Interactive System Productivity Facility (ISPF)

ISPF Application Server User's Guide and Reference

OS/390 Version 2 Release 8.0

SC34-4619-01

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Note
Before using this document, read the general information under “Notices” on page vii.

Second Edition (September 1999)

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Programming Interface Information

This book primarily documents information that is NOT intended to be used as Programming Interfaces of ISPF.

This book also documents intended Programming Interfaces that allow the customer to write programs to obtain the services of ISPF. This information is identified where it occurs, either by an introductory statement to a chapter or section or by the following marking:

```
-----------Programming Interface information----------------
```

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About This Book

This book provides use and reference information for the ISPF Application Server, an ISPF feature that allows an ISPF application using the ISPF graphical user interface (GUI) to be accessed from an Internet (or intranet) World Wide Web browser.

The Application Server is made up of three components, each one is described in a separate section of this book. Reference material and examples also appear in this book.

Prerequisite and Related Information

A working knowledge of ISPF and Java ™ is useful when using this feature.

Summary of Changes

OS/390 V2R8.0 ISPF contains the following changes and enhancements:
- ISPF Product and Library Changes
- ISPF Dialog Manager Component Changes
- ISPF PDF Component Changes
- ISPF SCLM Component Changes
- ISPF Client/Server Component Changes

ISPF Product Changes

Changes to the ZENVIR variable. Characters 1 through 8 contain the product name and sequence number in the format *ISPF x.y*, where x.y indicates:
- <= 4.2 means the version.release of ISPF
- = 4.3 means ISPF for OS/390 release 2
- = 4.4 means ISPF 4.2.1 and ISPF for OS/390 release 3
- = 4.5 means ISPF for OS/390 Version 2 Release 5.0
- = 4.8 means ISPF for OS/390 Version 2 Release 8.0

The ZENVIR variable is used by IBM personnel for internal purposes. The x.y numbers DO NOT directly correlate to an ISPF release number in all cases. For example, as shown above, a ZENVIR value of 4.3 DOES NOT mean ISPF Version 4 Release 3. NO stand-alone version of ISPF exists above ISPF Version 4 Release 2 Modification 1.

The ZOS390RL variable contains the OS/390 release on your system.

The ZISPFOS system variable contains the level of ISPF code that is running as part of the OS/390 release on your system. This might or might not match ZOS390RL. For this release, the variable contains **ISPF for OS/390 Version 2 Release 8.0**.

The ZPFKEY system variable contains PFKey values.

Support of CCSIDs 1140 through 1149 was added so the EURO currency symbol can be used in ISPF.

The Samples and Macros libraries each have an index member called @INDEX.

ISPF DM Component Changes

The DM component of ISPF includes the following new functions and enhancements:
- Support added for ″VER(&variable, DSNAMEQ)″.
- Support added for four-digit year on TBSTATS command and Option 7.4.
- Support added for four-digit year on TBSORT command.
- Message numbers were added to ISPF Line Mode messages.
- Support added for date format in Configuration table.
- Support added for a print utility exit for ISPF termination and Log/List commands.
- Support added for NEXT and PREV commands for Dialog Test Tables.

- The ZSCRNAME modifiable shared variable, containing the current screen name, was added.
- The ZPFKEY variable, which returns the name of the PFKey on exit from a panel, was added.
- The TPUT buffer size variable was added to the configuration table.
- The ISPSPROF system variables were moved to the configuration table.
- Support was added for commands chained after the START command.
- ISPDTLC enhancements:
  - New invocation options: NOPLEB / PLEB, NOMCOMMENT / MCOMMENT.
  - New tags: ATTENTION.
  - Added "German to Swiss German" character transform to create Swiss German panels from German DTL source files.
  - Expanded number of DTL source files for interactive processing from 4 to 12.
  - Allow DTL type comments (<: -- or <!--) in MVS profile data stream.
  - Allow SOURCE tag within ABC, AREA, PANEL, and REGION tags.
  - Added "Options" to action bar of interactive panel as an alternate method of setting conversion options.
  - Added support for macro tags.

ISPF PDF Component Changes

The ISPF PDF component contains the following new functions and enhancements:

- Conversion of the ISPF configuration table to a keyword format.
- Introduction of an interactive tool to create and update the keyword file and to build the needed load module from the keyword file.
- Edit CUT and PASTE commands. Data is saved in data spaces with multiple clipboards available.
- The Edit MOVE, COPY, CREATE, and REPLACE commands now accept a data set name or data set name and member name as a parameter.
- A VSAM editor or browser can be specified in the configuration table and is invoked automatically when a VSAM data set it specified in Options 1, 2, 3, or 11.
- Through the EPDF command, Edit, View, and Browse functions are available from any command line.
- A new edit macro VOLUME command to retrieve the volume of the data set being edited.
- The edit macro RECFM has been enhanced to return the full record format rather than just F or V.
- The new edit macro SESSION command returns EDIT, EDIF, or VIEW, as well as indicating whether the session was initiated from SCLM.
- Edit STATS mode is no longer forced to OFF if a sequential data set is edited. The STATS mode is simply ignored.
- The target data set for the Move/Copy utility or the Edit CREATE and REPLACE commands can be allocated automatically if it does not exist.
- Edit highlighting of FIND strings and the cursor phrase is enabled for data wider than 256 bytes.
- When the View REPLACE command is used to update the member being viewed, the confirmation panel shows whether the member has been updated by someone else during the View session.

- LMMDISP, LMMFIND, and LMMLIST return individual variables for load module statistics when STATS(YES) is specified.
- The COBOL options and PL/I options in Foreground and Batch have been consolidated into 1 COBOL option and 1 PL/I option.
- Data set information processes multivolume data sets with more than 20 volumes.
- Member list REFRESH command added.
- Member list SORT and LOCATE honor the collating sequence table in the PDF translate tables.
- The creation date is displayed on the Confirm Delete panel for VSAM data sets.
- AIX paths are identified in Option 3.4 with *PATH* in the volume column.
- REFLIST function improved.
- A warning message displays on the first data change made while in View.
- RIGHT and LEFT commands are supported in member list to enable the presentation of additional data such as full 4–character year dates.
- The LMMDISP service allows the selection of members that do not exist in the data set being processed.
- SuperC supports VSAM files.
- SuperC supports the FMSTOP performance option which stops on the first mismatch for file compare. FMSTOP is also supported for string searches.

ISPF SCLM Component Changes

The ISPF SCLM component contains the following new functions and enhancements:

- When a language that is not valid is specified on the SPROF panel, a scrollable table display of the valid languages is presented so the user can choose the desired language.
- ISPLNK is a valid CALLMETH for non-BUILD translators.
- A sample DTL parser and translator are available.
- Additional samples added to SAMPLIB.
- An SCLM EDIT service was added to enable editing of SCLM controlled parts from a dialog.
- The data set name and member is added to the SPROF panel (FLMEINFO) to assist users when selecting a language for a part.
- The ability to specify that SCLM temporary load libraries should be allocated as PDSEs has been added.
- Two new exit points added.
- SCLM warning messages issued by the ISPF editor when an SCLM controlled member is edited are only issued if the member's directory entry indicates the member is SCLM controlled.
- SCLM Versioning can be directed to ignore sequence number differences.

ISPF Client/Server Component Changes

The ISPF Client/Server Component enables a panel to be displayed unchanged (except for panels with graphic areas) at a workstation using the native display function of the operating system of the workstation. ISPF manuals call this ″running in GUI mode.″

The ISPF Client/Server component changes are:

- Support added to provide for an automatic download of the Client/Server component
- Enhanced usability and function of the Client/Server component download panel
- Support added to enable initiation of a workstation connection (without GUI display) while in split screen mode.
- New WSCON and WSDISCON commands to improve entry to the ISPF C/S interface.
- Enable one or more ISPF screens to **Switch** back and forth between GUI and 3270 modes by using the new Switch commands.

ISPF User Interface Considerations

Many changes have been made to the ISPF Version 4 user interface to conform to CUA guidelines. If you prefer to change the interface to look and act more like the Version 3 interface, you can do the following:

- Use the CUAATR command to change the screen colors
- Use the ISPF Settings panel to specify that the TAB or HOME keys position the cursor to the command line rather than to the first action bar item
- Set the command line to the top of the screen by deselecting ***Command line at bottom*** on the ISPF Settings panel
- Set the primary keys to f13–24 by selecting 2 for Primary range on the Tailor Function Key Definition Display panel
- Use the KEYLIST OFF command to turn keylists off
- Use the PSCOLOR command to change point-and-shoot fields to blue.
- Change the DFLTCOLR field in the PDF configuration table ISRCONFG to disable action bars and or edit highlighting

ISPF Migration Considerations

When migrating to OS/390 V2R8.0 or higher for the first time, you must convert your ISPF customization to the new format. Refer to the section entitled ***The ISPF Configuration Table*** in the *ISPF Planning and Customizing manual.*

When migrating from one version of ISPF to another, you must be sure to reassemble and re-link the SCLM project definition.

ISPF Profiles

Major changes have been made to the ISPF profiles for ISPF Version 4.2 and OS/390 V2R8.0 ISPF. If you are moving back and forth between a Version 3.3 or Version 3.5 system and a Version 4.2 or an OS/390 V2R8.0 system, you must run with separate profiles.

Year 2000 Support for ISPF

ISPF is fully capable of using dates for the year 2000 and beyond. All of your existing applications should continue to run (some may need minor changes, as explained below) when the year 2000 comes. The base support for the year 2000 was added to OS/390 Version 1 Release 2.0, but the same level of support is

available for ISPF Version 3.5, ISPF Version 4, and OS/390 Version 1 Release 1.0 as well. To get support for the earlier versions, be sure that your system has the correct APARs installed. All ISPF APARs that add or correct function relating to the year 2000 contain the YR2000 identifier in the APAR text. You should search for these APARs to ensure you have all the function available.

What function is included?

- ISPF Dialog variable ZSTDYEAR now correctly shows the year for dates past 1999. Earlier versions always showed the first 2 characters of the year as 19.
- A new ISPF dialog variable (ZJ4DATE) is available for Julian dates with a 4–digit year.
- An ISPF Configuration Table field enables PDF to interpret 2 character year dates as either a 19xx or 20xx date. The default value is 65. Any 2-character year date whose year is less than or equal to this value is considered a 20xx date, anything greater than this value is considered 19xx. To see what value has been set by the ISPF Configuration Table, use the new ZSWIND variable.
- New parameters in the LMMSTATS service (CREATED4 and MODDATE4) for specifying 4-character year dates. All existing parameters still exist and you can continue to use them. If both the 2-character year date parameters (CREATED and MODDATE) and the 4-character year date parameters (CREATED4 and MODDATE4) are specified, the 2-character versions are used.
- Dialog variables ZLC4DATE and ZLM4DATE have been added.
  - You ***can*** set them before making an LMMREP or LMMADD call. Do this to specify a 4-character *created* or *last modified* date to set in the ISPF statistics.
  - They ***are*** set by LMMFIND, LMMLIST and LMMDISP to the current value of the created and last modified dates in the ISPF statistics.

What might need to change? Some minor changes to your existing ISPF dialogs might be necessary, especially in ISPF dialogs that use the Library Access Services to manipulate ISPF member statistics.

- For those services that accept both 4-character year dates and 2-character year dates, you can specify one or the other. If you specify both, the 2-character year date is used to avoid affecting existing dialogs. When the 2-character year date is used, the configuration table field mentioned above is used to determine whether the date should be interpreted as 19xx or 20xx.
- ISPF will not necessarily show 4-character dates in all circumstances but it will process them correctly. For example, a member list might only display 2-character year dates but will sort those dates in the proper order.
- SCLM stores dates past the year 1999 in a new internal format. If an accounting file contains dates in this new format, it cannot be processed by a system without year 2000 support. Accounting files without dates past 1999 can be processed with or without the year 2000 support.
- No conversion of the LMF control file is necessary.

What's in the OS/390 V2R8.0 ISPF library?

You can order the ISPF books using the numbers provided below.

OS/390 V2R8.0 ISPF

Title	Order Number
OS/390 V2R8.0 ISPF Dialog Tag Language Guide and Reference	SC28-1219-03
OS/390 V2R8.0 ISPF Planning and Customizing	SC28-1298-03
OS/390 V2R8.0 ISPF User's Guide	SC28-1239-03
OS/390 V2R8.0 ISPF Services Guide	SC28-1272-03
OS/390 V2R8.0 ISPF Dialog Developer's Guide and Reference	SC28-1273-03
OS/390 V2R8.0 ISPF Reference Summary	SC28-1308-03
OS/390 V2R8.0 ISPF Edit and Edit Macros	SC28-1312-03
OS/390 V2R8.0 ISPF Library Management Facility	SC28-1317-03
OS/390 V2R8.0 ISPF Messages and Codes	GC28-1326-03
OS/390 V2R8.0 ISPF Software Configuration and Library Manager Project Manager's and Developer's Guide	SC34-4750-01
OS/390 V2R8.0 ISPF Software Configuration and Library Manager Reference	SC28-1320-03
OS/390 V2R8.0 ISPF Application Server User's Guide and Reference	SC34-4752-01
Entire library Bill of Forms	SBOF-8567

The licensed books that were declassified in OS/390 Version 2 Release 4 appear on the OS/390 Online Library Collection, SK2T-6700.

The remaining licensed books for OS/390 Version 2 appear on the OS/390 Licensed Product Library, LK2T-2499, in unencrypted form.

Elements and Features in OS/390

You can use the following table to see the relationship of a product you are familiar with and how it is referred to in OS/390 Version 2 Release 8.0. OS/390 V2R8.0 is made up of elements and features that contain function at or beyond the release level of the products listed in the following table. The table gives the name and level of each product on which an OS/390 element or feature is based, identifies the OS/390 name of the element or feature, and indicates whether it is part of the base or optional. For more compatibility information about OS/390 elements see *OS/390 Planning for Installation, GC28-1726*

Product Name and Level	**Name in OS/390**	**Base or Optional**
BookManager BUILD/MVS V1R3	BookManager BUILD	optional
BookManager READ/MVS V1R3	BookManager READ	base
MVS/Bulk Data Transfer V2	Bulk Data Transfer (BDT)	base
MVS/Bulk Data Transfer File-to-File V2	Bulk Data Transfer (BDT) File-to-File	optional
MVS/Bulk Data Transfer SNA NJE V2	Bulk Data Transfer (BDT) SNA NJE	optional
IBM OS/390 C/C++ V1R2	C/C++	optional
DFSMSdfp V1R3	DFSMSdfp	base
DFSMSdss	DFSMSdss	optional
DFSMShsm	DFSMShsm	optional
DFSMSrmm	DFSMSrmm	optional
DFSMS/MVS Network File System V1R3	DFSMS/MVS Network File System	base
DFSORT R13	DFSORT	optional
EREP MVS V3R5	EREP	base
FFST/MVS V1R2	FFST/MVS	base
GDDM/MVS V3R2 • GDDM-OS/2 LINK • GDDM-PCLK	GDDM	base
GDDM-PGF V2R1.3	GDDM-PGF	optional
GDDM-REXX/MVS V3R2	GDDM-REXX	optional
IBM High Level Assembler for MVS & VM & VSE V1R2	High Level Assembler	base
IBM High Level Assembler Toolkit	High Level Assembler Toolkit	optional
ICKDSF R16	ICKDSF	base
ISPF V4R2M1	ISPF	base
Language Environment for MVS & VM V1R5	Language Environment	base
Language Environment V1R5 Data Decryption	Language Environment Data Decryption	optional

Product Name and Level	Name in OS/390	Base or Optional
MVS/ESA SP V5R2.2		
BCP	BCP or MVS	base
ESCON Director Support	ESCON Director Support	base
Hardware Configuration Definition (HCD)	Hardware Configuration Definition (HCD)	base base
JES2 V5R2.0	JES2	optional
JES3 V5R2.1	JES3	base
LANRES/MVS V1R3.1	LANRES	base
IBM LAN Server for MVS V1R1	LAN Server	base
MICR/OCR Support	MICR/OCR Support	base
OS/390 UNIX System Services	OS/390 UNIX System Services	base
OS/390 UNIX Application Services	OS/390 UNIX Application Services	base
OS/390 UNIX DCE Base Services (OSF DCE level 1.1)	OS/390 UNIX DCE Base Services	base
OS/390 UNIX DCE Distributed File Services (DFS) (OSF DCE level 1.1)	OS/390 UNIX DCE Distributed File Services (DFS)	optional
OS/390 UNIX DCE User Data Privacy	OS/390 UNIX DCE User Data Privacy	optional
SOMobjects Application Development Environment (ADE) V1R1	SOMobjects Application Development Environment (ADE)	base
SOMobjects Runtime Library (RTL)	SOMobjects Runtime Library (RTL)	base
SOMobjects service classes	SOMobjects service classes	
Open Systems Adapter Support Facility (OSA/SF) R1	Open Systems Adapter Support Facility (OSA/SF)	base
MVS/ESA RMF V5R2	RMF	optional
OS/390 Security Server	Resource Access Control Facility (RACF) • DCE Security Server • OS/390 Firewall Technologies • Lightweight Directory Access Protocol (LDAP) Client and Server • Open Cryptographic Enhanced Plug-ins (OCEP)	optional
SDSF V1R6	SDSF	optional
SMP/E	SMP/E	base
	Softcopy Print	base
SystemView for MVS Base	SystemView for MVS Base	base
IBM TCP/IP V3R1 • TCP/IP CICS Sockets • TCP/IP IMS Sockets • TCP/IP Kerberos • TCP/IP Network Print Facility (NPF) • TCP/IP OS/390 Communications Service IP Applications • TCP/IP OS/2 Offload	TCP/IP • TCP/IP CICS Sockets • TCP/IP IMS Sockets • TCP/IP Kerberos • TCP/IP Network Print Facility (NPF) • TCP/IP OS/390 Communications Service IP Applications • TCP/IP OS/2 Offload	base • optional • optional • optional • optional • optional • optional
TIOC R1	TIOC	base
Time Sharing Option Extensions (TSO/E) V2R5	TSO/E	base

Product Name and Level	Name in OS/390	Base or Optional
VisualLift for MVS V1R1.1	• VisualLift Run-Time Environment (RTE) • VisualLift Application Development Environment (ADE)	• base • optional
VTAM V4R3 with the AnyNet feature	VTAM	base
3270 PC File Transfer Program V1R1.1	3270 PC File Transfer Program	base

Chapter 1. Introduction

NOTICE

This function will be discontinued at OS/390 Version 3, Release 10. It has been stabilized at the OS/390 Version 2, Release 5 level. ***No*** new enhancements will be considered. You should use this as a *proof of concept* component only, not as a *tactical* or *strategic* component.

