



THE
POWER
TO KNOW.

SYSTEM 2000[®] V2

Web Interface to CICS

Administrator's Guide



The correct bibliographic citation for this manual is as follows: SAS Institute Inc. 2007. *SYSTEM 2000® V2 Web Interface to CICS: Administrator's Guide*. Cary, NC: SAS Institute Inc.

SYSTEM 2000® V2 Web Interface to CICS: Administrator's Guide

Copyright © 2007, SAS Institute Inc., Cary, NC, USA

ISBN 978-1-59994-578-1

All rights reserved. Produced in the United States of America.

For a hard-copy book: No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written permission of the publisher, SAS Institute Inc.

For a Web download or e-book: Your use of this publication shall be governed by the terms established by the vendor at the time you acquire this publication.

U.S. Government Restricted Rights Notice: Use, duplication, or disclosure of this software and related documentation by the U.S. government is subject to the Agreement with SAS Institute and the restrictions set forth in FAR 52.227-19, Commercial Computer Software-Restricted Rights (June 1987).

SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513.

1st printing, September 2007

SAS® Publishing provides a complete selection of books and electronic products to help customers use SAS software to its fullest potential. For more information about our e-books, e-learning products, CDs, and hard-copy books, visit the SAS Publishing Web site at support.sas.com/pubs or call 1-800-727-3228.

SAS® and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are registered trademarks or trademarks of their respective companies.

Table of Contents

Chapter 1: Introduction	1
Chapter 2: System Setup and Installation Considerations	3
CICS Requirements	3
S2KCUSE Parameters for Timeouts and Output Limits.....	4
Browser Requirements	4
JavaScript.....	4
Cookies	5
Security	5
Stateless Environment and Web Userids	6
Chapter 3: Invoking SYSTEM 2000 Applications	7
URL Setup	7
SYSTEM 2000 Web Interface Menu.....	8
Database Access – Sign-on SYSTEM 2000	9
Database Access – Exit SYSTEM 2000	11
User Exits.....	12
Operator Communication.....	13
User Status	14
User Maintenance	15
Statistics and Logging.....	16
Exit Web Interface	17
Chapter 4: Web Maintenance.....	19
Chapter 5: Messages and Codes.....	21
S2KWEBD.....	21
S2KWSTAT.....	22
S2KWERR.....	22

Chapter 1: Introduction

The SYSTEM 2000 Web interface to CICS provides direct access to SYSTEM 2000 databases via the Internet. With Internet or intranet access, SYSTEM 2000 users can take advantage of the extensive GUI capabilities of desktop computers.

The Web SCF interface enables you to access SYSTEM 2000 databases by using product-supplied HTML interfaces. All functionality provided in the 3270 interface, with the exception of the Command Editor, is provided in the Web interface. A GUI gives the end user powerful features that are easy to use, such as point-and-click functionality and easy scrolling to view output. The need for paging and PF keys has been eliminated. All output is sent to the browser, eliminating constant interaction with the mainframe to view the next or the previous page.

With CICS TS 1.3 and later, IBM supplies a built-in Web server that allows client access from the Web to the mainframe without a mainframe Web server. Rather than entering CICS directly from TCP/IP, there is an option to enter through a Web server such as the WebSphere Application Server on z/OS. Clients on the Internet rather than an intranet might want this option for additional security.

In addition to database access, Web support includes the following applications:

- Operator Communication
- User Status Display
- User Maintenance
- Statistics

A separate application, Web Maintenance, enables DBAs to monitor and control Web access.

Chapter 2: System Setup and Installation Considerations

CICS Requirements	3
S2KCUSE Parameters	8
Browser Requirements	4
JavaScript	4
Cookies	9
Security	5
Stateless Environment and Web Userids	10

CICS Requirements

Some key installation elements are addressed in this section, but for a comprehensive explanation see the appropriate CICS Web support manual. Software requirements are CICS TS 1.3 (or later) and z/OS Version 2.5 (or later).

CICS must be started with the TCPIP=YES option specified in the SIT. TCPIP=YES specifies that TCP/IP services are to be activated at CICS startup. A new CICS resource type called TCPIPSERVICE allows for the management of TCP/IP ports and IP addresses. See your *CICS Resource Definition Guide* for details about defining this resource.

The following is a sample definition of TCPIPSERVICE for using the S2K Web interface. Contact the MVS system programmer for an available TCP/IP port number.

```
DEFINE tcpipservice(httpnssl) group(S2KV2) urm(dfhwbadx)
    status(open) portnumber( ) transaction(cwxn) protocol(http)
    description(s2k web tcpipservice with no ssl)
```

The SYSTEM 2000 CICS Web interface is composed entirely of Web-aware programs. All HTML responsibilities are handled by SYSTEM 2000. HTML is read from the browser and the appropriate HTML response is sent back to the browser. Templates are used to build these HTML responses. The templates must reside in a PDS identified by a DD statement in the CICS JCL. DFHHTML is the default ddname. These templates are defined via a new resource type called DOCTEMPLATE.

All required definitions for SYSTEM 2000 are in source module S2KCSD. If you want a ddname other than DFHHTML, then you must modify the DOCTEMPLATE definitions to point to the chosen ddname. In addition to HTML, these templates contain JavaScript code to manage screen layouts and button functions.

S2KCUSE Parameters for Timeouts and Output Limits

Two Web parameters have been added to S2KCUSE: S2KWTIM and S2KWMLN.

S2KWTIM specifies the amount of time in minutes that a Web user can be inactive before being considered timed out. Module S2KWEBTO frees control blocks and terminates the sessions of users who have timed out, but are still in the interface. Allowable values are 0–999 minutes. The default is 30 minutes. A value of 0 disables timeout processing but is not recommended, because control blocks are not freed. Sites with a large number of Web users might want a short timeout value, such as 10 minutes, because a long timeout value with many users can tie up a significant number of control blocks.

After your SYSTEM 2000 session has initialized its SYSTEM 2000 storage and returned a form to the Web browser, it might never be invoked again because the Web user abandons the session. Similarly, a user might complete a task but fail to properly exit SYSTEM 2000. A large number of idle Web sessions in CICS can lead to storage problems, so a timeout mechanism to purge inactive Web users is provided. Program S2KWEBTO begins execution at the first Web transaction. It scans SYSTEM 2000 control blocks for timestamp information maintained for every Web user. Users inactive for a set period of time, specified in S2KWTIM, have their sessions terminated and the resources freed.

S2KWMLN is the maximum number of lines of output that SYSTEM 2000 sends to the browser after processing input commands. This limit prevents unnecessary network traffic and tie-ups. Allowable values are 500 to 9,999 lines. The default is 2000.

Note: Sites with a large number of Web users might need to increase the S2KCUSE parameter MAXTERM to reflect the number of expected Web users.

Browser Requirements

The SYSTEM 2000 Web interface functions under Microsoft Internet Explorer and Netscape. You should have installed at least version 4.0 of Internet Explorer and version 6.0 of Netscape, and security settings must allow JavaScript to execute and cookies to be written.

Your Web browser must be set to refresh the cache file each time a Web page is loaded.

In Internet Explorer, select **Tools**→**Internet Options**, and then click the **General** tab. Select **Temporary Internet Files** and click **Settings**. Then select the **Every visit to the page** button.

In Netscape, select **Edit**→**Preferences**→**Advanced**→**Cache**, and then select the **Every time I visit the page** setting.

JavaScript

JavaScript is a scripting language written into SYSTEM 2000 Web pages to help manage and control the pages. JavaScript is a Netscape product that executes in Internet Explorer as well. SYSTEM 2000 uses JavaScript for simple functions such as cursor placement and editing forms data, and for more complex functions such as button manipulation. One of the main uses of JavaScript is for the retrieval and writing

of cookies. Screen customization data and certain forms data are saved by using cookies. User JavaScript functions can be added for such things as security and customization.

