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Welcome to aXes for IBM i

This section describes the aXes product and explains how to use the product. It also includes a complete description of the Control Language commands and configuration directives, and provides assistance with problem solving. For the latest information about aXes, refer to the aXes web site (axeslive.com).

Road Map

Use the following table to find information that will help you configure aXes.

If you want to ...	Refer to ...
Configure aXes Application Server	aXes Reference
Configure Data Explorer Server	aXes Reference
Configure Spool File Server	aXes Reference
Configure Terminal Server	aXes Reference
Create keyboard maps	aXes Reference
Learn about scenarios	aXes Reference
Set up Secure Sockets Layer	aXes Reference
Solve problems	aXes Reference
Tune aXes Application Server	aXes Reference
Tune Terminal Server	aXes Reference
Understand aXes commands	aXes Reference

Topics available in other guides are:

If you want to ...	Refer to ...
Apply maintenance to aXes	aXes Quick Start
Install aXes	aXes Quick Start
Learn about authorities	aXes User Guide
Learn about recovery	aXes User Guide
Learn about system requirements	aXes Quick Start
Manage security	aXes User Guide
Manage servers	aXes User Guide
Manage users	aXes User Guide
Remove aXes	aXes Quick Start
Understand FastCGI	aXes User Guide
Understand licensing	aXes User Guide

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If you want to ...	Refer to ...
Use Data Explorer Server	aXes User Guide
Use Spool File Server	aXes User Guide
Use Terminal Server	aXes User Guide

For detailed information about using aXes, including installation, configuration and licensing, consult aXes Quick Start and aXes User Guide.

About aXes

aXes comprises an application server, a terminal server, a spool file server, a data explorer server, and a set of tools that allow you to distribute existing AS/400 and iSeries applications via a TCP/IP network using a web browser. The application server component is called aXes-W3, the terminal server component is called aXes-TS, the spool file server component is called aXes-WS, and the data explorer server is called aXes-DE. Multiple instances of each server can be active at the same time. CL commands are provided to start, stop and manage these servers.

About aXes Terminal Server

Terminal Server features

aXes Terminal Server is an effective host access solution that is managed from a standard web server. Offering all of the advanced features found in desktop-based solutions within a browser-based interface. The aXes Terminal Server lowers your Total Cost of Ownership (TOC) for host access by exploiting the infrastructure of the Web and internet-based protocols. The aXes Terminal Server provides unprecedented control over host connectivity combined with centralized configuration, licence management, and security.

The aXes Terminal Server is an advanced host-based solution that provides access to enterprise applications via an industry standard Web browser interface in XML format over the Web or company intranet.

Using a browser, users simply access an URL — eliminating the need to install software and user configurations on the individual desktops. Users access their host-based applications in a variety of styles, with a click of the mouse via their web browser.

The aXes Terminal Server uses open standards to ensure host access is quickly, efficiently, and securely managed between browser-based client and host application resulting in lower network traffic than native terminal protocols. You get reduced telecommunication, administration, and client management costs with decreased complexity.

Terminal sessions created by the aXes Terminal Server can optionally access the full batch CPW capacity of your host system. These terminal sessions have the appearance and behaviour of normal interactive jobs but they are not counted as interactive jobs by the interactive CPW monitor. Terminal sessions created by the aXes Terminal Server are independent of terminal sessions created by other mechanisms such as Telnet. Telnet and other emulator sessions continue to be counted against available interactive CPW.

The ability to access the full batch CPW is enabled by the aXes Intersession configuration directive. See the Terminal Server configuration in this guide for a detailed explanation of the syntax.

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aXes-TS and aXes-TS2

aXes versions prior to version 1.35 included a browser interface engine known as aXes-TS and it supported only Internet Explorer.

aXes version 1.35 introduced aXes-TS2, a second browser interface engine which allows aXes 5250 sessions to be used with additional browsers:

- Chrome (Google)
- Firefox (Mozilla)
- Internet Explorer (Microsoft)
- Safari (Apple)

aXes users can choose either aXes-TS or aXes-TS2 by changing the URL they use to start their aXes 5250 session. This means that aXes-TS and aXes-TS2 browser sessions can be run side by side on the same Windows PC.

aXes-TS2 also enables you to work with mobile devices such as iPhones and iPads to provide modernized web browser access to IBM i based application from any device.

When working as an aXes designer with aXes-TS2 you are seeing an aXes-TS session and you need to use Internet Explorer 8 (or later) to customize your applications. You can deploy the resulting aXes application and use it with any of the supported browsers.

The aXes-TS2 engine can apply AutoGUI rules to screens that have been customized. The aXes-TS engine does not support this feature. The screen level property named, disableAutoGUI, allows you to control this in aXes-TS2, but it is ignored by aXes-TS.

About aXes Application Server

aXes Application Server is a fast, secure, non-blocking application server for the IBM i (System i, iSeries and AS/400). Its features include:

- A light foot print; small memory utilization and low CPU consumption
- Authentication
- Embedded database support
- Embedded scripting
- FastCGI
- HTTP 1.1 support
- Logging
- Multiple instances
- Simple installation and configuration
- SSL support

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Section 1 - Terminal Server Configuration

Configuration File

All options, except the name of the configuration file and the socket or port, can be set in a configuration file. One advantage of using a configuration file is that the file can be changed, and the changes will apply when the server is restarted. The configuration file is generally stored in the / (root) file system and can be modified using an editor such as EDTF. If you wish, you can store the configuration file in a source member and use an editor such as SEU. Configuration files can be shared across different aXes Terminal Servers.

The default location for the configuration file is the /axes/configs directory. You can edit the default TS configuration file using the command:

EDTF STMF('/axes/configs/aXesTS.conf')

The configuration file is a simple text file containing a series of 'option' or 'option=value' directives separated by white space. Valid directives are described below.

Comments may be placed anywhere within the configuration file. Comments begin with the hash (#) character and all characters after the # are ignored. Long lines can be continued by breaking them with a trailing backslash ('\').

Sections are used to group various configuration options. The aXes Terminal Server supports the UserList section. This section can be replaced by a separate file.

The configuration file can be encoded using any IBM i supported CCSID or code page.

Most aXes-TS configuration directives have reasonable defaults and need not be specified.

> When specifying numeric values do not include leading zeroes because these will cause the value to be interpreted as an Octal number (i.e., 037 will be interpreted as decimal 31).

Configuration Directives

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

AutoGUI

Enables or disables the autoGUI menu option. To turn AutoGUI functionality on or off, use the AutoGUIOn property in Application Level Basic Properties.

Allowable values are 0 or 1. Zero (0) disables autoGUI menu option and 1 enables it.

The default value is 1.

AdminPath

Specifies the directory where the aXes Terminal Server Administration JavaScript and XSL files reside. There are no constraints on the name of this directory.

The default is a directory named <prod-dir>/TS/Admin where <prod-dir> is the product installation library.

AdminView

Specifies the Administration View function is enabled. The default is disabled to comply with European privacy requirements. The allowable values are:

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noview	Specifies that an administrator or other authorized user cannot view other sessions.
view	Specifies that an administrator or other authorized user may view other sessions.
user	Specifies that the ability to view another user's session is defined in the user configuration file.

ClientAttrRemapBase

Specifies the base Unicode value that marks the starting point for mapping 5250 attribute characters into the user-defined Unicode character range. Any Unicode value is allowed but the character should be in the user-defined range (0xe000 to 0xf8ff). This value must be specified using C language syntax where the hexadecimal numbers are preceded by 0x (zero and x). The default value is 0xf000

ClientNullReplaceChar

Specifies the Unicode value sent to the client as the replacement for a host null (x'00') character byte.

The default value is 0xa0 which is the non-breaking space character.

This is the same character as that represented by the HTML   entity. This value must be specified using C language syntax where the hexadecimal numbers are preceded by a 0x (zero and x). The default value is 0x0a

Compress

Specifies whether dynamic data sent to the client is compressed. Allowable values are 0 or 1. Zero (0) disables compression and 1 enables compression.

The default value is 1.

Disabling compression will cause more data to be sent over the network.

Data compression is used only if the browser indicates it can accept compressed data via the Accept-Encoding HTTP header.

CompressTS

Specifies whether static data in the <prod-dir>/ts directory sent to the client is compressed. Static data is cached by the aXes Terminal Server during start-up and includes the Javascript files that comprise the aXes Terminal Server client.

Allowable values are:

0 (zero)	Disables compression and causes an uncompressed cache to be used. Using an uncompressed cache will cause more data to be sent over the network.
1	Enables compression and causes a compressed cache to be used. Cached data will be uncompressed dynamically if the browser client indicates it cannot accept compressed data. This setting may increase the CPU used by the aXes Terminal Server if many clients indicate compression is not supported.
2	Causes both compressed and uncompressed caches to be created. If the client indicates it can accept compressed data the compressed cache will be used otherwise the uncompressed cache will be used. This setting will increase the amount of storage used by the aXes Terminal Server by an amount equal to the uncompressed size of the <prod-dir>/ts directory.

The default value is 1.

Data compression is used only if the browser indicates it can accept compressed data via the Accept-Encoding HTTP header.

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DefaultWorkstationType

Specifies the type of workstation device created by aXes Terminal Server. The allowable values are:

auto — Specifies that aXes Terminal Server will automatically determine the device type to use based on the setting of the QIGC system value. If this system value is set to '1' then a dual-size (27*132) DBCS-capable device (5555-C01) will be created, otherwise a dual-size (27*132) SBCS device (3487-HC) is created.

IBM i VRM530 is inherently a DBCS capable system therefore aXes Terminal Server will create a DBCS-capable device.

CCSID — If the QIGC system value is set to '1' and the HostCSSID directive is set to Auto or to a DBCS CCSID number then a dual-size (27*132) DBCS-capable device (5555-C01) will be created, otherwise a dual-size (27*132) SBCS device (3487-HC) is created.

This value is the word CCSID rather than a CCSID number.

type — Specifies the device type aXes Terminal Server will use when creating a workstation device. The allowable type values are:

Type	Workstation	Description
3	5292-2	24*80 colour graphics display
6	3179-2	24*80 colour display
8	3477-FC	24*80 or 27*132 colour display
10	5555-C01	24*80 or 27*132 colour double-byte character set (DBCS) display
12	5555-G02	24*80 colour double-byte character set (DBCS) graphics display
15	3487-HC	24*80 or 27*132 colour display

You should not choose a DBCS device if your host system is SBCS.

DefaultKeyboardType

Specifies the type of keyboard for workstations device created by aXes Terminal Server. The allowable values are:

Sysval — Specifies that aXes Terminal Server will automatically determine the device type to use based on the setting of the QIGC system value. If this system value is set to '1' then a dual-size (27*132) DBCS-capable device (5555-C01) will be created, otherwise a dual-size (27*132) SBCS device (3487-HC) is created.

IBM i VRM530 is inherently a DBCS capable system therefore aXes Terminal Server will create a DBCS-capable device.

type — Specifies the keyboard type aXes Terminal Server will use when creating a workstation device. The Keyboard Types table shows allowable type values.

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The Keyboard Types table shows the keyboard type and the associated countries.

Keyboard Types	
Type	**Language or Country**
AGB	Austria/Germany
AGE	Austria/Germany (Euro)
AGI	Austria/Germany Multinational
ALI	Albania
BGB	Bulgaria
BLI	Belgium Multinational
BLM	Belgium Multinational (Euro)
BRB	Brazilian Portuguese
BRE	Brazilian Portuguese (Euro)
CAB	Canadian French
CAI	Canadian French Multinational
CAM	Canadian French Multinational (Euro)
CLB	Arabic
CSB	Czech Republic
CYB	Cyrillic
DMB	Denmark
DME	Denmark (Euro)
DMI	Denmark Multinational
ESB	Estonia
FNB	Finland/Sweden
FNE	Finland/Sweden (Euro)
FNI	Finland/Sweden Multinational
FAB	France (Azerty)
FAE	France (Euro)
FAI	France (Azerty) Multinational
FQB	France (Qwerty)
FQI	France (Qwerty) Multinational
GKB	Greece
GNB	Greece

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Keyboard Types	
Type	**Language or Country**
HNB	Hungary
ICB	Iceland
ICE	Iceland (Euro)
ICI	Iceland Multinational
INB	International
INI	International Multinational
IRB	Iran (Farsi)
ITB	Italy
ITE	Italy (Euro)
ITI	Italy Multinational
JEB	Japan (English)
JEI	Japan English Multinational
JKB	Japan (Kanji) and Katakana
JPB	Japan Latin Extended
JUB	Japan Kanji and United States English
KAB	Japan (Katakana)
KOB	Korea
LTB	Lithuania
LVB	Latvia
MKB	FYR (former Yugoslav Republic of Macedonia)
NCB	Hebrew
NEB	Netherlands
NEE	Netherlands (Euro)
NEI	Netherlands Multinational
NWB	Norway
NWE	Norway (Euro)
NWI	Norway Multinational
PKB	India (Urdu)
PLB	Polish
PRB	Portugal

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Keyboard Types	
Type	**Language or Country**
PRE	Portugal (Euro)
PRI	Portugal Multinational
RCB	Simplified Chinese
RMB	Romania
ROB	Latin 2
RUB	Russian
SFI	Switzerland/French Multinational
SFM	Switzerland/French Multinational (Euro)
SGI	Switzerland/German Multinational
SGM	Switzerland/German Multinational (Euro)
SKB	Slovakia
SPB	Spain
SPE	Spain (Euro)
SPI	Spain Multinational
SQB	Serbia (Cyrillic)
SSB	Spanish Speaking
SSE	Spanish Speaking (Euro)
SSI	Spanish Speaking Multinational
SWB	Sweden
SWE	Sweden (Euro)
SWI	Sweden Multinational
TAB	Traditional Chinese
THB	Thailand
TKB	Turkey
TRB	Turkey (F1)
UAB	Ukraine
UKB	United Kingdom
UKE	United Kingdom (Euro)
UKI	United Kingdom Multinational
USB	United States/Canada

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Keyboard Types	
Type	**Language or Country**
USE	United States/Canada Euro
USI	United States/Canada Multinational
VNB	Vietnam
YGI	Croatia, Serbia (Latin), and Slovenia

DefaultWorkstationCharset

Specifies the graphic character set used when creating a workstation device. The allowable values are:

Keyboard — Specifies that the character set associated with the device keyboard type will be used.

Sysval — Specifies that the character set defined in the QCHRID system value will be used.

Character set identifier — Specify the character set identifier to use. This value is a number between 1 and 32767 and must be a valid character set identifier. See the International Application Development book for information about valid graphic character sets.

If a character set identifier is specified then a value must also be specified for the DefaultWorkstationCodepage directive.

DefaultWorkstationCodepage

Specifies the code page used when creating a workstation device. If not specified the value used depends on the setting for DefaultWorkstationCharset.

When DefaultWorkstationCharset=Keyboard the code page associated with the device keyboard type is used.

When DefaultWorkstationCharset=Sysval the code page defined in the QCHRID system value is used. Otherwise a code page must be specified.

codepage identifier — Specify the codepage identifier to use. This value is a number between 1 and 32767 and must be a valid codepage identifier. See the International Application Development book for information about valid code pages.

HostCCSID

Specifies the CCSID used to convert host panel data into Unicode before sending the data to the client. This value has no effect on the interactive job - it is used only during data conversion. The allowable values are:

Auto — Specifies that aXes Terminal Server will automatically determine the CCSID to use by extracting the CCSID of the currently active display file. If the display file CCSID cannot be determined or is 65535 then aXes Terminal Server will use the CCSID of the interactive job. If this value is 65535 then the default CCSID of the interactive job will be used.

Job — Specifies that aXes Terminal Server will use the CCSID of the interactive job. If this value is 65535 then the default CCSID of the interactive job will be used.

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CCSID-number	Specifies the CCSID that aXes Terminal Server will use. This value must be a valid CCSID, the CCSID must be valid for interactive IBM i jobs, and the data sent to the display must be in the specified CCSID.

InterSession

Specifies whether interactive sessions started by the terminal server have access to the full batch CPW capacity of the host system. Allowable values are 0 or 1. Zero (0) disables aXes Intersession and 1 enables aXes Intersession.

The default value is 0.

If you are installing aXes on IBM i Version 6 then aXes Intersession cannot be used. If you enable this directive the job log will indicate aXes Intersession is active but it will have no effect. On Version 6 you should leave, or reset, the value to the default of 0.

If you are installing aXes on an iSeries server with zero interactive capacity running IBM i VRM530 or above, you must use named devices.

In addition, if you are running aXes on an i5 Standard Edition Server with zero or reduced interactive capacity running IBM i VRM530 or above, you must used named devices and all virtual display devices must begin with the letters QQF.

See the Users Section and Device Selection information in the Terminal Server Configuration chapter of the aXes Reference for detailed information on controlling device naming and the meaning of special substitution values.

For iSeries servers on IBM i VRM530 or above ensure that all virtual devices used by aXes will be named devices by adding one of the following entries as the last entry in the list of user entries:

=1,QPADEV$

-or-

=1,QPAU

For i5 servers running IBM i VRM530 or above ensure that all virtual display devices used by aXes will have the prefix QQF by adding one of the following entries as the last entry in the list of user entries:

=1,QQFDEV$

-or-

=1,QQFU

Named device values must go in either the Users section of the aXes Terminal Server configuration file or in the file referenced in that section (usually <prod-dir>/configs/aXesTSUsers.conf).

If you already have a 'catch-all' entry such as this then you must modify it to match the required device naming criteria.

If you already have device names for individual users, or plan to add them, then you must ensure that they also match the required device naming criteria.

If aXes Terminal Server client sessions receive "AXS8124 – Error occurred opening terminal" and the AXES5250 job log shows "CPF8902 – Virtual device not available" then multiple users are requesting the same virtual device. You can either ignore this error and sign-on again or choose a device naming convention that reduces the possibility of device name collision by including the user name in the device name. For example:

=1,QPAU

-or-

=1,QQFU

Be aware that if you change the device naming convention you must ensure the system value QAUTOVRT is set to a sufficiently hight value to allow the new devices to be created. You may delete existing devices that no longer satisfy the required naming convention.

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aXes Intersession is not supported on IBM i Version 6. Refer to the Considerations for IBM i Version 6 topic in the aXes Quick Start for more information.

aXes Intersession has no effect on systems without separate batch and interactive capacity. The following system models will not benefit from Intersession because they have a single CPW rating for the entire system workload.

Model	CPW	Model	CPW	Model	CPW
200	7.3—16.8	400	13.8—35.0	600	22.7—73.1
300	11.6—21.1	500	21.4—43.9	620	50.0—464.3
310	33.8—56.5	510	81.6—11.5	640	319.0—998.6
320	67.5—177.4	530	148.0—650.0	650	1794.0—4550.0
515	3800—7100	525	3800—7100		

IPMask

Specifies the mask for an IP address that the connecting client must match. If the client does not match this address then the logon attempt will be rejected. The mask is of the form 'nnn.nnn.nnn.nnn' and wildcards (?,*,**) are permitted. The wildcards have the following meanings:

?	Matches any single character
*	Matches any characters except the dot (.) separator
**	Matches any single character

For example, '192.10.1.1??' means any IP address in the range 192.10.1.100 to 192.10.1.199 would be allowed. '192.10.1.*' means addresses that start with 192.10.1 would be allowed. '192.**' would allow any address that starts with 192. The default is to allow connections from any IP address.

JobName5250

Specifies the name of the child job created by aXes Terminal Server.

The default is to use the same name as the aXes Terminal Server job.

Library

Specifies the IBM i library name for aXes objects such as data queues.

The default value is the product installation library, if this is not found it then defaults to 'AXES'.

Logpath

Specifies the name of the directory used for server trace files.

There is no default value.

MaxUsers

Specifies the maximum number of users allowed to sign on simultaneously the terminal server instance. The minimum allowable value is 1 and the maximum value is 32,767.

The default value is 32767.

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Monocase

Controls which characters are converted to upper-case when the field indicates upper-case input is required. The allowable values are:

5494-subset	Specifies that only those characters specifically listed in the 5494 Functions Reference as being affected by the monocase bit are converted to upper-case.
Extended	Includes additional diacritic characters.
DBCS	Indicates that full-width lower-case characters are converted to their upper-case equivalent if the field has the monocase bit set.
All	All lower-case characters typed (diacritic, non-diacritic, and full-width) are converted to their upper-case equivalent if the field has the monocase bit set.

The options for the Monocase directive are additive and can be combined to achieve the preferred behaviour. For example:

Monocase=5494-subset, extended

Path

Specifies the PATH used for invocation of the aXes Terminal Server (aXes-TS) and CGI programs. The default path is /usr/bin:%LIBL%

ReplaceShiftWithSpace

Specifies whether to replace Shift-Out and Shift-In characters with a space. The space character used is x'0a' which is the non-breaking space character. This is the same character as that represented by the HTML   entity. Allowable values are 0 or 1. Zero (0) disables shift character replacement and 1 enables shift character replacement.

The default value is 0.

RequestThreadCount

Specifies the number of request threads that the terminal server supports. Request threads accept connections from an application server. This process is normally very fast and therefore the default is usually sufficient. The value can be increased if you have an exceptionally large number of connection requests.

The default value is 3.

ResponseThreadCount

Specifies the number of response threads that the terminal server supports. Response threads deliver the terminal XML to the application server. When the connection to the application server is across a slow network this number may need to be increased. The default value should be adequate when aXes Terminal Server is running as an internal FastCGI server using UNIX domain socket connections or when using local IP socket connections.

The default value is 3.

SignatureModel

Specifies the signature model that should be used for 5250 screen identification by the client system. The allowable values are 1 or 2 only. The default value is 2. Value 1 indicates that the original signature model should be used. Value 2 indicates that the enhanced signature model should be used. It is recommended that you only change this setting when advised to by your product vendor.

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AllowLayoutGrids

Indicates whether CSS layout-grid options are allowed in client browser sessions. The default value is 1 (on) but you should always set this option to 0 (off) unless you are using Japanese or Chinese 5250 applications. The use of CSS layout-grid options are IE (Internet Explorer) specific at this time. HTML knowledge is required to understand how using them they may impact non-DBCS and mixed mode DBCS data. For this option to be effective your IBM i server must also have system value QIGC set to true.

TS2DefaultTheme

The default theme to be used for aXes-TS2 sessions. This value must specify the name of a validly formatted CSS style sheet document that exists in the <axes root>/ts/ts2/css folder. This theme will be used when useJQueryExtensions is unchecked in Application setting.

TS2DefaultJQTheme

The default theme to be used for aXes-TS2 sessions. This value must specify the name of a validly formatted CSS style sheet document that exists in the <axes root>/ts/ts2/css or the project folder. This theme will be used when useJQueryExtensions is checked in Application setting.

TS2ChangeTheme

Indicates whether users of aXes-TS2 sessions are allowed to change their theme. Allowable values are 1 (users can change themes) or 0 (users cannot change themes).

ccsidoverride

Allows the overriding of the CCSID conversion rules for 5250 screen content only.

Use this option with extreme caution. Do not use it unless you exactly understand what it does and why you need to use it. Carefully test all results before any production implementation is made. The customer is solely and completely responsible for any impact (in any context) that the use of ccsidoverride may have.

The configuration format must be ccsidoverride=CCCCC-EEEE-UUUU-OO-A. The override format must always be exactly as specified.

Always check the aXes AXES5250 job log after any ccsidoverride = changes for messages and warnings.

The ccsidoverride=CCCCC-EEEE-UUUU-OO-A format content is:

CCCCC	A valid 5 digit CCSID (eg: 05035 or 00037) that specifies the CCSID to be overridden. The value must be 5 characters long.
EEEE	An EBCDIC character value in hexadecimal format – the value must be 4 characters long and a valid hexadecimal value.
UUUU	A UNICODE character value in hexadecimal format – the value must be 4 characters long and a valid hexadecimal value.
OO	An option specified as BD (both directions), EU (EBCDIC->UNICODE) or UE (UNICODE->EBCDIC).
A	The application. It must be one of D (DBCS), S (SBCS) or B (Both).

SignonMsgCCSID

Specifies the CCSID used to convert message text retrieved from the IBM i sign-on display panel into Unicode before sending the data to the client. The allowable values are:

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Auto	Specifies that aXes Terminal Server will automatically determine the CCSID to use by extracting the CCSID of the sign-on display file associated with the subsystem that has allocated the display device. If the display file CCSID cannot be determined or is 65535 then aXes Terminal Server will use the QCCSID system value. If QCCSID is 65535 then Axes Terminal Server will use the CCSID of its own job. If this value is 65535 then the default CCSID of the aXes Terminal Server job will be used.
Job	Specifies that aXes Terminal Server will use the CCSID of its own job. If this value is 65535 then the default CCSID of its own job will be used.
CCSID-number	Specifies the CCSID that aXes Terminal Server will use. This value must be a valid CCSID, the CCSID must be valid for interactive IBM i jobs, and the sign-on messages must be in the specified CCSID.

TSExpiryTime

Specifies the timeout period, in seconds, for idle terminals. The host virtual terminal associated with a client will be closed if it does not perform a transaction within this period. After this idle period the session cannot be re-established via the 'Resume' or 'Refresh' options.

The default value is 3600 (1 hour).

TSInactiveLimit

Specifies the wait time, in seconds, between the aXes Terminal Server and the client application.

The default value is 30.

The wait time is a conditional transaction timeout period. For example, when a terminal transaction exceeds this time, the aXes Terminal Server client (browser) will prompt the user if they wish to wait for the transaction to complete. The user may answer 'yes' in which case the client will continue to wait for the transaction to complete or they answer 'no' in which case the terminal can perform another HTTP transaction and may re-establish or refresh the terminal display by issuing the 'Refresh' transaction.The value specified for this directive must be less than the value specified for –idle-timeout specified on the FastCgiServer or FastCgiExternalServer directives in the aXes-W3 configuration file.

TSPath

Specifies the directory where the aXes Terminal Server files reside. There are no constraints on the name of this directory.

The default is a directory named <prod-dir>/ts where <prod-dir> is the product installation library

Trace

Specifies whether server tracing is active. Allowable values are 0 or 1. Zero (0) disables server tracing and 1 enables server tracing.

The default value is 0.

When set to 1 the LogPath directive must also be specified. A diagnostic trace is written to the <log-path>/.aXesTStrc.txt file.

TraceLevel=option-list

Specifies the level of trace information written to the trace log. The option-list is a space-separated list containing at least one of the following keywords:

Info	When specified Informational messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.

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Error — When specified Error messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.

Warn — When specified Warning messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.

Debug — When specified Debugging messages will be logged to the trace file (if enabled). The default is that these messages are not logged.

Typeahead

Specifies whether keyboard type-ahead is active in the client. Allowable values are 0 or 1. Zero (0) disables keyboard type-ahead and 1 enables keyboard type-ahead.

The default value is 1.

Users Section

This optional section is used to specify User options for the aXes Terminal Server (aXes-TS) and is prefaced by a User tag. Each entry in the section is a comma-separated list of values. Each entry specifies a set of overrides for a specific user. This section must be at the end of the configuration file.

The Users section can be replaced by a separate file if you specify Users=path. For example:

Users=/axes/configs/users.conf

Each entry in the Users section or the Users file is formatted as follows:

username=enable,device,inlpgm,inlmnu,curlib,ipmask,view,sessions,devtype, kbdtype,charset,codepagewhere username is an IBM i user profile name. Generic names may be specified by using wildcard characters. The question mark (?) represents any single character and the asterisk (*) represents any number of characters. The order of generic entires is important because the first match found is used. Generic names should be listed in order of most specific to least specific.

You can omit option values by specifying commas as placeholders, for example, **JOE=1,,,,JOELIB** but count the commas carefully. A user can be disabled from aXes Terminal Server by specifying a zero, for example, **JOE=0**.

The allowable option values are:

enable — Enables or disables terminal access for a specific user. The default is to allow terminal access for anyone who has a valid IBM i user profile and password. Allowable values are 0 or 1. Zero (0) disables terminal access for the user. If the value is 0 the remaining parameters can be omitted.

Device
- The name of the device associated with this user. There is no default value. Specifying a device name without substitution values effectively limits the user to one terminal session. This value must be unique. The following substitution values are supported: **$U** is replaced by the user's profile
- **$*** is replaced by a number padded with zeroes

Inlpgm — The initial IBM i program to be run after a successful sign on. This value overrides any value defined on the user profile. There is no default value.

See Note 1 below.