End of Notice

The ISPF Application Server is an ISPF feature that allows an application using the ISPF graphical user interface (GUI) to be accessed from an Internet (or intranet) World Wide Web browser. The Application Server feature comprises the following components:

- An Application Server
- A Workstation Agent Applet

The Application Server works in conjunction with a Web server, such as the IBM Internet Connection Server, to provide a connection between an ISPF application in an OS/390 environment and the Workstation Agent Applet that provides ISPF GUI display services from a Java virtual machine running within a Web browser. The display services provided by the Workstation Agent Applet are similar to the services provided by the ISPF workstation agent for native workstation platforms (separately available with ISPF for OS/390). New ISPF capability in OS/390 enables network connectivity by means of the Application Server.

Application Server Design with Respect to the Web

Some significant characteristics of the Application Server design with respect to the Web environment are as follows:

- The Workstation Agent Applet software is maintained at a Web server. The end user of the Workstation Agent Applet is not required to install the software on a personal workstation. This feature is critical for diskless workstations or network personal computers that preclude software installation.
- The Application Server and Workstation Agent Applet software are written in the Java programming language. The software can be run on any operating system platform that supports the required version of the Java runtime.
- The Application Server runs at the same Internet address as the Web server that provides the Workstation Agent Applet running in a Web browser. Consequently the applet is able to establish communication with the Application Server without violating Java virtual machine security within the Web browser.
- No 3270 emulator is required to establish a session for an ISPF application.
- The TCP protocol is used to establish communication with the Application Server. A persistent connection is established between the ISPF application and the Workstation Agent Applet in contrast to the typically intermittent connections that characterize communication using the HTTP protocol on the Web.
- Links to Web pages can be included in ISPF dialogs by means of an ISPF workstation command option.

- ISPF applications can be consolidated with other applications into a uniform Web browser environment.
- Remote access to ISPF applications can be established through the Internet (or intranet).
- Distribution of a password for a userid associated with an ISPF application shared among multiple users can be eliminated by establishing a default application password at the Application Server.
- Multiple ISPF applications associated with the same TSO userid can be run concurrently.

Chapter 2. Connecting to TSO/ISPF

The basic steps necessary to connect to TSO/ISPF from a Web browser by means of the ISPF Application Server are illustrated in Figure 1.

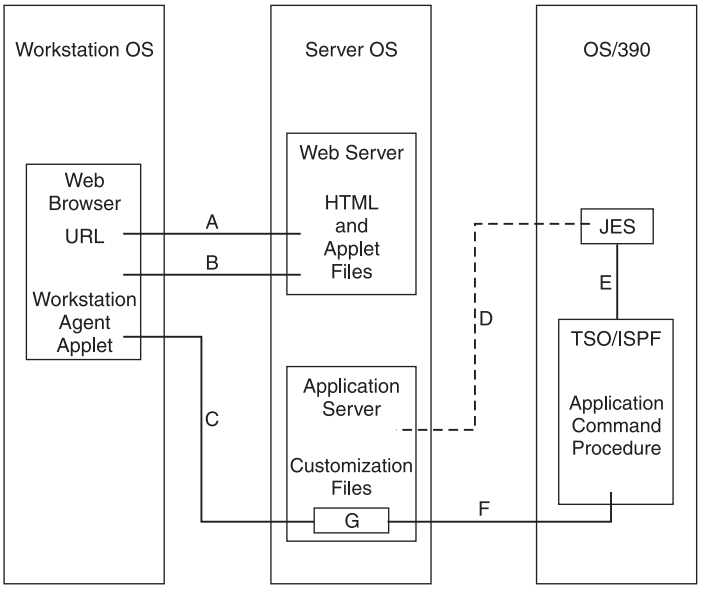

Figure 1. CONNECTING TO TSO/ISPF

Although the sequence of steps may vary depending on local requirements, the essential steps remain the same in all cases. The example sections of this guide provide detailed explanations of the sequence of steps and of the customization involved in establishing a connection in each of the following cases:

- When the Application Server is used to start a batch mode TSO/ISPF session (see "Server with Server-initiated Batch Mode Session" on page 41).
- When a user or operator starts a batch mode TSO/ISPF session (see "Server with User-initiated Batch Mode Session" on page 44).
- When a user is logged into an interactive mode TSO/ISPF session (see "Server with User-initiated Interactive Mode Session" on page 47).

In all cases the following steps are performed (see Figure 1):

A A Uniform Resource Locator (URL) for the ISPF Workstation Agent Applet HyperText Markup Language (HTML) is selected from a Web browser, causing a connection to be established with a Web server.

B The Web server locates the Workstation Agent Applet HTML and associated Java applet files, and sends them to the Web browser.

C The Workstation Agent Applet files from the Web server are loaded into a Java virtual machine within the Web browser. The applet establishes a connection with the ISPF Application Server running at the same Internet address as the Web server, and requests a TSO/ISPF application.

D Optionally, the ISPF Application Server uses the File Transfer Protocol (FTP) to submit batch mode OS/390 Job Control Language (JCL) for the application to the Job Entry Subsystem (JES) on the OS/390 system.

Alternatively, a user or operator may have previously submitted batch mode JCL to JES on the OS/390 system or a user may have logged on using JCL for an interactive TSO/ISPF session.

E The JCL results in creation of a TSO/ISPF environment for the application.

F A command supplied in the JCL in batch mode, or by the user in interactive mode, causes a connection to be established with the Application Server. Information supplied with the command identifies the TSO/ISPF application to the Application Server.

G The ISPF Application Server matches the connection to the Workstation Agent Applet with the connection to the TSO/ISPF application and transfers data back and forth until the interaction between the Workstation Agent Applet and the TSO/ISPF application is concluded.

Steps A, B, and C in Figure 1 on page 3 are completed in order before steps D, E, and F, when the Application Server is used to start a batch mode TSO/ISPF session.

Steps D, E, and F are completed in order before steps A, B, and C, when a user is logged into an interactive mode TSO/ISPF session.

Steps D, E, and F *can* be completed before steps A, B, and C or after steps A, B, and C, when a user or operator starts a batch mode TSO/ISPF session.

In all cases the minimum requirements for establishing a connection between the ISPF Workstation Agent Applet and an ISPF application on an OS/390 system are as follows:

- The ISPF Workstation Agent Applet must be started from a Web browser and must connect to the address and workstation connection port number of the ISPF Application Server. The Application Server itself must be active at the same address as the Web server that supplied the applet to the Web browser.
- The ISPF application on OS/390 must be started and must connect to the address and application connection port number of the ISPF Application Server.
- The ISPF application on OS/390 must specify an application name to identify itself to the ISPF Application Server and the ISPF Workstation Agent Applet must specify the same application name in its request to the ISPF Application Server.
- The ISPF Workstation Agent Applet must access or provide authorization information appropriate for the connection to the ISPF application on OS/390. For connections to a batch mode ISPF session authorization is generally accomplished by means of a ***userid*** and ***password***. For connections to an interactive mode ISPF session, authorization is accomplished by means of a unique application name supplied to the user from within the interactive mode ISPF session.

Chapter 3. Installing the ISPF Application Server

The following prerequisites must be satisfied in order to install and use the ISPF Application Server:

- At least OS/390 Version 2 Release 5.0 must be installed as the ISPF host operating system .
- Approximately 10 megabytes of disk storage must be available on the target installation system to retain the Application Server files.
- At minimum the Java 1.1.6 runtime (JDK 1.1.6 or JRE 1.1.6i internationalization support) must be available for use by the ISPF Application Server.
- The ISPF Application Server must run on the same processsor on which the Web server supplying the ISPF Workstation Agent Applet runs.
- If the ISPF Application Server is to be run on OS/390 UNIX System Services (OS/390 UNIX), the X-Windows System support component of OS/390 Communications Services IP (TCP/IP) must be enabled.
- The Web browser used to invoke the ISPF Workstation Agent Applet must require at minimum the Java 1.1.1 runtime.
- TCP/IP network connectivity must be enabled among the operating systems on which OS/390 ISPF, the Application Server, and the Web browser will be activated.

A program to install the ISPF Application Server on a system that enables the Java 1.1.6 runtime is provided on the OS/390 distribution tape in partitioned data set ***ISP.SISPJSRV***. The program resides in member ***ISPJINST***, and can be downloaded to the target system as a binary file using the TCP/IP File Transfer Protocol (FTP). The following example shows a typical sequence of user interactions to download the installation utility from an OS/390 host named ***CARMVS1*** by means of an FTP transfer initiated from a Windows NT system:

```
G:\>ftp carmvs1
Connected to carmvs1.raleigh.ibm.com.
220-EZAFTSRV IBM MVS V3R2 at CARMVS1.RALEIGH.IBM.COM, 15:50:31 on 1997/08/07
220 Connection will close if idle for more than 15 minutes.
User (carmvs1.raleigh.ibm.com:(none)): webuser
331 Send password please.
Password:
230 WEBUSER is logged on.  Working directory is "WEBUSER.".
ftp> cd ..
250 "''" is working directory name prefix
ftp> cd isp.sispjsrv
250 "'ISP.SISPJSRV'" partitioned data set is working directory
ftp> bin
200 Representation type is Image
ftp> get ispjinst install.class
200 Port request OK.
125 Sending data set ISP.SISPJSRV(ISPJINST)
250 Transfer completed successfully.
64217 bytes received in 0.40 seconds (160.14 Kbytes/sec)
ftp> quit
221 Quit command received. Goodbye.
G:\>
```

In the preceding example the user initiates the connection from a DOS command prompt by entering the command ***ftp carmvs1*** and then supplying a valid user identifier and password for the OS/390 system ***CARMVS1***. Subsequent commands entered by the user are indicated by the ***ftp>*** prompt characters. It is important to

enter the FTP command ***bin*** so that the installation utility will be downloaded as binary (executable) data into the workstation file ***install.class***. Also, if the application server is to be installed in the OS/390 UNIX environment, the user must first logon to OS/390 UNIX and then invoke the FTP transfer from the OS/390 UNIX command prompt.

After the installation program has been downloaded into file ***install.class*** on the target system, it can be run as a Java program to install the ISPF Application Server. The format for invocation of the program may differ depending on the system platform. The following examples show the formats for invocation using either the Sun Java Development Kit (JDK) ***java*** command, or the Sun Java Runtime Environment (JRE) ***jre*** command from a DOS command prompt on a **Windows NT** system:

```
D:\java install
F:\jre -cp classes.zip; Install
```

Use the appropriate command depending on whether the JDK or JRE software is installed in the local environment. If you receive an error, verify that the classpath is set properly and that the directory in which the install.class file is located has access to the JRE or JDK environment.

If the application server is to be installed in the OS/390 UNIX environment, the user must first logon to OS/390 UNIX and enter the following command at the OS/390 UNIX command prompt:

```
export DISPLAY=host:0
```

where **host** is the TCP/IP address or hostname of the workstation that X-Windows uses to display the application server installation dialog. Subsequently the user enters the following command at the OS/390 UNIX command prompt:

```
java install
```

After the installation program executes, a Java installation application is invoked. The Java installation application leads you through the ISPF Application Server installation. You are prompted to read the License Agreement, select the location to put the ISPF Application Server on your system, watch the actual code extraction, and then to read the ***readme*** file to finish the installation.

The Application Server directory structure created by the installation utility is shown in Figure 2 on page 7. The default installation directory is **D:\webinstall**.

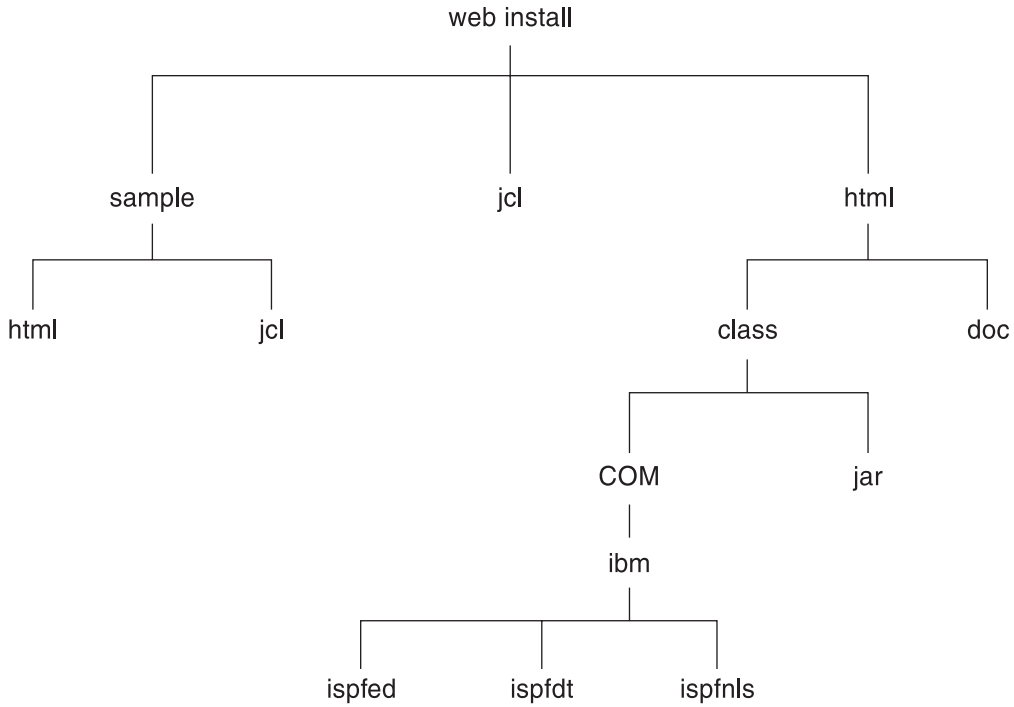

Figure 2. INSTALLING - DIRECTORY STRUCTURE

The root directory may not be ***webinstall***, if the installation utility was used to specify a different root directory. The installation utility copies files from directory ***webinstall\sample\html*** into directory ***webinstall\html*** , from directory ***webinstall\sample\jcl*** into directory ***webinstall\jcl*** , and from directory ***webinstall\sample*** into directory ***webinstall*** , provided that the individual files do not already exist in the target directories. Consequently, the installation utility can be rerun without replacing files containing changes that the Application Server administrator may have made to the Workstation Agent Applet sample HTML files copied to directory ***webinstall\html*** , to the Application Server batch JCL sample files copied to directory ***webinstall\jcl*** , or to the Application Server sample properties files copied to directory ***webinstall*** .

The class files required to run the ISPF Workstation Agent Applet are consolidated into Java archive (JAR) files. File download performance from a Web server to a Web browser is significantlly improved by consolidating multiple classes of an applet as JAR files, but some Web browsers do not yet support Java archives. To accomodate Web browsers that do not support JAR files the individual Workstation Agent Applet files are also provided as individual class files. The JAR files required to run the Workstation Agent Applet are ***webinstall\html\class\jar\wsb.jar*** , ***webinstall\html\class\jar\ispfldt.jar*** , ***webinstall\html\class\jar\ispfnls.jar***, and ***webinstall\html\class\jar\ispfed.jar*** . The individual class files corresponding to the Java archives are located in ***webinstall\html\class*** for ***wsb.jar*** , in ***webinstall\html\class\COM\ibm\ispfdt*** for ***ispfdt.jar*** , in ***webinstall\html\class\COM\ibm\ispfnls*** for ***ispfnls.jar*** , and in ***webinstall\html\class\COM\ibm\ispfed*** for ***ispfed.jar*** .

Installed with the default directory structure the ISPF Application Server uses ***webinstall\html*** as the root directory for HTML files. The file containing the Workstation Agent Applet HTML resides in ***webinstall\html*** . To allow Web

browsers that support either JAR files or individual class files the following ***APPLET*** tag could be used in the Workstation Agent Applet HTML for the Web server on ***webservehost*** :

```
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/ispf/html/class/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
   height="570" width="760">
```

Web browsers that support the ***ARCHIVE*** option will load the specified JAR files from ***webinstall\html\class\jar*** based on the ***CODEBASE*** and the relative directory, ***jar/***. Web browsers that do not support the ***ARCHIVE*** option will load the individual classes from ***webinstall\html\class***, ***webinstall\html\class\COM\ibm\ispfdt***, ***webinstall\html\class\COM\ibm\ispfnls***, and ***webinstall\html\class\COM\ibm\ispfed*** based on the ***CODEBASE*** option and a Java programming language ***package*** name shared by individual class files. The shared ***package*** names are ***COM.ibm.ispfdt*** for the class files in ***webinstall\html\class\COM\ibm\ispfdt***, ***COM.ibm.ispfnls*** for the class files in ***webinstall\html\class\COM\ibm\ispfnls***, and ***COM.ibm.ispfed*** for the class files in ***webinstall\html\class\COM\ibm\ispfed***. The remaining required class files do not share a ***package*** name and reside in ***webinstall\html\class***.