Note: JavaScript can contain non-display characters such as left and right brackets.

Cookies

SYSTEM 2000 uses cookies to maintain customized session information and to retain prior SCF and operator commands. If values other than the defaults are used for session customization—such as screen width, maximum output lines, or case—a cookie is created.

In order to minimize the number of cookies created, session cookies are set to expire after one hour. Prior Command cookies, which are created when the first SCF or operator command is sent to CICS, are set to expire after 12 hours. The following JavaScript variables kept in HTML template S2KWHEAD can be modified to control when cookies will expire and the number of commands that will be retained.

cookExph specifies the number of hours before Prior Command cookies expire. The default is 12.

numCmds specifies the number of prior commands that will be retained. Oldest commands are deleted as necessary. The default is 20.

Note: Browsers sometimes limit the number of cookies that can be created. SYSTEM 2000 will not create more than five cookies. In some instances, it might be necessary to delete cookies after changing the previous options.

Security

In a Web environment, there is no principal facility such as the terminal. As a result, the normal sign-on process (transaction CESN) cannot be used. All transactions run under the alias transaction specified in the URL (CWBA). This alias transaction normally runs under the default userid specified in the SIT (unless modified in an exit).

For more restrictive access, you can have different alias transactions, as long as they have at least the same security as CWBA. If an alias transaction other than CWBA is used, then HTML templates must be modified accordingly, because they have relative URLs with transaction CWBA as the default.

CICS provides sample programs for obtaining a userid, as well as HTTP Basic Authentication Sample Programs. Each site must examine its own security requirements and determine what is needed. Encryption and authentication techniques, although beyond the scope of this discussion, can be employed for additional security.

Stateless Environment and Web Userids

The Web was originally designed for “stateless” communication between client and server. Its function was basically information retrieval only. With the advent of forms programming, the need arose for maintaining or saving information about the state of processing across invocations of the Web server.

SYSTEM 2000 maintains state processing in a Web environment by assigning each user a unique userid on initial invocation of the interface. This userid is maintained for the life of the browser and is used to uniquely identify each Web user to SYSTEM 2000. Unless the browser window has been closed or a timeout has occurred, a new userid is *not* required. The initial userid does not preclude the use of a security package userid. Access to CICS resources can be restricted with RACF userids and HTTP Basic Authentication.

Chapter 3: Invoking SYSTEM 2000 Applications

URL Setup	7
SYSTEM 2000 Web Interface Menu.....	8
Database Access – Sign-on SYSTEM 2000.....	9
Database Access – Exit SYSTEM 2000.....	11
User Exits.....	12
Operator Communication.....	13
User Status	14
User Maintenance	15
Statistics and Logging.....	16
Exit Web Interface	17

URL Setup

Unlike 3270 terminals where transaction codes are entered to invoke the desired interface, a URL is required to access the SYSTEM 2000 Web Menu. Enter the appropriate URL in one of the following formats:

Entered directly from TCP/IP:

```
//S2KCUST.MVS.COM:8080/CICS/CWBA/web-aware program
```

Entered from an z/OS server:

```
//S2KCUST.MVS.COM:99/ADVCICS/CICS/CSMI/web-aware program
```

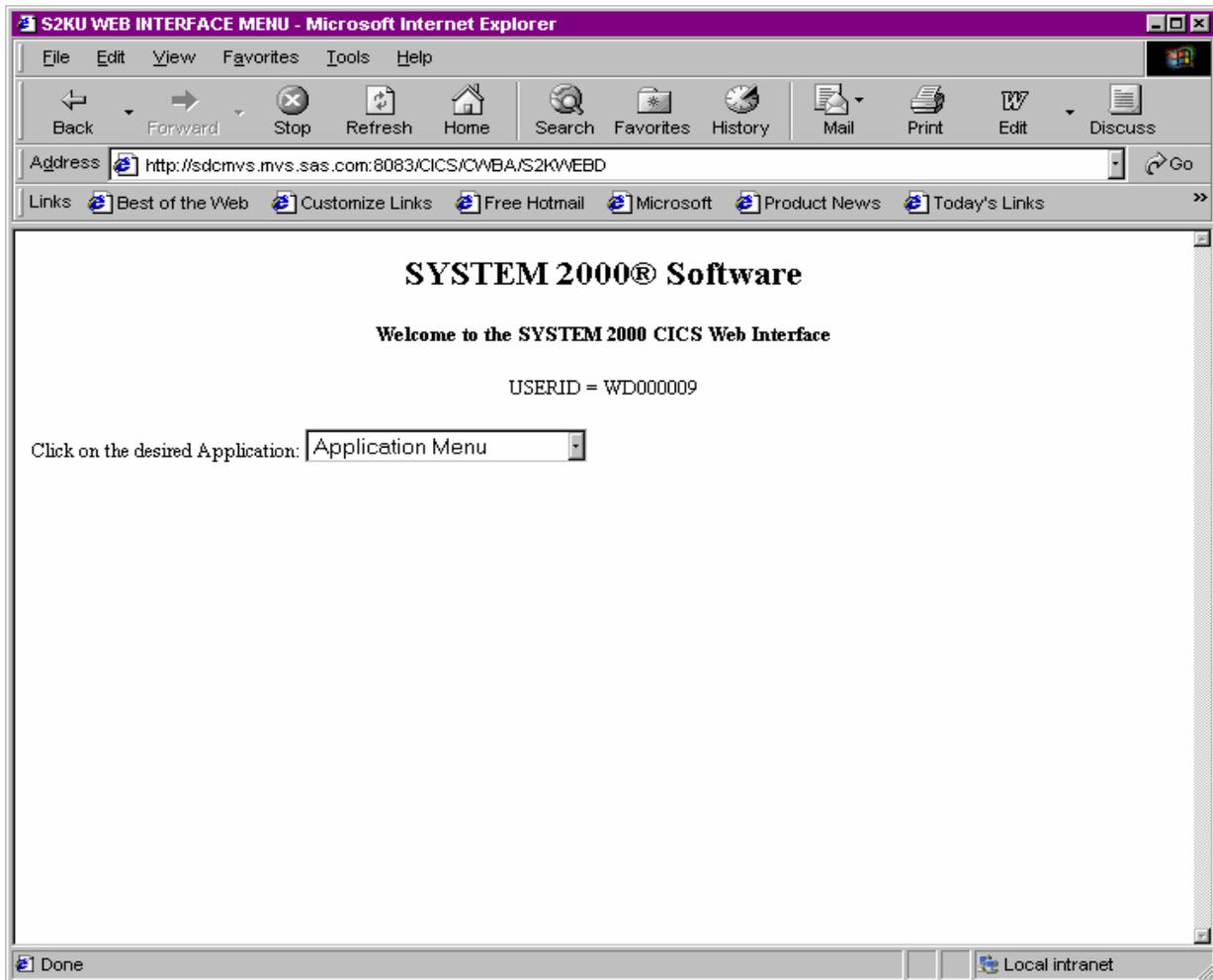
where

- S2KCUST.MVS.COM is the name of the system on which your CICS is running. You can also use the TCP/IP address of S2KCUST.MVS.COM.
- 8080 is the port number assigned to CWS (see TCPIP SERVICE).
- 99 is the port number assigned to the z/OS server.
- ADVCICS is your CICS applid.
- CICS is the converter name (this is interpreted as meaning that no converter is required).
- CWBA is the name of the alias transaction provided by CICS Web support.
- CSMI is the name of a mirror transaction.
- web-aware program is the name of the SYSTEM 2000 program to be executed.

The required Web-aware program is S2KWEBD.

SYSTEM 2000 Web Interface Menu

When you open a browser window and enter the URL as described in the previous section, you will see the following Web interface menu. The unique userid at the top of the page is maintained for the life of the browser window, and it is used to identify each SYSTEM 2000 Web user. The userid consists of a unique number prefixed with either WD for the database access application, or WO for the operator communication application. This initial menu should be invoked only once per browser session; all subsequent navigation in the Web interface is done using the pull-down **Application Menu**.