Inlmnu — The initial IBM i menu displayed after a successful sign on. This value overrides any value defined on the user profile. There is no default value.

See Note 1 below.

Curlib — The initial current library for the user. This value overrides any value specified on the user profile. There is no default value.

See Note 1 below.

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Ipmask	An IP address mask that must match the client IP address. This can be used to constrain user access from a range of IP addresses or a specific IP addresses. The default is to allow connection from any IP address. Address ranges may be specified by using wildcard characters. The wildcards have the following meanings: **?** matches any single character. ***** matches any characters except the dot (.) separator. ****** matches any characters.
view or noview or default	Specify **view** to indicate that this user's sessions can be viewed by an authorised administrator. Specify **noview** to indicate this user's sessions cannot be viewed. The default is to not allow viewing of sessions. Specify **default** to use the value specified on the AdminView directive.
sessions	Specify the maximum number of aXes Terminal Server sessions this user is allowed to start at one time. The default is no maximum.
Devtype	Specify the type of workstation device created for this user. The default is to use the value specified in DefaultWorkstationType.
kbdtype	Specify the type of keyboard for the workstation device created for this user. The default is to use the value specified in DefaultKeyboardType.
Charset	Specify the character set for the workstation device created for this user. The default is to use the value specified in DefaultWorkstationCharset. If charset is specified then codepage must also be specified.
codepage	Specify the character set for the workstation device created for this user. The default is to use the value specified in DefaultWorkstationCodepage. If codepage is specified then charset must also be specified.

Note 1: specifying the initial program, initial menu, and current library is an arcane 5250 method and should not be used in a modernized application. Instead you should use the INLPGM associated with the user profile to call the required program.

User options example 1

User option:	JOE=1,JOEDSP0001,QCMD,MAIN,JOELIB,192.10.1.*,view,1
Means:	User JOE is allowed to start an aXes Terminal Server session.
	JOE sessions will acquire the display device JOEDSP0001.
	The initial program will be QCMD.
	The initial menu will be MAIN. Note: This is ignored by IBM i because an initial program is specified which takes precedence over an initial menu.
	The current library will be set to JOELIB.
	JOE must sign-on from a client within the 192.10.1 network.
	Administrators can view JOE sessions.
	And JOE is restricted to a single session. Note: This is also a side effect of specifying a named device with no substitution values.

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User options example 2

User option:	QSECOFR=0
Means:	QSECOFR cannot use any aXes Terminal Server sessions.

User options example 3

User option:	SHC=1,AXESTS2$*
Means:	User SHC is allowed to start an aXes Terminal Server session
	SHC sessions will acquire display devices using the name AXESTS2nn where nn is a sequence number.
	SHC can sign-on from any client
	SHC sessions cannot be viewed
	SHC can start any number of sessions

User options example 4

User option:	TP*=1,AXES$U,,,,,,1
Means:	Any user starting with TP is allowed to start aXes Terminal Server sessions
	TP users will acquire display devices using the name AXESxxxxxx where xxxxxx will be the first six characters of the user name.
	TP users can sign-on from any client
	TP sessions cannot be viewed
	TP users are restricted to one session each

User options example 5

User option:	*=1,AXU*
Means:	All users are allowed to start aXes Terminal Server sessions
	Users will acquire display devices using the name AXxxxxxxnn where xxxxxx will be the first 6 characters of the user name and nn will be a sequential number.
	A catch-all entry such as this example must be the last entry in a list of user entries.

Device Selection

Device selection is controlled by the <prod-dir>/ts/admin/tslogonexit.lua script. The script processes any substitution values specified in the device name component of the user definition.

The tslogonexit.lua script may be modified by customers to satisfy unique device naming requirements. Be aware that an exception in the script is likely to cause the server to fail so test any script changes thoroughly in a development server before making them available in a production server. The Lua Virtual Machine in aXes Terminal Server is Lua 5 so you must use Lua 5 functions and syntax if you modify this script.

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The script is read into storage when the server is started so you must end and restart the server before any changes take effect.

If the tslogonexit.lua script is not found during server start up then a message is sent to the job log of the server job and default behaviour is used. The default behaviour respects the enable/disable flag and the IP mask setting.

Automatic GUI Recognition

Rules for Automatic GUI

The rules associated with aXes Terminal Server support for automatic GUI recognition can be controlled using the URL:

http://system:port/ts/dev/ts.html

This URL is protected by an Access Control List so you will be prompted for authentication before the URL will load successfully. The default user ID and password is 'dev'. This may have been changed after installing the product in which case you should ask your system administrator for the user ID and password.

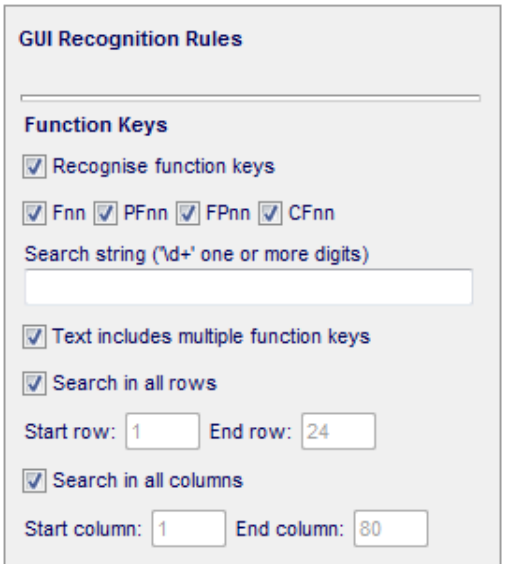
After successfully authenticating the browser loads a development skin that contains an additional tab in the Action Tabs panel. Click the icon in the top-left corner to make the Action Tabs panel appear.

You can use the AutoGUI tab to control the recognition algorithms used to convert text to GUI components.

Each type of control is split into sections as follows.

Function Keys

The Function Keys section indicates aXes Terminal Server should search for text that represents function key definitions and convert that text into push buttons. You can control the style of text and the area on the screen that is searched.



This feature is used only for recognising function keys. It does not handle other engraved keys such as Help, Print, RollUp, or RollDown. By default aXes Terminal Server recognises standard function key patterns such as F3=Exit. You can use the check boxes to modify the

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recognised prefix values. The key text must include a number to be recognised as a valid function key. If your application uses non-standard function key patterns you may be able to get aXes Terminal Server to recognise them by specifying a suitable search string.

The value for search string is a regular expression. The default value is \d+ which means one or more digits. See a Javascript Reference for information about the syntax for regular expressions. For example, the regular expression:

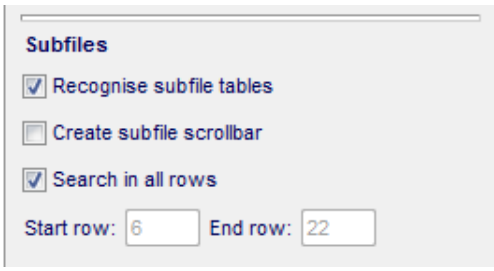
```
(F|CF|PF|cmd)( *|-)\d+ *(=|-| )
```

will catch many strange function key formats and turn them into buttons. However, some function key formats may never be recognised by aXes Terminal Server. In these cases you must change the DDS and either use a recognisable function key text pattern or use DDS pushbutton fields to replace the function key text.

You should tick the 'Text includes multiple function keys' box if you put all the function keys in a single field. If you use separate fields for each function key text then you should uncheck this box.

Subfiles

The Subfiles section indicates aXes Terminal Server should convert subfiles into HTML tables.



Subfile recognition will only occur for proper subfile record formats and UIM list areas.

> aXes Terminal Server uses a heuristic algorithm to locate column headings for the subfile. Because of this it may not always correctly find column headings or may misinterpret other fields as column headings. Although a best effort will be applied to make the algorithm as robust as possible sometimes the only solution will be to change the DDS to make the column headings less ambiguous.

You can improve the chances of correct interpretation by restricting the subfile control record to contain only column headings. Other display fields should be on separate record formats. For example:

```
WRITE   HEADER
WRITE   FOOTER
EXFMT   SFLCTL
```

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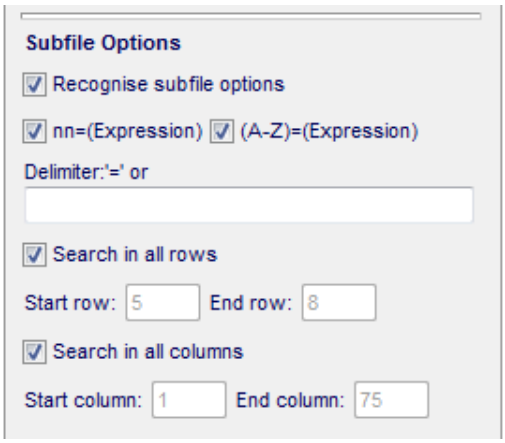
Subfile Options

The Subfile Options section indicates aXes Terminal Server should convert subfile options into clickable links. A clicked option will be applied to the subfile entry that currently contains the cursor.

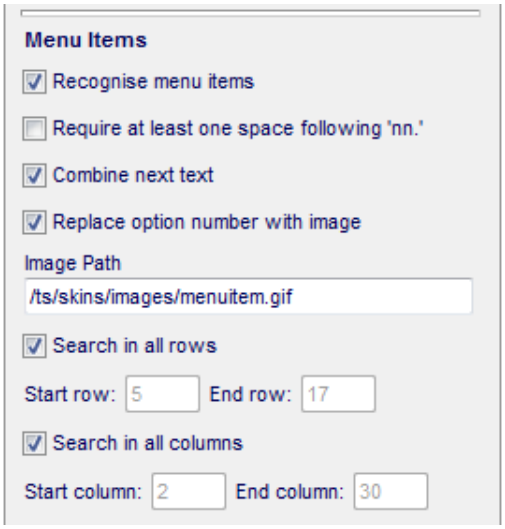


You can select numeric options, alphabetic options, or both.

The value for the delimiter is an equal sign plus any other character you specify.

Menu Items

The Menu Items section indicates aXes Terminal Server should convert menu options into clickable links. The menu number associated with the option is entered into the first input-capable field.



The value for the image path should be a URL that references an appropriate image which will be used to replace the menu option number.

Note that menu item recognition will only occur for proper UIM menu objects and normal record formats that satisfy the following criteria:

- Digits are the first characters of the text object
- Digits are followed by "."
- Spaces must follow the "." if you tick the "Require at least one space following 'nn'" box.

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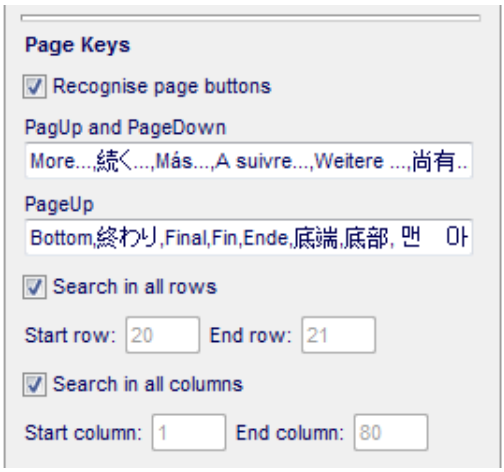
Page Keys

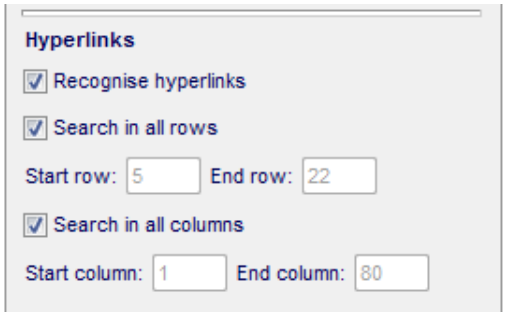
The Page Keys section indicates aXes Terminal Server should convert More… and Bottom text into push buttons.



The values for the text can be a comma-separated list which allows you to specify multiple languages.

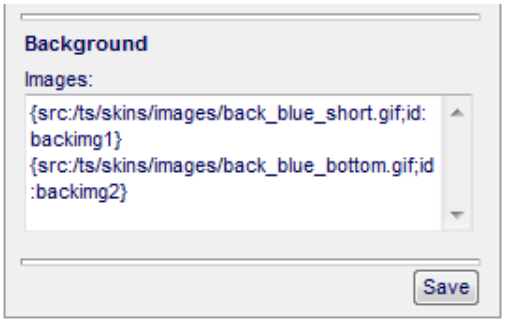
Hyperlinks

The Hyperlinks section indicates aXes Terminal Server should convert text that looks like a URL into a clickable link.



Background

The Background section allows you to specify the images displayed in the background of the terminal session. You can use this to display a corporate logotype for example.



Save your changes by clicking the Save button.

The ts/dev/ts.html skin automatically reloads the GUI rules definitions and applies them to the current session so you can see the effect of your changes immediately. However only new sessions will use the changes. They will not affect currently active sessions—even if those sessions sign off and back on. The session must be reloaded before the new rules will be used.

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DDS Keywords

aXes Terminal Server supports almost all of the available DDS keywords and further aspects of the 5250 data stream that are not exposed via DDS keywords. However, due to various differences in behaviour between a browser-based environment and host emulators some keywords are either not supported or are partially supported.

Unsupported

The following DDS keywords are not supported by aXes Terminal Server. If present in the 5250 data stream they are ignored.

Keyword	Notes
ALARM	Ignored
ALWGPH	Unknown. Should be handled by host
CNTFLD	Fully supported for SBCS fields. Not supported for DBCS fields.
CSRINPONLY	Ignored
CHCACCEL	Ignored
DSPRL	Ignored
GRDATR	Ignored
GRDBOX	Ignored
GRDCLR	Ignored
GRDLIN	Ignored
GRDRCD	Ignored
MSGALARM	Ignored

Partially Supported

The following DDS keywords have partial support:

Keyword	Notes
FRCDTA	Accepted but has no effect
INVITE	Read from invited devices is supported but cancel invite is not supported
MOUBTN	Supported however there are some restrictions depending on the pointer device being used. Middle button events will be ignored unless you are using a 3-button pointer device. Double-click events are only available for one button being the normal double-click button for the current pointer device. This is normally the left button unless the pointer device has been configured for left-handed use in which case it will be the right button.
WDWBORDER	Border attributes and characters ignored because no counterpart exists in HTML windows.

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Limitations

Break messages

Break messages via the Send Break Message (SNDBRKMSG) command or via setting a message queue in break mode (CHGMSGQ DLVRY(*BREAK)) will not immediately interrupt the client session because the browser does not maintain a permanent connection with the host. Because it is not connected there is no way to inform the browser that a message has broken onto the display screen. The client session will receive the break message on the next interaction with the host.

It is strongly recommended that you don't use break message in aXes 5250 sessions - especially in RAMP-TS and aXes-Mobile applications.

Using these IBM i CL commands in a user's IBM i logon program will generally stop all break messages:

```
CHGJOB BRKMSG(*HOLD) STSMSG(*NONE)
MONMSG MSGID(CPF0000 MCH0000)
```

```
CHGMSGQ MSGQ(*WRKSTN) DLVRY(*HOLD)
MONMSG MSGID(CPF0000 MCH0000)
```

```
CHGMSGQ MSGQ(*USRPRF) DLVRY(*HOLD)
MONMSG MSGID(CPF0000 MCH0000)
```

Unsolicited data

Unsolicited data is data sent from the host without a prior client request. This includes, but is not limited to, break messages (described above), F19 from Work with Active Jobs (WRKACTJOB) or Work with System Activity (WRKSYSACT), or applications that issue Cancel Invite then refresh the display.

See Browser Limitations in aXes User Guide for additional information.

SDA

Screen Design Aid is not supported under aXes Terminal Server because it embeds attribute bytes in a single full-screen input-capable field. The browser does not allow attribute bytes to be embedded in input fields so aXes Terminal Server cannot support SDA. LANSA recommends that source code editing be performed using client development tools such as WebSphere Development Studio Client.

Note that SEU, RLU, and DFU are supported by aXes Terminal Server.

QSHELL

QSHELL is the Unix interface for IBM i. It is not supported by aXes Terminal Server because it uses Cancel Invite.

QP2TERM

QP2TERM is the PASE shell interface for IBM i. It is not supported by aXes Terminal Server because it uses Cancel Invite.

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Section 2 - Keyboard Mapping

Keyboard map files can be created by defining an XML file that maps the relationship between a key and a function. Any key may be mapped to any of the supported functions. If a key is not mapped then the key event is passed to the browser. Keyboard map files must be created in the <prod-dir>/ts directory.

Mappable Keys

Shift, Ctrl, and Alt key combinations can be mapped by prefixing the base key name with the combination key using a plus (+) sign to separate them. For example, to map the Shift-Tab key combination, use the “Shift+Tab” definition.

If more than one shift modifier key is used you must ensure they are specified in the correct order; Shift, followed by Ctrl, followed by Alt. The key names are also case sensitive.

> The shift modifier keys may be mapped individually, so the Ctrl key could be mapped to the PostData function. This sort of mapping applies to the individual key only so Ctrl+C would still copy data to the clipboard.

Any printable character can be mapped to a supported function but alphabetic keys must be entered in uppercase. Thus, to map ‘r’ use “R”; to map ‘R’ use “Shift+R”.

You can also specify the hexadecimal code of the virtual key. Thus, 0xBF maps to the ‘/’ forward-slash key.

Base Key Name	Key Description
LeftMouseButton	Left mouse button
RightMouseButton	Right mouse button
MiddleMouseButton	Middle mouse button (on a 3-button mouse)
DownArrow	Down arrow key
LeftArrow	Left arrow key
RightArrow	Right arrow key
UpArrow	Up arrow key
Alt	Alt key Note: It is not possible to distinguish between the left and right Alt keys
Backspace	Backspace key
Cancel	Cancel key
Clear	Clear key
Ctrl	Control state key Note: It is not possible to distinguish between the left and right Ctrl keys
Del	Delete key
End	End key

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Base Key Name	Key Description
Enter	Enter key Note: It is not possible to distinguish between Enter and the numeric keypad Enter
Esc	Escape key
F1	Function key 1
F2	Function key 2
F3	Function key 3
F4	Function key 4
F5	Function key 5
F6	Function key 6
F7	Function key 7
F8	Function key 8
F9	Function key 9
F10	Function key 10
F11	Function key 11
F12	Function key 12
Home	Home key
Ins	Insert key
PageDown	Page down key
PageUp	Page up key
Pause	Pause key
Shift	Shift state key Note: It is not possible to distinguish between the left and right shift keys
Space	Spacebar
Tab	Tab key
LeftWindows	Left “Windows” key
RightWindows	Right “Windows” key
Apps	Applications key (next to the right “Windows” key)
ScrollLock	Scroll lock key
NumLock	Numeric lock key
NumPlus	Numeric keypad plus key
NumMinus	Numeric keypad minus key

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Base Key Name	Key Description
Decimal	Numeric keypad decimal point key
Add	Numeric keypad addition key (synonym for NumPlus)
Divide	Numeric keypad division key (synonym for NumMinus)
Multiply	Numeric keypad multiplication key
Subtract	Numeric keypad subtraction key
All printable characters	A-Z, 0-9, etc.

There is no difference between the left and right Cntrl, Alt, or Shift keys, nor between the Enter key and numeric keypad Enter. aXes Terminal Server relies upon the virtual key codes sent by the browser. The Microsoft MSDN website includes the list of virtual key codes.

Key Functions

Key functions are case sensitive.

Key Function	Function Description
Attention	Run the Attention key operation.
BackSpace	Runs the backspace operation but ignores it if the cursor is not in an input-capable field.
ClearField	Clear the contents of the current field.
ClearScreen	Clear the contents of the screen.
Duplicate	Run the Duplicate operation.
Enter	Run the Enter operation.
EraseEOF	Clears the field from the current cursor position to the end.
EraseInput	Clears all modified fields and moves the cursor to the first input-capable field.
FieldExit	Run Field Exit operation.
FieldMinus	Run Field- operation.
FieldPlus	Run Field+ operation.
ForwardEdgeTriggerAutoEnter	Run the Forward Edge Trigger Auto Enter operation.
Function	Run a function key (F1 to F12).
Help	Run the Help operation.
Home	Move to the home position.
InsertDecimal	Insert the decimal separator when pressing the decimal point in the numeric pad keyboard, regardless of whether aXes is currently in OVERWRITE or INSERT mode. To overwrite a character, use the PutDecimal command. Applies to aXes-TS and aXes-TS2 except OVERWRITE or INSERT mode

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Key Function	Function Description
InsertUnicodeChar	Insert a Unicode character, regardless of whether aXes is currently in OVERWRITE or INSERT mode.To overwrite a character, use the PutUnicodeChar command. Applies to aXes-TS and aXes-TS2 except OVERWRITE or INSERT mode.
InsertYen	Insert a Yen symbol, regardless of whether aXes is currently in OVERWRITE or INSERT mode. To overwrite a character, use the PutYen command. Applies only to aXes-TS.
MoveDown	Move the cursor. Applies only to aXes-TS.
MoveLeft	Move the cursor. Applies only to aXes-TS.
MoveRight	Move the cursor. Applies only to aXes-TS.
MoveUp	Move the cursor. Applies only to aXes-TS.
NewLine	Run the New Line operation.
NextField	Move to the next field.
Noop	No operation. Trap and ignore unwanted key press events.
PutDecimal	Insert the decimal separator when pressing the decimal point in the numeric pad keyboard, overwriting existing one if in OVERWRITE mode. Applies only to aXes-TS.
PutUnicodeChar	Insert a Unicode character, overwriting existing one if in OVERWRITE mode. Applies only to aXes-TS.
PutYen	Insert a Yen symbol, overwriting existing one if in OVERWRITE mode. Applies only to aXes-TS.
PA1	Program Attention key 1.
PA2	Program Attention key 2.
PA3	Program Attention key 3.
PostData	Send the current form (screen) to the server.
PrevField	Move to the previous field.
Print	Run the Host Print operation.
RecordBackspace	Run the Record Backspace operation.
Refresh	Redraw the current panel.

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Key Function	Function Description
RollDown	Run the RollDown operation
RollLeft	Run the RollLeft operation
RollRight	Run the RollRight operation
RollUp	Run the RollUp operation
ShiftFunction	Run a function key (F13 to F24).
SLPAutoEnter	Run the Select Light Pen Auto Enter operation.
SystemRequest	Run System Request operation.
ToggleSelect	Toggle a selection item (such as a radio button or check box) on or off.

XML File Format

The XML keyboard mapping file must have one <KEYMAP></KEYMAP> block that contains all the key maps. Each key map must be enclosed in a <MAP></MAP> block.

The syntax of the XML file is:

```
<?xml version="1.0" encoding="utf-8" ?>
<KEYMAP>
  <TITLE>Textual title</TITLE>
  <DESCRIPTION>Text description</DESCRIPTION>
  <MAP>
          <KEY>Key name</KEY>
          <COMMAND>Key function</COMMAND>
          <PARAMETER name="charCode">Unicode character</PARAMETER>
          <DESC>Text description</DESC>
  </MAP>
  <MAP type="Range">
          <START_KEY>First key in range</START_KEY>
          <END_KEY>Last key in range</END_KEY>
          <COMMAND>Key function</COMMAND>
          <DESC>Text description</DESC>
  </MAP>
</KEYMAP>
```

Each <KEY></KEY> block must contain a key name from the Mappable Keys table listed above or a virtual key code. Virtual key codes can be found in the MSDN library.

The value in each <COMMAND></COMMAND> pair must be one of the values found in the Key Functions table listed above.

The only type of parameter supported on the <PARAMETER></PAREMETER> pair is "charCode". The value must be a valid Unicode character. The value may be specified in decimal, octal (0nn), or hexadecimal (0xnn) notation).

Two types of key mapping are supported:

- Single key mapping
- Key range mapping

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Single Key Maps

A single map simply maps one specific key, or key combination, to one function. For example, the following definition maps the “Enter” key to the “PostData” function.

```
<MAP>
  <KEY>Enter</KEY>
  <COMMAND>PostData</COMMAND>
  <DESC>Send the form to the server</DESC>
</MAP>
```

Key Range Maps

Range maps allow a range of keys to be mapped. The range is determined by the virtual key code of the key pressed.

You must provide a start and end key. The range includes the start and end key.

```
<MAP type=”Range”>
  <KEY_START>LeftArrow</KEY_START>
  <KEY_END>DownArrow</KEY_END>
  <COMMAND>Move</COMMAND>
</MAP>
```

The following example maps the arrow key range to the “Move” function. The arrow keys have the virtual key codes:

LeftArrow	X’25’	RightArrow	X’27’
UpArrow	X’26’	DownArrow	X’28’

So to include all arrow keys in the range the left and down arrows define the range bounds.

> Single key maps take precedence over range maps so it is possible to map a range and then override a single key within the range. For example, the F1 to F12 keys could be mapped as a range and the F3 key could be mapped to something else.

Making a New Keyboard Map Available

In aXes-TS, once you have defined a keyboard map file you can make it available by editing the ts_keymaps.html file (found in the <prod-dir>/ts/skins directory) and add the name of the new keyboard map file to the list of available keyboard maps. You can also change the keyboard map that is selected by default.

In aXes-TS2 you simply make sure the file name conforms to the format xxxxkeymap.xml and place it in your /ts/ directory. TS2 will find it and add it to the keymaps menu. If you want the menu to show text other than the file name, create a translation for it in Texts_Cust_xx.txt, for example: **"mycustomkeymap.xml": "Custom Keymap",**

Changing the Default Keyboard Map

The default keyboard map is windowskeymap.xml. In aXes-TS you can change this to any defined keyboard map by editing the ts_frame.html file (found in the <prod-dir>/ts/skins directory) and replace the line:

```
var key_map = “windowskeymap.xml”
```

with the name of the preferred keyboard map file. For example:

```
var key_map = “as400keymap.xml”
```

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You should also copy the new default keyboard map and replace the DefaultKeyMap.xml file. This file is used when no keyboard map files can be found.

In TS2 you cannot set the default (except by replacing the defaultkeymap.xml file). However, end-users can change the default themselves because TS2 remembers the last used keymap.

Mapping the Decimal Point Numeric Pad Key

If you are in a country where the decimal separator is not the decimal point and you want the decimal point in the numeric key pad to reflect this, add the following block to the keyboard map file:

```
<MAP>
  <KEY>0x6E</KEY>
  <DESC >Num Pad decimal point</DESC>
  <COMMAND>InsertDecimal</COMMAND>
</MAP>
```

Mapping the Yen Symbol

The Yen symbol is mapped to x'5c' in Shift-JIS code page, which is also the code point used for the backslash in other code pages. This makes it difficult to correctly determine whether the user wanted a Yen or a backslash. Keyboard mapping can be used to correct this difficulty.

Depending on the type of keyboard in use the keyboard mapping may need to be different. The following examples use a standard US keyboard and physical location of keys will be different in various geographies and will vary even in Japan depending on keyboard type and physical layout of engraved keys, but the codes issued to the operating system do not change.

To map the InsertYen function to "/" (Forward slash), add the following block to the keyboard map file:

```
<MAP>
  <KEY>0xBF</KEY>
  <DESC >Insert Yen </DESC>
  <COMMAND>InsertYen</COMMAND>
</MAP>
```

To map the InsertYen function to "\" (Backslash), add the following block to the keyboard map file:

```
<MAP>
  <KEY>0xDC</KEY>
  <DESC >Insert Yen</DESC>
  <COMMAND>InsertYen</COMMAND>
</MAP>
```

Only insert one of the above at a time in the keyboard map XML definitions.

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Section 3 - Terminal Server Tuning

The aXes Terminal Server is just a job like any other IBM i job therefore the normal rules of work management and performance tuning apply. However, because aXes Terminal Server is a transaction server there are some additional considerations.

Tuning Guidelines

An iterative process to tuning is required but the following table may be used as a guideline for tuning the aXes Terminal Server.

In this section "transaction" is used to mean the round-trip from a user pressing Enter in an application panel until the screen is available for use again.