If a Web server other than the one provided with the Application Server is to be used, the Workstation Agent Applet HTML and applet files must be copied from the installation directories to corresponding directories of the alternative Web server. For example, assume that the default HTML directory path for an alternative Web server is ***altserv1\html*** and a subdirectory called ***classes\ispf*** has been created. Assume that the following ***APPLET*** tag will be used in the Workstation Agent Applet HTML for the Web server on ***webservehost*** :

```
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/altserv1/html/classes/ispf/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar" height="570" width="760">
```

Because the path, ***jar/*** , for the JAR files is relative to the specified ***CODEBASE***, a ***jar*** directory must be created in the ***altserv1\html\classes\ispf*** directory. The JAR files in ***webinstall\html\class\jar*** must be copied to ***altserv1\html\classes\ispf\jar***. Individual class files in ***webinstall\html\class*** must be copied to ***altserv1\html\classes\ispf*** . Individual class files that share a Java programming language ***package*** name must be copied to corresponding directories for the alternative Web server. Consequently, directories ***COM\ibm\ispfdt*** , ***COM\ibm\ispfnls*** , and ***COM\ibm\ispfed*** must be created in the directory ***altserv1\html\classes\ispf*** . The class files in ***webinstall\html\class\COM\ibm\ispfdt*** must be copied into ***altserv1\html\classes\ispf\COM\ibm\ispfdt*** . The class files in ***webinstall\html\class\COM\ibm\ispfnls*** must be copied into ***altserv1\html\classes\ispf\COM\ibm\ispfnls*** . The class files in ***webinstall\html\class\COM\ibm\ispfed*** must be copied into ***altserv1\html\classes\ispf\COM\ibm\ispfed*** .

Chapter 4. The Application Server

The ISPF Application Server is a Java application that provides services to allow an ISPF Workstation Agent Applet running within a Web browser to establish and maintain communication with an ISPF application running on an OS/390 system. The Application Server runs at the same internet address as the Web server that supplies the HTML and applet files for the ISPF Workstation Agent Applet that runs within a Web browser.

A limited Web server capable of fulfilling Web browser file download requests is integrated with the Application Server. This integrated HTTP facility can be used if no other Web server is available. The Application Server administrator can **Start** and **Stop** the integrated Web server after choosing the **HTTP server** menu selection from the Application Server main window. If the integrated Web server is stopped it cannot service file download requests from a Web browser.

Using the Application Server

The format of the command to invoke the Application Server using the Sun Java Development Kit (JDK) ***java*** command is as follows:

```
java <java options> ApplicationServer <server options>
```

The following example illustrates a typical invocation using the ***java*** command and specifying a complete Java **classpath** when the Application Server is invoked from the installation directory ***webinstall***\:

```
java -classpath server.zip;.;html\class;%classpath% ApplicationServer
```

The format of the command to invoke the Application Server using the Sun Java Runtime Environment (JRE) ***jre*** command is as follows:

```
jre <jre options> ApplicationServer <server options>
```

The following example illustrates a typical invocation using the ***jre*** command and specifying path to attach to the default Java **classpath** when the Application Server is invoked from the installation directory ***webinstall***\:

```
jre -cp server.zip;.;html\class; ApplicationServer
```

The syntax of the preceding example command is valid on **Windows NT** systems. To perform an equivalent command invocation from an OS/390 UNIX environment, the user must first logon to OS/390 UNIX and enter the following command at the command prompt:

```
export DISPLAY=host:0
```

where **host** is the TCP/IP address or hostname of the workstation that X-Windows uses to display the application server user interface. Subsequently the user enters the following command at the OS/390 UNIX prompt:

```
java -classpath server.zip:.:html/class:$CLASSPATH ApplicationServer
```

Note: Sample Application Server invocation command files are provided in the ***webinstall*** installation directory. The command file name is ***go.bat*** or ***gojre.bat*** for Windows systems, ***go.cmd*** or ***gojre.cmd*** for OS/2 systems, and ***go.ksh*** or ***gojre.ksh*** for UNIX-style operating systems.

The format and available options for **java** or *jre* command invocation may differ slightly depending on the local Java environment. Consult documentation for your Java implementation for details.

The format and available options for the Application Server itself can be determined by entering **–?** as the lone Application Server option.

The Application Server presents a graphical user interface to allow access to tailoring and control functions by an administrator. Figure 3 shows the main Application Server window displayed to show active connections completed between Workstation Agent Applets and ISPF applications, and connections initiated from Workstation Agent Applets and from ISPF applications that are waiting to be completed.

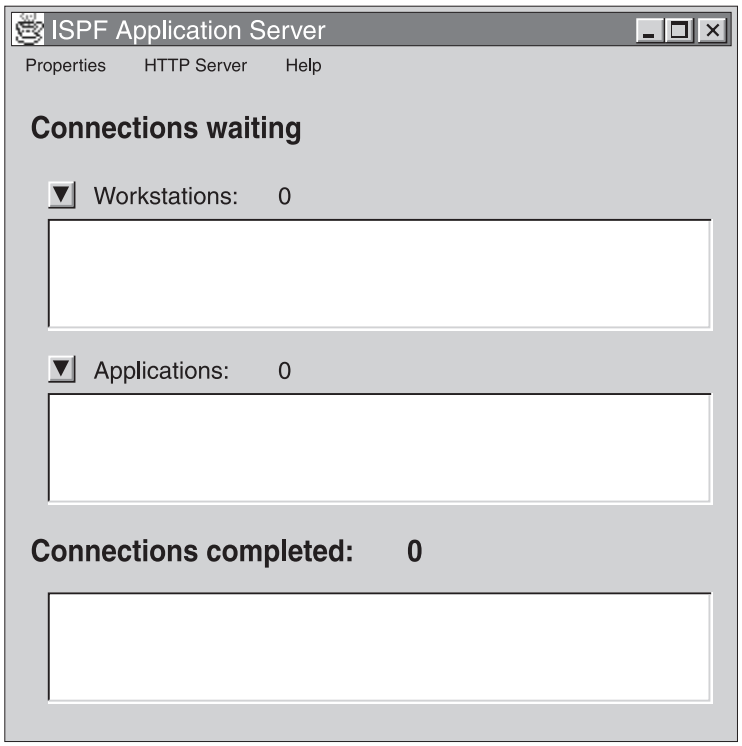

Figure 3. APPLICATION SERVER MAIN WINDOW

Individual waiting or completed active connections displayed can be deactivated by selecting the displayed connection with a double mouse button click and pressing the ***Delete*** pushbutton in the displayed popup window. When the Application Server is closed all waiting and completed active connections are deactivated.

Selecting a push button imprinted with a triangular symbol hides the associated window in the ***Connections waiting*** area so that more information regarding completed connections is displayed. Figure 4 on page 11 shows the main Application Server window displayed when both ***Connections waiting*** windows are hidden and one connection has been completed.

Figure 4. APPLICATION SERVER MAIN WINDOW

Regardless of the viewing mode the ***Properties*** menu selection allows the user to tailor the following Application Server information:

- general operational properties
- individual application properties

The information is retained in Java properties files which are intended to be maintained only by means of the interactive interface provided by the Application Server. The dialogs for each **Properties** selection allow the administrator to add, delete, or update information and either press ***Apply*** to record the new information and continue interaction with the current dialog, or press ***OK*** to record the new information and dismiss the current dialog. In both cases the new information will be used when the Application Server is restarted.

The general operational properties specify global information regarding all connecting OS/390 ISPF applications and ISPF Workstation Agent Applets. Default values are provided for most of the properties.

Note: For more detailed information about the General Properties selections, see "Properties File Options" on page 18.

Figure 5 on page 12 shows the **General Properties** window with the **Environment** selection prominent.

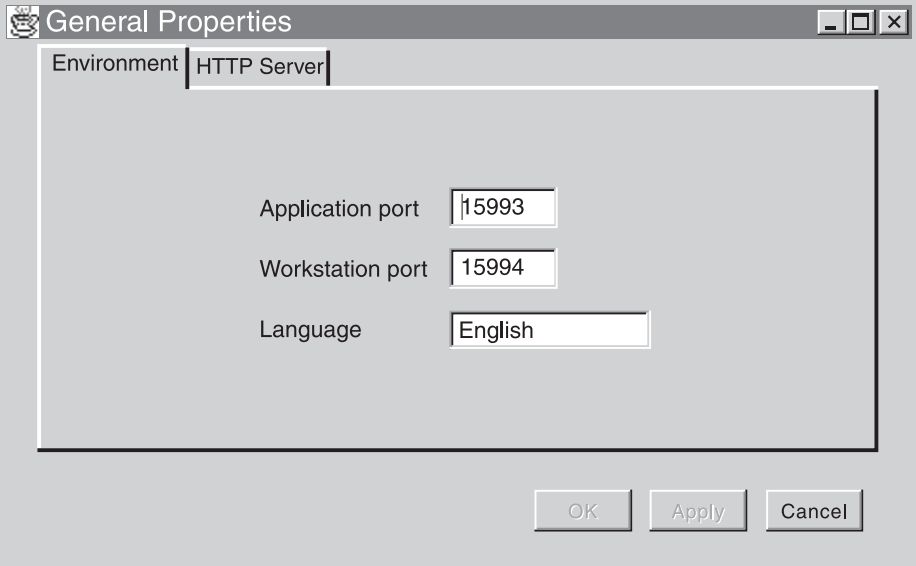

Figure 5. GENERAL PROPERTIES — ENVIRONMENT

Displayed property values can be changed in the window. **Application port** specifies the Application Server port to which OS/390 ISPF applications will connect to establish communication with ISPF workstation agent applets. **Workstation port** specifies the application server port to which Workstation Agent Applets will connect to establish communication with OS/390 ISPF applications. **Language** specifies the language in which the Application Server will display text.

Figure 6 shows the **General Properties** window with the **HTTP Server** selection prominent.

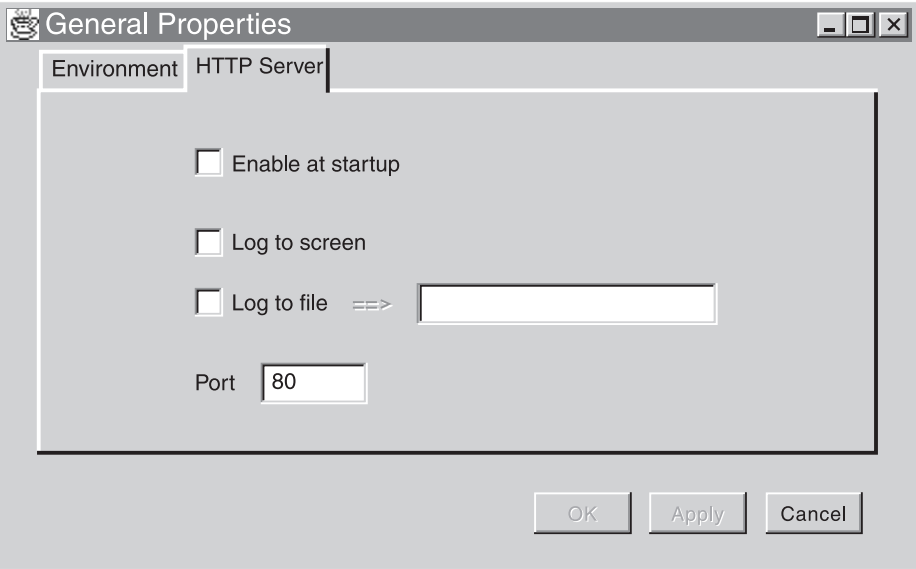

Figure 6. GENERAL PROPERTIES —HTTP Server

Displayed property values can be changed in the window. ***Enable at startup*** indicates that the integrated Web server will be activated when the Application Server is started. ***Log to screen*** indicates that a historic record of file download requests will be displayed. ***Log to file*** indicates that a historic record of file

download requests is to be created. The name of the trace file must be specified in the field provided. **Port** indicates the Web server port to which Web browsers must connect to request files to be downloaded.

Figure 7 shows the **General Properties** window with the ***Trace*** selection prominent. The ***Trace*** selection is displayed only if the Application Server program is activated with the ***-Trace*** option specified.

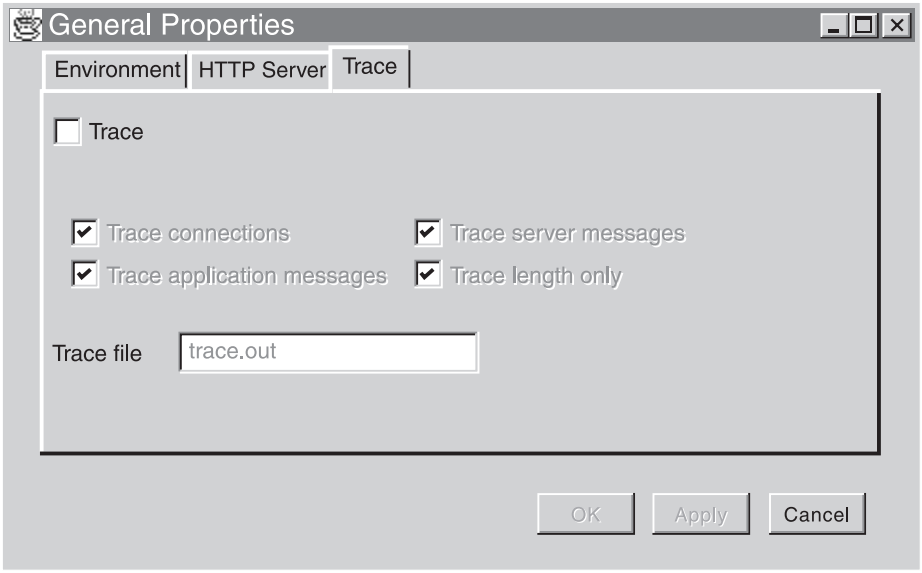

Figure 7. GENERAL PROPERTIES-TRACE

The ***Trace*** checkbox indicates whether tracing is enabled and ***Trace file*** specifies the name of the file to which trace output will be written. Remaining options enable various trace modes. Tracing should be activated only at the request of ISPF Application Server product support personnel.

The individual application properties specify information that will be used in establishing communication between batch mode TSO/ISPF applications on OS/390 and ISPF workstation applets running in Web browsers. Figure 8 on page 14 shows the ***Application Properties*** window with the ***Application Name*** column highlighted.

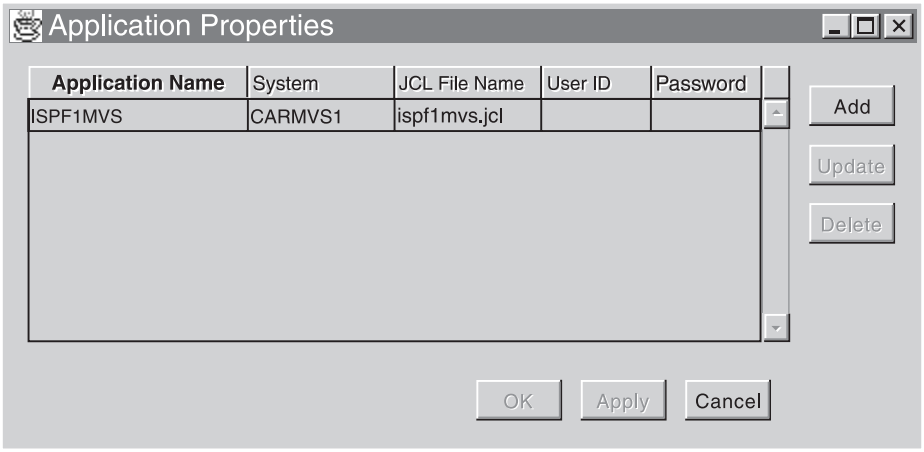

Figure 8. APPLICATION PROPERTIES

Selecting a column heading in this window causes the rows to be sorted in either ascending or descending alphanumeric character order. The small triangle adjacent to the column name indicates whether the current ordering sequence is ascending or descending. Column width can be adjusted by selecting a column header boundary and moving it to the left or right. Rows contain information pertaining to individual TSO/ISPF applications that can be started in batch mode when requested by a Workstation Agent Applet. ***Application Name*** is the name that will be used to identify an individual application. ***System*** identifies the default OS/390 system to which JCL will be submitted for batch mode activation of the TSO/ISPF session associated with this application. ***JCL File Name*** identifies the name of the file containing JCL that can be submitted to an OS/390 system to start a TSO/ISPF batch mode session for the application. ***User ID*** and ***Password*** respectively indicate the default user identifier and default user verification that will be used for File Transfer Protocol submissions of batch mode JCL. Values for these last two properties could be specified for a shared ISPF application that requires no unique user identifier and password to be supplied by the user.

An application record can be deleted by selecting the displayed record and pressing the ***Delete*** push button. An application record can be updated by selecting the displayed record and pressing the ***Update*** push button. An application record can be added by pressing the ***Add*** push button. The following dialog is displayed to allow records to be added or updated:

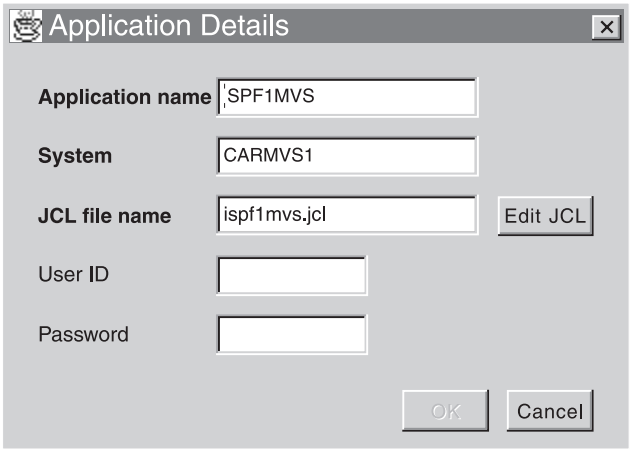

Figure 9. APPLICATION DETAILS

The JCL associated with the application can be edited using the dialog shown in Figure 10 by pressing the ***Edit JCL*** push button from the dialog shown in Figure 9.