Note: When you create a bookmark for the Web interface, make one for this initial **Application Menu** only, and not the sign-on screen or any other screens. Otherwise you will get an error; see S2KWERR in Chapter 5.

Database Access – Sign-on SYSTEM 2000

To sign on to SYSTEM 2000, select the **Sign-on SYSTEM 2000** option on the initial Web interface menu screen. If you are already in a SYSTEM 2000 application, select **Sign-on SYSTEM 2000** from the **Application Menu**. The sign-on screen looks like this:

The screenshot shows a Microsoft Internet Explorer browser window titled "S2KU WEB INTERFACE HEADER - Microsoft Internet Explorer". The address bar contains the URL: `http://sdcmyvs.mvs.sas.com:8083/CICS/CWBA/S2KWWEBD?SIGNN`. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar contains icons for Back, Forward, Stop, Refresh, Home, Search, Favorites, History, Mail, Print, Edit, and Discuss. The Links bar shows several links: Best of the Web, Customize Links, Free Hotmail, Microsoft, Product News, Today's Links, and Web Gallery.

The main content area displays the following text:

SYSTEM 2000® Software

SYSTEM 2000 INTERFACE to CICS
SELF-CONTAINED FACILITY
PLEASE ENTER YOUR SIGN-ON INFORMATION
USERID = WD000009

USER PASSWORD :

DATABASE NAME TO ACCESS :

ARE YOU CREATING A NEW DATABASE ? :

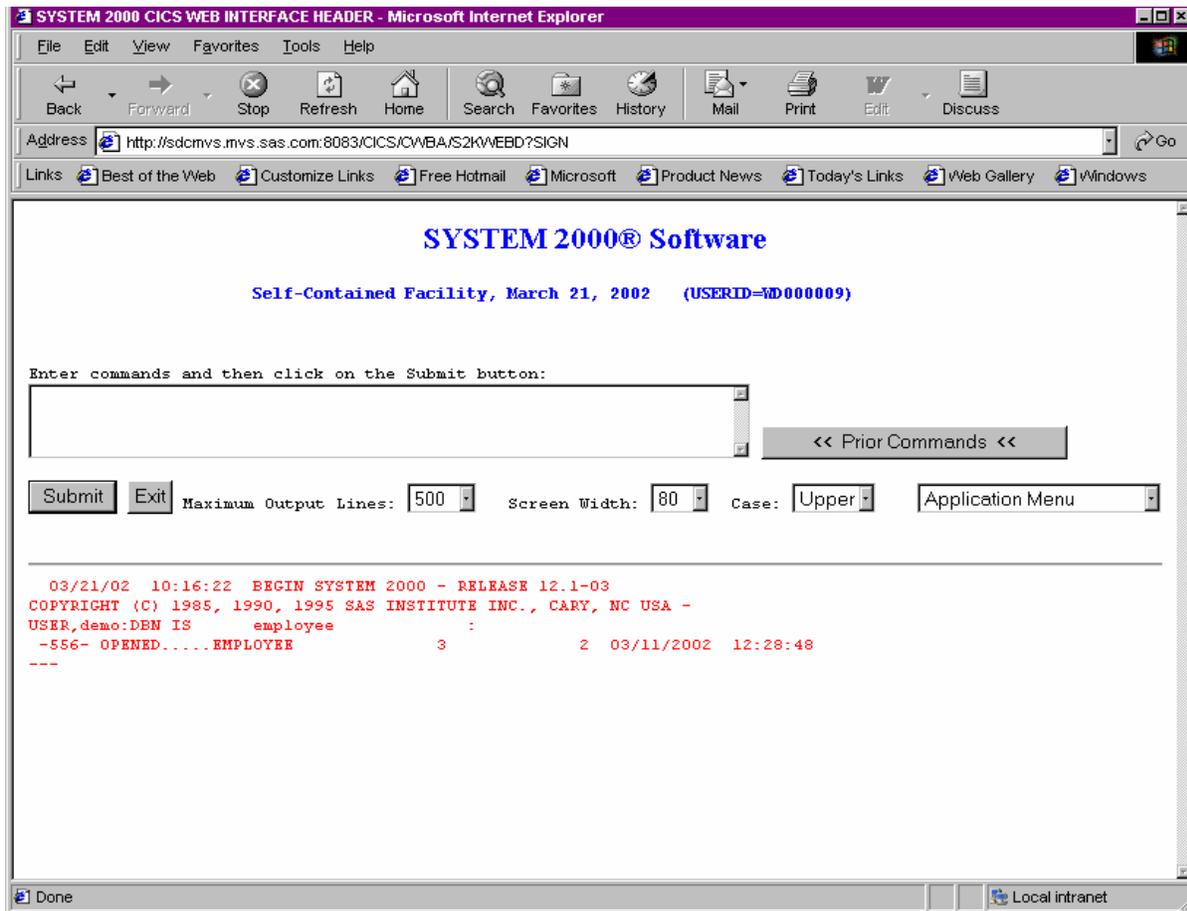
DO YOU NEED EXCLUSIVE USE OF THE DATABASE? :

WHEN ALL INFORMATION IS ENTERED CLICK THE SUBMIT BUTTON

Application Menu

The status bar at the bottom shows "Done" and "Local intranet".

The Web sign-on screen is similar to the 3270 S2KU transaction screen described in Chapter 2 of the *SYSTEM 2000 Software: Interface to CICS* manual. Pull-down menus and buttons are supplied for user convenience. After the required information is entered, you click the **Submit** button to transfer data (known as a *form* in HTML terms) to CICS. To clear the data in the form and restore the original values, click the **Reset** button. After sign-on, the following screen is displayed in your browser:



Type in your SCF commands and click the **Submit** button. To exit, click the **Exit** button. Three pull-down menus enable each user to customize the session. These values can be changed as often as needed.

- **Maximum Output Lines** enables the user to specify the number of lines sent from SYSTEM 2000 to the browser. Note that this value does not override the S2KWMLN value specified in S2KCUSE.
- **Screen Width** enables the user to change screen width from the default of 80.
- **Case** enables the user to change the default case (upper) to mixed.