Problem	Possible Solutions
Users experience frequent 'Application Busy' messages	Determine the average length, in seconds, of a transaction for your application and set the TSInactiveLimit= directive in the aXes-TS configuration file to that value plus a few seconds. If you change the TSInactiveLimit= directive then you must also set the –idle-timeout switch on the FastCGIServer directive in the configuration file for the associated application server to value slightly greater than TSInactiveLimit. For example, if it generally takes 2 minutes to process a transaction then you should set TSInactiveLimit=125 and –idle-timeout 140. aXesTS.conf TSInactiveLimit=125 aXesW3.conf FastCGIServer "/axests" –program "AXESTS.PGM '/axes123/configs/aXesTS.conf'" –mt –idle-timeout 140 –authpath 'admin=/axests/admin/**' If you need to set the TSInactiveLimit= directive to a value in excess of 300 seconds then you should seriously consider changing the way your application works. Long running tasks (anything that takes more than 5 minutes to complete) are better handled as batch jobs and should be submitted to batch or sent to a data queue for asynchronous processing.
Response seems erratic when many users have active sessions	If the number of sessions exceeds 80 to 100 you may need to increase the number of threads in the Terminal Server job. Increase the RequestThreadCount= and ResponseThreadCount= directives by 1 for each group of 80 to 100 sessions.

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Section 4 - Application Server Configuration

> The FastCGI External Server appendix is essential reading before configuring a FastCGI External Server.

Configuration File

All options, except for the configuration file name, can be set in a configuration file. One advantage of using a configuration file is that the file can be changed, and the changes will apply when the server is restarted.

The default location for the configuration file is the /axes/configs directory. You can edit the default W3 configuration file using the command:

EDTF STMF('/axes/configs/aXesW3.conf')

The configuration file is a simple text file containing a series of 'option' or 'option=value' directives separated by white space. Valid directives are described below.

Comments may be placed anywhere within the configuration file. Comments begin with the hash ('#') character; all characters after the # are ignored.

Long lines can be continued by breaking them with a trailing backslash ('\').

Most aXes-W3 configuration directives have reasonable defaults and need not be specified.

> When specifying numeric values do not include leading zeroes because these will cause the value to be interpreted as an Octal number (i.e., 037 will be interpreted as decimal 31).

Configuration Directives

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

AdminPath

Specifies the directory where the aXes Application Server Administration JavaScript and XSL files reside. There are no constraints on the name of this directory.

The default is a directory named <server-root>/Admin
where <server-root> is the root directory of the aXes Application server.

AGILimit

Specifies the time limit, in seconds, for AGI processes to return a response.

The default value is 30.

AGIPattern

Specifies the legal set of URL patterns for AGI and therefore CGI programs. Multiple patterns are separated with a bar '|'. An asterisk '*' matches any number of characters in a component, '**' matches any number of characters in any number of components, '?' matches any character. The default pattern stipulates that AGI or CGI programs must be in the URL /agi, or /anydir/agi or /anydir/anydir/agi, or the name must end with '.CGI'. CGI is disabled if '**.CGI' is removed from the pattern. AGI, and by implication CGI, is disabled by setting the pattern to a nonexistent URL.

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The default value is: (/agi/**|/*/agi/*|/*/*/agi/*|/**.cgi)

CERNLog

Specifies that CERN logging is active. Allowable values are 0 or 1. Zero (0) disables CERN logging and 1 enables CERN logging.

The default value is 0.

When set to 1 the LogPath directive must also be specified.

CGILuaScript

Specifies that CGI is implemented via AGI. The provided Lua script agi/cgi.lua implements CGI. If you wish use an alternative script you may change this name. Rename or delete the stream file agi/cgi.lua to permanently disable CGI.

The default value is (agi/cgi.lua)

Host

Specifies the hostname or IP address of the interface to which the server will bind. If this directive is not specified the server will bind to all available addresses.

Refer to the Multi-homing section for more information.

Library

Specifies the IBM i library name for aXes objects such as data queues.

This defaults to the product installation library, if this is not found it then defaults to 'AXES'.

LogPath

Specifies the name of the directory to be used for CERN logs and server trace files.

There is no default value.

This directory is secured with an Access Control List upon creation. Log files are written in the code page specified by the Codepage directive. This directive is required when the CERNLog or Trace directive is enabled.

Path

Specifies the PATH used for invocation of any external processes such as CGI programs.

The default path is (/usr/bin:%LIBL%)

PersistenceThreshold

Specifies the maximum number of persistent connections that aXes Application Server will support. Connections in excess of this number will be treated as non-persistent connections.

The default value is 0.

PersistenceLimit

Specifies the server side time limit, in seconds, for persistent connections.

The default value is 0.

Port

Specifies an alternate TCP/IP port number on which to listen.

The default port number is 80.

This directive is equivalent to the PORT keyword on the STRAXESW3 command.

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If you need to alter your aXes installation to use a port number other than the default of 80 then there are some port numbers you probably should not choose because some web browsers have a list of port numbers they will block by default.

If you use a port number that your web browser blocks by default you will need to alter your web browser configuration to allow it.

There are 65535 port numbers available. Only a very small number are blocked by web browser default configurations – you should try to avoid these numbers so you don't have to alter your browser configuration.

Your best choice is any port number:

- Greater than 1023
- Not listed in the Wikipedia list (eg: 8085) or listed in the Wikipedia list with Status = Unofficial (eg: 8081)

Wikipedia has a list of well known and registered ports:

http://en.wikipedia.org/wiki/List_of_TCP_and_UDP_port_numbers

The Wikipedia list is far longer than the list of ports that are blocked by any of the default web browser configurations.

IANA also has a list of ports: http://www.iana.org/assignments/port-numbers

PostLimit

Specifies the maximum number of bytes that may be sent to the server with a POST transaction.

The default value is 5000.

When using eXtensions you should set this value to 12000.

ServerRoot

Specifies a directory that is the 'root' directory for aXes Application Server. This value is used as the ServerRoot from which URLs are mapped to files. It restricts aXes Application Server to serving files that exist in the directory tree starting from the specified directory. This directive is equivalent to the SVRDIR keyword on the STRAXESW3 command.

The default value is the product installation directory.

SSLAppID

Specifies a character string, of up to 100 characters, representing the registered SSL application identifier. If SSLPort is specified you must specify this directive.

There is no default value.

SSLOnly

Specifies whether clients must connect using Secure Sockets Layer (SSL). Allowable values are 0 or 1. Zero (0) disables SSL Only and 1 enables SSL Only.

The default value is 0.

When SSLOnly is enabled (set to 1) the aXes Application Server will ignore the Port value and start the server with SSL support. The SSLAppID must be specified and SSLPort must also be specified. This allows the aXes Application Server to be started using the SSL protocol only, which creates a very secure server. Using SSLOnly you could use multiple application servers. One aXes Application Server instance could be listening for non-secure requests on port 80 while another instance listens on port 443. This allows you to spread the SSL encryption workload to a separate process.

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SSLPort

Specifies a TCP/IP port number to listen on. The normal value for this port is 443. If this entry is not specified then SSL support is disabled. If you specify an SSL port you must also specify either SSLAppID.

There is no default value.

Trace

Specifies whether server tracing is active. Allowable values are 0 or 1. Zero (0) disables server tracing and 1 enables server tracing.

The default value is 0.

When set to 1 the LogPath directive must also be specified. A diagnostic trace is written to the <log-path>/.aXesW3trc.txt file.

TraceLevel=option-list

Specifies the level of trace information written to the trace log. The option-list is a space-separated list containing at least one of the following keywords:

Info	When specified Informational messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.
Error	When specified Error messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.
Warn	When specified Warning messages will be logged to the IBM i job log and the trace file (if enabled). The default is that these messages are not logged.
Debug	When specified Debugging messages will be logged to the trace file (if enabled). The default is that these messages are not logged.

FastCGI Directives

> The FastCGI External Server appendix is essential reading before configuring a FastCGI External Server.

FastCgiIpcDir=(/tmp/fcgi)

Specifies the directory used for inter-process communication. This directory is used to contain the Unix domain sockets that are used for communication between the FastCGI applications and the application server. If the directory path does not begin with a slash (/) then it is presumed to be relative to the ServerRoot. If the directory doesn't exist it will be created with appropriate authorities. The directory path must be on a local file system. If you use the default directory, or another directory within /tmp, aXes Application Server will fail if your system periodically deletes files from /tmp.

This directive must precede any FastCgiServer or FastCgiExternalServer directives (which make use of Unix sockets). The application server user profile must have read (*R), write (*W), and execute (*X) permissions to the directory path, but otherwise should not be accessible to anyone.

FastCgiIpcDir is typically used move the directory some where more suitable than the default for the platform or to prevent multiple aXes Application Server instances from sharing FastCGI application servers.

FastCgiServer

This directive defines an internal FastCGI server. It has the following form:

FastCgiServer urlname –program name [option-list]

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Specifies the URL and program that defines the internal FastCGI application. If the Urlname does not begin with a slash (/) then it is presumed to be relative to the ServerRoot. The URL is the identifier for the FastCGI application. The application server will pass client requests that begin with this URL to the specified FastCGI application.

FastCgiServer Switches

Switches are not case-sensitive and can be one of the following:

Required switches:

-program name

Specifies the name of the IBM i FastCGI program that will be started as a Batch Immediate (BCI) job. The name can be a fully qualified name using the IFS naming format. If parameters are passed to this program then an additional level of quotation marks may be required. For example:

-program "AXESTS.PGM /axescfg/ts.conf"

-Program '/QSYS.LIB/AXES.LIB/ECHO.PGM'

-PROGRAM 'ACCOUNTS.PGM "parameter with spaces"'

Optional switches:

-appConnTimeout n (0 seconds)

Specifies the number of seconds to wait for a connection to the FastCGI application to complete or 0 to indicate that a blocking connect() should be used. Blocking connections have an OS dependent internal timeout. If the timeout expires, a server error results. For non-zero values, this is the amount of time used in a select() call to write to the file descriptor returned by a non-blocking connect(). Non-blocking connections may be troublesome on many platforms. See the -idle-timeout option which produces similar results but in a more portable manner.

-authpath name[=pattern]

Specifies a path where aXes Application Server will look for an Access Control List. The ACL will control authorized access to this FastCGI application.

-clientstderr (none)

Specifies that data written to stderr will be written to the client browser, however it will be always written to the aXes-W3 log.

-flush (none)

Specifies that data received from the application will be forced to the client as it is received. The default behaviour is for the application server to buffer data until all application data is received and then send it to the client, which results in better throughput.

-idle-timeout n (30 seconds)

Specifies the number of seconds of FastCGI application inactivity allowed before the request is ended and the event is logged — depending on the current TraceLevel. The inactivity timer applies only as long as a connection is pending with the FastCGI application. If a request is queued to an application, but the application doesn't respond (by writing and flushing) within this period, the request will be ended. If communication is complete with the application but incomplete with the client (the response is buffered), the timeout does not apply.

-initial-env name=value (none)

Specifies a name=value pair representing an environment variable which is passed in the FastCGI application's initial environment. The option can be repeated for a maximum of 64 name=value pairs.

-jobname name

Specifies the simple job name to use for the submitted job. If this option is not provided the job name will be the same as the aXes-W3 job. For example:

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"-Jobname AXESTS"

-kill n (10)

Specifies the number of seconds to allow for an aXes Application Server started FastCGI application to end. If this number is zero aXes Application Server will not end the application when it exits.

-listen-queue-depth n (100)

Specifies the depth of the listen() queue, also known as the backlog, shared by all of the instances of this application. A deeper listen queue allows the server to cope with a temporary connection increase by allowing the TCP/IP stack to queue excess requests; it does not increase throughput. Adding additional application instances may increase throughput and performance, depending upon the application and the host.

-mt (none)

Specifies that the application is started as a multithreaded enabled application.

-pass-header header (none)

Specifies the name of an HTTP Request Header to be passed in the request environment. This option makes available the contents of headers that are normally not available to a CGI environment such as the Authorization header.

-port n (none)

Specifies the TCP port number (1-65535) the application will use for communication with the application server. This option makes the application accessible from remote systems in the network as well as the local system. The -socket and -port options are mutually exclusive.

-processes n (1)

Specifies the number of instances of the application to start during server initialization.

For aXes Terminal Server, this value is restricted to 1.

-socket filename (generated)

Specifies the filename of the Unix domain socket that the application will use for communication with the application server. The socket is created in the directory specified by FastCgiIpDir. This option makes the application accessible to other applications on the same machine or via an external FastCGI application definition specified on the FastCgiExternalServer directive. If neither the -socket nor the -port options are specified, a Unix domain socket filename is generated. The -socket and -port options are mutually exclusive.

FastCgiExternalServer

This directive defines an external FastCGI server. It has the following forms:

FastCgiExternalServer urlname –host hostname:port [option-list]

FastCgiExternalServer urlname –socket socketname [option-list]

Specifies the URL and connection that defines the external FastCGI application. If the Urlname does not begin with a slash (/) then it is presumed to be relative to the ServerRoot. The URL is the identifier for the FastCGI application. The application server will pass client requests that begin with this URL to the specified FastCGI application

External FastCGI applications are not started by aXes Application Server, they are presumed to be started and managed separately. The aXes samples contain the source for a command called Submit FastCGI Job (SBMFCGIJOB) that can be used for starting FastCGI applications independent of the server. Applications can also be self-starting and information regarding this can be found in the FastCGI development kit at http://www.fastcgi.com. External FastCGI applications may be shared between application servers across a network. Use external FastCGI when you need to start and stop the application server without starting or stopping the application, or for example when sharing an aXes Terminal Server between Apache and aXes Application Server.

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FastCgiExternalServer Switches

Switches are not case-sensitive and can be one of the following:

Required switches:

-host hostname:port (none)

The hostname or IP address and TCP port number (1-65535) the application uses for communication with the web server. This option makes the application accessible to other applications on the same system and also on remote systems. You may omit the hostname part if you want the server to accept requests on any IP address recognized by the local system. The -socket and -host options are mutually exclusive and one of them must be specified.

-socket filename (generated)

Specifies the filename of the Unix domain socket that the application will use for communication with the web server. The socket filename is relative to the directory specified by FastCgiIpDir. This option restricts application accessibility to other applications on the same system. The -socket and -host options are mutually exclusive and one of them must be specified.

Optional switches:

-appConnTimeout n (0 seconds)

Specifies the number of seconds to wait for a connection to the FastCGI application to complete or 0 to indicate that a blocking connect() should be used. Blocking connection have an OS dependent internal timeout. If the timeout expires, a server error results. For non-zero values, this is the amount of time used in a select() call to write to the file descriptor returned by a non-blocking connect(). Non-blocking connection may be troublesome on many platforms. See the -idle-timeout option which produces similar results but in a more portable manner.

-authpath name[=pattern]

Specifies a path where aXes Application Server will look for an Access Control List. The ACL will control authorized access to this FastCGI application.

-clientstderr (none)

Specifies that data written to stderr will be written to the client browser, however it will be always written to the aXes-W3 log.

-flush (none)

Specifies that data received from the application will be forced to the client as it is received. The default behaviour is for the web server to buffer data until all application data is received and then send it to the client, which results in better throughput.

-idle-timeout n (30 seconds)

Specifies the number of seconds of FastCGI application inactivity allowed before the request is ended and the event is logged — depending on the current TraceLevel. The inactivity timer applies only as long as a connection is pending with the FastCGI application. If a request is queued to an application, but the application doesn't respond (by writing and flushing) within this period, the request will be ended. If communication is complete with the application but incomplete with the client (the response is buffered), the timeout does not apply.

-pass-header header (none)

Specifies the name of an HTTP Request Header to be passed in the request environment. This option makes available the contents of headers that are normally not available to a CGI environment such as the Authorization header.

For example:

FastCGIExternalServer “/rmtecho” –appConnTimeout 30-idle-timeout 30 –socket rmtecho

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CompressList Section

This section is prefaced by the CompressList tag and entries in this section specify the file types that will be compressed. These entries are equivalent to the file extension without the dot separator. If a CompressList section does not exist in the configuration file then the server automatically compresses the following types:

css

dat

doc

htm

html

js

log

man

mime

mjs

ppt

tar

text

txt

xml

xsl

The existence of a CompressList section in the configuration file will override the default values.

MimeTypes Section

This section is prefaced by the MimeTypes tag and defines the mime types for the HTTP Content-Type: header.

If there is no matching mime type for the document it is transmitted as 'text/plain; charset=...'

If a **MimeTypes** section does not exist in the configuration file then the server uses the following default values:

```
html,text/html; charset=%s
htm,text/html; charset=%s
txt,text/plain; charset=%s
rtx,text/richtext
etx,text/x-setext
tsv,text/tab-separated-values
css,text/css
xml,text/xml
dtd,text/xml
gif,image/gif
jpg,image/jpeg
jpeg,image/jpeg
jpe,image/jpeg
png,image/png
js,application/x-javascript
mjs,application/x-javascript
```

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The **%s** of the **charset** is replaced with the character set name of the configured code page. The default character set is **ISO-8859-1**. The existence of a **MimeTypes** section in the configuration file will override the default values.

URLMap Section

aXesW3 does not support symbolic links; instead it offers URL mapping. URL mapping allows you to hide file system information by mapping virtual URLs to an associated IFS path name. Only directories can be mapped as virtual URLs and mapped directories cannot be symbolic links. There is a limit of **100** virtual URLs per server.

This section is prefaced by UrlMap tag and each entry is of the form path=URL. The left hand side of the entry is the IFS pathname and the right hand side is URL name. If the URL name matches an existing path name within the IFS it will be ignored. For example:

```
/usr/testapp/e_rpg=/rpgapp
```

URL mapping also allows aXesW3 to serve files outside the Server Root by mapping a URL to a directory path.

Multi-homing

Multi-homing means using one machine to serve multiple hostnames. For instance, if you are an internet provider and you want to let all of your customers have customized web addresses, you might have www.joe.axes.com, www.simon.com, and your own www.axes.com, all running on the same physical hardware. This feature is also known as virtual hosts.

When a host name is not specified then the aXes Application Server will bind to any IP address that is defined for the system on which aXes Application Server is running, thus a single instance of aXes Application Server can serve requests addressed to multiple IP interfaces as long as each interface is defined on the same system.

Additional IP addresses can be defined using the ADDTCPIFC (Add TCP/IP Interface) Control Language command, or option 1 of the CFGTCP menu.

A more flexible approach would be to define separate configuration files for each web site and start a separate instance of aXes Application Server for each web site. The aXes Application Server has much lighter resource requirements than other web servers so it is less of a problem starting multiple instances of aXes Application Server. Also, it allows greater flexibility in enabling and disabling web site access, and it has improved security because a given instance of aXes Application Server cannot serve pages from a different instance.

To accomplish this you would create separate configuration files and set Host= to the IP address or domain name of the web site, set ServerRoot= to the directory containing the web site files. Then you would start a server instance for each configuration. For example:

```
STRAXESW3 CFG('/configs/widgets.conf')
STRAXESW3 CFG('/configs/gadgets.conf')
STRAXESW3 CFG('/configs/doodads.conf')
```

Each server must either use a unique IP address or a unique port.

See Appendix A. Configuration Scenarios for more information.

Custom Errors

The aXes Application Server lets you define your own custom error pages for the various HTTP errors. There is a separate file for each error number, all stored in one special directory. The directory name is 'errors', at the top of the web directory tree. The error files should be named 'errNNN.html', where NNN is the error number. So for example, to make a custom error page for the authentication failure error, which is number 401, you would put your HTML into the file 'errors/err401.html'. If no custom error file is found for a given error number, then the usual built-in error page is generated.

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Custom error pages can be generated for any language by prefixing the error page with the IANA country code, for example. ‘frerrors/err401.html’, ‘dkerrors/err401.html’. If the browser primary language preference matches the defined page name then the appropriate page will be served. If no language match occurs then the page without a language prefix will be used.

HTTP Compression

HTTP compression provides faster transmission time between compression-enabled browsers and aXes Application Server. You can compress static files and data from applications. By default aXes Application Server uses HTTP compression for appropriate text content.

The aXes Application Server will compress data streams that are sent back to a browser. URL resources are compressed only if they are not already compressed and if their extension exists in the CompressList of extensions.

When aXes Application Server receives a request, it checks to see if the browser is compression-enabled. It then checks the file name extension to see if the requested file extension is contained within the configuration compression list, aXes Application Server then checks to see if the file has previously been requested and is already stored in a compressed format in the server cache. If the file extension is in the configuration compression list and is not already stored in a compressed format, aXes Application Server compresses it and sends the compressed file to the browser, and adds a compressed copy of the file to the server cache. If the file is stored in a compressed format, aXes Application Server sends the compressed file to the browser, and adds a compressed copy of the file to the server cache.

The cost of compressing a static file is modest and is typically incurred only once, because the file is then stored in the server cache. The cost of compressing dynamically generated files is slightly higher, because they are not stored and must be regenerated with each request. The cost of expanding the file at the browser is minimal. Compressed files download faster, so are particularly beneficial to the performance of any browser that uses a network connection with restricted bandwidth (a modem, for example).

> aXes Application Server will only compress files when the browser indicates that it supports compression.

Logs

Message Queue

aXes-W3 logs the start and stop of the server and any errors to the 'AXESW3' message queue. Critical errors are also sent to the system operator’s message queue '*SYSOPR'.

aXes issues the message AXS5001 on successful start-up and AXS5002 on successful termination and AXS5003 on abnormal termination.

Job Log

The aXes-W3 job log will contain any errors that prevent the server from starting such as invalid invocation parameters, invalid configuration file, invalid configuration file contents. Critical errors are also placed in the job log.

CERN Common Log Format

The aXes Application Server can optionally log all incoming requests to a server access log file. All log files are generated using the common log file format used by many web servers. Log files are maintained in the same format as the CERN and NCSA servers. Log files in this format can be imported into one of the many log file analysis programs on the market.

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Common log-file format entries are generated by aXes Application Server with the following structure:

remotehost rfc931 authuser [date] “request” status bytes

where:

remotehost	The remote hostname, or IP address if the hostname is not available.
rfc931	The remote logname of the user.
Authuser	The name supplied by the user in response to an authentication request.
[date]	The date and time on which the request occurred.
“request”	The request line exactly as it came from the client.
Status	The HTTP status code returned to the client.
Bytes	The content-length of the document transferred.
Status	Status element

Status and Status element

The log-file Status element is a three-digit request result code. The Status can be used by log-file analysis programs and is also returned to the client. The first digit of the Status defines the class of response. There are five values for the first digit:

1xx: Informational: Request received, continuing process

2xx: Success: The action was successfully received, understood, and accepted

3xx: Redirection: Further action must be taken in order to complete the request

4xx: Client Error: The request contains bad syntax or cannot be fulfilled

5xx: Server Error: The server failed to fulfil an apparently valid request

The individual values of the numeric status codes returned to clients by aXes Application Server are presented below. The phrases listed here are recommended phrases, they may be replaced by local equivalents. See HTTP Status Codes for more information.

"200" OK

"206" Partial Content

"302" Found

"304" Not modified

"400" Bad Request

"401" Unauthorized

"403" Forbidden

"404" Not Found

"408" Request timeout

"500" Internal Error

"501" Not Implemented

"502" Server Busy

"503" Service Temporarily Overloaded

Log files are written to the path specified on the LogDir configuration file option. If required, the creation of log files can be disabled using the configuration file option CERNLog=0 so that no logs are produced. The default is to not produce log files.

Log files are written in the code page specified in the configuration file used to start the aXes Application Server instance. Consequently, suitably authorized clients may view log files by using a browser. When log files are created, read, write, and execute (*RWX) access

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permissions are granted to the aXes Application Server job user profile, and PUBLIC have read (*R) access permissions. The aXes Application Server will always create an empty Access Control List in the log file directory, if an ACL does not already exist and logging is enabled. Thus no browser user or agent can view these log files unless access authority is explicitly granted by adding the user to the ACL or by deleting the ACL.

When logging is enabled, each time an instance of aXes Application Server starts it cycles past existing log files and creates a new one. All aXes Application Server created log files use the following naming convention:

cernYYYYMMMDD _HHMMSS.txt

Where:

YYYY	4 digit year
MMM	Abbreviated month name
DD	Day of the month
HH	Hour in 24-hour format
MM	Minutes of the hour
SS	Seconds of the minute

Log file entries are cached by aXes Application Server for efficiency reasons. Consequently, log-file entries may not be written immediately to disk. Log-files are flushed periodically by aXes Application Server eliminating concurrency and synchronization lags.

Trace File

The aXes Application Server trace file, when enabled, provides a detailed trace of aXes Application Server operations. The level of detail traced is specified through configuration file directives.

Symbolic Links

The aXes Application server does not allow symbolic links. Each URL is parsed and expanded to ensure that no component of the URL contains a symbolic link. This means that to access a directory that is not subordinate to the ServerRoot directory a URL map entry must be used. This means that that aXes Application Server can serve files outside of its directory tree only if they have been explicitly defined in the URL map.

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Section 5 - Application Server Tuning

The aXes Application Server is just a job like any other IBM i job therefore the normal rules of work management and performance tuning apply.

An application server has a number of different finite resources, namely; memory, CPU, disk I/O, connection, and network bandwidth. Typically, application servers reach the limit on network bandwidth before they run out of other resources. It takes a small amount of CPU and memory to consume all of the available bandwidth. Smaller responses use less main storage, CPU, disk I/O, and network bandwidth; therefore pre-compress your files. Smaller responses also use a connection for less time.

Tuning Guidelines

An iterative process to tuning is required but the following table may be used as a guideline for tuning the aXes Application Server.

Problem	Possible Solutions
CPU utilization is high or CPU availability is a problem	Pre-compress files. Disable CERN logs and tracing. Set timeouts to the minimum required. Limit the use of SSL to URIs that require security.
Exceeded connection limits	Pre-compress files. Disable connection persistence. Decrease the persistence timeout. Decrease the persistence threshold. Add additional URL patterns to the CompressList. Create additional instance(s) of aXes Application Server.
Network bandwidth utilization is high	Pre-compress files. Add additional URL patterns to the CompressList.
SSL slows the responses unacceptably	Pre-compress files. Enable persistence. Enable compression. Add additional URL patterns to the CompressList.
Responses are slow on Web pages that contain a large number of URLs.	Enable persistence. Disable CERN logs.
Disk activity is high.	Pre-compress files. Disable CERN logs and/or tracing.
Memory limitations or high swap rates.	Pre-compress files. Add additional URL patterns to the CompressList.

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Tuning Guidelines Summary

Experiment.

Set all timeouts to the minimum required.

Use FastCGI for high volume and large requests.

Always enable compression for file based URL's that compress well such as .txt, .html, etc.

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Section 6 - Spool File Server Configuration

Configuration Files

All options, except for the configuration file name and the socket or port, can be set in a configuration file. One advantage of using a configuration file is that the file can be changed, and the changes will apply when the server is restarted. The configuration file is generally stored in the / (root) file system and can be modified using an editor such as EDTF. If you wish, you can store the configuration file in a source member and use an editor such as SEU. Configuration files can be shared across different aXes Application Servers.

aXes Spool File Server uses a number of configuration files:

aXesWS.conf	This file is primary configuration file and it controls attributes of the aXes Spool File Server.
aXesWSPDF.conf	This file controls global settings for generating PDF documents from spooled files.
default.conf	This file contains a default set of user preferences. When a new user signs on to aXes Spool File Server their personal preferences file is initialised with values from this file.

The default location for the configuration files is the /axes/configs directory. You can edit the default WS configuration file using the command:

EDTF STMF('/axes/configs/aXesWS.conf')

The configuration files are simple text files containing a series of 'option' or 'option=value' directives separated by white space. Valid directives are described below.

Comments may be placed anywhere within the configuration file. Comments begin with the hash ('#') character; all characters after the # are ignored.

Long lines can be continued by breaking them with a trailing backslash ('\').

The configuration file can be encoded using any IBM i supported CCSID or code page.

Most aXes-WS configuration directives have reasonable defaults and need not be specified.

> When specifying numeric values do not include leading zeroes because these will cause the value to be interpreted as an Octal number (i.e., 037 will be interpreted as decimal 31).

Spool File Server Configuration Directives

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

CfgSection

Identifies the value used to mark the start of the Web Spooler section in the user configuration file.

The default value is aXesWS.

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CheckLimitedCapability

Specifies whether the server checks the limited capability status of the user and disallows running commands from the Command tab that do not allow limited capability users.

The default value is yes.

DefaultLoginPage

Specifies the name of the file used as the default login page. This is the first panel displayed to a client. The file must reside in the path specified by the WSPath= directive.

The default value is ws_login.html.

DefaultUserCfgFile

Specifies the name of the file containing the default user settings for aXes Spool File Server. This file is used as a template when creating a user-specific configuration file. The user-specific configuration file is used to save user preferences.

The default value is default.conf.

The default location for the file is in the <prod-dir>/configs/users directory.

MaximumPagesToViewHTML

Specifies the maximum number of pages allowed when viewing spooled file data as HTML output.