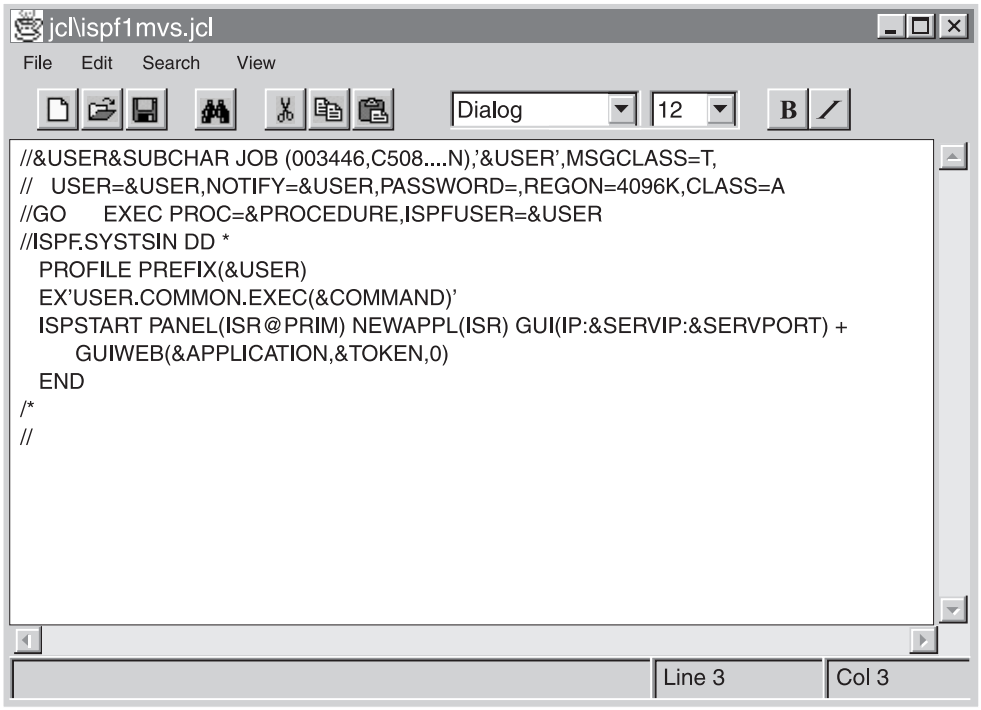

Figure 10. APPLICATION SERVER OPTIONS - APPLICATION/EDIT JCL

If batch mode JCL is to be submitted to an OS/390 system several application server variables are available to facilitate tailoring and submission of the JCL. The first character of all Application Server variables is the *&* character. The Application Server will substitute for each occurrence of a variable in the JCL the current value of that variable. Although specific uses are intended for each variable, the possible uses are limited only by the validity of the JCL stream that results from substitution of variable values. Consider the following JCL that resides at the Application Server for the application named ***ISPF1MVS*** :

```
//&USER&SUBCHAR  JOB (003446,C508,,,,N),'&USER',MSGCLASS=T,
//   USER=&USER,NOTIFY=&USER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=&PROCEDURE,ISPFUSER=&USER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(&USER)
  EX 'USER.COMMON.EXEC(&COMMAND)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:&SERVIP:&SERVPORT) +
        GUIWEB(&APPLICATION,&TOKEN,0)
  END
/*
//
```

The **&USER** variable contains either the ***USER*** parameter value supplied by the Workstation Agent Applet requesting the ***ISPF1MVS*** application or the default user identifier specified in the ***ISPF1MVS*** application file entry if the applet supplies no value. Assume that the user value is ***WEBUSER*** . In this example the Workstation Agent Applet will be required to supply both the ***USER*** and ***PASSWORD*** parameter values not only for substitution into the JCL, but also for authorization of the FTP submission of the JCL to an OS/390 system. The target OS/390 system itself can be specified by the ***SYSTEM*** parameter value supplied by the workstation agent applet or by the default system value from the application file entry for ***ISPF1MVS*** if the applet supplies no value. The **&SUBCHAR** variable contains a character selected by the Application Server to help ensure that unique job names distinguish jobs submitted for this **&USER** . The **&PROCEDURE** variable will contain the name of an OS/390 cataloged procedure specified by the ***PROCEDURE*** parameter value supplied by the Workstation Agent Applet. In this example the Workstation Agent Applet will specify the cataloged procedure named ***TSOISPF*** that contains the following JCL:

```
//TSOISPF  PROC ISPFUSER=
//*
//* MAKE A COPY OF THE PROFILE TABLES SO THAT THE USER CAN RUN MORE
//* THAN ONE JOB CONCURRENTLY.
//*
//* UPDATE THE DSN ON SYSUT1 TO BE AN EXISTING DATA SET WITH ISPF
//* PROFILE TABLES WHICH HAVE INITIAL SETTINGS.
//*
//COPYPROF EXEC PGM=IEBCOPY
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DSN=&ISPFUSER..PRIVATE.TABLES,DISP=SHR
//SYSUT2   DD  DSN=&&PROFILE,UNIT=VIO,DISP=(NEW,PASS),
//             SPACE=(TRK,(1,1,5)),DCB=(LRECL=80,DSORG=PO,RECFM=FB)
//*
//* RUN ISPF
//*
//* UPDATE THE DD STATEMENTS WITH ANY NEEDED ALLOCATIONS OR
//* ALLOCATIONS CAN BE DONE BY THE COMMAND THAT IS RETURNED BY THE
//* ISPF WORKSTATION AGENT APPLET.
//*
//ISPF     EXEC PGM=IKJEFT01,TIME=1440,REGION=4096K,DYNAMNBR=75
//SYSTSPRT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//ISPPROF  DD  DSN=&&PROFILE,DISP=(OLD,DELETE)
//SYSTSIN  DD  DUMMY
```

The **&COMMAND** variable will contain the name of a command specified by the ***COMMAND*** parameter value supplied by the Workstation Agent Applet. In this example the command will be a REXX program or CLIST named ***ISPF1GUI***, which allocates necessary ISPF and private data sets for the user.

Four Application Server variable values are supplied for substitution in the ***ISPSTART*** command that requests a connection to the Application Server. The

Application Server variable **&SERVIP** represents the internet address of the Application Server. The variable **&SERVPORT** represents the Application Server port to which a TSO/ISPF application on OS/390 must establish a connection. The variable **&APPLICATION** contains the ***APPLICATION*** parameter value supplied by the Workstation Agent Applet. The value of the variable **&TOKEN** is generated by the Application Server to distinguish this particular application request from requests made by other Workstation Agent Applets for the same application.

After the Application Server substitutions are made the result is the following JCL:

```
//WEBUSERA  JOB (003446,C508,,,,N),'WEBUSER',MSGCLASS=T,
//   USER=WEBUSER,NOTIFY=WEBUSER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=TSOISPF,ISPFUSER=WEBUSER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(WEBUSER)
  EX 'USER.COMMON.EXEC(ISPF1GUI)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:9.37.196.127:15993) +
        GUIWEB(ISPF1MVS,383503,0)
  END
/*
//
```

Application Server Reference

The following types of options are available to customize the environment and operation of the Application Server:

- program activation options
- Web server activation options
- properties file options
- JCL tailoring options

Program Activation Options

The format of the command to invoke the Application Server using the Sun Java Development Kit (JDK) ***java*** command is as follows:

```
java <java options> ApplicationServer <server options>
```

The format of the command to invoke the Application Server using the Sun Java Runtime Environment (JRE) ***jre*** command is as follows:

```
jre <jre options> ApplicationServer <server options>
```

Use the appropriate command based on whether the JDK or JRE is installed in your system.

None of the server options are required but the following server options may be specified:

-Trace This option activates display of the general properties selection that enables tracing of Application Server packets. Tracing should only be used if requested by IBM service personnel to diagnose a problem. The option may be abbreviated as ***-T*** .

-? This option requests available server options to be displayed. If this option is specified all other options are ignored and application server operation completes after available options are displayed.

The following example shows Application Server invocation using the ***java*** command with the ***classpath*** option and all server options except the **/?** option in a Sun JDK environment:

```
java -classpath server.zip;.;html\class;%classpath% ApplicationServer -T
```

This example shows Application Server invocation using the ***jre*** command with the ***cp*** option and all other server options except the **-?** option in a Sun JRE environment:

```
jre -cp server.zip;.;html\class; ApplicationServer -T
```

Web Server Activation Options

Activation of the integrated Web server facility can be controlled by choosing the **HTTP server** selection from the Application Server main window as shown in Figure 13.

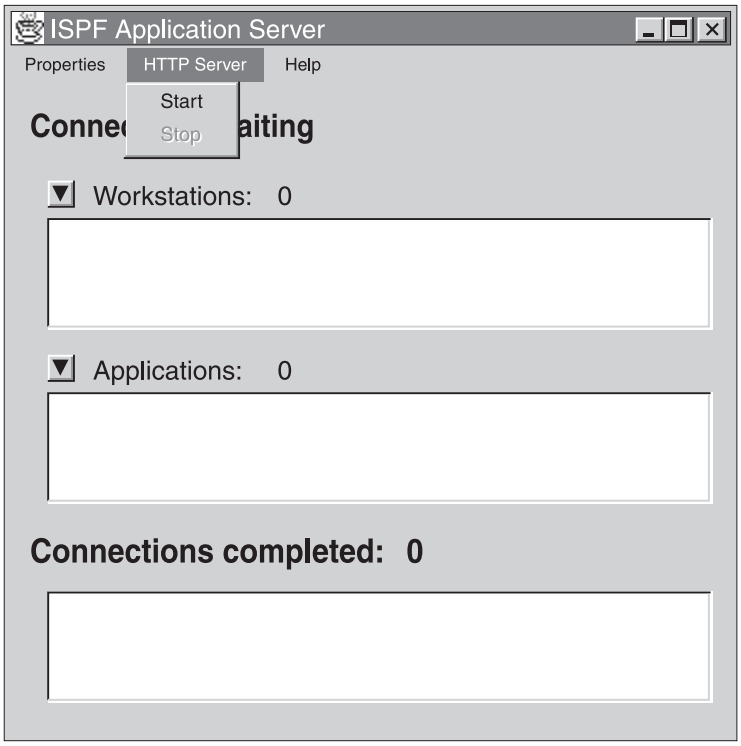

Figure 13. HTTP Server

The displayed options are as follows:

Start This option activates the integrated Web server.

Stop This option deactivates the integrated Web server.

Properties File Options

Two Java properties files contain ISPF Application Server customization information. The properties file options can be viewed and modified by choosing the **Properties** selection from the Application Server main window as shown in Figure 14 on page 19.

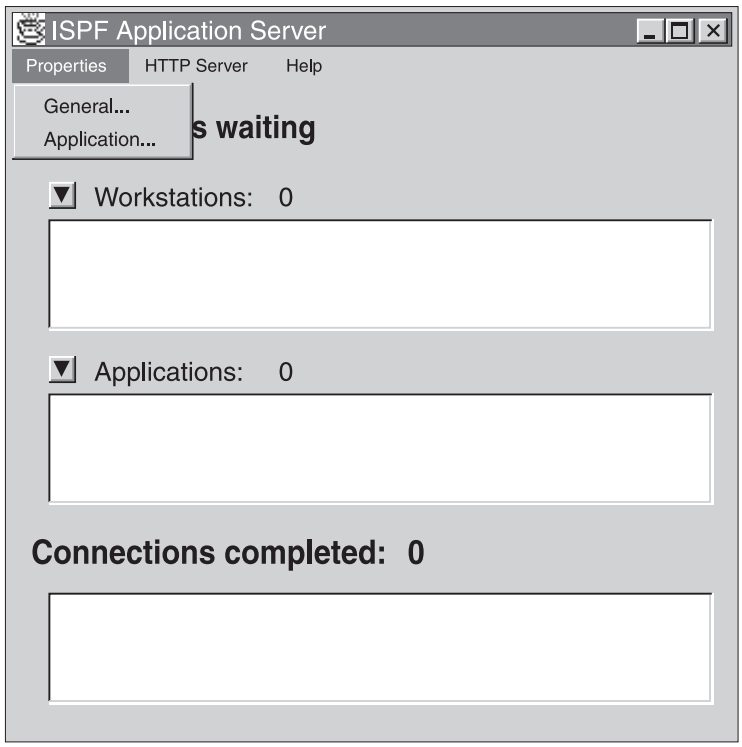

Figure 14. Properties

Figure 15 shows the **General Properties** window with the **Environment** selection prominent.

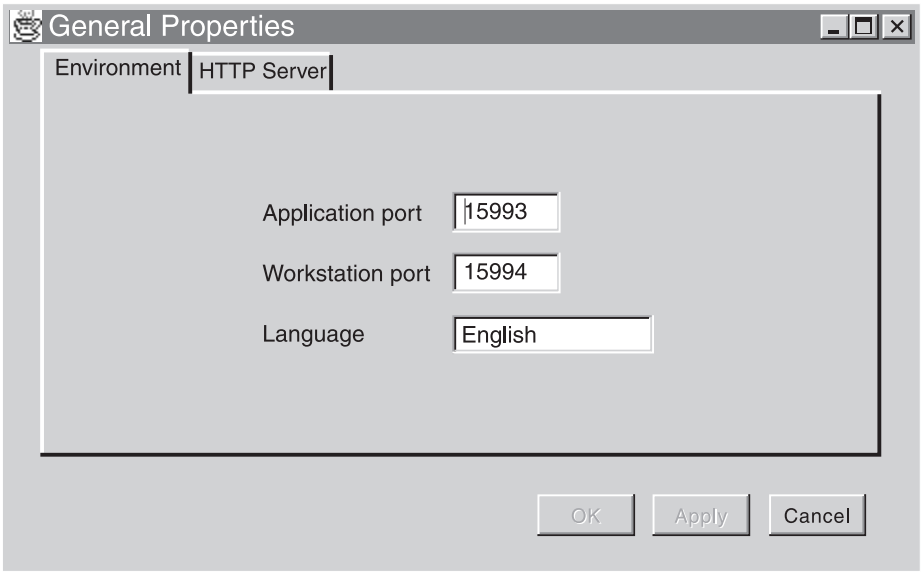

Figure 15. Environment

The displayed properties are as follows:

Application port
This property specifies the Application Server port to which OS/390 ISPF

applications will connect to establish communication with ISPF workstation agent applets. Permitted values are numeric and range from 1024 to 65535.

Workstation port
This property specifies the Application Server port to which workstation agent applets will connect to establish communication with OS/390 ISPF applications. Permitted values are numeric and range from 1024 to 65535.

Language
This property specifies the language in which the Application Server will display text. Permitted values are listed. The initial setting for this property is determined from the operating system environment.

Figure 16 shows the **General Properties** window with the **HTTP Server** selection prominent.

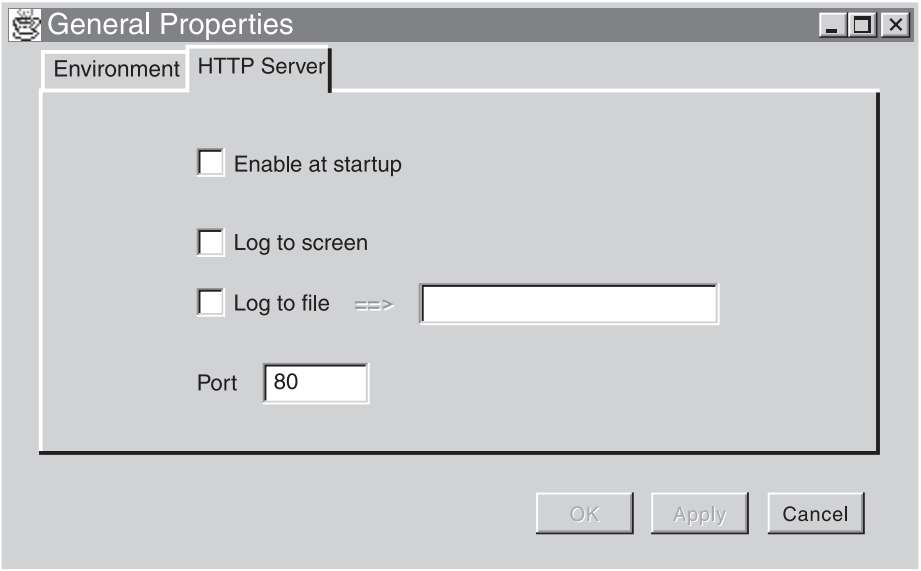

Figure 16. General Properties —HTTP Server

The displayed properties are as follows:

Enable at startup
This property specifies that the integrated Web server will be activated when the Application Server is started.

Log to screen
This property specifies that a window will be created to allow viewing of the historic record of file download requests.

Log to file
This property specifies that a file will be created to retain the historic record of file download requests. A file name must be specified in the adjacent entry field. Alphabetic text case for the file name is respected by the application server and may be significant to some file systems. Permitted length and character composition of the file name are also dependent on the local file system.

Port This property specifies the Web server port to which Web browsers must

connect to request files to be downloaded. Permitted values are numeric and include 80, the well-known World Wide Web HTTP port, as well as the range from 1024 to 65535.

Figure 17 shows the **General Properties** window with the **Trace** selection prominent.

