

# Implementing a Web Server on OS/390: Part I – Setting Up and Operating Your Web Server

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A key advantage of running a web server on OS/390 is that the data and applications that you need for commerce or web services are present on the same system.

**SOME** people believe that Internet servers must be implemented on UNIX or similar systems. However, there is significant value in putting a web server on OS/390. OS/390 already holds major amounts of enterprise business data. A key advantage of running a web server on OS/390 is that the data and applications that you need for commerce or web services are present on the same system. The technology available to users of IBM S/390 servers is some of the most advanced in the industry and is not likely to be rivaled by UNIX or Microsoft NT pretenders for some years. OS/390's strengths are proven: very high capacity, availability, security and integrity. All these strengths can be applied to Internet work as they are used today for transaction or batch processing.

Starting with OS/390 release 1.3 in March 1997, IBM delivers at no additional charge Internet Connection Secure Server (ICSS) version 2.2. With OS/390 release 2.4, ICSS changes its name to Domino Go Web server 4.6.1 and is still a no-charge product.

This four-part series presents the implementation of a web server on OS/390. Part I describes how to set up and operate a web server on one of the most advanced computer platforms, IBM's OS/390. Part II will examine how to use this server to implement your business applications. I will outline basic functions such as defining a Web Hotel, protecting your server with RACF and using page access counters. I will also describe advanced functions such as implementing IBM Host On Demand to provide 3270 access from the Internet or securing web access with SSL.

Part III will describe how to install and run Java CGI (Common Gateway Interfaces) and applets on OS/390 and how to build dynamic web HTML pages. The concluding article will examine how to interconnect web applications to the heart of your existing OS/390 system, strategic OS/390 products like DB2 databases or CICS transactions servers.

Figure 1: A Web Server on OS/390

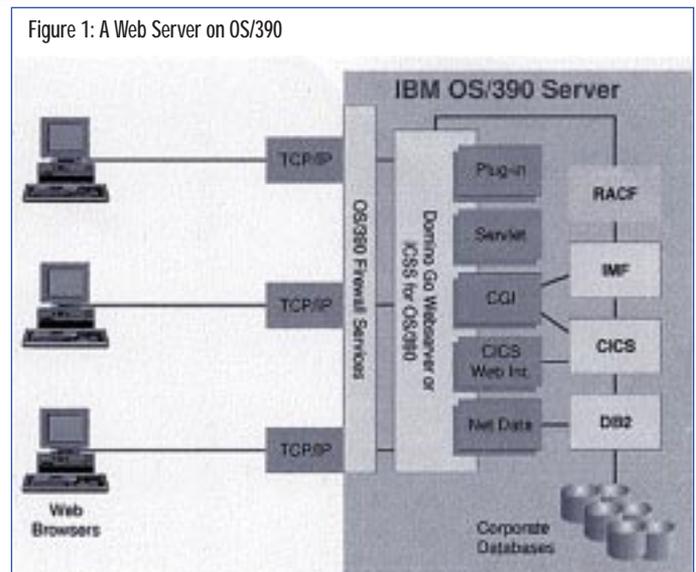


Figure 2: TCP/IP Profile Customization

```

PORT
...
80 TCP OMVS          ; ICSS
...
443 TCP OMVS        ; ICSS Secure Server
...
    
```

Figure 3: Sample IMWEBSRV Directories Structure

```

                                Directory List

/u/imwebsrv/
Select one or more files with / or action codes.

  Type  Perm  Changed (GMT)      Owner   Size  Fil      Row 1 of 8
- Dir   755   01/30/1998 14:41  WEBADM   0     .
- Dir   755   12/10/1997 09:46  I990557  0     ..
- Dir   755   02/10/1998 15:13  I990557  0     config
- Dir   755   01/30/1998 14:59  I990557  0     Counters
- File  644   02/17/1998 08:53  I990557  10    httpd-pid
- Dir   755   02/17/1998 08:53  I990557  0     logs
- Dir   755   02/17/1998 08:53  I990557  0     security
- Dir   755   01/22/1998 16:58  I990557  0     www01
- Dir   755   02/03/1998 14:52  I990557  0     www02
    
```

## THE INSTALLATION PROCEDURE

The first part of this article provides an overview of the installation process. This procedure is shown in Figure 1. For a more detailed explanation of the procedure, refer to *IBM Internet Connection Secure Server - Planning for Installation* (GC31-8489).

In order to install Internet Connection Secure Server (ICSS), you must have OpenEdition customized. As a traditional MVS product, ICSS 2.2 is installed using SMP/E. It has three components:

- ◆ HIMW300 (WWW Base)
- ◆ JIMW301 (WWW U.S. English)
- ◆ JIMW310 (WWW U.S. Security) or JIMW320 (WWW Non-U.S. Security)

Before performing SMP/E apply, you must allocate the following two HFS files:

- ◆ SIMWHFS (to store product libraries) mounted on /usr/lpp/internet.
- ◆ SIMWHFSL (to store product logs) mounted on /usr/lpp/internet/server\_root/logs

The ICSS product prefix is IMW, so MVS target libraries will be named similar to this example: SYS1.SIMW\*.