The default value is 300.

If you increase this value you may also need to increase the value specified for –idle-timeout on the aXes-WS FastCgiServer or FastCgiExternalServer directive in the aXesW3 configuration file.

MaximumPagesToViewPDF

Specifies the maximum number of pages allowed when viewing spooled file data as PDF output.

The default value is 100.

If you increase this value you may also need to increase the value specified for –idle-timeout on the aXes-WS FastCgiServer or FastCgiExternalServer directive in the aXesW3 configuration file.

MaximumPagesToViewTEXT

Specifies the maximum number of pages allowed when viewing spooled file data as TEXT output.

The default value is 300.

If you increase this value you may also need to increase the value specified for –idle-timeout on the aXes-WS FastCgiServer or FastCgiExternalServer directive in the aXesW3 configuration file.

MaximumPagesToViewXML

Specifies the maximum number of pages allowed when viewing spooled file data as XML output.

The default value is 300.

If you increase this value you may also need to increase the value specified for –idle-timeout on the aXes-WS FastCgiServer or FastCgiExternalServer directive in the aXesW3 configuration file.

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MultiThreaded

Specifies whether the server runs in multi-threaded mode.

The default value is 'yes'. Specifying 'no' will disable multi-threading.

NoncePage

Specifies the name of the file used as the default nonce retrieval page by aXes Terminal Server when linked to aXes Spool File Server in mini-mode. This page is used to authenticate aXes Terminal Server users to aXes Spool File Server.

NumberOfInitialThreads

Specifies the iitial number of threads started by the server when running in multi-threaded mode.

The default value is 10.

ProcessEmbeddedLua

Specifies the file extensions of files that will be processed for embedded Lua.

The default values are: html, xml, txt

ServerCCSID

Specifies the Coded Character Set Identifer (CCSID) used by the Web Spooler server job. The allowable values are:

Sysval	Specifies that aXes Spool File Server will use the CCSID specified in the QCCSID system value. If this value is 65535 then the default CCSID of the job will be used.
User	Specifies that aXes Spool File Server will use the CCSID of the user profile associated with the server job.
CCSID-number	Specifies the CCSID that aXes Spool File Server will use. This value must be a valid CCSID that is allowable for IBM i jobs.

SessionExpiryTime

Specifies the timeout period, in seconds, for idle sessions. The host session associated with a client will require re-authentication if it does not perform a transaction within this period.

The default value is 300 (5 minutes).

SessionPollTime

Specifies the frequency, in seconds, with which the session management thread checks for inactive sessions. Sessions that have exceeded the limit specified by the SessionExpiryTime directive will have any allocated session licence released. If the user reconnects then a new session licence will be requested. If all session licences are in use the reconnection request will be rejected.

The default value is 10.

WkstnCustObj

Specifies the name of the workstation customisation object used when converting spooled files to image-based PDF documents.

The default value is QWPTIFFG4.

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WkstnCustLib

Specifies the name of the library containing the workstation customisation object.

The default value is QSYS.

WSPath

Specifies the directory where the aXes Spool File Server files reside. There are no constraints on the name of this directory.

The default is a directory named <prod-dir>/ws where <prod-dir> is the product installation directory.

PDF Configuration Directives

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

Encoding

Specifies the character set conversion performed on spooled file data. This directive is ignored for DBCS data in which case the conversion is performed using the encoding of the font selected for output. The allowable values are:

ISOLatin1Encoding	Conversion is performed using CCSID 819. This is equivalent to ISO-8859-1. This value will cause accented characters to display incorrectly and you should choose one of the other values if your language requires accented characters. This is the default.
WinAnsiEncoding	Conversion is performed using CCSID 1252. This is equivalent to Microsoft Latin-1.
MacRomanEncoding	Conversion is performed using CCSID 1275. This is equivalent to Apple Latin-1.

Fit

Specifies that pages are displayed with their contents magnified just enough to fit within the window both horizontally and vertically. The allowable values are:

0 | false | no	The pages will not be magnified to fit. This is the default.
1 | true | yes	The pages will be magnified to fit.

Font

Identifies the font to use for the output. The chosen font must be suitable for the data contained in the spooled file. The allowable values are:

Font Title	Characteristics	Samples
Courier	Fixed-width. This is the default.	Sample
Courier-Bold	Fixed-width, bold	**Sample**
Courier-Oblique	Fixed-width, italic	*Sample*
Courier-BoldOblique	Fixed-width, bold, italic	***Sample***

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Font Title	Characteristics	Samples
Helvetica	Proportional	Sample
Helvetica-Bold	Proportional, bold	**Sample**
Helvetica-Oblique	Proportional, italic	*Sample*
Helvetical-BoldOblique	Proportional, bold, italic	***Sample***
Times-Roman	Proportional	Sample
Times-Bold	Proportional, bold	**Sample**
Times-Italic	Proportional, italic	*Sample*
Times-BoldItalic	Proportional, bold, italic	***Sample***
Symbol	Symbol Set	Σαμπλε
ZapfDingbats	Dingbats	Σαμπλε
aXesMono	Fixed-width	Sample
aXesWide	Fixed-width	Sample
HeiseiMin-W3	Japanese	
HeiseiMin-W3,Bold	Japanese	
HeiseiMin-W3,Italic	Japanese	
HeiseiMin-W3,BoldItalic	Japanese	
HeiseiKakiGo-W5	Japanese	
HeiseiKakiGo-W5,Bold	Japanese	
HeiseiKakiGo-W5,Italic	Japanese	
HeiseiKakiGo-W5,BoldItalic	Japanese	
PMingLiU	Traditional Chinese	
PMingLiU,Bold	Traditional Chinese	
PMingLiU,Italic	Traditional Chinese	
PMingLiU,BoldItalic	Traditional Chinese	
STSong	Simplified Chinese	
STSong,Bold	Simplified Chinese	
STSong,Italic	Simplified Chinese	
STSong,BoldItalic	Simplified Chinese	
HYSMyeongJoStd	Korean	
HYSMyeongJoStd,Bold	Korean	
HYSMyeongJoStd,Italic	Korean	

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Font Title	Characteristics	Samples
HYSMyeongJoStd,BoldItalic	Korean	

FontSize

Specifies the initial font size. This value is scaled according to the paper size and spooled file width and length. The result is a font size that ensures no spooled file data is truncated.

The default value is 9.

PageBorders

Specifies whether borders are drawn around each page. The allowable values are:

0 | false | no	Page borders are not generated. This is the default.
1 | true | yes	Page borders will be generated.

PageLayout

Specifies the page layout used by a PDF viewer when the document is opened. The allowable values are:

SinglePage	Display one page at a time. This is the default.
OneColumn	Display the pages in one column.
TwoColumnLeft	Display the pages in two columns with odd numbered pages on the left.
TwoColumnRight	Display the pages in two columns with odd numbered pages on the right.

PageNumbers

Specifies whether page numbers are generated for each page. The allowable values are:

0 | false | no	Page numbers are not generated. This is the default.
1 | true | yes	Page numbers will be generated.

PageMode

Specifies how the document should be displayed when opened by a PDF viewer. The allowable values are:

UseNone	Specifies that neither the document outline nor thumbnail images are visible. This is the default
FullScreen	Full screen mode with no menu bar, window controls, or any other window visible.

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PageRotate

Specifies the number of degrees by which the page is rotated clockwise when displayed or printed. This value must be a multiple of 90. The allowable values are:

0	No rotation. This is the default value.
90	Rotate 90 degrees clockwise.
180	Rotate 180 degrees clockwise.
270	Rotate 270 degrees clockwise.

PaperSize

Identifies the paper size used to format the spooled file data.

A4 is the default value.

The allowable values are:

Paper Size	Description
A3	ISO standard paper size (297mm x 420mm).
A4	ISO standard paper size (210mm x 297mm). This is the default value.
A5	ISO standard paper size (148mm x 210mm).
LETTER	US paper size (8.5” x 11”).
TABLOID	US paper size (17” x 11”).
LEDGER	US paper size (11” x 17”).
LEGAL	US paper size (8.5” x 14”).
STATEMENT	US paper size (5.5”x 8.5”).
EXECUTIVE	US paper size (7.5” x 10”).
LISTING	Computer listing paper size (15” x 11”)
JISB4	Japanese paper size (257mm x 364mm).
JISB5	Japanese paper size (182mm x 257mm).
widthXheight	Specifies physical dimensions of the required paper size.

ViewerPreferences

Specifies a comma-separated list of values that control the behaviour of a compliant PDF viewer. The allowable values are:

HideToolbar	Specifies to hide the PDF viewer toolbar.
HideMenuBar	Specifies to hide the PDF viewer menu bar.
HideWindowUI	Specifies to hide the user interface elements in the document’s window.

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FitWindow	Specifies to resize the document's window to fit the size of the first displayed page.
CenterWindow	Specifies to position the document's window in the centre of the screen.

There is no default value.

Zoom

Specifies that pages are displayed with their contents magnified by the zoom factor. This value is a percentage between 0 and 6400. The default is 0 (zero). The actual maximum zoom factor is dependent on the size of the PDF, the amount of RAM available at the viewing computer, and the availability of other resources required by the PDF viewer.

User Configuration Directives

User configuration files are initially populated with the settings from the default.conf file. A user configuration file is created for each user when they change their preferences. You may customise the default.conf file and new users will inherit those changes.

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

columnOrder

Specifies the default order of columns displayed in the spooled file list.

The default order is:

col_file, col_user, col_userdata, col_status, col_formtype, col_pagecount, col_currentpage, col_copiesremaining, col_printername, col_date, col_time, col_priority, col_splnbr, col_job, col_jobnbr, col_outq, col_outqlib, col_save, col_hold, col_pagelength, col_pagewidth, col_prtdevtype, col_devtype, col_ccsid, col_charcode, col_ctlchar

Any order can be specified.

The names used must be found in the visible columns list. See the table below.

defaultOutq

Specifies the output queue from which spooled files are initially listed.

The default value is *ALL but the name of any existing output queue can be specified.

When *ALL is specified the defaultOutqLib value must be blank.

defaultOutqLib

Specifies the library qualifier for the defaultOutq directive.

The default value is blank but the name of any existing library can be specified.

outputFormat

Specifies the default output format. Allowable values are one of:

HTML, TEXT, XML, PDF

The default value is HTML but any valid output value can be specified.

outqFilter

Specifies the output queue list filter.

The default value is *ALL but any valid filter can be specified.

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outqLibFilter

Specifies the output queue list library qualifier filter.

The default value is *LIBL but any valid filter can be specified.

pdfFont

Specifies the default font used for PDF output.

The default value is Courier but any valid font can be specified.

The default font will be overridden if it is not appropriate for the data in the spooled file. Allowable values are one of:

Courier	Helvetica	Times-Roman
Symbol	ZapfDingbats	aXesMono
aXesMono-Wide	HeiseiMin-W3	HeiseKakuGo-W5
PmingLiU	STSong	HYSMyeongJo-Std

pdfStyle

Specifies the default PDF style. Allowable values are one of:

Auto, Landscape, Portrait

The default value is Auto but any valid style can be specified.

Auto automatically determines the style based on the spooled file width to length ratio.

showfiles

Specifies the default number of spooled files displayed per page.

Allowable values are one of:

20, 50, 100, 1000, *ALL

The default value is 20.

sortColumn

Specifies the default sort column.

The default value is ‘user’ but any column name can be specified.

sortOrder

Specifies the default sort order for the sort column. Allowable values are one of:

ASCENDING, DESCENDING

The default value is ASCENDING but any valid value can be specified.

userFilter

Specifies the user list filter.

The default value is *ALL but any valid filter can be specified.

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Visible columns

The following values are Boolean and control which columns are visible in the list of spooled files. Allowable values are On and Off.

col_ccsid=	col_formtype=	col_printername=
col_charcode=	col_hold=	col_priority=
col_codepage=	col_job=	col_prtdevtype=
col_copiesremaining	col_jobnbr=	col_save=
col_ctlchar=	col_outq=	col_splnbr=
col_currentpage=	col_outqlib=	col_status=
col_date=	col_pagecount=	col_time=
col_devtype=	col_pagelength=	col_user=
col_file=	col_pagewidth=	col_userdata=

Editable attributes

The following values are Boolean and control the edit boxes displayed in the edit properties panel. Allowable values are On and Off.

edit_dev=	edit_save=	edit_frontovl=
edit_restart=	edit_prtqlty=	edit_fntrsl=
edit_schedule=	edit_duplex=	edit_copies=
edit_align=	edit_afpchars=	edit_pagerange=
edit_fidelity=	edit_ipdspasthr=	edit_usrdta=
edit_formdf=	edit_formtype=	edit_drawer=
edit_usrdfnopt=	edit_filesep=	edit_pagdfn=
edit_code=	edit_outpty=	edit_backovl=
edit_prtseq=	edit_formfeed=	edit_exchtype=
edit_outq=	edit_multiup=	

Data Conversion

Spooled file data is generally created using an EBCDIC CCSID. aXes Spool File Server will convert spooled file data from the file CCSID to the client CCSID. The client CCSID is generally 1208 (UTF-8).

aXes Spool File Server uses the following algorithm to derive the spooled file CCSID.

1. Retrieve the CCSID of the printer file used to create the spooled file
2. If 0 or 65535 then retrieve the CCSID of the job that created the spooled file.
3. If the job has a CCSID of 65535 then the job default CCSID is used.
4. If the job is not found then the CCSID of the aXes Spool File Server job is used.
5. If this value is 65535 then the job default CCSID of the server job is used.

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In some cases this may result in incorrect data conversion. This is highly likely if the QCCSID system value is set to 65535. In such cases you may be able to get the correct conversion to occur by setting the ServerCCSID= directive correctly. The proper solution is to set QCCSID correctly for your system.

Spooled file data displayed in a PDF is converted from the spooled file CCSID (determined using the algorithm described above) to the code page associated with the font encoding used for the PDF document.

SBCS spooled files can use the following three encodings:

Encoding	Code Page
ISOLatin1Encoding	819
WinAnsiEncoding	1252
MacRomanEncoding	1275

DBCS spooled files are limited to one of the following encodings:

Encoding	Language	Code Page
90ms-RKSJ-H	Japanese	943
ETen-B5-H	Traditional Chinese	950
GB-EUC-H	Simplified Chinese	936
KSCms-UHC-H	Korean	949

You must use an encoding appropriate for the data contained within your spooled files.

Spooled File Authority

Access to spooled file data is subject to normal IBM i authority requirements. The user must have authority to the output queue and to the spooled file. The user is subject to the OPRCTL and AUTCHK values specified when the output queue was created or changed. Special values such as *SPLCTL are also respected.

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Section 7 - Data Explorer Server Configuration

Configuration File

All options, except for the file name and the socket or port, can be set in a configuration file. One advantage of using a configuration file is that the file can be changed, and the changes will apply when the server is restarted.

The default location for the configuration file is the /axes/configs directory. You can edit the default DE configuration file using the command:

EDTF STMF('/axes/configs/aXesDE.conf')

The configuration file is a simple text file containing a series of 'option' or 'option=value' directives separated by white space. Valid directives are described below.

Comments may be placed anywhere within the configuration file. Comments begin with the hash ('#') character; all characters after the # are ignored.

Long lines can be continued by breaking them with a trailing backslash ('\').

The configuration file can be encoded using any IBM i supported CCSID or code page.

Most aXes-DE configuration directives have reasonable defaults and need not be specified.

> When specifying numeric values do not include leading zeroes because these will cause the value to be interpreted as an Octal number (i.e., 037 will be interpreted as decimal 31).

Configuration Directives

Default values are either underlined or explicitly stated.

Mandatory parameters are marked with an asterisk *.

AllowedSQL

Specifies a comma-separated list of SQL statements that are allowed to be run by aXes Data Explorer Server.

The default is to allow all SQL statements.

CharSet

Specifies the Character Set used by the aXes Data Explorer server job for client responses. The allowable values are:

IANA-name	Specifies the IANA name of the character set used by aXes Data Explorer Server for client responses. The default value is UTF-8. The value specified here must complement the value specified for ClientCCSID. For example; CharSet=UTF-8 requires ClientCCSID=1208, CharSet=iso=8859-1 requires ClientCCSID=819.

The default value is UTF-8.

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ClientCCSID

Specifies the Coded Character Set Identifier (CCSID) used by the Data Explorer server job. The allowable values are:

CCSID-number	Specifies the CCSID that aXes Data Explorer Server will use. This value must be a valid CCSID that is allowable for IBM i jobs. The value specified here must complement the value specified for CharSet.

The default value is 1208.

DEPath

Specifies the directory where the aXes Data Explorer Server files reside. There are no constraints on the name of this directory.

The default is a directory named <prod-dir>/DE where <prod-dir> is the product installation directory.

MaxTableEntries

Specifies the maximum number of tables or files aXes Data Explorer Server will display in the table list.

The default value is 500.

MaxQueryEntries

Specifies the maximum number of saved queries aXes Data Explorer Server will display in the query list.

The default value is 30.

ServerCCSID

Specifies the Coded Character Set Identifier (CCSID) used by the aXes Data Explorer Server job. The allowable values are:

Sysval	Specifies that aXes Data Explorer Server will use the CCSID specified in the QCCSID system value. If this value is 65535 then the default CCSID of the job will be used.
User	Specifies that aXes Data Explorer Server will use the CCSID of the user profile associated with the server job.
CCSID-number	Specifies the CCSID that aXes Data Explorer Server will use. This value must be a valid CCSID that is allowable for IBM i jobs.

Data Conversion

Data read from a database file is first converted from the file or field CCSID to the job CCSID. This conversion is performed automatically by the SQL Database Manager. aXes Data Explorer Server will convert the result set data received from SQL to the client CCSID. The client CCSID is generally 1208 (UTF-8).

In some cases this may result in incorrect data conversion. This is highly likely if the QCCSID system value is set to 65535. In such cases you may be able to get the correct conversion to occur by setting the ServerCCSID= directive correctly. The proper solution is to set QCCSID correctly for your system.

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Configuring Remote Data Sources

The aXes Data Explorer Server can access any remote data source that is defined in the IBM i Relational Database Directory. You use the Work with Relational Database Directory Entries (WRKRDBDIRE) command to manage remote data sources. The only requirement is that the remote database provides a DRDA Application Server interface.

See the "Setting Up an IBM i Distributed Relational Database" section of the Information Centre for more information about setting up another IBM i system as a remote data source.

See the Distributed Relational Database Cross-Platform Connectivity (SG24-4311) book or the Distributed Relational Database Architecture Connectivity Guide (SC26-4783) for information about setting up a distributed network of unlike systems.

You must have network communications configured between the systems. You can use either SNA or TCP as long as both systems support the chosen protocol. You can use AnyNet to encapsulate TCP traffic over an SNA network or SNA traffic over a TCP network. See the Communications Configuration manual for more information.

In essence you use the WRKRDBDIRE command to define a remote data source. The following command defines a connection to a remote IBM i database:

```
ADDRDBDIRE RDB(WESTERN) RMTLOCNAME(WESTERN *SNA) +
TEXT('Remote DB2/400 database.')
```

The following command defines a connection to a remote DB2 database on a PC server:

```
ADDRDBDIRE RDB(SAMPLE) RMTLOCNAME('server.mycompany.com.au' *IP) +
TEXT('Sample DB2 database on SERVER.')
```

You must define an entry for the local database. For example:

```
ADDRDBDIRE RDB(LOCAL) RMTLOCNAME(*LOCAL) TEXT('Local DB2/400 database.')
```

> A local database entry must exist on all systems to which to want to connect.

Once the database directory entries have been defined the TCP/IP DDM server must be started on each remote system to which you want to connect over TCP. You can start this server using the STRTCPSVR *DDM command. You can have the system automatically start the DDM server when TCP is started by setting the autostart attribute to yes using:

```
CHGDDMTCPA AUTOSTART(*YES)
```

Data File Authority

Access to file data is subject to normal IBM i authority requirements. The user must have authority to the library and file. The user is subject to the object and data authorities specified for the file. Special values such as *ALLOBJ are also respected.

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Section 8 - Secure Sockets Layer Support

This section provides guidelines for configuring Secure Sockets Layer (SSL) support for the aXes Application Server.

Secure Sockets Layer (SSL) Requirements

Secure Sockets Layer (SSL) support on IBM i requires the following IBM components installed:

- One of the Cryptographic Access Provider versions:
  - ✓ Crypto Access Provider 40-bit for AS/400.
  - ✓ Crypto Access Provider 56-bit for AS/400.
  - ✓ Cryptographic Access Provider 128-bit.
- IBM i - Digital Certificate Manager or later versions.

SSL locates the correct certificate through the use of application identifier.

Configuring aXes Application Server

1. Use IBM's Digital Certificate Manager to define an application identifier.

2. Edit the aXes Application Server configuration file and update the following directives.

   #SSLOnly=1

   SSLPort=443

   SSLAppID=<application identifier>

3. You must also ensure that the AXES user profile has read (*R) authority to the certificate files and execute (*X) authority to any directories in the certificate path.

   The path for the *SYSTEM certificate store is:

   /QIBM/UserData/ICSS/Cert/Server/DEFAULT.KDB

   /QIBM/UserData/ICSS/Cert/Server/DEFAULT.RDB

Configuring TLSv1.2 on IBM i 7.1

1. Check if TLSv1.2 is enabled on the system.

   Use WRKSYSVAL QSSLPCL. If the value is set as *OPSYS, change it to:

   *TLSV1.2

   *TLSV1.1

   *TLSV1

   *SSLV3

   If QSSLPCL is set to something other than *OPSYS, just add *TLSV1.2 and *TLSV1.1.

2. After setting the above, TLSV1.2 can now be set in the Application definition using the Digital Certificate Manager.

   In the DCM, set the SSL protocols to *PGM or tick the TLS1.2 check box.

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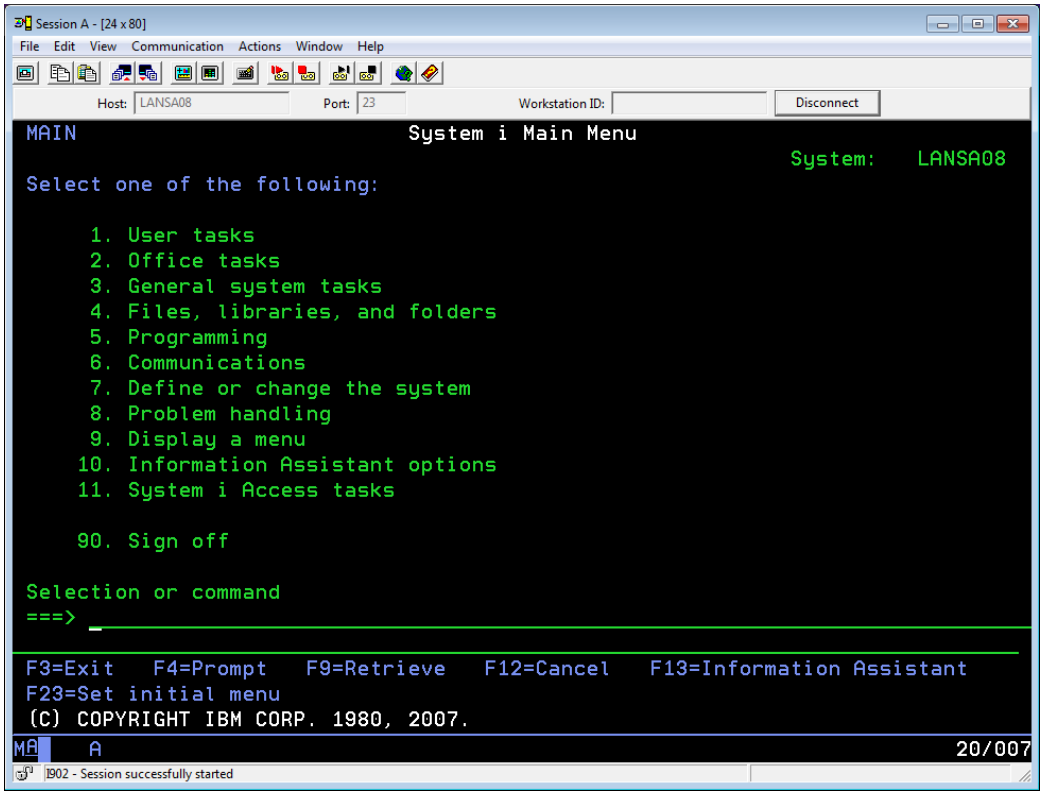
Section 9 – Single Sign-On Support

This section provides guidelines for configuring Single Sign-On (SSO) support for the aXes Application Server.

Single Sign-On (SSO) Support Requirements

Before attempting to configure SSO support for aXes, SSO support on IBM i needs to be configured properly. In order to assess if your IBM i has been configured properly, you need to be able to login using SSO using the terminal client emulator.



Please note that configuring your IBM i to use SSO is not in the scope of this guide. However, we have listed a few points you might consider if you encounter issues when configuring SSO on your IBM i.

Do you have the JSM service configured and working?	The best way to check to is make sure DE2 or WS2 are working properly.
Do you have the correct Kerberos Domain?	For example: BRANCH.MYCOMPANY.COM
Do you have the windows user name with proper permissions?	For example: user1
Do you use you IBM FQN in the CHGTCPDMN command?	For example: server.branch.company.com

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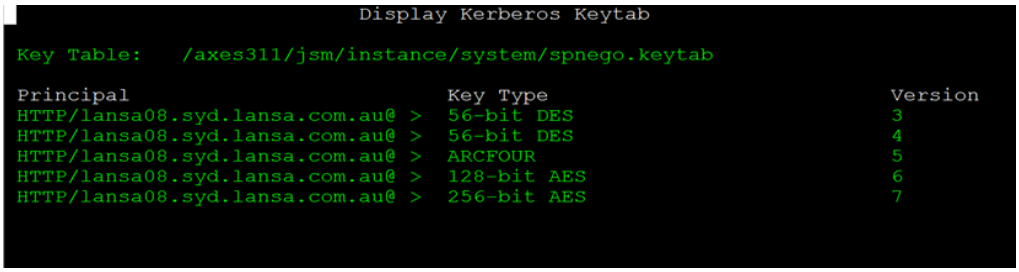
Do you have the correct SPN setup on the Kerberos Domain Controller (KDC)?	For example: HTTP/server.branch.company.com@BRANCH.COMPANY.COM
Do you have the KEYTAB file for IBM i Applications?	This Keytab file is used by IBMi applications to process the SSO authentication. It is located in: /QIBM/UserData/OS400/NetworkAuthentication/keytab/krb5.keytab
Does the windows user name have an EIM mapping to an IBM i user?	
Is the windows user name account enabled for delegation on the KDC?	
Is the Service Account enabled for delegation on the KDC?	For example: HTTP/lansa01.syd.lansa.com.au needs to be enabled for delegation.

Configuring Single Sign-On (SSO) Support for aXes.

Configure the Keytab File for the JSM service.

The Keytab file configured for IBM i application cannot be used by the JSM service to authenticate users. You need to configure you own Keytab file called spnego.keytab.

1	Use the KTPASS utility on the windows KDC to generate the spnego.keytab.
2	Copy the spnego.keytab to the following folder in your axes instance. The file should be located in /<axes_dir>/jsm/instance/system
3	Display the spnego.keytab file to make sure the HTTP SPN is included. Use the following command on the IBM i: DSPKRBKTE KEYTABFILE('/<axes_dir>/jsm/instance/system/spnego.keytab') This is the type of output to expect: 

```
                    Display Kerberos Keytab

Key Table:   /axes311/jsm/instance/system/spnego.keytab

Principal                          Key Type                          Version
HTTP/lansa08.syd.lansa.com.au@ >   56-bit DES                        3
HTTP/lansa08.syd.lansa.com.au@ >   56-bit DES                        4
HTTP/lansa08.syd.lansa.com.au@ >   ARCFOUR                           5
HTTP/lansa08.syd.lansa.com.au@ >   128-bit AES                        6
HTTP/lansa08.syd.lansa.com.au@ >   256-bit AES                        7
```

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4	Also, to check your configuration, you can run the following command to Add a Kerberos Ticket.
	ADDKRBTKT PRINCIPAL('HTTP/lansa08.syd.lansa.com.au' *DFT) KEYTABFILE(*DFT)
	Check you joblog and you should see an entry like the below:
	`3 > ADDKRBTKT PRINCIPAL('HTTP/lansa08.syd.lansa.com.au' *DFT) KEYTABFILE(*DFT)`
	`The ticket granting ticket has been created successfully.`

5	ADDKRBTKT PRINCIPAL('HTTP/lansa08.syd.lansa.com.au' *DFT) KEYTABFILE('/axes311/jsm/instance/system/spnego.keytab')
	Which should result in a message in your joblog:
	`3 > ADDKRBTKT PRINCIPAL('HTTP/lansa08.syd.lansa.com.au' *DFT) KEYTABFILE('/axes311/jsm/instance/system/spnego.keytab')`
	`The ticket granting ticket has been created successfully.`

Configure the JSM-SSO service.