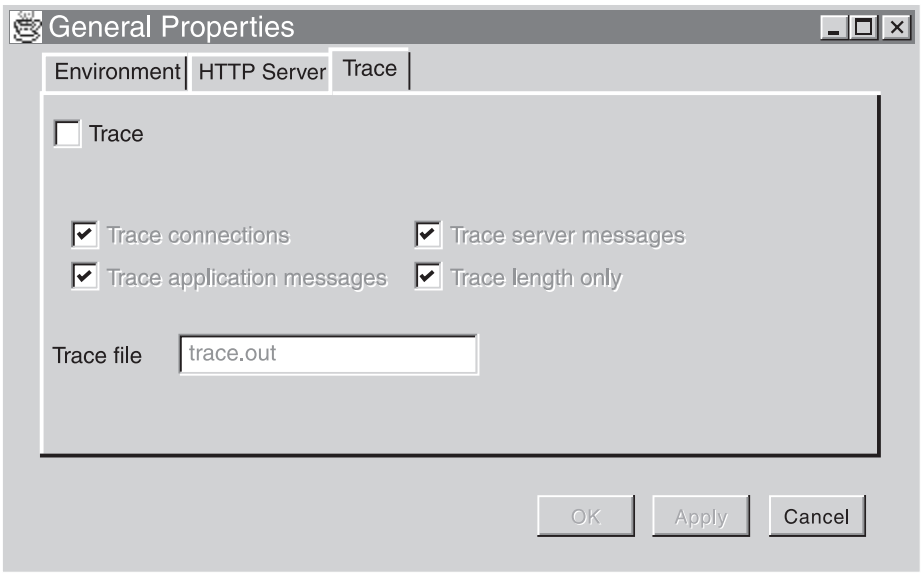

Figure 17. Trace

The displayed properties are as follows:

Trace This property indicates whether tracing is enabled.

Trace file
This property indicates the name of the file to which trace output will be written. Alphabetic text case for the file name is respected by the application server and may be significant to some file systems. Permitted length and character composition of the file name are also dependent on the local file system.

The remaining settings in this window are to be used by product service personnel for problem determination. Unless requested by service personnel the ***Trace*** option in the window should not be selected. Tracing negatively affects Application Server performance.

Figure 18 on page 22 shows the **Application Properties** window.

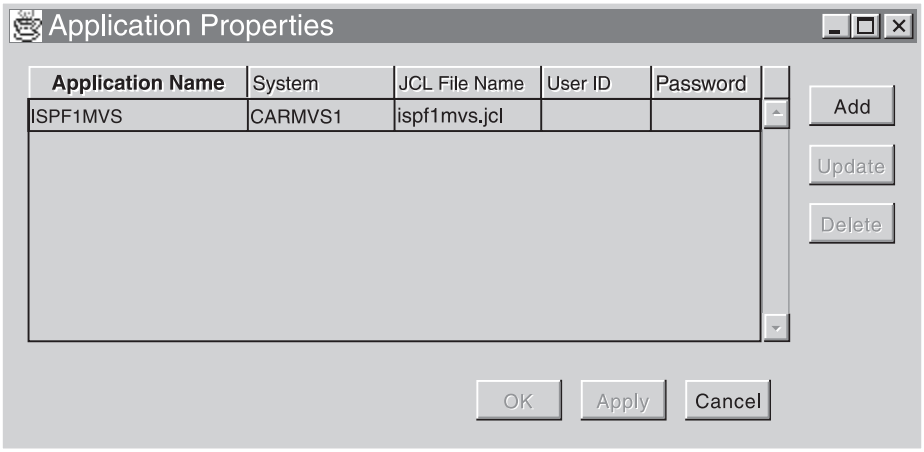

Figure 18. Application Properties

A row in the table constitutes a properties entry for a single application. The displayed properties for each application properties entry are as follows:

Application Name
This property specifies the name that will be used to identify an individual TSO/ISPF application that can be activated in batch mode on an OS/390 system. Alphabetic text case for the name is respected for name display but ignored for name comparison by the Application Server. A value for this property is required in an application properties entry.

System
This property specifies the default OS/390 system to which JCL will be submitted for batch mode activation of the TSO/ISPF session for this application. The value can be overridden by the value of the ***SYSTEM*** parameter attribute of the <***APPLET*** > HTML element for the Workstation Agent Applet or by the ***System*** value specified on the Workstation Agent Applet main window. Either a host name (e.g. carmvs1) or domain name (e.g. carmvs1.raleigh.ibm.com) or a dotted decimal IP address (e.g. 9.67.43.25) can be specified as appropriate in the local environment. Alphabetic text case for the name is respected by the Application Server. A value for this property is required in an application properties entry.

For batch JCL submission to a target OS/390 system the TCP/IP File Transfer Protocol (FTP) is used. If an FTP Control port other than the well-known port ***21*** is used on the OS/390 system the Control port must be defined to the Application Server. The port definition for a given OS/390 system can be added to the file ***general.file*** in the ***webinstall*** installation directory. Edit the file and add an ***ftpport*** entry of the form ***system.ftpport=nnnnn*** where: ***system*** is the name of the host system exactly in terms of text case and length as it will be defined in the Application Server application properties or by the Workstation Agent Applet; ***ftpport*** is entered in lower case exactly as shown; and ***nnnnn*** is the numeric port number. For example, if the application properties or Workstation Agent Applet define the system as ***CarMVS1.raleigh.ibm.com*** and the FTP port number should be 2021, then the ***ftpport*** definition in the general properties file would be ***CarMVS1.raleigh.ibm.com.ftpport=2021*** .

JCL File Name
This property specifies the name of the file in the ***ISPF/JCL/*** directory that will contain the batch mode TSO/ISPF JCL to be submitted to an OS/390 system to activate this application. Alphabetic text case for the file name is

respected by the Application Server and may be significant to some file systems. Permitted length and character composition of the file name are also dependent on the local file system. A value for this property is required in an application properties entry.

User ID
This property specifies the user identifier that will be associated with the file transfer and OS/390 processing of the batch mode JCL for this TSO/ISPF application. The value can be overridden by the value of the ***USER*** parameter attribute of the <***APPLET*** > HTML element for the workstation agent applet or by the ***User ID*** value specified on the Workstation Agent Applet main window. Alphabetic text case for the ***User ID*** value is forced to upper case by the Application Server. A value for this property is not required in an application properties entry.

Password
This property specifies the identifier used to authenticate the ***User ID*** value for this application. The value can be overridden by the value of the ***PASSWORD*** parameter attribute of the <***APPLET*** > HTML element for the Workstation Agent Applet or by the ***Password*** value specified on the Workstation Agent Applet main window. Alphabetic text case for the ***Password*** value is forced to upper case by the Application Server. A value for this property is not required in an application properties entry.

JCL Tailoring Options

The following variables can be included in JCL as well as in data supplied in the JCL stream to allow unique values to be substituted by the application server before the JCL is submitted to an OS/390 system:

&APPLICATION
This variable represents the name of the application for which JCL will be submitted on the OS/390 system. The value of the **APPLICATION** parameter attribute of the <**APPLET** > HTML element for the Workstation Agent Applet or the overriding value of the **Application** specified on the Workstation Agent Applet main window will be substituted. The value will be identical to the **Application Name** property defined for an application in the application properties file and can be substituted for the value of the **application_name** parameter of the **GUIWEB** option of the **ISPSTART** command.

&COMMAND
This variable represents a command that is to be invoked within the TSO/ISPF environment established by batch mode JCL on an OS/390 system. The value of the **COMMAND** parameter attribute of the <**APPLET** > HTML element for the Workstation Agent Applet or the overriding value of the **Command** specified on the Workstation Agent Applet main window will be substituted if available. The value can be substituted for the name of a program that is to be invoked, for example, from the **SYSTSIN** data supplied in the JCL stream submitted for the application. Alphabetic text case for the parameter value is respected by the Application Server.

&PASSWORD
This variable represents the identifier that will be used to authenticate the user identifier that authorizes FTP transmission of the JCL to an OS/390 system. The value of the **PASSWORD** parameter attribute of the <**APPLET** > HTML element for the workstation agent applet or the overriding value of the **Password** specified on the Workstation Agent Applet main window

will be substituted if available. If the workstation agent applet specifies no value then the **Password** property value associated with the application in the application properties file will be substituted. If no value is available from any of the aforementioned sources the FTP transmission of the JCL will fail. If needed the **&PASSWORD** value can also be substituted for the **PASSWORD=** parameter value on the **JOB** card.

&PROCEDURE
This variable represents procedure JCL that is to be invoked within the batch mode JCL submitted to an OS/390 system. The value of the **PROCEDURE** parameter attribute of the <**APPLET** > HTML element for the Workstation Agent Applet or the overriding value of the **Procedure** specified on the Workstation Agent Applet main window will be substituted if available. The value can be substituted for the **PROC=** parameter value for a procedure step in JCL. Alphabetic text case for the parameter value is forced to upper case by the Application Server.

&SERVIP
This variable represents the internet address of the Application Server. The value can be substituted for the value of the **address** component of the **IP:address:port** parameter of the **GUI** option of the **ISPSTART** command used to invoke the application.

&SERVPORT
This variable represents the TCP/IP port number of the Application Server. The value can be substituted for the value of the **port** component of the **IP:address:port** parameter of the **GUI** option of the **ISPSTART** command used to invoke the application. The value is identical to the **Port** property of the **Application** selection in the general properties file for the Application Server.

&SUBCHAR
This variable represents a single character selected by the application server. The value can be substituted to form part of a job name used on the **JOB** statement to identify the job that will be submitted to an OS/390 system.

&TOKEN
This variable represents a unique value generated by the application server to distinguish this particular submission of batch mode JCL for the application requested by a Workstation Agent Applet from JCL submissions for the same application made by other Workstation Agent Applets. The value must be substituted for the **token_id** parameter of the **GUIWEB** option of the **ISPSTART** command that is invoked for the JCL submitted for the application.

&USER
This variable represents the user identifier that will be used to authorize FTP transmission of the JCL to an OS/390 system. The value of the **USER** parameter attribute of the <**APPLET** > HTML element for the workstation agent applet or the overriding value of the **User ID** specified on the Workstation Agent Applet main window will be substituted if available. If the Workstation Agent Applet specifies no value then the **User ID** property value associated with the application in the application properties file will be substituted. If no value is available from any of the aforementioned sources the FTP transmission of the JCL will fail. The **&USER** variable can also be included anywhere in the JCL that a valid user identifier can be substituted such as in the job name on the **JOB** card or for the **USER=** parameter on the **JOB** card or in a data set name in a JCL **DD** statement.

Error Codes

The following error codes may be returned to an ISPF application or to a Workstation Agent Applet by the Application Server if a connection cannot be established between the ISPF application and the Workstation Agent Applet:

17 The maximum time to wait for a connection to an ISPF application or to a Workstation Agent Applet has been exceeded.

19 The Application Server was unable to submit the batch ISPF application JCL to the target OS/390 system.

20 The Application Server was unable to find an application properties entry for batch JCL submission of an ISPF application to a target OS/390 system.

21 A connection protocol error was encountered between the Application Server and an ISPF application or a Workstation Agent Applet.

22 A waiting ISPF application connection or Workstation Agent Applet connection to the Application Server was deleted from the Application Server main window.

Chapter 5. The Workstation Agent Applet

The ISPF Workstation Agent Applet runs in a Java virtual machine environment within a Web browser. The applet provides graphical display services for ISPF similar to the services provided by the workstation agent for native platforms that is separately provided with ISPF for OS/390. The essential differences between the two agents are as follows:

- The Workstation Agent Applet uses the generic programming and graphical presentation services provided by a Java virtual machine instead of the unique platform services provided by a workstation operating system.
- The Workstation Agent Applet enlists the services of an ISPF Application Server in order to establish communication with a TSO/ISPF application in contrast to the native platform workstation agent which establishes communication directly.

Using the Workstation Agent Applet

The ISPF Workstation Agent Applet enables ISPF applications to be accessed by means of an ISPF Application Server from any Web browser supporting a Java runtime release level at least as high as that required by the applet.

Workstation agent applet operation can be controlled by means of HTML elements and by means of Workstation Agent Applet window elements. Window element values specified by the user override the values of corresponding HTML elements. Window pushbutton actions are as follows:

Connect
This pushbutton causes a connection request for an application to be sent to the ISPF Application Server.

Font This pushbutton causes display of a dialog that allows the user to select a text presentation font for the Workstation Agent Applet.

About
This pushbutton causes display of information about the current release of the Workstation Agent Applet.

Dock/Float
The text on the pushbutton shows the available display characteristic. This characteristic is the opposite of what your display is currently using. When the pushbutton text is ″Dock″ , it means that you are currently in **float** display mode, **dock** display mode is available to you, and pressing this pushbutton causes ISPF application windows to be confined inside the area defined by the Web browser window. When you have chosen **dock** display mode, the text of the pushbutton changes to ″Float″.

When the pushbutton text is ″Float″, it means that you are currently in **dock** display mode, **float** display mode is available to you, and pressing this pushbutton allows ISPF applicaton windows to be moved outside the area defined by the Web browser window. When you have chosen **float** display mode, the text of the pushbutton changes to ″Dock″.

The Workstation Agent Applet main window can have different styles as shown in Figure 23 on page 28 and in Figure 24 on page 28.

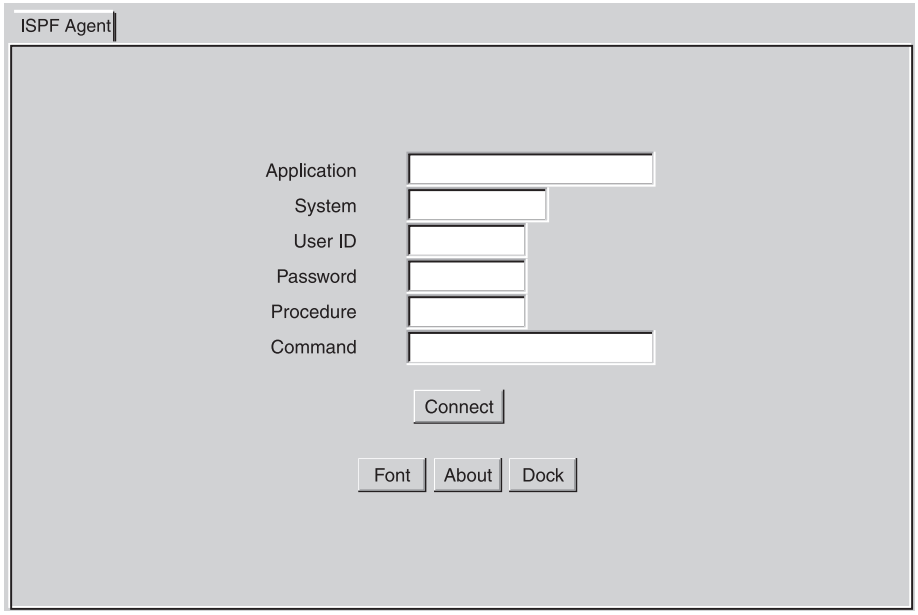

Figure 23. WSA Applet Window Style 1

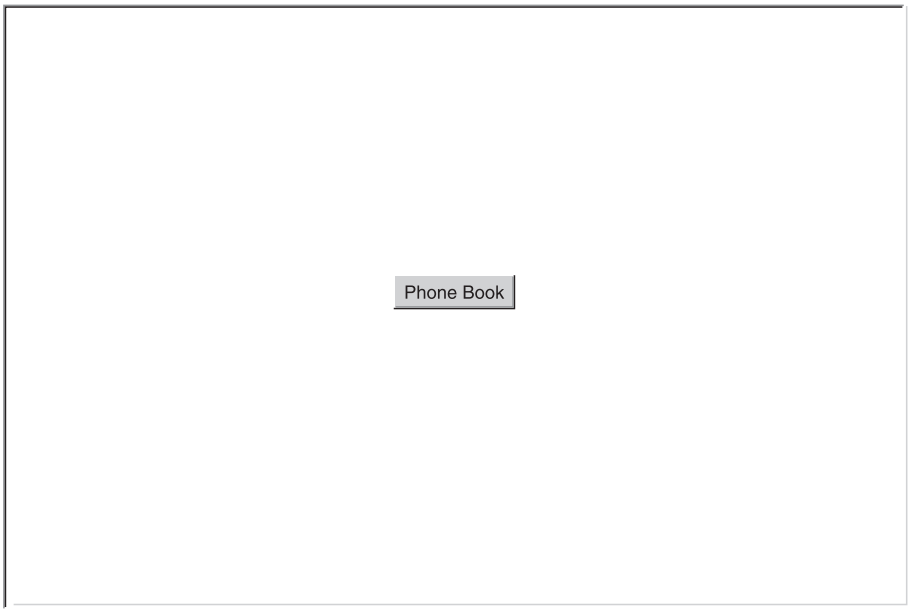

Figure 24. WSA Applet Window Style 2

Display of the various options in the window shown in Figure 23 is enabled and disabled by parameters of the < APPLET > HTML element. Each of those parameters that is associated with an entry field in the applet window begins with the characters **REQ** , for example, **REQPASSWORD** . The parameter **SHOWOPTIONS** enables display of the ***Font*** , ***About*** , ***Float*** , and ***Dock*** push buttons that appear in the applet window. The parameter **PANELSINBROWSER** determines whether ISPF application windows will be constrained to display ***Dock***ed within the browser window or allowed to display ***Float***ed outside the browser window. The parameter **RUNBUTTONTEXT** allows customization of the

text on the button that activates the applet. The default text for the activation button is ***Connect*** . Figure 24 on page 28 shows a Workstation Agent Applet window containing a single activation push button with customized text. This latter window style with minimal controls would be useful for accessing a generic ISPF application that requires no individualized TSO/ISPF session control information to be supplied by the user. A simple example of such an application is an ISPF dialog that allows any user to access a corporate phone book.

More significant than the options that control the Workstation Agent Applet window style are options that fall into the following categories:

- Options that allow the Workstation Agent Applet to be downloaded from a Web server.
- Options that allow the workstation agent applet to access an ISPF application server, to access application control data, and to control application connection timing.
- Options that allow OS/390 JCL processing and tailoring to accomodate individual users.