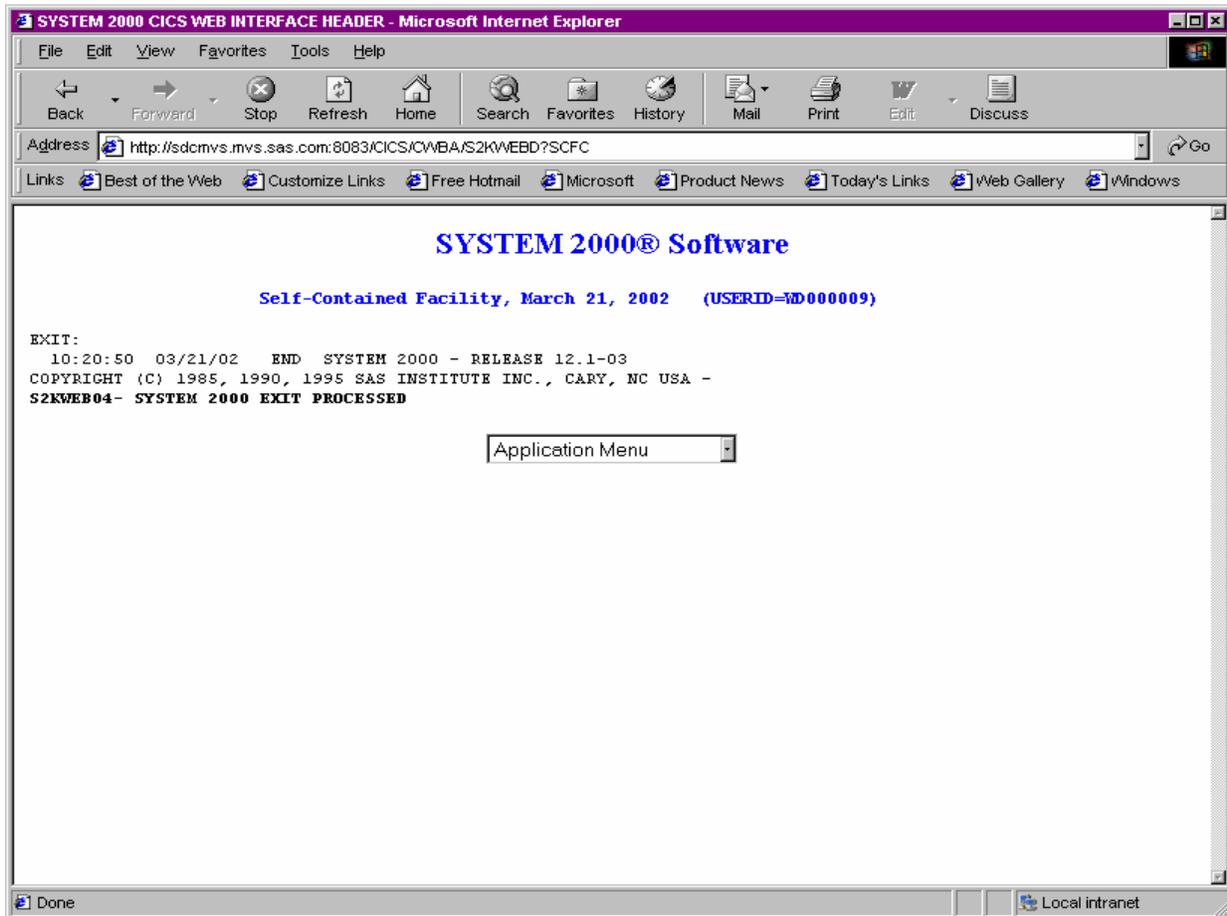
One additional button, **Prior Commands**, enables the user to view and select previous commands for editing and submission. Extraneous blanks are removed from text when saved in **Prior Commands**. They are not restored when the command is retrieved.

Note: Any **USER**, command or set of commands containing **USER**, will not be displayed in the **Prior Commands** box.

You can leave the SCF session to begin another application such as User Status Display or Operator Communication by clicking the desired option on the **Application Menu**. To resume the SCF session, click the **Resume SCF** on the **Application Menu**.

Database Access – Exit SYSTEM 2000

When you click the **Exit** button or when you issue the EXIT: command, your SYSTEM 2000 session is ended. Although your SYSTEM 2000 session has ended, you are still active in the Web interface. You can choose another application or even sign back on to SYSTEM 2000 by simply clicking the desired application in the **Application Menu**. Any commands issued on the same screen before the exit are processed. The screen you see looks like this:



User Exits

The following user exits are invoked by using the EXEC CICS LINK PROGRAM command. The exits must be stand-alone command-level programs. The link to the exits contains a common area defined by the macro S2KWCOM (assembler) or S2KWCOMC (COBOL) on your SOURCE library. See Chapter 5 on User Exits in the *SYSTEM 2000 Software: Interface to CICS* manual for information about addressing the COMMAREA.

Note: S2KWCOMC contains comments and value clauses that must be removed if placed in the linkage section.

S2KWEBU1—Monitor the input in its unedited form. Input is in the format that is received from TCP/IP. Input includes the forms method, URL, various HTTP headers and forms data in name/value pairs. Data is in unescaped format. The following fields are relevant to this exit:

S2KWMSGA	input message address
S2KWMSGL	input message length

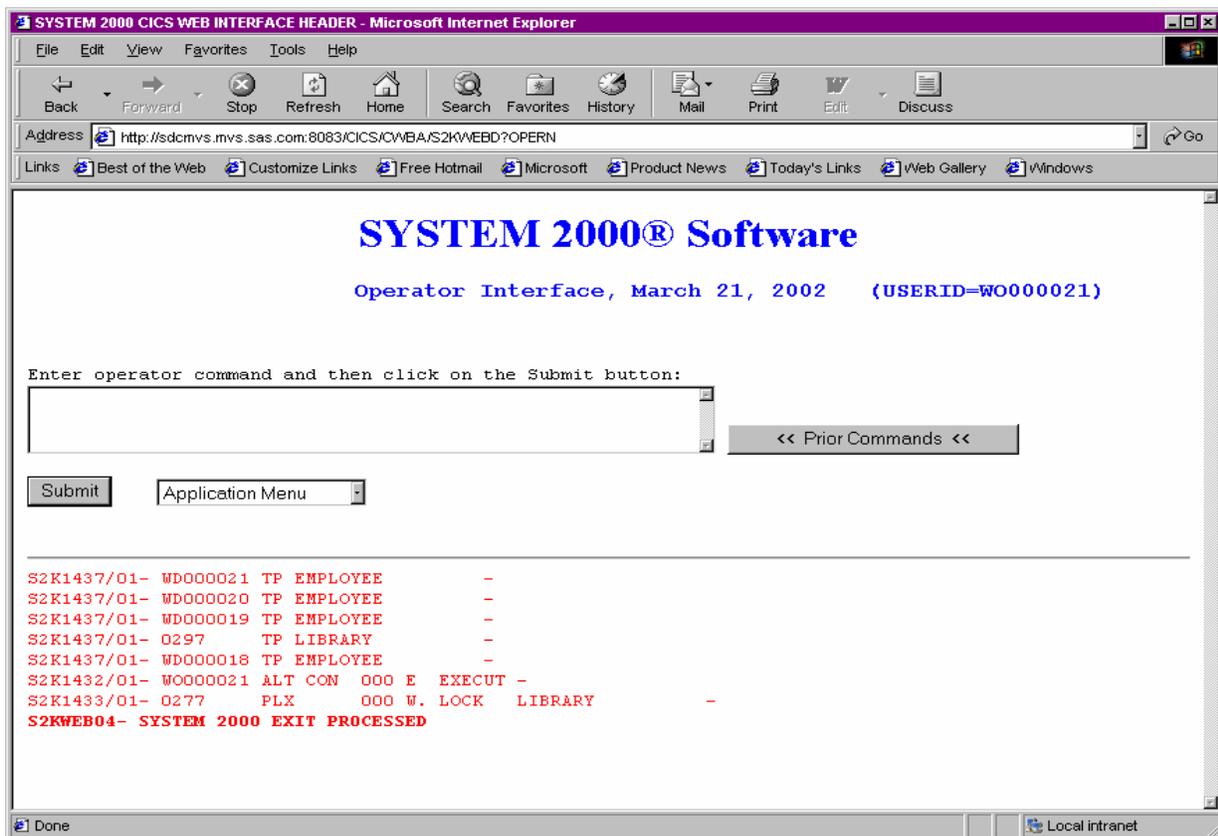
S2KWEBU2—Monitor or modify the input message in its edited form. The input message has had all HTTP/HTML dependencies removed from it and is ready to be passed to Multi-User software. The following fields are relevant to this exit:

S2KWMSGA	edited input message address
S2KWMSGL	edited input message length

S2KWEBU3—Monitor or modify the User Request Block (URB). The field relevant to this exit is S2KWURB