The following steps will configure the JSM SSO service based on a successful configuration of the previous steps.

1	Make sure the spnego.keytab file is located in <axes_dir>/jsm/instance/system/ folder.
2	Create a spnego.txt file and specify the default realm, default keytab file and the Windows KDC server. Place the spnego.txt file in the same folder where the spnego.keytab file is located. For example: Change values to match your setup.

Spnego code example

```
#
# Be careful with whitespace and blanks lines as these can break the file parsing
#
[libdefaults]
   default_realm = SYD.LANSA.COM.AU
   default_keytab_name = system/spnego.keytab
   [realms]
      SYD.LANSA.COM.AU = {
         kdc = SYD1.SYD.LANSA.COM.AU:88
         }
   [domain_realm]
   [capaths]
```

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3 Add the following properties to the file:
<axes_dir>/jsm/instance/system/manager.properties

Manager.properties snippet example

```
#
# Kerberos
#
# sun.security.jgss.debug=true
# sun.security.krb5.debug=true
# com.ibm.security.jgss.debug=all
# com.ibm.security.krb5.Krb5Debug=all
java.security.krb5.conf=system/spnego.txt
javax.security.auth.useSubjectCredsOnly=false
```

4 Edit the file <axes_dir>/jsm/instance/system/httpd.xml file and add or update the ssoservice.jsp entry, with values matching your domain.

The snippet should be added in the <script> </script> tag, preferably just after the <script> tag

http.xml snippet example

```
<!--
   SSO service
-->
<match uri="/axes/ssoservice.jsp"
class="com.lansa.mobile.service.HTTPServiceSSO">
  <parameter name="service.origin"  value="*"/>
  <parameter name="service.host"    value="lansa01.syd.lansa.com.au"/>
  <parameter name="service.realm"   value="SYD.LANSA.COM.AU"/>
  <parameter name="service.default.ports" value="true"/>
</match>
```

5 Check if you are running JRE version 1.6+

Open the trace file located at

/<axes_dir>/jsm/instance/trace/<latest_date>/manager.txt

And look for the line: “system: java.version”

If it displays 1.5.0 then you need to upgrade your JRE runtime to 1.6+ and follow step 6.

If it displays 1.6.0 (or greater) then go to step 7.

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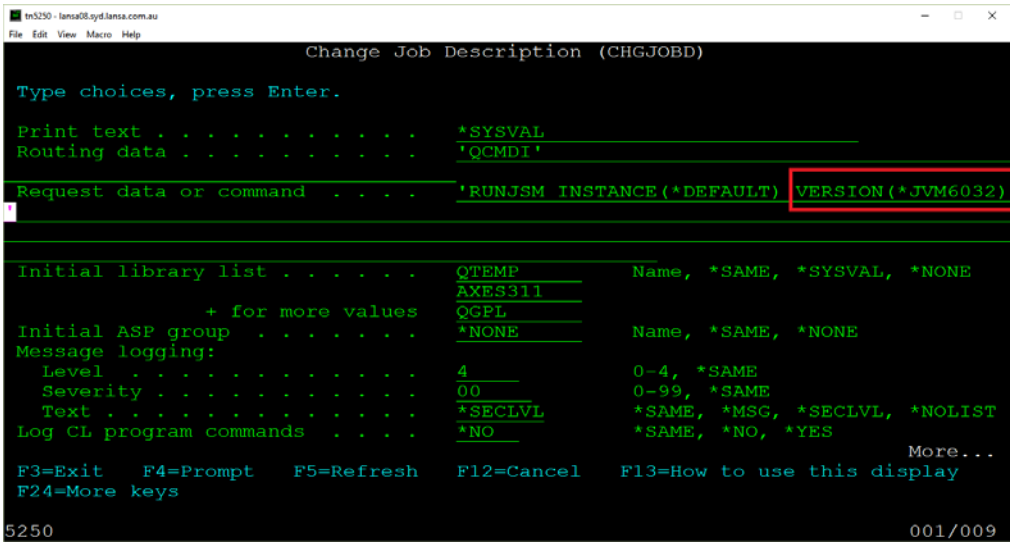
6 If necessary, change the job Description on IBM i to use JRE version 1.6+

Use the command:

CHGJOBD JOBD(axes_library>/JSM) then F4, then F10.

Change the RUNJSM start line version Parameter to v6.

As below:



7 Save your changes and restart aXes

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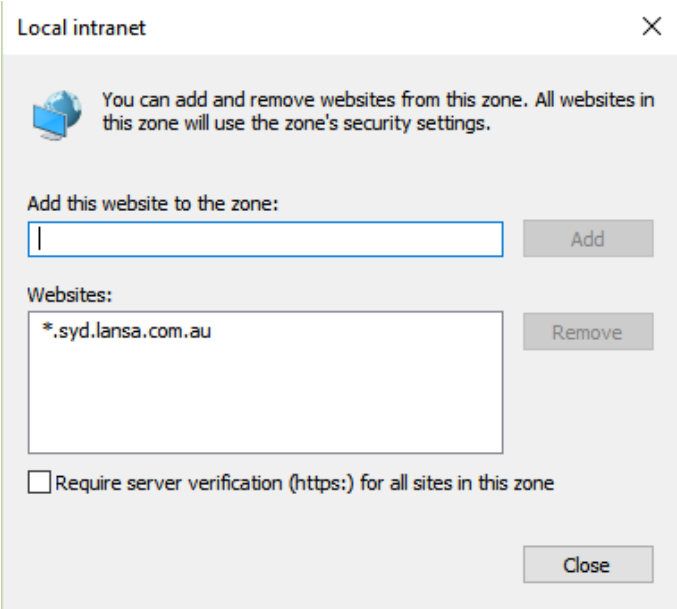
Configure users' browsers to perform spnego authentication.

1 To use Internet Explorer, you need to add the address in the trusted sites, at the following location:

Internet Options/Security/Local Intranet/Sites/Advanced/WebSites

Also make sure the settings of internet options / Security / local intranet / sites/ advanced references your domain.



2 To use Chrome, you need to add / change the following Registry keys values to match your domain.

[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Google]

[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Google\Chrome]

"AuthNegotiateDelegateWhitelist"="*.mycompany.com"

"AuthServerWhitelist"="*.mycompany.com"

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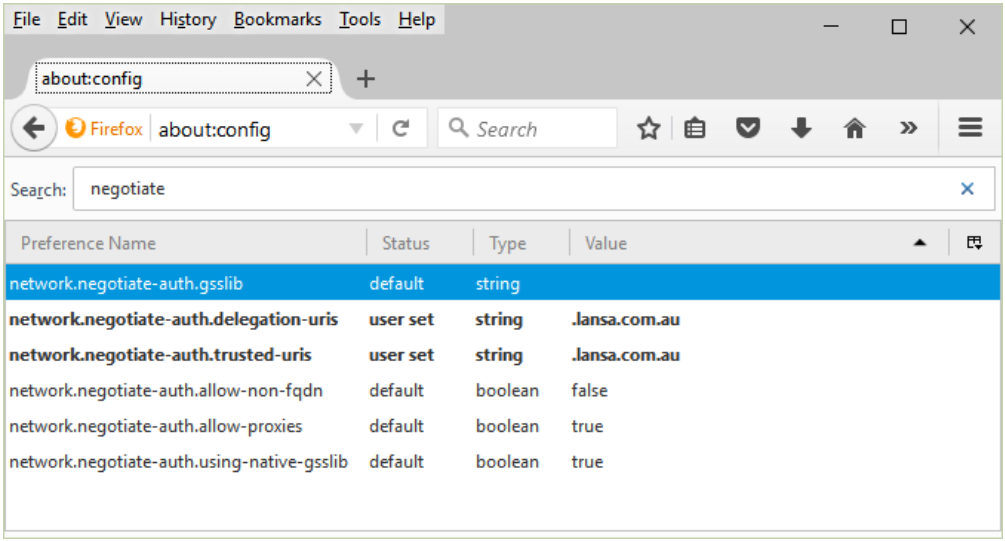
3 To use Firefox, add the following properties in the advanced option. In the address bar, type about:config, then change the following values to match your domain:

network.negotiate-auth.trusted-uris:

network.negotiate-auth.delegation-uris:



Test your settings.

1 Once aXes has been restarted on the IBM i, open the trace file located in:

/<axes_dir>/jsm/instance/trace/<latest_date>/manager.txt

check that the following lines display:

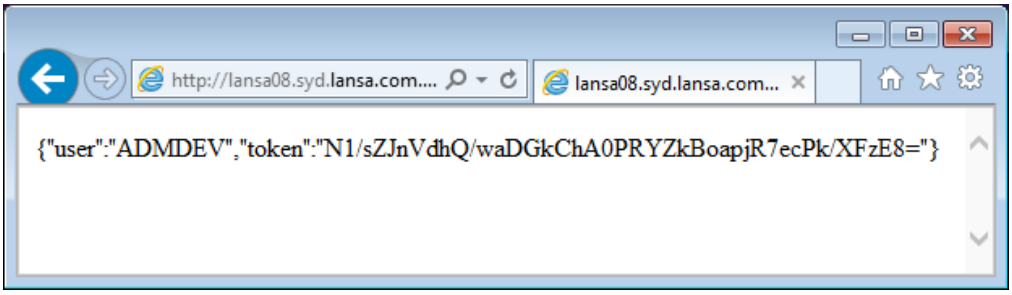
system: java.version : <version> (where version >= 1.6.0)

manager: start http instance 'WebServer', listen on port <port> across all interfaces (where port is the http port value)

2 Open a browser and navigate to the following address. Please note to use the FQN name of the server, and make sure you are logged in on Windows with the user mapped in the EIM.

http://server.mycompany.com:port/axes/ssoservice.jsp

3 Result with Internet Explorer



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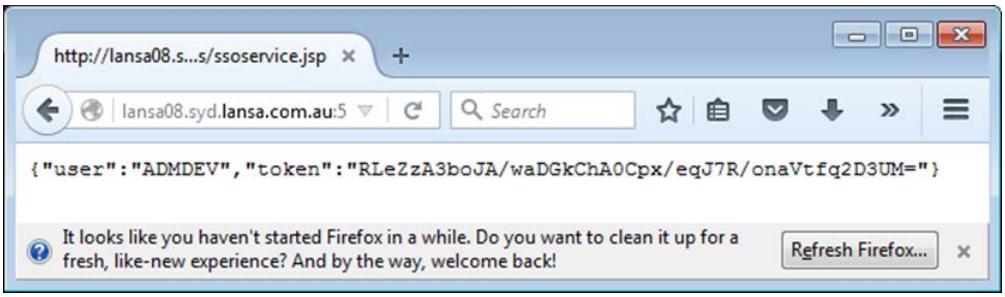
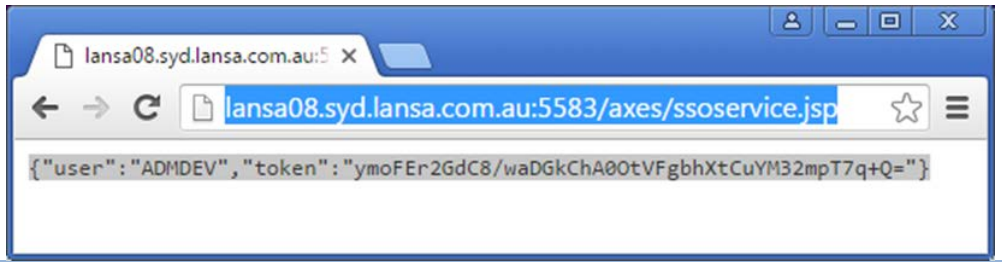
4 Result with Chrome



5 Result with Firefox



Configure the aXes SSO service.

Follow the below steps to enable aXes to use SSO.

1 Open the AxesTS.conf configuration file. Add the following configuration lines.

The tgturl should refer to the ssoservice defined in the JSM-SSO configuration point 4.

Httpd.xml snippet example

```
<listen port="5563" sslport="5564" interface="*ALL"
backlog="256"secure="false" store="pki/wwwssl.jks" password="password"
sslprotocol="TLSV1.2" buffersend="-1" bufferreceive="-1" nodelay="false"
timeout="5"/>
```

axests.conf snippet example

```
# Enable single sign on with Kerberos
autosignon=1
tgturl=http://server.mycompany.com:port/axes/ssoservice.jsp?storetoken=true
```

Server: the address of the JSM http server (for example: lansa08.syd.lansa.com.au)

Port: the port defined as the JSM http server in the httpd.xml file located in <axes_dir>/jsm/instance/system/httpd.xml. The default listener port is 5563.

2 Restart aXes subsystem.

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3	Test your configuration: Open the following address: http://server.domain.com:port/ts/ts2/index.html?sso=true For example: http://lansa08.syd.lansa.com.au:8311/ts/ts2/index.html?sso=true

Appendix A - Configuration Scenarios

This section provides information on different ways to configure the aXes servers. Many customers will be able to use the default configuration with minimal modification however larger sites or those with special security requirements will have to define their own configuration files and instance definitions.

Default Configuration

The default configuration supplies an instance of aXes Application Server configured to run on port 80.

The default aXes Application Server instance is configured to automatically start the other aXes servers as Internal FastCGI servers.

For most customers this means they need start only the aXes Application Server and all the aXes servers will be started.

However it also means that the internal FastCGI servers take their initial configuration information from the FastCGIServer directives in the aXesW3 configuration file rather than the instance definitions. It also means that all servers must be ended when any server requires a restart.

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Appendix B - Troubleshooting

This section provides information on how to diagnose and solve problems. For the latest information on known problems and their solutions go to LANSA web site.

In general, you should follow the same diagnostic process as you would for any IBM i application.

Check the job log of the problem job.	The problem job could be an interactive job running a command, a batch job started by a command, or a batch job started by another batch job. Use the Display Job Log (DSPJOBLOG) command.
Check the job log of the parent job.	The parent job could be an interactive job running a command, or a batch job starting another batch job. Use the Display Job Log (DSPJOBLOG) command.
Check the job log of the child job.	The child job could be a batch job started by a command, or a batch job started by another batch job. Use the Display Job Log (DSPJOBLOG) command.
Check the system operator's message queue	Check QSYSOPR for relevant messages. Use the Display Messages (DSPMSG) command.
Check the history log	Check QHST for relevant messages. Use the Display Log (DSPLOG) command.

Specific information for troubleshooting the various parts of aXes Server can be found in the following sections:

- Browser Problem Analysis
- Configuration File Problem Analysis
- aXes Terminal Server Problem Analysis
- aXes Data Explorer Server Problem Analysis
- aXes Spool File Server Problem Analysis
- aXes Application Server Problem Analysis
- Document Access Problem Analysis
- HTTP Status Codes

Browser Problem Analysis

Browser problems usually manifest as an incorrect terminal display. Either data is missing from the terminal display or an error occurs.

Firstly, ensure that the browser is a supported version. You need an XML capable Web browser that supports the HTTP 1.1 protocol, frames, and JavaScript. One browser that currently provides the required support is Microsoft Internet Explorer 6.0 or later.

If you are using IE 6.0 or later then you should already have an appropriate level of Microsoft Core XML support. However you should install Service Pack 1, or later, for IE 6.0 to ensure IE is current.

Some common problems and suggestions for resolving them follow:

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Logon Script not found

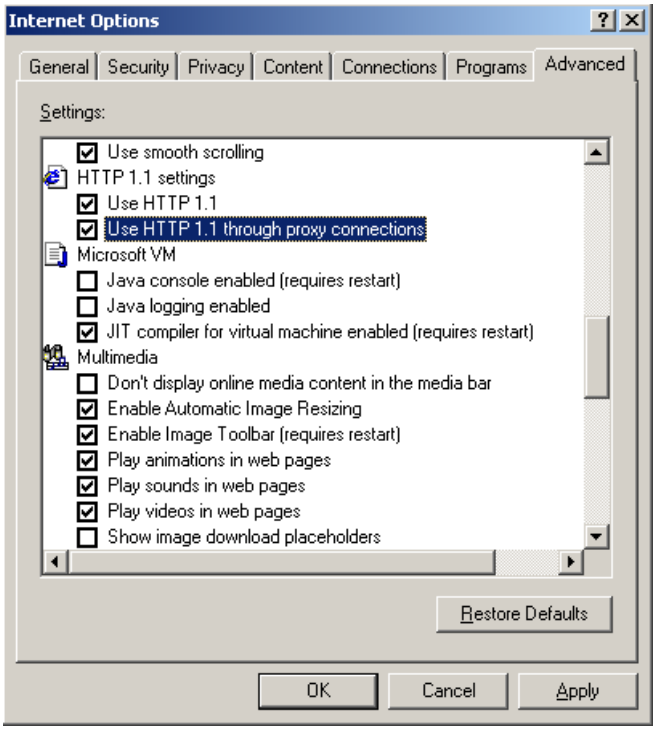
This means the axlogin.mjs file was not served by the host.

Check that the file exists.

If you are using the aXes Application Server then check that AXES has authority to the full file path.

Check that a firewall or proxy is not blocking the request. This includes personal firewalls such as ZoneAlarm.

This problem is frequently caused by HTTP/1.0 proxy servers and is known to occur with the Avirt Gateway and WebMarshal proxy servers. In this case you should change your browser settings to select the "Use HTTP 1.1 through proxy connections" setting. This option is found under the Tools->Options panel on the Advanced tab in the HTTP 1.1 settings section.



Sometimes this problem is caused by an error in the caching support provided by Internet Explorer. Try requesting the page directly by using the URL http://system:port/axests/axlogin.mjs where 'system' and 'port' are appropriate values for your environment.

You may also need to clear the cache by getting Internet Explorer to delete temporary files, close all browser windows, and start the aXes Terminal Server session again.

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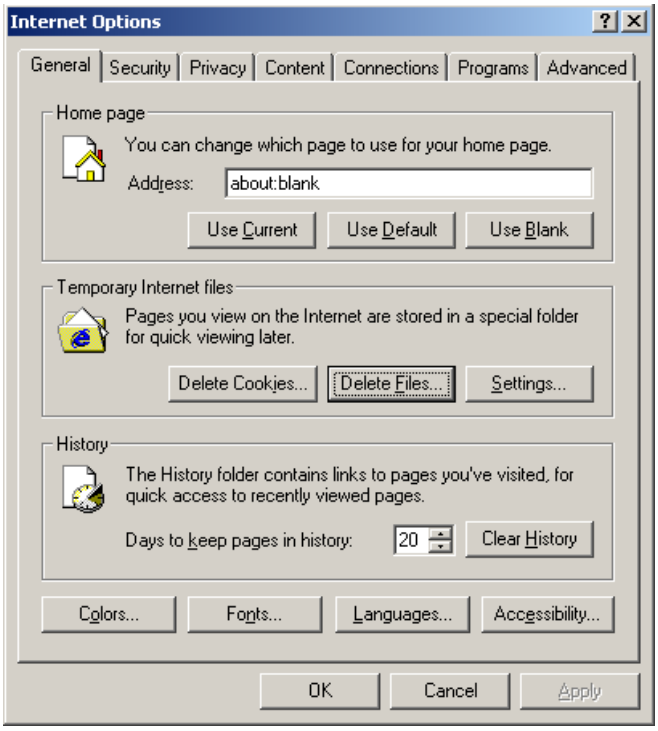
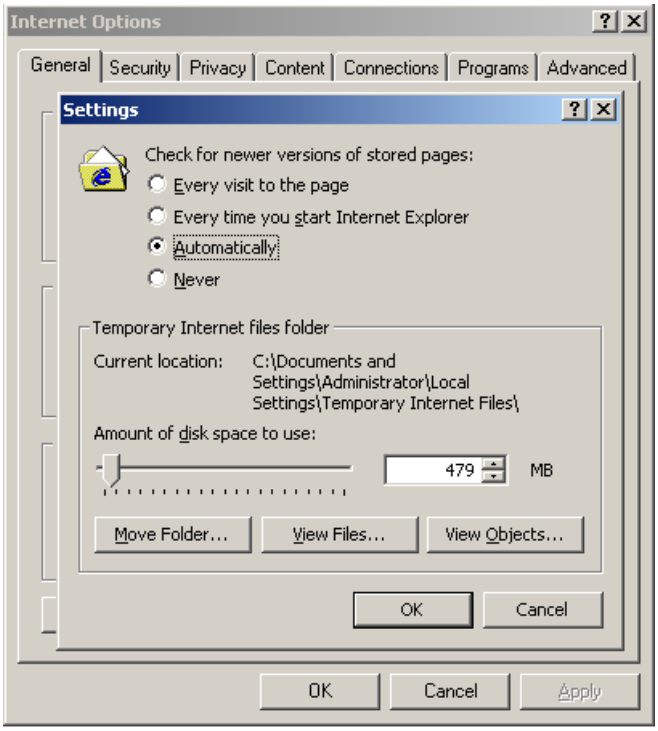


Previously seen screens redisplayed

This problem usually indicates a caching error in Internet Explorer. Ensure your browser settings allow Internet Explorer to automatically determine whether it should check for newer versions of cached pages. This option is found under the Tools->Internet Options panel on the General tab in the settings for the Temporary Internet files section.



Open terminal failed

This error can be caused by a number of things:

- The virtual device you requested is disabled.
- The QAUTOVRT system value is set such that virtual devices cannot be created.

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- The IP address of the client is specified on the IPMask= directive in the aXes-TS configuration file.
- The entry in the User section of the aXes-TS configuration file is incorrect.
- The tslogonexit.lua script has rejected the logon request.
- A problem occurred running the AXRTVVTDEV program:
  - ✓ Check that the program exists in the product library
  - ✓ Check that it is a system state program
  - ✓ If you are using the aXes Application Server then check that AXES has authority to the program.

If the message is due to a failure when opening a virtual terminal then the API message will also be displayed.

Internal system error occurred in program QTVSINIT

This error indicates a virtual device problem. Examine the job log of the AXES5250 job. It will provide more information about the cause of the problem. Follow any recovery steps described in the job log messages. Errors of this type are not usually aXes problems. They usually indicate an operating system problem of some sort such as device in use, device not available, device varied off, etc. Follow the normal recovery steps you would perform for device error recovery. These include varying off and on the device, deleting the device, checking authority to the device, etc. The recovery steps described under “Open terminal failed” may also prove helpful for this problem.

Unexpected internal system error occurred in program QTVWRTVT

This error indicates a virtual device problem. Examine the job log of the AXES5250 job. It will provide more information about the cause of the problem. Follow any recovery steps described in the job log messages. Errors of this type are not usually aXes problems. They usually indicate an application problem of some sort such as incorrectly using pop-up windows.

If the job log of the AXES5250 job shows message CPF87D4 “Data sent exceeded the corresponding I/O request” then the problem is most likely caused by the way the application handles pop-up windows. When a window is displayed by an application, the default behaviour is for the operating system to issue a request to save the current screen. When aXes Terminal Server receives this request it returns a representation of the current screen to the operating system. The operating system rejects responses that exceed 16KB. In some cases the representation of the screen used by aXes Terminal Server will exceed 16KB. Panels that contain lots of data and fields, such as very full 27*132 panels, can cause this limit to be exceeded. It can also be caused by the application displaying many windows on top of each other.

The reason the aXes Terminal Server screen representation may exceed 16KB is because aXes Terminal Server saves the complete creation data for the current screen where 5250 emulators just save the visible data. aXes Terminal Server needs to save everything to support future enhancements. Thus the more data in each panel, and the more windows on the screen, the more likely that a Save Screen request will cause the 16KB limit to be exceeded.

In most cases the default Save Screen request is not necessary because the application does not allow the operating system to restore the saved screen. Most applications cause the screen to be redrawn by reissuing the various WRITE commands for the record formats that make up the current screen once the window has been closed.

To correct the problem the application should exercise better control over whether a Save Screen request is issued by the operating system. For window record formats the Save Screen request can be controlled by specifying the USRRSTDSP keyword on the WINDOW record. For other record formats ensure the display file has RSTDSP(*NO) specified.

Because the root cause of the problem is directly related to the amount of data present in the screen being saved the problem can be avoided by making screens less cluttered with information. Perhaps the screen would be better designed as two or more panels with less useful information on the subsequent panels.

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Logon fails

This message can appear when signing on to aXes Terminal Server using a skin that shows the spooled output tab (such as /ts/skins/ts.html). In this case it usually means the aXes Spool File Server is not licensed for this system therefore the automatic logon to aXes Spool File Server has failed. In this case use a skin that does not include spooled output such as /ts/skins/ts_basic.html

400 Bad Request

This error can be caused by a number of things:

- A problem occurred with the virtual device. See Open terminal failed above.
- A time-out occurred between aXes Application Server and aXes Terminal Server. Check that both servers are active and that the value for TSInactiveLimit directive in the TS configuration file is less than the value specified for –idle-timeout on the FastCGIServer directive in the W3 configuration file.

URL http://system:port/axests/0 displayed but no terminal frame visible

This means the POST of data to the server failed so no POSTed data is available.

Check that POST is not disabled in the server configuration file.

Check that you have the correct level of browser and MSXML support.

Check that a firewall or proxy is not blocking the request. This includes personal firewalls such as ZoneAlarm.

Check that the URL is not being redirected.

Error loading transaction

The following was returned in place of an XML document:

> 400 Bad Request
>
> Because this is an HTTP error message you should follow the normal web server diagnosis for HTTP errors.
>
> This message indicates the host could not satisfy the client request. It is usually caused by a time-out between the aXes Application server and the aXes Terminal Server due to the aXes Terminal Server taking too long to respond to the client request.
>
> The time-out can be caused by excessive network traffic, by network configuration issues, or by the host system simply being too busy to respond in a timely manner. In some cases it can be caused by inappropriate workload such as long running queries being invoked from the client session. To recover just close the XML error window and issue the request again.
>
> If the problem persists you will need to determine the cause of the delay. You can increase the amount of time aXes will wait for responses. Try increasing the wait time specified for the –idle-timeout switch on the FastCGIServer directive in the W3 configuration file. Depending on the cause of the error you may also need to increase the value for the TSInactiveLimit directive.

Error loading transaction

The following was returned in place of an XML document:

> Server Error!
>
> The red box may contain web server diagnostic information such as:
>
> ✓ The server encountered an internal error and was unable to
>
> ✓ Complete your request. Either the server is overloaded or
>
> ✓ There was an error in a CGI script.
>
> If you think this is a server error, please contact the webmaster.
>
> Error 500

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Apache/2.0.47 (Linux/SuSE)

In this example the error message came from an Apache web server running on SuSE Linux therefore investigation of the problem should start with Apache. This problem may be a time-out similar to that described above under 400 Bad Request or it could be something specific to Apache.

Error loading transaction

The following was returned in place of an XML document:

The XML page cannot be displayed

This message indicates the client did not receive an XML document from the host. The red box may contain additional information about the problem.

This error does not necessarily indicate a problem with aXes Terminal Server. This sort of error can happen for many reasons. It may indicate a network problem, a firewall problem, a proxy server problem, or a time-out. It is simply part of using a browser and web server. To recover just close the XML error window and issue the request again.

Ensure the network path between the browser and application server is correctly configured.

If the problem persists you will need to determine the cause. See other “Error loading Transaction” topics in this section for additional possibilities.

Error Loading Transaction

Cannot view XML input using XSLT style sheet

This message indicates that the MSXML parser is either not available or at the wrong level. The red box may contain additional information about the problem. Ensure that MSXML3 or Service Pack 1 is installed for IE6.0

If you do not have MSXML3 you can get download it from http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=c0f86022-2d4c-4162-8fb8-66bfc12f32b0.

Be aware that many applications ship MSXML3. Accidentally uninstalling any one of those applications on a Windows system could potentially deregister the MSXML3 program files (msxml3.dll and msxml3r.dll). The visible effect of doing this is that MSXML3 appears to no longer be installed or available but its program files still remain in the Windows system folder.

If you experience problems attempting to use MSXML 3.0 SP4 after removing an application that might have been using it then you can fix this by repeating the registration of msxml3.dll on your system.

