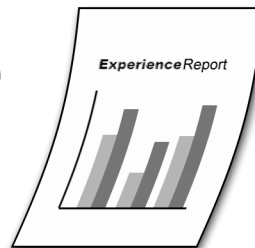


iSeries



Restricted State

Experience Report



iSeries



Restricted State

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Restricted State

At times you may need to perform work on your iSeries^(TM) server without interference from other users. Performing that work while the system is in the restricted state allows you to do just that.

Restricted state is a condition where all the subsystems on the iSeries server have ended and only a single user job remains active in the controlling subsystem. The controlling subsystem is the subsystem that starts automatically when the system starts and is specified by the Controlling Subsystem (QCTLSBSD) system value. IBM ships two subsystem descriptions that can be used as the controlling subsystem: QBASE and QCTL. The iSeries Information Center contains additional information on the subsystems shipped with the system.

Some system commands require that the system is in the restricted state in order to run; for example, Save System (SAVSYS) and Reclaim Storage (RCLSTG) for the system and basic user auxiliary storage pools (ASPs). Restricted state ensures that other functions are not interfering with the system's access to objects and that the objects are not changing while the system commands are running.

In addition, you may want to take the system to the restricted state before powering down. This ensures that all user work has ended before the system loses power. If a problem occurs while the user jobs are ending, the system operator can provide assistance from the active job that remains. This cannot be done when the Power Down System (PWRDWNSYS) command is called first because the command issuer's job is ended along with all the other user jobs.

Since all the other jobs that run in subsystems are ended when the system goes into the restricted state, functions that run in these jobs are not available during this time. For example, the TCP/IP servers that run in the QSYSWRK subsystem are not available while the system is in the restricted state. System jobs remain active while the system is in the restricted state to handle critical system functions. However, not all functions provided by system jobs are available. For example, the QJOBSCD system job will not submit jobs for job schedule entries while the system is in the restricted state.

The following sections contain additional information about the restricted state:

“Start restricted state”

Describes how to put the system in the restricted state.

“Restricted state status” on page 3

Provides information on how to determine when the system has reached the restricted state.

“End restricted state” on page 4

Describes the proper method for bringing the system out of the restricted state.

Start restricted state

You can choose to start the system in the restricted state. When you do this, only the controlling subsystem is started and the console is the only device available for working with the system.

If you are performing an attended initial program load (IPL) of the system, specify Y for the Start system to restricted state option on the IPL Options display.

```

                                IPL Options

Type choices, press Enter.

System date . . . . . 09 / 01 / 03   MM / DD / YY
System time . . . . . 12 : 45 : 30   HH : MM : SS
System time zone . . . . . QN0600CST   F4 for list
Clear job queues . . . . . N         Y=Yes, N=No
Clear output queues . . . . . N       Y=Yes, N=No
Clear incomplete job logs . . . . . N   Y=Yes, N=No
Start print writers . . . . . N       Y=Yes, N=No
Start system to restricted state . . . . Y   Y=Yes, N=No

```




Figure 1. IPL Options display with restricted state option

If you are performing an unattended IPL, you can use the Change IPL Attributes (CHGIPLA) command before the system is powered down to set the Start to restricted state (STRRSTD) IPL attribute to *YES.

```

                                Change IPL Attributes (CHGIPLA)

Type choices, press Enter.

Restart type . . . . . RESTART        *SYS
Keylock position . . . . . KEYLCKPOS   *NORMAL
Hardware diagnostics . . . . . HDWDIAG  *MIN
Compress job tables . . . . . CPRJOBTL  *NONE
Check job tables . . . . . CHKJOBTL    *SYNC
Rebuild product directory . . . . . RBDPRDIR *NONE
Mail Server Framework recovery . . . . . MSFRCY *NONE
Display status . . . . . DSPSTS        *ALL
Start TCP/IP . . . . . STRTCP         *YES
Clear job queues . . . . . CLRJOBQ     *NO
Clear output queues . . . . . CLROUTQ  *NO
Clear incomplete joblogs . . . . . CLRINCJOB *NO
Start print writers . . . . . STRPRTWTR *YES
Start to restricted state . . . . . STRRSTD *YES

```




Figure 2. CHGIPLA command prompt with restricted state attribute

When the system is fully operational, you can use the End System (ENDSYS) command or specify *ALL for the subsystem on the End Subsystem (ENDSBS) command to put the system in the restricted state. You must have job control (*JOBCTL) special authority to use these commands. These commands must be specified from an interactive job that is running in the controlling subsystem and only from a work station whose work station entry in the controlling subsystem description specifies *SIGNON for the Allocation (AT) parameter. For the controlling subsystems as they are shipped by IBM, this is the console. For more information on the Allocation parameter, refer to the Add Work Station Entry (ADDWSE) command.

When the ENDSYS command is used, the console is the only device that remains active. This means that if you issue this command from an interactive job that is not running at the console, your job will end when the system goes to the restricted state.

The ENDSBS command behaves differently than ENDSYS with respect to which device remains active. When the ENDSBS command is used, the device from which the command was issued remains active.

This means that your job will not end if you issue this command from a job that is not running at the console. Note that you must specify *ALL for the Subsystem (SBS) parameter in order to put the system into the restricted state. If you specify the name of the controlling subsystem on the ENDSBS command, you will put the controlling subsystem into a restricted state, but not the entire system. This is probably not what you want, because the user jobs in other subsystems will continue to run.