Operator Communication

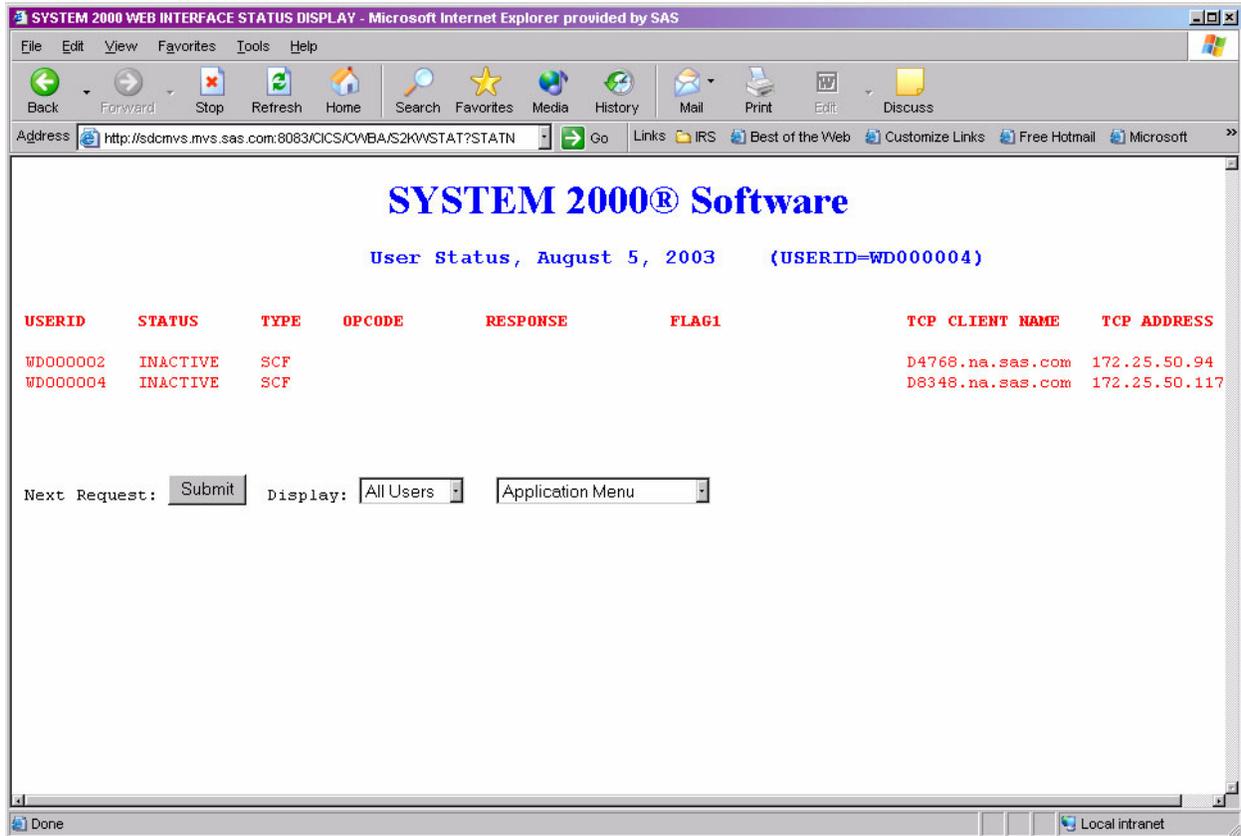
To begin operator communication, select the **Operator Communication** (S2OP transaction) option on the initial Web interface menu screen, or if you are already in a SYSTEM 2000 application, select **Operator Communication** from the **Application Menu**. The Operator Interface screen looks like this:



Enter a SYSTEM 2000 operator command and click the **Submit** button. Prior operator commands can be viewed and edited for submission by clicking the **Prior Commands** button. For further information, see the description of transaction S2OP in the *SYSTEM 2000 Software: Interface to CICS* manual.

User Status

To obtain user status information, select the **User Status** option on the initial Web interface menu screen, or if you are already in a SYSTEM 2000 application, select **User Status** from the **Application Menu**. The User Status screen looks like this:



The **Display** menu shows PLEX or SCF user status. The default is **All Users**. The **Display** menu enables the user to control which users to view. For further information, see the descriptions of 3270 transactions LALL, LPLX, and LSCF in the *SYSTEM 2000 Software: Interface to CICS* manual. Two fields have been added for Web users:

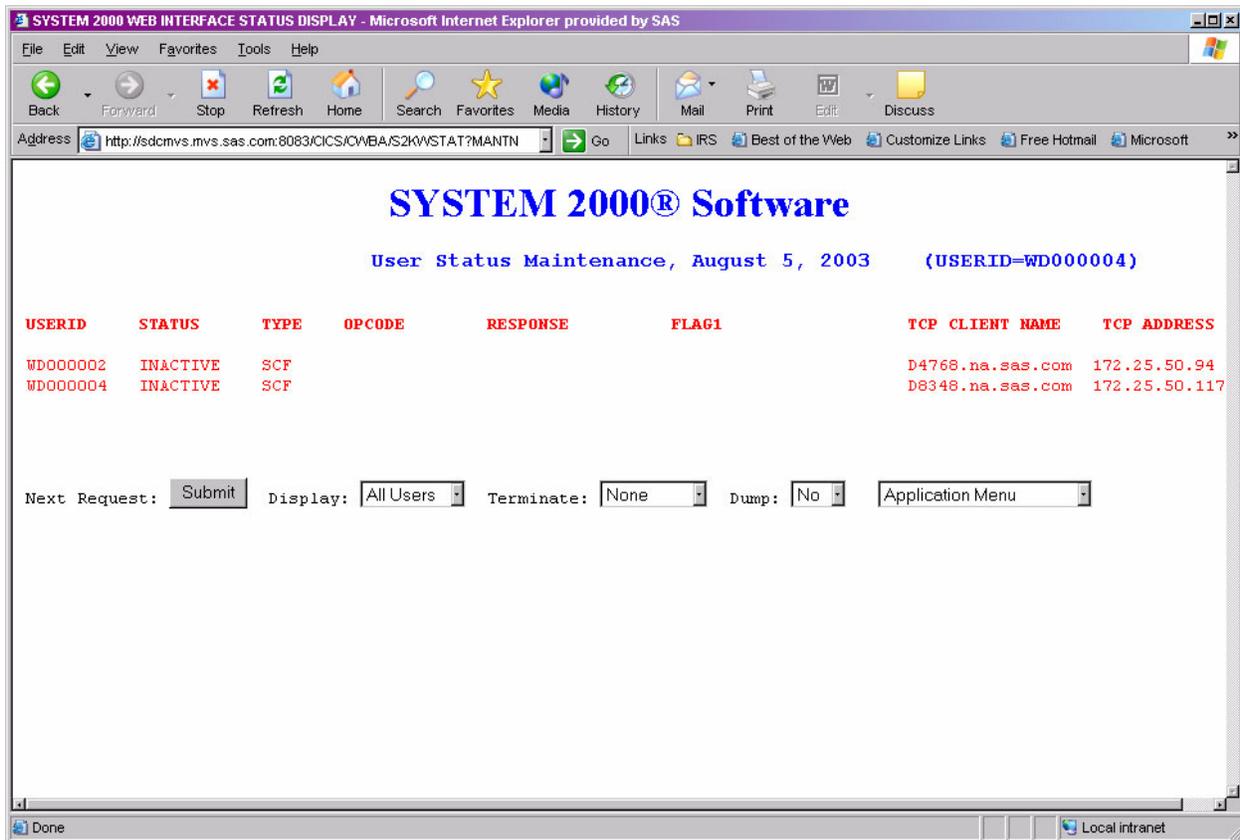
TCP CLIENT NAME is the client's name as the Domain Name Server knows it.

TCP ADDRESS is the client's TCP/IP address in character format.

To refresh the current status, click the **Submit** button.