To register MSXML 3.0

1. From the Start menu, click Run.

2. Enter the following command:

regsvr32 %windir%\system32\msxml3.dll

3. Click OK.

If the registration is successful, you should see a message box displaying a message similar to the following:

DllRegisterServer in C:\WINDOWS\system32\msxml3.dll succeeded.

This problem is also frequently caused by HTTP/1.0 proxy servers and is known to occur with the Avirt Gateway and WebMarshal proxy servers. In this case you should change your browser settings to select the “Use HTTP 1.1 through proxy connections” setting. This option is found under the Tools->Internet Options panel on the Advanced tab in the HTTP 1.1 settings section.

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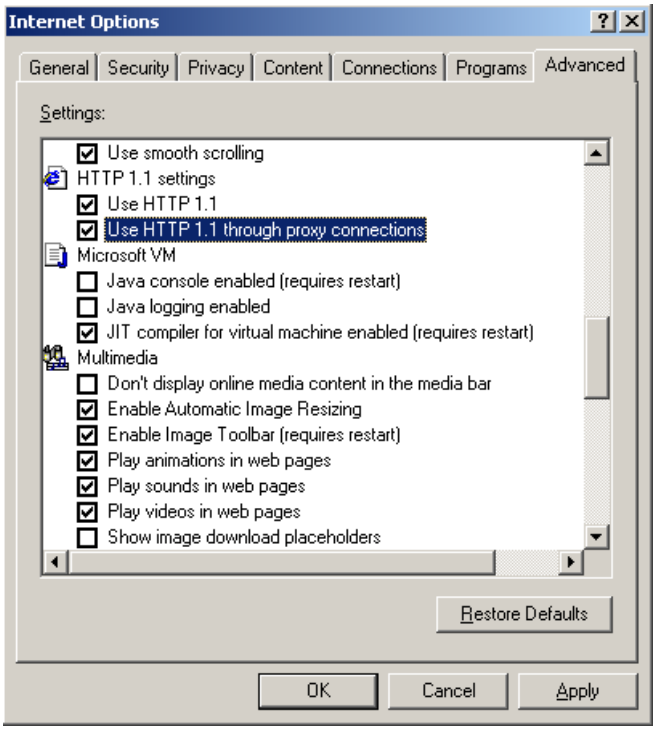
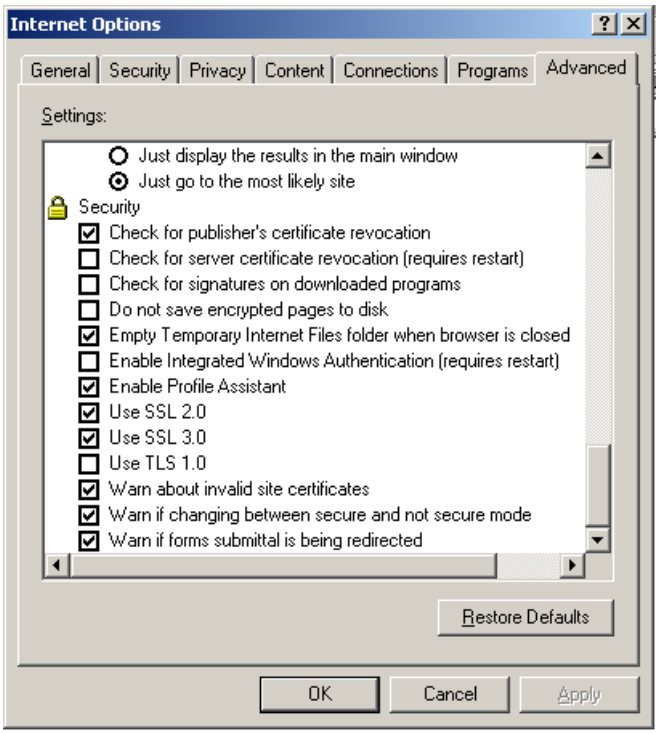


This problem may also be caused by checking the "Do not save encrypted pages to disk" setting. This option is found under the Tools->Internet Options panel on the Advanced tab in the Security section.



Raw XML is displayed in the browser

If a panel much like the following is displayed when loading the terminal it usually indicates that the MSXML parser is either not available or at the wrong level. This can be caused by not having MSXML installed, by installing another product that disables MSXML, or by uninstalling a product that removes the MSXML registry entries.

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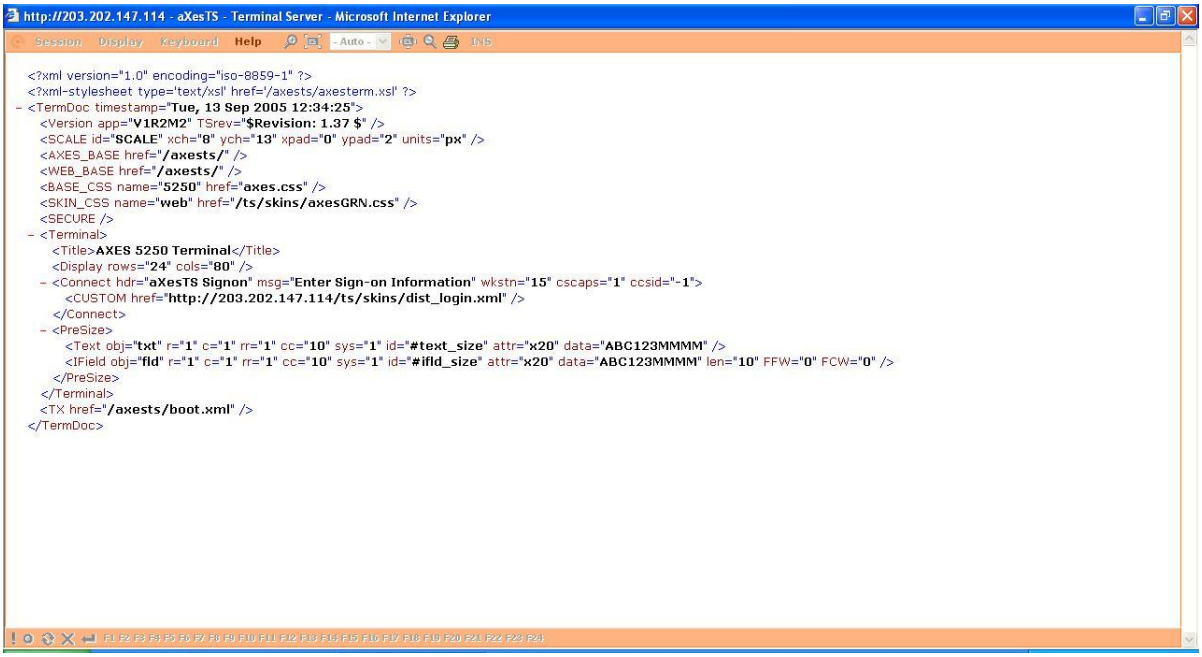

The cause of this problem and the recovery process is the same as for the previous error.

The XML page cannot be displayed

Cannot view XML input using XSL style sheet

Please correct the error and then click the Refresh button, or try again later

Error while parsing “https://system:port/ts/skins/my_login.xml”.

No data is available for the requested resource

This message, or similar, indicates the client did not receive an XML document from the host or the XML document cannot be parsed.

Follow the instructions for the “Error loading transaction” topics with similar titles in this section for recovery.

Message “CPF1296 – Signon information required.” displayed

This message is usually caused by a customized sign-on display where the row and column order has changed the relative positions of the fields. The aXes terminal has a temporary restriction which requires that the IBM supplied input-capable fields must be specified with row and column values such that the fields are present in the following order.

- USERID
- PASSWRD
- PROGRAM
- MENU
- CURLIB

You may change the row and column positions for these fields but USERID must always be prior to PASSWRD, and PASSWRD must always be prior to PROGRAM, and so on, even when some fields (such as PROGRAM, MENU, or CURLIB) are non-display fields.

> Do not confuse row and column position with buffer position.
>
> IBM requires that you must not change the buffer position when altering the sign-on screen but you can change the row and column positions of the fields.
>
> aXes Terminal Server requires that the row and column positions you use do not alter the relative positions of these fields.

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Other errors

If the previous information does not help you solve your problem you can obtain additional diagnostic information about the terminal session from the Help->Diagnostics menu in the terminal session menu bar.

Configuration File Problem Analysis

Configuration file entries that are incorrect will cause a message to be sent to the job log of the server job indicating the problem. Read the second-level help for the message and correct the directive in error. Stop and restart the server.

aXes Terminal Server Problem Analysis

If the aXes Terminal Server was started using the STRAXESTS command, or by an aXes Application Server instance, or automatically when the AXES subsystem was started, the server jobs run under the AXES user profile. You can find these jobs by using the WRKUSRJOB USER(AXES) command.

If the aXes Terminal Server will not start the most likely cause is that the required TCP/IP port is in use by another process. Determine the port number and host identifier (IP address or host name) from the appropriate configuration file. Each server must use a unique combination of host and port. Use the NETSTAT OPTION(*CNN) command to check if the port is in use.

Always check the job log of the server job for error messages—even if an error message is displayed at the client there may be more detailed information in the server job log.

If the information in the job log is not sufficient to determine the cause of the problem then tracing can be activated to get low-level detail about the server process.

Tracing is activated by adding the Trace=1 directive to the aXes-TS configuration file and then starting the server. The diagnostic trace is written to the <log-path>/.aXesTStrc.txt file. The log-path can be controlled by specifying the LogPath= directive. For example:

LogPath=/logs/mylogs

The trace data detail can be controlled by specifying the TraceLevel= directive. This directive takes a list of options. For example:

To log Informational messages, specify: **TraceLevel=Info**

To log Warning messages, specify: **TraceLevel=Warn**

To log Error messages, specify: **TraceLevel=Error**

To log all messages, specify: **TraceLevel=Info Warn Error**

The TraceLevel= directive also causes the messages to be sent to the job log.

Message CPF1151 when starting the server

This means a library exists in both the system portion of the library list and the user portion of the library list. It is usually caused by specifying QTEMP in the QSYSLIBL system value. A work-around is to remove QTEMP from the AXES job description. Use the Change Job Description (CHGJOBD) command to do this.

aXes Data Explorer Problem Analysis

If the aXes Data Explorer Server was started using the STRAXESDE command, or by an aXes Application Server instance, or automatically when the AXES subsystem was started, the server jobs run under the AXES user profile. You can find these jobs by using the WRKUSRJOB USER(AXES) command.

If the aXes Data Explorer server will not start the most likely cause is that the required TCP/IP port is in use by another process. Determine the port number and host identifier (IP address or host name) from the appropriate configuration file. Each server must use a

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unique combination of host and port. Use the NETSTAT OPTION(*CNN) command to check if the port is in use.

Always check the job log of the server job for error messages - even if an error message is displayed at the client there may be more detailed information in the server job log.

If the information in the job log is not sufficient to determine the cause of the problem then tracing can be activated to get low-level detail about the server process.

Tracing is activated by adding the showTrace=true directive to the aXes-DE configuration file and then starting the server. The diagnostic trace is written to the server job log.

aXes Data Explorer uses the SQL CLI to run SQL statements in server mode. When SQL runs in server mode, SQL statements are run in a separate QSQSRVR job. This allows a single script to handle multiple database connection from different clients. You can determine which QSQSRVR jobs are being used by looking in the job log for the aXes-DE job.

aXes Data Explorer AXES123 started successfully.

FastCGI: This is a FastCGI job initiated by 400956/AXES/AXES123.

Job 400153/QUSER/QSQSRVR used for SQL server mode processing.

Job 400155/QUSER/QSQSRVR used for SQL server mode processing.

Job 400153/QUSER/QSQSRVR used for SQL server mode processing.

Job 400153/QUSER/QSQSRVR used for SQL server mode processing.

Job 400155/QUSER/QSQSRVR used for SQL server mode processing.

If you have user's connecting with different user profiles each user may connect using a different QSQSRVR.

You can use the Display Job (DSPJOB) or Work with Job (WRKJOB) command to display information about the QSQSRVR job. For example:

DSPJOB (400153/QUSER/QSQSRVR)

Take option 10 to display the job log and press F10 to see all the messages. If a database connection is active you should see something similar to the following:

Job 400153/QUSER/QSQSRVR started on 16/06/05 at 08:34:53 in subsystem

QSYSWRK in QSYS. Job entered system on 16/06/05 at 08:34:53.

User Profile = AXES

If you want to see the Query Optimiser messages for SQL statements running in this job you can service the job and start debug, for example:

STRSRVJOB JOB(400153/QUSER/QSQSRVR)

STRDBG

Alternatively, you can use the query analysis tools provided with Operations Navigator.

The QSQSRVR jobs are IBM-supplied pre-started jobs running in the QSYSWRK subsystem. They are re-used when a database connection is closed. As part of the cleanup during close the job log is cleared. This can make diagnosing errors difficult. You can force the pre-started jobs to be used only once and to always create a job log on completion.

1. Display the subsystem description for QSYSWRK, list the defined pre-start jobs, and display the QSQSRVR entry.

   DSPSBSD QSYSWRK

   Then take, Option 10 Prestart job entries,

   then Option 5=Display on QSQSRVR.

   Note the Job description and Maximum number of uses. The job description is usually the job description associated with the QUSER user profile.

2. Change the pre-start job attributes so each job is used only once.

   CHGPJE SBSD(QSYSWRK) PGM(QSQSRVR) MAXUSE(1)

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3. Change the job description of the jobs to force a job log.

   CHGJOBD JOBD(jobd-noted-earlier) LOG(4 0 *SECLVL)

Run the aXes Data Explorer Server request again and you should find a job log created for the QSQSRVR job. Examine this for possible errors.

Once you have completed debug and diagnosis return the pre-start job and job description settings to their previous values.

Many of the SQL error messages displayed by aXes Data Explorer Server also include the SQL State and SQL Code. The SQL State values are those defined by the X/OPEN SQL CAE and the X/Open SQL CLI plus IBM specific and product specific SQL State values. You can look up the meaning the various SQL State and SQL Code values in the IBM DB2/400 documentation.

When aXes Data Explorer Server is connecting to the local database (i.e., the *LOCAL database defined on the system on which the aXes Data Explorer Server is running) the requests are run in a QSQSRVR job as described above. However, when connecting to a remote database the SQL request will have a local QSQSRVR job involved but it will also have a job at the remote server. For remote IBM i servers that job will be a QRWTSRVR job. You may need to perform similar diagnostic procedures for this job as described for the QSQSRVR job.

For other remote databases such as DB2 UDB you will need to follow appropriate diagnostic procedures for that database. See the vendor's documentation for more information.

For IBM i you can also take the absolute value of the SQL code and prefix it with the characters 'SQ' if the code is 5 digits or 'SQL' if the code is 4 digits to derive a message identifier. Then you can display the message description from the QSQLMSG message file to see the second-level text of the message. For example, information about SQL code 30060 can be found by prefixing it with 'SQ' and then running the following command:

DSPMSGD SQ30060 QSQLMSG

Some common problems and suggestions for resolving them follow:

User cannot connect to datasource. SQLSTATE: 08001 SQLCODE: -30080

This message is equivalent to SQ30080 and usually means the *DDM TCP server is not started at the target system. For IBM i systems you can use the STRTCPSVR *DDM command to start it. For other systems see the database vendor's documentation. Other possible causes are:

- The remote system is not available
- The communications network is not available
- The user identifier specified does not exist on the remote system
- The remote system might require the password to be encrypted
- The password might not be correct for the specified user

See the second-level text of message SQ30080 for recovery information. For example:

DSPMSG SQ30080 QSQLMSG

User cannot connect to datasource. SQLSTATE: 08004 SQLCODE: -30061

This message is equivalent to SQ30061 and usually means the specified relational database (RDB) was not found at the target system. Ensure the name of the database defined in Work with Relational Database Entries (WRKRDBDIRE) matches the name of the remote database and that it points to the correct remote system.

Character conversion cannot be performed. SQLSTATE: 22021 SQLCODE: -331

This message is equivalent to SQL0331 and usually means the CCSID of the data in the table being queried is not compatible with the CCSID of the aXes Data Explorer Server job. One example is trying to read data from a field tagged with CCSID 5026 when the aXes Data Explorer Server is running in CCSID 37.

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See the second-level text of message SQL0331 for recovery information. For example:

DSPMSG SQL0331 QSQLMSG

400 Bad Request

This is a general HTTP error condition and means that the aXes Data Explorer Server did not respond to the application server within the allowed time. It is often caused when running a query over a large database table. Increase the –idle-timeout value specified on the FastCGIServer directive for the /aXes-WS server in the application server configuration file.

You should also perform normal SQL diagnostic processes to optimise the query such as evaluating index and access path usage. See above for information about database tools how to obtain the Query Optimiser messages for aXes Data Explorer Server.

This error can also occur if the Lua scripts are running with a CCSID where square brackets do not have the expected values. Error messages in the aXes-DE server job log will usually give an indication that this is the problem. Change the CCSID used by the server job by setting the ServerCCSID= directive in the aXes-DE configuration file. Try CCSID 37 first and experiment until you find a CCSID suitable for your environment.

Be aware that these are simply the most likely causes but 400 Bad Request can be sent for many other reasons and can indicate network problems, file problems, or authority problems.

aXes Spool File Server Problem Analysis

If the aXes Spool File Server was started using the STRAXESWS command, or by an aXes Application Server instance, or automatically when the AXES subsystem was started, the server jobs run under the AXES user profile. You can find these jobs by using the WRKUSRJOB USER(AXES) command.

If the aXes Spool File Server will not start the most likely cause is that the required TCP/IP port is in use by another process. Determine the port number and host identifier (IP address or host name) from the appropriate configuration file. Each server must use a unique combination of host and port. Use the NETSTAT OPTION(*CNN) command to check if the port is in use.

Always check the job log of the server job for error messages—even if an error message is displayed at the client there may be more detailed information in the server job log.

Some common problems and suggestions for resolving them follow:

Logon fails

It usually means the user ID or password is incorrect. A message can also appear when signing on to aXes Terminal Server using a skin that shows the spooled output tab (such as /ts/skins/ts.html). In this case it usually means the aXes Spool File Server is not licensed for this system therefore the automatic logon to aXes Spool File Server has failed. In this case use a skin that does not include spooled output such as /ts/skins/ts_basic.html

400 Bad Request

This is a general HTTP error condition and means that the aXes Spool File Server did not respond to the application server within the allowed time. It is often caused when listing spooled files on a small host system with a large number of spooled files. Increase the –idle-timeout value specified on the FastCGIServer directive for the /aXes-WS server in the aXes Application Server configuration file.

Be aware that this is simply the most likely cause but 400 Bad Request can be sent for many other reasons and can indicate network problems, file problems, or authority problems.

iconv_open (3021) The value specified for the argument is not correct

Means: Conversion from the spooled file CCSID is not supported.

Ensure that the spooled file CCSID is correct and that the data contained in the spooled file matches the CCSID of the spooled file.

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iconv (3021) The value specified for the argument is not correct

Means: The conversion stopped because of an incomplete character or shift-state sequence at the end of the input buffer. For example, an EBCDIC shift-out (x'0e') control character may be encountered without a closing shift-in (x'0f') control character, or a DBCS character may be split and incomplete.

Ensure that the spooled file CCSID is correct and that the data contained in the spooled file matches the CCSID of the spooled file.

iconv (3028) Message data is not valid

Means: Shift-state is not valid in input data.

The beginning shift-state of the input data buffer does not correspond to the shift-state of the conversion descriptor. A shift-state sequence was encountered that tried to change the shift state of the input buffer to the current shift-state of the conversion descriptor. For example, an EBCDIC shift-in (x'0f') control character may have been encountered while the conversion descriptor indicated single-byte state.

Ensure that the spooled file CCSID is correct and that the data contained in the spooled file matches the CCSID of the spooled file.

PDF problem analysis

Always check the aXes Spool File Server job log on the host for possible script error messages.

Acrobat Reader

If a window is displayed at the client showing an Adobe Reader error such as:

> "Adobe Reader could not open file tempfile.fdf because it is either not a supported file type or because the file has been corrupted (for example, it was sent as an e-mail attachment and wasn't correctly decoded)."

Use Search to locate the file name shown in the message and open it in WordPad to see what the problem may be.

CPF9801 Object &1 in library &2 not found.

If this message occurs in the AXESWS server job log then read the second-level text of the message. If it refers to object type *FNTRSC (or perhaps *FNTTBL) then you are missing fonts required by Host Print transform during the creation of an image-based PDF. You must install the missing fonts. See the aXes QuickStart for information about required font products.

aXes Application Server Problem Analysis

If the aXes Application server was started using the STRAXESW3 command the server jobs run under the AXES user profile. You can find these jobs by using the WRKUSRJOB USER(AXES) command.

If the aXes Application Server will not start the most likely cause is that the required TCP/IP port is in use by another process. Determine the port number and host identifier (IP address or host name) from the appropriate configuration file. Each server must use a unique combination of port and host. Use the NETSTAT OPTION(*CNN) command to check if the port is in use.

If the information in the job log is not sufficient to determine the cause of the problem then tracing can be activated to get low-level detail about the server process.

Tracing is activated by adding the Trace=1 directive to the aXesW3 configuration file and then starting the server. The diagnostic trace is written to the <log-path>/.aXesW3trc.txt file. The log-path can be controlled by specifying the LogPath= directive. For example:

```
LogPath=/logs/mylogs
```

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The trace data detail can be controlled by specifying the TraceLevel= directive. This directive takes a list of options. For example:

To log Informational messages, specify: **TraceLevel=Info**

To log Warning messages, specify: **TraceLevel=Warn**

To log Error messages, specify: **TraceLevel=Error**

To log all messages, specify: **TraceLevel=Info Warn Error**

The TraceLevel= directive also causes the messages to be sent to the job log.

Message CPF1151 when starting the server

This means a library exists in both the system portion of the library list and the user portion of the library list. It is usually caused by specifying QTEMP in the QSYSLIBL system value. A work-around is to remove QTEMP from the AXS job description. Use the Change Job Description (CHGJOBD) command to do this.

Document Access Problem Analysis

When using the aXes Application Server:

Verify that *PUBLIC has read (*R) authority and does not have execute (*X) authority to the data files being served.

Verify that *PUBLIC has execute (*X) authority and does not have read (*R) authority to scripts being run.

HTTP Status Codes

Status codes are part of the response that the aXes Application Server returns to clients that request information from the server. Status codes are a standard function of using the HyperText Transfer Protocol (HTTP). This section lists all of the status codes in version 1.1 of HTTP. The aXes Application Server supports the HTTP/0.9, HTTP/1.0, and most of the HTTP/1.1 specifications.

The complete set of HTTP specifications is available on the Web at http://www.w3.org/Protocols/Specs.html#rfc. The RFC documents provide the complete definition for the HTTP status codes. You should read this RFC to find out more information about HTTP status codes.

Informational 1xx

These status codes indicate a provisional response. The response consists of only the status line and optional headers. The server ends the response with an empty line. HTTP/1.0 (HTTP version 1.0) did not define any 1xx status codes. This means that servers should not send a 1xx response to an HTTP/1.0 client except under experimental conditions.

The informational 1xx status codes include the following:

100	Continue
101	Switching Protocols

Successful 2xx

These status codes indicate that the server successfully received, understood, and accepted the client's request.

The successful 2xx status codes include the following:

200	OK
201	Created

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202	Accepted
203	Non-Authoritative Information
204	No Content
205	Rest Content
206	Partial Content

Redirection 3xx

These status codes indicate that the browser must take further action to fulfil the user request. The browser can carry out the action required by the server. The browser can do this without interaction with the user if and only if the method used in the second request is GET or HEAD. A browser should not automatically redirect a request more than five times. Such redirections usually indicate an infinite loop.

The redirection 3xx status codes include the following:

300	Multiple Choices
301	Moved Permanently
302	Found
303	See Other
304	Not Modified
305	Use Proxy

Client Error 4xx

The 4xx class of status code is intended for cases in which the client causes an error. Except when the server responds to a HEAD request, the server includes an entity that contains the following information:

- An explanation of the error situation
- An analysis of whether it is a temporary or permanent condition

These status codes are applicable to any request method. Browsers should display any entity that the server includes.

The client error 4xx status codes include the following:

400	Bad request
401	Unauthorized
402	Payment Required
403	Forbidden
404	Not Found
405	Method Not Allowed
406	Not Acceptable
407	Proxy Authentication Required
408	Request Timeout

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409	Conflict
410	Gone
411	Length Required
412	Precondition Failed
413	Request Entity Too Large
414	Request URI Too Long
415	Unsupported Media Type

Server Error 5xx

The 5xx status codes indicate cases in which the server causes an error or is incapable of performing a request. Except when responding to the HEAD request, the server includes an entity that contains the following information:

An explanation of the error situation

An analysis of whether it is a temporary or permanent condition

These status codes are applicable to any request method. Browsers should display any entity that the server includes.

The server error 5xx status codes include the following:

500	Internal Server Error
501	Not Implemented
502	Bad Gateway
503	Service Temporarily Overloaded
504	Gateway Timeout
505	HTTP Version Not Supported

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Appendix C - Editing stream files

This appendix discusses the editing aXes text files on the IFS.

All aXes files on the IFS are owned by the AXES user profile.

All aXes files on the IFS are marked with the CCSID attribute value of 819 except the hidden .axespwd files which have a CCSID of 37.

Editing the aXes Servers' Configuration File

The Edit File (EDTF) CL command allows you to edit a stream file or a database file. The command is shipped with the base code of IBM i. The EDTF utility is a fairly primitive text editor but it is a quick and convenient method of making changes to stream files.

To edit an aXes server configuration file with EDTF, you can run the command directly, or you can select option 22=Edit configuration from the Work with aXes Servers (WRKAXESSVR) panel.

To run the EDTF command directly, perform the following steps:

Step 1: Start the file editor

Type the EDTF command on an IBM i command line and press F4. The Edit File (EDTF) command prompt will be shown. The command prompt show two parameters:

If you want to edit a stream file, enter the directory path and the name of the file in the Stream file (STMF) parameter.

If you want to edit a database file, enter the database file name and library.

```
                         Edit File (EDTF)
Type choices, press Enter.
Stream file, or  . . . . . . . .  ________________________________
Data base file . . . . . . . . .  __________   Name
  Library  . . . . . . . . . . .  *LIBL_____   Name, *LIBL, *CURLIB


                                                                Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Step 2: Define directory path and file name

Enter the directory path and name of the file to be edited in the Stream file (STMF) parameter. In our example, we edit an aXes-TS configuration file. In this example, the file is located in the /axes/configs directory.

```
                         Edit File (EDTF)
Type choices, press Enter.
Stream file, or  . . . . . . . .  > /axes/configs/aXesTS.conf______
Data base file . . . . . . . . .  __________   Name
  Library  . . . . . . . . . . .  *LIBL_____   Name, *LIBL, *CURLIB


                                                                Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

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Step 3: Edit the file

After the Edit File (EDTF) command is invoked, you see a display similar to the example shown above.

When editing a file with the EDTF command, line commands are available, such as:

- I for inserting a line
- D for deleting a line
- C for copying a line
- R for repeating a line

To see an overview of the available line commands, position the cursor on one of the input lines and press function key F1 for help. You receive a help display showing you which commands are allowed.

```
Edit File: /axes/configs/aXesTS.conf
Record . : ______1 of      61 by __8            Column: ___1 of   80 by _74
Control  : ____________________________________________________________
                                                                        CMD
....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+
___  ************Beginning of data**************
___ #
___ # Default aXesTS configuration file
___ # Uncomment (remove the #) and alter as required
___ #
___ # We compress by default
___ #Compress=1
___
___ # Any response less than 400 bytes will not be compressed
___ #ZipLimit=400
___
___ # The elapsed time before the browser client intervenes
___ # This time must be less than the “-idel-timeout” specified
___ # on the FastCgi directives (FastCgiServer and FastCgiExternalServer)
___ # in the aXesW3 configuration file.
___ #TSInactiveLimit=30
___

F2=Save   F3=Save/Exit   F12=Exit   F15=Services   F16=Repeat find
F17=Repeat change  F19=Left  F20=Right
```

Step 3: Save the changed file

After you edit the file, press function key F3 (Save/Exit) to save your changes and exit the EDTF command.

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Appendix D - DBCS Support

Terminal Server

The aXes Terminal Server will create DBCS-capable devices when it is running on a DBCS-enabled version of IBM i. The QIGC system value indicates whether IBM i is DBCS enabled. If set to 1 the operating system is DBCS, if set to 0 the operating system is SBCS.

