirius-software.com:9292/pacman/PAC.172.16.60.38.JS
```

The Client Status bar reports on the result of the command; for example, a message like:

```
HTTP PUT file upload completed.
```

See also httpPutString 215, httpGet 213, retryHttpPac 247, and &&currentPacFile 333.

Client menu: —

Introduced: Build 63

5.55 httpPutString command

Action: Attempts an HTTP PUT upload using the string and the URL you specify.

Useful for testing the Proxy Auto Configure (PAC) file 388 feature and as needed, the command bypasses the current settings in the Client's **Preferences** 18 window.

Syntax:

```
httpPutString string url
```

For example, the following command stores a quoted literal string in a file in a Janus Web Server configured to use the file name `MYSTRING.JS`:

```
httpPutString 'debuggerInternalPac.js'
http://sirius.sirius-software.com:9292/pacman/MYSTRING.JS
```

The Client Status bar 49 reports on the result of the command, with for example, a message like:

```
HTTP PUT string upload completed.
```

See also `httpPutFile` 214, `httpGet` 213, `retryHttpPac` 247, and `&&currentPacFile` 333.

Client menu: —

Introduced: Build 63

5.56 include command

Action: Calls another Debugger macro 315.

Syntax:

```
include macroname
```

where *macroname* is the non-quoted name of the macro.

Scope: Allowed only in Debugger macros 315; **not** available as a mappable Client command.

Client menu: —

Introduced: —

5.57 includeIf command

Action: Conditionally calls another Debugger macro 315. The specified macro is included if and only if the state ("True" or "False") of a specified macro variable 325 is `True`. If the state of the macro variable is `False`, no action is taken and the macro continues.

If the variable is `0` or a zero length (null) string, or if it is undefined, its state is considered to be `False`. For all other values, its state is considered to be `True`.

Syntax:

```
includeif &var macroName
```

where:

- *&var* is a macro variable that may or may not already exist.
- *macroName* is the non-quoted name of a macro.

Scope: Allowed only in Debugger macros; **not** available as a mappable Client command.

Client menu: —

Introduced: Build 57

5.58 increment command

Action: Increases the value by 1 of a specified numeric macro variable 325. If the macro variable is non-numeric or is undefined, an error is issued.

Syntax:

```
increment &var
```

where *&var* is a macro variable that may or may not already exist.

For an example that uses the `increment` command, see the `evaluate` 203 command.

The inverse of this command is `decrement` 199. A related Client function is `&&sum` 345.

Client menu: —

Introduced: Build 57

5.59 jumpToLine command

Action: Transfers control to a specified request statement in the **Source Code** or **Daemon** page, then executes that statement.

The command's required argument is a number or keyword that indicates the target statement:

```
jumpToLine [current | number]
```

where:

- The keyword `current` specifies a jump to and then execution of the current statement.
- *number* may be in one of three forms:

  ```
  nnn | -nnn | +nnn
  ```

  - *nnn* specifies an "absolute jump" to the *nnn* statement line number 11 in the **Source Code** or **Daemon** page display, then an execution of that statement.

- *-nnn* or *+nnn* specifies a "relative jump," jumping the indicated number of statements backward or forward relative to the current (yellow highlighted) line, followed by the execution of that statement.

  For example, specifying `-1` re-executes the statement prior to the current line. `+1` skips the current executable statement and executes the one following it.

If you use the command in a macro 315:

1. When you specify the `jumpToLine` command in the macro, explicitly supply its argument (the `current` keyword or a number to indicate the target line) or specify an argument variable. 320
2. Observe the jump validation rules. 82

If you use the command in a mapped button or hot key 288:

1. Do not specify an argument for the `jumpToLine` command in the mapping; you specify the argument (the `current` keyword or a number to indicate the target line) in the Entity-name input box 50.
2. Observe the jump validation rules.

For information about invoking a jump by right-clicking a line in the **Source Code** or **Daemon** tab, see Altering the flow of execution. 81

Client menu: —

Introduced: Build 27

5.60 jumpToMatch command

Action: Transfers control to a request statement that contains a specified matching string, then attempts to execute that statement.

Syntax:

```
jumpToMatch string
```

where *string* is the string for which a match is searched *from the top* (first) line in the **Source Code** or **Daemon** page. The search string may be a regular expression, as described for the Search button 39.

The nesting level of a statement has no effect on whether it is located.

If a match is not found, `JumpToMatch string not found` is displayed in the Status area. 49 If a match is found but the statement is not executable, `Invalid line for jump` is displayed in the **Status** area.

If you use the command in a macro 315:

1. When you specify the `JumpToMatch` command in the macro, explicitly supply its argument (the `current` keyword or a number to indicate the target line) or specify an argument variable. 320
2. Observe the jump validation rules. 82

If you use the command in a mapped button or hot key 288:

1. Do not specify an argument for the `JumpToMatch` command in the mapping; you specify the argument (the `current` keyword or a number to indicate the target line) in the **Search** text box.
2. Observe the jump validation rules.

For information about invoking a jump by right-clicking a line in the **Source Code** or **Daemon** tab, see Altering the flow of execution. 81

Client menu: —

Introduced: Build 27

5.61 kill command

Action: Stops a running macro[315] and issues a message indicating that fact. If `kill` is issued and the specified macro is not running, you receive a message indicating that no such macro is running. This is most suitable if a macro's execution spans multiple requests.

Syntax:

```
kill macroName
```

where *macroName* is the name of the macro you want to stop.

Client menu: **Macros**

Introduced: Build 58

5.62 labelButton command

Action: Lets you replace the label of a Client button bar button 39.

Syntax:

```
labelButton buttonName newlabel
```

where:

- *buttonName* is `button0, button1,` etc; that is, the name of a currently mapped 289 button.
- *newlabel* can be as many as 50 characters (the button is expandable).

If the command executes successfully, the label changes immediately, and you receive a `Label set for: buttonName` message.

Example:

The following macro uses `labelButton`:

```
continueMacroIf &&blackOrWhiteList = 'black'
labelButton button0 BlackList On
turnOffBlackList
restoreTitle
set &changed = 1
clearStatus
```

Client menu: —

Introduced: Build 62

5.63 lastHistory command

Action: Scans chronologically forward in the current statement execution history[132], then highlights *in the* **Source Code** *or* **Daemon** *tab* the last (latest) statement in the history.

Syntax:

```
lastHistory
```

Client menu: **Execution** > **Select Last History Line**

Introduced: Build 54

5.64 loadWatch command

Action: Restores from a local `.watch` file a list of items to display in the **Watch Window**, as described in Saving and restoring Watch Window contents.[89]

Syntax:

```
loadWatch [watchfile]
```

where the command's optional argument is the name of the `.watch` file to be loaded. If you omit *watchfile,* a Windows file selection dialog box lets you select a saved `.watch` file when the command executes.

Otherwise, if you specify a *watchfile* argument (the `.watch` extension may be omitted), the named file opens when the command executes.

To locate the watch file you identify, the Client looks in the folder that contains the `JanusDebugger.exe` file, by default[303]. If the watch file cannot be found, an error is issued.

You may also specify the watch file name in these ways:

- As a macro variable[325]. For example:

```
set &a = "foo"
loadWatch &a
```

- As part of an absolute file system path, which *must be enclosed in quotation marks.* Requires Build 58 or higher. For example:

```
loadWatch "c:\temp\foo.watch"
```

The saveWatch 250 command saves the **Watch Window** contents to a watch file.

Client menu: **Data Display** > **Load Watch**

Introduced: Build 49

5.65 macro command

Action: Identifies a user-defined macro 315.

Syntax:

```
macro macroName
```

where *macroName* is the name of the macro you are identifying.

Client menu: —

Introduced: Build 26

5.66 macroConsole command

Action: Invokes the macro console 322, which reports the starting and completing of macro execution, as well as any error messages.

Syntax:

```
macroConsole
```

A synonym for `macroConsole` is `openMacroConsole.` 236

See also `closeMacroConsole.` 194

Client menu: **Macros** > **Console**

Introduced: Build 43

5.67 macroTrace command

Action: Starts or stops a display in the macro console[322] of a trace of all macro statements in your debugging session.

Syntax:

```
macroTrace [ on | off ]
```

where:

- **on** indicates that macro lines will be traced until turned off with `macroTrace off`.
- **off** turns off `macroTrace`, if it is on.

Note: When `macroTrace` is turned on, the trace output is produced *only if* the macro console is open.

This is an example of macro trace output:

```
>>>macroTrace: step
>>>macroTrace: assert %i = 1
>>>passed...
>>>macroTrace: run
>>>macroTrace: step
>>>macroTrace: assert %i = 2
>>>passed...
```

Note that the trace includes the pass or fail status of `assert`[178] commands, and it includes syntax help if commands have syntax errors (as of Client Build 59).

Client menu: —

Introduced: Build 50

5.68 macroWait command

Action: Slows down Debugger macro execution by adding a wait after each command in the macro 315.

Syntax:

```
macroWait nnn
```

where:

- *nnn* is the number of milliseconds to wait after the execution of each command in the macro.

Scope: Allowed only in Debugger macros; **not** available as a mappable Client command

Client menu: —

Introduced: Build 57

5.69 mainButtonBar command

Action: Determines the position within the Client window (non-external) of the Client's main button bar 39. To place the button bar in an external window, use the buttonBar 184 command.

Syntax:

```
mainButtonBar position
```

where *position* is one of these options:

- **top** places the bar in its default location, above the Client main window.
- **center** places the bar below the main window (but above the search, tracing, and value displaying controls).
- **bottom** places the bar at the very bottom of the Client window.

The show parameter, new in Build 56, is the default.

Client menu: **File** > **Preferences** > **Main Button Bar**

Introduced: Build 57

5.70 manual command

Action Displays the PDF reference manual for the Debugger.

Syntax:

```
manual
```

Client menu: **Help > View PDF Manual**

Introduced: —

5.71 mapButton command

Action: Lets you assign a command to a Client button288 without having to edit a mapping file (`ui.xml` or `uimore.xml`) and to restart the Client.

Syntax:

```
mapButton [buttonModifier-]buttonName command
```

Where (case not important):

- *buttonModifier* is one of:
  - `Alt`

    Maps the Alt-key version of the button (command runs when you click the button while holding down Alt)
  - `Cntrl`, `Control`, `Cntl`, `Ctl`, or `Ctrl`

    Maps the control-key version of the button (command runs when you click the button while holding down Ctrl)

  buttonModifier is optional, and its default is no modifier (command runs when you click the button).
- *buttonName* is one of:
  - `button0`, `button1`, ... `button14`, the names of the main button bar39 buttons
  - `extraButton0`, `extraButton1`, ... `extraButton14`, the names of the extra button bar42 buttons

- *command* is either:
  - A Client command 177
  - The `separator` keyword (case not important), which converts the *buttonName* button to a visual separator button 289

Examples:

```
mapbutton button0 viewtext

mapButton ctl-button0 showAbout

mapButton ALT-button0 showCommands

mapButton eXTRAbutton0 openmacroConsole
```

After you execute the command, the new mapping is reflected immediately in the button bar to which it applies. The new mapping does **not** appear in the button-mapping file. The new mapping does **not** survive a Client restart.

The command to remove a button mapping is `clearButton.` 187 The command to map a keyboard shortcut is `mapKey.` 228

Client menu: —

Introduced: Build 56

5.72 mapKey command

Action: Lets you assign a keyboard shortcut 288 without having to edit a mapping file (`ui.xml` or `uimore.xml`) and to restart the Client.

Syntax:

```
mapKey [modifier-]key command
```

Where (case not important):

- *modifier* is one of:
  - `Alt`

    Maps the Alt-key version of a key combination (command runs when you hold down the Alt key and press the specified *key*)
  - `Cntrl`, `Control`, `Cntl`, `Ctl`, or `Ctrl`

    Maps the control-key version of a key combination

  modifier is optional, and its default is no modifier.
- *key* is a keyboard key: a single letter or digit, or one of `F2` through `F12` (the function keys)
- *command* is a Client command 177

Examples:

```
mapkey f2 Step

mapKey alt-f2 stepover

mapkey Ctl-f2 stepout

Mapkey ALT-2 run
```

After you execute the command, the new mapping is reflected immediately in the keyboard. The new mapping does **not** appear in the mapping file, and it does not remain if the Client is restarted.

The command to remove a keyboard shortcut mapping is `clearKey.` 189 The command to map a Client button is `mapButton.` 226

Client menu: —

Introduced: Build 57

5.73 moveBrowserToTop command

Action: Brings the web browser window to the top of your current stack of open windows.

Syntax:

```
moveBrowserToTop
```

Formerly available for cases where the Client was paused while awaiting user input (for example, READ SCREEN or $WEB_FORM_DONE processing), this window stack manipulation is invoked at any time by executing `moveBrowserToTop`. Like the window feature for READ SCREEN or $WEB_FORM_DONE code, you set up `moveBrowserToTop` processing by specifying your browser's program title142 in the **Preferences** dialog box in the Debugger Client.

Client menu: —

Introduced: Build 54

5.74 moveTn3270ToTop command

Action: Brings the window of your 3270 terminal-emulator program to the top of your current stack of open windows.

Syntax:

```
moveTn3270ToTop
```

Formerly available for cases where the Client was paused while awaiting user input (for example, READ SCREEN processing), this window stack manipulation is invoked at any time by executing `moveTn3270ToTop`. Like the window feature for READ SCREEN code, you set up `moveTn3270ToTop` processing by specifying your emulator's program title61 in the **Preferences** dialog box in the Debugger Client.

Client menu: —

Introduced: Build 54

5.75 nextCompileError command

Action: Finds the next line in error relative to the current line, if the request being displayed fails to compile[136].

Syntax:

```
nextCompileError
```

You can map this command to a button that also has another command or macro mapped to it. See Button toggle for compilation errors[294].

Client menu: **Error > Next Compile Error**

Introduced: —

5.76 nextHistory command

Action: Scans chronologically forward in the statement execution history[132], then highlights *in the **Source Code** or **Daemon** tab* the statement that was executed immediately following the statement that is currently highlighted with the Execution Position color.[298]

Syntax:

```
nextHistory
```

Client menu: **Execution > Select Next History Line**

Introduced: Build 54

5.77 noSpan command

Action: Reverses the default spanning behavior of a Debugger macro 315. By default, macro execution spans the evaluation of requests (if a request completes before a macro is finished, the remaining macro commands apply to the next request).

With noSpan in effect, any running macro is terminated at the end of request evaluation.

Syntax:

noSpan

The span 274 command reverses a previously issued noSpan command.

Scope: Allowed only in Debugger macros 315; **not** available as a mappable Client command

Client menu: —

Introduced: Build 37

5.78 nsLookup command

Action: Requests a host name or IP address from the Domain Name System (DNS). This is useful for debugging setup issues such as getting the IP number of the Client workstation host or for testing the Client's ability to resolve a host name. It is similar to the operating system nsLookup command.

Syntax:

```
nslookup [host]
```

Where *host* is the name of a TCP/IP host machine known to your local DNS server. Specifying a *host* value displays that host's IP number. If *host* is not specified, the IP number of the workstation on which the Client is running is displayed.

Examples:

- Specifying:

  ```
  nslookup google.com
  ```

  produces the following output:

  ```
  Looking up IP number for: google.com
  IP Number is: 74.125.226.233
  ```

- Specifying:

  ```
  nsLookup
  ```

  produces the following output:

  ```
  Looking up this workstation's IP number
  IP Number is: 198.242.244.3
  ```

- Specifying an unknown host reults in an error message:

  ```
  Looking up IP number for: googlasdasd
  DNS lookup failure for: googlasdasd: No such host is known
  ```

Client menu: —

Introduced: Build 61

5.79 openCommandLine command

Action: Invokes the **Command Line** dialog box, which lets you run a macro or command. Any macro you identify must be located in the same folder as the Debugger Client executable file or in a folder specified 303 in the `debuggerConfig.xml` file.

Syntax:

```
openCommandLine
```

See also `closeCommandLine` 191.

Client menu: **Macros** > **Command Line**

Introduced: Build 53

5.80 openExternaAuditTrailWindow command

Action: Displays in a separate, external window 306 the current contents of the Client **Audit Trail** tab. Or, it brings to the top of your current stack of open windows the external **Audit Trail** window.

Syntax:

```
openExternalAuditTrailWindow
```

Client menu: **Window** > **Open External Audit Trail Window**

Introduced: Build 50

5.81 openExternalButtonWindow command

Action: Displays in a separate, external window 306 the current contents of the Client's main button bar 39 (restoring any previous docking position). Or, if the main button bar is already open, it brings to the top of your current stack of open windows the external **Button Bar** window.

Syntax:

```
openExternalButtonWindow
```

A `buttonBar show` 184 command has very similar effects.

Client menu: **Window > Show Main Button Bar in External Window**

Introduced: Build 54

5.82 openExternalExecutionTraceWindow command

Action: Displays in a separate, external window 306 the current contents of the Client Execution Trace tab 13. Or, it brings to the top of your current stack of open windows the external **Execution Trace** window.

Syntax:

```
openExternalExecutionTraceWindow
```

Client menu: **Window > Open External Execution Trace Window**

Introduced: Build 50

5.83 openExternalWatchWindow command

Action: Displays in a separate, external window 306 the current contents of the Client Watch Window. Or, it brings to the top of your current stack of open windows the external Watch Window.

Syntax:

```
openExternalWatchWindow
```

Client menu: **Window > Open External Watch Window**
Data Display > Open External Watch Window

Introduced: Build 49

5.84 openExternalWebBufferWindow command

Action: Displays in a separate, external window 306 the current contents of the Client Web Buffer tab 12. Or, it brings to the top of your current stack of open windows the external **Web Buffer** window.

Syntax:

```
openExternalWebBufferWindow
```

Client menu: **Window > Open External Web Buffer Window**

Introduced: Build 50

5.85 openMacroConsole command

Action: Invokes the console[322], which reports the starting and completing of macro or command execution, as well as any error messages.

Syntax:

```
openMacroConsole
```

The `openMacroConsole` command is a synonym for the `macroConsole`[223] command.

See also `closeMacroConsole.`[194]

Client menu: **Macros** > **Console**

Introduced: Build 53

5.86 pafgi command

Action: Displays all the visible fields for the current Model 204 field group, just like the User Language PAFGI statement.

Syntax:

```
pafgi
```

Note: The debugging context must be a field group (for example, within an FEO Of Fieldgroup loop), the version of the Sirius Mods must be at least 7.6, and the version of Model 204 must be at least 7.2.

For more information, see Displaying a record's field groups.[118]

Client menu: **Data Display** > **PAFGI**

Introduced: Build 46

5.87 pai command

Action: Displays all the visible fields for the current Model 204 record just like the User Language PAI statement.

Syntax:

```
pai
```

Note: The debugging context must be a record, and the version of the Sirius Mods must be at least 7.6.

For more information, see Displaying all fields in a record. 115

Client menu: **Data Display** > **PAI**

Introduced: Build 45

5.88 pin command

Action: Pins the specified Client external window(s)306, that is, keeps the window(s) at the top of the Client PC's open window stack. Such a window can be moved by mouse around the screen, and it can be joined by other pinned windows. It remains at the top as long as it is open, even if other external windows or applications are subsequently opened. It can only be removed from the top by by closing it, by unpinning it (the `unpin`283 command), or by clicking its upper-right-corner "Minimize" button.

Syntax:

```
pin {windowname | pattern | *}
```

where you must specify one of these:

- *windowname*, the (case not important) name, or title, at the top of a Client work window or external window
- *pattern*, a character sequence that ends with an asterisk (*), which performs a "wildcard" search (for example, `ab*` finds the **About** window)
- A lone asterisk (*), which pins all open external windows

If you `pin` a window that is already pinned, the command is ignored. If the command indicates a window that is missing or invalid, or if it does not match an open external window, an error message is issued.

Client menu: Context menu option (**Pin**) of external window title bar

Introduced: Build 56

5.89 preferences command

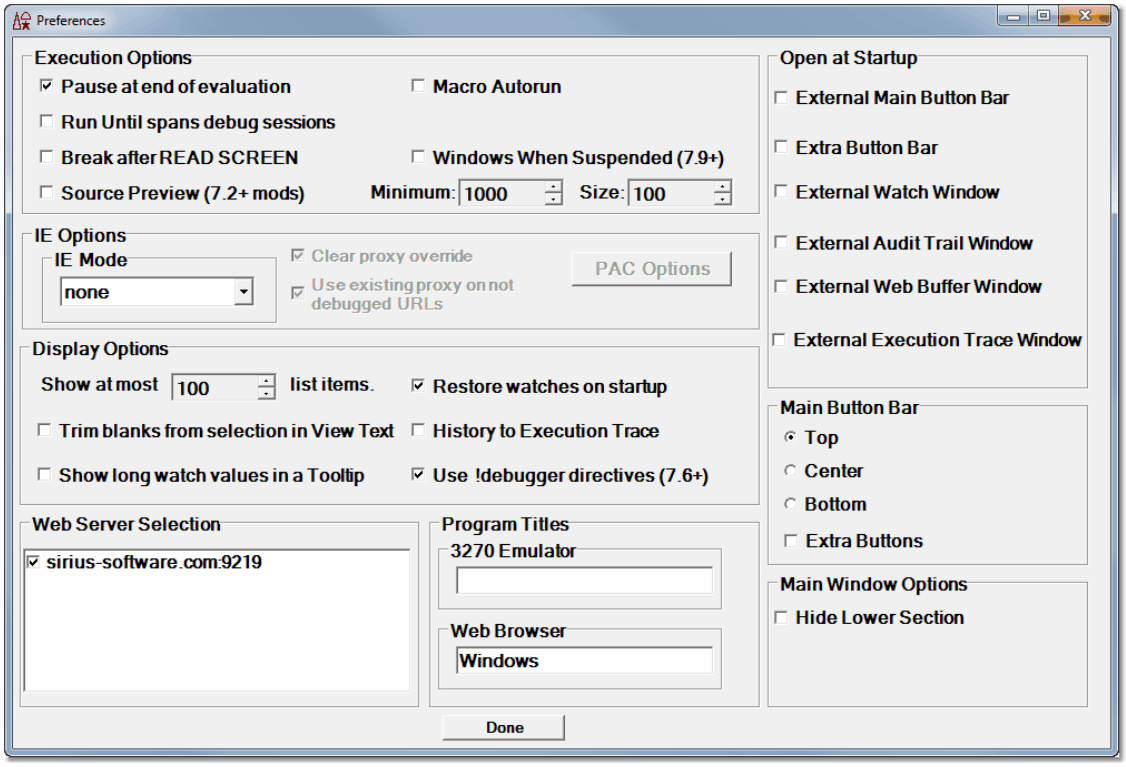
Action: Displays the **Preferences** dialog box (shown below), which is also accessible from the File menu 18 and by default by the Ctrl+P keyboard shortcut 295.

Syntax:

```
preferences
```

Client menu: **File > Preferences**

Introduced: —



5.90 previousCompileError command

Action: Finds the previous line in error relative to the current line, if the request being displayed fails to compile[136]. If the program you are debugging has no compilation errors, the commands does nothing.

Syntax:

```
previousCompileError
```

This command is unusual in that you can map it to a button that also has another command or macro mapped to it. See Button toggle for compilation errors[294].

Client menu: **Error > Previous Compile Error**

Introduced: —

5.91 previousHistory command

Action: Scans chronologically backward in the statement execution history[132], then highlights *in the Source Code or Daemon tab* the statement that was executed immediately prior to the statement that is currently highlighted with the Execution Position color.[298]

Syntax:

```
previousHistory
```

Client menu: **Execution > Select Previous History Line**

Introduced: Build 54

5.92 reloadBlackList command

Action: Updates the existing Black List 77 with the current contents of the `blacklist.txt` file, so you can dynamically update your Black List. Same as clicking the **Reload Black List** button on the **Proc Selection** page.

Syntax:

```
reloadBlackList
```

Client menu: **Execution** > **Reload Black List**

Introduced: Build 62

5.93 reloadWhiteList command

Action: Updates the existing White List 77 with the current contents of the `whitelist.txt` file, so you can dynamically update your White List. Same as clicking the **Reload White List** button on the **Proc Selection** page.

Syntax:

```
reloadWhiteList
```

Client menu: **Execution** > **Reload White List**

Introduced: Build 28

5.94 reloadLists command

Action: Loads or reloads to the Client the Exclude/Include lists 68, that is, lists of procedures or routines (methods, or User Language "complex" subroutines) whose code you want to be excluded from interactive debugging 65. These lists must be specified in particular text files: `excludeProc.txt`, `excludeRoutine.txt`, `includeProc.txt`, and `includeRoutine.txt`.

Syntax:

```
reloadLists
```

Same as clicking the **Reload Proc/Routine/Method Lists** button on the **Proc Selection** page.

Client menu: —

Introduced: Build 58

5.95 removeCurrentWatch command

Action: Removes the currently selected Watch Window 86 item. If there is no currently selected item, it does nothing.

The current selected item may simply be the last added or clicked line (and not highlighted), or it may be a highlighted line as the result of a search or location (top or bottom) command.

Using `removeCurrentWatch` to remove a watched item is essentially the same operation as right-clicking an item and selecting **Remove** from the context menu.

Syntax:

```
removeWatch
```

This "removeWatch" macro is an example of using the command:

```
# RemoveWatch.macro
#
# Usage: removeWatch varName
# where varName is name of watched variable to remove
# as it appears in the Watch Window.
# For example, removeWatch %j
#
# See if it is watched. If not, done:
in watchWindow searchFromTop &argstring
continueMacroIf &&searchSuccess
#
# It was watched, so remove and report:
removeCurrentWatch
echo &&concatenate("removed watch ", &argstring)
```

Client menu: —

Introduced: Build 58

5.96 resetAssertCounts command

Action: Normally, the assert counts accessible from the `&&assertFailureCount`, `&&assertStatus`, and `&&assertSuccessCount` Client functions 327 are reset when the Client is started/restarted and when a new macro is invoked. If you want to clear them at any arbitrary time, executing `resetAssertCounts` resets them to 0.

Syntax:

```
resetAssertCounts
```

Client menu: —

Introduced: Build 56

5.97 resetGlobalAssertCounts command

Action: Normally, the assert counts accessible from the `&&globalAssertFailureCount`, `&&globalAssertStatus`, and `&&globalAssertSuccessCount` Client functions 327 are reset only when the Client is started/restarted. If you want to clear them at any arbitrary time, executing `resetGlobalAssertCounts` resets them to 0.

Syntax:

```
resetGlobalAssertCounts
```

Client menu: —

Introduced: Build 57

5.98 restart command

Action: Restarts the Debugger Client.

1. Terminates all socket connections between the Client and the Online, and/or between the Client and a web browser.
2. Shuts down the Client normally, as if the **Exit** option were selected, and closes the Client window.
3. Starts the Client, reopening its window and invoking the same processing as if started by a click of the Client desktop icon (which includes reading the `debuggerConfig.xml` file).

Syntax:

```
restart
```

Client menu: **File** > **Restart**

Introduced: Build 56

5.99 restartDefault command

Action: Restarts the Debugger Client, restoring the window dimensions with which the Client displayed when it was initially installed. Otherwise, the Client restarts with the size and position (including internal window dimensions) it occupied upon last exit.

Syntax:

```
restartDefault
```

Client menu: **File** > **Restart with Default Window Size**

Introduced: Build 56

5.100 restoreLower command

Action: Restores the display of the lower section[14] of the Client main window, after it was hidden by a previous `hideLower`[212] or `toggleLower`[278] command or by selecting the **Hide Lower Section** option of the **Main Window Options** section of the **Preferences**[18] dialog box.

Syntax:

```
restoreLower
```

This command is equivalent to clearing the **Hide Lower Section** option of the **Preferences** dialog box.

`restoreLower` has no effect if the lower section is *not* hidden when the command is issued.

See also the `toggleLower`[278] command, which also restores the lower section if it is hidden when the command is issued, but which hides the section if it was not hidden.

Client menu: **File** > **Preferences** > (**Main Window Options**) **Hide Lower Section**

Introduced: Build 57

5.101 restoreTitle command

Action: Restores to the default the title of a Client main window that was changed by the `setTitle`[268] command. The default main window title is "The Janus Debugger" or "The TN3270 Debugger."

Syntax:

```
restoreTitle
```

See also `&&currentTitle`[334] and `&&originalTitle`[341].

Client menu: —

Introduced: Build 62

5.102 retryHttpPac command

Action: Attempts to execute an HTTP PUT and GET of a Proxy Auto Configure (PAC) 388 verification file to and from the HTTP server that is set up 390 to service PAC files.

`retryHttpPac` simulates simultaneous selection of both of the following in the **Preferences** 18 window:

- Either of the **IE Mode** options `newPac` or `mergedPac`
- The **PAC Options** option `http://URL`

Setting both of these items together triggers the automatic creation and maintenance of PAC files using HTTP URLs -- given an appropriately-setup HTTP server and Client configuration file `httpPacURL` 385 element.

Note: Command execution does not modify current settings in the Client's **Preferences** 18 window. However, if the **IE Mode** option **proxy** is selected, the command fails.

Syntax:

```
retryHttpPac
```

If the file verification test succeeds, the Client Status bar 49 displays a message like:

```
HTTP PAC files can be used.
```

See also `httpPutFile` 214, `httpGet` 213, and `&&currentPacFile` 333.

Client menu: —

Introduced: Build 63

5.103 run command

Action: Executes the code displayed in the Client's **Source Code** page until end-of-request or until an error, breakpoint, or daemon is encountered.

Syntax:

```
run
```

Client menu: **Execution** > **Run**

Introduced: —

5.104 runMacroFromUISelection command

Action: Lets you select and open for editing (via Windows Explorer) an existing Debugger macro 315 file.

Syntax:

```
runMacroFromUISelection
```

Client menu: **Macros** > **Run Macro**

Introduced: Build 53

5.105 runUntil command

Action: Runs program code without interruption until it reaches a specific procedure, then displays that procedure for debugging. Same as the Run Until Procedure button 73.

Note: As of version 7.6 of Model 204 and Client Build 63, the Debugger also stops at procedures that are included from an sdaemon 139 thread.

Syntax:

```
rununtil targetProc
```

where *targetproc* is the name of, or a character pattern for, the target procedure.

Client menu: **Execution** > **Run Until Proc**

Introduced: Build 26 (macros only); Build 28 (menu)

5.106 runUntilVariableChanges command

Action: Steps through the program being debugged, stopping if a statement modifies the value of the variable specified in the text box above the **Watch Window.** Displays in the **Execution Trace** tab the statement that modified the variable and the new variable value. Same as the Run to Change button 131.

In a macro, the command syntax is:

```
rununtilVariablechanges variable
```

where *variable* is the name of the User Language variable being observed.

Client menu: **Execution** > **Run Until Variable Changes**

Introduced: Build 26

5.107 runWithoutDaemons command

Action: Runs until end-of-request, or until an error or breakpoint is encountered; does not pause at daemon code 140.

Syntax:

```
runWithoutDaemons
```

Client menu: **Execution** > **Run Without Daemons**

Introduced: —

5.108 saveWatch command

Action: Saves to a local file the list of items currently displayed in the **Watch Window**, as described in Saving and restoring Watch Window contents 89.

The command's first optional argument is the name of the `.watch` file in which to store the **Watch Window** contents:

```
saveWatch [watchfile [overwrite]]
```

If you omit *watchfile,* a Windows file-selection dialog box lets you create a `.watch` file when the command executes.

Otherwise, if you specify a *watchfile* argument (the `.watch` extension may be omitted), the **Watch Window** contents are stored in the named file when the command executes.

The Client saves the watch file in the folder that contains the `JanusDebugger.exe` file, by default. 303

If a watch file with the same name already exists when `saveWatch` executes, the result depends on whether you also specified the `overwrite` parameter:

- If it is not specified, the `saveWatch` command fails, and an error message is issued.
- If it is specified, the existing file gets overwritten.

You may also specify the watch file name in these ways:

- As a macro variable[325]. For example:

```
set &a = "foo"
saveWatch &a overwrite
```

- With an absolute file-system path, which *must be enclosed in quotation marks*. Requires Build 58 or higher. For example:

```
saveWatch "c:\temp\foo.watch"

saveWatch "c:\temp\foo.watch" overwrite
```

The `loadWatch`[222] command restores the **Watch Window** contents from a watch file.

Client menu: **Data Display** > **Save Watch**

Introduced: Build 49

5.109 searchDown command

Action: Searches down[46] (relative to the current line) in the current main window page for the search string you specify in the command. Repeating the command locates the next occurrence of the search string. The search is *not* case-sensitive.

Optionally, searches down for the search string *in the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] searchDown search_string
```

where:

- *window* is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

```
about 39
auditTrail
commands 38
console
executionHistory 132
executionTrace
keyboardShortcuts 38
source
textviewer 147
value 99
watchWindow
webBuffer
```

- *search_string* is the required search string, with no additional quotation marks.

  To locate a target string that begins with an ampersand (&) and is **not** the name of a macro variable or Client function, prefix the target with a backslash (\) to treat the ampersand as a literal.

  To locate a single backslash character, escape the target backslash with a second backslash (`searchDown \\`).

  The backslash escape is valid as of Client Build 58.

Command examples:

```
in WatchWindow searchDown %y

searchDown &a
  (searches for value of macro variable &a)

in auditTrail searchdown \&&myProc
  (searches for string '&&myProc')
```

Related commands include: searchUp 255, searchFromTop 254, searchFromBottom 252

Client menu: **Search > Search Down**

Introduced: —

5.110 searchFromBottom command

Action: Searches up 45, from the bottom of the current main window page, for the search string you specify in the command. Repeating the command locates the same occurrence of the search string. The search is *not* case-sensitive.

Optionally, searches from the bottom *of the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] searchFromBottom search_string
```

where:

- *window* is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

  about 39
  auditTrail
  commands 38
  console
  executionHistory 132
  executionTrace
  keyboardShortcuts 38
  source
  textviewer 147
  value 99
  watchWindow
  webBuffer

- *search_string* is the required search string, with no additional quotation marks.
- To locate a target string that begins with an ampersand (&) and is **not** the name of a macro variable or Client function, prefix the target with a backslash (\) to treat the ampersand as a literal.

  To locate a single backslash character, escape the target backslash with a second backslash (`searchFromBottom \\`).

  The backslash escape is valid as of Client Build 58.

Command examples:

```
in WatchWindow searchFromBottom printText

searchFrombottom &a
  (searches for macro variable &a)

in auditTrail searchFromBottom \&&myProc
  (searches for string '&&myProc')
```

Related commands include: **searchUp** 255, **searchDown** 251, **searchFromTop** 254

Client menu: **Search > Search From Bottom**

Introduced: Build 11

5.111 searchFromTop command

Action: Searches 45 down, from the top of the current main window page, for the search string you specify in the command. Repeating the command only locates the same occurrence of the search string. The search is *not* case-sensitive.

Optionally, searches from the top *of the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] searchFromTop search_string
```

where:

- *window* is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

  about 39
  auditTrail
  commands 38
  console
  executionHistory 132
  executionTrace
  keyboardShortcuts 38
  source
  textviewer 147
  value 99
  watchWindow
  webBuffer

- *search_string* is the required search string, with no additional quotation marks.
- To locate a target string that begins with an ampersand (`&`) and is **not** the name of a macro variable or Client function, prefix the target with a backslash (`\`) to treat the ampersand as a literal.

  To locate a single backslash character, escape the target backslash with a second backslash (`searchFromTop \\`).

  The backslash escape is valid as of Client Build 58.

Command examples:

```
in WatchWindow searchFromTop printText

searchFromTop &a
```
(searches for value of macro variable &a)

```
in auditTrail searchFromtop \&&myProc
```
(searches for string &&myProc)

Related commands include: **searchUp**[255], **searchDown**[251], **searchFromBottom**[252]

Client menu: **Search > Search From Top**

Introduced: —

5.112 searchUp command

Action: Searches up[46] (relative to the current line) in the current main window page for the search string you specify in the command. Repeating the command locates the next occurrence of the search string. The search is *not* case-sensitive.