Regardless of whether you use the ENDSYS or the ENDSBS command, you should consider specifying *NOJOBLOG for the End subsystem option (ENDSBSOPT) parameter. This option prevents the writing of joblogs for those jobs that are ended as the system goes to the restricted state. Not only does this prevent the creation of many spooled files that you might not need, but it can significantly reduce the amount of time necessary to reach the restricted state.

Restricted state status

There are several ways to determine whether the system is in the restricted state or not.

If you are working from an interactive session, use the Work with Subsystems (WRKSBS) command to determine when the system has reached the restricted state. When the controlling subsystem is the only subsystem still in the list and its status is RSTD (restricted), the system has reached the restricted state. The status of the subsystem is shown on the second view of the Work with Subsystems display, which can be seen by pressing the F11=Display system data key. The following figure shows the Work with Subsystems display when the system has reached the restricted state.

```

Work with Subsystems                               System:  SYSTEM1
Type options, press Enter.
 4=End subsystem  5=Display subsystem description
 8=Work with subsystem jobs

Opt Subsystem      Total      Subsystem  Active
   Storage (M)    Number    Jobs    Status
_  QCTL             .00      009573    1    RSTD

```




Figure 3. WRKSBS display with controlling subsystem in restricted state

Another way to determine when the system has reached the restricted state is to look for the message CPF0968 in the QSYSOPR message queue. Specify *SYSOPR as the message queue on the Display Messages (DSPMSG) command to display the messages in the QSYSOPR message queue.

```

Message ID . . . . . :  CPF0968

Message . . . . . :  System ended to restricted condition.
Cause . . . . . :  ENDSBS *ALL or ENDSYS command processing is complete. For
  ENDSBS *ALL, the requester's device or job is the only active device or job
  in the system. For ENDSYS, the console device is the only active device in
  the system. The system is in a restricted condition.

```

Figure 4. CPF0968 message text

The Retrieve System Status (QWCRSSTS) API can be used to programmatically determine if the system is in the restricted state. The SSTS0200 format returns a CHAR(1) restricted state flag that indicates the current state of the system.

You do not have to check the state of the system before using a system command that requires the restricted state. The SAVSYS command and the RCLSTG command will verify that the system is in the restricted state before performing their functions. If the system is not in the restricted state, SAVSYS will issue a CPF3785 message and RCLSTG will issue a CPF8209 message.

```
Message ID . . . . . : CPF3785
Message . . . . . : Not all subsystems ended.
Cause . . . . . : All subsystems must be ended to run this save or restore
                  command. If all subsystems do not end, then a job such as a group job or
                  secondary job running in the controlling subsystem may be preventing a
                  subsystem from ending.
```

Figure 5. CPF3785 message text

```
Message ID . . . . . : CPF8209
Message . . . . . : System not in proper state to reclaim storage.
Cause . . . . . : Either all the subsystems were not ended before running
                  the RCLSTG command or there is a system job still running or there is at
                  least one Auxiliary Storage Pool (ASP) Device not in VARIED OFF status.
```

Figure 6. CPF8209 message text

It is important to note that the system cannot reach the restricted state until there is only one job remaining in the controlling subsystem. Sometimes it may appear as though there is a single job remaining, but the system does not go into the restricted state. In this case you need to verify that there are no suspended system request jobs, suspended group jobs, or disconnected jobs on the remaining active display. Use the Work with Active Jobs (WRKACTJOB) command and press F14=Include to display any suspended or disconnected jobs. If these jobs exist, you need to end them in order for the system to reach the restricted state. The ENDSYS and ENDSBS functions will send a CPI091C information message to the command issuer when this condition is detected.

```
Message ID . . . . . : CPI091C
Message . . . . . : Subsystem does not end with other jobs on device.
Cause . . . . . : The controlling subsystem QCTL is ending to the restricted
                  state, but there are jobs on this device which must be ended first. Check
                  for group jobs, system request jobs, or disconnected jobs.
Recovery . . . . . : Use the Work with Active Jobs (WRKACTJOB) command, press
                  F14 to include additional jobs. Use the End Job (ENDJOB) command to end
                  the jobs so the subsystem goes into the restricted state.
```

Figure 7. CPI091C message text

End restricted state

To bring the system out of the restricted state, use the Start Subsystem (STRSBS) command to start the controlling subsystem. You must specify the name of the controlling subsystem rather than a special value such as *ALL. When the controlling subsystem is started, the system automatically starts the QSYSWRK subsystem where a large number of system functions run. In addition, the IBM-supplied controlling subsystems will start a job to call the system startup program specified in the Startup program (QSTRUPPGM) system value.

You should **not** call the startup program directly in an attempt to get out of the restricted state. While startup programs start most subsystems, they do not start the controlling subsystem, and as a result, any functions that run in the controlling subsystem will not be available.

If you attempt to start any subsystems other than the controlling subsystem, you will receive the warning message CPI0906 which instructs you to start the controlling subsystem. This message is sent to both the issuer of the STRSBS command and the QSYSOPR message queue.

```
Message ID . . . . . : CPI0906
Message . . . . . : *ATTENTION* Controlling subsystem QCTL should be started.
Cause . . . . . : A subsystem is being started while the controlling
                  subsystem QCTL is in the restricted state or is entering the restricted state.
                  The system can become unusable if there are no jobs or devices that allow
                  access to the system.
Recovery . . . . . : Start QCTL subsystem (STRSBS command). If QCTL subsystem is
                  entering the restricted state (i.e. still active), start the subsystem when
                  it reaches the restricted state.
```

Figure 8. CPI0906 message text

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Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve the performance improvements stated here.



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