Note that IBM i V5R4 and above is always DBCS-capable thus aXes will always create DBCS devices by default.

The aXes Terminal Server will create a 5555-C01 device on DBCS-capable systems. You can specify the required workstation type globally using the DefaultWorkstationType= directive, or for a specific user on the user entry in the configuration file. See Section 1. Terminal Server Configuration for more information about these directives.

When a DBCS device is created the DBCS feature attributes are set automatically by IBM i based on the device keyboard type. However they are not changed when an existing device is reused even if they keyboard type is changed.

The following table shows the default DBCS features set for specific keyboard types:

Language	Keyboard Type	Keyboard Description	CS	CP	DBCS Feature
Japanese	JEB	Japan English	697	281	2424J4
	JEI	Japan English Multinational	697	500	2424J4
	JKB	Japan Kanji and Katakana	1172	290	2424J4
	JPB	Japan Latin Extended	1172	1027	2424J4
	JUB	Japan Kanji and United States English	697	37	2424J4
	KAB	Japan Katakana	332	290	2424J4
Korean	KOB	Korea	1173	833	2424K0
Chinese	RCB	Simplified Chinese	1174	836	2424S0
	TAB	Traditional Chinese	1175	37	2424C0

If specific DBCS features are required for your application then specify the correct keyboard type and let aXes create new devices, or manually create the devices with the required DBCS feature and let aXes reuse the devices.

You can specify the required keyboard type globally using the DefaultKeyboardType= directive in the aXes-TS configuration file, or for a specific user on the user entry in the configuration file. See Section 1. Terminal Server Configuration for more information about these directives.

Input Method Editors

Dynamic HTML does not allow full control over the Input Method Editor (IME). aXes Terminal Server will activate the IME for the current language when the cursor enters a DBCS-capable or Katakana-shift field. Although aXes Terminal Server will activate the IME for Katakana-shift fields it cannot switch to Half-width Katakana input mode. The user must do that using the mouse or a keyboard shortcut. Normally the IME is in Direct Input mode. For DBCS-

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Open and DBCS-Either fields, the IME will retain its previous setting. For DBCS-Only and DBCS-Graphic fields, the IME is switched to DBCS input for Chinese and Korean. If the current language is Japanese the IME is switched to Hiragana input.

Spool File Server

The aXes Spool File Server supports DBCS data if the CCSID of the spooled file can be determined. See Data Conversion for information on how Web Spooler performs data conversion.

PDF documents that contain DBCS data may require the Adobe Asian Fonts to be downloaded. Acrobat Reader will determine if these fonts are required when a PDF containing DBCS data is opened. A “Missing Components Found” message box will be displayed asking if you want to download one of the Asian Fonts.

There are four categories of Asian Fonts supplied by Adobe:

Japanese	6.95 MB
Traditional Chinese	7.08 MB
Simplified Chinese	10.73 MB
Korean	4.11 MB

If you choose to not install the appropriate Asian fonts you will not be able to correctly view PDF documents that contain DBCS data.

If you have AFPDS or IPDS spooled files that contain DBCS data you will also need to install the IBM AFP DBCS Fonts/400 collection.

Data Explorer Server

The aXes Data Explorer Server supports DBCS data if the CCSID of the aXes-DE job is a DBCS CCSID. The CCSID is set by default to the value specified in the QCCSID system value. See Data Conversion for information on how Data Explorer performs data conversion.

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Appendix E - HTML keyword support

The aXes Terminal Server supports the use of the HTML keyword to embed HTML within a DDS-defined display panel. This allows you to embed HTML data from within your application and it will be displayed in the browser. The HTML can provide additional textual information and formatting, links to other locations or Javascript.

Data embedded via the HTML keyword is ignored when the record format is sent to a green-screen or terminal emulator. Information on how to code the HTML keyword and the restrictions that apply can be found in the DDS Reference and the Application Display Programming book. These books also provide coding examples.

Examples

Any valid HTML constructs can be used in the content of DDS fields that use the HTML keyword. Because the HTML will be rendered inside an already active HTML display you should include only HTML that is valid for inclusion in the BODY of an HTML document. For example:

```
A                                3  1HTML('<h1>HTML H1 Heading</h1><p>F-
A                                    irst paragraph containing an order-
A                                    ed list.<ol><li>Item 1<li>Item 2<l-
A                                    i>Item 3</ol><h2>HTML H2 Heading</-
A                                    h2><p>Second paragraph containing-
A                                     an unordered list.<ul><li>Item 1-
A                                    <li>Item 2<li>Item 3</ul><h3>HTML-
A                                     H3 Heading</h3><p>Third paragrap-
A                                    h containing a definition list.<dl-
A                                    ><dt>Term1<dd>Description 1<dt>Ter-
A                                    m 2<dd>Description 2</dl>')
```

Although the above example embeds the HTML directly in the DDS source you can of course populate variables with HTML data from within a program. Any variable in which you embed HTML must be defined as an HTML variable in the DDS for example:

```
A            HTMLSFL       12000A  P
A                                  1  2HTML('<h1>Test HTML Keyword</h1>')
A                                  2  1HTML('<p>This panel shows a list –
A                                      of items generated programmatical-
A                                      ly</p>')
A                                 10  1HTML(HTMLSFL)
```

The program can then populate the HTMLSFL field with the appropriate HTML.

This example is in RPG IV:

```
C                   Z-ADD     0              remainder         5 0
C                   Z-ADD     0              count             5 0
C                   Z-ADD     1              strPos            5 0
C                   MOVE      *BLANKS        tableRow        170
C                   IF        NOT(%OPEN(ITEMMAST))
C                   OPEN      ITEMMAST
C                   ENDIF
```

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```
 * Populate the list of items
C                   EVAL      tableHdr = '<table border="1"> +
C                             <tr bgcolor="008080"> +
C                             <th>Item</th><th>Description</th>-
C                             <th>Quantity</th><th>Backordered</th>-
C                             </tr>'
C                   EVAL      %SUBST(HTMLSFL : strPos : %SIZE(tableHdr)) =
C                                                                  tableHdr
C                   EVAL      strPos = strPos + %SIZE(tableHdr)
C     *START        SETLL     ITEMMAST
C                   READ      ITEMMAST
C                   DOW       NOT(%EOF(ITEMMAST))
C                   EVAL      count = count + 1
C     count         DIV       2              remainder
C                   MVR                      remainder
C                   IF        ( remainder = *ZERO )
C                   EVAL      tableRow = '<tr bgcolor="808080">'
C                   ELSE
C                   EVAL      tableRow = '<tr bgcolor="00FFFF">'
C                   ENDIF
C                   EVAL      tableRow = %TRIMR(tableRow) +
C                                        '<td>' + ITMNBR + '</td>' +
C                                        '<td>' + ITMDES + '</td>' +
C                                 '<td align="right">' + %EDITC(QTYOH:'Z') +
C                                 '</td>' +
C                                 '<td align="right">' + %EDITC(QTYBO:'Z') +
C                                 '</td></tr>'
C                   EVAL      %SUBST(HTMLSFL : strPos : %LEN(tableRow)) =
C                                                                  tableRow
C                   EVAL      strPos = strPos + %LEN(tableRow)
C                   IF        ( strPos + %SIZE(tableRow) > %SIZE(HTMLSFL) )
C                   LEAVE
C                   ENDIF
C                   READ      ITEMMAST
C                   ENDDO
C                   EVAL      %SUBST(HTMLSFL : strPos : 8) = '</table>'
```

This technique can also be used to embed clickable links in DDS panels.

```
A             HTMLDATA         500A  P
A                                       1  2HTML(HTMLDATA)
```

The links could be hard-coded inside the DDS source but here is an RPG IV example:

```
C                   EVAL      HTMLDATA = '<a href= +
C                             "http://www.google.com" target=_blank> +
C                             Google in a new window</a>'
```

If you use this technique you must ensure that links open in a new window and not inside the aXes terminal window.

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You can also embed inline Javascript if you set the “defer” attribute to true.

For example:

```
A             HTMLDATA         500A  P
A                                        1  2HTML(HTMLDATA)
```

The Javascript could be hard-coded inside the DDS source but here is an RPG IV example:

```
C                   EVAL      HTMLDATA = <h1>Test Javascript</h1> +
C                             <script +
C                             language="Javascript" defer="true"> +
C                             alert("Warning!\nUse of this application +
C                             is restricted to management approved +
C                             purposes only”); +
C                             </script>’
```

You can use this technique to integrate aXes Terminal Server functions into your HTML.

For example:

```
C                   EVAL      HTMLDATA =
C                             '<BUTTON onclick="PostAIDKey(''attention'')" +
C                             >Attention</BUTTON> +
C                             <BUTTON onClick="PostAIDKey('' f3 '')"> +
C                             F3</BUTTON>’
```

The Microsoft Knowledge Base has an article describing this use of DEFER at http://support.microsoft.com/kb/q273793/

Documentation for the DEFER attribute can be found in the "HTML and DHTML Reference" in the Microsoft MSDN library.

Limitations

The developer must ensure that valid well-formed HTML is specified when using this keyword. aXes Terminal Server does not validate the contents of HTML data fields. Well-formed HTML means all tags must be closed appropriately.

If you use the <img> tag in embedded HTML you should also specify the height and width attributes to avoid potential problems with images overlapping text.

Due to implementation limits in the IBM programs that handle the 5250 data stream the maximum amount of data that can be sent in an HTML field is 16,351 bytes. Although a display file will successfully compile with HTML fields that exceed this size, errors will occur when a record format is sent to the workstation.

If an HTML field exceeds 32,763 bytes the compile will fail with CPD7426 – Field length too large for data type. If the field is 32,763 bytes the file will compile but the QWSPUT program will fail with MCH1210 – Receiver too small for result. If the field is between 16,352 bytes and 32,762 bytes the file will compile but QWSPUT will fail with MCH0601 – Space offset x’00005000’ or teraspace offset x’0000000000000000’ is outside current limit for object WS FM RB – 0000000n.

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The sizes given above are for a single field. The actual size at which failure will occur depends on the number of other fields in the record format. To calculate the maximum amount of data that can be provided:

- For each HTML field allow the size of the field plus 14 bytes.
- For each constant field allow the size of the field plus 5 bytes.
- For each input, output or both field allow the size of the field plus 17 bytes for the first field of each type and 9 bytes for each additional field.

The size limit is per record format so you can send more data to the client by splitting the HTML fields across multiple formats.

The size limits described above are not found in any IBM documentation and have been obtained empirically. As such they are likely to change on different releases of the operating system and different combinations of field types and DDS keywords.

Unsupported features

Although it is possible to specify the following features in DDS they are not supported by aXes Terminal Server.

Embedded HTML in a DDS WINDOW	If you specify the HTML keyword in a WINDOW record format the HTML will not be rendered in the window. It will be rendered in the underlying base panel.
document.write()	If you specify document.write() in Javascript embedded in an HTML variable the aXes terminal session will be destroyed. This is because document.write() clears the existing terminal document structure.

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Appendix F - National Language Support

When aXes is installed on a system with a primary language different from one of the national languages supported by aXes you must select one of the supported languages.

Refer to the National Language Support section of the aXes Quick Start guide for a list of supported national languages, examples are 2924, 2938, 2950 or 2984.

The selected language must be installed as a secondary language. In most cases this is accomplished by specifying the language identifier on the LNG parameter of the RSTLICPGM command. However, if you are installing a new version of aXes beside a previous version and the primary language is different from the specified aXes language then you must install the *PGM and *LNG objects separately.

> The aXes Quick Start Guide includes installation instructions for national language support and installation of aXes versions.

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Appendix G - FastCGI External Server

The aXes FastCGI External Server feature may be used to achieve this type of configuration:

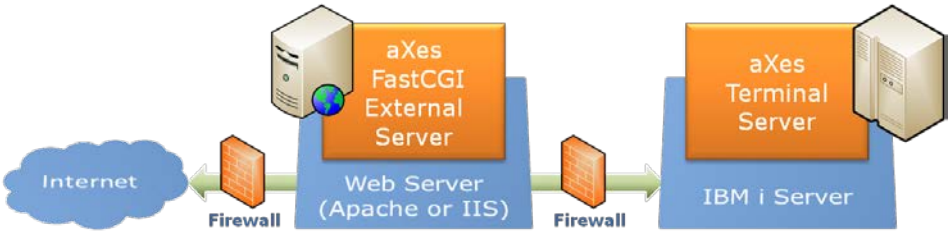

Figure 1: aXes FastCGI External Server

In this configuration the aXes-TS server runs on an IBM i server located behind a firewall. This provides an extra layer of security by not directly exposing the IBM i server to the Internet. However, this configuration prevents the use of aXes eXtensions.

Reverse proxy is a superior option for implementing this type of configuration.

A reverse proxy solution:

- Provides the same level of security with the IBM i server behind a firewall.
- Simplifies configuration and maintenance.
- Allows the use of aXes eXtensions.

> You cannot use aXes eXtensions when you configure aXes with a FastCGI External Server.

Another advantage of a reverse proxy configuration is the separation of network configuration from aXes configuration. No FastCGI configuration is required on the proxy server outside the firewall. Network administrators can manage and maintain the reverse proxy configuration without having to learn how to configure aXes.

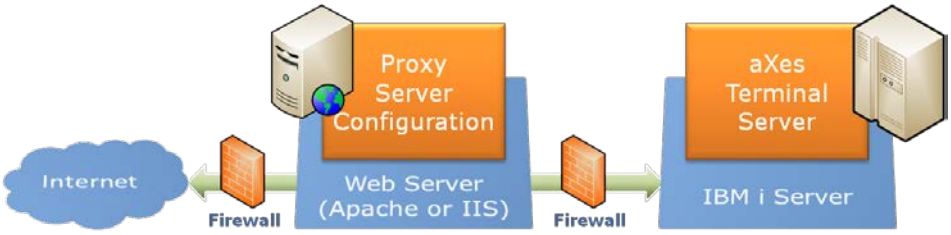

Figure 2: aXes with a Proxy Server

Please talk to your aXes reseller about using a reverse proxy solution before attempting to implement a FastCGI External Server solution.

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Appendix H - Command syntax diagrams

The commands are available through a menu interface. Commands are grouped by function on the aXes Administration Menu (GO AXESADM), and grouped alphabetically on the aXes Command Menu (GO CMDAXES).

Add aXes Data Explorer Server

Add aXes Terminal Server

Add aXes User

Add aXes Spool File Server

Add aXes Application Server

Change aXes Data Explorer Server

Change aXes Terminal Server

Change aXes User

Change aXes Spool File Server

Change aXes Application Server

Create aXes Access Control List

Delete aXes Access Control List

Display aXes Licence

End aXes Data Explorer Server

End aXes Terminal Server

End aXes Spool File Server

End aXes Application Server

Release aXes Licence

Remove aXes Data Explorer Server

Remove aXes Terminal Server

Remove aXes User

Remove aXes Spool File Server

Remove aXes Application Server

Start aXes Data Explorer Server

Start aXes Terminal Server

Start aXes Spool File Server

Start aXes Application Server

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Work with aXes Servers
Work with aXes Users

Commands and Menus in Library Lists

If the product language library is not in your library list you will have to qualify the menu name.

You can make the commands and menus available to your job by:

- Adding the product language library to the library list
- Qualifying the commands with the product language library name

You can make the commands and menus available to all jobs by:

- Adding the product language library to the QSYSLIBL or QUSRLIBL system values
- Duplicating the commands into a library that is in your library list

Command Syntax Conventions

The rules and syntax conventions shown in this section apply to all commands.

> Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

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ADDAXESDE (Add aXes Data Explorer Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ADDAXESDE---INSTANCE(--instance-name--)--------------->
                                                   (1)
>-----CFG(--path-name--)------------------------------->

>-----+----------------------------+------------------->
      |           .-*CFG--------.    |
      '--SVRDIR(--+-path-name-+--)---'
                                                   (2)(3)
>-----INTNETADR(--+-*ANY--------------+--)-------------->
                  '--internet-address--'
                                                   (3)
>-----PORT(--port-number--)---------------------------->
                                                   (2)
>-----SOCKET(--path-name--)---------------------------->

>-----+------------------------+----------------------><
      |             .-*YES-.    |
      '-AUTOSTART(--+-*NO--+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Add aXes Data Explorer Server (ADDAXESDE) command allows you to add an aXes Data Explorer Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ADDAXESDE

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling.

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AXS0025 Path not allowed.

AXS0301 Instance definition already exists.

AXS0306 Instance definition not added.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*CFG

The root directory specified in the configuration file is used. If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map

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system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the –socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*YES

The server is started automatically.

*NO

The server is not automatically started.

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ADDAXESTS (Add aXes Terminal Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ADDAXESTS---INSTANCE(--instance-name--)--------------->
                                                  (1)
>-----CFG(--path-name--)-------------------------------->
                                                  (2)(3)
>-----INTNETADR(--+-*ANY--------------+--)-------------->
                  '--internet-address--'
                                                  (3)
>-----PORT(--port-number--)----------------------------->
                                                  (2)
>-----SOCKET(--path-name--)----------------------------->

>-----+-----------------------+---------------------><
      |             .-*YES-.    |
      '-AUTOSTART(--+-*NO--+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Add aXes Terminal Server (ADDAXESTS) command allows you to add an aXes Terminal Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ADDAXESTS

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling.

AXS0301 Instance definition already exists.

AXS0306 Instance definition not added.

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Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Terminal Server jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

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Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the –socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

socket-path

Specify the path of the Unix domain socket the HTTP server and Terminal Server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*YES

The server is started automatically.

*NO

The server is not automatically started.

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ADDAXESUSR (Add aXes User)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ADDAXESUSR---USER(--user-name--)---------------------->

>-----PASSWORD(--password--)----------------------------->

>-----DIR(--path-name--)------------------------------><
```

The Add aXes User (ADDAXESUSR) command allows you to add a user to an aXes access control list object.

An access control list (ACL) is an object that contains the names of authorized users and encrypted passwords. It is used to control access to a directory path.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ADDAXESUSR

*ESCAPE Messages

AXS0003 User already exists.

AXS0007 Not authorized to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0012 Error(s) occurred adding user .

AXS0016 No such path or directory.

AXS0017 Access control list is in use.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling.

AXS0025 Path not allowed.

AXS0030 Character in name or password not valid.

AXS0132 Access control list not found.

User (USER)

Specifies the name of the user to add to the access control list.

This is a required parameter.

Password (PASSWORD)

Specifies the password for the user. This value is encrypted before being stored in the access control list.

This is a required parameter.

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Directory (DIR)

Specifies the path name of the directory containing the access control list to which this user will be added. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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ADDAXESWS (Add aXes Spool File Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ADDAXESWS---INSTANCE(--instance-name--)--------------->
                                                  (1)
>-----CFG(--path-name--)------------------------------->

>-----+----------------------------+------------------->
      |           .-*CFG--------.    |
      '--SVRDIR(--+-path-name-+--)---'
                                                  (2)(3)
>-----INTNETADR(--+-*ANY--------------+--)-------------->
                  '--internet-address--'
                                                  (3)
>-----PORT(--port-number--)---------------------------->
                                                  (2)
>-----SOCKET(--path-name--)---------------------------->

>-----+------------------------+----------------------><
      |             .-*YES-.    |
      '-AUTOSTART(--+-*NO--+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Add aXes Spool File Server (ADDAXESWS) command allows you to add an aXes Spool File Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ADDAXESDE

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling.

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AXS0025 Path not allowed.

AXS0301 Instance definition already exists.

AXS0306 Instance definition not added.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Web Spooler jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*CFG

The root directory specified in the configuration file is used. If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map

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system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the –socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*YES

The server is started automatically.

*NO

The server is not automatically started.

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ADDAXESW3 (Add aXes Application Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ADDAXESW3---INSTANCE(--instance-name--)--------------->
                                                  (1)
>-----CFG(--path-name--)------------------------------->

>-----+----------------------------+------------------->
      |           .-*CFG--------.    |
      '--SVRDIR(--+-path-name-+--)---'

>-----+----------------------------+------------------->
      |           .-*CFG--------.    |
      '--LOGDIR(--+-path-name-+--)---'

>-----+-------------------------------------+----------->
      |              .-*CFG-------------.    |
      '--INTNETADR(--+-*ANY-------------+--)-'
                     '-internet-address-'

>-----+---------------------------+-------------------->
      |         .-*CFG--------.    |
      '--PORT(--+-port-number-+--)-'

>-----+----------------------------+------------------->
      |           .-*CFG--------.    |
      '-SSLPORT(--+-port-number-+--)-'

>-----+------------------------+----------------------><
      |             .-*YES-.    |
      '-AUTOSTART(--+-*NO--+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form

The Add aXes Application Server (ADDAXESW3) command allows you to add an aXes Application Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

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Error messages for ADDAXESW3

*ESCAPE Messages

AXS0007 Not authorised to object.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0301 Instance definition already exists.

AXS0306 Instance definition not added.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Application Server jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'Dir=' keyword in the configuration file.

The possible values are:

*CFG

The root directory specified in the configuration file is used.

> If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Log directory (LOGDIR)

Specifies the path name of the server log directory. The server log directory is where the server will create the logging files. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'LogPath=' keyword in the configuration file.

The possible values are:

*CFG

The log directory specified in the configuration file is used.

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log-directory-path

Specify the absolute path of the log directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*CFG

The internet address specified in the configuration file is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*CFG

The non-secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the Terminal Server is listening on otherwise a port that is specified can result in the connection being rejected.

Secure port (SSLPORT)

Specifies the TCP/IP port number that the server will listen on for secure requests. Secure requests are commonly known as Secure Hypertext Transfer Protocol (HTTPS) and use SSL1, SSL2, or TLS to encrypt data. The standard port number for HTTPS requests is 443 but the aXes Application Server does not have a default secure port value. Other port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

A secure port number must be specified here or in the configuration file to enable HTTPS. The 'SSLAppID=' keyword must be specified in the configuration file.

> When a port other than 443 is used, the client is required to include a specific port number when sending requests to the server.

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This parameter overrides the 'SSLPort=' keyword in the configuration file.

The possible values are:

*CFG

The secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The client must be aware of the specific port the server is listening on otherwise a port that is specified can result in the connection being rejected.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*YES

The server is started automatically.

*NO

The server is not automatically started.

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CHGAXESDE (Change aXes Data Explorer Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-CHGAXESDE---INSTANCE(--instance-name--)--------------->

>-----+------------------------+------------------------->
      |       .-*SAME-----.    |
      '-CFG(--+-path-name-+--)-'
                                                        (2)(3)
>-----+---------------------------+--------------------->
      |           .-*SAME-----.    |
      '--SVRDIR(--+-*CFG------+--)-'
                  '-path-name-'

>-----+-------------------------------------+------------>
      |             .-*SAME------------.    |
      '-INTNETADR(--+-internet-address-+--)-'
                                                        (3)
>-----+--------------------------+---------------------->
      |        .-*SAME-------.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+--------------------------+---------------------->
      |          .-*SAME-----.    |
      '-SOCKET(--+-path-name-+--)-'

>-----+-------------------------+---------------------><
      |             .-*SAME-.    |
      '-AUTOSTART(--+-*YES--+--)-'
                    '-*NO---'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Change aXes Data Explorer Server (CHGAXESDE) command allows you to change an aXes Data Explorer Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

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Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CHGAXESDE

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0302 Instance definition not found.

AXS0307 Instance definition not changed.

CPF0011 Error detected by prompt override program.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

The possible values are:

*SAME

The configuration file value that was previously set does not change.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*SAME

The server root directory value that was previously set does not change.

*CFG

The root directory specified in the configuration file is used.

> If no root directory is specified in the configuration file, the installed root directory is used.

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root-directory-path

Specify the absolute path of the server root directory. Internet address to bind

(INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*SAME

The internet address value that was previously set does not change.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*SAME

The port value that was previously set does not change.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the -socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

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For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*SAME

The socket value that was previously set does not change.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*SAME

The auto-start value that was previously set does not change.

*YES

The server is started automatically.

*NO

The server is not automatically started.

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CHGAXESTS (Change aXes Terminal Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-CHGAXESTS---INSTANCE(--instance-name--)--------------->


>-----+-----------------------+------------------------->
      |       .-*SAME-----.    |
      '-CFG(--+-path-name-+--)-'
                                                        (2)(3)
>-----+-----------------------------------+------------>
      |             .-*SAME------------.    |
      '-INTNETADR(--+-internet-address-+--)-'
                                                        (3)
>-----+-------------------------+--------------------->
      |        .-*SAME-------.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+-------------------------+--------------------->
      |          .-*SAME-----.    |
      '-SOCKET(--+-path-name-+--)-'


>-----+-------------------------+--------------------><
      |             .-*SAME-.    |
      '-AUTOSTART(--+-*YES--+--)-'
                    '-*NO---'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Change aXes Terminal Server (CHGAXESTS) command allows you to change an aXes Terminal Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CHGAXESTS

*ESCAPE Messages

AXS0007 Not authorized to object.

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AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0302 Instance definition not found.

AXS0307 Instance definition not changed.

CPF0011 Error detected by prompt override program.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Terminal Server jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

The possible values are:

*SAME

The configuration file value that was previously set does not change.

configuration-path

Specify the absolute path of the configuration file.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*SAME

The internet address value that was previously set does not change.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

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A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*SAME

The port value that was previously set does not change.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the -socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*SAME

The socket value that was previously set does not change.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*SAME

The auto-start value that was previously set does not change.

*YES

The server is started automatically.

*NO

The server is not automatically started.

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CHGAXESUSR (Change aXes User)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-CHGAXESUSR---USER(--user-name--)---------------------->

>-----PASSWORD(--password--)----------------------------->

>-----DIR(--path-name--)------------------------------><
```

The Change aXes User (CHGAXESUSR) command allows you to change a user in an aXes access control list object.

An access control list (ACL) is an object that contains the names of authorized users and encrypted passwords. It is used to control access to a directory path.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CHGAXESUSR

*ESCAPE Messages

AXS0005 User not found.

AXS0007 Not authorised to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0013 Error(s) occurred changing user .

AXS0016 No such path or directory.

AXS0017 Access control list is in use.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0030 Character in name or password not valid.

AXS0132 Access control list not found.

User (USER)

Specifies the name of the user to change in the access control list.

This is a required parameter.

Password (PASSWORD)

Specifies the password for the user. This value is encrypted before being stored in the access control list.

This is a required parameter.

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Directory (DIR)

Specifies the path name of the directory containing the access control list in which this user will be changed. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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CHGAXESWS (Change aXes Spool File Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-CHGAXESWS---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*SAME-----.    |
      '-CFG(--+-path-name-+--)-'
                                                        (2)(3)
>-----+---------------------------+--------------------->
      |           .-*SAME-----.    |
      '--SVRDIR(--+-*CFG------+--)-'
                  '-path-name-'

>-----+-----------------------------------+------------>
      |             .-*SAME------------.    |
      '-INTNETADR(--+-internet-address-+--)-'
                                                        (3)
>-----+-------------------------+--------------------->
      |        .-*SAME-------.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+-------------------------+--------------------->
      |          .-*SAME-----.    |
      '-SOCKET(--+-path-name-+--)-'

>-----+-----------------------+--------------------><
      |             .-*SAME-.    |
      '-AUTOSTART(--+-*YES--+--)-'
                    '-*NO---'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Change aXes Spool File Server (CHGAXESWS) command allows you to change an aXes Spool File Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

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Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CHGAXESWS

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0302 Instance definition not found.

AXS0307 Instance definition not changed.

CPF0011 Error detected by prompt override program.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Web Spooler jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

The possible values are:

*SAME

The configuration file value that was previously set does not change.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*SAME

The server root directory value that was previously set does not change.

*CFG

The root directory specified in the configuration file is used.

> If no root directory is specified in the configuration file, the installed root directory is used.

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root-directory-path

Specify the absolute path of the server root directory. Internet address to bind

(INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*SAME

The internet address value that was previously set does not change.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*SAME

The port value that was previously set does not change.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the -socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

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For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*SAME

The socket value that was previously set does not change.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*SAME

The auto-start value that was previously set does not change.

*YES

The server is started automatically.

*NO

The server is not automatically started.

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CHGAXESW3 (Change aXes Application Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                    (1)
>>-CHGAXESW3---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*SAME-----.    |
      '-CFG(--+-path-name-+--)-'

>-----+---------------------------+--------------------->
      |           .-*SAME-----.    |
      '--SVRDIR(--+-*CFG------+--)-'
                  '-path-name-'

>-----+---------------------------+--------------------->
      |           .-*SAME-----.    |
      '--LOGDIR(--+-*CFG------+--)-'
                  '-path-name-'

>-----+-------------------------------------+----------->
      |              .-*SAME------------.    |
      '--INTNETADR(--+-*CFG-------------+--)-'
                     +-*ANY-------------+
                     '-internet-address-'

>-----+---------------------------+--------------------->
      |         .-*SAME-------.    |
      '--PORT(--+-*CFG--------+--)-'
                '-port-number-'

>-----+----------------------------+------------------->
      |           .-*SAME-------.    |
      '-SSLPORT(--+-*CFG--------+--)-'
                  '-port-number-'

>-----+-------------------------+---------------------><
      |             .-*SAME-.    |
      '-AUTOSTART(--+-*YES--+--)-'
                    '-*NO---'
```

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Notes:

(1) All parameters preceding this point can be specified in positional form.