These option categories are illustrated by the following HTML file that was downloaded from a Web server located at ***webservehost***:

```
<HTML>
<TITLE> ISPF Workstation Agent Applet</TITLE>
<BODY>
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/ispf/html/class/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
   height="400" width="600">
<PARAM NAME=APPLICATION VALUE=ISPF1MVS>
<PARAM NAME=AUTOCONNECT VALUE=n>
<PARAM NAME=BATCH VALUE=y>
<PARAM NAME=COMMAND VALUE=ISPF1GUI>
<PARAM NAME=MAXWAIT VALUE=120>
<PARAM NAME=PANELSINBROWSER VALUE=n>
<PARAM NAME=PASSWORD VALUE="">
<PARAM NAME=PORT VALUE=15994>
<PARAM NAME=PROCEDURE VALUE=TSOPROC>
<PARAM NAME=REQAPPLICATION VALUE=n>
<PARAM NAME=REQCOMMAND VALUE=n>
<PARAM NAME=REQPASSWORD VALUE=y>
<PARAM NAME=REQPROCEDURE VALUE=n>
<PARAM NAME=REQSYSTEM VALUE=n>
<PARAM NAME=REQUSER VALUE=y>
<PARAM NAME=RUNBUTTONTEXT VALUE="">
<PARAM NAME=SHOWOPTIONS VALUE=y>
<PARAM NAME=SYSTEM VALUE=CARMVS1>
<PARAM NAME=USER VALUE="">
</PARM>
</APPLET>
</BODY>
</HTML>
```

The <**APPLET** > element provides information needed by the Web browser to request download of the Workstation Agent Applet from the Web server. The **CODE** option indicates the name of the file, **wsb.class** , that contains the compiled applet. The **ARCHIVE** option indicates one or more Java archives that may contain classes and other resources that are to be preloaded before the applet runs. In this case there are four archives, one for the Workstation Agent Applet itself, one for ISPF graphical display support files, one for national language support files and one for workstation editor support. The **CODEBASE** option of the <**APPLET** >

element indicates the location of individual class files for the applet. The individual class files will be downloaded by Web browsers that do not support the **ARCHIVE** option for Java archives.

Two parameters (<**PARAM** > elements) of the <**APPLET** > element are used to identify, respectively, the ISPF Application Server and the Application Server data associated with the requested application. The value of the parameter named **PORT** indicates the target TCP/IP port number that must be used by the Workstation Agent Applet to establish a connection with the ISPF application server. Notice that no internet address is specified for the Application Server, because that address is identical to the address of the Web server from which the HTML file was downloaded. The value of the parameter named **APPLICATION** indicates the name of an application, in this case **ISPF1MVS**, that will be represented by an entry in the application properties file managed by the target ISPF Application Server.

Two more parameters control timing of connection establishment for an application. The value ***n*** of the parameter named **AUTOCONNECT** indicates that the Workstation Agent Applet will not attempt to connect to the ISPF Application Server until the user explicitly requests a connection. The value **120** of the parameter named **MAXWAIT** indicates the length of time that the workstation agent applet is willing to wait for a connection to the TSO/ISPF application on the OS/390 system.

Additional parameters of the <**APPLET** > element relate to OS/390 Job Control language processing and tailoring. The value ***y*** of the parameter named **BATCH** enables tailoring and submission of JCL that will establish a batch TSO environment on a target OS/390 system. The OS/390 system **CARMVS1** to which the JCL will be submitted is indicated by the value of the parameter named **SYSTEM** . The JCL itself resides at the ISPF Application Server and is submitted to the Job Entry Subsystem on the target OS/390 system by means of the TCP/IP File Transfer Protocol (FTP). In the current case the following JCL resides at the Application Server:

```
//&USER&SUBCHAR  JOB (003446,C508,,,,N),'&USER',MSGCLASS=T,
//   USER=&USER,NOTIFY=&USER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=&PROCEDURE,ISPFUSER=&USER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(&USER)
  EX 'USER.COMMON.EXEC(&COMMAND)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:&SERVIP:&SERVPORT) +
        GUIWEB(&APPLICATION,&TOKEN,0)
  END
/*
//
```

An Application Server variable is distinguished by the character **&** preceding the variable name. A variable name corresponds to an <**APPLET** > element parameter name if the variable name without the **&** prefix is identical to the <**APPLET** > element parameter name. A variable having a name corresponding to an <**APPLET** > element parameter name will be replaced by the corresponding parameter value supplied by the Workstation Agent Applet. Several <**APPLET** > element parameters are employed in this example to allow the user to tailor the JCL dynamically. The values of the parameters named **USER** and **PASSWORD** are used to authorize file transfer to the OS/390 system and can also be used, if necessary, to supply valid **USER=** and **PASSWORD=** values on the **JOB** statement for the submitted TSO batch job. In the case under consideration here the value of the parameter named **USER** is also employed to form the basis of a unique job

name for the JCL and a unique data set name prefix in the data stream. The value of the parameter named **PROCEDURE** specifies cataloged procedure JCL that will invoke the TSO program **IKJEFT01** . The value of the parameter named **COMMAND** specifies a command that will be executed within the TSO session. In the current case the **ISPF1GUI** command represents a REXX program or CLIST that allocates ISPF data sets. The values ***y*** of the parameters that have names beginning with **REQ** enable display of the visual prompt and entry field in the Workstation Agent Applet main window for the **USER** and **PASSWORD** parameter values.

The Web browser applet window corresponding to the HTML file is shown in Figure 25.

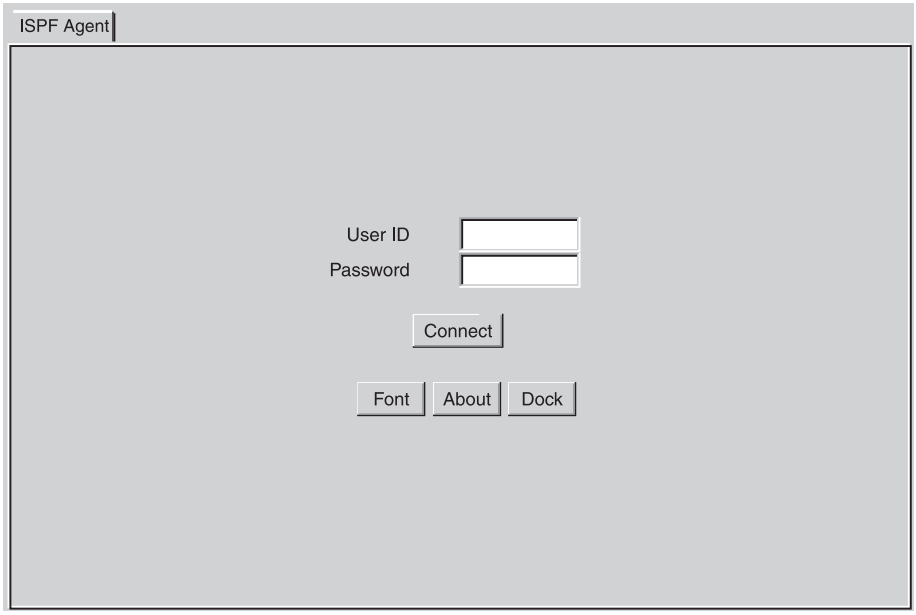

Figure 25. WSA Applet Main Window

After entering the required **user** identifier and **password** the user would press the ***Connect*** push button in the applet window as shown in Figure 26 on page 32 in order to connect to the ISPF Application Server.

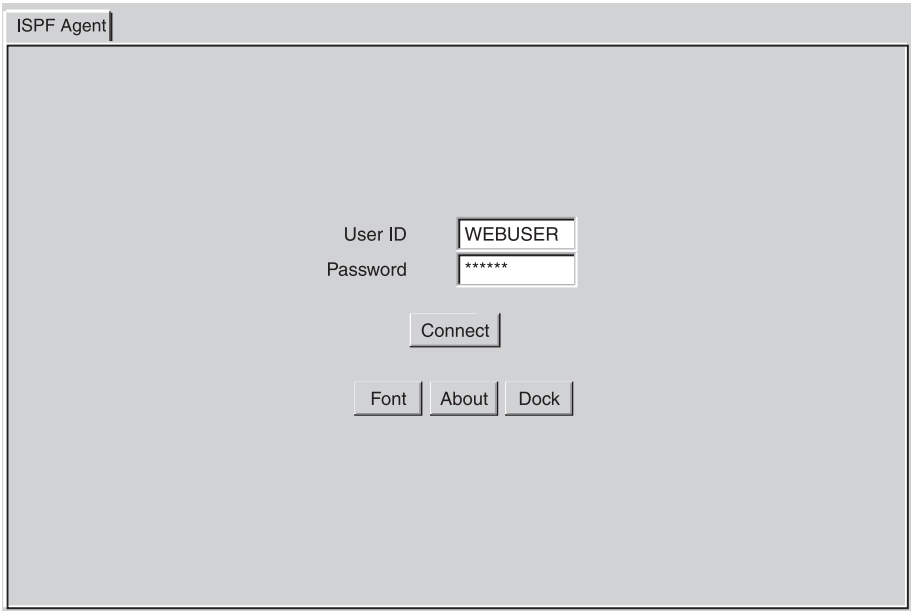

Figure 26. WSA Applet Window — Connect

The Application Server would submit the TSO batch job associated with application **ISPF1MVS** to system **CARMVS1** . From the job on **CARMVS1** the **ISPFGUI** command would complete and the **ISPSTART** command would be invoked to establish a connection from the TSO/ISPF session to the Application Server.

Sample HTML files for browsers using the JAVA Plug-in (SAMP2.HTM) and for browsers not using the JAVA Plug-in (SAMP1.HTM) are included with the application server.

Note: A Java plug-in HTML converter program was used to convert SAMP1.HTM to SAMP2.HTM for use with the Java plug-in code.

The SAMP2.HTM file contains code that attempts to load the necessary Java plug-in for the Java-enabled Web browser. If the Web browser does not have the necessary Java plug-in, then a Java icon displays. Selecting this icon loads the Web page that enables you to install the necessary Java plug-in. Follow the instructions on the Web pages to install the Java plug-in. The Java plug-in should only be installed this first time. After the plug-in is installed, restart your Web browser and load an ISPF Workstation Agent applet HTML file. After the first load the converted HTML file recognizes that the Java plug-in is available and loads it automatically.

It is recommended that all ISPF Workstation Agent applet HTML files that were previously generated be converted using the Java plug-in HTML Converter after any null responses have been corrected. Look at the new SAMP1.HTM file to see what null responses were corrected. This step is only necessary if your Web browser supports Java plug-in technology.

The SAMP2.HTM file can be copied and used as a template to create the ISPF Workstation Agent applet and HTML files, but this is **NOT RECOMMENDED**.

The Java plug-in and Java plug-in Converter can be found on the SUN Microsystems Java technology Web pages.

Workstation Agent Reference

Workstation Agent Applet options are provided by attributes of the HTML <**APPLET** > element and its associated <**PARAM** > elements. The general format of the <**APPLET** > element and its associated <**PARAM** > elements with respect to the ISPF Workstation Agent Applet is as follows:

```
<APPLET ARCHIVE=value CODEBASE=value CODE="wsb.class"
    HEIGHT=value WIDTH=value>
<PARAM NAME=APPLICATION VALUE=value>
<PARAM NAME=REQAPPLICATION VALUE=value>
<PARAM NAME=SYSTEM VALUE=value>
<PARAM NAME=REQSYSTEM VALUE=value>
<PARAM NAME=USER VALUE=value>
<PARAM NAME=REQUSER VALUE=value>
<PARAM NAME=PASSWORD VALUE=value>
<PARAM NAME=REQPASSWORD VALUE=value>
<PARAM NAME=PROCEDURE VALUE=value>
<PARAM NAME=REQPROCEDURE VALUE=value>
<PARAM NAME=COMMAND VALUE=value>
<PARAM NAME=REQCOMMAND VALUE=value>
<PARAM NAME=BATCH VALUE=value>
<PARAM NAME=SHOWOPTIONS VALUE=value>
<PARAM NAME=AUTOCONNECT VALUE=value>
<PARAM NAME=RUNBUTTONTEXT VALUE=value>
<PARAM NAME=MAXWAIT VALUE=value>
<PARAM NAME=PORT VALUE=value>
<PARAM NAME=PANELSINBROWSER VALUE=value>
</APPLET>
```

Attributes of the APPLET Element

ARCHIVE

This optional attribute specifies one or more Java archives (JAR files) containing applet resources that are to be preloaded. ISPF workstation agent applet files are available packaged as JAR resource files. Preloading JAR resource files reduces the runtime overhead involved in downloading resources individually as requested by the applet. The value for this option when the integrated Web server is used with the default installation directory hierarchy is as follows:

```
ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
```

CODE

This required attribute specifies the name of the primary file containing the compiled applet. The ISPF Workstation Agent Applet is contained in file **wsb.class** .

CODEBASE

This optional attribute specifies the base URL for the applet. If the CODEBASE is not specified, the default value is the URL for the HTML file containing the **APPLET** element. The value for this option if it is specified when the integrated Web server is used with the default installation directory hierarchy is as follows:

```
CODEBASE="http://webservehost/ispf/html/class/"
```

where ***webservehost*** identifies the location of the Web server. A Web browser that does not support the ***ARCHIVE*** option for JAR files will search the path defined by ***CODEBASE*** to attempt to locate individual class files.

HEIGHT
This required attribute specifies initial height in pixels of the applet display area.

WIDTH
This required attribute specifies initial width in pixels of the applet display area.

The complete HTML syntax specification for the **APPLET** element can be found in the Java Development Kit documentation located within the Sun Microsystems Java technology Web pages.

Attributes of the PARAM Elements

APPLICATION
The **VALUE** of this required attribute specifies the name that will be used to select application information from the **application** properties entries managed by the target ISPF Application Server. The associated TSO/ISPF application on OS/390 must use the same value to identify itself to the Application Server. Alphabetic characters in the application name will match corresponding characters in the name at the Application Server regardless of text case.

AUTOCONNECT
The **VALUE** of this optional attribute specifies whether the applet after being loaded will attempt to connect automatically to an ISPF Application Server and request a TSO/ISPF application on an OS/390 system. This option is useful if the applet requires no user interaction to specify initial connection information such as a **USER** or **PASSWORD** value. Valid values are ***y*** (yes) and ***n***(no). The default value is ***n***.

BATCH
The **VALUE** of this optional attribute specifies whether the applet will request that the ISPF Application Server submit JCL to an OS/390 system for a TSO/ISPF batch mode application . The JCL to be submitted must have been established for the Application Server as a file associated with the application specified by the **APPLICATION** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

COMMAND
The **VALUE** of this optional attribute enabled by specification of the value ***y*** for the **BATCH** attribute is intended to specify the name of a command such as a REXX program that is to be run from a TSO batch job submitted to an OS/390 system by the ISPF Application Server. The name of the command will be substituted wherever **&COMMAND** appears in the JCL associated with the requested application at the Application Server. Alphabetic text case for the parameter value is respected by the Workstation Agent Applet and by the Application Server.

MAXWAIT
The **VALUE** of this optional attribute specifies the number of seconds that the applet is willing to wait for communication to be established with a requested application. The default value **0** (zero) indicates that the applet will not wait. In that case the application must have established a connection to the Application Server prior to the application being requested by the applet.

PANELSINBROWSER
The **VALUE** of this optional attribute specifies the whether ISPF

application windows will be constrained to display within the browser window or allowed to display outside the browser window. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***, indicating that application windows will be allowed to display outside the browser window. The initial setting can be changed dynamically by means of the ***Dock/Float*** push button in the applet window. ***Float*** allows ISPF application windows to display outside the browser window. ***Dock*** constrains ISPF application windows to display within the browser window. When multiple ISPF logical session windows are displayed in ***Dock*** mode the windows overlay each other in a single display area. A visible tab on each window shows the logical session number associated with the window. Selecting the tab causes the window to be displayed. Any options displayed on a menu bar in ***Float*** mode will be displayed as options in a popup menu in ***Dock*** mode.

PASSWORD
The **VALUE** of this optional attribute enabled by specification of the value ***y*** for the **BATCH** attribute specifies the user authentication that will be used to enable the transfer of JCL to an OS/390 system for a user specified by the **USER** attribute. The password value will be automatically associated with the user indicated for the submitted batch mode application without the need for explicit substitution for the JCL **JOB** card **PASSWORD=** parameter value at the Application Server. Alphabetic text case for the attribute value is forced to upper case by the Application Server.

PORT
The **VALUE** of this required attribute specifies the Application Server TCP/IP port number to which the Workstation Agent Applet will connect to request an application. This value must not be the same as the value of the port number to which the application will connect for communication with the Application Server.

PROCEDURE
The ***VALUE*** of this optional attribute enabled by specification of the value ***y*** for the ***BATCH*** attribute is intended to specify the name of the procedure that is to be run in JCL submitted to an OS/390 system by the ISPF Application Server. The name of the procedure will be substituted wherever **&PROCEDURE** appears in the JCL associated with the requested application at the Application Server. Alphabetic text case for the attribute value is forced to upper case by the Application Server.

REQAPPLICATION
The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **APPLICATION** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

REQCOMMAND
The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **COMMAND** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

REQPASSWORD
The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **PASSWORD** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

REQPROCEDURE

The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **PROCEDURE** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

REQSYSTEM

The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **SYSTEM** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

REQUSER

The **VALUE** of this optional attribute specifies whether the applet will display a window requiring the user to specify a value for the **USER** attribute. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

RUNBUTTONTEXT

The **VALUE** of this optional attribute specifies the text that will appear on the displayed button that is pressed to cause an application request to be sent to an ISPF Application Server. The default value is **Connect**.

SHOWOPTIONS

The **VALUE** of this optional attribute specifies whether the applet will display the push buttons that allow the user to select the **Dock/Float** option and the **Font** and **About** dialogs. This option is useful in cases in which a limited number of displayed visual cues is desirable for the applet. Valid values are ***y*** (yes) and ***n*** (no). The default value is ***n***.

SYSTEM

The **VALUE** of this optional attribute enabled by specification of the value ***y*** for the **BATCH** attribute specifies the OS/390 system to which TSO batch mode JCL will be transferred for submission. Alphabetic text case for the attribute value is respected by the workstation agent applet and by the application server.