## RACF Customization

Several RACF users must be defined to implement ICSS. These userids will use OpenEdition services, so they need special definitions in their RACF profile (UID, GID, HOME).

- ◆ userid for IMWEBSRV STC: WEBSRV with root authority UID(0)
- ◆ userid for web administrator: WEBADM

Web servers frequently need to process requests from users who do not have userids on the system running the server. So ICSS will use surrogate userids to perform these requests. You will have to define, for example, userid PUBLIC to handle requests from unknown users.

## CONFIGURING THE WEB SERVER TCP/IP Customization

1. In your TCP/IP profile, you should reserve ports number 80 (default) and 443 (secure server) as shown in Figure 2.

2. Allocate a new directory to store ICSS objects. In order to customize ICSS, you should use the sample directories structure found in Figure 3. The following summarizes the types of directories that will be used.

- **/u/imwebsrv/config:** This directory will be used to store ICSS startup parameters httpd.conf, httpd.envvars, mvds.conf...).
- **/u/imwebsrv/Counters:** This directory will be used to store page access counters.
- **/u/imwebsrv/logs:** This directory will be used to store ICSS logs.
- **/u/imwebsrv/security:** This directory will be used to store SSL keys and certificates.
- **/u/imwebsrv/www01 and /u/imwebsrv/www02:** These directories will be used to implement two logical servers, www01 and www02.

Using this directory architecture, it will be possible to mount the ICSS SIMWHFS file system (mounted on /usr/lpp/internet) in read-only mode. This will help future ICSS maintenance or migration.

Figure 4: IMWEBSRV STC Procedure

```
//IMWPROC PROC ICSPARM='-r /u/imwebsrv/config/httpd.conf',
// LEPARM='ENVAR("_CEE_ENVFILE=/u/imwebsrv/config/httpd.envvars")'
//*****
//WEBSRV EXEC PGM=IMWHTTPD,REGION=OK,TIME=NOLIMIT,
// PARM=('&LEPARM/&ICSPARM')
//STEPLIB DD DISP=SHR,DSN=SYS1.SIMWMOD1
//*****
//SYSIN DD DUMMY
//OUTDSC OUTPUT DEST=HOLD
//SYSPRINT DD SYSOUT=*,OUTPUT=(*,OUTDSC)
//SYSERR DD SYSOUT=*,OUTPUT=(*,OUTDSC)
//STDOUT DD SYSOUT=*,OUTPUT=(*,OUTDSC)
//STDERR DD SYSOUT=*,OUTPUT=(*,OUTDSC)
//SYSOUT DD SYSOUT=*,OUTPUT=(*,OUTDSC)
//CEEDUMP DD SYSOUT=*,OUTPUT=(*,OUTDSC)
```

Figure 5: httpd.conf Basic Customization

```
ServerRoot /u/imwebsrv
...
ErrorLog /u/imwebsrv/logs/httpd-errors
CgiErrorLog /u/imwebsrv/logs/cgi-errors
TraceLog /u/imwebsrv/logs/jttrace
...
```

Figure 6: httpd.envvars Customization

```
PATH=/bin:./usr/lpp/internet/bin
SHELL=/bin/sh
TZ=ESTOEDT0
LANG=C
NLSPATH=/usr/lib/nls/msg/%L/%N:/usr/lpp/internet/%L/%N
LIBPATH=/usr/lpp/internet/bin:/usr/lpp/internet/sbin
```

Figure 7: Starting IMWEBSRV STC

```
S IMWEBSRV
$HASP100 IMWEBSRV ON STCINRDR
IEF695I START IMWEBSRV WITH JOBNAME IMWEBSRV IS ASSIGNED TO USER
WEBSRV
$HASP373 IMWEBSRV STARTED
IEF403I IMWEBSRV - STARTED - TIME=16.53.47
IMW3534I PID: 318767122 ICSS STARTING
IMW3536I SA 318767122 0.0.0.0:80 * * READY
```

Figure 8: Restarting the Server

```
F IMWEBSRV,APPL=-RESTART
IMW3537I SA 301989906 0.0.0.0:80 * * RESTARTING
IMW3538I SA 301989906 0.0.0.0:80 * * RESTART SUCCESSFUL
```

3. Customize IMWEBSRV STC. ICSS is started as a STC: IMWEBSRV. See Figure 4. You must modify the RACF started task table (ICHRIN03) to assign WEBSRV's userid to this STC.

4. Customize startup parameters. At this point, you must customize the following ICSS configuration files:

**httpd.conf:** This configuration file implements "directives" that define particular setting for the server. Update the directives shown in Figure 5 in the default httpd.conf file to reflect your directories

architecture. (A sample httpd.conf file is available for download from the NaSCOM Internet server as filename SEP98001.EX1.)

**httpd.envvars:** This file defines environment variables used by ICSS during its execution. See Figure 6.

**mvsds.conf:** This file is used by the mvsds.so service to access MVS sequential datasets.

These sample configuration files are shipped with the product and can be used to start your server. You should copy these

files from /usr/lpp/internet/samples/config/ to /u/imwebsrv/config/.