User Maintenance

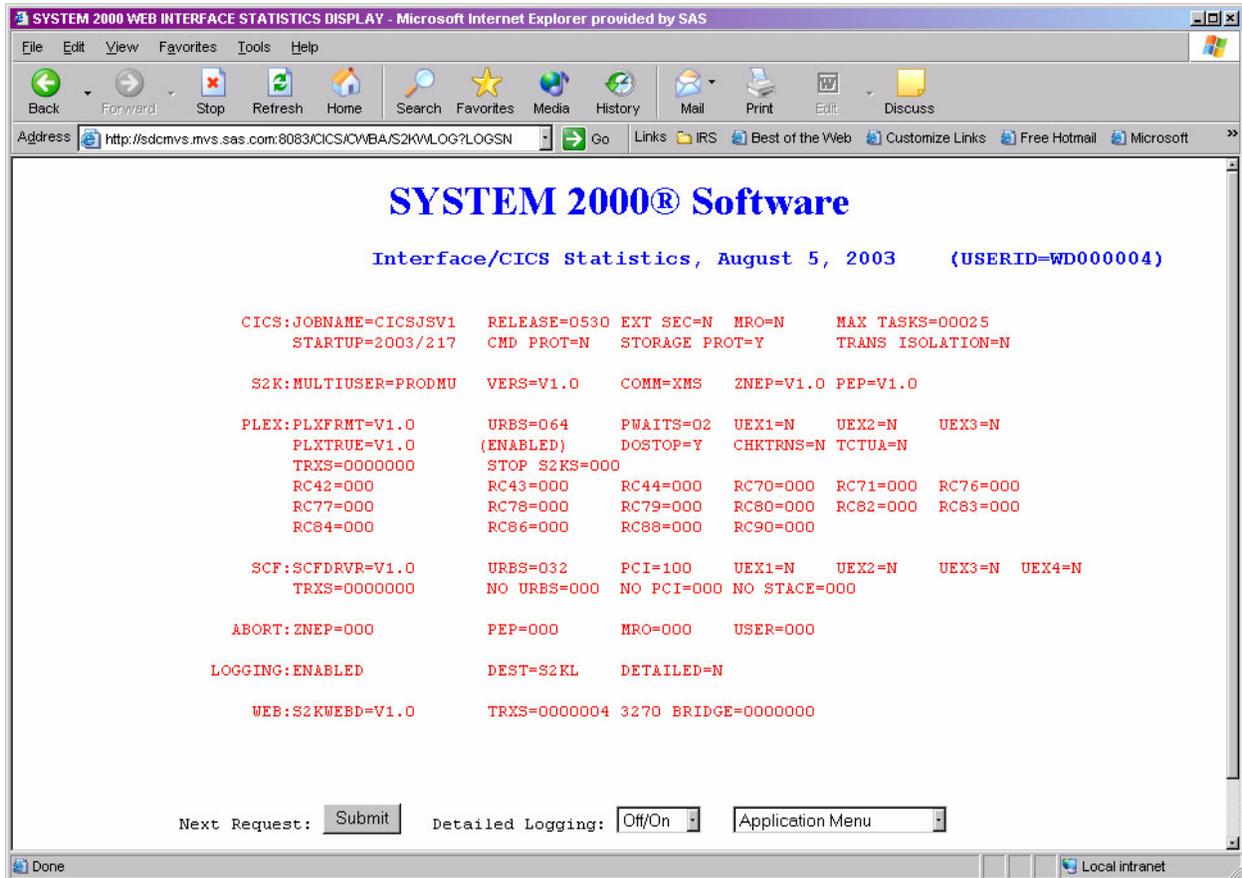
To access the User Status Maintenance screen, select the **User Maintenance** option on the initial Web interface menu screen, or if you are already in a SYSTEM 2000 application, select **User Maintenance** from the **Application Menu**.



The User Status Maintenance screen enables the user to terminate the sessions of SCF and PLEX users in the interface. See the CICS interface transactions TALL, TPLX and TSCF for a description of functionality. The **Terminate** menu enables you to select which user session or sessions should be terminated. The **Dump** menu produces a dump if **Yes** is selected. See the CICS interface Dump transaction for an explanation of what CICS areas are dumped. The User Status Maintenance screen provides system-type functions and so should be restricted to qualified users. This screen functions identically to the User Status screen if the **Terminate** menu defaults to a value of **None** and the **Dump** menu defaults to **No**.

Statistics and Logging

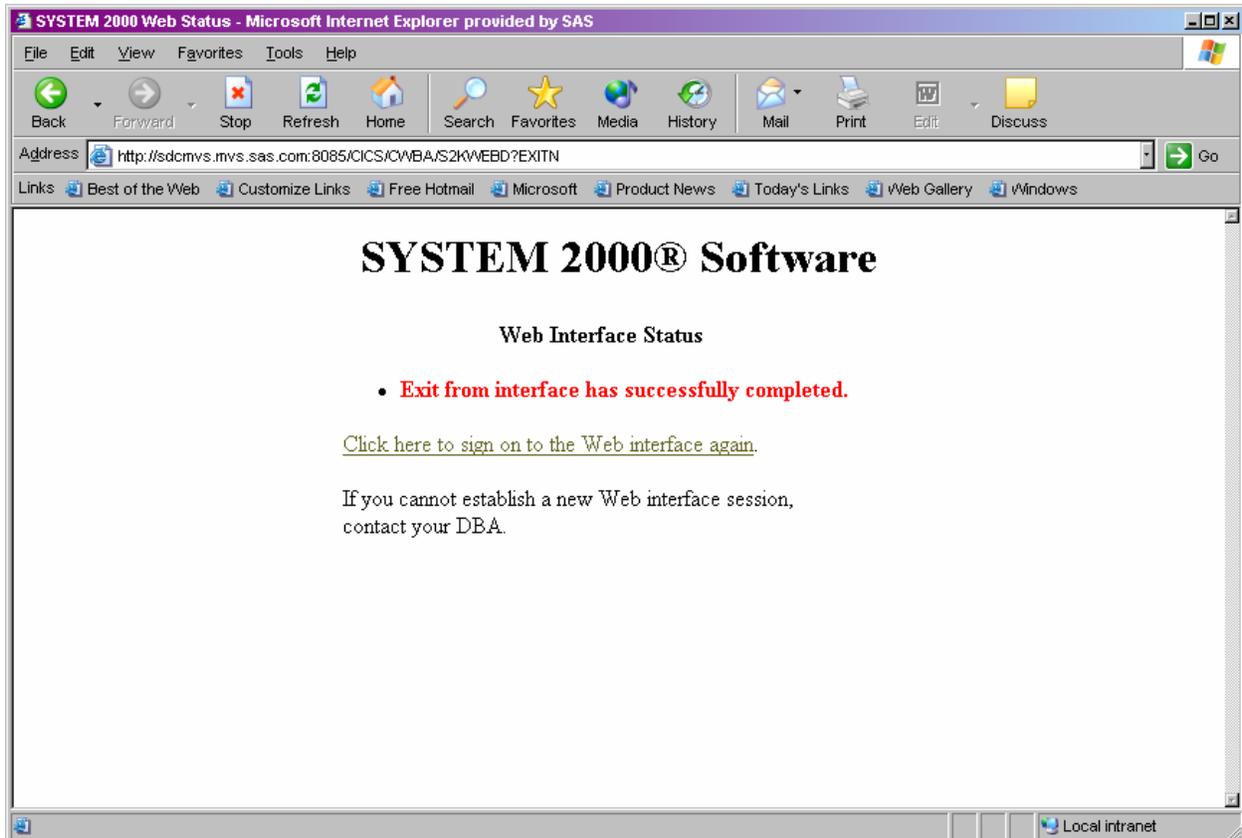
To obtain statistics and logging information, select the **Statistics** option on the initial Web interface screen, or if you are already in a SYSTEM 2000 application, select **Statistics** from the **Application Menu**. The Interface/CICS Statistics screen looks like this:



Statistics and logging provide the user with interface and CICS statistics that have been recorded by the SYSTEM 2000 CICS event-logging feature. For further information, see the description of 3270 transaction S2KL in the *SYSTEM 2000 Software: Interface to CICS* manual. The **Detailed Logging** menu enables the user to turn logging on and off.