Optionally, searches up for the search string *in the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] searchUp search_string
```

where:

- *window* is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

about 39
auditTrail
commands 38
console
executionHistory 132
executionTrace
keyboardShortcuts 38
source
textviewer 147
value 99
watchWindow
webBuffer

- *search_string* is the required search string, with no additional quotation marks.
- To locate a target string that begins with an ampersand (&) and is **not** the name of a macro variable or Client function, prefix the target with a backslash (\) to treat the ampersand as a literal.

  To locate a single backslash character, escape the target backslash with a second backslash (`searchUp \\`).

  The backslash escape is valid as of Client Build 58.

Command examples:

```
in WatchWindow searchUp printText

searchUp &a
  (searches for value of macro variable &a)

in auditTrail searchup \&&myProc
  (searches for string '&&myProc')
```

Related commands include: searchDown 251, searchFromTop 254, searchFromBottom 252

Client menu: **Search > Search Up**

Introduced: Build 11

5.113 selectAuditTab command

Action: Displays the Audit Trail tab[10] in the Client main window.

For example:

```
<mapping command="selectAuditTab" key="1"
   keyModifier="ctrl" />
```

Client menu: —

Introduced: Build 46

5.114 selectExecutionTraceTab command

Action: Displays the Execution Trace tab[13] in the Client main window.

Syntax:

```
selectExecutionTraceTab
```

Client menu: —

Introduced: Build 46

5.115 selectNextTab command

Action: Displays in the Client main window the page whose tab[10] is to the right of the currently displayed page; wraps from the rightmost page to the leftmost.

Syntax:

```
selectNextTab
```

Client menu: —

Introduced: Build 46

5.116 selectProcSelectionTab command

Action: Displays the Proc Selection tab 13 in the Client main window.

Syntax:

```
selectProcSelectionTab
```

Client menu: —

Introduced: Build 46

5.117 selectSourceTab command

Action: Displays in the Client main window the page (**Source Code** 11 or **Daemon** 139) that contains the source code that is currently executing.

Syntax:

```
selectSourceTab
```

Client menu: —

Introduced: Build 46

5.118 selectWatchWindow command

Action: Displays and gives focus either to an external 306 **Watch Window** or to the Client main window (if no external **Watch Window** is deployed).

Syntax:

```
selectWatchWindow
```

Client menu: —

Introduced: Build 51

5.119 selectWebBufferTab command

Action: Displays the Web Buffer page 12 (if Janus Debugger) in the Client main window.

Syntax:

```
selectWebBufferTab
```

Client menu: —

Introduced: Build 46

5.120 set command

Action: Lets you create and initialize macro variables 325. Variable names begin with a single ampersand (&), and eligible variable values include constants, User Language variables, fields, and $list elements, and other macro variables and functions 327.

Syntax:

```
set &target = string | [-]nnn | &var | %xxx | g.xxx | f.xxx
              | $listcnt(x) | $listinf(x,y)
              | &&function([args])
```

where:

- &*target* is the macro variable being set.
- *string* is a quoted string constant (double-quotes or single quotes are valid).
- [-]*nnn* is an integer constant with an optional leading minus sign.
- &*var* is a previously defined macro variable.
- *%xxx* is a mainframe variable.
- g.*xxx* is a Debugger global variable reference 94.
- f.*xxx* is a Debugger field reference 93, possibly with a subscript.
- $listcnt/$listinf are the Debugger functions for viewing $list counts and elements. 96
- &&*function* is a macro function.

Note: To set a macro variable or macro function in a Client mapping command 292, you need to XML entity-encode each ampersand (&). For example, to map the command `set &foo = %i`, you specify it like this:

```
<mapping command="set &amp;foo = %i" button="button14"/>
```

Client menu: —

Introduced: Build 28

5.121 setBlackList command

Action: Lets you dynamically specify or clear a procedure Black List 77, which identifies the outer procedures you do *not* want the Debugger to debug. These procedures get executed but their code is not sent to or displayed in the Client. This command temporarily overrides any existing Black List, but it does **not** physically affect the contents of the black list file stored on disk (`blacklist.txt`). The command's effect is not persistent over runs of the Client.

Syntax:

```
setBlackList [proc] ...
```

where *proc* is one of possibly multiple, blank-separated, procedure file names. Name matching is case insensitive, and wildcards 74 are allowed.

If no names are specified, the current black list, if any, is treated as empty. If one or more procedure names are specified, the contents of the black list are overridden by this new set of procedure names.

You might use this command for testing:

1. Put it in a User Language procedure.
2. Send it to the Client via the TN3270 DEBUG CLIENTCOMMAND 149 Model 204 command.

Doing this lets you have a mainframe-based testing harness that sets up a list on the Client. For example:

```
TN3270 DEBUG CLIENTCOMMAND 'setBlackList P.SHEMP'
TN3270 DEBUG CLIENTCOMMAND 'turnOnBlackList'
```

See also the `setWhiteList` 269 command.

Client menu: —

Introduced: Build 62

5.122 setBreakpointOnCurrentLine command

Action:

Sets a breakpoint[56] on the currently selected line in the **Source Code** (or Daemon[139]) page; if the currently selected line is not an executable statement, sets a breakpoint on the next executable line after the currently selected line.

Syntax:

```
setBreakpointOnCurrentLine
```

Notes:

- If you have not explicitly selected a code line, the current line is the highlighted code line in the current execution position.
- If you execute this command for a line that already has a breakpoint set, no additional action is taken.

For code lines for which no breakpoint is already set, the toggleBreakpointOn[277] command has the same effect as the setBreakpointOnCurrentLine command, and both commands have the same effect as double-clicking a code line or right-clicking a line and selecting **Toggle Breakpoint** from the context menu.

Example:

This macro looks for a line that matches its argument; if it finds such a line, it sets a breakpoint on it:

```
selectsourcetab
searchFromTop &argstring
continueMacroIf &&searchSuccess
setBreakPointOnCurrentLine
set &message = &&concatenate("breakpoint on line matching '", &
setStatusMessage &message
```

To clear a breakpoint that is set on the current line, you can use the clearBreakpointOnCurrentLine[186] command or the toggleBreakpointOn command.

See also the breaksAt[183] and breaks[182] commands.

Client menu: —

Introduced: Build 57

5.123 setIEmode command

Action: Controls whether, and the host URLs for which, the Debugger will serve as the proxy server 385 for users of the Internet Explorer or Chrome browser. The command has options to set or remove the setting of the Debugger Client as the proxy server for IE or Chrome browser requests. The command also has an option to create a PAC (Proxy Auto Config) file 388, which restricts the host URLs for which the Client will act as proxy server, and an option to merge such a PAC file with a preexisting PAC file, if any.

Syntax:

```
setIEmode {none|proxy|newPac|mergedPac} [file|http]
```

Where:

- `none`

  Makes no changes to the Internet Properties tool 392, which contains configuration settings for Internet Explorer and Chrome browsers, and undoes any such setting changes made since the Debugger Client was started.

  This option also undoes the effects of any other `setIEmode` commands issued since the Client was started.

- `proxy`

  Makes the Debugger Client the proxy server for Internet Explorer and Chrome. This is the same as setting the **Preferences** dialog box equivalent, the **proxy** option for **IE Mode.**

- `newPac`

  Generates a PAC file using the hosts and ports specified 378 in the Debugger configuration file (`debuggerConfig.xml`) settings, and sets IE and Chrome to use it. Any existing PAC file (that is, specified in the Internet Properties tool 392) is *not* used.

- `mergedPac`

  Merges any existing PAC file with a PAC file generated from the Debugger configuration file settings, and sets IE and Chrome to use it.

- `file` or `http`

  If you are using `newPac` or `mergedPac` to produce a PAC, specifying `file` or `http` sets the type of the URL that is sent to the browser. `file` is the default.

  To take advantage of an `http` setting, you must also set up an HTTP server 390 to service the PAC file.

These options are available as of Build 63.

For parameter options that modify the **Internet Properties** configuration, no restart of the browser is necessary, and the Debugger provides automatic maintenance (makes the **Internet Properties** modifications at Client startup, then removes them when the Client closes).

Example:

If you issue the following command, the Debugger Client immediately generates a merged PAC file and configures the browser to run it; then at Client shutdown, the command restores the **Internet Properties** initial (pre-command) settings:

```
setIEmode mergedPac
```

Once the above command is issued, the browser runs the script each time a URL is requested, and the Debugger Client serves as proxy only for the hosts specified in the script. The merged PAC file specification will persist through Client closes and starts until you use `setIEmode` or the **Preferences** dialog box to change or remove it.

See also:

- The `generatePac` 207 command, which creates and/or merges a PAC file, but makes no modifications to the **Internet Properties** configuration settings.
- The `showIE` 272 command, which displays the current Internet connection settings plus additional details.
- The **`retryHttpPac`** 247 command, which verifies whether your HTTP PAC server is properly set up and pointed to from the Client configuration file.

Client menu: —

Introduced: Build 62

5.124 setM204Data command

Action: Lets you set a Model 204 %variable or global variable as if you right-clicked a **Watch Window** item and selected **Change Value** 122. The behavior and restrictions for this command are the same as the **Change Value** option.

Syntax:

```
setM204Data %xxx | g.xxx
     = "string" | [-]nnn | &var | &&function([args])
```

where:

- *%xxx* is a User Language variable.
- g.*xxx* is a Debugger global variable reference 94.
- *string* is a quoted string constant (double-quotes or single quotes are valid).
- [-]*nnn* is an integer constant with an optional leading minus sign.
- &*var* is a previously defined macro variable.
- &&*function* is a macro function.

Note: This command may only be issued while a request is being evaluated.

Client menu: —

Introduced: Build 50

5.125 setPreference command

Action: Lets you use a macro 315 or mapped 289 button or key to control Client preference settings that are available via the Preferences 18 dialog box or the Proc Selection 13 page.

Syntax:

```
setPreference option {on|off}
```

where *option* is one of the following:

- `breakAfterReadScreen`

  Selects or clears the **Break after READ SCREEN** 59 checkbox in the Client's **Preferences** dialog box

- `debuggerdirectives`

  Selects or clears the **Use !debugger directives** 66 checkbox in the **Preferences** dialog box

- `historyToTrace`

  Selects or clears the **History To Execution Trace** 132 checkbox in the **Preferences** dialog box

- `ignoredFileTypeList`

  Toggles Debugger file-type filtering 380 on or off:

  `setPreference ignoredFileTypeList {on|off}`

  Where:

  - `on` honors the "ignore-list" default behaviour
  - `off` does no file-type filtering

- `macroAutorun`

  Selects or clears the **Macro Autorun** 324 checkbox in the **Preferences** dialog box

- `pauseAtEndEval`

  Selects or clears the **Pause at end of evaluation** 59 checkbox in the **Preferences** dialog box

- `useProcLists`

  Selects or clears the **Use Proc Lists for exclude/include** 68 checkbox in the Client's **Proc Selection** tab

- `useRoutineLists`

  Selects or clears the **Use Routine Lists for exclude/include** 68 checkbox in the Client's **Proc Selection** tab

- `valueDisplayOnConsole`

  Controls whether value displays 99 appear in a separate **Value** window when the **Console** 322 is open (the default, `on`, shows them in the **Console** if it is open)

Note: Instead of `on` or `off`, the command also takes `1` or `0`.

You may want to use the command to toggle a setting in a Client macro[315], for example:

```
# toggle use exclude/include directives
toggle &debuggerDirectives !Directives
setPreference debuggerDirectives &debuggerDirectives
```

Client menu: —

Introduced: Build 55

5.126 setStatusMessage command

Action: Lets you specify a message for display in the Client Status bar[49].

Syntax:

```
setStatusMessage {&var|&&function|const}
```

where:

- *&var* is a macro variable that may or may not already exist.
- *&&function* is a macro function.
- *const* is a character string, which does not have to be enclosed in quotes.

Examples:

```
setStatusMessage Nothing happening!

set &msg = "Here's Johnny"
setStatusMessage &msg
```

Client menu: —

Introduced: Build 59

5.127 setTitle command

Action: Lets you change the title of the Client main window (which by default is "The Janus Debugger" or "The TN3270 Debugger."

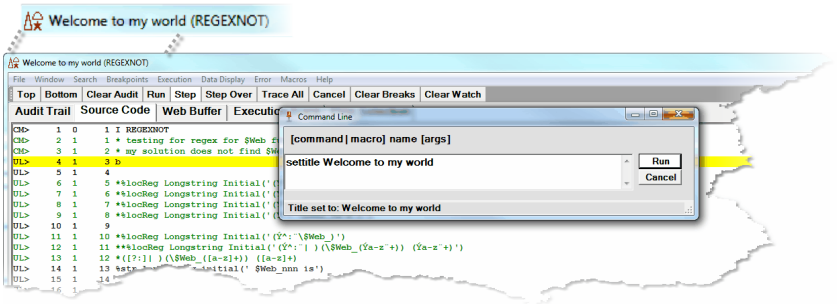
Syntax:

```
setTitle newtitle
```

where *newtitle* is a non-quoted, case-insensitive string of as many as 50 characters.

Examples:

- The image below shows the result of issuing a `setTitle Welcome to my world` command. Notice that the name of the procedure being debugged is retained.



- The following macro uses `setTitle`:

```
continueMacroIf &&blackOrWhiteList <> 'black'
labelButton button0 BlackList Off
turnOnBlackList
setTitle Black List on
set &changed = 1
clearStatus
```

See also:

- The `restoreTitle` 246 command replaces any changed main window title with the default title.
- `&&currentTitle` 334 and `&&originalTitle` 341 display the current and default titles of the Client main window.

Client menu: —

Introduced: Build 62

5.128 setWhiteList command

Action: Lets you dynamically specify or clear a procedure White List 77, which explicitly identifies the outer procedures you want the Debugger to debug. Non-listed procedures get executed, but their code is not sent to or displayed in the Client. This command temporarily overrides any existing White List, but it does **not** physically affect the contents of the white list file stored on disk (`whitelist.txt`). The command's effect is not persistent over runs of the Client.

Syntax:

```
setWhiteList [proc]...
```

where *proc* is one of possibly multiple, blank-separated, procedure file names. Name matching is case insensitive, and wildcards 74 are allowed.

If no names are specified, the current white list is treated as empty. If one or more procedure names are specified, the contents of the white list are overridden by this new set of procedure names.

You might use this command for testing by putting it in a User Language procedure and sending that to the client via the existing TN3270 DEBUG CLIENTCOMMAND 153 Model 204 command. Doing this lets you have a mainframe-based testing harness that sets up a white list on the Client.

For example:

```
TN3270 DEBUG CLIENTCOMMAND 'setWhiteList P.MOE P.LARRY'
TN3270 DEBUG CLIENTCOMMAND 'turnOnWhiteList'
```

See also the `setBlackList` 261 command.

Client menu: —

Introduced: Build 62

5.129 showAbout command

Action: Displays the contents of the Client's "About box," which is accessed from the **About** option of the Client Help menu 38.

Syntax:

```
showAbout
```

Displays the following in the **About** window:

- The Sirius Mods version with which this "build" of the Debugger Client is associated
- The number of this Client build
- A searchable summary of the features provided by this and past builds

Client menu: **Help** > **About**

Introduced: Build 43

5.130 showCommands command

Action: Displays in alphabetical order and with simple definitions the entire set of Client commands 177.

Syntax:

```
showCommands
```

Client menu: **Help** > **Commands**

Introduced: Build 50

5.131 showFunctions command

Action:: Displays in alphabetical order and with simple definitions the entire set of Client functions 327.

Syntax:

```
showFunctions
```

Client menu:: **Help** > **Functions**

Introduced:: Build 58

5.132 showIE command

Action: Displays the current Internet Explorer browser operating mode (the **File** menu > **Preferences** > **IE Mode** option or equivalent `setIEmode`[263] command setting that is in effect), as well as the current values of IE settings that pertain to the Debugger Client.

Syntax:

```
showIE
```

Sample output:

```
Current ie settings
...Proxy flags=(5)
...Proxy server=()
...Proxy bypass=()
...Proxy autoConfigUrl=(http://sirius.sirius-software.com:929
...Raw flag byte=(05)
...Read from registry key=
(HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\
Generated New Pac file: C:\Users\jlapierre\Documents\Debugger
Added: 4 web servers from the configuration.
Generated Pac File:
// C:\Users\jlapierre\Documents\Debugger\testInst\debuggerInt
debugger client on:
2015 06 11 15:20:40
function FindProxyForURL(url, host) {
   urlLc = url.toLowerCase();
   isDebuggable = (
      (shExpMatch(urlLc, "http://sirius-software.com:3666/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:9219/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:3667/*")
         ||
      (shExpMatch(urlLc, "http://sirius-software.com:3000/*")
   );
   if (isDebuggable) return "PROXY 127.0.0.1:8081;DIRECT";
   return "DIRECT";
}
pacURLMode: http
httpPacUrl='http://sirius.sirius-software.com:9292/pacman/'
httpPac upload filename: 'PAC.182.16.60.88.JS'
```

Common values for `Proxy flags` (in the output above) are:

5 A proxy automatic-configuration (PAC) file is being used

3 A proxy server is being used

1 A direct connection to the Internet is being used (no proxy or automatic-configuration file)

Client menu: —

Introduced: Build 62

5.133 showShortcuts command

Action: Displays the Client's current (default 295 as well as mapped) keyboard shortcuts.

Syntax:

```
showShortcuts
```

Client menu: **Help** > **Keyboard Shortcuts**

Introduced: Build 43

5.134 skipPreview command

Action: When the Source Preview feature 83 is enabled, runs the program code normally but without downloading the source code for viewing or controlled execution.

Syntax:

```
skipPreview
```

Client menu: **Execution** > **Skip Previewed Source**

Introduced: Build 30

5.135 span command

Action: Restores to the default the spanning behavior of a Debugger macro 315, reversing any previously issued noSpan 231 command. By default, macro execution spans the evaluation of requests (if a request completes before a macro is finished, the remaining macro commands apply to the next request).

Syntax:

```
span
```

Scope: Allowed only in Debugger macros; **not** available as a mappable Client command

Client menu: —

Introduced: Build 37

5.136 step command

Action: Executes a single statement 53 in the code displayed in the Client's **Source Code** or **Daemon** page.

Syntax:

```
step
```

Client menu: **Execution** > **Step**

Introduced: —

5.137 stepOut command

Action: Steps out 62 of a subroutine or method.

Syntax:

```
stepOut
```

Client menu: **Execution** > **Step Out**

Introduced: —

5.138 stepOver command

Action: Executes a single statement 53 in the code displayed in the **Source Code** or **Daemon** page, but bypasses a subroutine or method.

Syntax:

```
stepOver
```

Client menu: **Execution** > **Step Over**

Introduced: —

5.139 toggle command

Action: Reverses the state ("True" or "False") of a macro variable 325. If the variable value is `0` or a zero length (null) string, or if it is undefined, its state is considered to be `False.` For all other values, its state is considered to be `True.`

The `toggle` command sets to 0 ("toggles to False") a variable whose state is True. And it sets to 1 ("toggles to True") a variable whose state is False.

Syntax:

```
toggle &var [msg_string]
```

where:

- *&var* is a macro variable that may or may not already exist.
- *msg_string* is an optional message string, useful for constructing a message to report what was toggled.

  If *msg_string* is specified, either of the following is displayed in the Status bar 49 after the toggle:

  "*msg_string* `is on`" (if toggled on)

  "*msg_string* `is off`" (if toggled off)

Example:

```
# toggle history
toggle &historyWanted Auto History
```

Client menu: —

Introduced: Build 37

5.140 toggleBreakpointOnCurrentLine command

Action: Sets (or removes) a breakpoint[55] for the current **Source Code** or **Daemon** line, if the line is or starts an executable statement. If the line is not an executable statement or the start of one, sets (or removes) a breakpoint for the first subsequent line that is or starts an executable statement.

For code lines for which a breakpoint is set, `toggleBreakpointOn` removes the breakpoint.

Syntax:

```
toggleBreakpointOnCurrentLine
```

This command has the same effect as double-clicking a code line or right-clicking a line and selecting **Toggle Breakpoint** from the context menu.

`toggleBreakpointOnCurrentLine` always sets or clears a breakpoint; `setBreakpointOnCurrentLine`[262] performs only a set action, and `clearBreakpointOnCurrentLine`[186] performs only a clear.

See also the `breaksAt`[183] and `breaks`[182] commands.

Client menu: **Breakpoints** > **Toggle Breakpoint on Current Line**

Introduced: Build 28

5.141 toggleInitExclude command

Action: Inverts the way Exclude mode 65 operates so that it initially excludes code instead of initially including code (until an explicit directive).

Syntax:

```
toggleInitExclude
```

Requires at least version 7.6 of the Sirius Mods.

Client menu: **Execution** > **Toggle Init Exclude**

Introduced: Build 47

5.142 toggleLower command

Action: Changes the display of the Client's main window either to hide the lower section 14 (if currently it is not hidden) or to restore the display of the lower section (if currently it is hidden).

This command is equivalent to either selecting or clearing the **Hide Lower Section** option of the **Main Window Options** section of the **Preferences** 18 dialog box.

Syntax:

```
toggleLower
```

`toggleLower` always hides or restores the lower windows; `hideLower` 212 performs only a "hide" action, and `restoreLower` 246 performs only a "restore."

Client menu: **File** > **Preferences** > (**Main Window Options**) **Hide Lower Section**

Introduced: Build 57

5.143 top command

Action: Scrolls to the top of the currently displayed page; has no effect if the **Proc Selection** page is being displayed.

Optionally, scrolls to the top of *the Client window you specify* as the value of the command's `In window` prefix.

Syntax:

```
[In window] top
```

where *window* is one of the following keywords, not case sensitive, which identify a Client window. Links are provided to help identify the less common windows:

about 39
auditTrail
commands 38
console
executionHistory 132
executionTrace
keyboardShortcuts 38
source
textviewer 147
value 99
watchWindow
webBuffer

Client menu: **Window > Top**

Introduced: —

5.144 trace command

Action: Traces 128 execution, and records executed lines.

Syntax:

```
trace
```

Client menu: **Execution > Trace To End**

Introduced: Build 26

5.145 traceUntilVariableEqualsValue command

Action: Steps through the program being debugged, stopping if a statement modifies the value of the variable specified in the input box so that it equals a value you specify. Displays in the **Execution Trace** tab the statement that modified the variable and the new variable value.

Same as Alt key + Run to Change 132 button.

In a macro, the command syntax is:

```
traceUntilVariableEqualsValue variable target
```

where:

- *variable* is the required variable name
- *target* is the required target *variable* value

Client menu: **Execution** > **Trace Until Variable Equals Value**

Introduced: Build 26

5.146 traceValues command

Action: Same as run 248 command, but also reports all statements that modify the value of the variable specified in the text box, and reports what value was assigned to the variable. Described further in Tracing all updates to a variable's value. 130

In a macro, the command syntax is:

```
traceUntilValues varName
```

where *varName* is the required variable name.

Client menu: **Execution** > **Trace Values**

Introduced: Build 26

5.147 turnOffBlackList command

Action: Deactivates Black List filtering 79 (like clicking the **Turn off Lists** button on the **Proc Selection** page).

Syntax:

```
turnOffBlackList
```

Client menu: **Execution** > **Turn Off Black List**

Introduced: Build 62

5.148 turnOffDebugging command

Action: Turns off Debugger processing (like executing TN3270 DEBUG OFF 149).

Syntax:

```
turnOffDebugging
```

Client menu: **Execution** > **Turn Off Debugging**

Introduced: —

5.149 turnOffWhiteList command

Action: Deactivates White List filtering 79 (like clicking the **Turn off Lists** button on the **Proc Selection** page).

Syntax:

```
turnOffWhiteList
```

Client menu: **Execution** > **Turn Off White List**

Introduced: Build 28

5.150 turnOnBlackList command

Action: Activates Black List filtering 79 (like clicking the **Turn On Black List** button on the **Proc Selection** page).

Syntax:

```
turnOnBlackList
```

Client menu: **Execution** > **Turn On Black List**

Introduced: Build 62

5.151 turnOnWhiteList command

Action: Activates White List filtering 79 (like clicking the **Turn On White List** button on the **Proc Selection** page).

Syntax:

```
turnOnWhiteList
```

Client menu: **Execution** > **Turn On White List**

Introduced: Build 28

5.152 unPin command

Action: Unpins the specified Client external window(s)306, that is, no longer forces the window(s) to remain at the top of the Client PC's open window stack.

Syntax:

```
unpin {windowname | pattern | *}
```

where you must specify one of these:

- *windowname*, the (case not important) name, or title, at the top of a Client work window or external window
- *pattern*, a character sequence that ends with an asterisk (*), which performs a "wildcard" search (for example, `w*` finds the **Watch Window** and **Web Buffer** window)
- A lone asterisk (*), which removes the pinning from all pinned windows

If you `unPin` a window that is not already pinned, the command is ignored. If the command indicates a window that is missing or invalid, or if it does not match an open external window, an error message is issued.

To pin a window that is not currently pinned, use the `pin`238 command.

Client menu: Context menu option (**UnPin**) of external window title bar

Introduced: Build 56

5.153 unSet command

Action: Lets you remove a macro variable 325.

Syntax:

```
unSet &target
```

where &*target* is the macro variable being removed.

Note: To unset a macro variable or macro function in a Client mapping command 292, you need to XML entity-encode each ampersand (&). For example, to map the command `unset &foo`, you specify it like this:

```
<mapping command="unset &amp;foo" button="button14"/>
```

Client menu: —

Introduced: Build 59

5.154 valueDisplay command

Action: Acts like the Value button 99, displaying in a separate window the value of the item specified or the value currently in the Entity-name input box 50.

Syntax:

```
valueDisplay [value]
```

where *value* is the program item whose value you want to display.

If *value* is not specified, the command attempts to use the value specified in the Entity-name input box. For example, you might want to map a button you can readily click to display the value of what is in the Entity-name input box:

```
mapbutton Button0 valueDisplay
```

The **Value** window opened by `valueDisplay` can be closed by `closeValueDisplay.` 194

In a macro, the variable name is specified as an argument, for example: `valueDisplay %i`

If `valueDisplay` is executed, *and* the Console 322 is open, the value is displayed in the **Console** window. To insist that a Value window be used for the display in this case, use the `valueDisplayOnConsole` option of the `setPreference` 265 command.

Client menu: **Data Display > Value Display**

Introduced: Build 43

5.155 varDump command

Action: Displays the current values of all macro variables 320 defined during this Client session. The message is normally displayed in a standard Windows informational box (entitled **varDump for Macro**). If the macro console 322 is open, however, the message is sent to the console instead.

Syntax:

```
varDump
```

The command output is a display of the count of the number of macro variables, followed by an alphabetically ordered list of the individual variables (including &argstring 320) in name="value" format. For example:

```
8 macro variables
&a1="1"
&a2="-1"
&a3="666"
&a4="4"
&a5="5"
&a6="All work and no play makes jack a dull boy..."
&argstring=""
&b="1"
```

Client menu: —

Introduced: Build 28

5.156 viewText command

Action: Invokes a separate viewer 147 for copying, printing, and saving Client text data.

Syntax:

```
viewText
```

Client menu: **Window** > **View Text**

Introduced: —

5.157 windowToTop command

Action: Brings the specified Client window to the top of your screen's stack of application-windows. For example, specifying `windowToTop Web Buffer` brings an external 306 **Web Buffer** window to the foreground of your monitor screen.

Syntax:

```
windowToTop windowname
```

where *windowname* is the (case not important) name, or title, at the top of a Client work window or external window. *windowname* may end with an asterisk (*) to perform a "wildcard" search (for example, `ab*` finds the **About** window).

Client menu: —

Introduced: Build 50

CHAPTER 6 Customizing Client Operations

The Debugger Client standard operations are mainly controlled by a default set of buttons and hot keys and their menu-option counterparts. Those controls activate a set of underlying commands to which you have access. This chapter describes how you can create alternative mappings of these commands to reassign the operations that the buttons and keys perform.

The chapter also describes the options available for changing the default colors of the text or background of the various Client displays, how to change the location of the files the Client creates and uses during debugging sessions, and a variety of options for detaching and arranging the Client's constituent windows.

Note: In addition to the customizations described in this chapter, the Client's **Preferences** window (accessed via the **File** menu) contains multiple options 18 for controlling the operation of the Client.

The Client configuration file, set up during installation of the Debugger, is the site of some of the customizations discussed in this chapter, and it can be edited to provide other customizations, as described in Customize the Debugger configuration file 378.

The sections included in this chapter are:

6.1 Reconfiguring GUI buttons and hot keys

The fifteen buttons[289] in the main button bar[39] (and those in any extra button bar[42]) are fully configurable. You can set the buttons to perform commands or macros, and you can rearrange their positions or add separator buttons[289].

You may also create your own keyboard shortcuts[291] (also called "hot keys") for commonly used commands.

If necessary, you can even provide an alternative customization that overrides the primary reconfiguration. This lets you provide, say, group-level settings that may be overridden by individual-level settings.

The default setting of a configurable button is provided where the individual button is discussed in this document, and the settings are also summarized later[295] in this section.

To reconfigure buttons or keyboard shortcuts, you can define a mapping file or use a Client command.

Using a mapping file

1. Create[291] an XML file that contains the command[177] or macro[315] (multiple commands) to execute paired with the button and/or key that invokes it.

   This file must be named `ui.xml` and is assumed[303] to reside in the installation target folder (along with the JanusDebugger.exe Client program).

2. Restart the Debugger Client.

Using a Client command

As of Client Build 56, there is an alternative way to reconfigure buttons or keyboard shortcuts that does not involve a mapping file or a Client restart:

1. From the Client's **Command Line**[323] tool, or within a macro[315], or from within a User Language request by using the ClientCommand method of the DebuggerTools[159] class, issue these commands as necessary:

   - `mapButton`[226], which specifies the button mapping[292] you want
   - `mapKey`[226], which specifies the keyboard shortcut you want
   - `clearButton`[187], which removes the button mapping you specify
   - `clearKey`[189], which removes the keyboard shortcut you specify

2. View the button arrangement or test the key combination you specified or removed.

Unless you changed only a button modifier (a key you press along with clicking the button), an updated button's new label is displayed and the button is available for immediate use. A cleared button is removed immediately from its button bar.

The button-mapping and hot-key updates you make with `mapButton` or `mapKey` are **not** reflected in the `ui.xml` file, and they do not persist through subsequent Client sessions.

Additional Client commands let you modify buttons:

- `disableButton` 200 and `enableButton` 202 disable and enable button bar buttons.
- `labelButton` 221 lets you replace the label of a button.

In this section

The following subsections discuss the eligible commands, buttons, and keys, how you create a `ui.xml` file for their reconfigurations, and what their default settings are:

6.1.1 Introducing the configurable components

The activities you invoke from the Debugger Client GUI are also available as commands you can assign to different Client buttons or keyboard keys or combinations of both of these, as well as to Debugger macros 315. This section describes the commands, buttons, and keys you can associate in a mapping file 291 or using a mapping command 288 to reconfigure the Client user interface.

Commands

Client commands are the operations that you invoke from Client menus and can assign to a Debugger Client button, keyboard shortcut, or macro. The act of associating a button or keyboard shortcut with a command or macro (multiple commands) is termed "mapping."

The Client command reference 177 describes the available commands. The default hot keys and buttons with which some of these commands are associated are summarized later. 295

Named buttons and separators

When mapping a command or macro to a button in the `ui.xml` file, you refer to the button by name:

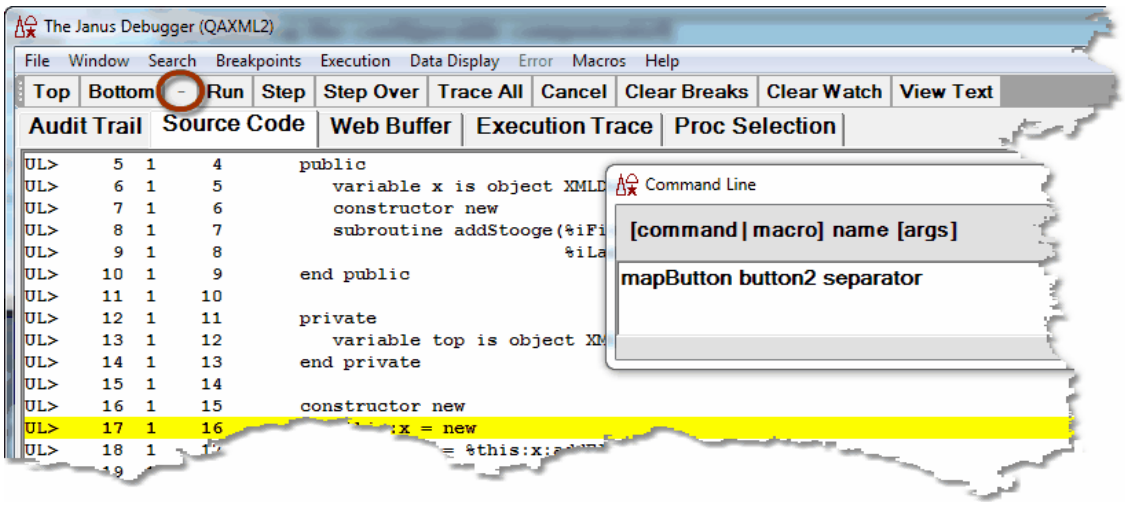
- From left to right, the fifteen mappable buttons in the main button bar[39] are named `button0, button1, . . . button14.` The buttons have initial default mappings.[295]
- The fifteen mappable buttons in the extra button bar[42] are named `extrabutton0, extrabutton1, . . . extrabutton14.` These buttons have **no** initial default mappings.

Only button bar buttons are mappable. No other Client buttons are mappable.

An additional option (as of Client build 57) is to map a named button to a special command keyword (`separator`) that converts the button to a **separator**, a button whose sole function is to provide a visual separation between buttons, say for better visual discrimination or to create button groupings. Such a button is always dimmed and not responsive.

The `separator` keyword is available for the `mapButton`[226] command and the mapping-file `mapping`[292] element.

The following image shows a newly created separator button:



Button modifiers

Normally, when you map a command or macro to a button, the command or macro is executed when you click the button. However, you can also map a command or macro to a "modified" button: the command or macro executes only when you click a button while you are holding down the Alt or Ctrl key on your keyboard.

This mechanism lets you map multiple commands or macros to one button. The usual click of the button executes one command or macro, while pressing Alt and clicking the button executes a second command or macro, and pressing Ctrl and clicking the button executes a third command or macro.

A button's label is not affected by specifying a modifier for the button. The label always indicates the primary, unmodified, function of the button.

Keyboard shortcuts

Often, a keyboard shortcut is the best way to do an important operation. You may map a keyboard shortcut to any alphabetic key (lowercase and uppercase are differentiated), numeric key, or to any of the function keys except F1 (that is, F2, F3, . . . F12). As with mapping buttons, you can specify an Alt or Ctrl modifier key for a keyboard shortcut.

To be reminded of the current (default 295 as well as mapped) keyboard shortcuts, select **Keyboard Shortcuts** from the **Help** menu.

6.1.2 Setting up the ui.xml file

Each time the Debugger Client is started, it checks for the presence of a `ui.xml` file in the same folder as the Client executable file itself (the default) or in the folder specified in the Client configuration file 303. If no such file is located, the Client opens with its default presentation of GUI buttons and their associated commands, and it responds to its default set of hot keys and their associated commands.

If you want to change the Client's default buttons and hot key associations 295, you must provide in the appropriate folder a `ui.xml` text file that adheres to the structure described in this section.

Note: You can also define an alternative to the `ui.xml` file: following the same rules for setting up the `ui.xml` file, you provide settings in the uimore.xml file 295 that override those in the `ui.xml` file.

And/or:

You can use the mapButton or the mapKey command 288 to reconfigure buttons or hot keys without editing a mapping file.

To set up a `ui.xml` file:

1. From the Client's **File** menu, select **Edit ui.xml.**

   An untitled Notepad file is opened for you, along with a prompt to create a `ui.xml` file. (If a `ui.xml` file already exists, that file is opened.)

2. In the file, specify or update the **`mappings`** tag, the first line in the file.

   The top level tag in the `ui.xml` file is the `mappings` tag, which has two optional attributes (`useDefaults` and `startUpMacro`):

   ```
   <mappings [useDefaults="true|false"] [startUpMacro="macroname"]>
   ```

useDefaults indicates the mode in which the mappings are applied:

- useDefaults="true" tells the Client to apply the ui.xml file mappings **after** the defaults are set for the buttons and hot keys. In this mode, your mappings are additions or overrides to the existing defaults.

  Use this mode if you generally like the defaults but want to make a small number of additions or changes to them.

- useDefaults="false" tells the Client *not* to set the defaults, just to process the ui.xml file mappings. You start with a "clean slate" and only the settable buttons and hot keys you assign will be available.

  Use this mode if you want to completely change the settings from the defaults.

  This is the default.

- **startUpMacro** indicates a macro 315 that is run when the Debugger Client starts.

3. Specify or update **mapping** sub-elements for your buttons/keys.

   Contained within the mappings element are one or more mapping sub-elements. Each mapping element associates a command or macro with a button, a hot key sequence, or both. If it associates a command or macro with a button, it may also specify a modifier for the button.

   The mapping element attributes are described below, after which is a comprehensive example:

command

A double-quoted string that contains a Client command, each of which is described in the command reference 177, and two of which deserve special mention here:

- The macro 223 command calls a user-defined macro
- The separator keyword creates an inactive button whose only function is to be a visual button separator 289 on a Client button bar

The command attribute is required.

The quoted command string may include a command parameter or an "In *window*" prefix (as of Client build 57) if appropriate. Check the individual command description in the command reference. As an example:

```
<mapping command="runUntilVariableChanges %i"
  button="button12"/>
```

Note: If a command parameter contains an ampersand (&), you need to XML entity-encode it. For example, to map the command set &foo = %i, you specify it like this:

```
<mapping command="set &amp;foo = %i"
  button="button14"/>
```

button	A named button[289] (`button0`, . . ., `button14` for the main button bar[39], and `extrabutton0`, . . ., `extrabutton14` for an extra[42] button bar). If no `button` setting is specified, a `key` setting must be specified.
buttonModifier	A button modifier[290] (Alt or Ctrl). This attribute is optional.
key	One of these keyboard keys: a-z, A-Z, or F2-F12. If no `key` setting is specified, a `button` setting must be specified.
keyModifier	A key modifier[291] (Alt or Ctrl). This attribute is optional.

Note: As with all XML, the element and attribute names are case sensitive. Attribute values, which must be quoted and non-null, are *not* case sensitive.

For any given `mapping` element, you must specify a `button` or `key` setting (or both). Here is an example:

```
<mappings useDefaults="true" startUpMacro="myDefault">
   <mapping command="step" button="button0" />
   <mapping command="run" button="button1" key="f5" />
   <mapping command="cancel" button="button2" />
   <mapping command="stepOut" button="button3" />
   <mapping command="runWithoutDaemons" button="button4" />
   <mapping command="in audittrail top" button="button5" />
   <mapping command="in audittrail bottom" button="button5" buttonModifier="
   <mapping command="traceValues" button="button6" />
   <mapping command="breakOnNextProc" key="9" />
   <mapping command="nextCompileError" key="F2"/>
   <mapping command="previousCompileError" key="F2" keyModifier="alt"/>
   <mapping command="macro stepstep" key="Z" keyModifier="ctrl"/>
   <mapping command="openMacroConsole" button="button10"/>
   <mapping command="closeMacroConsole" button="button11"/>
   <mapping command="showCommands" button="button12" />
   <mapping command="help" button="button13" />
   <mapping command="step" button="button14" />
   <mapping command="manual" button="extrabutton0" />
   <mapping command="showAbout" button="extrabutton1" />
   <mapping command="showShortcuts" button="extrabutton2" />
   <mapping command="manual" button="extrabutton3" />
</mappings>
```

If you define more than one mapping for the same key or button, the last mapping (closest to the `</mappings>` end tag) takes precedence.

If you specify a macro, it is assumed to reside in the same folder as the Debugger Client executable file unless you configured a different location.[303]

4. Save, then Exit the file.

   If you edited an existing `ui.xml` file, the updated settings take effect the next time the Client is started.

Button toggle for compilation errors

The following two commands are only meaningful in the context of examining the results of a failed compilation[136]. If the program you are debugging has no compilation errors, these commands do nothing:

```
previousCompileError
nextCompileError
```

Since a button you map to one of these commands is not likely to often be used, you are allowed to map these commands (and only these) to a button that has another command or macro mapped to it. Then, if a request you are debugging encounters a compilation error, the button switches its association from the first command or macro you specified to the compile error function.

The button toggle occurs only when viewing a failed compilation — in a non-error context, repeated button clicks execute only the first command specified for that button.

Here is an example:

```
<mapping command="stepOver" button="button8"/>
<mapping command="nextCompileError" button="button8"/>
<mapping command="stepOut" button="button9" />
<mapping command="previousCompileError" button="button9" />
```

Validation of mappings

When you (re)start the Client, the ui.xml file is validated for XML structure and conformance to the rules given above for specifying its elements and attributes. Parsing violations produce an error message, the Debugger Client opens, and either of the following result, depending on whether the offending attribute was optional or required:

- The offending attribute is absent, but the other items are as mapped.
- All the mappings are rejected, and the Client has a set of default mappings.

For semantic violations like misspelling a command name or specifying a command that is not supported in the current Client build, the Client opens with an error message, and the offending attribute is absent while the other items are as mapped.

Note: You may set a command to a button with a modifier only if you have set a command for that button without a modifier.

In other words, to successfully map a command to an "Alt+button" or "Ctrl+button" combination, you must first map the command to an unaccompanied button click.

Overriding the ui.xml file

It may be suitable at your site to provide a second level of overrides to the default button and key mappings of the Debugger Client. For example, you might define a `ui.xml` file that contains a set of standard mappings for all the users in a group, and let individuals in the group override the group settings by defining their own mappings in a `uimore.xml` file.

To override the `ui.xml` file:

1. Define a `ui.xml` file following the guidelines specified above.[291]

2. In the same file folder and using the same format, define a `uimore.xml` file.

   You can use the editing tool of your choice, or you can use the **Edit uimore.xml** option in the Client's **File** menu (as of Client build 57).

   The settings in the uimore.xml file override those in the `ui.xml` file, and they will be subject to the same structure and content validation[294].

3. Restart[18] the Debugger Client.

   The `uimore.xml` file is read **after and only if** a valid `ui.xml` file is read. If no `ui.xml` file is present or if it contains a significant error, the `uimore.xml` file is not processed.

6.1.3 Default settings of buttons and hot keys

Unless you have provided[291] a user interface reconfiguration file, the Debugger Client starts with the default presentation of GUI buttons and hot keys summarized in this section.

Buttons

The ten buttons above the Client's main window tabs are initially set to perform the commands that are shown in the table below (and described further in The Client command reference[177]). The buttons are named by their left-to-right position. The button labels shown in the Client are close approximations if not the same as the name of the command they execute, and the labels are configurable with the `labelButton`[221] command as of Build 62. Five additional buttons are available for mapping but have no command associated with them by default, and they do not appear unless they are explicitly mapped:

Button	Default command setting
button0	top
button1	bottom
button2	clearAudit
button3	run
Alt+button3	runWithoutDaemons
button4	step
button5	stepOver
Alt+button5	stepOut
button6	trace
button7	cancel
button8	clearBreaks
button9	clearWatch
button10	— (none)
button11	— (none)
button12	— (none)
button13	— (none)
button14	— (none)

Hot keys

The Client's default set of hot keys and the commands that they perform are shown below.

Hot key	Default command setting
Alt+B	breaksAt

Hot key	Default command setting
Ctrl+B	breaks
Ctrl+C	copy
Ctrl+F	focusToSearchBox
Ctrl+P	preferences
Ctrl+T	trace
Ctrl+U	searchFromBottom
Ctrl+X	cancel
F4	step
F5	run
Alt+F5	runWithoutDaemons
F9	searchDown
Alt-F9	searchUp
F10	stepOver; also, previousCompileError
Alt+F10	stepOut
F11	step; also nextCompileError

Note: By default, the Enter key repeats the command performed by the currently active button (which is highlighted with a white background).

6.2 Changing the colors in Client displays

Whether to boost visual discrimination or simply to add visual variety, you can change the color of the text and backgrounds in the various Client windows and pages. You may want to make your code comments stand out by displaying them in a different color, for example. Or maybe you want to change the highlighting the Client uses for breakpoints because your eyes are insensitive to the default maroon.

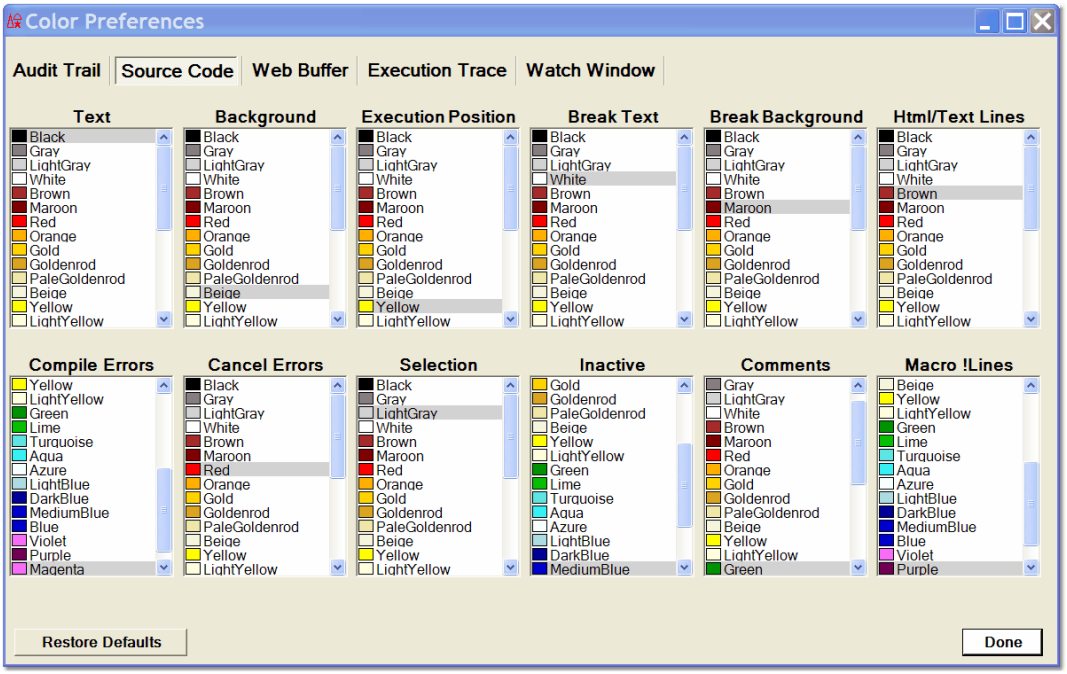
The **Color Preferences** option in the Client's **File** menu leads to a set of panels, each of which represents an element on the Client whose color can be modified. The panels display the (standard, Windows) colors you can apply to the Client element.

When you select a color, it is immediately displayed on the specified Client window or page. You can test as many colors and elements as you want, and you can return at any time to the default Client color settings. Any color modifications you make remain through subsequent sessions of the Client.

To make a color change

1. In the Client's **File** menu, select **Color Preferences.**

   The **Color Preferences** window displays the color options for the current Client page or window, highlighting with a gray background stripe the default or existing color values:



   The window contains separate tabs (five) for the Client areas for which you can make color changes. Each tab contains a labeled panel for each display element whose color you can change.

   The **Audit Trail** tab controls both the Client **Audit Trail** page and **Most Recent Audit Trail** window. The Client **Proc Selection** page has no color-changeable elements, and the Client **Daemon** page colors are the same as those for the **Source Code** page.

2. Select the tab for the Client area you want to modify.

   The panels you see are those that are available for the tab you selected. The labels above the panels indicate the type of element to which the color applies. These elements are described further in the table below.

3. In the panel that represents the display element you want to color, click anywhere in the row of the color you want for this element.

   The color is immediately reflected in the Client, and it persists through Client sessions unless you change it again.

4. Experiment further with other color changes, or click the **Done** button to exit. Click the **Restore Defaults** button to return to the original Client color values.

The color panels

The following table describes the Client elements that are represented by the **Color Preferences** color panels.

Panel label	Page or window	Refers to
Text	all	All text in the page or window. The color is subject to override if it is for "inactive" code lines shown in the **Source Code** page.
Background	all	The background color of the page or window.
Selection	all	The last reported, or last user-selected, display line.
Execution Position	Source Code	The line of code that is next to execute.
Break Text	Source Code	The text in a breakpoint 55 line.
Break Background	Source Code	The background color of the row that contains a breakpoint line.
Html/Text Lines	Source Code	The text within User Language HTML and TEXT statement blocks.
Compile Errors	Source Code	The text of compilation error messages.
Cancel Errors	Source Code	The background color of the row that contains a line of code whose execution produced a request cancellation.
Inactive	Source Code	The text color of code that is currently not executable or able to respond while the executable code in a Client **Daemon** page is active.

Panel label	Page or window	Refers to
Comments	Source Code	The text in User Language code comment lines (any that begin with an asterisk). **Note:** You must be running at least version 7.6 of the Sirius Mods to add color to in-line or multi-line comments (bounded by characters like `/?` and `?/` defined by Model 204 COMSTART and COMEND commands).
Macro !Lines	Source Code	The text in User Language Macro Facility statements. These statements begin with an exclamation character (`!`).
Most Recent	Web Buffer	The background color of the lines most recently added to the page.
Changed Values	Watch Window	The background color of the row that contains a watched item whose value is changed by the last statement execution.
Out of Scope	Watch Window	The text color of a row that contains (the last value of) a watched item that is no longer in scope, that is, not within code in the currently active tab (**Source Code** or **Daemon**).

6.3 Specifying a startup command for the Client

Command line parameters are available to customize your invocation of the Debugger Client (JanusDebugger.exe). You can use these parameters in the following contexts:

- Command prompt/MS DOS box
- A Windows shortcut that targets JanusDebugger.exe
- A script (.bat or .vbs file) that invokes JanusDebugger.exe

Syntax and general syntax rules

Here is the command syntax:

```
JanusDebugger[.exe] [configFile|*] [proxyPort|*] [workFolder]
```

Where:

- The program name (JanusDebugger) may be specified with or without the .exe qualifier.
- One or more blanks must separate the parameters from each other and from the program name.
- If a parameter value contains embedded blanks, enclose the value in double-quotation marks (the standard DOS way of handling embedded blanks). Single-quotation marks may not be used. For example:

  ```
  JanusDebugger "config file.xml"
  ```

- Parameter position is important. To omit a parameter that precedes another, use an asterisk (*) for the parameter you are omitting. For example:

  ```
  JanusDebugger * 999
  JanusDebugger * * c:\workFile
  ```

- The *configFile* parameter is an absolute or relative path to an alternate Debugger configuration file (that is, to be used in place of the default file, debuggerConfig.xml 378). A relative path is relative to the application folder (the installation target).

  Examples:

`myConfig.xml`	(relative path)
`"my Config.xml"`	(relative, embedded blanks)
`a\myConfig.xml`	(relative path)
`c:\folder\myConfig.xml`	(absolute path)

- The *proxyPort* parameter is an override for the proxy port number specified 380 in the default or the alternate Debugger configuration file. It must be an integer in the range 1 through 65535.

- The *workFolder* parameter (as of Build 62, Tag 13) specifies an **absolute** file system path of a writable folder. The command is rejected if the folder does not exist, is not writable, or is relative.

  workFolder is an alternate location for state and log files, preferences, macros, and UI customization files. These files, which belong to one of three folders, are described in A summary of the Client work files 303.

Example

Consider the following Client startup command:

```
c:\appdir> janusdebugger * * c:\work
```

This command makes the Debugger Client look for the following items in the `C:\work` folder:

Client configuration file (`.xml`)
A sub-folder for state files (see `stateFileFolder` tag below)
A sub-folder for UI files (see `uiFolder` tag below)
A sub-folder for macro files (see `macroLibraryFolder` tag below)

Note: In the work folder, these items must **not** be specified by an absolute path.

For example, if *workFolder* `C:\work` has this directory content:

```
11/04/2013  11:28 AM         3,388 debuggerConfig.xml
11/04/2013  11:13 AM    <DIR>      macros
11/04/2013  11:28 AM    <DIR>      state
11/04/2013  11:12 AM    <DIR>      uiconfig
```

And the `debuggerConfig.xml` file has these folder tags:

```
<stateFileFolder>state</stateFileFolder>
<uiFolder>uiconfig</uiFolder>
<macroLibraryFolder>macros</macroLibraryFolder>
```

The Client will do the following:

- Look for the configuration file in: `C:\work`
- Use this macroLibraryFolder: `C:\work\macros`
- Use this stateFileFolder: `C:\work\state`
- Use this uiFolder: `C:\work\uiconfig`
- Report to the Client's **Help > About** box the locations of the preceding items

6.4 Changing the location of Client work files

The Debugger Client uses a variety of text files to store information about user activity to maintain its tools and displays, as well as a comprehensive troubleshooting log. These work files are catalogued below 303.

The Client configuration file 378 (`debuggerConfig.xml`) has optional XML elements with which you can specify alternative folder locations for the Client work files. The files are divided into three groups, each of which is controlled by a single element, as follows:

- **`<stateFileFolder>`** specifies where most Client work files are written (log, preferences, searches, for example)
- **`<uiFolder>`** specifies where the Client interface-customization files (ui.xml, uimore.xml) are stored
- **`<macroLibraryFolder>`** specifies where Client macro files are stored

Within `debuggerConfig.xml`, you specify folder path values for the elements as in the following:

```
<debuggerConfig version="1.0">
        ...
    <stateFileFolder>c:\myData</stateFileFolder>
    <uiFolder>c:\myUI</uiFolder>
    <macroLibraryFolder>c:\work\macroLibrary</macroLibraryFolder>
        ...
</debuggerConfig>
```

If you include an element, the specified folder location is validated when the Client is started, and you receive an error if the folder is missing or not writable. The locations are also reported in the audit trail.

If an element is not specified, the installation target folder is the assumed location. The exception to this is the `macroLibraryFolder` element: if this element is *not* specified, the Client will initially attempt to store or find macro files in the **`stateFileFolder`** location, else in the Client installation folder. Similarly, if the `macroLibraryFolder` element *is* specified, the Client tries that location first, else it tries the **`stateFileFolder`** location, else the Client installation folder.

A summary of the Client work files

File (by type)	File content	Configuration file element that specifies file default location
.macro	Client macro	macroLibraryFolder

File (by type)	File content	Configuration file element that specifies file default location
excludeProc.txt	The list of procedures to be excluded from debugging 65	stateFileFolder
excludeRoutine.txt	The list of methods and subroutines to be excluded from debugging 65	stateFileFolder
find.txt	The most recent Search 39 terms	stateFileFolder
includeProc.txt	The list of procedures **not** to be excluded from debugging 65	stateFileFolder
includeRoutine.txt	The list of methods and subroutines **not** to be excluded from debugging 65	stateFileFolder
log.txt	The Debugger Client log 352	stateFileFolder
until.txt	The most recent run-until 73 target procedures	stateFileFolder
vars.txt	The most recent entries in the text box above the **Watch Window**	stateFileFolder
watchmemory.txt	The contents of the **Watch Window** between Client runs (if feature 89 is enabled)	stateFileFolder
whitelist.txt	The white list 77 of procedures to omit from debugging	stateFileFolder
.watch	Saved 89 **Watch Window** lists	stateFileFolder
about.xml	The remembered position and size of the Client's **About** 38 box	stateFileFolder
console.xml	The remembered position and size of the Macro Console 322 window	stateFileFolder
getVariableList.xml	The remembered position and size of the `getVariablesForClass` 209 command output window	stateFileFolder

File (by type)	File content	Configuration file element that specifies file default location
history.xml	The remembered position and size of the **Execution History** 132 window	stateFileFolder
preferences.xml	The settings from the **Preferences** 18 and **Color Preferences** 297 dialog boxes	stateFileFolder
shortcuts.xml	The remembered position and size of the **Keyboard Shortcuts** 291 window	stateFileFolder
textviewer.xml	The remembered position and size of the **Text Viewer** 147 window	stateFileFolder
ui.xml	Modifications 288 to the Client's default buttons and hot key associations	uiFolder
uimore.xml	Settings that override 291 the ui.xml file settings	uiFolder
valueDisplay.xml	Remembered position and size of Value window displays 99	stateFileFolder
windowmemory.xml	Remembered position and size of the main Debugger Client window	stateFileFolder

6.5 Changing the font size in Client displays

The Client configuration file 378 (`debuggerConfig.xml`) has an optional XML element **(fontScale)** with which you can specify a larger font size than the default for Client displays. Your font scale changes are applied to the user data contained in these (tabbed, external, Value, console, history, watch, Help information) Client windows:

Audit Trail, **Web Buffer**, **Execution Trace** (tabbed or external)
Source Code (including **Daemon**) tabs
Watch Window (including external)
Execution History (tab or separate window)
Console (macro and command output)
Value (value displays, object and list expansions, records and field groups)
Help menu information options (**About**, **Keyboard Shortcuts**, **Commands**)

Note: Debugger scaling is applied after any scaling by Windows if you are running with a non-standard DPI.

To scale the font size

1. Specify the fontScale element at the root level in the `debuggerConfig.xml` file. For example:

```
<debuggerConfig version="1.0">
   <fontScale>2.5</fontScale>
   <serverList>
      ...
   </debuggerConfig>
```

   The scaling value you specify may be from 1.00 to 9.99 (with 0, 1, or 2 decimal digits). The value is the factor by which the default apparent font size is multiplied and scaled accordingly. A value of 1 leaves the default font size unchanged; a value of 2 doubles it.

2. Save your change, and restart the Client.

   If your fontScale value is valid and not 1, the Client Audit Trail display will resemble the following:

```
... 08:18:30    Executable: C:\debugger\ClientSource\bin\JanusDebugger.exe
... 08:18:30    Executable date: 9/27/2010 4:10:51 PM
... 08:18:30    Font Scale: 2.5 <<<<<<
```

6.6 Opening an external window

Although the Client's **Watch Window** is expandable (by dragging its left edge) and you can also view long values by hovering the mouse pointer, you still may find cases where you would like to have more room for the **Watch Window** than is available. Or you may have cases where you could take better advantage of your monitor screen real estate if the **Audit Trail** tab were separated from the Client. Or you may have dual monitor capability, and ideally would like to use one monitor for the Client main window and one monitor for the **Web Buffer** tab.

The "external window" feature of the Client lets you display any combination of the Client main areas (the **Watch Window, Audit Trail** tab, **Execution Trace** tab, **Web Buffer** tab) or the button bar 39 in individual windows that are separate from each other and from the Client.

You invoke the feature by double-clicking the name of the Client area, or by menu option or mapped button, key, or macro. Any of these actions instantly creates a separate independent window for the specified Client area. The contents and label of the former area are removed and transferred to the new window, which (except for an external button bar) is equipped with Print and Save options accessible by menu or button. Closing the external window returns its contents to the usual area on the Client.

The rest of this section describes the feature with a detailed example, considers ways to control the positioning of external windows, and shows how to open an external window automatically.

Watch Window example

To use an external **Watch Window**, for example:

1. Do either of the following:

   a. Select **Open External Watch Window** from the Client's **Window** menu.

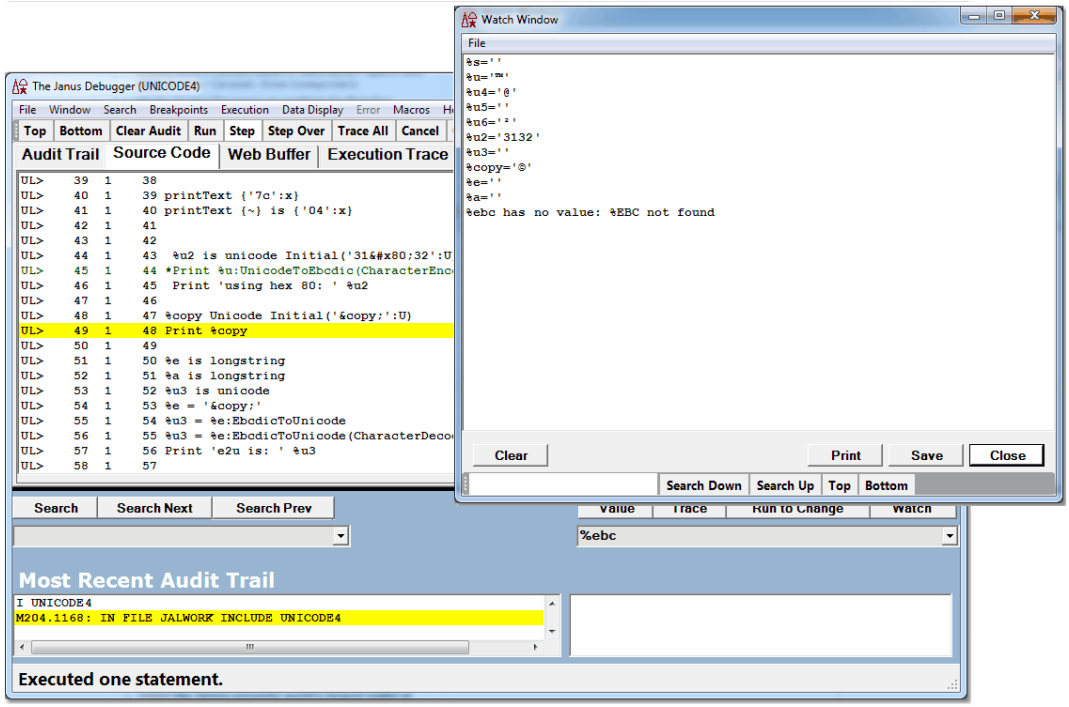
      For opening the **Watch Window** (but not for the other areas) you can also use the **Data Display** menu.

   b. Invoke a button, key, or macro mapped 288 to the openExternalWatchWindow 235 command.

      Unique open commands exist for each of the other areas.

      As described below 311, you may want to open the external window at Client startup.

2. The external **Watch Window** window opens, displaying the current **Watch Window** items. The space formerly occupied by the **Watch Window** is vacated, including its label:



In the external window:

- Print and save options are on buttons and in the **File** menu.
- The **Clear** button deletes all the items in the window.
- The **Close** button closes the external window but repopulates the former **Watch Window** area on the Client with the items that were present at the time of the close.

  The mappable command closeExternalWatchWindow[192] performs the same action as the **Close** button.

  Unique close commands exist for each of the other areas except for the button bar, and the closeExternalWindows[193] command closes multiple windows at once.
- A search bar provides a text box and control buttons for searching the window content. **Top** and **Bottom** buttons locate and highlight the first or last line of the content, while **Search Down** and **Search Up** activate backwards or forwards searching.

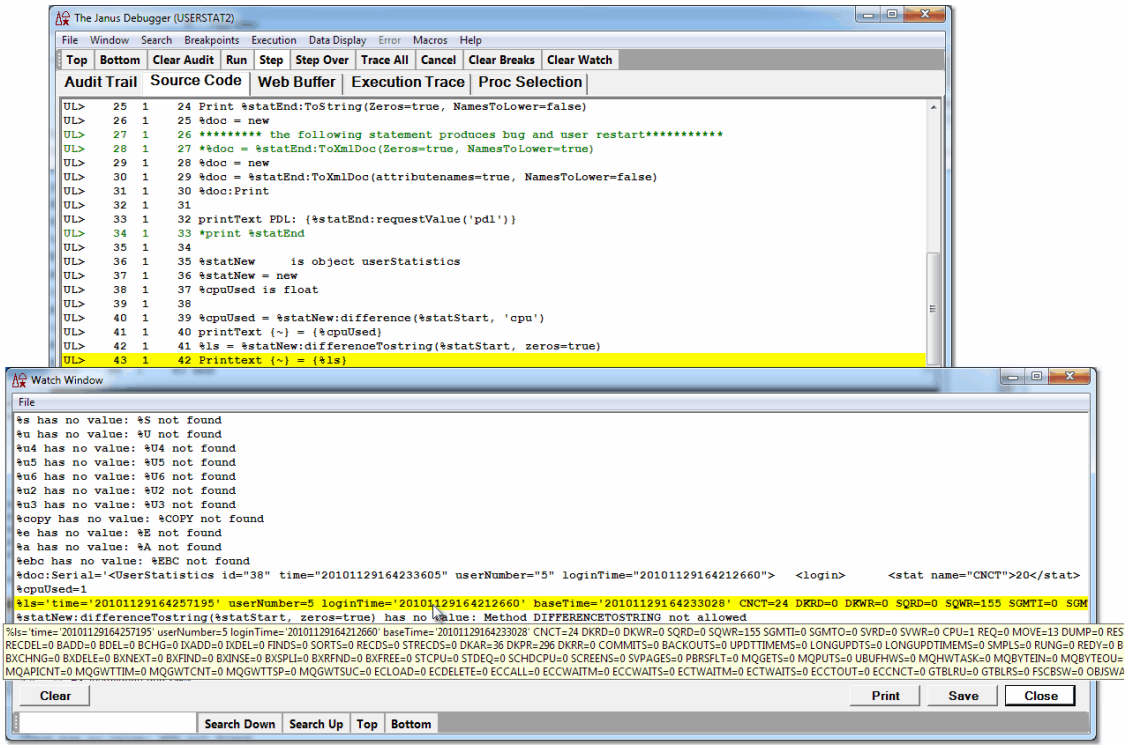
  Pressing the Enter key after entering a search string in the search text box searches down, by default, and each subsequent key press searches for additional occurrences of the string, as long as the focus remains on the search text box.

3. Continue debugging. The external window functions the same as the normal one, except:
   - The external window typically pops up when you click it or when new content is written to it. Clicking a Client control brings the Client window to the top.
   - External windows may be pinned[309]: you can specify one or more of them to keep in view at all times
   - Only the external window has print and remove-all-items-at-once (Clear) capabilities.

   If you close and restart the Client, the external window location will remain what it was when you closed the Client.

You might want an external window simply to display more data, for example, data that is displayed in long lines. In the image below, which also shows the show-as-tooltip feature[88], the very long data is more fully displayed in the external **Watch Window.**

Placing the external window below the Client also means both the Client and the external window remain in view as you step through the source code, even as variable value changes cause the external **Watch Window** to pop up in front of the Client window:

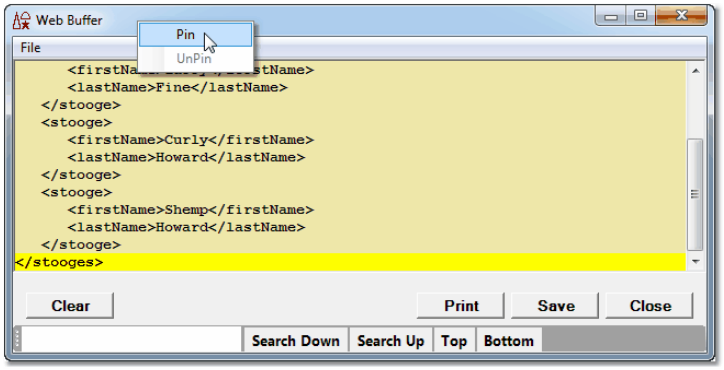


The following subsection describes an additional tool for controlling the viewing of multiple windows.

Keeping external window(s) constantly on top

With a proliferation of external windows on your PC desktop, it is sometimes useful to mark a window to remain at the top of the window stack (often called "pinning" a window). For example, you may want an external **Web Buffer** window to always be the "topmost" window, especially if you have large or multiple monitors.

As of Build 57 of the Debugger Client, you can "pin" an external window by simply right-clicking its title bar, then selecting the **Pin** option from the context menu:

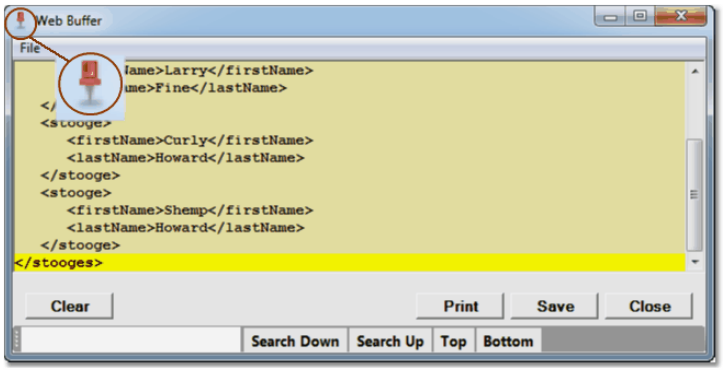


Alternatively, you can issue the Client **pin** 238 command (Build 56). For example, to pin an external **Web Buffer** window, you issue the following command (from a UI mapping 291, the command line 322, a macro 315, or the clientCommand 162 method):

```
pin web buffer
```

The window identifier (`web buffer`, above) may be the title of any open external window, it may be a trailing-asterisk (*) wildcard pattern for any open external window, or it may be a single asterisk to pin all open external windows.

A pinned window displays a pin icon in the title bar in place of the product icon:



You can move pinned windows around on your screen, and close or minimize them as necessary. You can also remove their pinning by:

- Selecting **UnPin** from the title bar context menu
- Issuing an **unPin** 283 command

Opening the Client and external window(s) simultaneously

If you want an external window to open when the Client starts, the Preferences 21 dialog box has options in the **Open at Startup** area to specify which Client areas (**Watch Window**, **Audit Trail**, **Web Buffer**, **Execution Trace**) you want to open as an external window when the Client starts. These options are in Client build 57 or later.

Prior to Build 57, the recommended technique for automatically opening the Client and its external windows together it was necessary to use a macro: You were to put the open command for the particular Client area (for example, `openExternalWatchWindow`) in a startup macro that you reference in the `ui.xml` file. This file, which the Client always looks for when it starts, contains any reconfigurations of the default mappings of buttons and keyboard shortcuts in the Client GUI.

You specified your startup macro as the value of the **`startUpMacro`** attribute in the mappings tag in the ui.xml file. 291 As described in Creating and running a macro, 315 your entire macro (the *yourMacro*.macro text file) could be as simple as the following single line:

```
openExternalWatchWindow
```

See Also

Launching an external button bar 42

6.7 Hiding the Client's lower windows

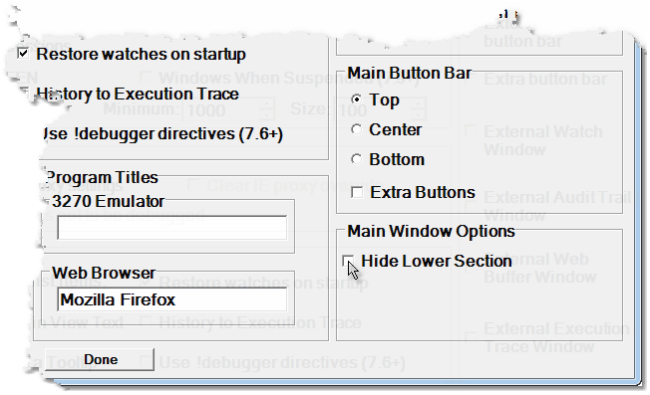
For occasions when you want more "real estate" for the main window display of the contents of one of the Client's tabbed pages 10, you can hide the Client's lower windows 14 and stretch the main window to occupy nearly the entire window. This is especially useful in a multiple-monitor environment, where the **Audit Trail** and **Watch Window** can reside in separate windows 306 on another monitor.

Client Build 57 or higher is required.

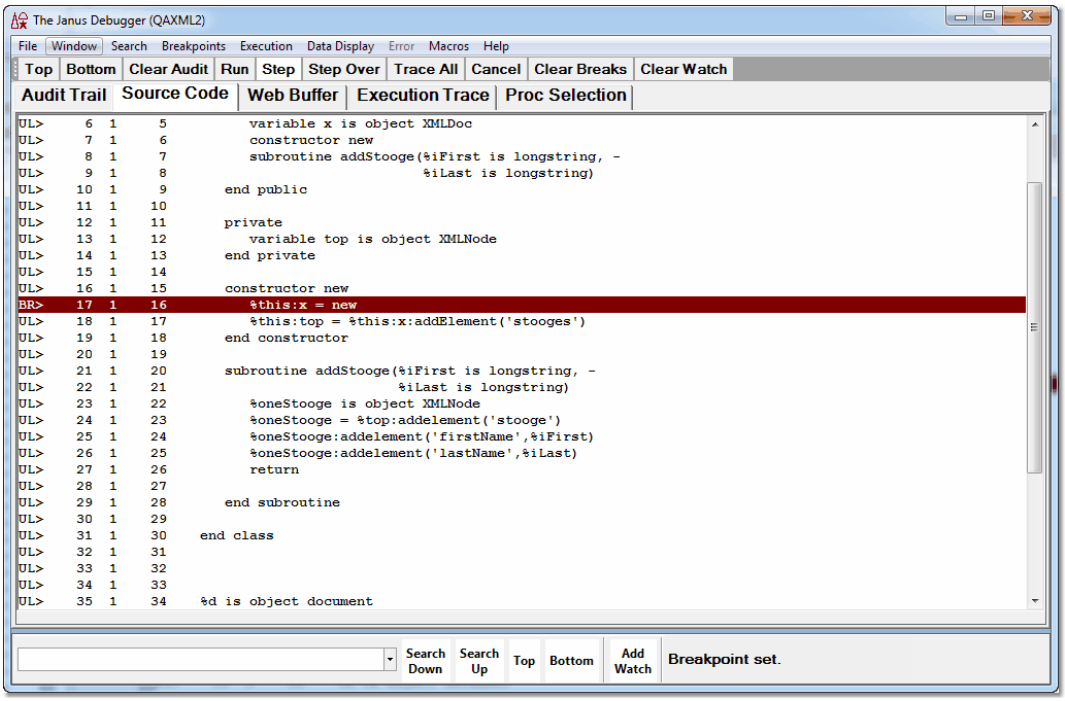
Probably the simplest way to hide the lower section of the Client is:

1. Open the **Preferences** dialog box by using the Ctrl+P keyboard shortcut (or by selecting **Preferences** from the Client's **File** menu, or by using the `preferences` mappable 289 command).

2. In the **Main Window Options** section, select the **Hide Lower Section** checkbox (it is clear by default), then click **Done.**



The lower section of the Client is hidden immediately by an expanded main window:



The searching controls[44] and the button for adding **Watch Window** items are moved to the beginning of the Status bar at the bottom of the Client. They share the single input box to the extreme left. In addition to these, you can still right-click code lines[86] to add variables to the **Watch Window,** and **you** can use the searching controls available on each external window. You can also use the **Data Display** and **Search** menus, as well as the watch commands (`addWatch`, `addWatchOnCurrentLine`) and the search commands (`searchDown`, `searchFromBottom`, `searchFromTop`, `searchUp`, `top, bottom`) via the Command Line tool[323].

3. To restore the lower windows at any time, simply clear the **Hide Lower Section** checkbox.

You can also use Client commands to hide and restore the lower section of the main window:

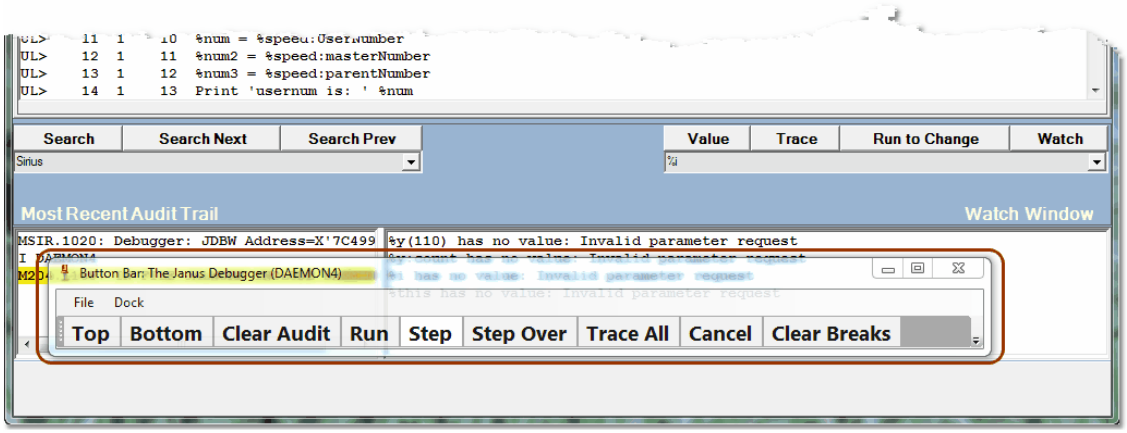
- `hideLower` 212 hides the lower section if it is currently not hidden (and does nothing if it is already hidden)
- `restoreLower` 246 restores a hidden lower section (and does nothing if it is not hidden)
- `toggleLower` 278 either hides the lower section if it is not hidden or restores it if it is hidden

6.8 Seeing through Client windows

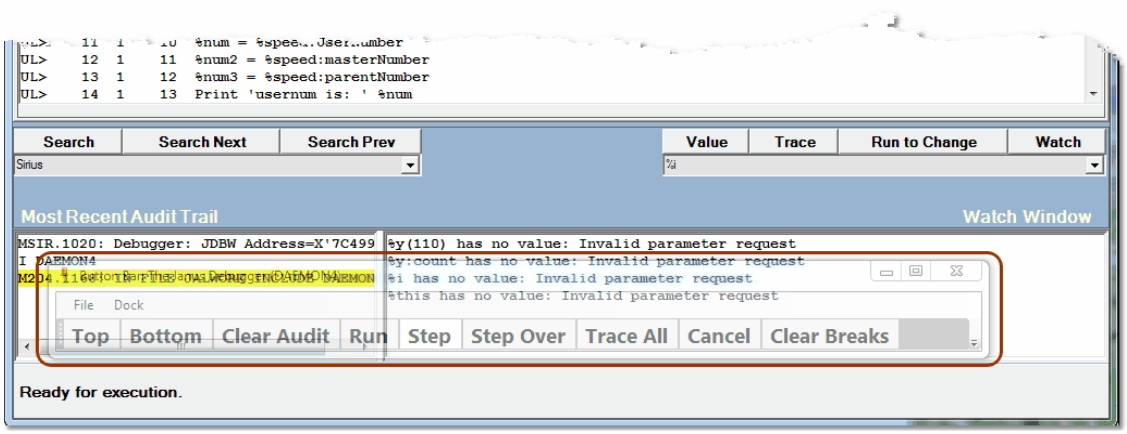
The degree of transparency of certain (Preferences and external-button 42) Client display windows is user-settable. You can adjust the transparency/opacity of the **Preferences** and external button windows to allow the application windows underneath to be visible.

The `opacity` element in the Client configuration file (`debuggerConfig.xml`) controls this transparency, as described 383 in the guidelines for setting up that file.

The default opacity setting (.9) is shown below for an external button bar:



And here is a setting of .5:



The valid setting values range from .01 (least opaque) to 1 (fully opaque). Invalid values are ignored. To turn off all transparency, specify:

```
<opacity>1</opacity>
```

Client Build 59 or higher is required.

CHAPTER 7 Using Debugger Macros

A macro lets you execute one or more commands as a single unit of work to automate an often-repeated series of operations.

Subsequent sections in this chapter describe:

7.1 Creating and running a macro

A Debugger macro is a Windows PC text file that contains a list of Debugger Client commands 289 to execute (as shown in the A macro example 318 subsection). This section describes how to set up and run a macro, as well as the context and calling requirements you must observe.

You run a macro from the Macros menu 36, from a Client button or hot key to which you have assigned 320 a macro, or from a command line utility. 323 You can also run a macro automatically:

- If the macro name matches that of an included procedure.
- At Client startup, if the macro name is an attribute value at the beginning of the Client customization file 291 `(ui.xml)` or the Client configuration file 384 `(debuggerConfig.xml)`.

Macro definition

To define a new macro:

1. Start a text file by doing either of these:

   - From the Client's **File** menu, select **New Blank Macro.**

     The "Select name for a new macro" Windows dialog box opens, from which you select where to locate and what to name the macro file.

     Macro files must have a `.macro` file extension, and the file name must not contain embedded blanks.

     When you click the **Save** button, the macro file opens in Notepad.

   - Alternatively, open a new file in a Windows text editor like Notepad.

     When you later name and save this file after defining its contents, you must specify a `.macro` file extension and make sure the file name contains no embedded blanks.

   Note: If you decide to store the file in a location other than the Client installation folder, see Changing the location of Client work files. 303

2. In the text file, specify the Debugger commands you want to be run consecutively.

   These are the formatting guidelines:

   - Specify one command (case does not matter) per line; leading spaces and blank lines are ignored; line can be indefinitely long.
   - Any line that begins with a number sign (#) is treated as a comment.
   - Several commands require arguments; specify arguments or argument variables 320 after the command keyword separated by at least one blank. For example:

     ```
     addwatch %i
     searchFromTop   image foo
     runUntil daemonnest
     ```

     Separate multiple command arguments by one or more blanks. For example:

     ```
     traceUntilVariableEqualsValue %i 3
     ```

- For a macro to run another macro, specify either of the following:

  ```
  include macroName
  ```

  ```
  macro macroName
  ```

  Specifying the extension `.macro` after the macro name is optional. The following commands are equivalent:

  ```
  include foo.macro
  ```

  ```
  include foo
  ```

3. Save and exit the macro file.

   You can easily access this file for editing by selecting the **Edit Macro** option from the **Macros** menu.

4. Consider opening the macro console 322 (from the **Macros** menu) to display information about the macros you run.

   The console reports the starting and completing of the macro execution, as well as any error messages.

5. Invoke the macro.

   Use any of the following ways to run a macro:

   - From the **Macros** menu, select the **Run Macro** option.
   - From the **Macros** menu, select the **Command Line** option.
   - Use a button or hot key combination to which you have mapped the macro. 320
   - Specify the macro name as the value of the **`startUpMacro`** 291 attribute in the Client's `ui.xml` file, or as the value of the **`startup`** attribute in the Client's `debuggerConfig.xml` file.

   The title bar of the main Client window indicates that the macro is executing:

   ```
   . . . macro running
   ```

   Potential errors include: an invalid macro command, trying to invoke a macro that does not exist, and violating the context and recursion restrictions. 319

   If you want to stop a macro at any time it is running or in a not-completed state awaiting further input, select the **Kill Running Macro** option from the **Macros** menu.

   Note: A macro runs until it has exhausted all its commands or encounters a `kill` 220 command. If a request completes before the macro is finished, the remaining commands in the macro apply to the next request in the session. If you want to prevent these commands from being applied to the next request, use the **Kill Running Macro** option or the `noSpan` 231 command.

A macro example

The following sample macro prepares a particular program (shown below the macro) for further debugging:

```
# Remove any existing breakpoints or watches
clearWatch
clearBreaks

# Set breakpoint on the first line we
# want to examine
top
breaksAt For 1 record

# watch some variables we are interested in
addWatch %i
addWatch %what

# Run to the breakpoint we set
run
```

The sample macro above was designed for a program like this:

```
begin
   %i is float
   %what is string len 30
   *BREAK
   %i = 1
   * this should not be recognized as a *break
   for 1 record
      *breaks
      %i = %i + 1
      %what = $sirTime
      change testfield to %what
   end for
   *break
   %i = %i + 1
   assert %i = 3
   trace 'hello ....'
   *break
   audit 'Hey moe...'
   print $sirtime
   print %i
end
```

Macro usage restrictions

These are the context and calling restrictions you must observe when using macros:

Context restrictions

Some of the commands that may appear in a macro are valid only when you are interactively running a program under the Debugger. If a macro attempts to execute one of these commands when no program code is ready or remains to execute, the macro is terminated, and the following message is displayed in the Client's Status bar:

```
Invalid context for: Offending command
```

The following types of commands are allowed only when executing a program:

- All run commands
- All cancel commands
- All step commands
- All watch commands
- All breakpoint commands
- All trace commands

Similarly, the following commands are allowed only after a program fails to compile. If these commands are issued when there is no compilation error, the Client issues the "Invalid context" message described above:

- nextCompileError
- previousCompileError

Recursion restriction

Macros may not be recursively called, either directly or indirectly. These sequences are not allowed:

- "Macro Alpha calls macro Alpha" (direct recursion)
- "Macro Alpha calls macro Beta which calls macro Alpha" (indirect recursion)

In either case, when a recursive call is detected, the macro is terminated and a message is displayed in the Status bar 49.

7.2 Mapping a macro to a button or hot key

Following the same rules as for mapping other Debugger commands 288, you can map a macro to a button or hot key. All such button/key mappings are stored by default 303 in the `ui.xml` and `uimore.xml` files in the folder that contains the Debugger Client executable file.

To set up a button or hot key to run a macro:

1. Create an XML text file named `ui.xml` (or `uimore.xml`) as described in Setting up the ui.xml file 291, or open the existing `ui.xml` (or `uimore.xml`) file.

2. Provide a **`mapping`** element that associates the macro with a button or hot key.

   The value of the `command` attribute must have the following form:

   ```
   "macro macroname"
   ```

   where one or more blanks separate the keyword `macro` from the name of the macro.

   These are examples:

   ```
   <mapping command="macro hello" button="button2" key="m" keyModifier="ctrl"/>

   <mapping command="macro    world" button="button2" buttonModifier="alt"/>

   <mapping command="macro stepstep" key="Z" keyModifier="ctrl"/>
   ```

3. Save and close the file.

7.3 Passing a command argument to a macro

As described in Creating and running a macro 315, several of the Debugger commands require explicit arguments when used within a macro. You can use either a standard macro variable 325 or a standard Client function 327 to pass an argument to a macro command at the time the macro runs.

Using the &argstring variable

To use the `&argstring` variable to pass an argument to a command in a macro:

1. In the macro, specify `&argstring` where you would normally specify the command argument.

   For example, note the use of `&argstring` in the `breaksat` command in the following macro:

```
# Run till line that matches the user-passed string
top
clearBreaks
breaksat &argstring
run
clearBreaks
```

Note: For commands that have multiple arguments, use the numbered-argument function, `&&arg(n)`, to distinguish the arguments. For example:

```
traceUntilVariableEqualsValue &&arg(1) &&arg(2)
```

2. Provide the actual argument value before or as you run the macro.

   This depends on how you invoke the macro:

   - If you use the **Run Macro** option of the **Macros** menu, the contents of the Entity-name text box[50] replace instances of `&argstring` in the commands in the macro.
   - If you use the **Command Line** option of the **Macros** menu, you explicitly specify in the command line tool[323] the replacement for `&argstring.`
   - If you use an associated[288] button or key, the `&argstring` replacement depends on whether the `macro` command *in the mapping*[292] *in the ui.xml file* is specified with or without arguments:
     - If the `macro` command has an argument (after the name of the macro), that argument replaces `&argstring` in the macro. For example, if this is the mapping:

       ```
       <mapping command="macro stooge moe" key="f2" />
       ```

       Pressing the F2 key invokes the `stooge` macro with `moe` as the replacement argument for instances of `&argstring.`
     - If the `macro` command is specified without an argument, the contents of the Entity-name text box replace `&argstring.`

Using the &&prompt function

The `&&prompt`[342] function causes a macro to:

1. Pause, to accept a Client-user supplied argument value for a command that is specified within the macro
2. Continue, to execute the command with the supplied value

The format of the `&&prompt` function is:

```
&&prompt(prompt)
```

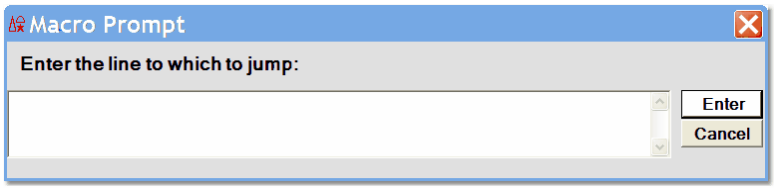
where *prompt* is either:

- A single- or double-quoted character string with 80 or fewer characters.
- A Client macro variable 325 (requires Build 58 or higher).

As an example, the following macro clears all breaks in the current source code, prompts for the string it will use as the argument for the `breaksAt` 183 command, then executes the code from its current position until it reaches a line that contains the user-supplied string, after which it clears the break:

```
# Run till first line that has the string entered at the prompt
top
clearBreaks
breaksat &&prompt("Enter the string at which to break:")
run
clearBreaks
```

When the macro command that contains `&&prompt` executes, the Client displays a **Macro prompt** dialog box like the following, which shows the prompt string from the preceding example macro:



You can use the `&&prompt` function wherever an argument to a command may appear, as shown in the following example:

```
traceUntilVariableEqualsValue &&prompt('var') &&prompt("val")
```

When this command executes, it produces two consecutive prompts, one for each of the command arguments.

7.4 Using the console and command line

As macro development aids, the Debugger Client provides a console window and a command line dialog box.

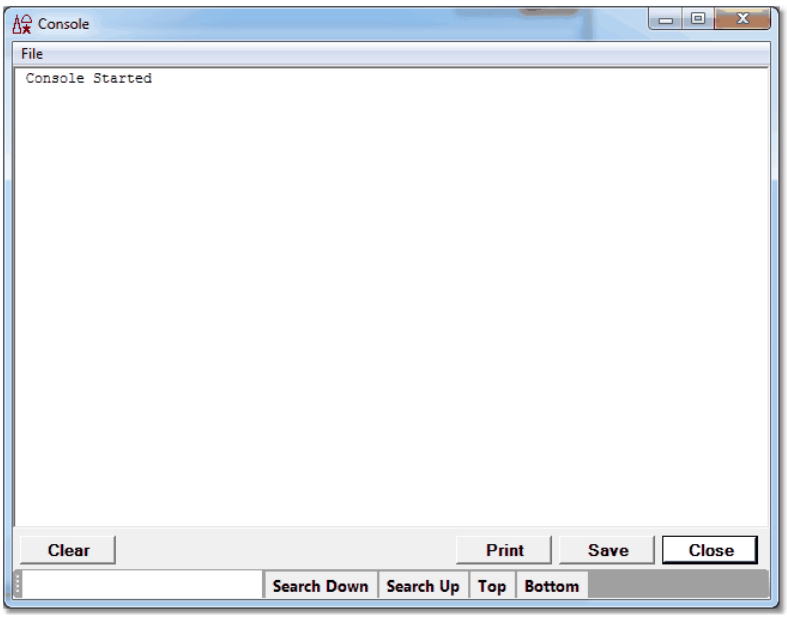
The Console

The **Console** is an independent window that logs informational, error, and trace messages from the Debugger macros (and Client commands) that you run.

To use the console:

1. From the Client's **Macros** menu, select **Console**.

   The **Console** window opens. It remains open until you explicitly close it.



2. Invoke a macro 315 or invoke command 177.

   The console window moves to the top of the window stack and displays information about the macro or command, including its starting and stopping, as well as any error messages.

   The console's **Print** and **Save** buttons and **File** menu options work the same as their counterparts in the Client Text Viewer 147. The **Close** button closes the window. The search bar on the bottom of the window provides controls for searching the window content.

   You can also clear the window with the `clearMacroConsole` 189 command, and you can close it with the `closeMacroConsole` 194 command.

Note: If you have the console open, value displays 99 appear in the console instead of in a **Value** window. To override this default, use the `valueDisplayOnConsole` option of the Client `setPreference` 265 command.

The Command Line

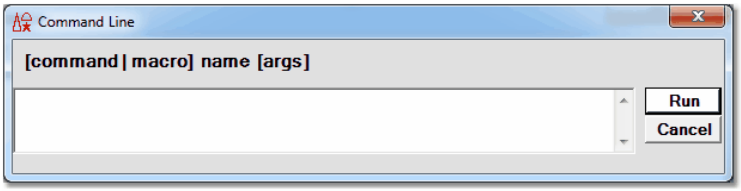
The **Command Line** dialog box provides a command line interface for running macros and commands. This utility is an alternative to the **Macros** menu **Run Macro** option or to a button or hot key combination; it stays available unless explicitly closed, so it is a step-saver for macro testing. In addition, this interface will invoke a Client command 177 if no same-named macro exists.

To use the command line tool:

1. Consider opening the Console window (322) (from the Client's **Macros** menu) to display information about the macros or commands you run.

2. From the **Macros** menu, select **Command Line**.

   The **Command Line** dialog box opens. It remains open until you explicitly close it.



3. Enter the name of a macro or command, and specify its required arguments, if any.

   The extension `.macro` after a macro name is optional, as is a preceding `Macro` keyword (case not important). The `Command` keyword directs the Client to look exclusively for a command that has the name you are specifying.

   For a macro, the Client looks for the macro file in the same folder as the `JanusDebugger.exe` file, by default (303).

   Use one or more blanks to separate arguments from each other and from the macro or command name. If you provide more arguments than are required, the extra characters are ignored.

4. Click the **Run** button to execute the named macro or command.

   Clicking **Cancel** closes the command line dialog box.

5. If during your session you run many macros and commands, you can easily review them or repeat an earlier one by scrolling through their history using your keyboard up/down arrow keys (Client Build 59 or higher required).

7.5 Using the Macro Autorun feature

The Debugger Client lets you automatically run a particular macro whenever you debug a particular procedure. Such a macro might set up watches and breakpoints tailored to aid the debugging of that procedure. This Macro Autorun feature requires simply that the macro have the same name as the procedure, and it works only for procedures that are included from command level (level 0), that is, **not** from within a procedure (level 1).

By default, the feature is initially not enabled.

To use the feature:

1. For a procedure that you debug somewhat frequently, define (315) a macro that sets up the debugging environment you want for that procedure.

2. Give the macro the same name as the procedure. Character case is not important.

3. From the keyboard or from the Client **File** menu, select the **Preferences** option.

4. In the **Execution Options** section of the **Preferences** dialog box, select the **Macro Autorun** checkbox, which is clear by default.

   Note: The Client `setPreference` 265 command has an option that lets you toggle the **Macro Autorun** checkbox.

5. Include the procedure, for example via the URL of your Janus Web application.

   The Debugger searches (the Debugger installation folder or in any alternative work folder 303 you may have specified) for a `.macro` file that has the same name as the procedure. If such a file is found, it is run.

   If a same-named macro is not found, no action is taken.

7.6 Working with macro variables

Macro variables are placeholders for Debugger command arguments within Debugger macros, as well as placeholders for Client function arguments (as of Client Build 58). Distinguished by names that begin with a single ampersand (&) character, macro variables can be set to a variety of types of values.

As an example, you could have a macro set some breakpoints, run to each of them, and use a macro variable to note the value of the program's %variable at each break. This would let you note the values at different points in program execution:

```
breaks
run
set &val1 = %i
run
set &val2 = %i
echo &val1
echo &val2
```

`set` 260 (in the example above) is a Client command that is particularly useful for working with macro variables.

Macro variables are either system-supplied (predefined) or user-defined.

Predefined macro variables

The system `&argstring` variable is described in Passing a command argument to a macro. 320

User-defined macro variables

To define your own macro variable, you use the set 260 command within a macro. As shown in the syntax and examples below, the types of values to which you can set the variable include constants, User Language variables, fields, and $list elements, and other macro variables and functions.

The syntax of the set command is:

```
SET &target = "string" | [-]nnn | &var | %xxx | g.xxx | f.xxx
| $listcnt(x) | $listinf(x,y) | &&function
```

where:

- &*target* is the case-sensitive name of a macro variable to create or set. If no variable with that name exists, it is created and set. If a variable with that name already exists, its value is reset.

  The name must begin with a single ampersand (&), which must be followed by an alphabetic character, which is optionally followed by one or more alphanumeric characters and underscores. For example, &A_b is a valid name, but & and &a.b are *not* valid.

- "*string*" is a string constant.
- [-]*nnn* is an integer constant with an optional leading minus sign.
- *&var* is a previously defined macro variable.
- *%xxx* is a User Language percent variable.
- g.*xxx* is a Debugger global variable reference 94.
- f.*xxx* is a Debugger field reference 93, possibly with a subscript.
- $listcnt/$listinf are the Debugger functions for viewing $list counts and elements. 96
- &&*function* is a macro function.

These command examples also show that multiple blanks may surround names and values:

```
SET &a2 = %a(2)

  set &i=%i

SEt   &g =    %G

set &s=%s

set &l =   %L

set &lc = $listcnt(%g)

set &l1 = $listinf(%g,1)
```

```
set &l2 = $listinf(%g,2)

set &global = g.JACK

set &sl = %sl:item(1)

set &num   = 1

set &string = "a"

set &a = &&prompt("g'day mate!")

set &f  = f.name

set &f3 = f.name(3)

set &a2 = -1

set &xx = &asa
```

Note: If you later want to review the values of macro variables you have defined, you can issue the varDump[285] Client command, for example from the Command Line[323] tool. Other commands useful for working with macro variables include setM204Data[265], assert[178], continueIf[195], and toggle[276].

7.7 Working with Client functions

The available Debugger Client functions are described in individual subsections that follow. The function names are specified without regard for case.

Client function names begin with two ampersand (&&) characters; those characters must be followed by one alphabetic character, which may be followed by one or more alphanumeric characters and underscores.

Client function arguments *all* have the same form: that is, they may be single- or double-quoted strings, numeric constants, or, as of Client Build 58, they may also be macro variables.[325]

To see in a message box or the console a value returned by a function, you can assign it to a macro variable, then issue the varDump[285] command; or use the function with the echo[201] command.

Macro-only functions

It may be that a &&function is **macro-only**: it may be used only in a Debugger macro.[315] The description of such a &&function includes a **Scope** section that reminds of this restriction.

String functions

The &&functions include a group of string manipulation functions, all of which follow these rules:

- The first character in a string occupies position 1, the second occupies 2, and so on.
- If a function searches for and returns the position of a desired string within a target, it returns `0` if the searched-for string is not found.
- If a function takes a position or length as an argument, and the argument value that is passed is non-numeric, an error is issued and the command that references the function is aborted.
- If a number is passed for a parameter that is a string, the number is converted to a string. For example, `1234` is treated like `'1234'`.
- Character matching is case sensitive.
- Like all &&functions, arguments may be single- or double-quoted strings, numeric constants, or &variables.

7.7.1 &&amDaemon function

Action: Useful for testing purposes, this function returns a `1` if a Daemon tab contains the currently active code. Otherwise, the returned number is `0` .

Syntax:

```
&&amDaemon
```

Introduced: Build 59

7.7.2 &&arg function

Action: Serves as a placeholder for a command argument *within a macro* (if used outside of a macro, an error is issued). The argument that takes the place of `&&arg` is dynamically provided 321 by the Client user.

Syntax:

```
&&arg(n)
```

where *n* is a single- or double-quoted string, a numeric constant, or as of Build 58, a macro variable 325.

Designed for commands that have multiple arguments, this function parses the blank-delimited, user-provided string to determine the replacement values for the `&&arg` occurrences within the command. The first such value in the string replaces `&&arg(1)`, the second replaces `&&arg(2)`, and so on.

For example, for the following provided argument string, `&&arg(1)` returns `%a`:

```
%a  2
```

The `&argstring` 320 variable is a placeholder designed for single-argument commands within a macro.

If a command takes a single argument, or you want to treat whatever is passed to the command as a single string (even if it contains blanks), use the `&argstring` 320 variable instead of the `&&arg` function.

Scope: Allowed only in Debugger macros

Introduced: Build 28

7.7.3 &&assertFailureCount function

Action: Returns a count of the number of times that the result of an assert[178] command is a Failure (since the beginning of the execution of the macro that contains the `assert`).

Syntax:

```
&&assertFailureCount
```

The "assert" functions (also including `&&assertSuccessCount` and `&&assertStatus`) are particularly useful if you are using the `assert` command to automate your code testing, letting you keep track of the successes and failures of the assertions.

To clear the count at any time (other than by default when the Client is started/restarted or when a new macro is invoked), you can use the `resetAssertCounts`[244] command, as of Build 56.

Introduced: Build 50

7.7.4 &&assertStatus function

Action: Returns a string that contains a summary of the counts of assert[178] command results (since the beginning of the execution of the macro that contains the `assert`).

Syntax:

```
&&assertStatus
```

The "assert" functions (also including `&&assertSuccessCount` and `&&assertFailureCount`) are particularly useful if you are using the `assert` command to automate your code testing, letting you keep track of the successes and failures of the assertions.

To report the function result, you may want to use the echo[201] command, as shown in the following macro trace output[224]:

```
>>>macroTrace: macroTrace on
>>>macroTrace: echo &&assertStatus
Macro message: Assert Summary: Failed: 0, Succeeded: 17
```

Introduced: Build 50

7.7.5 &&assertSuccessCount function

Action: Returns a count of the number of times that the result of an assert[178] macro command is a Success (since the beginning of the execution of the macro that contains the `assert`).

Syntax:

```
&&assertSuccessCount
```

The "assert" functions (also including `&&assertFailureCount` and `&&assertStatus`) are particularly useful if you are using the `assert` command to automate your code testing, letting you keep track of the successes and failures of the assertions.

To clear the count at any time (other than by default when the Client is started/restarted or when a new macro is invoked), you can use the `resetAssertCounts`[244] command, as of Build 56.

Introduced: Build 50

7.7.6 &&blackOrWhiteList function

Action: Tests whether the Debugger is filtering[79] the procedures you are going to debug, and if so, whether a Black List or White List is being used.

Syntax:

```
&&blackOrWhiteList
```

The all-lowercase return string is one of these values: `black`, `white`, or `none`.

Example:

The following macro includes a comparison involving `&&blackOrWhiteList`:

```
continueMacroIf &&blackOrWhiteList <> 'black'
labelButton button0 BlackList Off
turnOnBlackList
setTitle Black List on
set &changed = 1
clearStatus
```

Introduced: Build 62

7.7.7 &&concatenate function

Action: Concatenate and return the function's arguments.

If fewer than two arguments are specified, an error is issued.

Syntax:

```
&&concatenate(str1,str2[,str3] ...)
```

where the *str* arguments observe the rules for &&function string arguments 328.

For example, the following fragment would display: **abc123hi**

```
set &hello = 'hi'
set &result = &&concatenate('a', 'b', "c", 1,2,3,&hello)
echo &result
```

Introduced: Build 58

7.7.8 &&currentPacFile function

Action: Returns the URL of the Proxy Auto Configure (PAC) 388 file in use, or it returns empty if no PAC file is in use. The URL returned is a `file://` or an `http://` URL.

Syntax:

```
&&currentPacFile
```

For example, after running an `echo &&currentPacFile` command, you might receive a message like the following:

```
http://pacServerHost:pacServerPort/pacman/PAC.10.111.2.82.JS
```

Introduced: Build 63

7.7.9 &&currentRunningMacro function

Action: Returns the full file-system path to the macro within which it is called. If not called from within a macro, the function returns a null string.

Syntax:

```
&&currentlyRunningMacro
```

For example, after running the macro `mymacro`, which contains a call to `&&currentlyRunningMacro`, the Console includes a line like the following:

```
Invoking Macro: C:\Users\JAL\Documents\Debugger\test\mymacro.macro
```

Introduced: Build 60

7.7.10 &&currentTitle

Action: Returns the current title of the Client main window.

Syntax:

```
&&currentTitle
```

This function may be useful in conjunction with the `setTitle` 268 and `restoreTitle` 246 commands.

See also `&&originalTitle` 341.

Introduced: Build 62

7.7.11 &&exists function

Action: Tests if a macro variable[325] is defined.

Syntax:

```
&&exists(variableName)
```

where *variableName* is the macro variable whose existence is being checked.

If the named variable exists, `&&exists` returns `1`; otherwise, it returns `0` .

A variable is deemed to "not exist" in these cases:

- It has not been defined since the Debugger Client was last started or restarted.
- It has been defined, but it was removed with the `unset` command.

Examples:

The following statement returns `0`:

```
echo &&exists("&neverSet")
```

The `echo` statement below returns `1`:

```
set &i = 666
echo &&exists("&i")
```

The `echo` statement below returns `0`:

```
unset &i
echo &&exists("&i")
```

Introduced: Build 60

7.7.12 &&getMainSearchInputArea function

Action: Returns the value specified in the search 44 input area on the Client main window. If the Client is in hide-lower 311 mode, the function returns the value specified in the input box in the Status bar. 49

Note: The function does **not** return a value for an external window.

Syntax:

```
&&getMainSearchInputArea
```

Introduced: Build 58

7.7.13 &&getVariableOrFieldInputArea function

Action: Returns the value specified in the Entity-name input box 50. If the Client is in hide-lower 311 mode, the function returns the value specified in the input box in the Status bar. 49

Syntax:

```
&&getVariableOrFieldInputArea
```

Introduced: Build 58

7.7.14 &&globalAssertFailureCount function

Action: Same as `&&assertFailureCount` 330 except its scope is the entire Client session. During such a session, the count is only cleared if done explicitly with the `resetGlobalAssertCounts` 244 command.

Syntax:

```
&&globalAssertFailureCount
```

Introduced: Build 57

7.7.15 &&globalAssertStatus function

Action: Same as &&assertStatus 330 except its scope is the entire Client session. During such a session, the counts are only cleared if done explicitly with the resetGlobalAssertCounts 244 command.

Syntax:

```
&&globalAssertStatus
```

Introduced: Build 57

7.7.16 &&globalAssertSuccessCount function

Action: Same as &&assertSuccessCount 331 except its scope is the entire Client session. During such a session, the count is only cleared if done explicitly with the resetGlobalAssertCounts 244 command.

Syntax:

```
&&globalAssertSuccessCount
```

Introduced: Build 57

7.7.17 &&ieMode function

Action: Returns the current setting of the Client's IE Mode preference. 19

Syntax:

```
&&ieMode
```

The returned value is a lowercase string: `none`, `proxy`, `newpac` or `mergedpac`. These values are exactly the options of the `setIEmode` 263 command.

Introduced: Build 62

7.7.18 &&index function

Action: Returns the 1-based position of the *needle* argument within the *haystack* argument, or it returns `0` if the *needle* value is not found within the *haystack* value.

If fewer than two arguments are specified, an error is issued.

Syntax:

```
&&index(haystack,needle)
```

where the *haystack* and *needle* arguments observe the rules for &&function string arguments 328.

For example, the first `&&index` call in the following fragment would return `3`; the second would return `0`:

```
set &g = 'george'
&&index(&g,'or')
&&index('moe', 'x')
```

Introduced: Build 58

7.7.19 &&isWatched function

Action: Determines whether its argument is a variable that is currently specified in the **Watch Window.** If it is, `&&isWatched` returns `1`; if not, it returns `0`.

Syntax:

```
&&isWatched(value)
```

where *value* is a single- or double-quoted string, a numeric constant, or a macro variable 325.

Introduced: Build 58

7.7.20 &&length function

Action: Returns the length in characters of its string argument.

Syntax:

```
&&length(value)
```

where *value* observes the rules for &&function string arguments 328.

For example, the first `&&length` call in the following fragment returns `0`; the second returns `3`; the last returns `6`:

```
&&length("")
&&length(123)
set &g = 'george'
&&length(&g)
```

Introduced: Build 58

7.7.21 &&numberOfBreakpoints function

Action: Returns the number of breakpoints that are set in the current request, irrespective of the current executing position in the request.

Syntax:

```
&&numberOfBreakpoints
```

Introduced: Build 58

7.7.22 &&numberOfLevels function

Action: Returns the number of code levels being debugged. The main program is one level and each active daemon adds another level. For example, if a request spawns a daemon which itself spawns a daemon, and that second daemon still has code to execute, the return to `&&numberOfLevels` is `3`.

If no program is being debugged, `0` is returned.

Syntax:

```
&&numberOfLevels
```

Introduced: Build 59

7.7.23 &&numberWatched function

Action: Returns the number of items that are currently being watched 85 in the **Watch Window.**

Syntax:

```
&&numberWatched
```

Introduced: Build 58

7.7.24 &&originalTitle

Action: Returns the default value of the title of the Client main window (the window title is subject to change by a `setTitle` 268 command). The default main window title is "The Janus Debugger" or "The TN3270 Debugger."

Syntax:

```
&&originalTitle
```

The `&&originalTitle` function returns the same value as the `restoreTitle` 246 command.

See also **`&&currentTitle`** 334.

Introduced: Build 62

7.7.25 &&preference function

Action: Returns the value of the specified Client preference setting. Client preferences are selected from the Preferences 18 dialog box or the Proc Selection 13 page, or they are set with the `setPreference` 265 command. Their names for the purposes of this function match the options listed for the `setPreference` command.

Syntax:

```
&&preference(preferenceName)
```

where *`preferenceName`* is one of the `setPreference` command preference options (not case-sensitive).

For example, the following command returns a `1` or `0` (indicating that the preference is on or off):

```
echo &&preference('BreakAfterReadScreen')
```

Introduced: Build 60

7.7.26 &&procName function

Action: Returns the name of the procedure that is being executed. If no procedure or an ad hoc procedure is being executed, a zero-length string is returned.

Syntax:

```
&&procName
```

Introduced: Build 48

7.7.27 &&prompt function

Action: Pauses a macro while you supply an argument value for a command that is specified within the macro, then continues running the macro using the supplied value for the command.

Syntax:

```
&&prompt("string" | &var)
```

where:

- *string* is any single- or double-quoted character string.
- *&var* is a macro variable 325. This option is new in Build 58.

Described further in Passing a command argument to a macro. 321

Introduced: Build 27

7.7.28 &&searchResult function

Action: Returns the line number of the line that contained the found string, if the last Client search operation (invoked by **Search** button or command) successfully found something. If the last search found nothing, or if there was no prior search, then `&&searchResult` returns `-1.`

Syntax:

```
&&searchResult
```

This function considers the numbering of the lines in a Client tab's display to start with 0.

Introduced: Build 48

7.7.29 &&searchSuccess function

Action: Returns `1` (True) if the last Client search operation (invoked by button or command) successfully found something. If the last search found nothing, or if there was no prior search, `&&searchSuccess` returns `0` (False).

Syntax:

```
&&searchSuccess
```

Introduced: Build 48

7.7.30 &&selectedTab function

Action: Useful for testing purposes, this function returns the label of the Client main window tab that is currently active (for example, "Audit Trail"). Or, it returns a null string ('') if no tab is active (for example, no program is being debugged).

Syntax:

```
&&selectedTab
```

Introduced: Build 59

7.7.31 &&statusMessage

Action: Returns the most recent Client status 49 message.

Syntax:

```
&&statusMessage(windowName)
```

where *windowName* is a single- or double-quoted string, a numeric constant, or a macro variable 325 that identifies a Client window. *windowName* may be specified without regard for character case.

Introduced: Build 59

7.7.32 &&substring function

Action: Return a substring of the target *string* argument. The returned substring characters begin with the *start* character position (1-based) and continue for *len* characters. If no len value is specified, the returned substring extends to the end of *string*.

Syntax:

```
&&substring(string,start[,len])
```

where the arguments observe the rules for &&function string arguments 328.

For example, the first `&&substring` call in the following fragment returns `b`; the second returns `bc`; the last returns `c`:

```
&&substring('abc',2,1)
&&substring('abc',2)
&&substring('abc',3)
```

Introduced: Build 58

7.7.33 &&sum function

Action: Returns the sum of the function arguments.

Syntax:

```
&&sum(value, value ...)
```

where *value* is a numeric constant, or a macro variable 325.

If fewer than two arguments are passed, or if any argument has a non-numeric value, an error is issued.

See also the increment 217 and decrement 199 commands.

Introduced: Build 58

7.7.34 &&verifyMatch function

Action: Returns the 1-based position (in *string*) of the first character in *string* that is also in the characters in *charSet.* If no character in *string* is in *charSet,* returns `0`.

Syntax:

```
&&verifyMatch(string,charSet)
```

where the arguments observe the rules for &&function string arguments 328.

For example, the first `&&verifyMatch` call in the following sequence returns `2`; the second returns `1`; the third returns `1`; the fourth returns `3`; the fifth returns `0`:

```
&&verifyMatch("Shazam","abcsh")
&&verifyMatch("Shazam","abcSh")
&&verifyMatch("Shazam","Shazam")
&&verifyMatch("Shazam","abc")
&&verifyMatch("Shazam","xxx")
```

Introduced: Build 58

7.7.35 &&verifyNoMatch function

Action: Returns the 1-based position (in *string*) of the first character in *string* that is **not** in the characters in *charSet.* If no character in *string* is not in *charSet,* returns `0`.

Syntax:

```
&&verifyNoMatch(string,charSet)
```

where the arguments observe the rules for &&function string arguments 328.

For example, the first `&&verifyNoMatch` call in the following sequence returns `1`; the second returns `4`; the third returns `0`; the fourth returns `4`:

```
&&verifyNoMatch("Shazam","abcsh")
&&verifyNoMatch("Shazam","abcSh")
&&verifyNoMatch("Shazam","Shazam")
&&verifyNoMatch("123.45","0123456789")
```

Introduced: Build 58

7.7.36 &&windowStatus function

Action: Returns `1` if the named window is open 306, `0` otherwise.

Syntax:

```
&&windowStatus(windowName)
```

where *windowName* is a single- or double-quoted string, a numeric constant, or a macro variable 325 that identifies a Client window. *windowName* may be specified without regard for character case.

Introduced: Build 58

CHAPTER 8 Problem Diagnosis

These sections are included:

8.1 Debugging the Janus Debugger

Whenever your browser sends a web request to a Janus Web Server that has been configured for debugging, this sequence of events unfolds:

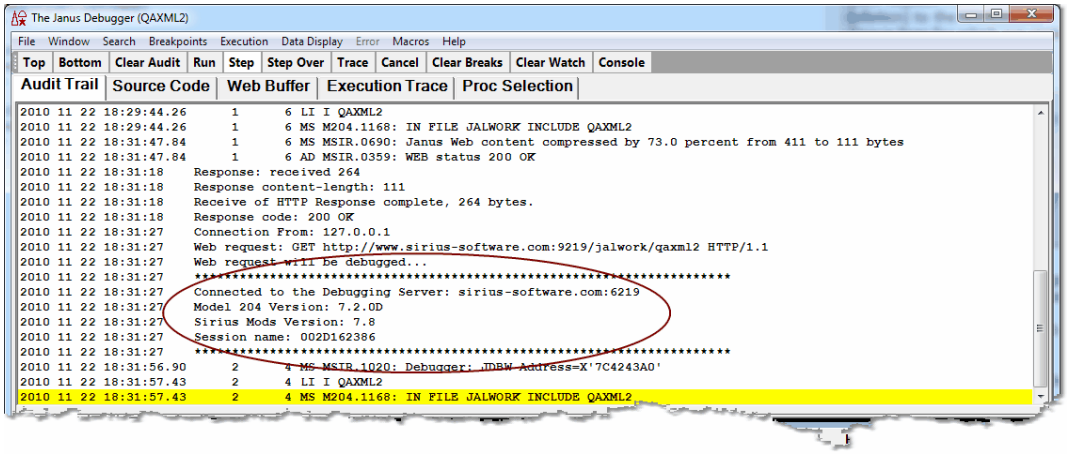
1. Before sending your web request, the Debugger Client on the workstation, which is defined 385 as your proxy server, connects to the Debugger Server port on the online (set up during product installation 371). The Debugger Server starts a Model 204 thread whose default user ID is SOCKUSER.

2. The Debugger Server communicates over a socket connection with the Client and creates a worker thread for this debugging session. The connection handshake contains a unique ID from the Client for this debugging session. The Server worker thread uses AUDIT statements to report its activities to the Model 204 audit trail.

   The following SirScan audit trail lines for user SOCKUSER report the Debugger Server activity described thus far. The session ID is encircled. Subsequent worker thread lines are shown later 351:

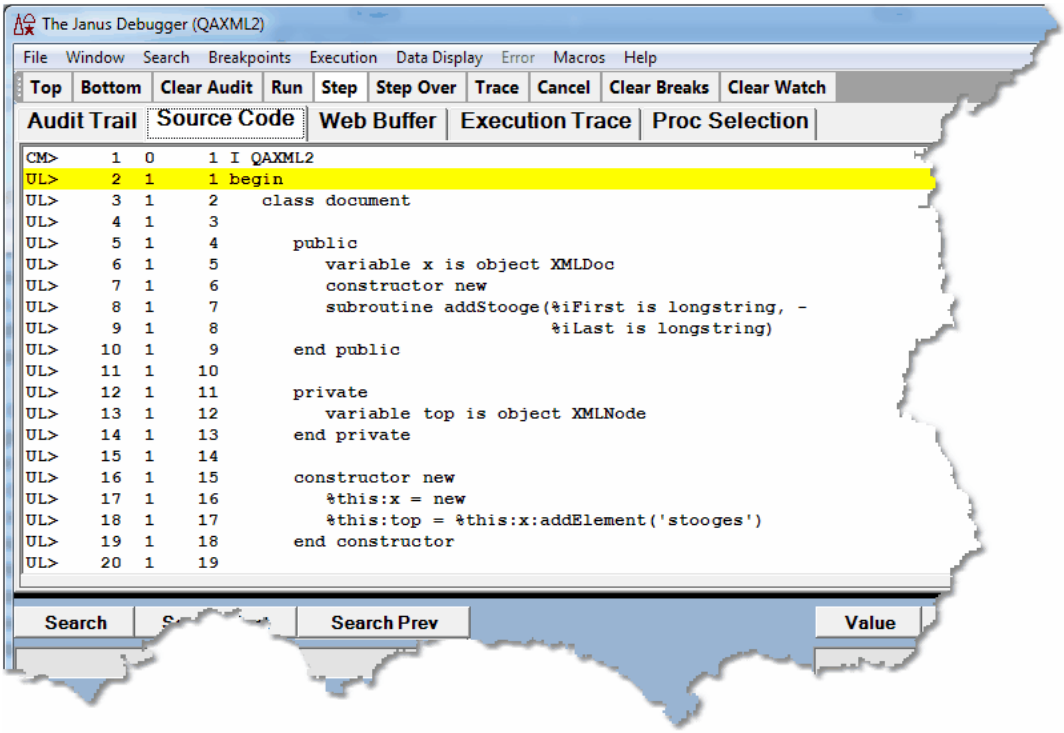
```
3 AD MSIR.0114: Processing connection for port DEBUGSERVER3355 from 198.242.244.16
3 AD M204.0352: IODEV=15, OK SOCKUSER   SOCKUSER   LOGIN  05.363  DEC 29  10.44.30 -13
3 LI I DEBUGSERVER.UL
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UL
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UTABLE
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVERTOOLS.UL
3 ST USERID='SOCKUSER' ACCOUNT='SOCKUSER' LAST='CMPL' SUBSYSTEM='' PROC-FILE='JALPROC'
     NTBL=97 QTBL=584 STBL=5690 VTBL=776 PDL=696 CPU=15 DKRD=4 PCPU=832 RQTM=18 DKPR=12
3 US Debug request from: 198.242.244.16 33D39348
```

3. The worker thread is directed by the Debugger Client (based on user interface actions), and the worker thread maintains an internal master/slave, post/wait relationship with the Web Server thread being debugged. The initial action of the worker thread is to announce itself to the Debugger Client in the **Audit Trail** page:



4. The worker then continues in a loop/dialogue with the Client, reporting its state and latest activity to the Client, and receiving XML requests from the Client (commands that are based on what the Debugger GUI user is invoking). If the normal Web Server response to your web request is to include a Model 204 procedure, for example, the Client sends the worker a command to have the Web Server continue, the worker posts that command to the Web Server, the worker sends AUDIT lines about this exchange, and the worker waits.

5. While the worker thread waits, the Debugger Client sends your web request to the Janus Web Server. The worker's wait limit is two minutes, so it will time out and end if the request fails for any reason. Otherwise, the Web Server recognizes the debugging session ID, so sends its response to the worker. In this example, the response is procedure code, which is sent to the worker instead of being run. The worker wakes up, sends the procedure code in an XML document to the Client, and the Client displays the procedure code in the Debugger **Source Code** page:



The worker thread reports its actions thus far in the lines below that begin with three asterisks (***). The worker refers to the Web Server thread as the "debuggee":

```
3 AD MSIR.0114: Processing connection for port DEBUGSERVER3355 from 198.242.244.16
3 AD M204.0352: IODEV=15, OK SOCKUSER   SOCKUSER   LOGIN  05.363  DEC 29  10.44.30 -13
3 LI I DEBUGSERVER.UL
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UL
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UTABLE
3 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVERTOOLS.UL
3 ST USERID='SOCKUSER' ACCOUNT='SOCKUSER' LAST='CMPL' SUBSYSTEM='' PROC-FILE='JALPROC'
     NTBL=97 QTBL=584 STBL=5690 VTBL=776 PDL=696 CPU=15 DKRD=4 PCPU=832 RQTM=18 DKPR=12
3 US Debug request from: 198.242.244.16 33D39348
3 US ***Connection to worker: External user number: 5 Internal user number: 2
3 US ***Worker got command from client: R
3 US ***Worker posts debuggee, and then waits...
3 US ***Debugger Worker wakes up: S
```

6. The Client-worker-Web Server communication continues in this fashion according to the commands invoked by the Client GUI user. The Client user initiates the next round of activity by invoking an operation on the source code, say, stepping to the next statement. The Client signals the worker, and the worker instructs the Web Server thread. The worker reports a sequence of audit lines similar to the previous ones (the ending N's below mean "run to ***N***ext statement" and "***N***ext statement executed"):

```
RK SCAN: US=SOCKUSER TM=C6F2F410 IP=198.242.244.16 JA=DEBUGSERVER3355
US ***Worker got command from client: N
US ***Worker posts debuggee, and then waits...
US ***Debugger Worker wakes up: N
```

7. In case you need to debug the Debugger, you can access the XML traffic exchanged between the worker and Debugger Client. To do so, use the JANUS TRACE command (described in the ***Janus TCP/IP Base Reference Manual***) to increase the tracing on the Debugger Server port (in this example, DEBUGSERVER3355), and use SirScan to view the traffic. The JANUS DISPLAYTRACE command reveals the current trace value.

   Since a high tracing value, say `15`, can capture huge amounts of data, remember to return the tracing setting to its former value when you no longer need so much detail.

   Also of possible use in a debugging situation, the Debugger Client installation folder is the default location 303 for a text log (`log.txt`) that includes the Client and workstation browser activity that is captured by the Client.

8.2 Debugging the TN3270 Debugger

Whenever you invoke a User Language program from an Online that has been configured for debugging, this sequence of events unfolds:

1. The initial user call to start the TN3270 Debugger (`SIRDEBUG ON DEBCLI1 198.242.244.16 8081 3270` in the SirScan example lines below, which is described 396 as part of the product installation) triggers a socket connection request from the issuing user's thread (using the CLSOCK port defined 372 during installation) to the workstation that hosts the Debugger Client. The connection request (trace lines for which are circled below) contains the number of the Debugger Server port (set up during product installation 371) and the user thread number.

```
18 LI SIRDEBUG ON DEBCLI1 198.242.244.16 8081 3270
18 MS MSIR.0469: Establishing connection to host 198.242.244.16 port number 8081 using
      Janus CLSOCK port DEBCLI1, user socket number 2
18 RK APO(2) 000000 : 47455420 2F204854 54502F31 2E310D0A | GET / HTTP/1.1..
18 RK APO(2) 000010 : 69676E6F 72654C65 76656C5A 65726F3A | ignoreLevelZero:
18 RK APO(2) 000020 : 20310D0A 4A616E75 734F6E6C 696E6552 |  1..JanusOnlineR
18 RK APO(2) 000030 : 65717565 73743A20 30303031 380D0A57 | equest: 00018..W
18 RK APO(2) 000040 : 6F726B65 72506F72 743A2030 33323730 | orkerPort: 03270
18 RK APO(2) 000050 : 0D0A0D0A                           | ....
```

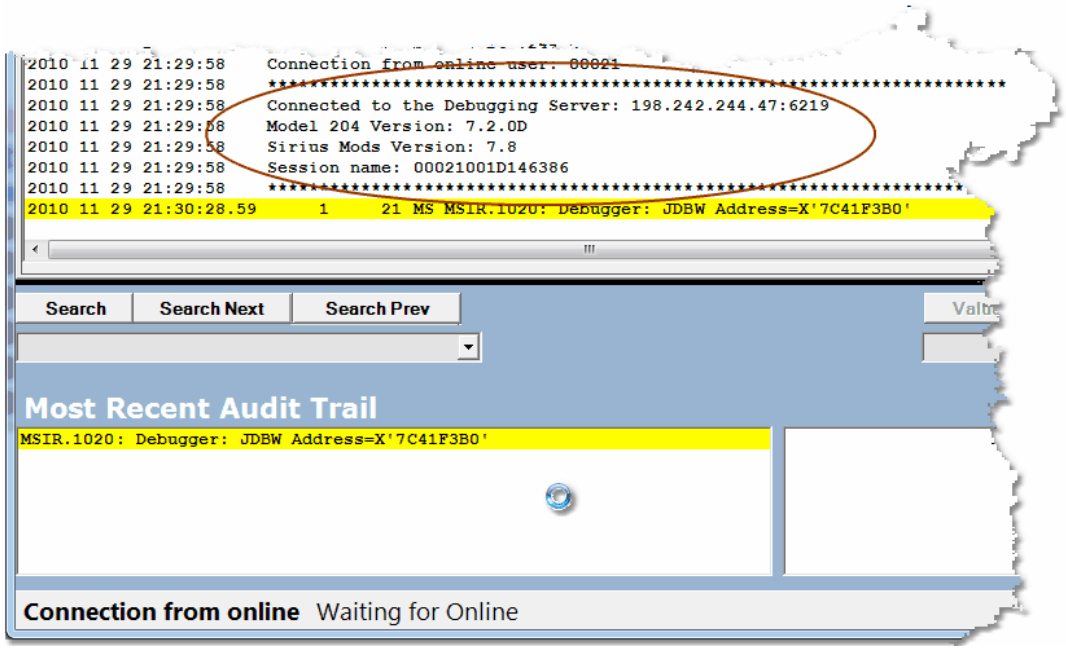
2. Once the connection succeeds, the Debugger Client, in turn, connects to that Debugger Server port, which starts a Model 204 thread whose default user ID is SOCKUSER (see top two SirScan lines, below). The Debugger Server communicates over a socket connection with the Client and creates a worker thread for this debugging session. The connection handshake contains a unique ID from the Client for this debugging session (circled, below). The Server worker thread uses AUDIT statements to report its activities to the Model 204 audit trail.

```
 2 AD MSIR.0114: Processing connection for port DEBUGSERVER3270 from 198.242.244.16
 2 AD M204.0352: IODEV=15, OK SOCKUSER   SOCKUSER   LOGIN  06.170  JUN 19  14.29.14   1 C6F2F410
 2 LI I DEBUGSERVER.UL
 2 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UL
 2 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVER.UTABLE
 2 MS M204.1168: IN FILE JALPROC INCLUDE DEBUGSERVERTOOLS.UL
 2 ST USERID='SOCKUSER' ACCOUNT='SOCKUSER' LAST='CMPL' SUBSYSTEM='' PROC-FILE='JALPROC' PROC='DEBUGSERVER.UL'
      NTBL=100 QTBL=606 STBL=5712 VTBL=785 PDL=700 CPU=14 PCPU=932 RQTM=15 DKPR=14
 2 RK APO 000000 : 32303020 4A616E75 73446562 75670D0A | 200 JanusDebug.. |
 2 RK API 000000 : 30303031 38303032 44343336 3533320D | 00018002D436532. |
 2 US Debug request from: 198.242.244.16 00018002D436532
 2 RK API 000010 : 0A                                  | .                 |
 2 RK APO 000000 : 32303020 362E312E 30472020 20362E39 | 200 6.1.0G   6.9 |
 2 RK APO 000010 : 20363636 0D0A                       |  666..            |
18 RK API(2) 000000 : 48545450 2F312E30 20323030 20303030 | HTTP/1.0 200 000 |
18 RK API(2) 000010 : 31383030 32443433 36353332 0D0A     | 18002D436532..   |
 2 US *** Connection to worker: External user number: 21 Internal user number: 18
```

The worker thread reports its actions in lines that begin with three asterisks (***). The worker refers to the Online thread to be debugged as the "debuggee." A successful connection between the Debugger Server and Debugger Client results in a "Debugging is on" message, and the ID referred to in the connection handshake becomes the "session ID" for this debugging session:

```
 2 US ***Worker got command from client: R
 2 US ***Worker posts debuggee, and then waits...
18 MS MSIR.0915: Debugging is on: client is 198.242.244.16 port 8081, sessionID: 00018002D436532
```

3. The worker thread is directed by the Debugger Client (based on user interface actions), and the worker thread maintains an internal master/slave, post/wait relationship with the Online thread that is being debugged. The initial action of the worker thread is to announce itself to the Debugger Client in the **Audit Trail** page:



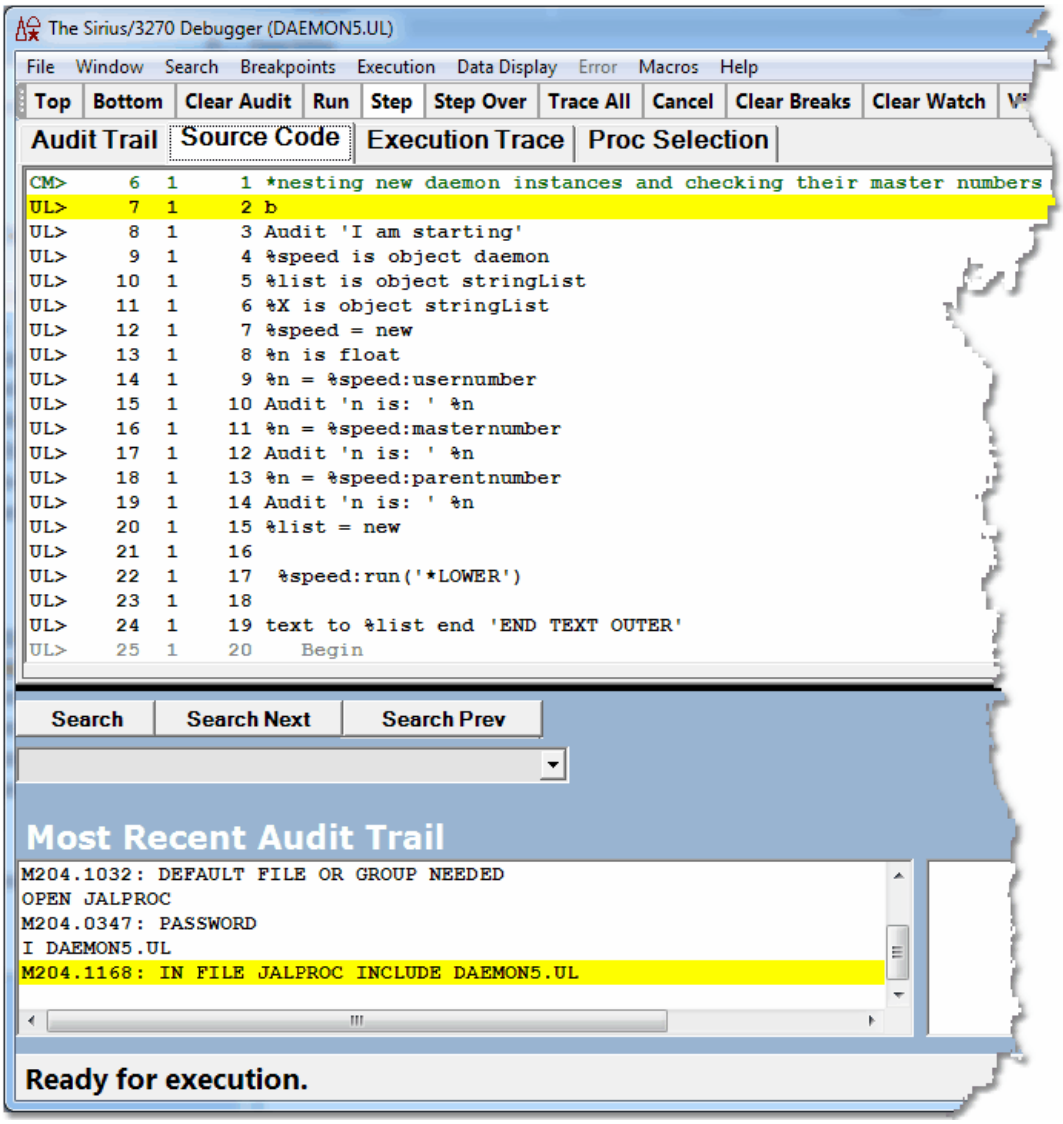
4. The worker then waits for the Online thread to initiate debuggable activity. If you include a Model 204 procedure from the Online thread, for example (DAEMON5.UL in the SirScan excerpt below), the worker detects this and pauses procedure processing while it sends the code lines to the Client (in an XML document) using the DEBCLI1 CLSOCK port, then waits for a response from the Client.

Note: The format of the XML messages in the following and subsequent code examples in this section is unpublished and subject to change.

```
18 LI I DAEMON5.UL
18 MS M204.1168: IN FILE JALPROC INCLUDE DAEMON5.UL
 2 RK SCAN: US=SOCKUSER TM=C6F2F410 IP=198.242.244.16 JA=DEBUGSERVER3270
 2 US ***Debugger Worker wakes up: S
 2 US ***TraceCount: 0
 2 RK API 000050 : 0A                                  | .                |
 2 RK APO 000000 : 3C446562 75674175 6469743E 3C737461 | <DebugAudit><sta |
 2 RK APO 000010 : 74653E53 3C2F7374 6174653E 3C73746F | te>S</state><sto |
 2 RK APO 000020 : 7054696D 653E3036 31393131 32333935 | pTime>0619112395 |
 2 RK APO 000030 : 3337303C 2F73746F 7054696D 653E3C6E | 370</stopTime><n |
 2 RK APO 000040 : 6578743E 2D313C2F 6E657874 3E3C6C61 | ext>-1</next><la |
 2 RK APO 000050 : 73743E2D 313C2F6C 6173743E 3C726574 | st>-1</last><ret |
 2 RK APO 000060 : 75726E43 6F64653E 303C2F72 65747572 | urnCode>0</retur |
```

```
 2 RK APO 0001D0 : 206D6173 74657220 6E756D62 [illegible] | master numbers |
 2 RK APO 0001E0 : 203C2F6C 696E653E 3C6C696E 653E4320 | </line><line>C   |
 2 RK APO 0001F0 : 20202020 20202020 20302020 20202020 |          0       |
 2 RK APO 000200 : 32303320 20202020 20312062 20203C2F | 203      1 b  </ |
 2 RK APO 000210 : 6C696E65 3E3C6C69 6E653E4D 533C2F6C | line><line>MS</l |
 2 RK APO 000220 : 696E653E 3C6C696E 653E5353 20202020 | ine><line>SS     |
 2 RK APO 000230 : 20202020 20302020 20202020 32303420 |      0      204  |
 2 RK APO 000240 : 20202020 20312041 75646974 20274920 |      1 Audit 'I  |
 2 RK APO 000250 : 616D2073 74617274 696E6727 20203C2F | am starting'  </ |
 2 RK APO 000260 : 6C696E65 3E3C6C69 6E653E53 20202020 | line><line>S     |
 2 RK APO 000270 : 20202020 20323820 20202020 20323035 |      28      205 |
 2 RK APO 000280 : 20202020 20203120 25737065 65642069 |       1 %speed i |
 2 RK APO 000290 : 73206F62 6A656374 20646165 6D6F6E20 | s object daemon  |
 2 RK APO 0002A0 : 203C2F6C 696E653E 3C6C696E 653E5320 |  </line><line>S  |
 2 RK APO 0002B0 : 20202020 20202020 32382020 20202020 |         28       |
 2 RK APO 0002C0 : 32303620 20202020 20312025 6C697374 | 206      1 %list |
 2 RK APO 0002D0 : 20697320 6F626A65 63742073 7472696E |  is object strin |
 2 RK APO 0002E0 : 674C6973 7420203C 2F6C696E 653E3C6C | gList  </line><l |
 2 RK APO 0002F0 : 696E653E 53202020 20202020 20203238 | ine>S         28 |
```

5. The Client displays the procedure code in the Debugger **Source Code** page:



6. The Client user initiates the next round of activity by invoking an operation on the source code, say, stepping to the next statement. The Client sends this command in an XML message to the worker (upper circle, below), and the worker wakes up and instructs the Online thread. The worker reports a sequence of "***" audit lines (the ending N's below mean "run to ***N***ext statement" and "***N***ext statement executed"), then sends an XML response to the Client (lower circle, below) about the result of executing the next statement in the program:

```
 2 RK API 000000 : 3C446562 75675265 71756573 743E3C6F | <DebugRequest><o |
 2 RK API 000010 : 70657261 74696F6E 3E4E3C2F 6F706572 | peration>N</oper |
 2 RK API 000020 : 6174696F 6E3E3C61 7267313E 3C2F6172 | ation><arg1></ar |
 2 RK API 000030 : 67313E3C 61726732 3E3C2F61 7267323E | g1><arg2></arg2> |
 2 RK API 000040 : 3C2F4465 62756752 65717565 73743E0D | </DebugRequest>. |
 2 RK SCAN: US=SOCKUSER TM=C6F2F410 IP=198.242.244.16 JA=DEBUGSERVER3270
 2 US ***Worker got command from client:  N
 2 US ***Worker posts debuggee, and then waits...
18 RK SCAN: US=JAL TM=JAL2
18 ST USERID='JAL' ACCOUNT='JAL' LAST='CMPL' SUBSYSTEM='' PROC-FILE='JALPROC' PRO
      STBL=1553 VTBL=59 PDL=892 CNCT=13371 CPU=1 RQTM=13370903 SVRD=1 SVWR=1 DKPR
 2 US ***Debugger Worker wakes up: N
 2 US ***TraceCount: 0
 2 RK API 000050 : 0A                                  | .                |
 2 RK APO 000000 : 3C446562 75674175 6469743E 3C737461 | <DebugAudit><sta |
 2 RK APO 000010 : 74653E4E 3C2F7374 6174653E 3C73746F | te>N</state><sto |
 2 RK APO 000020 : 7054696D 653E3036 31393131 36323234 | pTime>0619116224 |
 2 RK APO 000030 : 3436303C 2F73746F 7054696D 653E3C6E | 460</stopTime><n |
 2 RK APO 000040 : 6578743E 303C2F6E 6578743E 3C6C6173 | ext>0</next><las |
 2 RK APO 000050 : 743E2D31 3C2F6C61 73743E3C 72657475 | t>-1</last><retu |
 2 RK APO 000060 : 726E436F 64653E30 3C2F7265 7475726E | rnCode>0</return |
 2 RK APO 000070 : 436F6465 3E3C7661 6C756573 2F3E3C74 | Code><values/><t |
 2 RK APO 000080 : 72616365 20636F75 6E743D22 30222F3E | race count="0"/> |
 2 RK APO 000090 : 3C2F4465 62756741 75646974 3E0D0A   | </DebugAudit>..  |
```

7. The Client-worker-Online communication continues in this fashion according to the commands invoked by the Client GUI user. The worker continues in a loop/dialogue with the Client, reporting its state and latest activity to the Client, and receiving XML requests from the Client (commands that are based on what the Debugger GUI user is invoking). The worker also maintains a master-slave relationship with the Online thread, guiding the execution of the program and reporting execution results.

8. In case you need to debug the Debugger, you can access the XML traffic exchanged between the worker and Debugger Client. To do so, use the JANUS TRACE command (described in the ***Janus TCP/IP Base Reference Manual***) to increase the tracing on the Debugger Server port (in this example, DEBUGSERVER3270) and on the Online's client socket port (in this example, DEBCLI1), and use SirScan to view the traffic. The JANUS DISPLAYTRACE command reveals the current trace values.

   Since a high tracing value, say `15`, can capture huge amounts of data, remember to return the tracing settings to their former values when you no longer need so much detail.

   Also of possible use in a debugging situation, the Debugger Client installation folder is the default location 303 for a text log (`log.txt`) of Client activity and reference file information.

8.3 How the Janus Debugger handles communication breaks

If the Janus Debugger is not properly configured or if communication between any of its components is lost, the Debugger Client or the browser or both will display error messages and will attempt to restore normal operation, typically without requiring a recycling of any of the components.

In most cases, as long as the Debugger Client itself is not the problem, these communication breaks are signaled by the Client with a Communication Error message box and the display of `Communication Error` in the Status bar 49.

This section describes the most likely types of communication breaks (not related to product configuration) and how the Debugger responds. The subsections below (except for the last) are organized by the Client's Communication Error message:

Invalid response from debugger: info 358

An existing connection was forcibly closed by the remote host 360

The Debugger Client is not available 361

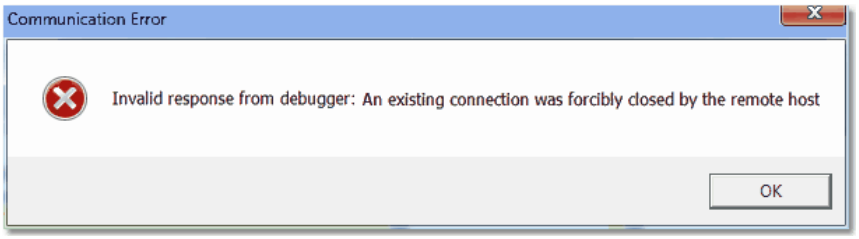
Invalid response from debugger: *info*

info is one of the following:

- **An existing connection was forcibly closed by the remote host**

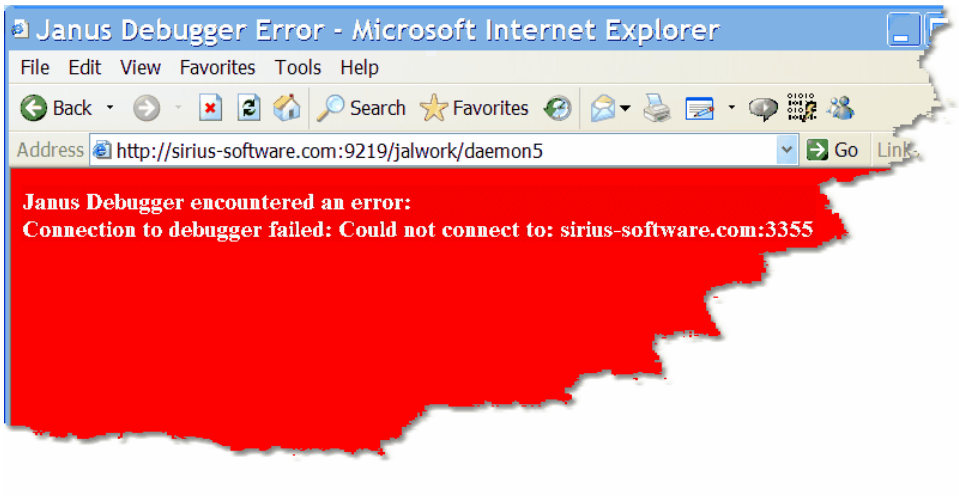
  In this case, the network connection between the PC and the Online is lost, or the Debugger Server port is not started.

  If the Debugger Client was in the process of debugging code, the next Client operation you attempt produces a Client message like the following, and `Communication Error` is displayed in the Status bar 49:



  Clicking **OK** here removes the message, but processing cannot continue until the connection to the Online is reestablished or the Debugger port on the Online is restarted. There is no need to recycle the Debugger Client, although any program that was being processed is discarded.

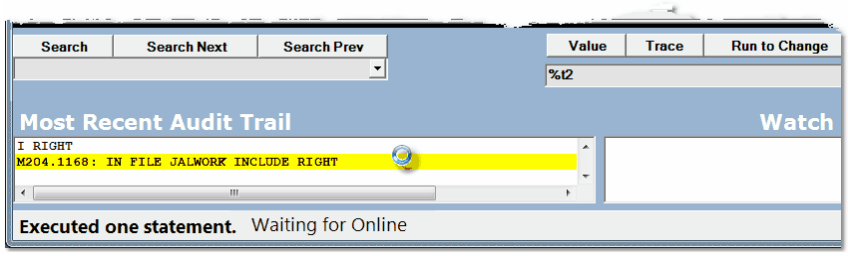
If the browser was waiting while the Debugger Client was processing, it continues to wait. If no debugging was in process, and the browser sends a new request to the Web Server, the browser is sent a reply from the Client like the following:



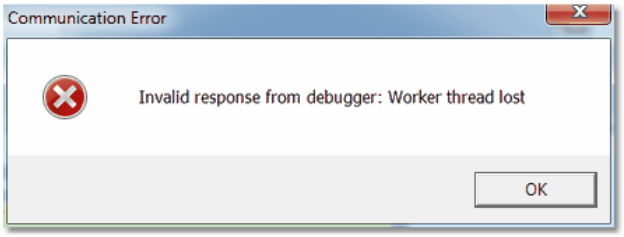
Once the broken connection is reestablished, debugging continues when the browser sends or resends a request. There is no need to recycle the browser.

- **Worker thread lost**

  The Web Server or Debugger Server encounters a Model 204 or Janus error while doing work for the Client, leaving the Client in an extended waiting state (`Waiting for Online` is displayed in the Status bar).



In such a case, the Server eventually times out (two minutes), and the Client displays `Communication Error` in the Status bar as well as an error message box like the following:



Shortly thereafter, the Client resumes processing, and the browser waits and follows its own timeout default.

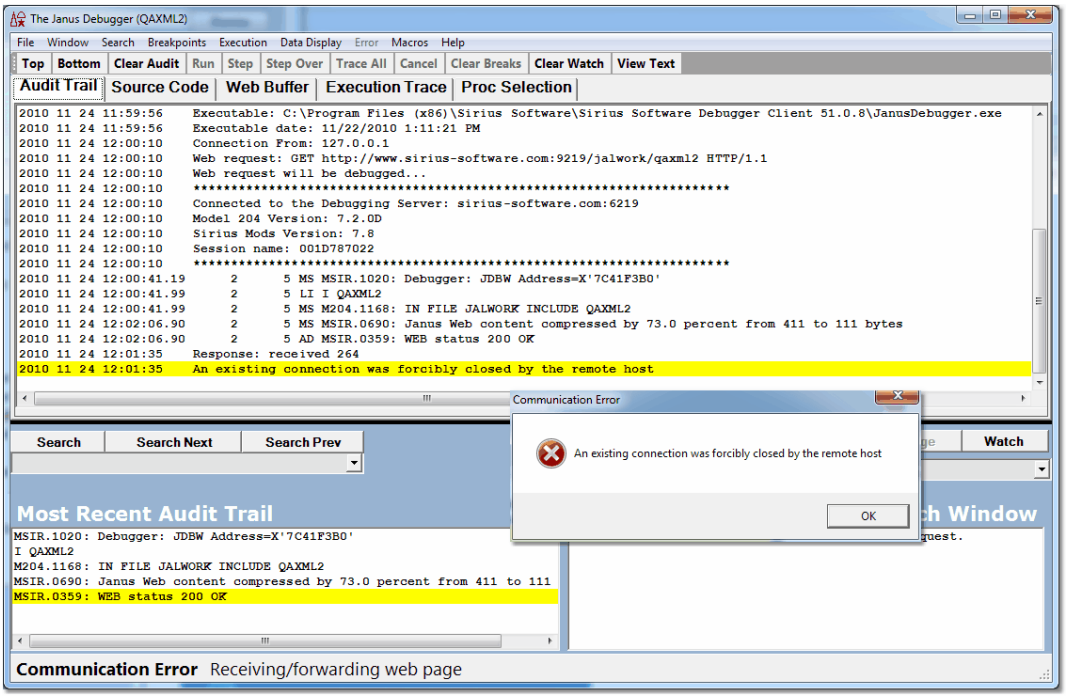
You can review the **Audit Trail** page for information to help locate the error in the Online processing.

An existing connection was forcibly closed by the remote host

Two cases of these browser problems follow:

- An external connection to the browser is broken.

  As a new browser session begins, the Debugger processing is halted and a Communication Error message like the following is displayed:



  In its role as the browser's proxy, the Debugger Client has received an error notification from a site that the browser has contacted, say to load an image, as part of its normal setup and home page presentation.

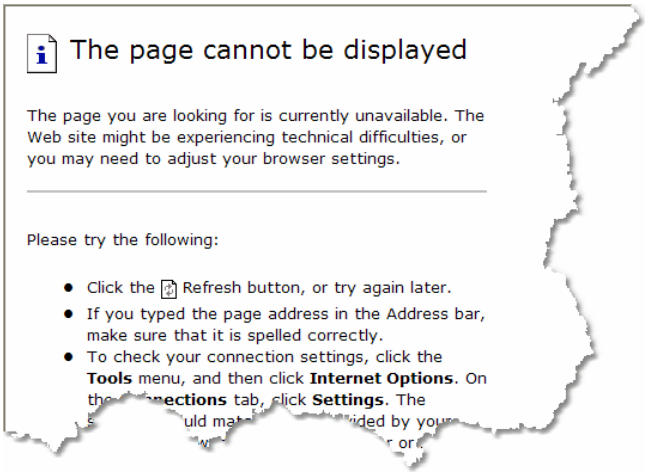
  Such errors are infrequent and usually harmless, and clicking **OK** releases the Debugger to continue processing.

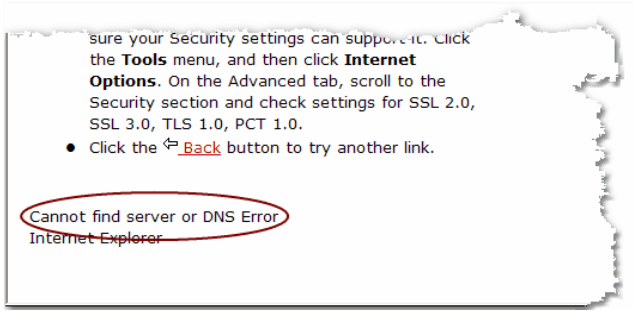
- The browser breaks the connection to the Debugger Client.

  As the Debugger Client is processing code that a Janus Web Server sends in response to a browser request, a user sends another browser request (or the browser sends a scheduled polling request). The Client-browser socket gets broken, and the Client displays a message like the one shown above. When you click the message **OK** button, the Client-browser socket gets reestablished.

The Debugger Client is not available

Browser requests return a "cannot find server" or "proxy server is unavailable" message like the following when the Debugger Client goes down or is not started:





Once the Debugger Client becomes available, debugging continues when the browser sends or resends a request. There is no need to recycle the browser.

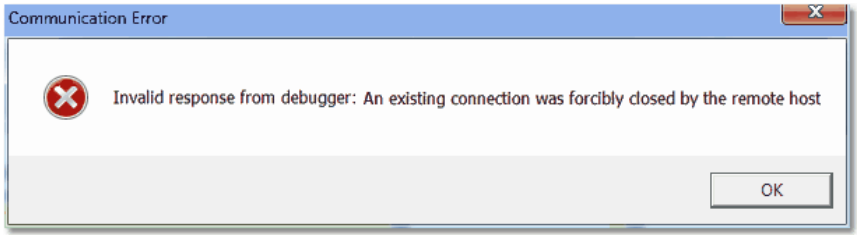
8.4 How the TN3270 Debugger handles communication breaks

If the TN3270 Debugger is not properly configured or if communication between the Client workstation and the host Online is lost, the Debugger Client will display error messages and will attempt to restore normal operation, typically without requiring a recycle of any of the components.

The most likely types of communication breaks (not related to product configuration) and the Debugger responses are described below.

The network connection between the PC and the host Online is lost, or the Debugger Server port is not started

If the Debugger Client was in the process of debugging code, the next Client operation you attempt produces a Client message like the following, and `Communication Error` is displayed in the Status bar[49]:



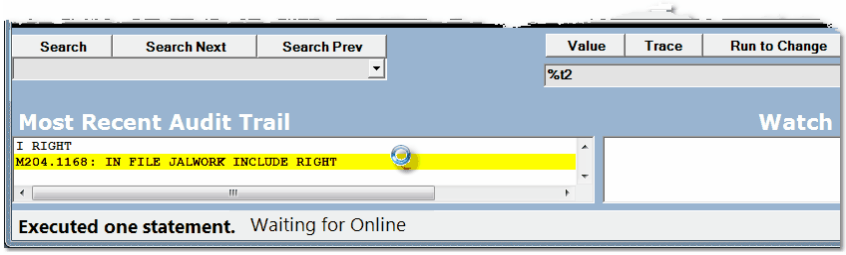
Clicking **OK** here removes the message, but processing cannot continue until the connection to the Online is reestablished or the Debugger port on the Online is restarted. There is no need to recycle the Debugger Client, although any program that was being processed is discarded.

If the Online was waiting while the Debugger Client was processing, loss of connection to the PC returns control to the Online user and causes the program to run to completion.

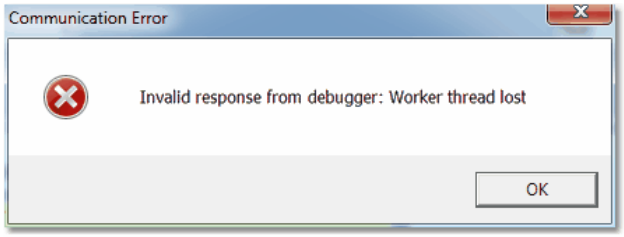
Once the broken connection is reestablished, debugging continues when the Online sends or resends a request. There is no need to recycle the Client.

Worker thread lost

The Web Server or Debugger Server encounters a Model 204 or Janus error while doing work for the Client, leaving the Client in an extended waiting state (`Waiting for Online` is displayed in the Status bar):



The Server eventually times out (two minutes), and the Client displays `Communication Error` in the Status bar as well as the following error message box:



Shortly thereafter, the Client resumes processing.

You can review the **Audit Trail** page for information to help locate the error in the Online processing.

The Debugger Client goes down or is not started

Online requests run as normal when the Debugger Client is not available: that is, the program executes without first being intercepted by the Debugger.

Once the Debugger Client becomes available, debugging continues when the Online sends or resends a request.

If the Online is waiting while the Client was in the process of debugging code, a shutdown of the Client causes control to return to the Online user, and the code that was being debugged runs to completion in the Online.

8.5 Tracking Client performance

Programs with thousands of lines of code can introduce a slight delay while the Debugger Client reads, parses, and displays the code in the **Source Code** tab. As an aid to program tuning, you can have the Client log the time it spends processing program code. For example, you can isolate the elapsed time between the arrival of program code on the workstation and its display in the **Source Code** tab, ready for debugging.

To send code handling data to the Client log file (`log.txt`), you add an entry to the Client configuration file (`debuggerConfig.xml`). This file is installed in the same directory as the Debugger Client executable file, and it is initially configured 378 as part of the Debugger Client installation.

To update the file:

1. Open the `debuggerConfig.xml` file in a text editor.

2. Add a `<collectTuningData/>` element at the same level (as a sibling of) the existing `<serverList>` element.

   When complete, your configuration file should have a structure like the following:

```
<debuggerConfig version="1.0">
   <serverList>
        .
        .
        .
   </serverList>
   <proxy>
        .
        .
        .
   </proxy>
        .
        .
        .
   <collectTuningData/>
</debuggerConfig>
```

3. Save and close the file; then restart the Debugger Client.

After each subsequent Client interaction with the Online, the `log.txt` file will contain blocks of time-stamped lines like the following (the data is sent in XML documents, as described in Debugging the Janus Debugger 349 and in Debugging the TN3270 Debugger 352):

```
2008 10 03 10:07:20    Receive: read XML begin
2008 10 03 10:07:20    Receive: read XML end, bytes read=1819
2008 10 03 10:07:20    Receive: parse XML begin
2008 10 03 10:07:20    Receive: parse XML end
2008 10 03 10:07:20    Receive: process XML begin
2008 10 03 10:07:20    Incoming program state: S Prior state: I
2008 10 03 10:07:21    Receive: process XML end
2008 10 03 10:07:21    UI: load source begin
2008 10 03 10:07:21    UI: load source end
```

The last two sample lines above are recorded only when a new program is sent to the Client. Otherwise, all Client GUI commands provoke an XML message exchange between the Client and the Debugger Server that is reflected in a block of single pairs each of read, parse, and process lines.

8.6 Resolving issues when automatically maintaining IE proxy settings

The installation of the Janus Debugger calls for setting up the Debugger Client as a proxy server to intercept HTTP calls made from a browser. For sites using the Internet Explorer browser, an option in IE lets them designate certain exceptions, URL addresses that will *not* be routed to the proxy server. This option is the "Do not use proxy server for addresses beginning with:" box (accessed by **Tools** > **Internet Options** > **Connections** > **LAN Settings** > **Advanced**).

Although the Client has Preferences (**File** menu > **Preferences**) options to automatically deactivate the proxy bypassing  , the Debugger can be subject to issues such as hangs or timeouts when these exception URLs are invoked. The set of preconditions is:

- An IE proxy server is set up, and at least one exception URL is specified in IE
- Client **Preferences** settings include both of these:
  - The **proxy** option of **IE Mode**
  - **Clear IE proxy override** in the **IE Options** area

The recommended initial remedy for these kinds of problems is a Client **Preferences** option that routes these exception URLs through the Debugger Client to the proxy server IE was using before the Debugger installation. The **Preferences** option is **Use existing IE proxy for URLs not to be debugged** (in the **IE Options** area). As a result, the Client will collect troubleshooting information concerning its handling of these URLs, and it will display messages in its **Audit Trail** page:

```
2010 06 08 08:01:46    Web request: GET http://www.google.com/ HTTP/1.1
2010 06 08 08:01:46    Web request will NOT be debugged:
www.google.com:80 not listed in the configuration ...
2010 06 08 08:01:46    Passing thru not debugged request:
http://www.google.com/ to proxy: 127.0.0.1:808
```

CHAPTER 9 Installation and Configuration

This section describes how to install the Janus Debugger, the TN3270 Debugger, or both. Once you complete this installation, you can begin to use either or both products.

The working part of this section consists of two subsections of mostly cookbook-style directions. It is recommended that you first complete the steps in the "Online Configuration" section, then complete the "Workstation Configuration" section.

Most of the steps are to be performed whether you are installing one or both Debugger products, and exceptions are noted.

If you will be using a local editor (Xtend or UltraEdit) with the Debugger, finish the Debugger installation first, then see Using a local editor 164.

For information about setting up at your site a centralized distribution of updated Debugger Client replacement files, see Providing updated versions of the Debugger Client 398.

9.1 Overview

To use the Janus Debugger or the TN3270 Debugger, you must first install and configure two components:

Debugger Server	Located in the Online for which Janus Web or 3270/Batch2 threads are to be debugged, this is a Janus Sockets server socket application. The Server manages the “worker” threads used by the Debugger to control the threads that are being debugged. Installing and configuring this Server is done once for each Model 204 Online whose web or 3270/Batch2 threads are to be debugged.
Client GUI	Located on each workstation where the Debugger is to be used. The Client acts as an intermediary between the developer’s Web browser or output terminal and the online, and it provides the user interface for controlling the Debugger. Installing and configuring this Client is done once for each workstation.

The Model 204 Online portion of the installation should be done first, since decisions made doing the Online setup are input to the Client setup (for example, the port number of the debugging server). Because there are two installation locales, each of which will often be done by different people in an organization, the installation instructions are divided into two ”tracks”:

Online Configuration	Performed by Model 204 system manager or equivalent.
Workstation Configuration	Most likely performed by individual developers on their own machines, after the Online configuration is complete. It is recommended that the system manager do one workstation configuration after completing the online configuration, verifying that the installation and configuration were successful.

9.2 Online Configuration

This section shows how to prepare a Model 204 Online for use of the Janus Debugger, the TN3270 Debugger, or both.

The installation tasks require Model 204 system manager privileges. Also, since you must set at least one User 0 parameter, a cycle of the Model 204 Online will be required.

The Online configuration tasks are listed below.

9.2.1 Check prerequisites

Do not continue until the following product version requirements have been met:

1. For the Janus Debugger or TN3270 Debugger, make sure that you are running Version 7.0 or higher of the Sirius Mods, and at least Model 204 Version 6.1.

   You can verify this by issuing the `SIRIUS` command at the Model 204 command prompt, for example:

   ```
   Site - SIRIUS                Job name ULSPFPRO
   Sirius Mods version - 7.8    Model 204 version 7.2.0D
   ```

2. A Janus SOAP license or Model 204 version 7.5 or greater are required to use the DebuggerTools class methods 159.

9.2.2 Authorize the Debugger

1. Through your Rocket Software Sales representative:

   a. Arrange a Janus Debugger Trial or TN3270 Debugger Trial agreement for one or more seats of the Janus Debugger or TN3270 Debugger.

      The number of “seats” or connections indicates the number of programmers who will be able to use the Debugger concurrently.

b. Obtain information about applying (zapping) the Authorization Key that enables the appropriate software.

   You may need to download a key from the Rocket Software web site. The "Rocket M204 Customer Care" page (https://m204.rocketsoftware.com/) contains information about the required site user ID and password and also contains a link to download an authorization zap.

   The Download product authorization keys link accesses the "Authorization keys for Sirius Software Inc." page, which contains links to comprehensive and product-specific authorization zaps you apply using the Rocket Rockzap utility.

2. Once authorization is complete, view the output of the `SIRIUS` command in your Model 204 Online to verify that you have some authorized Debugger seats. The output should contain one or both of lines like this:

```
Janus Debugger   Expires 02/24/2014   Max connections 10
TN3270 Debugger  Expires 02/24/2014   Max connections  3
```

9.2.3 Set Model 204 system parameters

User 0 parameters

1. Set the Model 204 User 0 parameter DEBUGMAX. This parameter, which defaults to 0, is the number of internal debugging control blocks that will be allocated.

   Specify a DEBUGMAX value of at least the number of seats authorized by the Authorization Key (or the sum of the numbers of seats, if keys for both Debuggers) you obtained in the previous step. You can set it higher, however, if you anticipate getting a key in the future that adds seats.

   Note: The maximum number of concurrent debugging sessions may never exceed the seat count of the key(s), no matter what value you specified for DEBUGMAX.

2. Set the User 0 parameter DEBUGPAG, if necessary. This parameter specifies the upper limit of the CCATEMP page allowance for a debugging session (for the combination at any one time of Audit Trail and Source Code data). The Debugger uses CCATEMP pages for its audit trail and source code lines.

   DEBUGPAG defaults to 100.

   If you are going to debug large programs (more than 1000 lines in a single request), increase the DEBUGPAG setting to, say, 250. Its maximum is 25000.

   Note: Although DEBUGPAG is resettable by the system manager, DEBUGMAX is **not** resettable.

3. The SDAEMDEV User 0 parameter sets the IODEV number for the sdaemon threads that are the Debugger Server worker threads. In any Online where either the Janus or TN3270 Debugger will be used, these threads require a pushdown-list size (Model 204 LPDLST parameter setting) of at least 9000.

   Note: As described below, the PDL size is user-resettable, and the Model 204 thread that is running the program that is being debugged also uses additional PDL space.

4. The User 0 parameters SDEBGUIP and SDEBWRKP set the default values respectively of the workstation port number[374] on which the Debugger Client is listening, and the port number in your Online that is defined[371] for worker threads. Explicitly setting these parameters is optional.

5. Cycle the Online, so the parameter settings take effect.

User parameters

1. As stated above, the Debugger Server worker sdaemon threads require a pushdown-list size of at least 9000.

2. A thread that runs a request to be debugged under the Debugger will use more PDL, VTBL, and STBL space than normal. If you suspect the existing values at your site for the size of these areas may not be adequate, add 2000 bytes to the the PDL size, about 100 bytes (3 units) to VTBL, and about 300 bytes to STBL. You can use `UTABLE LVTBL`, `UTABLE LSTBL`, and `UTABLE LPDLST` commands.

9.2.4 Define and start the Debugger Server port

1. Select an unused TCP port number on which your Online will run the Debugger Server.

   A Janus server socket port will be opened on that port number to service requests for Debugger Server worker threads. Make sure that port number is free of any security restraints at your site that might prevent access by any Debugger Client workstation seeking a connection.

2. Confirm that, as described in Set Model 204 system parameters[371], the Debugger Server *worker threads* have a Model 204 LPDLST parameter setting of at least 9000 in any Online where either the Janus or TN3270 Debugger will be used.

3. Define and start a Debugger Server port.

   You may want to consult with your system manager or whomever sets up Janus port definitions for your site. The Rocket M204wiki JANUS_DEFINE command documentation describes port definition particulars.

   For Debugger purposes, the JANUS DEFINE command format is:

   ```
   JANUS DEFINE portName portNumber DEBUGGERSERVER maxConnections
   ```

Note the DEBUGGERSERVER port type, which is a Debugger-only, license-free, Janus server socket.

An example command sequence follows, which creates/recreates and starts a server port on port 3226, then displays the full port definition:

```
JANUS DRAIN DEBUGSERVER3226

JANUS DELETE DEBUGSERVER3226

JANUS DEFINE DEBUGSERVER3226 3226 DEBUGGERSERVER 15 TRACE 0

JANUS START DEBUGSERVER3226

JANUS DISPLAY DEBUGSERVER3226
```

For your convenience, you may want to store this command sequence for reuse in a Model 204 procedure.

4. Issue the following command to check that the Server port started:

   ```
   JANUS STATUS
   ```

   You should see a line like the following (using the naming convention in these examples and procedures):

   ```
   DEBUGSERVER portNumber portNumber sockType Start statistic-values
   ```

   Where *portNumber* is the port number from above, and *sockType* is DEBUGSRV.

5. Once you know the Debugger Server has started, the best way to verify its functioning is to install the Debugger Client on a workstation and make sure the workstation can connect, as described in Workstation Configuration 373.

9.2.5 Define and start a client socket port (Sirius Debugger only)

To initiate TN3270 Debugger sessions from this Online, you must have a Janus client socket port to connect to the Debugger Client that is running on the workstation. You may want to consult with your system manager or whomever sets up Janus port definitions for your site, and the ***Janus Sockets Reference Manual*** documents the port definition particulars.

A sample Janus port definition (for the port DEBCLIENT7) follows. The DEBUGGERCLIENT port type is a Debugger-only, Janus client socket that requires a Debugger license.

```
JANUS DEFINE DEBCLIENT7 *       -
   DEBUGGERCLIENT 5 REMOTE * * -
   LINEND 0D0A                  -
   TRACE 0                      -
   TIMEOUT 40                   -
   MASTER                       -
   SOCKPMAX 1

JANUS START DEBCLIENT7

JANUS CLSOCK DEBCLIENT7 ALLOW
```

Notes:

- If you have a Debugger license and a Janus Sockets license, you can use a CLSOCK port type instead of DEBUGGERCLIENT.
- The JANUS DEFINE parameters KEEPALIVE and SSL are valid for CLSOCK ports but not for DEBUGGERCLIENT ports or for a CLSOCK port used for the Debugger.
- The JANUS CLSOCK ALLOW statement applies to both CLSOCK and DEBUGGERCLIENT ports. As specified above (with no additional parameters), unrestricted access is allowed to the port.

9.3 Workstation Configuration

This section specifies how to prepare a workstation for use by the Janus Debugger, TN3270 Debugger, or both.

These are the workstation configuration tasks:

9.3.1 Perform preliminary tasks

1. Make sure your workstation environment is adequate for the Debugger Client:
   - The operating system must be Windows 7 or Windows 8. Windows 2000 is also acceptable for builds of the Client prior to 51.

- The target drive of the workstation must have at least fifteen megabytes of free disk space.
- The Microsoft .NET Framework (3.5 SP1) must be installed on your machine. Version 3.5 is included with Windows 7.

  If .NET 3.5 is not on your machine at the time of Client installation, the installer program will **not** complete, and it will inform you to download and install the Framework. You can get the Framework from:

  http://msdn.microsoft.com/en-us/netframework/cc378097.aspx

  Or locate the download from:

  http://msdn.microsoft.com/en-us/netframework/default.aspx
- For Janus Debugger sessions, your browser must support proxy servers.

  Most, if not all, current popular browsers have this support. Consult your browser's documentation or "properties" information. The "Configure the web browser" 385 section describes how to set up a proxy for several popular browsers.
- It is assumed you are accessing the Debugger Client locally, that is, from the machine on which the software is installed. Accessing the Debugger Client and its online Help file from another workstation may be problematic. Microsoft security may prevent you from accessing the Debugger compiled Help file from a networked location. For more information, contact Rocket Software Technical Support.

2. Obtain the following information from the system manager of the Online running the web or 3270/Batch2 threads that are to be debugged:
   - Confirmation that the Debugger Server is running
   - The host name (or IP number) of the Online
   - The port number of the Debugger Server
   - For Janus Debugger sessions, the port number on that Online of the web server whose threads are to be debugged
   - For TN3270 Debugger sessions, the name of the client socket port set up 372 in that Online for the programs that are to be debugged
3. On this workstation, select a local TCP port number for the Debugger Client to listen on, if the default (8081) is not available.

   For Janus Debugger sessions, the Client acts as a proxy server between the local web browser and the Janus Web Server; it's "address" is `localhost:port`, where *localhost* is the workstation machine's host name or IP address, and *port* is the listening port number. For TN3270 Debugger sessions, the workstation port is for communication between the Debugger Client and Model 204 Online.

   If you are already using port 8081 for something else, or if you cannot use 8081 for some other reason, you must select a new port number. Port numbers in the 8000 range are often used for proxies, but any unused port number is acceptable.

For information about the TCP ports that are currently active on your workstation, you can issue the NETSTAT command from an MS DOS command box on your machine.

If you are going to change this port number, have the new number ready when you customize the debuggerConfig.xml file 378, later.

4. For IE and Chrome browsers: if you want to use the Client PAC file option 388, where the Client acts as a proxy server *only* for requests for Client-configured 378 hosts but for no other browser requests, you may want to find an additional port number on the Debugger host workstation or on another suitable machine that can service HTTP requests.

5. For TN3270 Debugger sessions, determine the host identification of the workstation where the Debugger Client will run.

   This may be either an IP number or DNS name. Two ways to obtain the IP number are:

   - Select the **Audit Trail** tab in the Client main window, and click the **Top** button. Approximately the fourth line from the top displays the `Local IP address` of the Client workstation.
   - Open an MS DOS box, and issue the `IPCONFIG` command. You will see output similar to this:

```
Ethernet adapter ....
     Connection-specific DNS Suffix  . :
     IP Address. . . . . . . . . . . . : x.x.x.x   <== you want this
     Subnet Mask . . . . . . . . . . . : y.y.y.y
     Default Gateway . . . . . . . . . : z.z.z.z
```

9.3.2 Run, check, and verify the Client installation

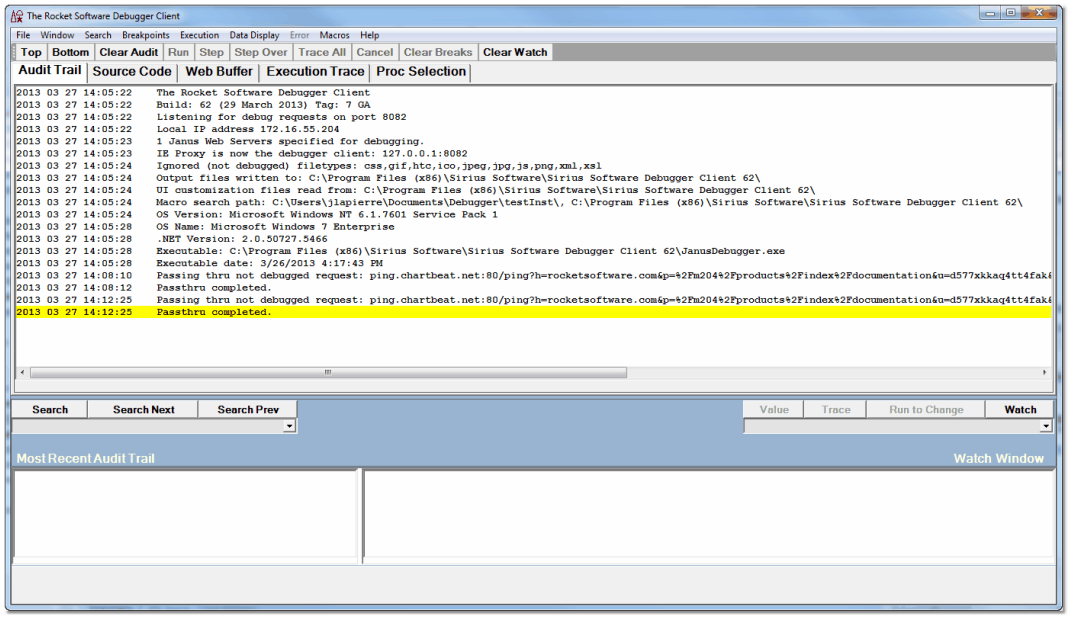
1. To install or upgrade the Debugger Client, download, extract, and run the SETUP.EXE file, which invokes a Windows installer, using either of the the following links:

   - http://www.sirius-software.com/debclient.zip
   - The "Download the ZIP file" link you reach via the "Download client (workstation) files" link in your individual Customer Maintenance Area — reached from https://m204.rocketsoftware.com/maint/cllist?nickname=SIRIUS — on the Rocket Software web site.

   If you are upgrading to a newer build of the Client, the installer program will **not** remove the previous Debugger Client configuration file `(debuggerConfig.xml).`

   If you are re-installing the same build version of the Client, the installer insists that you first remove the existing Client files (using the Add/Remove program from the Windows Control Panel). The uninstaller program will **not** remove the Client configuration file `(debuggerConfig.xml)`, and the installer will not overwrite it.

2. After the installer finishes, double-click the **Debugger Client** icon (from the Windows system **Start** menu or from the desktop). The Client should open, displaying a list of messages that identify the Client and its host, as well as key file locations and software versions; the last message is yellow-highlighted:



3. Make sure the installer did the following:

   - Placed an icon on your desktop to run the Debugger Client: 
   - Created a Windows **Start Menu** item under:

     Programs > Rocket Software > Rocket Software Debugger Client

     For Client builds prior to 50, the target folder name is **Client for Janus and Sirius Debuggers.**

- Installed these files in the target installation folder:

`JanusDebugger.exe`	The actual Debugger Client program.
`updateGet.exe`	Program for downloading updated versions 398 of the Client.
`unzip.exe`	Freeware program for unpacking zipped files.
`debuggerConfig.xml`	XML-based configuration file that sets startup parameters for the Debugger Client. You must tailor this file, as directed in the next step.
`Org.Mentalis.Security.dll`	Support for SSL connections.
`msvcr71.dll`	Microsoft C library functions used by .NET programs.
`gdiplus.dll`	Microsoft graphics file.
`whitelist.txt`	White List 77 file template.
`dir.txt`	Empty file installed to test the writability of the folder(s) designated 382 to contain various Client work files.
`JanusDebugger.chm`	A Windows compiled HTML Help file. To view the Help, double-click the .chm file or access it from the Debugger Client GUI Help menu.
`jdebugr.pdf`	The *Janus/TN3270 Debugger User's Guide,* which includes installation instructions and a copy of the online Help contents, formatted for convenient printing. To display PDF files, you need the Adobe Acrobat Reader, which you can download from http://www.adobe.com/products/acrobat/ . For Client builds prior to 50, the jdebugr.pdf file is installed in the `Doc` installation subfolder.

4. Set up 378 the Debugger Client configuration file.

9.3.3 Customize the Debugger configuration file

After you install the Debugger Client for the Janus Debugger, you must modify the Client configuration file (debuggerConfig.xml) as described in the six numbered steps below. This file is installed in the same directory as the Debugger Client executable file. It can be accessed for editing via the Client's **File** menu.

If you are using the Client only for the TN3270 Debugger, begin with step 5 380.

If this is an initial installation of the Debugger and you are primarily interested in getting the Client up and running, you may ignore for now and return later to view the Additional configuration options 382, below.

The configuration file contains parameters that associate the Debugger with the Model 204 online(s) whose Janus Web threads you want to debug. A template debuggerConfig.xml file is placed in your client installation target folder along with the executable for the Debugger Client (JanusDebugger.exe). The template file is amply annotated with XML-style comments which describe the contents.

Basic configuration steps

1. As supplied, debuggerConfig.xml contains a single serverList element (bounded by the <serverList> start tag and the <\serverList> end tag) that has a single server sub-element. A server element defines a Janus Web Server whose User Language requests you can debug.

   Provide within the serverList element a server element for each Web Server with which you want to use the Janus Debugger. Simply copy and paste the supplied server element.

   For example, if you are debugging for two Web Servers, the structure of your serverList element should be like this:

```
<serverList>
      <server>
         <host></host>
         <webPort></webPort>
         <workerPort></workerPort>
      </server>

      <server>
         <host></host>
         <webPort></webPort>
         <workerPort></workerPort>
      </server>
<\serverList>
```

2. For each `server` element within `serverList`, provide values for the three entries shown in the `Field` column below. You obtained the appropriate values earlier 373. Specify the values between the pairs of angle-bracketed tags, as shown in the `Comment` column below:

Field	Comment
<host></host>	The identifier of the machine that hosts the Janus Web Server application for which requests will be debugged. Either a TCP/IP host name or an IP Number may be specified. For example: `<host>rocketsoftware.com</host>`. **Note:** If you use an IP Number in this configuration file to identify a host, you must use the IP number when you reference a URL in your web browser. If you use a DNS name in this configuration file, you must also use it from the browser.
<webPort></webPort>	The port on this host that runs a Janus Web Server whose threads you want to debug. For example: `<webPort>3224</webPort>`.
<workerPort></workerPort>	The port on which this host provides Janus Debugger worker threads. These are the server socket threads that control the thread being debugged. They are set up 371 as part of your Model 204 Online configuration for the Debugger. For example: `<workerPort>3226</workerPort>`. **Note:** The worker port **must** be defined in the same Online that runs the Web Server identified by the values for `host` and `webPort`. If you are debugging multiple Web Servers in the same Online, they may all use the same worker port.

When an incoming HTTP request is received by the Debugger Client, its host and web port are extracted and matched against those of the servers in the `serverList` element. This matching is case insensitive, but otherwise it must be an exact match.

If you specify an invalid value (for example, a non-numeric port number), the Client will fail to start and you will receive an "Error reading the debuggerConfig.xml" message box.

3. If a Web Server you are debugging is secured (Janus Network Security), you must direct the Debugger Client to connect to the Web Server using the Secure Sockets Layer (SSL) protocol. Add an empty `ssl` sub-element to the appropriate `server` element defined in the previous step.

For example:

```
<server>
   <host>rocketsoftware.com</host>
   <webPort>3224</webPort>
   <workerPort>3226</workerPort>
   <ssl/>
</server>
```

4. By default, when the Janus Debugger examines a web request a browser sends, it excludes URLs with the following file types from debugging:

css	jpeg	png
gif	jpg	xsl
htc	js	xml
ico		

Each such skipped URL produces a "Web request will NOT be debugged" message in the Client's audit trail.

You may replace (entirely) the default list of file types, above, with a list you specify by adding a `filter` element to the `debuggerConfig.xml` file.

In the `filetype` subelement of the `filter` element, you specify (without regard for case and without a leading period) only the file types that will *not* be debugged, and these types replace the default list.

The file type filter applies to all web servers you debug, so the `filter` tag is a child of the root in the `debuggerConfig.xml`file. For example:

```
<debuggerConfig version="1.0">
    <serverList>
       ...
    </serverList>
       ...
    </editor>
       ...
    <filter>
      <filetype>jpg</filetype>
      <filetype>xml</filetype>
    </filter>
</debuggerConfig>
```

Note: If your browser is Internet Explorer, you can also filter by server host 386 the web requests to be debugged.

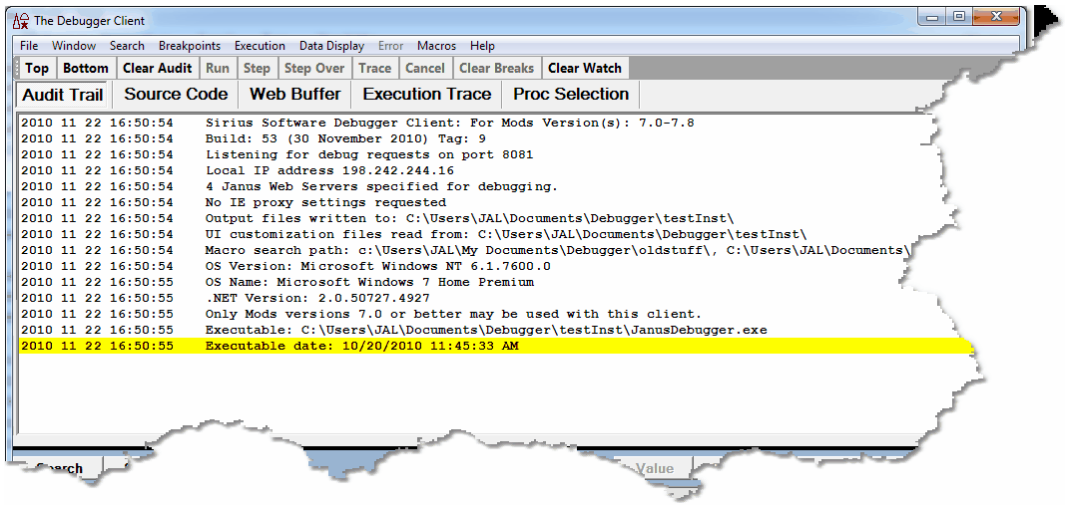
5. As discussed in the preliminary tasks 373, the Debugger Client requires a host workstation TCP port on which to listen during Janus Debugger or TN3270 Debugger sessions. If the default port number, 8081, is not available on your workstation, specify a suitable value for the `port` field in the `proxy` element of the `debuggerConfig.xml` file.

For example:

```
<debuggerConfig version="1.0">
    <serverList>
       ...
    </serverList>
    <proxy>
      <port>8888</port>
    </proxy>
    <editor>
       ...
    </editor>
       ...
</debuggerConfig>
```

6. Save your changes to the `debuggerConfig.xml` file, then restart the Debugger Client (either select **Restart** from the Client's **File** menu, or exit and run the Client again). The changes to the `debuggerConfig.xml` file do **not** take effect until the Debugger Client is recycled.

   The Client should open, ready for debugging, with information lines like the following:



For Janus Debugger sessions, the message report includes the number of Web Servers 145 for which the Client is configured and whether the Internet Explorer browser settings, if any, will be automatically toggled 386 by the Debugger. For TN3270 Debugger-only sessions, the highlighted message will be the same as seen earlier 375, reporting that the Janus Debugger is not active.

Note: Your modified `debuggerConfig.xml` file is ***not*** overwritten if you rerun the Debugger Client setup.exe file, for this or any subsequent versions of the Client.

Additional configuration options

The following options are separated from the preceding steps because they are not essential to an initial installation of the Debugger.

Alternative locations for the Client work files

During your debugging session, the Client stores information in various text files it creates or expects to find, by default, in the same folder as the Debugger Client executable file. If this folder location is inconvenient, three optional elements in the `debuggerConfig.xml` file let you specify alternative locations for the Client work files. You can add these root-child elements to `debuggerConfig.xml`:

- `<stateFileFolder>` specifies where most Client work files are written (log, preferences, searches, for example)
- `<macroLibraryFolder>` specifies where macro files are stored
- `<uiFolder>` specifies where the Client UI customization settings (ui.xml, uimore.xml) are stored

For example:

```
<debuggerConfig version="1.0">
    <serverList>
       ...
    </serverList>
       ...
    <stateFileFolder>c:\myData</stateFileFolder>
    <uiFolder>c:\myUI</uiFolder>
    <macroLibraryFolder>c:\work\macroLibrary</macroLibraryFolder>
       ...
</debuggerConfig>
```

For more information about the Client files that are stored in these locations, see Changing the location of Client work files. 303

For information about how to specify a location for these folders from a command line, see Specifying a startup command for the Client. 301

Font size

The font size in most Client windows is scalable 305 by specifying a valid setting of the `fontScale` element. For example:

```
<debuggerConfig version="1.0">
   <fontScale>1.33</fontScale>
   <serverList>
      ...
   </serverList>
      ...
</debuggerConfig>
```

Window transparency

The degree of transparency of Preferences and external-button[42] windows is adjustable by specifying a valid setting of the `opacity` element (max transparency is .01; max opacity is 1; default is .9). For example:

```
<debuggerConfig version="1.0">
   <opacity>.75</opacity>
   <serverList>
      ...
   </serverList>
      ...
</debuggerConfig>
```

Information URLs

The destination URL of the **Model 204 Wiki** link in the Debugger Client's **Help** menu defaults to http://m204wiki.rocketsoftware.com. If your Internet access is limited, you can override the default by specifying the `wikiURL` element. For example:

```
<debuggerConfig version="1.0">
   <wikiURL>http://123.4.5.666/myM204Wiki</wikiURL>
   <serverList>
      ...
   </serverList>
     ...
</debuggerConfig>
```

This must be an absolute URL, and the host domain specified may be a DNS name or an IP number.

Text file editor

Many Debugger tasks entail the editing of small text files, and typically the Client opens by default the Microsoft Notepad editor (`notepad.exe`), which is guaranteed to be present on a Windows system. You can change default editors by specifying a suitable value in the `notepadReplacement` element.

For example, the following defines Notepad++ (http://notepad-plus-plus.org/) as the default text editor:

```
<debuggerConfig version="1.0">
   <notepadReplacement>C:\Program Files\Notepad++\notepad++.exe</notepadReplacement>
   <serverList>
      ...
   </serverList>
      ...
</debuggerConfig>
```

The element value must be a full operating system (DOS style) path that identifies the executable file. An eligible editor must take the file to be edited as its first command line parameter. Given the definition above, for example, and selecting the **Edit debuggerConfig.xml** option from the Client's **File** menu, directs the Client to execute the following:

```
C:\Program Files\Notepad++\notepad++.exe debuggerConfig.xml
```

Multiple Client configurations

If, for testing purposes, you want to have multiple configurations, you can specify a configuration file other than `debuggerConfig.xml` on the command line:

1. Open and MS DOS command line window.
2. Navigate to the Debugger installation folder (it contains **`JanusDebugger.exe`**)
3. At the command line, issue `JanusDebugger` *`myconfig`*. This starts the Debugger using the file specified by *`myconfig`*, instead of **`debuggerConfig.xml`**. For example:

   ```
   JanusDebugger test1.xml
   ```

If you are going to make multiple configuration files, start by cloning the `debuggerConfig.xml` file that is installed by default. This will save work and minimize the chance of errors.

Startup macro

A Debugger macro 315 lets you automate a variety of Client tasks. You can invoke a macro in various ways, one of which is automatically, whenever the Client is started. To invoke such an automatic running of a macro at Client startup, you specify the macro name as the value of the `startup` attribute of the top level tag of the **`debuggerConfig.xml`** file. For example:

```
<debuggerConfig version="1.0" startup="startup.macro">
```

PAC file server

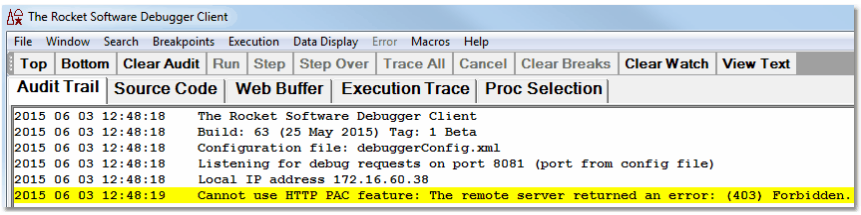
The Chrome and Internet Explorer PAC file feature[388] requires that you provide an HTTP (Web) server to hold the PAC files. You can use any web server that supports HTTP PUT and GET. Further details and an example are provided in Setting up an HTTP server for PAC files[390]. You specify the server location with the `httpPacURL` tag. For example:

```
<debuggerConfig version="1.0">
<httpPacURL>http://pacServerHost:pacServerPort/pacman</httpPacURL>
      ...
</debuggerConfig>
```

Where:

- *pacServerHost* is the host name or IP number of the PAC web server.
- *pacServerPort* is the port number used by the PAC web server. It must **not** be the same as any port in the `serverList` element in `debuggerConfig.xml`.
- pacman is an optional qualifier in the PAC file URL. It is used in the example in "Setting up an HTTP server for PAC files" (see the JANUS WEB commands in the Janus Web Server definition).

When the Debugger Client is started, and the `httpPacURL` element is specified in the Client configuration, the Client validates the URL with an HTTP PUT and GET of a test file. If there is a problem with `httpPacURL`, an error is displayed in the Client's **Audit Trail** tab. For example:



9.3.4 Configure the web browser (Janus Debugger only)

Set up your web browser to use the Debugger Client as a proxy server. Information follows for these individual browser types:

Chrome or Internet Explorer[386]

Firefox[394]

Lynx[394]

Opera[395]

You need the Janus Proxy port number you determined earlier in the preliminary tasks 374 section. The default port is 8081, but you can change this by editing 378 the `debuggerConfig.xml` file.

Once you define a proxy server for a browser:

- The Debugger Client must be running in order to operate that browser.

  You will need to turn off the proxy in order to use the browser without the Debugger Client. Automatic toggling of the proxy definition is a Client option available 387 for the Chrome and Internet Explorer browsers (only). Otherwise, it may be more convenient to point one browser at the Debugger Client proxy and use a different browser for your other Internet access.

- While you are debugging, you can use a second tab in your browser to access the Internet while another tab is occupied with User Language debugging. *Secured (HTTPS) connections are **not** allowed.* The occupied tab, the tab that invoked the Debugger, continues to remain unavailable for the duration of each debugging session.

Note: If it is not possible or not desirable to change the proxy settings on your web browser, an alternative way to debug web threads 155 is to invoke the Debugger from a command you insert in procedures you run on Janus Web threads.

Chrome or Internet Explorer (IE)

The directions that follow describe Debugger Client modifications to the **Internet Properties** dialog box on the browser workstation, which affects both Chrome and IE Internet connections.

Note: These instructions were originally prepared for early Client versions that had no features built into the Client to control the browser. It is now recommended that you:

- Use these instructions for the Client GUI or commands to use to set up Chrome or IE.
- Do *not* manually modify the **Internet Properties** dialog box invoked from the browser except to specify proxy server bypass addresses 388.

For more information about the **Internet Properties** dialog box, see Navigating to and within the Internet Properties dialog box 392.

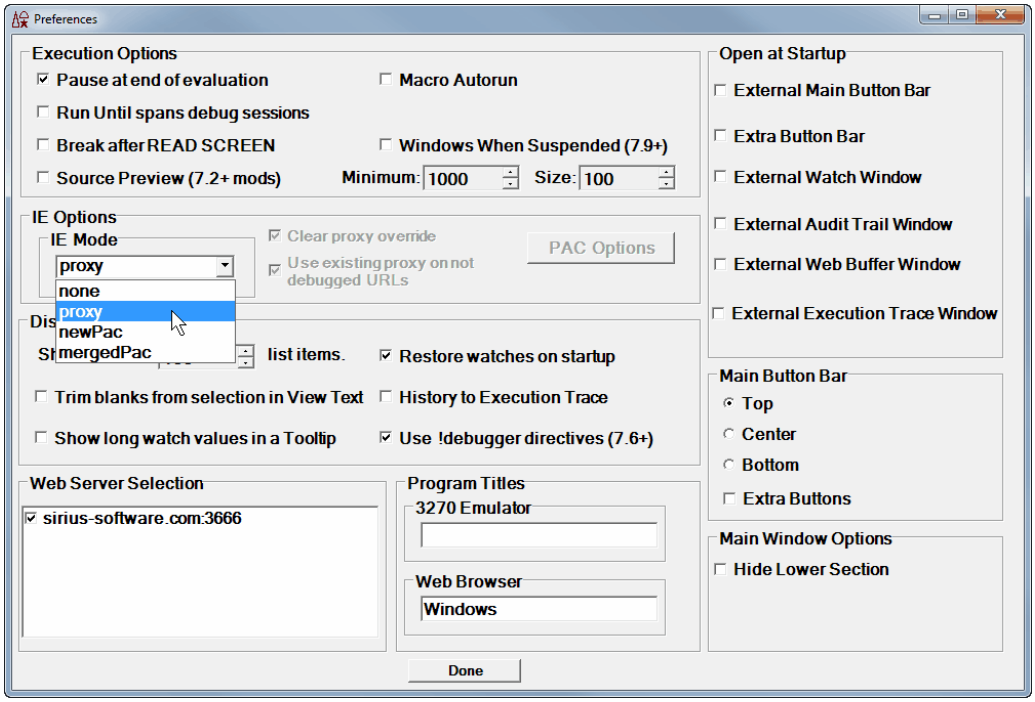
Automatically setting and removing the proxy definition

To invoke the proxy service automatically without having to manually define it each time (Chrome and Internet Explorer only; for other browsers, you must maintain proxy settings manually):

1. Select **Preferences** from the Debugger Client **File** menu to display the **Preferences** dialog box.

2. In the **IE Options** area, select the **proxy** option of **IE Mode.**

   The initial **IE Mode** setting is **none** (browser settings are not maintained).



2. Click the **Done** button.

   Now, whenever you start the Client, the Internet Explorer proxy settings are modified automatically, for all running browser instances.

   The proxy maintenance feature remains on until you clear the checkbox (it persists between runs of the Client). When you shut down the Client or turn this feature off, the proxy modifications are removed, again for all instances of IE.

   Only the following **Local Area network (LAN) Settings** dialog box settings (see Navigating to and within the Internet Properties dialog box 392) are modified, and then restored:

   - **Use automatic configuration script** (if specified) and **Address** values.
   - **Use a proxy server . . .** and its address and port.

The next subsection describes how to also include in the automatic maintenance any exception URLs specified to be bypassed by the proxy server.

The Client will automatically specify and enforce the proxy definition when the Client is started. When the Client is closed, the Client will restore the proxy settings to their state before the Client was started.

Handling addresses specified to bypass the proxy server

It is an option of the automatic proxy maintenance to clear and save *at Client opening* any settings in the "Do not use proxy server for addresses beginning with:" box (accessed this way 393). The settings for these exceptions are then restored when the Debugger Client is closed (or when the feature is disabled).

To enable this feature, you must select *both* the **IE Mode** option **proxy** *and* the **Clear IE proxy override** checkbox in the Debugger Client's **Preferences** dialog box. The feature is off by default.

Note: If you do enable this feature, then exception URLs you had specified in the Internet Properties 392 "Do not use proxy server for addresses beginning with:" box will now be routed to and passed through the Debugger when the Client is running. If the feature is not enabled (**Clear IE proxy override** is not selected), the operating system handles these exception URLs and the Debugger never sees them.

In the not very likely event that you want both to enable this feature and to have the exception URLs processed by your original proxy server, you can select the **Use existing IE proxy for URLs not to be debugged** checkbox in the **Preferences** dialog box (*in addition to* the **IE Mode** option **proxy** *and* the **Clear IE proxy override** checkbox).

In this case, the Debugger will process the exception URLs and pass them to the original proxy server. In fact, this option is designed primarily for troubleshooting purposes, as the Debugger Client **Audit Trail** page will then contain information about the disposition of these URLs.

Using the Client as proxy exclusively for designated addresses

You can use the Debugger Client as a proxy server *only* for requests for the hosts (Onlines) specified in the Debugger configuration file 378, `debuggerConfig.xml`. The browser is directed to do this host filtering by a script you create (by Client command or UI checkbox). Once this feature is in effect, the Client will act as a proxy server for requests for hosts specified in the script but for no other browser requests.

The Javascript script (`debuggerInternalPac.js`) is called a Proxy Auto Config (PAC) file, and it is created by default in the Client work-file folder 303. If no such work folder is configured, the Client installation folder is used.

The Client will automatically:

- Create the PAC script at Client startup.
- Specify the script location in the **Use automatic configuration script** > **Address** value in the **Local Area network (LAN) Settings** dialog box (see Navigating to and within the Internet Properties dialog box 392).
- Run the script each time the browser invokes a URL.
- Remove the script location specification at Client shutdown.

By default, the Client uses a file-mode URL format (`file://`) to locate the PAC file. As of Build 63, the Client can also use an HTTP-mode URL format (`http://`), storing the file on a web server. 390 You select file or HTTP mode from the Client GUI or by Client command, as described below.

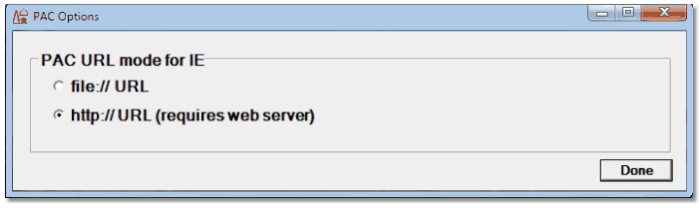
Note: Caution is recommended when working with PAC files. Errors are not well reported and have the potential to prevent the browser from operating. Be very careful if you edit or create your own PAC files, and be sure to consult the Guide at: http://www.proxypacfiles.com/proxypac/

Client steps to invoke the automatic creation and maintenance of a PAC file

- *From the Client GUI:*

1. Select **Preferences** from the **File** menu, and locate the **IE Options** area.
2. In the **IE Mode** box, select either **newPac** or **mergedPac**:
   - **newPac** generates a PAC file from `debuggerConfig.xml` settings and it modifies the Internet Properties dialog box 392 settings to point to the file. Any existing designated PAC file is ignored.
   - **mergedPac** generates a PAC file like **newPac** does, but it merges the freshly generated file with any existing PAC file.

   If Build 63 or higher, both **newPac** and **mergedPac** enable the **PAC Options** button if the following are true (as described in the next section, Setting up an HTTP server for PAC files 390):
   - A supporting web server is defined and running.
   - The HTTP file location is identified in the Debugger configuration file.
3. Click the **PAC Options** button to display the **PAC Options** dialog box:



Select `file://URL` or `http://URL` to set the delivery mode for the PAC file. A file-mode URL is the default.

If http, The Client instantly tests an HTTP PUT and GET of a verification file to and from the designated PAC file HTTP server 390. The Client then displays a Status bar 49 message like the following which reports the result of the test:

```
HTTP PAC files can be used.
```

4. Click the **Done** button.

- *By Client command:*

  Issue the **setIEmode** 263 command.

  Use the **newPac** parameter to ignore any existing PAC file, or use the **mergedPac** parameter to merge any existing PAC file with the PAC file freshly generated from the settings in the `debuggerConfig.xml` file.

  If Build 63 or higher, the `http` parameter gets the PAC file via HTTP. The default `file` parameter gets the PAC file from a folder on the local workstation. If you specify `http`, you must prepare a web server to service the PAC file; see the next section, Setting up an HTTP server for PAC files. 390

Whether you use the GUI or a Client command, no restart of the browser or the Client is necessary. The browser will run the script for each URL that is invoked from the browser.

Setting up an HTTP server for PAC files

If you will be using HTTP to access a PAC file, you must provide an HTTP (Web) server to hold the PAC files, and you must specify that server's location and port in the Client's configuration file.

1. Provide a web server.

   You can use any web server that supports HTTP PUT and GET. This section provides an example of how to set up a Janus Web Server to handle HTTP-based PAC files. This example is also supplied in a file in the Client's installation folder.

   Note: Note that the PAC files are temporary: when the Client starts, a new PAC is generated and uploaded. This prevents the problem of HTTP PAC files being out of date, since they are workstation-based configuration files which can change at any time.

   The following SOUL program takes one command line argument, a TCP/IP port number, and it creates a Janus Web server for uploading and serving PAC files:

```
begin
   variables are undefined
   local subroutine closeFile(%iFile is string len 8 input)
   * Close the file whose name is passed. Messages supressed.
      %rc is float
      $resetn('MSGCTL', 6, %rc)
      $close('FILE ' with %iFile)
      $resetn('MSGCTL', 0, %rc)
   end subroutine

   local function openFile(%iFile is string len 8 input) is float
      * Open the file whose name is passed and return 0 for success or
      * non-zero for failure. Messages supressed.
      %rc is float
      $resetn('MSGCTL', 6, %rc)
      openc file %iFile
      $resetn('MSGCTL', 0, %rc)
      return $status
   end function

   * Get and validate the command line argument: port number
   %args is object stringlist
   %args = %(system):arguments:unspace:parseLines(', ')
   %portNumber is float
   if (%args:count eq 0) then
       print 'No port number specified'
       stop
   elseif (%args:count > 1) then
       print 'Too many arguments'
       stop
   elseif (%args(1) is not like '/2-5(#)') then
       print 'Invalid port number'
       stop
   else
      %portNumber = %args(1)
   end if
   %pacRepo is string len 8 initial('JDPACREP')
   %worker is object daemon auto new
   %workForDaemon is object Stringlist auto new

   * See if memory file for PAC repository is there, if not create it
   if (%(local):openFile(%pacRepo) eq 0) then
      printText Memory file {%pacRepo} already present
      %(local):closeFile(%pacRepo)
   else
      printText creating memory file {%pacRepo}
      text to %workForDaemon = new
         ALLOCATE {%pacrepo} WITH MEMORY PAGES=300
         CREATE {%pacrepo}
         PARAMETER BSIZE=1, DSIZE=250
         END
         OPENC {%pacrepo}
         IN {%pacrepo} INITIALIZE
         CLOSE {%pacrepo}
      end text
      %worker:run(%workForDaemon):print
   end if

   * Set up a simple Janus web server with web rules for loading
   * serving and listing PAC files generated by the debugger client.
   %portName is string len 8 initial('JDPACSRV')
   * Get rid of any earlier one, so this script can be rerun as needed
   text to %workForDaemon = new
```

```
    JANUS DRAIN {%portName}
    JANUS DELETE {%portName}
  end text
  %worker:run(%workForDaemon)

  * Create the server and its rules
  text to %workForDaemon = new
    * Create a web server
    JANUS DEFINE {%portName} {%portNumber} WEBSERV 20 TRACE 7
    * Allow PAC file upload via HTTP PUT of URL of format /pacman/xxx.js
    JANUS WEB {%portName} -
       ON PUT /PACMAN/*.JS OPEN FILE {%pacRepo} RECV *.JS BASE64
    JANUS WEB {%portName} ALLOW PUT /PACMAN/*.JS
    * Provide HTTP GET access for URLs of format /pacman/xxx.js
    JANUS WEB {%portName} ON GET /PACMAN/*.JS OPEN FILE {%pacRepo} -
       SEND *.JS BINARY EXPIRE +0
    * Start the web server
    JANUS START {%portName}
  end text
  %worker:run(%workForDaemon):print
end
```

Since the PAC files are temporary, they are stored in an in-memory file (not persistent between runs) which does not need any disk files, DD cards, etc. The PAC files are stored as Model 204 procedures. The name of a PAC file procedure created by the Client (see the following sections) is based on the IP number of the Client workstation to avoid conflicts.

2. Update `debuggerConfig.xml`.

   You do this by including the httpPacURL element 385 in the `debuggerConfig.xml` file.

   The following example element suits the sample program in the preceding step (note the use of `PACMAN` in that program's JANUS WEB commands):

   ```
   <httpPacURL>http://pacServerHost:pacServerPortNum/pacman</httpPacURL>
   ```

3. Restart the Client, or just issue the retryHttpPac 247 command to test your setup.

   The Client must *not* be in proxy mode if and when you issue the command.

Note: Only when the HTTP server is defined to accept and serve PAC files, and the Debugger Client configuration is updated to identify it, will the **PAC Options** button be enabled in the **IE Options** box in the Client's **Preferences** dialog box (for the **newPac** and **mergedPac** options).

Navigating to and within the Internet Properties dialog box

The following directions are provided primarily for information purposes. They show the controls that the Client modifies automatically for Chrome and IE, as described in the preceding subsections. It is recommended that you not make these modifications manually except for any proxy server bypass addresses 393.

To access the Internet Properties dialog box:

- From Chrome:

  1. At the right end of the bar that contains the Omnibox navigation control, open the customization menu by clicking the three-stacked-lines icon:

  2. In the menu, select **Settings**.

  3. At the bottom of the the **Settings** tab, click the **Show advanced settings...** link.

  4. Find the **Network** section, then click the **Change proxy settings...** link.

     For Windows users, this opens the **Internet Properties** (or **Internet Options**) dialog box.

- From IE:

  1. From the **Tools** menu, select **Internet Options.**

To access the proxy server controls in the Internet Properties dialog box:

1. Select the **Connections** tab, and click the **LAN Settings** button.

2. In the **Local Area network (LAN) Settings** dialog box, locate the **Proxy Server** area, then select the "Use a proxy server" checkbox:

   a. In the **Address** box, the value the Client sets is: `localhost`.

   b. In the **Port** box, the Client sets the proxy listening port number discussed in the introduction above.

To access the proxy server bypass for certain connections:

1. In the **Local Area network (LAN) Settings** dialog box **Proxy Server** area, click the **Advanced** button.

2. In the **Exceptions** area, in the list box labeled "Do not use proxy server for addresses beginning with," specify the URLs of any locations the Debugger Client should ignore.

Note: You can set up the Client to automatically save and restore these addresses 388.

Firefox

To set up the proxy for Firefox browsers:

1. From the **Tools** menu, select **Options** > **Advanced** > **Network**.
2. In the **Connection** box, click **Settings**.
3. In the **Connection Settings** dialog box, select **Manual proxy configuration.**
   a. In the **HTTP Proxy** box, specify `localhost.`
   b. In the adjacent **Port** box, specify the port number discussed in the introduction above.
   c. Use the **No Proxy for** box to specify domain names that the browser will access directly, that is, for which the Debugger proxy will be bypassed.
4. Click **OK**.

Once defined, the proxy remains in effect whether the Debugger Client is operating or not.

Lynx

The Lynx character-mode browser is fast and handy for testing. To make it use a proxy, set the environment variable `http_proxy` to the full URL of the Janus proxy.

Here is a Unix shell script example (running on a PC under Cygwin) that sets this variable and runs Lynx:

```
#!/bin/bash
http_proxy=http://127.0.0.1:8081
export http_proxy
env
lynx
```

Note: The `http://` is required.

Once defined, the proxy remains in effect whether the Debugger Client is operating or not.

Opera

To set up the proxy:

1. From the main Menu, select **Settings** > **Preferences** > **Advanced** > **Network** > **Proxy Servers.**

2. Select the **HTTP** checkbox, and enter `localhost` and the proxy listening port number discussed in the introduction above.

Once defined, the proxy remains in effect whether the Debugger Client is operating or not.

9.3.5 Test the end-to-end configuration

Subsections follow for the Janus Debugger and for the TN3270 Debugger. It is assumed that the Debugger Client is up and running.

Janus Debugger

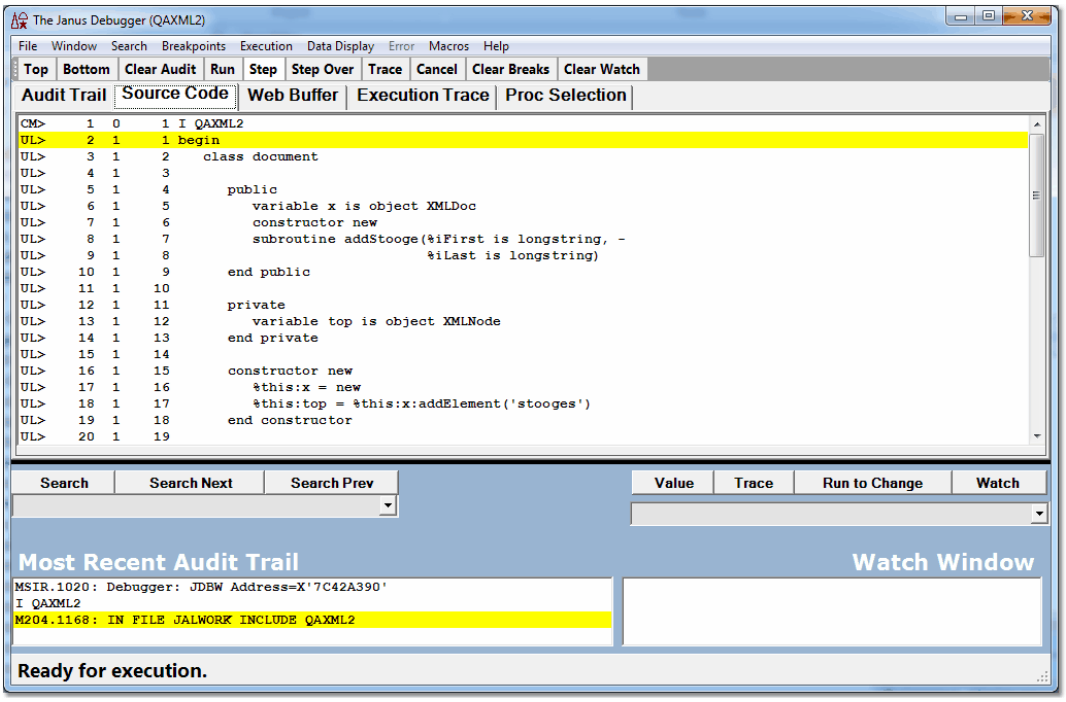
1. Open the browser you just set up385 to use the Debugger as a proxy.

   Note: It is not uncommon at this point for the Client to display a benign communication error message358 when a browser connection to an external site gets closed. If this occurs, just click the **OK** button on the message box.

2. Invoke the URL of a User Language-based page from your target Janus Web Server.

   Note: If you normally use "https://" and not "http://" to begin the URL (that is, your Web Server is SSL-secured), and if you set up378 the debuggerConfig.xml file for SSL support, make sure that you use "**http**://" here now to access the secured web port.

The source code of the program should appear in the **Source Code** page of the Client with its procedure name displayed in the title bar, similar to the following **Source Code** display:



If instead, you receive a Communication Error message that reports an "error while communicating with the remote host," you may have an error in the debuggerConfig.xml settings 378. If so, and you find the error, restart the Debugger Client and try the test URL again. For more information about error handling, see How the Janus Debugger handles communication breaks 358.

The Debugger Client is ready to use. From the Client GUI, you can control the execution of your web application's User Language code (see Getting Started 7).

For an archive of information about features that are new or enhanced in the latest version of the Debugger Client, see the Release Notes 403.

TN3270 Debugger

1. From the Model 204 command prompt or within a BATCH2 input stream, start a TN3270 Debugger session:

   ```
   TN3270 DEBUG ON janClientPort pcHost pcPort workerPort
   ```

   where:

   TN3270 DEBUG For versions of Model 204 before 7.6, use `SIRIUS DEBUG`.

janClientPort — The name of the Janus client socket port that is defined 372 for the TN3270 Debugger to use to contact the Debugger Client workstation.

This port must be started.

pcHost — The workstation running the Debugger Client. This may be an IP number or a DNS name, as described earlier 375.

pcPort — The workstation port number on which the Debugger Client is listening. As described earlier 374, this is typically 8081.

workerPort — The port number in your Online that is defined 371 for worker threads. This can be the same port number that provides worker threads for the Janus Debugger, as well.

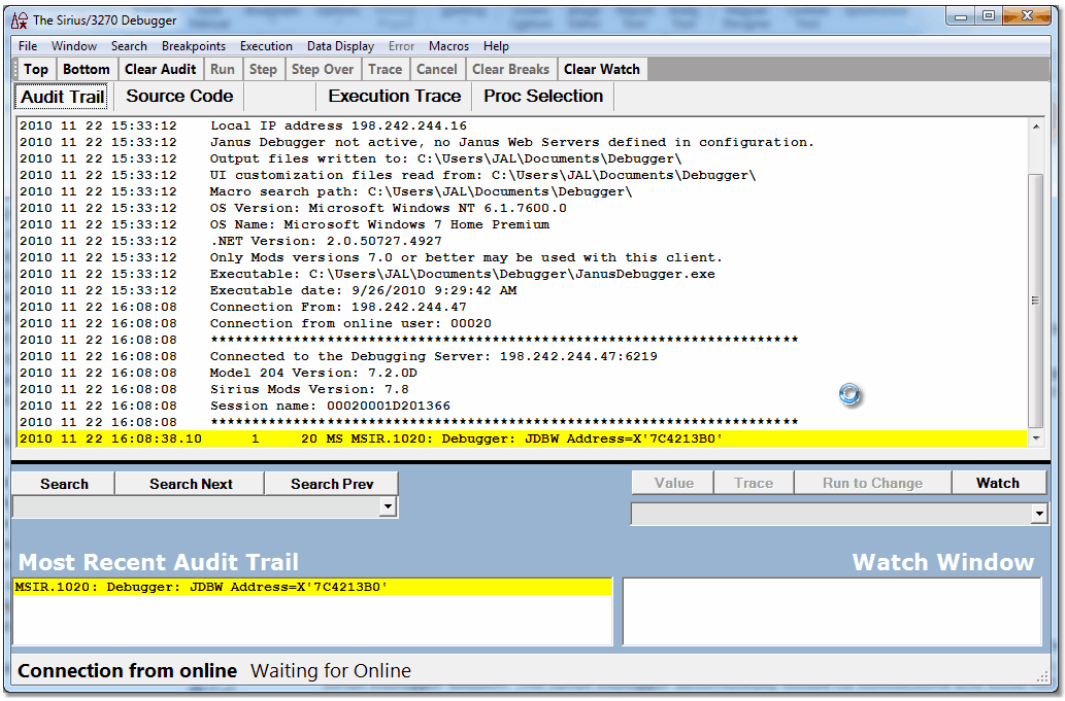
For example:

```
TN3270 DEBUG ON DEBCLIENT 198.242.244.234 8081 3226
```

2. Verify that you receive a message similar to:

```
*** MSIR.0915: Debugging is on; client is 198.242.244.234 port 8081,
    sessionID: 00000069D812279
```

3. On the Debugger Client, verify that a "busy" cursor displays, as well as a `Waiting for Online` message in the Status bar 49:



Additional **Audit Trail** page messages identify the Debugger Server's port and the address of its Online host, the user number assigned to the logged-in Model 204 user, as well as the Model 204 and Sirius Mods versions.

From this point on, any User Language program you initiate from the Model 204 command line will appear in the **Source Code** tab of the Debugger Client GUI for debugging, the procedure name will appear in the Client's title bar, and the "busy" cursor and `Waiting for Online` message will display between requests until your session ends.

4. Turn off the TN3270 Debugger by doing either of the following:

   - From the Model 204 command prompt (or at the end of your BATCH2 stream), issue:

     ```
     TN3270 DEBUG OFF
     ```

     You should receive this response in Model 204:

     ```
     ***  MSIR.0913: TN3270 Debugger is now off
     ```

     On the Debugger Client, `Online has disconnected` displays in the Status area.

   - Log off of Model 204 (any logoff is an implied TN3270 DEBUG OFF).

   Note: Explicitly turning off the Debugger is necessary if you are using the Janus Debugger as well as the TN3270 Debugger for the same Online and worker port. To switch from a TN3270 Debugger session to a Janus Debugger session, you must explicitly drop the TN3270 Debugger session. The Janus Debugger automatically closes its connections and does *not* require an explicit notification to switch or end a session.

5. Reissue the command from step 1 to restart the Debugger Client, and the Debugger Client is ready to use.

   From the Client GUI, you can control the execution of your Model 204 application's User Language code (see Getting started 71).

   For an archive of information about features that are new or enhanced in the latest version of the Debugger Client, see the Release Notes 403.

9.4 Providing updated versions of the Debugger Client

You can configure the Debugger to obtain updated builds of the Client from a central address, say, the URL of a local server. Then a Client menu item invokes a program (`updateGet.exe`) from which you download a new executable file (`JanusDebugger.exe`) to replace your existing Client.

This update maintenance feature assumes that each Client user has completed the initial Client installation, then uses this tool to refresh the executable as needed for fixes and enhancements. Currently, the Client does no checking of the version of the updated executable file, so you are responsible for determining when it is appropriate to download a new copy.

The updated executable file may be packaged in a zip file. If the file in the central URL has a .zip extension, the JanusDebugger.exe file is automatically extracted from it (an `unzip.exe` program is distributed).

To set up the feature:

1. Determine the URL where you will store updated Client executable files and prepare the mechanism by which the files are to be served from this URL.

   The updating program sends an HTTP GET call for the JanusDebugger.exe or .zip file to this URL. You must provide code at this URL to respond to the GET.

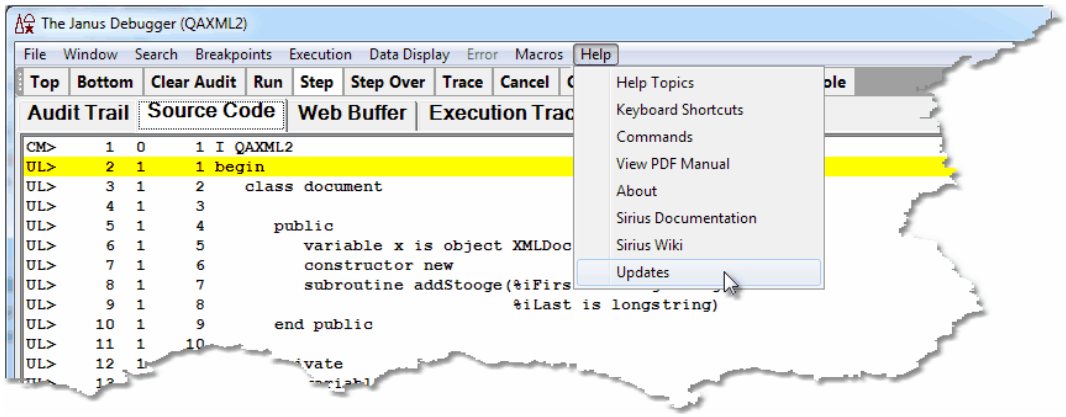
2. In the Debugger Client configuration file 378 (`debuggerConfig.xml`), insert an `<updateURL>` element as a child of the `<debuggerConfig>` element.

   This element must contain the URL (which must *not* be for an SSL port) at which you make available the updated Client executable file (and you may specify a .zip file).

   When complete, your configuration file should have a structure like the following:

```
<debuggerConfig version="1.0">
   <serverList>
        .
        .
        .
   </serverList>
   <proxy>
        .
        .
        .
   </proxy>
   <updateURL>http://rocketsoftware.com:3224/janusdebugger.exe</updateURL>
        .
        .
        .
</debuggerConfig>
```

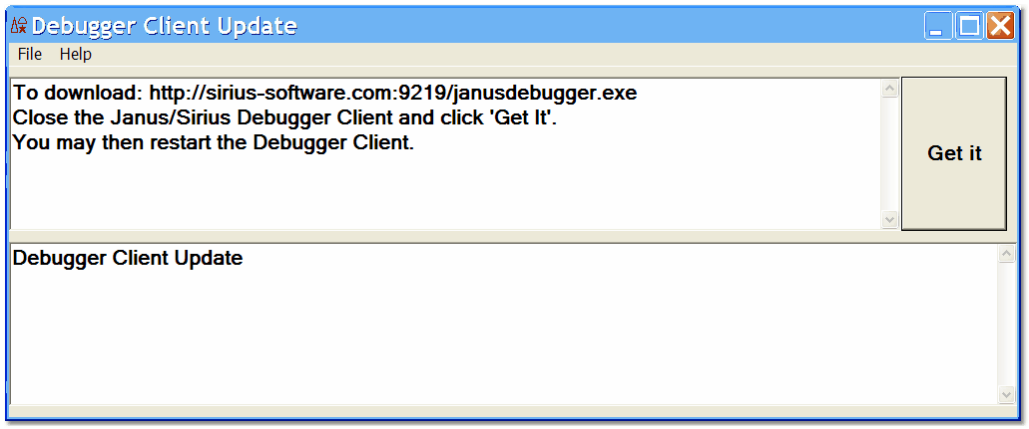
3. Check that the Debugger Client **Help** menu now contains the **Updates** option:



To get an updated version of the Client:

1. In the Client **Help** menu, click **Updates**.

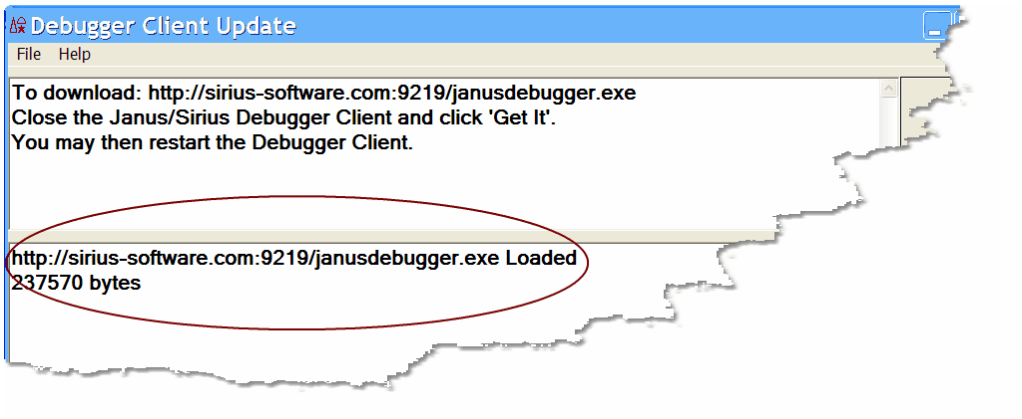
   The **Debugger Client Update** dialog box (updateGet.exe program) is invoked, and it is passed the URL you specified in the `<updateURL>` tag in `debuggerConfig.xml`:



2. Close the Client; then press the **Get It** button.

   The current JanusDebugger.exe is replaced with the new one. Closing the Client first avoids a file locking error.

You should see a confirmation message like the following:



CHAPTER 10 Release Notes

This section contains brief descriptions of the features added in each update, or "build," of the Debuggers since their first commercial release. You can determine the current build number of the Debugger Client by selecting the **About** option of the Client **Help** menu.

Model 204 Versions 7.1 - 7.6

Build: 63 (06 July 2015)

Note: Build 53 or higher of the Client is recommended for sites running under version 7.8 or higher of the Sirius Mods.

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- Support procedures running on sdaemons for Run Until 73 and White or Black List processing 77.

  This capability requires Model 204 version 7.6 or higher.
- Support object expansion 109 for JSON class objects (Model 204 Version 7.6 or higher).
- The **Preferences** 18 window **IE Mode** options (`newPac` and `newPac`) are enhanced to support HTTP URLs as well as MicroSoft file URLs. The options invoke automatic creation and maintenance of Proxy Auto Configure (PAC) files 388, which designate the only host URLs that the Debugger Client will handle requests for as a proxy server for the IE and Chrome browsers.

  The Client may now use HTTP to upload generated PAC files to the HTTP server specified in the Client's configuration file. Model 204 version 7.5 is sufficient for this feature.

- Added the `httpPacURL` 385 element to the Debugger configuration `.xml` file to identify the HTTP server that is set up to accept and serve PAC 388 files.
- Removed the **Sirius Documentation** Help menu 38 link.
- Renamed the **Sirius Wiki** Help menu link to **Model 204 Wiki**, setting its default destination to http://m204wiki.rocketsoftware.com/index.php.

Macro and command changes:

- Updated `setIEmode` 263 command with option `http` to support HTTP PAC files.
- Updated `showIE` 272 command to display URL information for HTTP PAC files.

- Added retryHttpPac 247 command to simplify testing and setting up of HTTP PAC files.
- Added httpPutFile 214, httpPutString 215, and httpGet 213 commands.
- Added &&currentPacFile 333 function to return the URL of the current PAC file in use.
- Enabled the runUntil 249 command (which you invoke by using the Run Until Procedure button 73 or the **Execution** > **Run Until Proc** menu option) to stop at procedures that are included from an sdaemon 139 thread.

  This capability requires Model 204 version 7.6 or higher.
- A synonym, **TN3270 DEBUG**, is added to the SIRIUS DEBUG command 149, reflecting the change in the name of the Sirius Debugger to the TN3270 Debugger.
- Removed the superseded ieAuto option from setPreference command.

Other changes:

- The Sirius Debugger product name is changed to **TN3270 Debugger**.
- This Client build fully supports Model 204 version 7.6.

Sirius Mods Versions 7.0 - 8.1
Model 204 Versions 7.1 - 7.5

Build: 62 (10 December 2013)

Note: Build 53 or higher of the Client is recommended for sites running under version 7.8 or higher of the Sirius Mods.

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- New **Preferences** 18 window option:

  The new **IE Options** area and **IE Mode** drop-down menu replace the former **Web Browser Options** area and **Automatically Maintain IE proxy settings** option. In addition, **IE Mode** options are available to invoke automatic creation and maintenance of Proxy Auto Configure (PAC) files 388, which designate the only host URLs the Debugger Client will handle requests for as a proxy server.
- The **Proc Selection** page now has Black List filtering 77 to accompany the already existing White List filtering, and your filtering selection now persists over runs of the Client.

Macro and command changes:

New commands:

- disableButton 200 and enableButton 202 commands disable and enable Client button bar buttons, and labelButton 221 lets you replace the label of a button.
- generatePac 207 command restricts the Debugger Client's role as-proxy-server to handling only Internet Explorer requests for hosts (onlines) specified in `debuggerConfig.xml`.
- setBlackList 261 and setWhiteList 269 commands let you temporarily override (but not physically affect) the contents of an existing procedure Black List or White List file.
- setIEmode 263 controls whether, and the host URLs for which, the Debugger will serve as the proxy server for users of the Internet Explorer browser.
- setTitle 268 and restoreTitle 246 let you change the title of the Client's main window.
- showIE 272 displays the current IE browser operating mode (the setIEmode 263 parameter setting that is in effect), and displays the current values of IE settings that pertain to the Debugger Client.
- turnOnBlacklist 282, turnOffBlacklist 281, and reloadBlacklist 241 are analogous to the already-existing `turnOnWhitelist`, `turnOffWhitelist`, `reloadWhitelist` commands.

Changed commands:

- The continueIf 195 and continueMacroIf 196 macro-only commands now support expressions.

New Client functions:

- &&currentTitle 334 and &&originalTitle 341 display the current and default titles of the Client main window.
- &&exists 335 tests if a macro variable is defined.
- &&blackOrWhiteList 332 tests whether black-list filtering, white-list filtering, or neither is in effect.
- &&ieMode 337 returns the setting of the **IE Mode** 19 option in the Client's **Preferences** window.

Other changes:

- Documentation added for setting up a Chrome browser as a Client proxy. 386
- A work folder specification is added as the fourth parameter to a command line Client invocation 301

Build: 61 (31 November 2012)

These are the principal changes to the Debugger Client since the previous build:

Macro and command changes:

- nsLookup 232 command added to aid in debugging setup problems
- Assorted bug fixes.

Build: 60 (31 October 2012)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- Status message improvements:
  - Added a display of the value (if ten characters or less) to the message received after a successful "run until variable = value" 132 execution.
  - The macroTrace, mapButton, mapKey, clearButton, and setPreference commands now report after a successful operation (in the Status bar 49, Console 322, and Client log).

Macro and command changes:

- New help command options:
  - preference 211 displays the preferences available to users via options of the setPreference 265 command.
  - ignoredFiles 211 displays the Debugger's filtered file types 380.
- New ignoredFileTypeList 265 option of the setPreference command allows on-off toggling of file-type filtering.

New Client functions:

- &&exists 335 tests if a macro variable is defined.
- &&currentRunningMacro 334 returns the file-system path of a currently running macro.
- &&preference 341 returns the current value of a specified Client preference.

Build: 59 (17 August 2012)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- **Help** menu **Commands** 38 option now displays individual command syntax
- Command line 323 tool now maintains persistent history of commands, reviewable via the keyboard up/down arrow keys
- `macroTrace` 224 processing log now shows syntax help if commands have syntax errors
- Watch Window color panel 300 option (**Out of Scope**) for **Watch Window** items not in code in currently active tab (**Source Code** or **Daemon**).
- Degree of transparency of Preferences and external-button 42 windows is now user-settable 313
- Search box widened for "Hide Lower" mode 311
- Selecting **Add Watch** (from context menu for a **Source Code** line) automatically opens external **Watch Window** if Client in "Hide Lower" mode 311
- Support master thread and daemon thread interaction 141 (`ReturnToDaemon` method/`Continue` method)

  At least version 8.1 of the Sirius Mods is required.

Macro and command changes:

- New commands:
  - `setStatusMessage` 267 lets you set a message in the Client Status bar 49
  - `unSet` 284 deletes macro variables 325
- `<>` ("not equal" operator) added to `assert` 178 command
- Argument added to `help` 211 command to display help for a specific command or function
- New Client functions:
  - `&&statusMessage` 344 returns most recent Client Status bar 49 message
  - `&&numberOfLevels` 340 returns the number of source levels being debugged
  - `&&amDaemon` 328 returns 1 if debugging a deamon, or 0 if not
  - `&&selectedTab` 344 returns label of selected main window tab, or '' if none

Build: 58 (30 April 2012)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- New **Help** menu option (**Functions**) to display Client functions 327
- Search and **Watch Window** controls display at bottom of main window when in "Hide Lower" mode 311

Macro and command changes:

- Macro variables 325 now allowed as arguments to Client functions
- New client functions:
  - &&getMainSearchInputArea 336
  - &&getVariableOrFieldInputArea 336
  - &&isWatched 338
  - &&numberWatched 340
  - &&numberOfBreakpoints 339
  - &&sum 345
  - &&windowStatus 347
  - String functions:
    - &&concatenate 333
    - &&index 338
    - &&length 339
    - &&substring 345
    - &&verifyMatch 346
    - &&verifyNoMatch 347
- New commands:
  - clearStatus 190 clears current messages from Client Status bar 49
  - feoDisplay 206 displays current occurrence value in an FEO loop
  - kill 220 stops a running macro (like **Kill Running Macro** option of **Macros** menu)
  - reloadLists 242 reloads the Exclude/Include proc/routine lists 68
  - removeCurrentWatch 243 removes currently selected **Watch Window** item
  - showFunctions 271 displays all the Client functions in alphabetical order

- Command argument of loadWatch 222 and saveWatch 250 allows absolute path name
- New option (valueDisplayOnConsole) of setPreference 265 command to control whether value displays 99 appear in a separate **Value** window when the **Console** window is open
- Backslash (\) escape character 45 for searches for strings beginning with an ampersand (&)
- &&arg 329 function now restricted to commands *within* macros (in previous builds, &&arg could be used outside of a macro, but its results were unpredictable and unreliable)
- Client functions and constants now allowed on continueIf 195 and continueMacroIf 196

Build: 57 (31 January 2011)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- New **Preferences** 18 window options:
  - **Main Button Bar** options (**Top, Center, Bottom**) allow changing the position 40 of the main (non-external) button bar
  - **Main Button Bar** option (**Extra Buttons** 21) to add extra buttons to the main button bar 43 instead of to a second button bar
  - **Main Window Options** option (**Hide Lower Section** 22) to hide or restore the lower section of the Client main window 311
  - More **Open at Startup** options to automatically open external windows 21 at Client startup (for the **Watch Window** and **Audit Trail**, **Web Buffer**, and **Execution Trace** pages)
- A Step out 62, Step over 54, or trace 128 followed by pressing the Enter key launches another step out, step over, or trace if program execution has not completed
- Named buttons may be replaced by separators 289 for visual separation between buttons
- Edit uimore.xml 22 option added to **File** menu
- Pinned external windows:
  - Context-menu options simplify pinning 309 and unpinning
  - Pin icon 309 in title bar

- Additional StringTokenizer class variables are viewable 111: CurrentQuoted, CurrentToken, String, and StringLength

  At least version 8.0 of the Sirius Mods is required.

Macro and command changes:

- New "global" versions of existing Client functions: &&globalAssertFailureCount 336, &&globalAssertSuccessCount 337, and &&globalAssertStatus 337
- New commands:
  - clearButton 187 removes all mappings from a Client named button
  - clearKey 189 removes all mappings from a Client hot key
  - evaluate 203 builds and runs a Client command
  - hideLower 212, restoreLower 246, and toggleLower 278 commands for hiding and restoring the lower section of the Client main window
  - increment 217 and decrement 199 add or subtract 1 from a numeric-valued macro variable
  - mainButtonBar 225 positions the main button bar within the Client window
  - mapKey 228 command assigns keyboard shortcuts without requiring a mapping file or Client restart
  - resetGlobalAssertCounts 244 clears counts of new "global" Client functions
  - setBreakpointOnCurrentLine 262 and clearBreakpointOnCurrentLine 186 expand flexibility of the commands for controlling breakpoints
  - Macro-only commands:
    - continueMacroIf 196 conditionally processes the macro that contains it
    - includeIf 216 conditionally calls another macro
    - macroWait 225 slows down macro execution
- New option (main) of extraButtonBar 205 command to combine the main and second button bars
- New option (ieAuto) of setPreference 265 command to control automatic proxy maintenance for the Internet Explorer browser
- "[In *window*] *command*" format and command parameters now allowed in command mappings 292 for Client button, keyboard shortcuts, and macros
- Button-mapping keyword (separator) for mapButton command or mapping-file mapping element converts a button to a visual separator 289

Build: 56 (22 August 2011)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- Optional second button bar 42
- Former **Window** menu option **Open External Button Window** renamed to **Show Main Button Bar in External Window** 26
- New **Preferences** window section Open at Startup 21 with checkboxes for button bars:
  - **External main button bar**
  - **Extra button bar**
- On external windows, Enter key searches down 308 when the search text box has focus

Macro and command changes:

- New commands control the pinning of external-windows 309: `pin` and `unPin`
- New `extraButtonBar` 205 command launches an extra button bar
- Addition to `buttonBar` command: new option `show` 184
- New `mapButton` 226 command assigns button mappings without requiring a mapping file or Client restart
- Other new commands:
  - `resetAssertCounts` 244 clears counts of Client functions
  - `restart` 245 and `restartDefault` 245 restart the Client
- The descriptions of the "macro-only" commands (`continueIf`, `include`, `macroTrace`, `noSpan`, `setM204Data`, and `span`) are moved to the Client command reference 177

Build: 55 (15 May 2011)

These are the principal changes to the Debugger Client since the previous build:

Physical changes and additions to the Client user interface:

- **Dock** and **File** menus added to the **external Button Bar** 42
- External **Button Bar** now dockable 42 (via **Dock** menu or `buttonbar` 184 command)

- Search buttons 44 added to bottom of work windows and external windows
- Three additional Client buttons 289 (bringing total to fifteen) for mapping Client commands
- New **Proc Selection** tab checkboxes 68 turn on or off the inspection of lists of procedures/routines to exclude or include in source code displays in the Client

Macro and command changes:

- "[In *window*] *command*" format applies the searching commands to most any Client window (main, external, or work), as follows:

In	*window*	*command*
	ls one of:	ls one of:
	about 39 **auditTrail** 10 **commands** 38 **console** 322 **executionHistory** 132 **executionTrace** 13 **keyboardShortcuts** 38 **source** 11 **textviewer** 147 **value** 99 **watchWindow** 15 **webBuffer** 12	**bottom** 181 **searchDown** 251 **searchFromBottom** 252 **searchFromTop** 254 **searchUp** 255 **top** 279

- windowToTop 286 now supports trailing wildcard searches
- getVariablesForClass 209 display window now is non-modal (user interaction not required)
- New buttonbar 184 command
- setPreference 265 command added for turning on and off the various code exclude/include options

Other changes:

- New parameter values and defaults for SIRIUS DEBUG ON 150 command

  At least version 7.9 of the Sirius Mods is required.

- Procedure name searches may now use asterisk and question mark wildcards 74 in any position, as well as double quotation marks to escape them

  At least version 7.9 of the Sirius Mods is required.

- Number of code blocks you can exclude/include 66 from or in debugging in a single request increased to 300

At least version 7.9 of the Sirius Mods is required.

Build: 54 (28 February 2011)

These are the principal changes to the Debugger Client since the previous build:

- Statement execution history now viewable in Source Code (or Daemon) tab 134, controlled by:
  - New Execution menu options: Select Previous History Line 30, Select Next History Line 30, Select First History Line 30, Select Last History Line 31
  - New Client commands: `previousHistory` 240, `nextHistory` 230, `firstHistory` 206, `lastHistory` 222
- Requirement 294 to have button mappings for the Client `step`, `run`, and `cancel` commands is removed
- Macro and command changes:
  - New program-window position commands: `moveBrowserToTop` 229 and `moveTn3270ToTop` 229
  - The "macro-only" restriction for the `set` and `assert` commands is removed, and their descriptions are moved to the Client command reference 177
  - New Client commands:
    - `previousHistory` 240, `nextHistory` 230, `firstHistory` 206, `lastHistory` 222
    - `openExternalButtonWindow` 234, `closeExternalButtonWindow` 192
- Physical changes and additions to the Client user interface:
  - Button bar may be moved to an external window 42 via **Open External Button Window** option of **Window** menu
  - New Search Prev button 44 searches backwards in the current Client tab (same as Alt+**Search** button)
  - New **Windows When Suspended** option in **Preferences** dialog box brings up 3270 emulator window 61 or browser window 142 for code not actively being debugged
  - **Get History** option of Execution menu 29 renamed to **Get/Display History**
  - **Preferences** 18 dialog box is no longer modal: it can remain open while the Client is active
  - Command Line 323 window now remains on top of your PC's window stack

Build: 53 (30 November 2010)

These are the principal changes to the Debugger Client since the previous build:

- Build 53 or higher of the Client is recommended for sites running under version 7.8 of the Sirius Mods.
- Debugger Client now insists on Version 7.0 or greater of the Sirius Mods (attempts to use earlier Sirius Mods versions produce an error message)
- Browsing-while-debugging 386 now allowed for browser on which the Client is defined as proxy server
- Physical changes and additions to the Client user interface:
  - Button bar 39 moved above main window, and Status area 49 moved to strip at bottom of main window
  - Font size in most Client windows is now scalable 305
  - Two additional Client buttons 289 (bringing the total to twelve) now available for mapping Client commands
  - New Help menu 38 documentation links, whose default destinations are also configurable 383:
    - **Sirius Documentation** (links to Documentation page of the Sirius website)
    - **Sirius Wiki** (links to Sirius wiki for Model 204 information)
  - Editor for Client text-editing tasks can now be set in debuggerConfig.xml file 383
  - READ SCREEN information 60 now displayed in the Client's **Audit Trail** tab
  - Mouse double-click now opens external windows 306
  - Removed label **Variable or Field** for text box above **Watch Window**; changed **Trace Changes** button label to **Trace**; changed the former **Trace** button label to **Trace All**; changed the former **Add Watch** button label to **Watch**.
- Macro and command changes:
  - Macro command line 323 tool is renamed to **Command Line** and now accepts and runs non-macro commands
  - New macro-related commands:
    - openCommandLine 233 and closeCommandLine 191 toggle the **Command Line** tool accessed from the **Macros** menu
    - openMacroConsole 236 is now a synonym for the `macroConsole` macro command, which opens the **Macro Console**; and closeMacroConsole 194 closes the console

- createMacro 198 mimics the action of the **Macros** menu **New Macro** option
- editMacroFromUISelection 202 mimics the action of the **Macros** menu **Edit Macro** option
- runMacroFromUISelection 248 mimics the action of the **Macros** menu **Run Macro** option

- New command and method options for sending user interface commands to the Client:
  - CLIENTCOMMAND 153 subcommand of SIRIUS DEBUG
  - DebuggerTools class additions:
    - New ClientCommand 162 method
    - New StatusMessage 164 method
    - New parameter (to execute Client command) for Break 160 method
    - New parameter (to execute Client command) for Command 162 method
- The "macro-only" restriction for some commands (`echo`, `toggle`, `varDump`, and `windowToTop`) is removed, and their descriptions are moved to the Client command reference 177

Build: 52 (9 August 2010)

These are the principal changes to the Debugger Client since the previous build:

- Bug fixes only.

Build: 51 (15 July 2010)

These are the principal changes to the Debugger Client since the previous build:

- New Preferences (**File** > **Preferences**) option (**Use existing IE proxy for URLs not to be debugged**) for troubleshooting IE proxy server 388 issues
- Some mapping errors 294 in the `ui.xml` and `uimore.xml` files will now invalidate only the individual item and not the entire file
- New selectWatchWindow 258 command to give focus to an external **Watch Window**
- Debugger Client now targets .NET Framework 3.5 SP1 373

Build: 50 (31 March 2010)

These are the principal changes to the Debugger Client since the previous build:

- **Audit Trail**, **Web Buffer** and **Execution Trace** windows may may now be moved to separate external windows 306
- Client Window menu 24 lists and tracks new Client external windows
- Multiple issues fixed concerning Client operation on a Windows 7 host, thereby making build 50 the preferred Client build for Windows 7 users
- Client's display and watch facilities now work for Janus SOAP Arraylist objects the same as they do for $lists or Stringlists 102
- New **Serialize** option in context menu for XmlDoc or XmlNode object variables in the **Watch Window** for displaying serialized object content 104
- New Preferences (**File** > **Preferences**) option (**Macro Autorun**) automatically runs a macro 324 when a same-named procedure is debugged
- New macro-only commands:
  - macroTrace 224 traces all macro statements in the debugging session
  - setM204Data 265 sets a Model 204 %variable or global variable
  - windowToTop 286 brings specified window to top of window stack
- New Client functions 327 (`&&assertFailureCount`, `&&assertSuccessCount`, `&&assertStatus`) report macro `assert` command results
- New mappable commands for Client windows:
  - clearHistory 188 and closeHistory 193 affect the Execution History window 132
  - clearMacroConsole 189 and closeMacroConsole 194 affect the Macro Console window 322
  - closeExternalAuditTrailWindow 191 closes an external 306 **Audit Trail** window
  - closeExternalExecutionTraceWindow 192 closes an external **Execution Trace** window
  - closeExternalWatchWindow 192 closes an external **Watch Window**
  - closeExternalWebBufferWindow 193 closes an external **Web Buffer** window
  - closeExternalWindows 193 closes any open external windows
  - closeValueDisplay 194 closes Value windows 99
  - openExternalAuditTrailWindow 233 opens an external 306 **Audit Trail** window

  - openExternalExecutionTraceWindow 234 opens an external **Execution Trace** window
  - openExternalWebBufferWindow 235 opens an external **Web Buffer** window
- New showCommands 270 mappable command displays all the Client commands in alphabetical order
- Boolean enumeration variables (for example, `%bool1 is enumeration Boolean`) may now be set 122 (only to True or False)

  At least version 7.7 of the Sirius Mods is required.
- Single quotes now allowed on string literal values in macros, wherever string literals may appear (for example with &&prompt 321)
- Search path for PDF copy of product User's Guide 375 (**View PDF Manual** option, Client **Help** menu) now first tries the product installation folder, then the Doc subfolder
- PDF version of Debugger *User's Guide* is installed 375 in the target installation folder instead of in a `Doc` subfolder.

Build: 49 (31 December 2009)

These are the principal changes to the Debugger Client since the previous build:

- New macro commands: loadWatch 222 and saveWatch 250
- Missing **Save** option added to **File** menu on Value windows 99
- New Client menu option (**External Watch Window**) and command `(openExternalWatchWindow)` move the Watch Window to an external window 306
- The assert 178 command now accepts a Client function as a target (left side)

Build: 48 (31 October 2009)

These are the principal changes to the Debugger Client since the previous build:

- Added **Proc Selection** tab buttons for creating and editing Exclude and Include lists for selectively excluding from debugging 65 the code for particular methods and User Language subroutines
- New Debugger configuration file (debuggerConfig.xml) elements for modifying the default location of Client work files 303
- New Client functions 327 (&&searchSuccess, &&searchResult, &&procName)

- Binary view 100 of a variable's value now also shows printable characters
- Client Value display windows 99 now are non-modal for ease of use

Build: 47 (30 September 2009)

These are the principal changes to the Debugger Client since the previous build:

- New Client menu option (**Toggle Init Exclude**) and command `(toggleInitExclude)` control whether to invert the way exclude mode 65 operates: initially excluding code instead of initially including code (until an explicit directive)

  At least version 7.6 of the Sirius Mods is required.
- Added Edit White List button 80 to **Proc Selection** tab
- Added exclude/include procedure lists when debugger directives 65 are on

Build: 46 (15 September 2009)

These are the principal changes to the Debugger Client since the previous build:

- Source Code lines can be explicitly excluded from Debugging 65
- Debugger commands and macros may now be mapped 291 to numeric keys as well as to alphabetic and function keys
- Multiple commands 289 added for Client tab selection and navigation:
  - selectAuditTab
  - selectSourceTab
  - selectWebBufferTab
  - selectExecutionTraceTab
  - selectProcSelectionTab
  - selectNextTab
- pafgi command 236 added for viewing field groups

  At least version 7.6 of the Sirius Mods is required.
- Options **PAI** and **PAFGI** added to Data Display menu 33
- Additional text items available for user-specified coloring 297 in the Client windows:
  - User Language TEXT and HTML statement blocks

  - User Language Macro Facility statements

- **Add Watch** and **Display** right-click options for lines within HTML or TEXT blocks now detect Model 204 field-name expressions 94

- New Client Preferences option 18 **(Show long watch values in a Tool Tip)** for viewing Watch Window items 88 too wide to fit

- $CURREC 95 calls as well as $FIELDGROUPID and $FIELDGROUPOCCURRENCE 119 calls can now be quickly evaluated/watched

  At least version 7.6 of the Sirius Mods is required.

- Added the Value property to the expansion 111 of a ScreenField object

Build: 45 (30 July 2009)

These are the principal changes to the Debugger Client since the previous build:

- Additional class variables are viewable: 111

  - Record class: RecordNumber and FileName variables
  - RecordsetCursor class: RecordNumber, FileName, LoopLockStrength, and State variables
  - FastUnloadTask class: State variable
  - StringTokenizer class: AtEnd and NotAtEnd variables
  - UserStatistics class: LoginToString, RequestToString, and ToString variables

  At least version 7.6 of the Sirius Mods is required.

  For all versions of the Sirius Mods, object variables belonging to these classes are recognized as system objects, but no variables are suitable for display:

  - CharacterMap class
  - RandomNumberGenerator class

- Support added for viewing fields 93 that belong to Model 204 field groups

  At least version 7.6 of the Sirius Mods is required.

- `pai` command added for viewing all fields 115 in a record

  At least version 7.6 of the Sirius Mods is required.

Build: 44 (09 July 2009)

These are the principal changes to the Debugger Client since the previous build:

- Fixes for some cases where string data was erroneously shown in binary/hex notation (X'aabbcc' format)
- FloatNamedArraylist class variables now viewable 109

Build: 43 (30 June 2009)

These are the principal changes to the Debugger Client since the previous build:

- Global variables referenced by $GETG 94 calls can now be quickly evaluated/ watched by right-clicking their program line and selecting **Add Watch** or **Display** from the context menu
- $STATUS and $STATUSD 95 calls can now be quickly evaluated/watched by right-clicking their program line and selecting **Add Watch** or **Display** from the context menu

  At least version 7.6 of the Sirius Mods is required.
- New **File** menu item (**Restart with Default Window Size** 18) restarts the Client and displays it with the size and position it occupied when it was first installed

  Otherwise, the overall size and position of the Client window as well as the dimensions of its internal windows is stored when the Client closes and reused when the Client is next opened.
- New **Macros** menu items (**Run and Edit** 36) identify the most recently run macro and enable quick re-execution or editing of that macro
- New mappable command (clearWebBuffer 191) and **Window** menu item (**Clear Web Buffer**) that clear the contents of the **Web Buffer** tab.
- New mappable commands that help to debug requests that contain objects, lists, or Stringlists. Probably better suited for macros, the commands may also be mapped to buttons or keys:
  - expandObject 204 displays a list of object variable names and values for its object instance argument
  - expandList 203 displays the list items in the $list or Stringlist referenced by the variable specified as the command argument
  - getVariablesForClass 209 displays a list of the names of the variable members in the class specified as the command argument
- New mappable command (valuedisplay 284) that, like the Value button 99, displays in a separate window the value of the item currently in the **Variable or Field** area
- New mappable command (showShortcuts 273) that displays the Client's current (default as well as mapped) keyboard shortcuts

- New macro-only command (macroConsole 223) that invokes the **Macro Console** 322 window.
- Class variable members in system exception classes are now viewable 109
- Increased drop-down history of search terms, procedure names, and variables from ten to twenty
- Multiple bug fixes (listed in Client's **Help** menu, **About** option).

Build: 42 (27 March 2009)

These are the principal changes to the Debugger Client since the previous build:

- User-specified 297 colors for text and backgrounds in the Client windows
- Independent coloring 299 for **Source Code** comments

  At least version 7.6 of the Sirius Mods is required for comments bounded by characters defined by COMSTART and COMEND commands.
- Ability to view dummy string substitutions 125 in Model 204 commands (formerly only in User Language statements)

  At least version 7.6 of the Sirius Mods is required.

Build: 41 (30 January 2009)

These are the principal changes to the Debugger Client since the previous build:

- Additions to the **Preferences** dialog box:
  - **3270 Emulator** option added to bring up 3270 emulator window 61 at pause for user input
  - **Web Browser** option added to bring up browser window 142 at pause for user input
  - **Clear IE Proxy Override** option enhances IE automatic proxy server maintenance 386
- New session highwater mark 154 item added to the output display of the SIRIUS DEBUG STATUS command.

  At least version 7.5 of the Sirius Mods is required.
- New **File** menu option (Edit debuggerConfig.xml 18) opens the `debuggerConfig.xml` file for editing
- "Web request will NOT be debugged" audit trail messages 380 now indicate reason

- Debugger Client now always becomes the topmost window when a breakpoint 56 is reached
- The **Add Watch** button now works properly with %variables whose names also have an embedded per cent (%x) character or whose names are enclosed in curly braces {%x}.

Sirius Mods Versions 7.0 - 7.3

Build: 40 (8 December 2008)

These are the principal changes since the previous build:

- `debugTrace` tag added to `debuggerConfig.xml` file for additional diagnostic Client logging

Build: 39 (15 October 2008)

These are the principal changes since the previous build:

- Bug fixes only.

Build: 38 (30 September 2008)

These are the principal changes since the previous build:

- The Dataset object is added to the list of viewable 109 classes.

  At least version 7.2 of the Sirius Mods is required.

Build: 37 (31 August 2008)

These are the principal changes since the previous build:

- New **Clear Execution Trace** menu item 24 and `clearExecutionTrace` command for clearing the contents of the **Execution Trace** tab
- Ability to display statement execution history 132 in **Execution Trace** tab
- **Clear** button added to **Execution History** and **Macro Console** windows.
- New macro-related commands: toggle 276, continueif 195, span 274, and noSpan 231 .

- New optional attribute, startUpMacro 291, for the `mappings` element in a `ui.xml` file mapping of alternative Client buttons, hot keys, and macros

Build: 36 (31 July 2008)

These are the principal changes since the previous build:

- Improved display of statement execution history 132

  At least version 7.3 of the Sirius Mods is required.

Build: 35 (11 July 2008)

These are the principal changes since the previous build:

- Ability to display the Model 204 Universal Buffer 121

  At least version 7.3 of the Sirius Mods is required.

- Ability to display the value of a Model 204 parameter 120

  At least version 7.3 of the Sirius Mods is required.

Build: 34 (20 June 2008)

These are the principal changes since the previous build:

- New **Execution Menu** option (**Get History**) and mappable command (getHistory) for displaying a history of the statements executed 132 to the current point in a program being debugged

  At least version 7.3 of the Sirius Mods is required.

Build: 33 (30 April 2008)

These are the principal changes since the previous build:

- User items specified during Client session now are preserved in the next session:
  - Previous search strings are accessible in a **Search** box drop-down list.
  - Previous variables specified are accessible in a **Variable or Field** box drop-down list.
  - **Watch Window** contents are redisplayed 89 by default.

  - Resizing of the Client window is preserved.

- **Watch Window** operations are no longer prevented when no program is being debugged
- New DebbuggerTools class method, Command 162, runs SIRIUS DEBUG subcommands within a request

  At least version 7.3 of the Sirius Mods is required.

Sirius Mods Versions 7.0 - 7.2

Build: 32 (18 February 2008)

These are the principal changes to the Debugger Client since the previous build:

- A fix for a rare case where the **Watch Window** failed to display certain variables in a program involving a persistent session

Build: 31 (08 February 2008)

These are the principal changes since the previous build:

- Enhancements to Source Preview 83 feature:
  - A Step or Search command is allowed and causes a download of the entire source program
  - A Run command runs the program without a code download
- A fix for the case where the Client was failing to display a compilation error message (M204.1265) for which a Model 204 MSGCTL was being issued

Build: 30 (28 January 2008)

These are the principal changes since the previous build:

- New option that allows previewing of program code 83

  At least version 7.2 of the Sirius Mods is required.
- Array item references that have spaces between the array name and the left parenthesis are now recognized properly by all the Client features

Build: 29 (09 December 2007)

These are the principal changes since the previous build:

- Displaying in the **Audit Trail** tab the names of procedures excluded from debugging by the White List processing 77 feature

  At least version 7.2 of the Sirius Mods is required.

- A command for interrupting 80 White List or Run Until processing

  At least version 7.2 of the Sirius Mods is required.

- Syntax added for watching mixed-case global variables 94

- Changes to the Search feature 39 to enable keyboard-invoked consecutive searches for a given string:

  - The default response to pressing the Enter key while the **Search** text box has focus is changed from "search from the top" to "search from current line." This lets you press Enter repeatedly to find subsequent occurrences of a search string. Formerly, pressing Enter again found the same occurrence as the first time because it repeated the search from the top.

    Note: This introduces a small upward incompatibility.

  - New `focusToSearchBox` command gives the input focus to the Search string text area. The Ctrl+F key combination is changed to perform the same function by default.

Build: 28 (09 November 2007)

These are the principal changes since the previous build:

- A console 322 for macro information
- **Macro Command Line** menu option 36 to run a macro
- `Echo` command output goes to console 322 if console is open
- A **... macro running** indicator to be displayed on the Client's title bar
- New macro-related commands: `set` 260, `assert` 178, and `vardump` 285
- New mappable commands:
  - addWatchOnCurrentLine 178 (with accompanying menu item **Add Watch on Current Line**)
  - toggleBreakpointOnCurrentLine 277 (with accompanying menu item **Toggle Breakpoint on Current Line**)
  - reloadWhiteList 241, turnOnWhiteList 282, and turnOffWhiteList 281 (with accompanying menu items **Reload White List**, **Turn On White List**, and **Turn Off White List**)

- New menu item (**Execution** > **Run Until Proc**) for Run Until processing, and the runUntil command 249 is now mappable
- Lines located via a Search button are now highlighted and displayed in the center of the page

Build: 27 (27 September 2007)

These are the principal changes since the previous build:

- Jump feature 81 is added

  At least version 7.2 of the Sirius Mods is required.
- New Client macro-related command (echo 201)
- &argstring macro variable 320 for passing arguments to macro commands
- &&prompt function 321 for interactive prompting
- An exception to ordinary request-cancellation handling for the purpose of ON UNIT code debugging 137
- Search buttons now located below the text box for search strings

Sirius Mods Versions 7.0 - 7.1

Build: 26 (17 August 2007)

These are the principal changes to the Debugger Client since the previous build:

- A new utility for user-created macros 315
- File types the Janus Debugger will *not* debug are settable 380

Build: 25 (13 July 2007)

These are the principal changes since the previous build:

- New Client Preferences option 18 (**Trim blanks from selection**) to remove blanks from text copied to the Text Viewer 147.
- Support for additional level of Client menu and keyboard reconfiguration via the uimore.xml 295 file
- Expanded menu bar 17, which accommodates all Client commands

Build: 24 (29 June 2007)

These are the principal changes since the previous build:

- help[211] and manual[226] programmable commands simplify access to product documentation

Build: 23 (27 June 2007)

These are the principal changes since the previous build:

- turnOffDebugging[281] programmable command turns off debugging from the Client

  At least Client build 23 and version 7.1 of the Sirius Mods are required.

- Debugger now recognizes %variable names that include question marks (?) and single-quotation marks (')

  At least version 7.1 of the Sirius Mods is required.

- Screen and ScreenField objects are added to the list of viewable[109] classes

  At least version 7.1 of the Sirius Mods is required.

Build: 22 (20 June 2007)

These are the principal changes since the previous build:

- Two new SIRIUS DEBUG commands[149] (SUSPEND and RESUME)

  At least version 7.1 of the Sirius Mods is required.

- NamedArraylist objects are added to the list of viewable[109] classes

Build: 21 (13 June 2007)

These are the principal changes since the previous build:

- Client's **Web Buffer** tab displays output if you debug a web thread program[155] that contains an embedded SIRIUS DEBUG ON command
- **File** menu option to create or edit the ui.xml file[18], which contains button and hot key reconfigurations
- Settable[122] image/screen items
- **Help** menu **Keyboard Shortcuts** display can be printed and saved

Build: 20 (08 June 2007)

These are the principal changes since the previous build:

- Viewing the Variables 109 in a Sirius or user-defined class
- Print options added to Value window 99 **File** menu
- New DebuggerTools method (DebugOff 163) mimics `SIRUS DEBUG OFF` command

  At least version 7.1 of the Sirius Mods is required.

Sirius Mods Version 7.0

Build: 19 (26 April 2007)

These are the principal changes to the Debugger Client since the previous build:

- Fix provided for problem with requests longer than 64, 000 lines

Build: 18 (20 April 2007)

These are the principal changes since the previous build:

- **Text Viewer** window for copying, printing, or saving text 147 data from Client pages
- The button whose functionality the Enter key repeats 295 is highlighted by a white background

Build: 17 (30 March 2007)

These are the principal changes since the previous build:

- Settable buttons and hot keys

  You may reconfigure 288 any of the ten contiguous buttons below the main window to invoke a different feature than its default. You also may create your own keyboard shortcuts for commonly used features.
- From **Help** menu option, keyboard shortcuts 291 can be displayed
- Trace button 47 has a new default hot-key combination: Ctrl+T
- Enter key is alternative to the **Set** button in the Set dialog box 122 for changing a variable's value

- Cosmetic changes to buttons

  The button widths are now uniform, their labels have a smaller font, and disabled buttons are more obviously so.

Build: 16 (05 March 2007)

These are the principal changes since the previous build:

- Name of current procedure displays in GUI title bar 395
- Workstation IP number displays on startup

  The **Audit Trail** page initially displays 375 a line like the following:

  ```
  Local IP address 198.242.244.234
  ```

Build: 15 (22 February 2007)

These are the principal changes since the previous build:

- Pressing Enter key repeats last GUI action

  Pressing the Enter key has the same effect as clicking the button that is currently highlighted 53. For example, when a request is first presented in the **Source Code** tab, the **Step** button is highlighted. You can step through the program simply by pressing Enter repeatedly.

Build: 14 (19 February 2007)

These are the principal changes since the previous build:

- Items in an array of $lists can be displayed in Value window 102

  In this context, subscripts are allowed for $list identifiers. For example:

  ```
  list %alpha(%i)
  ```

Build: 13 (09 February 2007)

These are the principal changes since the previous build:

- Regular expressions supported in the Search box 39
- SIRIUS DEBUG ON 149 command enhancement simplifies its syntax

  Two command parameters are settable in the User 0 stream. At least version 7.0 of the Sirius Mods is required.

- Options to set multiple breakpoints at once [58] — on all lines that match a search string or regex, or on executable statements that follow comment lines that begin with `*Break`

  At least version 7.0 of the Sirius Mods is required.

- Breakpoint [55] maximum increased from 40 to 1000 per User Language request

  At least version 7.0 of the Sirius Mods is required.

- In FEO loops, display current occurrence [114] value

  At least version 7.0 of the Sirius Mods is required.

Build: 12 (22 January 2007)

These are the principal changes since the previous build:

- Additional way to display the items in a $list or Stringlist [102] variable

  You can now right-click the variable's name in the **Watch Window** display. This is available for Sirius Mods versions 6.9 and 7.0 and higher.

- Copy page contents [10] to clipboard

  You can press the Ctrl+C keyboard key combination to copy the contents of the active (topmost) tab to the Windows clipboard.

- Additional "trace until" option

  The **Run To Change** button continues request execution until the value of a selected variable changes. The new variation to this feature (press Alt key while clicking **Run To Change**) continues execution unless or until a selected variable's value becomes equal to a value you specify.

  Tracing until a specific value [131] is available only for Sirius Mods version 7.0 and higher.

- Length limit increased to 255 for %variables whose value you set [122]

  This is available for Sirius Mods versions 6.9 and 7.0 and higher.

Build: 11 (09 January 2007)

These are the principal changes since the previous build:

- STATUS option for SIRIUS DEBUG command

  Using the STATUS option [149] produces a simple status report of the Debugger worker threads. At least version 7.0 of the Sirius Mods is required.

- White List processing enhancements

Processing is moved to the mainframe to eliminate code transfer and provide response time benefit. Also, trailing wild cards 77 are now allowed in the White List.

- Step Out option

  By pressing the Alt key and clicking the Client GUI **Step Over** button, you can immediately discontinue the Debugger processing of a called subroutine, method, or daemon and continue processing at the statement after the call to the subroutine, method, or daemon. This action is called a "Step Out". 62

- Skipping over Daemon code

  By pressing the Alt key and clicking the Client GUI **Run** button, you can discontinue the interactive debugging 140 of the Daemon object calls in your program. The Daemon code executes but is not displayed in the Debugger Client.

- Assembler language replaces User Language for Debugger internals

  - Downloading a User Language dump file (SIRDEBUG) to install the Debugger Server is no longer necessary.
  - The Windows Installer program (setup.exe) for the Debugger workstation client, which is stored in the SIRDEBUG procedure file for the Sirius Mods prior to version 7.0, is downloadable from the Sirius web site for Debugger customers running Sirius Mods 7.0.

- Removal of requirements 369 to license Janus SOAP and Janus Sockets for the Debugger for users running version 7.0 of the Sirius Mods

  A new Debugger Server port type (DEBUGGERSERVER) replaces the SRVSOCK type that is required for earlier versions of the Sirius Mods, and a new port type (DEBUGGERCLIENT) replaces the CLSOCK type that is required for the TN3270 Debugger for earlier versions of the Sirius Mods.

- New **File** > **Preferences** option 60 lets you break Debugger execution after READ SCREEN/MENU statements

  New message (`Full Screen Read Pending`) prompts TN3270 Debugger Client users when READ SCREEN is active. Formerly, the message was `Waiting for Online`.

- Breakpoint 55 maximum increased from 20 to 40 per User Language request

- Searching from bottom to top of page is added (via Alt key) to **Search and Search Next** 39 buttons

- After failed compilation, F11 and F10 keys 136 allow navigation to next and previous statement, respectively, that did not compile

- Watching variables within a class definition 98 no longer requires explicit `%this` specification

Sirius Mods Versions 6.8 and 6.9

Build: 10 (04 December 2006)

These are the principal changes to the Debugger Client since the previous build:

- Option to restart the Debugger Client

  From the file menu, the Restart option 18 shuts down the Debugger Client. The Client then restarts, doing the same processing as if you started it by clicking its desktop icon.

- Main working area is resizeable

  You can now drag the black bar just above the page-navigation buttons to resize the main working window in the Client.

- Improvements to $list and Stringlist viewing

  For a float variable $list handle or for a Stringlist object variable, you can now request a display 102 of its elements, which will be presented in a data viewer similar to the way XML documents are displayed.

Build: 9 (17 November 2006)

These are the principal changes since the previous build:

- Run Until spans debug sessions

  The **Run Until spans HTTP requests** option is renamed to **Run Until spans debug sessions,** and it is generalized to work with the TN3270 Debugger as well as with the Janus Debugger. With this option turned on, Run Until continues searching through the source program until it finds the specified procedure, even if the debugging session is interrupted by a loss of the connection to the Online or the TN3270 Debugger is toggled off and on again. When the session resumes, the Client keeps searching for the target procedure.

- Performance statistics 363 kept in log file are enhanced to report the number of bytes received per message incoming to the Debugger Client.

Build: 8 (13 November 2006)

These are the principal changes since the previous build:

- Right-clicking **Source Code** lines lets you display variable values

  As described in Displaying the value of a program data item 99, this approach lets you display a variable's value just as if you entered the variable name in the **Variable or Field** input area, then clicked the **Value** button.

Build: 7 (5 November 2006)

- These are the principal changes since the previous build:

  - The installation kit now installs a required MicroSoft file (gdiplus.dll) to the installation target folder instead of to the system root folder, avoiding any security issues concerning folder write permissions.
  - Minor memory-use and performance improvements for both source-code loading and variable watching.

Build: 6 (25 October 2006)

- These are the principal changes since the previous build:

  - Save and restore proxy settings for Microsoft Internet Explorer

    The automatic maintenance of proxy settings 386 for Janus Debugger IE users that was added in Build 5 did not save and restore *all* proxy-related settings. It now does.

  - Performance improvements for watching variables

    The display of the values of watched variables is slightly accelerated.

Build: 5 (18 October 2006)

- These are the principal changes since the previous build:

  - Better proxy control for Internet Explorer

    For those Janus Debugger users whose browser is Microsoft Internet Explorer, the task of defining the Debugger Client as the proxy server can be handled automatically 386 by the Client when it starts up (and undone when the Client shuts down).

  - Improved source line scrolling

    To avoid having the current execution position in a Client tabbed-page window you are stepping through be the last line on the page (obscuring the next line of code), the display of the highlighted current position now includes the next two lines.

Build: 4 (2 October 2006)

- These are the principal changes since the previous build:

  - Performance improvements for very long programs

Elapsed time for transferring and displaying programs with thousands of lines of code has been reduced by 90%. In addition, a new configuration file setting lets you trace the time the Client spends handling program code (see Tracking Client performance 363).

Build: 3 (27 September 2006)

These are the principal changes since the previous build:

- **Run Until Procedure** processing can ignore the end of an HTTP request

  This feature is designed to make it easier to debug HTML frame-based web applications, since the Debugger Client by default terminates the search for a designated Run Until procedure at the end of an HTTP request. Thus, a procedure search stops by default after each User-Language produced frame in a single HTML frameset statement.

  The **File** > **Preferences** menu option displays a checkbox that lets you direct the Client to continue across multiple HTTP requests until the specified Run Until procedure name or pattern is satisfied. See Precedence and scope for Run Until 75.

- Selecting which of multiple web servers are eligible for debugging

  After selecting the **File** > **Preferences** menu option, you can choose which of the Onlines specified in the Client configuration file (`debuggerconfig.xml`) are to have their web requests debugged. For more information, see Debugging multiple Web Servers 145.

- New hot-key combination for **Preferences** option

  The Ctrl+P key combination now invokes the **Preferences** option of the **File** menu.

Build: 2 (4 September 2006)

These are the principal changes since the previous build:

- Simplified editing and reloading of a White List

  You can now edit or create a white list file (`whitelist.txt`) with the Windows Notepad editor by selecting **Edit White List** from the Debugger Client **File** menu. In addition, instead of restarting the Client to reload the list when done editing, you simply click the **Reload White List** button on the **Proc Selection** tab.

  White list processing is described in Running only to listed procedures 77.

- Enhanced status reporting

  - An hourglass cursor displays whenever the Client is waiting for processing to complete on the Online.

  - Additional status area[49] message values indicate that the GUI is waiting for the Online to respond:
    - `Waiting for Online` is displayed when source code is being sent from the Online to the Client workstation, or when the Online is processing the Client's **Step**, **Run**, **Run Until**, or **Trace** command. The `Waiting for Online` message is also displayed in TN3270 Debugger sessions whenever the Client awaits a new request from the Online.
    - `Receiving/Forwarding Web Page` is displayed by the Janus Debugger Client when a Web Server's HTTP response to a web request is being read by the Client and forwarded to the web browser.
    - `Persistent Session Suspended` (see Debugging Web Server persistent sessions[142]) is changed to `Session awaits browser.`
  - When White List processing is toggled on or off from the **Proc Selection** tab, `White list is active` or `White list turned off` is displayed as appropriate.

- New hot-key combination for **Search** command

  The Ctrl+F key combination now performs the same function as the **Search** button (see The navigation and execution buttons[39]).

- A summary of the changes since the last build

  As described in Versions and builds[6], you can view a list of the changes in the current build of the Client by selecting **About** from the Debugger Client **File** menu.

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