USER

The **VALUE** of this optional attribute enabled by specification of the value ***y*** for the **BATCH** attribute specifies the user identifier that will be used to authorize the transfer of JCL to an OS/390 system. The value is also intended to specify a user name that will be associated with the submitted JCL by substituting **&USER** as the value for the **USER=** and **NOTIFY=** parameters of the JCL **JOB** card. The **&USER** value may also be used to form a unique job name for the JCL **JOB** card or to establish a unique data set name qualifier on a JCL **DD** statement. Alphabetic text case for the attribute value is respected by the Workstation Agent Applet and by the Application Server.

Chapter 6. OS/390 ISPF Capabilities

Using OS/390 ISPF Capabilities

Options have been updated for the ISPF ISPSTART command and for the **ISPF Settings Initiate Workstation Connection** panel to enable connection to the ISPF Workstation Agent Applet by means of the ISPF Application Server. The complete syntax specification for the **ISPSTART** command can be found in the *OS/390 ISPF Dialog Developer's Guide*. The format of the ISPSTART command with respect to the updated options is as follows:

```
ISPSTART  <other ISPF options>  GUI(IP:ip_address:port_number)
 GUIWEB(application_name,token_id,maxwait_value)
```

The **GUIWEB** option implies that the **IP:ip_address:port_number** parameter of the **GUI** option denotes the TCP/IP address and port number of an ISPF Application Server that will be used to establish a connection to an ISPF Workstation Agent Applet. The **GUI** option used without the **GUIWEB** option implies that the target address and port represent a native platform ISPF workstation agent to which a direct connection will be made without the use of an ISPF Application Server. Support for direct connection to an ISPF workstation agent for GUI display is separately available with the OS/390 ISPF software.

The parameters of the **GUIWEB** option are defined as follows:

application_name
: The name by which this application will be known to the Application Server and to the Workstation Agent Applet.

token_id
: The token used to specify the current instance of this application identifying a batch mode TSO/ISPF session submitted by the Application Server.

maxwait_value
: The number of seconds that this ISPF session is willing to wait for the Application Server to establish a connection to a Workstation Agent Applet.

As an example of use of each of the parameters of the **GUIWEB** option consider the case when the Application Server is used to start a batch mode TSO/ISPF session. The Application Server submits the following JCL to the OS/390 system when an ISPF Workstation Agent Applet requests the application named **ISPF1MVS** :

```
//WEBUSERA  JOB (003446,C508,,,,N),'WEBUSER',MSGCLASS=T,
//   USER=WEBUSER,NOTIFY=WEBUSER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=TSOISPF,ISPFUSER=WEBUSER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(WEBUSER)
  EX 'USER.COMMON.EXEC(ISPF1GUI)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:9.37.196.127:15993) +
        GUIWEB(ISPF1MVS,383503,0)
  END
/*
//
```

The contents of the cataloged procedure **TSOISPF** are as follows:

```
//TSOISPF  PROC ISPFUSER=
//*
//* MAKE A COPY OF THE PROFILE TABLES SO THAT THE USER CAN RUN MORE
//* THAN ONE JOB CONCURRENTLY.
//*
//* UPDATE THE DSN ON SYSUT1 TO BE AN EXISTING DATA SET WITH ISPF
//* PROFILE TABLES WHICH HAVE INITIAL SETTINGS.
//*
//COPYPROF EXEC PGM=IEBCOPY
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DSN=&ISPFUSER..PRIVATE.TABLES,DISP=SHR
//SYSUT2   DD  DSN=&&PROFILE,UNIT=VIO,DISP=(NEW,PASS),
//             SPACE=(TRK,(1,1,5)),DCB=(LRECL=80,DSORG=PO,RECFM=FB)
//*
//* RUN ISPF
//*
//* UPDATE THE DD STATEMENTS WITH ANY NEEDED ALLOCATIONS OR
//* ALLOCATIONS CAN BE DONE BY THE COMMAND THAT IS RETURNED BY THE
//* ISPF WORKSTATION AGENT APPLET.
//*
//ISPF     EXEC PGM=IKJEFT01,TIME=1440,REGION=4096K,DYNAMNBR=75
//SYSTSPRT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//ISPPROF  DD  DSN=&&PROFILE,DISP=(OLD,DELETE)
//SYSTSIN  DD  DUMMY
```

The ***ISPF1MVS*** JCL starts a batch mode TSO/ISPF session which runs the ***ISPF1GUI*** REXX procedure or CLIST to allocate necessary ISPF and private data sets for the user. After ***ISPF1GUI*** completes, the ***ISPSTART*** command is invoked to establish a connection to the ISPF Application Server. The presence of the ***GUIWEB*** option indicates that the ***IP:9.37.196.127*** parameter value of the ***GUI*** option specifies the Internet address of the Application Server. The parameter value ***ISPF1MVS*** of the ***GUIWEB*** option specifies the name by which this TSO/ISPF application is known at the Application Server. The parameter value ***383503*** specifies the token that will be used to distinguish this session from other ISPF sessions that may be known by the ***ISPF1MVS*** application name. The remaining parameter value of the ***GUIWEB*** option specifies that the ISPF session will not wait for an application request from a Workstation Agent Applet.

Figure 27 on page 39 further illustrates how **ISPF Settings Initiate Workstation Connection** panel options corresponding to **ISPSTART** command options can be used to start an Application Server connection to a Workstation Agent Applet for a user who has already established a terminal type 3270 interactive TSO/ISPF session. Selecting option 3, ***Connect to ISPF Web Server*** , of the **Workstation Connection** choices is equivalent to the specification of the **GUIWEB** option on the **ISPSTART** command. The specification of the **TCP/IP Address** is equivalent to specification of the **IP:x.yy.www.zzz** parameter value of the **GUI** option of the **ISPSTART** command. The specification of a parameter value for the**Maximum Connection Wait Time** entry field is equivalent to the specification of the same value for the **maxwait_value** parameter of the **GUIWEB** option of the **ISPSTART** command. The specification of a value for the **Application Name** entry field indicates that that value will be used as a prefix for an application name generated uniquely by ISPF. That unique application name is equivalent to the **application_name** parameter value for the **GUIWEB** option of the **ISPSTART** command.

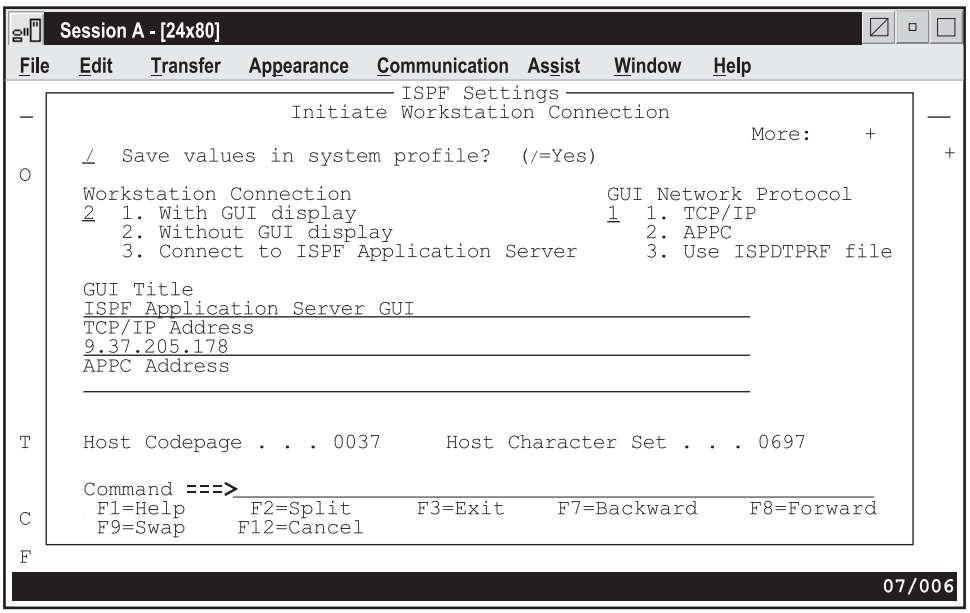

Figure 27. ISPF Settings

After the terminal type 3270 Enter key has been pressed, Workstation Connection Panel displays a message box. The information in the message box indicates that ISPF will use an application name it created using the prefix you specified (in the ***Application Name*** entry field) to identify this ISPF session uniquely to the ISPF Application Server. The ISPF workstation agent applet must specify this application name to request a connection to the ISPF session.

OS/390 ISPF Reference

The following new and changed options are available for the ***ISPSTART*** command:

GUI (IP:ip_address:port_number)
When the **GUIWEB** option is also specified the **IP:ip_address:port_number** parameter of the **GUI** option indicates the Internet address and port number of an ISPF Application Server to which ISPF will establish a connection for graphical display of ISPF panels by an ISPF Workstation Agent Applet running in a Web browser. **TCP/IP address** is the equivalent option on the **ISPF Settings Initiate Workstation Connection** panel as shown in Figure 28 on page 0. If no **port_number** is specified the ISPF default port number for GUI connection will be used.

GUIWEB (application_name,token_id,maxwait_value)
This option allows values to be supplied for the following parameters:

application_name
The name by which this application will be known to the Application Server and to the Workstation Agent Applet. This parameter is required. The parameter length can be from 1 to 50 characters. **Application Name** on the **ISPF Settings Initiate Workstation Connection** panel indicates a prefix for an application name generated uniquely by ISPF. That unique application name is equivalent to the **application_name** parameter value.

token_id

The token used to specify the current instance of this application identifying a batch mode TSO/ISPF session submitted by the ISPF Application Server. The parameter is not used for TSO/ISPF sessions started by other means. The parameter length can be from 1 to 64 characters.

maxwait_value

An integer specifying the number of seconds that this ISPF session will wait for the Application Server to establish a connection to a workstation agent applet. The parameter is not required and defaults to 0. A non-zero value should be specified any time that the TSO/ISPF session for a target application is not started by an ISPF Application Server at the request of an ISPF Workstation Agent Applet. **Maximum Connection Wait Time** on the **ISPF Settings Initiate Workstation Connection** panel is equivalent to the **maxwait_value** parameter.

The complete syntax specification for the **ISPSTART** command can be found in the *OS/390 ISPF Dialog Developer's Guide*.

Chapter 7. Examples

The following sections of this book describe examples of each of these situations:

- Server with server-initiated batch mode session
- Server with user-initiated batch mode session
- Server with user-initiated interactive mode session

Server with Server-initiated Batch Mode Session

The following example illustrates typical tasks performed by an administrator to establish an environment in which an ISPF Workstation Agent Applet requests an ISPF Application Server to activate an ISPF application on an OS/390 system. Preparation tasks are organized according to the software component with which they are associated. The components are the ISPF Application Server, the ISPF application, and the ISPF Workstation Agent Applet. The example contains application data that is unique to a specific ISPF Application Server environment.

ISPF Application Server Preparation Sample Steps

1. Activate the Application Server from the **ispf** directory using either the Sun Java Development Kit (JDK) ***java*** command or the Sun Java Runtime Environment (JRE) ***jre*** command:

   ```
   java -classpath server.zip;.;html\class;%classpath% ApplicationServer
   jre -cp server.zip;.;html\class; ApplicationServer
   ```

   Note: Sample Application Server invocation command files are provided in the ***ispf*** installation directory. The command file name is ***go.bat*** or ***gojre.bat*** for Windows systems, ***go.cmd*** or ***gojre.cmd*** for OS/2 systems, and ***go.ksh*** or ***gojre.ksh*** for UNIX-style operating systems.

   The Application Server must operate at the same TCP/IP address as the Web server that retains the Workstation Agent Applet HTML and program files.
2. Select ***Properties*** from the Application Server main window to obtain the list of properties options.
3. Select ***General*** properties from the list of options.
4. Note the ***Workstation Port*** value from the ***Environment*** selection. This value will be required in the HTML for the Workstation Agent Applet.
5. Close the ***General*** properties window.
6. Select ***Application*** properties from the list of options.
7. Press the ***Add*** push button to add an application record.
8. Enter the following values:
   - ***ISPF1MVS*** for the ***Application Name*** .
   - ***CARMVS1*** for the OS/390 ***System*** to which batch mode JCL will be submitted for activation.
   - ***ISPF1MVS.JCL*** for the ***JCL File Name*** for the batch mode JCL to be submitted.
9. Press the ***Edit JCL*** push button.
10. Using the editor enter the following JCL:

```
//&USER&SUBCHAR  JOB (003446,C508,,,,N),'&USER',MSGCLASS=T,
//   USER=&USER,NOTIFY=&USER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=&PROCEDURE,ISPFUSER=&USER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(&USER)
  EX 'USER.COMMON.EXEC(&COMMAND)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:&SERVIP:&SERVPORT) +
        GUIWEB(&APPLICATION,&TOKEN,0)
  END
/*
//
```

The Application Server substitution variables enable the same JCL to be used by multiple users who may require different cataloged JCL procedures or the ability to invoke different commands. With this flexibility the application could be considered to be simply the creation of a tailored TSO/ISPF environment on an OS/390 system.

11. Save the file and close the editor.
12. Press the ***OK*** push button to save the application record.

ISPF OS/390 Preparation Sample Steps

1. Create the following cataloged procedure JCL named ***TSOISPF*** in a procedure library that can be accessed by all TSO users on the target OS/390 system:

```
//TSOISPF  PROC ISPFUSER=
//*
//* MAKE A COPY OF THE PROFILE TABLES SO THAT THE USER CAN RUN MORE
//* THAN ONE JOB CONCURRENTLY.
//*
//* UPDATE THE DSN ON SYSUT1 TO BE AN EXISTING DATA SET WITH ISPF
//* PROFILE TABLES WHICH HAVE INITIAL SETTINGS.
//*
//COPYPROF EXEC PGM=IEBCOPY
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DSN=&ISPFUSER..PRIVATE.TABLES,DISP=SHR
//SYSUT2   DD  DSN=&&PROFILE,UNIT=VIO,DISP=(NEW,PASS),
//             SPACE=(TRK,(1,1,5)),DCB=(LRECL=80,DSORG=PO,RECFM=FB)
//*
//* RUN ISPF
//*
//* UPDATE THE DD STATEMENTS WITH ANY NEEDED ALLOCATIONS OR
//* ALLOCATIONS CAN BE DONE BY THE COMMAND THAT IS RETURNED BY THE
//* ISPF WORKSTATION AGENT APPLET.
//*
//ISPF     EXEC PGM=IKJEFT01,TIME=1440,REGION=4096K,DYNAMNBR=75
//SYSTSPRT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//ISPPROF  DD  DSN=&&PROFILE,DISP=(OLD,DELETE)
//SYSTSIN  DD  DUMMY
```

This cataloged procedure will be the ***PROCEDURE*** specified in HTML for the Workstation Agent Applet.

2. Create a TSO REXX procedure or CLIST named ***ISPF1GUI*** in a partitioned data set, ***USER.COMMON.EXEC*** in this example, on the target OS/390 system. ***ISPF1GUI*** should contain statements to allocate necessary ISPF and private data sets for the user. Data sets that are unique for user ***WEBUSER*** can be allocated by using the TSO user ***PREFIX*** value set in the JCL ***SYSTSIN*** data stream to represent the high level data set name qualifier for those data sets. ***ISPF1GUI*** will be the ***COMMAND*** specified in HTML for the Workstation Agent Applet.

ISPF Workstation Agent Applet Preparation Sample Steps

1. Install the Workstation Agent Applet JAR files at the Web server that runs at the same TCP/IP address as the ISPF Application Server.
2. Create and install the following HTML at the Web server:

```
<HTML>
<TITLE> ISPF Workstation Agent Applet</TITLE>
<BODY>
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/ispf/html/class/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
   height="570" width="760">
<PARAM NAME=APPLICATION VALUE=ISPF1MVS>
<PARAM NAME=AUTOCONNECT VALUE=n>
<PARAM NAME=BATCH VALUE=y>
<PARAM NAME=COMMAND VALUE=ISPF1GUI>
<PARAM NAME=MAXWAIT VALUE=30>
<PARAM NAME=PANELSINBROWSER VALUE=n>
<PARAM NAME=PASSWORD VALUE="">
<PARAM NAME=PORT VALUE=15994>
<PARAM NAME=PROCEDURE VALUE=TSOPROC>
<PARAM NAME=REQAPPLICATION VALUE=n>
<PARAM NAME=REQCOMMAND VALUE=n>
<PARAM NAME=REQPASSWORD VALUE=y>
<PARAM NAME=REQPROCEDURE VALUE=n>
<PARAM NAME=REQSYSTEM VALUE=n>
<PARAM NAME=REQUSER VALUE=y>
<PARAM NAME=RUNBUTTONTEXT VALUE="">
<PARAM NAME=SHOWOPTIONS VALUE=y>
<PARAM NAME=SYSTEM VALUE=CARMVS1>
<PARAM NAME=USER VALUE="">
</APPLET>
</BODY>
</HTML>
```

The ***CODE*** option of the ***APPLET*** element indicates the name of the ISPF Workstation Agent Applet. The ***CODEBASE*** option of the ***APPLET*** element indicates the location of the individual class files for the applet. The individual class files will be downloaded by Web browsers that do not support the ***ARCHIVE*** option for Java archives. The ***ARCHIVE*** option of the ***APPLET*** element indicates the names of the JAR files for the Workstation Agent Applet.The value ***y*** of parameter ***BATCH*** indicates that the Application Server is instructed to start the application ***ISPF1MVS*** indicated by the ***APPLICATION*** parameter. The value ***15994*** of parameter ***PORT*** indicates the Application Server TCP/IP port number to which the applet must connnect to establish communication. The value ***TSOISPF*** of parameter ***PROCEDURE*** indicates the name of the OS/390 cataloged procedure that will be substituted for **&PROCEDURE** in the application server JCL for application ***ISPF1MVS*** and the value ***ISPF1GUI*** for ***COMMAND*** indicates the name of the REXX program that will be substituted for **&COMMAND** in the JCL. The value ***y*** for parameters ***REQUSER*** and ***REQPASSWORD*** indicates that the Workstation Agent Applet will prompt the user for the TSO authorization and authentication information required to submit the JCL to the OS/390 system ***CARMVS1*** indicated by the value of the ***SYSTEM*** parameter. As the Application Server properties file information already indicates that the default target system is ***CARMVS1*** the ***SYSTEM*** parameter value could be omitted.