## OPERATING YOUR WEB SERVER

You'll need to know a few things to help you operate your web server. ICSS version 2.2 accepts a set of OS/390 MODIFY commands that allow you to make changes while the server is running. You can use MODIFY commands to restart the server using an updated httpd.conf file, display statistics about your server, or turn verbose tracing on and off.

**OS/390's strengths are proven: very high capacity, availability, security and integrity. All these strengths can be applied to Internet work as they are used today for transaction or batch processing.**

Notice that when you start IMWEBSRV, you get the messages shown in Figure 7. You may need to restart your server to reload the httpd.conf configuration file. This can be done using the "g" command presented in Figure 8. To get statistics on ICSS execution, use the command shown in Figure 9.

Debugging messages can be useful to have before you start tracing. This is done using the MVS command shown in Figure 10. In that case, you will get trace messages in the SYSOUT DD file of the IMWEBSRV procedure. See Figure 11.

As a traditional MVS STC, you can stop ICSS with the usual "P" command as shown in Figure 12.

## CONCLUSION

You should now have a basic grasp of how to install and operate an "empty" ICSS server on OS/390. As I mentioned at the beginning of this article, you may refer to *IBM Internet Connection Secure Server - Planning for Installation* (GC31-8489) for more extensive details. Part II will examine how to use this server to implement your business applications. I will outline basic functions such as defining a Web Hotel, protecting your server with RACF or using

### Figure 9: Display Statistics

```
F IMWEBSRV,APPL=-D STATS
IMW3502I Stats: Threads running: 40, Threads idle:
..... 40, Requests: 7, Bytes rcvd: 1969, Bytes
..... sent: 0, Actv In Conns: 0, Actv Out
..... Conns: 0.
```

### Figure 10: Turn Trace On

```
F IMWEBSRV,APPL=-VV
IMW3518I More trace enabled. (Very Verbose)
```

### Figure 11: IMWEBSRV SYSOUT Trace

```
..... This is IBM Internet Connection Secure Server for OS/390 V2R2
..... Built on Jan 19 1998 at 16:55:46.
..... Started at Tue Feb 24 09:04:21 1998
..... Running as "WEBSRV", UID:0, GID:205.
Y 7DB7338 at 24/Feb/1998:16:42:35 +0000~: 24Feb98 16:42:35: More trace enabled.
Y 7DB7338 at 24/Feb/1998:16:45:15 +0000~: HTSignal.... Sig terminating
Y 7DB7338 at 24/Feb/1998:16:45:15 +0000~: Create Fn... for module "HTVInit" being called.
Y 7DF5C30 at 24/Feb/1998: 16:45:15 +0000~: Create Fn... for module "HTDaemon" being called.
Y 7DF5C30 at 24/Feb/1998:16:45:15 +0000~: Create Fn... for module "HTTimer" being called.
Y 7DF5C30 at 24/Feb/1998:16:45:15 +0000~: Timer..... not being created for a type-4
thread.
....
```

### Figure 12: Stopping Your Server

```
P IMWEBSRV
IMW3540I SA 301989906 0.0.0.0:80 * * STOPPING WORK
IMW3541I SA 301989906 0.0.0.0:80 * * TERMINATING NOW
IEF404I IMWEBSRV - ENDED - TIME=16.45.26
$HASP395 IMWEBSRV ENDED
```

page access counters. Part II will also describe advanced functions such as implementing IBM Host On Demand to provide 3270 access from the Internet or securing web access with SSL.

#### Java

*Teach Yourself Java in 21 Days*, ISBN 1-57521-030-4

*Java in a Nutshell*, ISBN 1-56592-183-6

#### RELATED PUBLICATIONS

##### ICSS Publications

*Planning for Installation* (GC31-8489)

*Webmaster's Guide* (GC31-8490)

*Web Programming Guide* at [www.ics-raleigh.ibm.com/pub/icswpg.htm](http://www.ics-raleigh.ibm.com/pub/icswpg.htm)

##### Net.Data Publications

The following documents are available in HTML or Acrobat Reader format (PDF) at the Net.Data web site [www.software.ibm.com/data/net.data/docs/](http://www.software.ibm.com/data/net.data/docs/):

- ◆ *Net.Data Programming Guide*
- ◆ *Net.Data Reference Guide*
- ◆ *Net.Data Language Environment Guide*

##### IBM Red Books

*Enterprise Web Serving With the Internet Connection Secure Server for OS/390* (SG24-2074)

#### RELATED WEB SITES

##### ICSS

[www.ics.raleigh.ibm.com/ics/icftopps.htm](http://www.ics.raleigh.ibm.com/ics/icftopps.htm)

##### Java

[www.ibm.com/java/](http://www.ibm.com/java/)

[www.s390.ibm.com/java/](http://www.s390.ibm.com/java/)

[www.hursley.ibm.com/javainfo/hurindex.html](http://www.hursley.ibm.com/javainfo/hurindex.html)

<http://java.sun.com/>

##### Host On Demand

[http://www.networking.ibm.com/hex/hex-prod\\_en.html](http://www.networking.ibm.com/hex/hex-prod_en.html) 

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