The Change aXes Application Server (CHGAXESW3) command allows you to change an aXes Application Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CHGAXESW3

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0302 Instance definition not found.

AXS0307 Instance definition not changed.

CPF0011 Error detected by prompt override program.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Application Server jobs.

This is a required parameter.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

The possible values are:

*SAME

The configuration file value that was previously set does not change.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'Dir=' keyword in the configuration file.

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The possible values are:

*SAME

The server root directory value that was previously set does not change.

*CFG

The root directory specified in the configuration file is used.

> If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Log directory (LOGDIR)

Specifies the path name of the server log directory. The server log directory is where the server will create the logging files. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'LogPath=' keyword in the configuration file.

The possible values are:

*SAME

The log directory value that was previously set does not change.

*CFG

The log directory specified in the configuration file is used.

log-directory-path

Specify the absolute path of the log directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*SAME

The internet address value that was previously set does not change.

*CFG

The internet address specified in the configuration file is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map

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system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*SAME

The non-secure port value that was previously set does not change.

*CFG

The non-secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the Terminal Server is listening on otherwise a port that is specified can result in the connection being rejected.

Secure port (SSLPORT)

Specifies the TCP/IP port number that the server will listen on for secure requests. Secure requests are commonly known as Secure Hypertext Transfer Protocol (HTTPS) and use SSL1, SSL2, or TLS to encrypt data. The standard port number for HTTPS requests is 443 but the aXes Application Server does not have a default secure port value. Other port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

A secure port number must be specified here or in the configuration file to enable HTTPS. The 'SSLAppID=' keyword must also be specified in the configuration file.

Note: When a port other than 443 is used, the client is required to include a specific port number when sending requests to the server.

This parameter overrides the 'SSLPort=' keyword in the configuration file.

The possible values are:

*SAME

The secure port value that was previously set does not change.

*CFG

The secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The client must be aware of the specific port the server is listening on otherwise a port that is specified can result in the connection being rejected.

Autostart server (AUTOSTART)

Specifies whether the server is automatically started when the aXes subsystem is started.

The possible values are:

*SAME

The auto-start value that was previously set does not change.

*YES

The server is started automatically.

*NO

The server is not automatically started.

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CRTAXESACL (Create aXes Access Control List)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-CRTAXESACL---DIR(--path-name--)---------------------><
```

The Create aXes Access Control List (CRTAXESACL) command allows you to create an aXes access control list object.

An access control list (ACL) is an object that contains the names of authorized users and encrypted passwords. It is used to control access to a directory path.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for CRTAXESACL

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0121 Access control list not created.

AXS0122 Access control list already exists.

Directory (DIR)

Specifies the path name of the directory in which the access control list will be created. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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DLTAXESACL (Delete aXes Access Control List)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-DLTAXESACL---DIR(--path-name--)---------------------><
```

The Delete aXes Access Control List (DLTAXESACL) command allows you to delete an aXes access control list object.

An access control list (ACL) is an object that contains the names of authorized users and encrypted passwords. It is used to control access to a directory path.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for DLTAXESACL

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0131 Access control list not deleted.

AXS0132 Access control list not found.

Directory (DIR)

Specifies the path name of the directory from which the access control list will be deleted. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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DSPAXESLIC (Display aXes Licence Information)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-DSPAXESLIC-------------------------------------------><
```

The Display aXes Licence (DSPAXESLIC) command displays information about the licences for the aXes servers.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

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DSPICPWJOB (Display Interactive-CPW Jobs)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-DSPICPWJOB---PFRDTALIB(-+-instance-name-+-)----------->
                           '-library-name--'

>-----+----------------------------+------------------->
      |           .-*INTERACT-.     |
      '-JOBTYPE(--+-*ALL------+--)--'

>-----+-----------------------+-----------------------><
      |          .-*------.    |
      '-OUTPUT(--+-*PRINT-+-)-—'
```

The Display Interactive-CPW Jobs (DSPICPWJOB) command allows you to display a list of jobs on the system that consume Interactive CPW.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for DSPICPWJOB

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Performance data library (PFRDTALIB)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

This is a required parameter.

The possible values are:

QPFRDATA

The default performance data library. On some releases this may be Q.

library-name

Specify the name of the library that contains the performance data.

Job type (JOBTYPE)

Specifies where the output from the command is sent.

The possible values are:

*INTERACT

Only interactive jobs are listed.

*ALL

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All job types are listed.

Output (OUTPUT)

Specifies where the output from the command is sent.

The possible values are:

*

The output is displayed (if requested by an interactive job) or printed with the job's spooled output (if requested by a batch job).

*PRINT

The output is printed with the job's spooled output.

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DSPICPWMSG (Display Interactive-CPW Messages)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-DSPICPWMSG-------+-----------------------+-----------------><
                    |          .-*------.   |
                    '-OUTPUT(--+-*PRINT-+-)-—'
```

The Display Interactive-CPW Messages (DSPICPWMSG) command searches the history log (QHST) for messages indicating the available amount of Interactive CPW is nearing the limit.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for DSPICPWMSG

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Output (OUTPUT)

Specifies where the output from the command is sent.

The possible values are:

*

The output is displayed (if requested by an interactive job) or printed with the job's spooled output (if requested by a batch job).

*PRINT

The output is printed with the job's spooled output.

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ENDAXESDE (End aXes Data Explorer Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ENDAXESDE---INSTANCE(-+-instance-name-+-)-------------><
                         |               |
                         '-*ALL----------'
```

The End aXes Data Explorer Server (ENDAXESDE) command allows you to end an instance of the aXes Data Explorer Server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ENDAXESDE

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

This is a required parameter.

The possible values are:

*ALL

All active aXes-DE instances are ended.

instance-name

Specify up to ten characters for the instance name.

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ENDAXESTS (End aXes Terminal Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ENDAXESTS---INSTANCE(-+-instance-name-+-)-------------><
                         |               |
                         '-*ALL----------'
```

The End aXes Terminal Server (ENDAXESTS) command allows you to end an instance of the aXes Terminal Server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ENDAXESTS

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Terminal Server jobs.

This is a required parameter.

The possible values are:

*ALL

All active aXes Terminal Server instances are ended.

instance-name

Specify up to ten characters for the instance name.

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ENDAXESWS (End aXes Spool File Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ENDAXESWS---INSTANCE(-+-instance-name-+-)-------------><
                         |               |
                         '-*ALL----------'
```

The End aXes Spool File Server (ENDAXESWS) command allows you to end an instance of the aXes Spool File Server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ENDAXESWS

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Web Spooler jobs.

This is a required parameter.

The possible values are:

*ALL

All active aXes Spool File Server instances are ended.

instance-name

Specify up to ten characters for the instance name.

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ENDAXESW3 (End aXes Application Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-ENDAXESW3---INSTANCE(-+-instance-name-+-)-------------><
                         |               |
                         '-*ALL----------'
```

The End aXes Application Server (ENDAXESW3) command allows you to end an instance of the aXes Application Server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for ENDAXESW3

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0061 aXes instance type already ended.

AXS0062 aXes instance type not ended.

AXS0063 Not all aXes instances of type ended.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Application Server jobs.

This is a required parameter.

The possible values are:

*ALL

All active Application Server instances are ended.

instance-name

Specify up to ten characters for the instance name.

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RLSAXESLIC (Release aXes Licence)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RLSAXESLIC---INSTANCE(--instance-name--)-------------->

>-----+----------------------+------------------------->
      |                      |
      '-TYPE(--+-*BASE---+--)-'
               |-*AXESW3-|
               |-*AXESTS-|
               |-*AXESWS-|
               '-*AXESDE-'
                                                   (1)
>-----+---------------------------+------------------->
      |            .-*ALL------.    |
      '--RELEASE(--+-*INACTIVE-+--)-'
                   '-*SELECT---'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

The Release aXes Licence (RLSAXESLIC) command allows you to release licences for the aXes servers.

In normal circumstances licences are automatically released when the server ends or when a client session is ended either by the user or due to it exceeding the session inactive interval. Licences should be released even if the server ends abnormally. However, it is possible that licences might not be released due to abnormal termination of a server or a client session. This command is intended to be used to free up licences that might remain allocated after a session or server ends.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RLSAXESLIC

*ESCAPE Messages

AXS0008 *SECADM special authority required.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0032 Error occurred retrieving licence usage information.

AXS0077 Error occurred retrieving licence handle information.

AXS0091 Instance is active.

AXS0092 Session is active for instance .

AXS0093 Operation not allowed.

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AXS9091 Copyright violation occurred.

AXS9092 Grace period for demonstration version has been exceeded.

AXS9093 Copyright violation occurred.

AXS9898 .

Instance (INSTANCE)

Specifies the name of the server instance. Only licences allocated by the specified server instance will be released.

This is a required parameter.

The possible values are:

instance-name

Specify up to ten characters for the instance name.

Server type (TYPE)

Specifies the type of the server instance. Only licences allocated by the specified server type will be released.

This is a required parameter.

The possible values are:

*BASE

Licences for the base part of the product will be released.

*AXESW3

Licences for the aXes Application Server will be released.

*AXESTS

Licences for the aXes Terminal Server will be released.

*AXESWS

Licences for the aXes Spool File Server will be released.

*AXESDE

Licences for the aXes Data Explorer Server will be released.

Licence to release (RELEASE)

Specifies which allocated licences are to be released.

The possible values are:

*ALL

All allocated licences for the specified server instance and type will be released. The server instance must not be active.

*INACTIVE

This option is not yet implemented.

*SELECT

This option is not yet implemented.

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RMVAXESDE (Remove aXes Data Explorer Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RMVAXESDE---INSTANCE(--instance-name--)--------------><
```

The Remove aXes Data Explorer Server (RMVAXESDE) command allows you to remove an aXes Data Explorer Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RMVAXESDE

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0302 Instance definition not found.

AXS0308 Instance definition not removed.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

This is a required parameter.

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RMVAXESTS (Remove aXes Terminal Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RMVAXESTS---INSTANCE(--instance-name--)--------------><
```

The Remove aXes Terminal Server (RMVAXESTS) command allows you to remove an aXes Terminal Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RMVAXESTS

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0302 Instance definition not found.

AXS0308 Instance definition not removed.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Terminal Server jobs.

This is a required parameter.

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RMVAXESUSR (Remove aXes User)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RMVAXESUSR---USER(--user-name--)---------------------->

>-----DIR(--path-name--)------------------------------><
```

The Remove aXes User (RMVAXESUSR) command allows you to remove a user from an aXes access control list object.

An access control list (ACL) is an object that contains the names of authorized users and encrypted passwords. It is used to control access to a directory path.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RMVAXESUSR

*ESCAPE Messages

AXS0005 User not found.

AXS0007 Not authorized to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0014 Error(s) occurred removing user .

AXS0016 No such path or directory.

AXS0017 Access control list is in use.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0030 Character in name or password not valid.

AXS0132 Access control list not found.

User (USER)

Specifies the name of the user to remove from the access control list.

This is a required parameter.

Directory (DIR)

Specifies the path name of the directory containing the access control list from which this user will be removed. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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RMVAXESWS (Remove aXes Spool File Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RMVAXESWS---INSTANCE(--instance-name--)--------------><
```

The Remove aXes Spool File Server (RMVAXESWS) command allows you to remove an aXes Spool File Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RMVAXESWS

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0302 Instance definition not found.

AXS0308 Instance definition not removed.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Web Spooler jobs.

This is a required parameter.

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RMVAXESW3 (Remove aXes Application Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
>>-RMVAXESW3---INSTANCE(--instance-name--)--------------><
```

The Remove aXes Application Server (RMVAXESW3) command allows you to remove an aXes Application Server instance definition.

A server instance allows you to associate a name with a configuration file thus making it easier to use the corresponding start command. Server instances can also be automatically started when the aXes subsystem is started.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for RMVAXESW3

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

AXS0302 Instance definition not found.

AXS0308 Instance definition not removed.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Application Server jobs.

This is a required parameter.

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STRAXESDE (Start aXes Data Explorer Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-STRAXESDE---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*INSTANCE-.    |
      '-CFG(--+-*NONE-----+--)-'
              '-path-name-'
                                                        (2)(3)
>-----+----------------------------+------------------->
      |           .-*INSTANCE-.      |
      '--SVRDIR(--+-path-name-+--)---'

>-----+-----------------------------------+------------>
      |             .-*INSTANCE--------.    |
      '-INTNETADR(--+-*ANY------------+--)-'
                    |-internet-address-|
                    '-host-name--------'
                                                        (3)
>-----+-------------------------+--------------------->
      |        .-*INSTANCE---.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+-------------------------+--------------------->
      |          .-*INSTANCE-.    |
      '-SOCKET(--+-path-name-+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Start aXes Data Explorer Server (STRAXESDE) command allows you to start an instance of the aXes Data Explorer Server. The server is started as an external FastCGI server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for STRAXESDE

*ESCAPE Messages

AXS0007 Not authorised to object.

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AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0051 aXes instance type already started.

AXS0052 aXes instance type not started.

AXS0053 Configuration file name or CFG(*NONE) required.

AXS0071 Internet address required.

AXS0072 Port number required.

AXS0073 Unix domain socket required.

AXS9091 Copyright violation occurred.

AXS9092 Grace period for demonstration version has been exceeded.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Data Explorer jobs.

The possible values are:

AXES

The aXes-DE instance uses the simple job name AXES.

instance-name

Specify up to ten characters for the instance name. The instance name must be unique within all Data Explorer instances.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The configuration file specified in the instance definition is used.

*NONE

No configuration file is used. The server will start using internal default values.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

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The root directory specified in the instance definition is used. If no root directory is specified in the instance definition, the root directory specified in the configuration file is used. If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*INSTANCE

The internet address specified in the instance definition is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*INSTANCE

The port specified in the instance definition is used.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the -

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socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The socket specified in the instance definition is used.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

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STRAXESTS (Start aXes Terminal Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-STRAXESTS---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*INSTANCE-.    |
      '-CFG(--+-*NONE-----+--)-'
              '-path-name-'
                                                        (2)(3)
>-----+-----------------------------------+------------>
      |             .-*INSTANCE--------.    |
      '-INTNETADR(--+-*ANY-------------+--)-'
                    |-internet-address-|
                    '-host-name--------'
                                                        (3)
>-----+-------------------------+--------------------->
      |        .-*INSTANCE---.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+-------------------------+--------------------->
      |          .-*INSTANCE-.    |
      '-SOCKET(--+-path-name-+--)-'

>-----+-----------------------+---------------------><
      |            .-*CFG--.    |
      '-COMPRESS(--+-*YES--+--)-'
                   '-*NO---'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Start aXes Terminal Server (STRAXESTS) command allows you to start an instance of the aXes Terminal Server. The server is started as an external FastCGI server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for STRAXESTS

*ESCAPE Messages

AXS0007 Not authorised to object.

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AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0051 aXes instance type already started.

AXS0052 aXes instance type not started.

AXS0053 Configuration file name or CFG(*NONE) required.

AXS0071 Internet address required.

AXS0072 Port number required.

AXS0073 Unix domain socket required.

AXS9091 Copyright violation occurred.

AXS9092 Grace period for demonstration version has been exceeded.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Terminal Server jobs.

The possible values are:

AXES

The aXes Terminal Server instance uses the simple job name AXES.

instance-name

Specify up to ten characters for the instance name. The instance name must be unique within all Terminal Server instances.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The configuration file specified in the instance definition is used.

*NONE

No configuration file is used. The server will start using internal default values.

configuration-path

Specify the absolute path of the configuration file.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

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*INSTANCE

The internet address specified in the instance definition is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*INSTANCE

The port specified in the instance definition is used.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the Terminal Server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the –socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

> Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The socket specified in the instance definition is used.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

Compression (COMPRESS)

Specifies whether the server compresses the data stream before sending it to a connected client.

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This parameter overrides the 'Compress=' keyword in the configuration file.

The possible values are:

*CFG

The compression value specified in the configuration file is used.

*YES

The server compresses all data sent to the client.

*NO

The server does not compress transmitted data.

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STRAXESWS (Start Axes Spool File Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                        (1)
>>-STRAXESWS---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*INSTANCE-.    |
      '-CFG(--+-*NONE-----+--)-'
              '-path-name-'
                                                        (2)(3)
>-----+----------------------------+------------------->
      |           .-*INSTANCE-.      |
      '--SVRDIR(--+-path-name-+--)---'

>-----+-----------------------------------+------------>
      |             .-*INSTANCE--------.    |
      '-INTNETADR(--+-*ANY------------+--)-'
                    |-internet-address-|
                    '-host-name--------'
                                                        (3)
>-----+-------------------------+--------------------->
      |        .-*INSTANCE---.    |
      '-PORT(--+-port-number-+--)-'
                                                        (2)
>-----+-------------------------+--------------------->
      |          .-*INSTANCE-.    |
      '-SOCKET(--+-path-name-+--)-'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

(2) Either INTNETADR or SOCKET must be specified.

(3) If INTNETADR is specified then PORT must be specified.

The Start aXes Spool File Server (STRAXESWS) command allows you to start an instance of the aXes Spool File Server. The server is started as an external FastCGI server.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for STRAXESWS

*ESCAPE Messages

AXS0007 Not authorised to object.

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AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0051 aXes instance type already started.

AXS0052 aXes instance type not started.

AXS0053 Configuration file name or CFG(*NONE) required.

AXS0071 Internet address required.

AXS0072 Port number required.

AXS0073 Unix domain socket required.

AXS9091 Copyright violation occurred.

AXS9092 Grace period for demonstration version has been exceeded.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Web Spooler jobs.

The possible values are:

AXES

The aXes Spool File Server instance uses the simple job name AXES.

instance-name

Specify up to ten characters for the instance name. The instance name must be unique within all Data Explorer instances.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The configuration file specified in the instance definition is used.

*NONE

No configuration file is used. The server will start using internal default values.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The root directory specified in the instance definition is used. If no root directory is specified in the instance definition, the root directory specified in the configuration file

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is used. If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The address must match the value specified on the -host switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

> Either an Internet address or socket path must be specified.

The possible values are:

*INSTANCE

The internet address specified in the instance definition is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for requests. Port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

> A port number must be supplied if INTNETADR is specified.

The possible values are:

*INSTANCE

The port specified in the instance definition is used.

port-number

Specify any port in the range of 1 to 65534. The HTTP server must be aware of the specific port the FastCGI server is listening on otherwise a port that is specified can result in the connection being rejected.

Unix domain socket path (SOCKET)

Specifies the path of the Unix domain socket that the server will listen on for requests. The path name must be an absolute path. The path must match the path specified on the -socket switch of the FastCgiExternalServer directive in the configuration for the associated HTTP server.

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Either an Internet address or socket path must be specified.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The socket specified in the instance definition is used.

socket-path

Specify the path of the Unix domain socket the HTTP server and FastCGI server will use to communicate. Both servers must be active on the same system to use a Unix domain socket.

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STRAXESW3 (Start aXes Application Server)

Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                   (1)
>>-STRAXESW3---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*INSTANCE-.    |
      '-CFG(--+-path-name-+--)-'

>-----+-------------------------+---------------------->
      |          .-*INSTANCE-.    |
      '-SVRDIR(--+-path-name-+--)-'

>-----+-------------------------+---------------------->
      |          .-*INSTANCE-.    |
      '-LOGDIR(--+-path-name-+--)-'

>-----+-----------------------------------+------------>
      |             .-*INSTANCE--------.    |
      '-INTNETADR(--+-*ANY-------------+--)-'
                    |-internet-address-|
                    '-host-name--------'

>-----+-------------------------+---------------------->
      |        .-*INSTANCE---.    |
      '-PORT(--+-port-number-+--)-'

>-----+----------------------------+------------------->
      |           .-*INSTANCE---.    |
      '-SSLPORT(--+-port-number-+--)-'

>-----+-----------------------+------------------------><
      |            .-*CFG-.    |
      '-COMPRESS(--+-*YES-+--)-'
                   '-*NO--'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

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Job: B,I Pgm: B,I REXX: B,I Exec

Threadsafe: No

```
                                                  (1)
>>-STRAXESW3---INSTANCE(--instance-name--)--------------->

>-----+-----------------------+------------------------->
      |       .-*INSTANCE-.    |
      +-CFG(--+-path-name-+--)-+

>-----+-------------------------+---------------------->
      |          .-*INSTANCE-.    |
      +-SVRDIR(--+-path-name-+--)-+

>-----+-------------------------+---------------------->
      |          .-*INSTANCE-.    |
      +-LOGDIR(--+-path-name-+--)-+

>-----+-----------------------------------+------------>
      |             .-*INSTANCE--------.    |
      +-INTNETADR(--+-internet-address-+--)-+
                    '-host-name--------'

>-----+-------------------------+---------------------->
      |        .-*INSTANCE---.    |
      +-PORT(--+-port-number-+--)-+

>-----+----------------------------+------------------->
      |           .-*INSTANCE---.    |
      +-SSLPORT(--+-port-number-+--)-+

>-----+-----------------------+------------------------><
      |            .-*CFG-.    |
      +-COMPRESS(--+-*YES-+--)-+
                   '-*NO--'
```

Notes:

(1) All parameters preceding this point can be specified in positional form.

The Start aXes Application Server (STRAXESW3) command allows you to start an instance of the aXes application server. The aXes application server handles the interaction with the client browser.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

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Error messages for STRAXESW3

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0015 Path must be a file.

AXS0016 No such path or directory.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0051 aXes instance type already started.

AXS0052 aXes instance type not started.

AXS9091 Copyright violation occurred.

AXS9092 Grace period for demonstration version has been exceeded.

Instance (INSTANCE)

Specifies the name of the server instance. This value is used to identify the Application Server jobs.

The possible values are:

AXES

The aXesW3 instance uses the simple job name AXES.

instance-name

Specify up to ten characters for the instance name. The instance name must be unique within all Application Server instances.

Configuration file (CFG)

Specifies the path name of the server configuration file. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

The possible values are:

*INSTANCE

The configuration file specified in the instance definition is used.

*NONE

No configuration file is used. The server will start using internal default values.

configuration-path

Specify the absolute path of the configuration file.

Server root directory (SVRDIR)

Specifies the path name of the server root directory. The server root directory is where the server will look for files to serve. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'Dir=' keyword in the configuration file.

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The possible values are:

*INSTANCE

The root directory specified in the instance definition is used.

> If no root directory is specified in the instance definition, the value specified in the configuration file is used. If no root directory is specified in the configuration file, the installed root directory is used.

*CFG

The root directory specified in the configuration file is used.

> If no root directory is specified in the configuration file, the installed root directory is used.

root-directory-path

Specify the absolute path of the server root directory.

Log directory (LOGDIR)

Specifies the path name of the server log directory. The server log directory is where the server will create the logging files. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This parameter overrides the 'LogPath=' keyword in the configuration file.

The possible values are:

*INSTANCE

The log directory specified in the instance definition is used.

*CFG

The log directory specified in the configuration file is used.

log-directory-path

Specify the absolute path of the log directory.

Internet address to bind (INTNETADR)

Specifies the internet address of the interface to bind. The internet address is specified as either a dotted decimal value in the form, nnn.nnn.nnn.nnn, where nnn is a decimal number ranging from 0 to 255, or as a host name (for example, onramp.lansa.com).

This parameter overrides the 'Host=' keyword in the configuration file.

The possible values are:

*INSTANCE

The internet address specified in the instance definition is used.

*ANY

Indicates the server will bind to any IP address recognized by the local system.

*CFG

The internet address specified in the configuration file is used.

internet-address

Specify the dotted decimal internet address. An internet address is not valid if it has a value of all binary ones or all binary zeros for the network identifier (ID) portion or the host ID portion of the address.

If the dotted decimal address is entered from a command line, the address must be enclosed in apostrophes.

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host-name

A host name must resolve to an internet address. The user can assign names to an internet address with the Work with TCP/IP host table entries option on the Configure TCP/IP menu (CFGTCP command). Also, a remote name server can be used to map system names to internet addresses. You can use the Change TCP/IP domain information option on the CFGTCP menu to specify a remote name server.

Non-secure port (PORT)

Specifies the TCP/IP port number that the server will listen on for non-secure requests. Non-secure requests use the Hypertext Transfer Protocol (HTTP). The standard port number for HTTP requests is 80. Other port numbers less than 1024 are reserved for other TCP/IP applications and should not be used. Port numbers 8080 and 8008 are commonly used for proxy servers.

> When a port other than 80 is used, the client is required to include a specific port number when sending requests to the server.

This parameter overrides the 'Port=' keyword in the configuration file.

The possible values are:

*INSTANCE

The non-secure port specified in the instance definition is used.

*CFG

The non-secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The client must be aware of the specific port the server is listening on otherwise a port that is specified can result in the connection being rejected.

Secure port (SSLPORT)

Specifies the TCP/IP port number that the server will listen on for secure requests. Secure requests are commonly known as Secure Hypertext Transfer Protocol (HTTPS) and use SSL1, SSL2, or TLS to encrypt data. The standard port number for HTTPS requests is 443 but the aXes W3 server does not have a default secure port value. Other port numbers less than 1024 are reserved for other TCP/IP applications and should not be used.

A secure port number must be specified here or in the configuration file to enable HTTPS. The 'SSLAppID=' keyword must also be specified in the configuration file.

> When a port other than 443 is used, the client is required to include a specific port number when sending requests to the server.

This parameter overrides the 'SSLPort=' keyword in the configuration file.

The possible values are:

*INSTANCE

The secure port specified in the instance definition is used.

*CFG

The secure port specified in the configuration file is used.

port-number

Specify any port in the range of 1 to 65534. The client must be aware of the specific port the server is listening on otherwise a port that is specified can result in the connection being rejected.

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Compression (COMPRESS)

Specifies whether the server compresses the data stream before sending it to a connected client.

This parameter overrides the 'Compress=' keyword in the configuration file.

The possible values are:

*CFG

The compression value specified in the configuration file is used.

*YES

The server compresses all data sent to the client.

*NO

The server does not compress transmitted data.

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WRKAXESSVR (Work with aXes Servers)

Job: I Pgm: I REXX: I Exec

Threadsafe: No

```
>>-WRKAXESSVR-----------------------------------------------------><
```

The Work with aXes Servers (WRKAXESSVR) command allows you to display and work with a list of aXes servers. You can add, change, display, remove, start, and end servers.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for WRKAXESSVR

*ESCAPE Messages

AXS0022 Incorrect number of parameters received.

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WRKAXESUSR (Work with aXes Users)

Job: I Pgm: I REXX: I Exec

Threadsafe: No

```
>>-WRKAXESUSR---DIR(--path-name--)----------------------------><
```

The Work with aXes Users (WRKAXESUSR) command allows you to display and work with a list of users defined in an aXes access control list. You can add, change, and remove users.

> Warning: To use this command you must have *SECADM special authority.

Do not precede an entry with an asterisk unless that entry is a "special value" that is shown (on the display itself or in the help information) with an asterisk.

Error messages for WRKAXESUSR

*ESCAPE Messages

AXS0007 Not authorized to object.

AXS0008 *SECADM special authority required.

AXS0009 Path must be a directory.

AXS0011 Path must start with a slash.

AXS0016 No such path or directory.

AXS0017 Access control list is in use.

AXS0022 Incorrect number of parameters received.

AXS0023 Error calling .

AXS0025 Path not allowed.

AXS0132 Access control list not found.

Directory (DIR)

Specifies the path name of the directory containing the access control list to work with. The path name must be an absolute path.

For more information on specifying path names, refer to Chapter 2 of the CL Reference, SC41-5722, or the Integrated File System concepts section of the Information Centre.

This is a required parameter.

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