Exit Web Interface

The **Application Menu** contains an **Exit Web** option. When you select it, all Web resources, including userid, are released. This is the recommended way to end your Web session. Closing your browser without exiting the interface does not free up resources and can cause system degradation. SCF session resources are also released if a user is signed on to database access and has not already exited SYSTEM 2000. The Web Interface Status screen is confirmation of a successful exit.



Note: The **Application Menu** for the SCF application does not contain an **Exit Web** option. An **Exit** button already exists to exit SYSTEM 2000. After you have exited SYSTEM 2000, you can then exit the Web interface.

Chapter 4: Web Maintenance

CICS Web Maintenance is a DBA utility and is not part of the Web application package. For security reasons, it has its own URL. To access the CICS Web Maintenance screen, enter the appropriate URL in the format described in "URL Setup" in Chapter 3. The *web-aware program* is S2KWMAIN.

SYSTEM 2000® Software

CICS Web Maintenance

APPLID=C02CIC13 DATE=04/30/02 Timeout Interval=120 Max Users=0010 Current Web Users=0005

USERID	APPLICATION	LAST ACCESS	TCP CLIENT NAME	TCP ADDRESS
WD000006	SCF	15:58:25	d4780.na.sas.com	172.25.50.48
WD000007	OPERATOR *	15:59:01	d4780.na.sas.com	172.25.50.48
WD000008	USER MAINT	15:59:29	d4780.na.sas.com	172.25.50.48
WD000009	STATISTICS	16:17:22	d6288.na.sas.com	172.25.50.34
WD000010	INTERFACE	16:22:24	d4780.na.sas.com	172.25.50.48

Next Request: Terminate:

The CICS Web Maintenance screen shows all users currently signed on to the Web interface. Other information includes the current application and the time of last access. A **Terminate** menu enables you to remove Web users from the interface and free their resources. For example, a Web user who closed the browser without first exiting the interface is a candidate for termination. If a Web user is signed on to SYSTEM 2000 when terminated, an abort request is sent to SYSTEM 2000 to perform abort processing and free up Multi-User resources.

Note: An (*) in the APPLICATION column indicates that a user is signed on to SYSTEM 2000.

Chapter 5: Messages and Codes

S2KWEBD.....	21
S2KWSTAT.....	22
S2KWERR.....	22

S2KWEBD

S2KWEB01- S2K TP BUSY... NO URBS AVAILABLE- TRY AGAIN

S2KWEB02- COMMUNICATION ERROR ENCOUNTERED. UNABLE TO CONTINUE, RC =

RC04 = MULTI-USER TP NOT ACTIVE
 RC08 = INVALID SVC REQUEST CODE
 RC12 = INVALID URB FOR THIS CALL
 RC16 = NO SUCH SVC RETURN CODE
 RC20 = USER FOUND/NOT FOUND IN SVC TABLE
 RC24 = MULTI-USER TP BUSY ... TRY AGAIN
 RC28 = IRA SPACE NOT AVAILABLE FOR USER
 RC32 = ERROR ACCESSING S2KCOM FILE

S2KWEB03- SYSTEM 2000 BUSY, PLEASE TRY AGAIN

S2KWEB04- SYSTEM 2000 EXIT PROCESSED

S2KWEB05- ERROR ENCOUNTERED IN SYSTEM 2000, UNABLE TO CONTINUE, RC =

RC04 = REQUEST CANCELLED - S2K TP BEING QUIESCED
 RC08 = TP TERMINAL TABLE IS FULL
 RC12 = USER ALREADY ACTIVE IN MULTI-USER
 RC16 = USER LOGON PREVIOUSLY STARTED
 RC20 = DISCREPANCY IN URB ADDRESS
 RC24 = UNKNOWN ERROR