Connecting the Applet and the Application Sample Steps

1. From a Web browser select the Workstation Agent Applet HTML from the Web server at which the applet HTML is installed. The HTML and applet program files will be downloaded to the Web browser.

2. Supply the TSO user and password information when prompted by the applet and press the ***Connect*** push button. Assume in this example that the TSO user is ***WEBUSER*** .
3. The Application Server will accept the request for batch submission of the ***ISPF1MVS*** application JCL to OS/390 system ***CARMVS1*** . The following JCL will be submitted after the values of substitution variables are resolved:

```
//WEBUSERA  JOB (003446,C508,,,,N),'WEBUSER',MSGCLASS=T,
//   USER=WEBUSER,NOTIFY=WEBUSER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=TSOISPF,ISPFUSER=WEBUSER
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(WEBUSER)
  EX 'USER.COMMON.EXEC(ISPF1GUI)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:9.37.196.127:15993) +
        GUIWEB(ISPF1MVS,383503,0)
  END
/*
```

4. The ***ISPF1MVS*** JCL starts a batch mode TSO/ISPF session which runs the ***ISPF1GUI*** REXX procedure or CLIST to allocate necessary ISPF and private data sets for the user. After ***ISPF1GUI*** completes the ***ISPSTART*** command is invoked to establish a connection to the ISPF application server.
5. ISPF will establish a connection to Application Server port ***15993*** at address ***9.37.196.127*** and specify application ***ISPF1MVS*** . Because multiple users may request the application the Application Server uses the token ***383503*** to distinguish the request by user ***WEBUSER*** from requests by other users. When the ISPF application specification is matched with the applet request a connection is established and the ISPF primary options panel ***ISR@PRIM*** is displayed.

Server with User-initiated Batch Mode Session

The following example illustrates typical tasks performed by an administrator to establish an environment in which an ISPF Workstation Agent Applet requests a connection to an ISPF application activated in batch mode without JCL submission to the OS/390 system by an Application Server. The JCL for the batch mode TSO session for the ISPF application would be submitted by a TSO user. Preparation tasks are organized according to the software component with which they are associated. The components are the ISPF Application Server, the ISPF application, and the ISPF Workstation Agent Applet. The example contains application data that is unique to a specific ISPF Application Server environment.

ISPF Application Server Preparation Sample Steps

1. Activate the Application Server from the **ispf**\ directory using either the Sun Java Development Kit (JDK) ***java*** command or the Sun Java Runtime Environment (JRE) ***jre*** command:

```
java -classpath server.zip;.;html\class;%classpath% ApplicationServer
jre -cp server.zip;.;html\class; ApplicationServer
```

   Note: Sample Application Server invocation command files are provided in the ***ispf*** installation directory. The command file name is ***go.bat*** or ***gojre.bat*** for Windows systems, ***go.cmd*** or ***gojre.cmd*** for OS/2 systems, and ***go.ksh*** or ***gojre.ksh*** for UNIX-style operating systems.

   The Application Server must operate at the same TCP/IP address as the Web server that retains the Workstation Agent Applet HTML and program files.

2. Select ***Properties*** from the Application Server main window to obtain the list of options.
3. Select ***General*** properties from the list of options.
4. Note the ***Workstation Port*** value from the ***Environment*** selection. This value will be required in the HTML for the Workstation Agent Applet.
5. Note the ***Application Port*** value from the ***Environment*** selection. This value will be required by the ISPF application on OS/390.
6. Communicate the TCP/IP address and application port of the application server to the TSO user. A batch mode TSO/ISPF session that establishes communication with the Application Server will require the address value and may require the port value if it differs from the ISPF default. The values are entered as the ***IP:address:port*** parameter of the ***GUI*** option of the ***ISPSTART*** command.

ISPF OS/390 Preparation Sample Steps

1. Create the following cataloged procedure JCL named ***TSOISPF*** in a procedure library that can be accessed from batch mode JCL on the target OS/390 system:

```
//TSOISPF  PROC ISPFUSER=
//*
//* MAKE A COPY OF THE PROFILE TABLES SO THAT THE USER CAN RUN MORE
//* THAN ONE JOB CONCURRENTLY.
//*
//* UPDATE THE DSN ON SYSUT1 TO BE AN EXISTING DATA SET WITH ISPF
//* PROFILE TABLES WHICH HAVE INITIAL SETTINGS.
//*
//COPYPROF EXEC PGM=IEBCOPY
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DSN=&ISPFUSER..PRIVATE.TABLES,DISP=SHR
//SYSUT2   DD  DSN=&&PROFILE,UNIT=VIO,DISP=(NEW,PASS),
//             SPACE=(TRK,(1,1,5)),DCB=(LRECL=80,DSORG=PO,RECFM=FB)
//*
//* RUN ISPF
//*
//* UPDATE THE DD STATEMENTS WITH ANY NEEDED ALLOCATIONS OR
//* ALLOCATIONS CAN BE DONE BY THE COMMAND THAT IS RETURNED BY THE
//* ISPF WORKSTATION AGENT APPLET.
//*
//ISPF     EXEC PGM=IKJEFT01,TIME=1440,REGION=4096K,DYNAMNBR=75
//SYSTSPRT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//ISPPROF  DD  DSN=&&PROFILE,DISP=(OLD,DELETE)
//SYSTSIN  DD  DUMMY
```

2. Determine the TSO user identifier that will be associated with the batch mode JCL. In this example the user will be assumed to be ***WEBUSER*** .
3. Create a TSO REXX procedure or CLIST named ***ISPF2GUI*** in a partitioned data set, ***USER.COMMON.EXEC*** in this example, on the target OS/390 system. ***ISPF2GUI*** should contain statements to allocate necessary ISPF and private data sets for the user. Data sets that are unique for user ***WEBUSER*** can be allocated by using the TSO user ***PREFIX*** value set in the JCL ***SYSTSIN*** data stream to represent the high level data set name qualifier for those data sets. ***ISPF2GUI*** will be the ***COMMAND*** specified in HTML for the Workstation Agent Applet.
4. Create the following batch mode JCL named ***ISPF2MVS*** in a partitioned data set that can be accessed by TSO user ***WEBUSER*** :

```
//WEBUSERA  JOB (003446,C508,,,,N),'WEBUSER',MSGCLASS=T,
//   USER=WEBUSER,NOTIFY=WEBUSER,PASSWORD=,REGION=4096K,CLASS=A
//GO       EXEC PROC=TSOISPF,ISPFUSER=WEBUSER
```

```
//ISPF.SYSTSIN  DD  *
  PROFILE PREFIX(WEBUSER)
  EX 'USER.COMMON.EXEC(ISPF2GUI)'
  ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR) GUI(IP:9.37.196.127:15993) +
        GUIWEB(ISPF2MVS,,300)
  END
/*
//
```

The application name selected for the connection request to the Application Server is ***ISPF2MVS*** in this example. Note that the maximum time to wait for a connection to a workstation agent applet has been set to ***300*** seconds on the ***GUIWEB*** option of the ***ISPSTART*** command.

ISPF Workstation Agent Applet Preparation Sample Steps

1. Install the Workstation Agent Applet JAR files at the Web server that runs at the same TCP/IP address as the ISPF Application Server.
2. Create and install the following HTML at the Web server:

```
<HTML>
<TITLE> ISPF Workstation Agent Applet</TITLE>
<BODY>
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/ispf/html/class/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
   height="570" width="760">
<PARAM NAME=APPLICATION VALUE="">
<PARAM NAME=AUTOCONNECT VALUE=n>
<PARAM NAME=BATCH VALUE=n>
<PARAM NAME=COMMAND VALUE="">
<PARAM NAME=MAXWAIT VALUE=30>
<PARAM NAME=PANELSINBROWSER VALUE=n>
<PARAM NAME=PASSWORD VALUE="">
<PARAM NAME=PORT VALUE=15994>
<PARAM NAME=PROCEDURE VALUE="">
<PARAM NAME=REQAPPLICATION VALUE=y>
<PARAM NAME=REQCOMMAND VALUE=n>
<PARAM NAME=REQPASSWORD VALUE=n>
<PARAM NAME=REQPROCEDURE VALUE=n>
<PARAM NAME=REQSYSTEM VALUE=n>
<PARAM NAME=REQUSER VALUE=n>
<PARAM NAME=RUNBUTTONTEXT VALUE="">
<PARAM NAME=SHOWOPTIONS VALUE=y>
<PARAM NAME=SYSTEM VALUE=>
<PARAM NAME=USER VALUE=>
</APPLET>
</BODY>
</HTML>
```

The ***CODE*** option of the ***APPLET*** element indicates the name of the ISPF workstation agent applet. The ***CODEBASE*** option of the ***APPLET*** element indicates the location of individual class files for the applet. The individual class files will be downloaded by Web browsers that do not support the ***ARCHIVE*** option for Java archives. The ***ARCHIVE*** option of the ***APPLET*** element indicates the names of the JAR files for the Workstation Agent Applet. The value ***15994*** of parameter ***PORT*** indicates the Application Server TCP/IP port number to which the applet must connnect to establish communication. The value ***y*** for parameter ***REQAPPLICATION*** indicates that the Workstation Agent Applet will prompt the user for the ISPF application name. No ***USER*** and ***PASSWORD*** values are employed. Connection authorization is based soley on the application name selected by the ISPF user on the target OS/390 system.

Connecting the Applet and the Application Sample Steps

The order in which the ISPF application and the Workstation Agent Applet connect to the Application Server is not important from the perspective of the Application Server. The program that connects to the Application Server first must ensure only that the specified maximum time to wait for a completed connection to its partner is not exhausted. In this example assume that the ISPF application connects to the Application Server first.

1. Logon to TSO on the target OS/390 system. Assume the user identifier is ***WEBUSER*** .
2. Submit the ***ISPF2MVS*** JCL. After the submitted job is activated the ***ISPSTART*** command will establish a connection to Application Server port ***15993*** at address ***9.37.196.127*** specifying application ***ISPF2MVS*** .
3. From a Web browser select the Workstation Agent Applet HTML from the Web server at which the applet HTML is installed. The HTML and applet program files will be downloaded to the Web browser.
4. Supply the application name ***ISPF2MVS*** when prompted by the applet and press the ***Connect*** push button. The applet will connect to Application Server port ***15994*** and request application ***ISPF2MVS*** . When the ISPF application specification is matched with the applet request a connection is established and the ISPF primary options panel ***ISR@PRIM*** is displayed.

Server with User-initiated Interactive Mode Session

The following example illustrates typical tasks performed by an administrator to establish an environment in which an ISPF Workstation Agent Applet requests a connection to an ISPF application activated by a user who previously logged on to an interactive TSO session on an OS/390 system. Preparation tasks are organized according to the software component with which they are associated. The components are the ISPF Application Server, the ISPF application, and the ISPF Workstation Agent Applet. The example contains application data that is unique to a specific ISPF Application Server environment.

ISPF Application Server Preparation Sample Steps

1. Activate the Application Server from the **ispf** directory using either the Sun Java Development Kit (JDK) ***java*** command or the Sun Java Runtime Environment (JRE) ***jre*** command:

   ```
   java -classpath server.zip;.;html\class;%classpath% ApplicationServer
   jre -cp server.zip;.;html\class; ApplicationServer
   ```

   Note: Sample Application Server invocation command files are provided in the ***ispf*** installation directory. The command file name is ***go.bat*** or ***gojre.bat*** for Windows systems, ***go.cmd*** or ***gojre.cmd*** for OS/2 systems, and ***go.ksh*** or ***gojre.ksh*** for UNIX-style operating systems.

   The Application Server must operate at the same TCP/IP address as the Web server that retains the Workstation Agent Applet HTML and program files.
2. Select ***Properties*** from the Application Server main window to obtain the list of options.
3. Select ***General*** properties from the list of options.
4. Note the ***Workstation Port*** value from the ***Environment*** selection. This value will be required in the HTML for the Workstation Agent Applet.

5. Note the ***Application Port*** value from the ***Environment*** selection. This value will be required by the ISPF application on OS/390.
6. Publicize the TCP/IP address and application port of the Application Server. A user who establishes communication with the Application Server from an interactive TSO/ISPF session will require the address value and may require the port value if it differs from the ISPF default. The values are entered for ***TCP/IP Address*** (for example, 9.37.196.127:15994) on the ***ISPF Settings Initiate Workstation Connection*** panel or as the ***IP:address:port*** parameter of the ***GUI*** option of the ***ISPSTART*** command.

ISPF OS/390 Preparation Sample Steps

No preparation is required.

ISPF Workstation Agent Applet Preparation Sample Steps

1. Install the Workstation Agent Applet JAR files at the Web server that runs at the same TCP/IP address as the ISPF Application Server.
2. Create and install the following HTML at the Web server:

```
<HTML>
<TITLE> ISPF Workstation Agent Applet</TITLE>
<BODY>
<APPLET CODE="wsb.class" CODEBASE="http://webservehost/ispf/html/class/"
   ARCHIVE="jar/wsb.jar,jar/ispfdt.jar,jar/ispfnls.jar,jar/ispfed.jar"
   height="570" width="760">
<PARAM NAME=APPLICATION VALUE="">
<PARAM NAME=AUTOCONNECT VALUE=n>
<PARAM NAME=BATCH VALUE=n>
<PARAM NAME=COMMAND VALUE="">
<PARAM NAME=MAXWAIT VALUE=30>
<PARAM NAME=PANELSINBROWSER VALUE=n>
<PARAM NAME=PASSWORD VALUE="">
<PARAM NAME=PORT VALUE=15994>
<PARAM NAME=PROCEDURE VALUE="">
<PARAM NAME=REQAPPLICATION VALUE=y>
<PARAM NAME=REQCOMMAND VALUE=n>
<PARAM NAME=REQPASSWORD VALUE=n>
<PARAM NAME=REQPROCEDURE VALUE=n>
<PARAM NAME=REQSYSTEM VALUE=n>
<PARAM NAME=REQUSER VALUE=n>
<PARAM NAME=RUNBUTTONTEXT VALUE="">
<PARAM NAME=SHOWOPTIONS VALUE=y>
<PARAM NAME=SYSTEM VALUE="">
<PARAM NAME=USER VALUE="">
</APPLET>
</BODY>
</HTML>
```

The ***CODE*** option of the ***APPLET*** element indicates the name of the ISPF workstation agent applet. The ***CODEBASE*** option of the ***APPLET*** element indicates the location of individual class files for the applet. The individual class files will be downloaded by Web browsers that do not support the ***ARCHIVE*** option for Java archives. The ***ARCHIVE*** option of the ***APPLET*** element indicates the names of the JAR files for the Workstation Agent Applet. The value ***15994*** of parameter ***PORT*** indicates the Application Server TCP/IP port number to which the applet must connnect to establish communication. The value ***y*** for parameter ***REQAPPLICATION*** indicates that the Workstation Agent Applet will prompt the user for the ISPF application name. No ***USER*** and ***PASSWORD*** values are employed, because the user will already be logged on to TSO.

Connecting the Applet and the Application Sample Steps

1. Logon to TSO on the target OS/390 system. Assume the user identifier is ***WEBUSER*** .
2. Either invoke the ***ISPSTART*** command with the ***GUI*** and ***GUIWEB*** options and associated parameters specified, enter the equivalent parameters on the ***ISPF Settings Initiate Workstation Connection*** panel, or use the ***WSCON*** command form the ISPF command line. In either case ensure that the value specified for the maximum time to wait for a connection to the Workstation Agent Applet is sufficient to allow the user to perform any necessary tasks such as downloading the applet HTML and program files, entering the ISPF application name, or establishing communication with the Application Server. In this example assume that the application name specified by user ***WEBUSER*** is ***ISPF3MVS*** . Assume also that the default application port number is used, that the TCP/IP address of the Application Server is ***9.37.196.127*** , and that the maximum time to wait for a connection to the applet is ***300*** seconds. An ***ISPSTART*** command to establish a connection with the Application Server is:

   ```
   ISPSTART PANEL(ISR@PRIM) NEWAPPL(ISR)
      GUI(IP:9.37.196.127) GUIWEB(ISPF3MVS,,300) NOLOGO
   ```

3. If the ***ISPSTART*** command is invoked this message will be displayed:

   ```
   ISPO926  You have requested to connect to your ISPF Web Server.  You must enter
   the following application name in your Web Browser in order to run your ISPF
   application:
   ISPF3MVS-WEBUSER
   ```

   If the ***ISPF Settings Initiate Workstation Connection*** panel is used this message will be displayed:

   ```
   You have requested to connect to the ISPF Web Server. You must enter the
   following application name in your Web Browser in order to run your ISPF
   application: ISPF3MVS-WEBUSER. Hit enter to submit your request to
   connect to the ISPF Web Server. Note that any additional updates you make
   to this panel before hitting enter will be ignored.
   ```

   In either case the actual application name that must be specified from the workstation applet is ***ISPF3MVS-WEBUSER*** . ISPF will establish a connection to the default Application Server port at address ***9.37.196.127*** for application ***ISPF3MVS-WEBUSER*** .
4. From a Web browser select the Workstation Agent Applet HTML from the Web server at which the applet HTML is installed. The HTML and applet program files will be downloaded to the Web browser.
5. Supply the application name ***ISPF3MVS-WEBUSER*** when prompted by the applet and press the ***Connect*** push button. The applet will connect to Application Server port ***15994*** and request application ***ISPF3MVS-WEBUSER*** . When the ISPF application specification is matched with the applet request a connection is established and the ISPF primary options panel ***ISR@PRIM*** is displayed.

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