S2KWEB06- -800- SYSTEM 2000 ERROR CODE ----

S2KWEB07- USER NO LONGER ACTIVE, PLEASE SIGN-ON

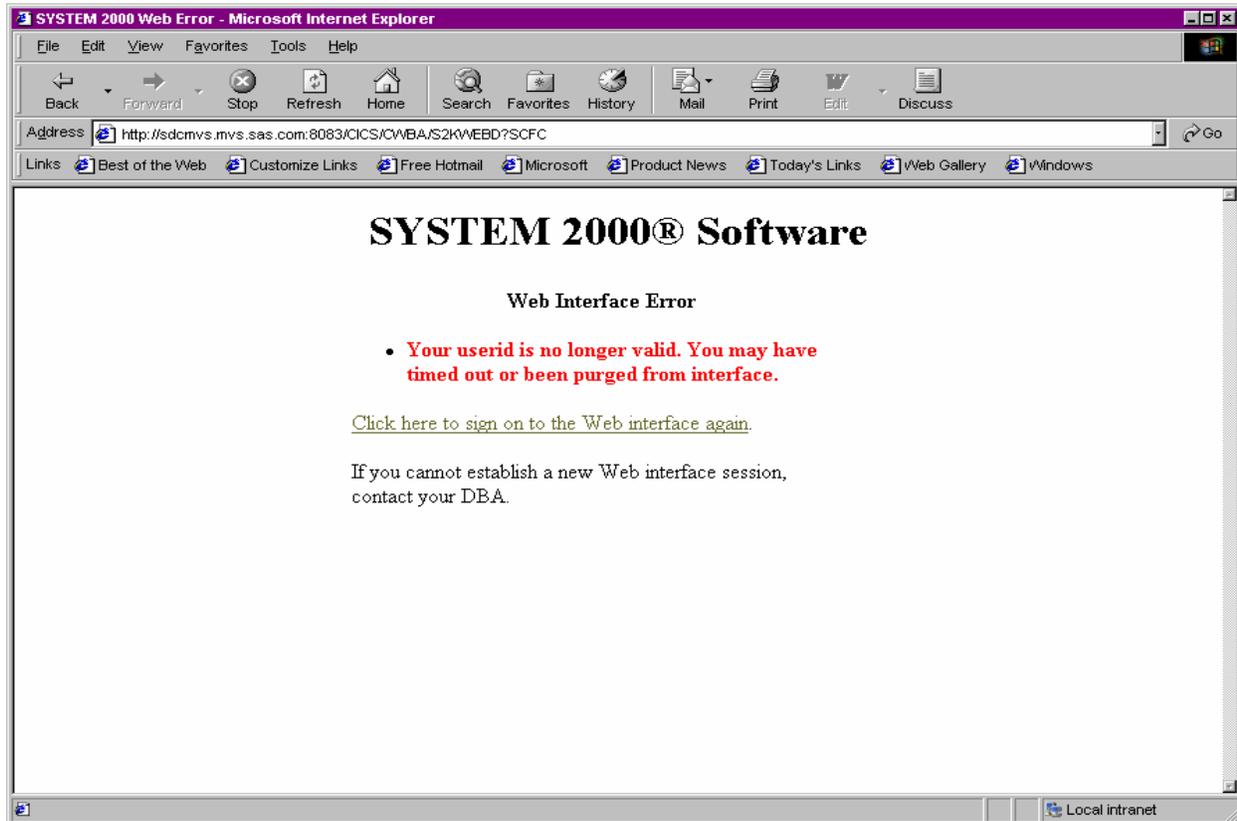
S2KWSTAT

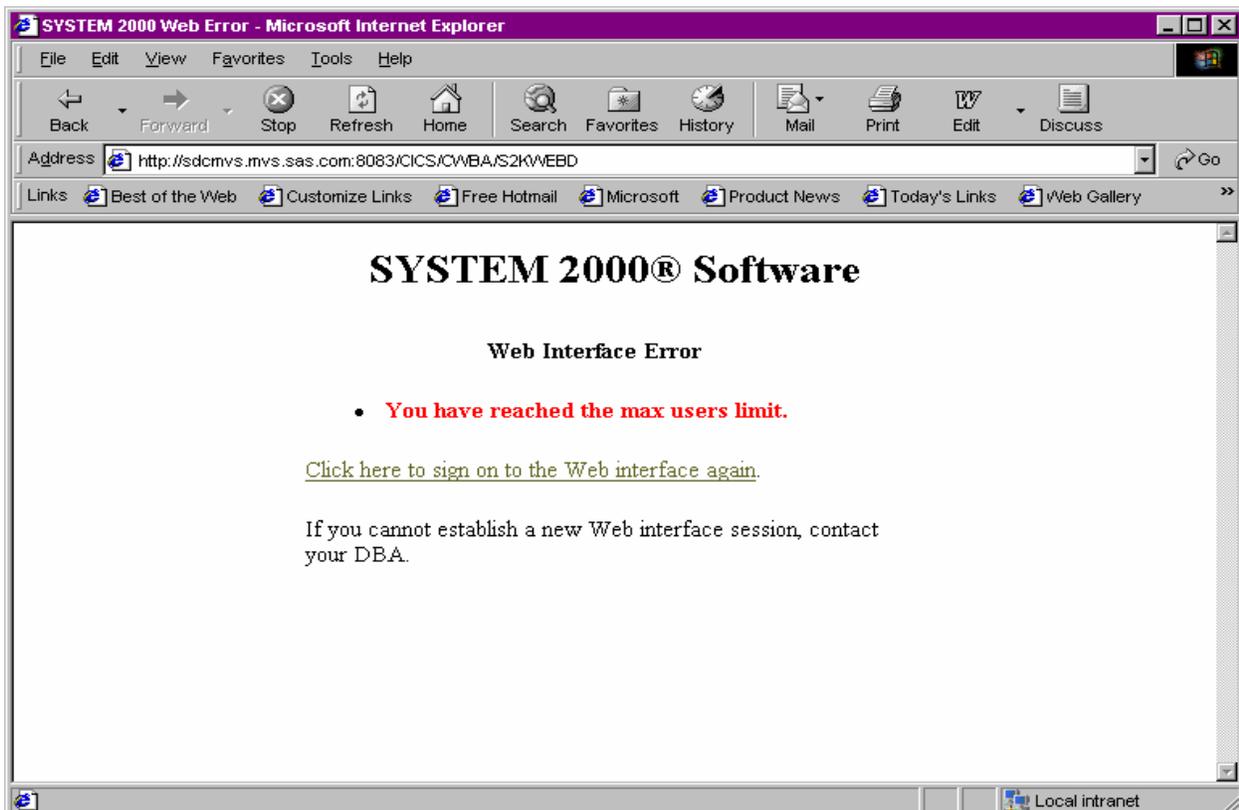
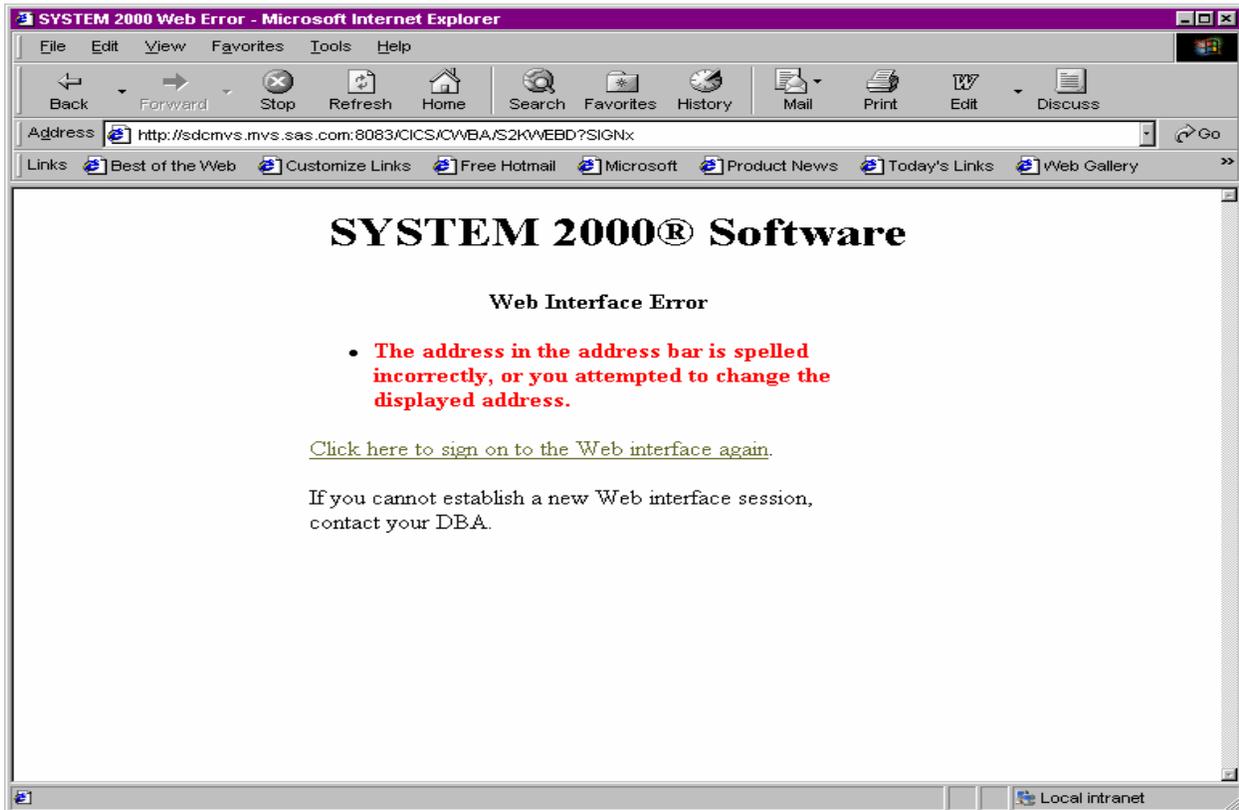
S2KWST01- *** NO USERS FOUND ***

S2KWST02- *** REQUESTED DUMP PROCESSING COMPLETE ***

S2KWERR

The following displays show the three Web interface status screens that you can receive if your session times out, your URL is invalid, or the maximum users limit is reached. If the S2KWERR screen can't be displayed, it means an unknown error condition has occurred, and either an S2KWabend dump or a CICS transaction dump is executed to aid in problem determination. In either case, you see your browser's error screen.





Your Turn

We want your feedback.

- If you have comments about this book, please send them to **yourturn@sas.com**. Include the full title and page numbers (if applicable).
- If you have comments about the software, please send them to **suggest@sas.com**.

SAS® Publishing gives you the tools to flourish in any environment with SAS!

Whether you are new to the workforce or an experienced professional, you need to distinguish yourself in this rapidly changing and competitive job market. SAS® Publishing provides you with a wide range of resources to help you set yourself apart.

SAS® Press Series

Need to learn the basics? Struggling with a programming problem? You'll find the expert answers that you need in example-rich books from the SAS Press Series. Written by experienced SAS professionals from around the world, these books deliver real-world insights on a broad range of topics for all skill levels.

support.sas.com/saspress

SAS® Documentation

To successfully implement applications using SAS software, companies in every industry and on every continent all turn to the one source for accurate, timely, and reliable information—SAS documentation. We currently produce the following types of reference documentation: online help that is built into the software, tutorials that are integrated into the product, reference documentation delivered in HTML and PDF—free on the Web, and hard-copy books.

support.sas.com/publishing

SAS® Learning Edition 4.1

Get a workplace advantage, perform analytics in less time, and prepare for the SAS Base Programming exam and SAS Advanced Programming exam with SAS® Learning Edition 4.1. This inexpensive, intuitive personal learning version of SAS includes Base SAS® 9.1.3, SAS/STAT®, SAS/GRAPH®, SAS/QC®, SAS/ETS®, and SAS® Enterprise Guide® 4.1. Whether you are a professor, student, or business professional, this is a great way to learn SAS.

support.sas.com/LE



**THE
POWER
TO KNOW®**

