



Washington Systems Center

# The z/OS GRS Resource Serialization Detective: Tools for Monitoring and Debugging Hands-on Lab

Session # 11634  
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**Note:** Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput 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 throughput improvements equivalent to the performance ratios stated here.

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# Agenda

- GRS Monitor - Provides current counts of resource names and volume “reserve” counts.
- ISGNQRSP - Measures Enqueue Response times.
- ISGECJES – Resource Contention Notification Program.
- GRS “Display Cmds” – System display of Enqueue/Reserve contention.
- Questions?

## ISPF SESSION

▶ APPLICATION : **TSO**

▶ USERID – **SHARCxx**

PASSWORD – **welcome**

## LAB SETUP

- Create the sequential “test data sets” and the PDS data set.
  - ▶ Go to ISPF opt 3.2 to allocate “sharcxx.nat.data”.
    - First, select data set “sharc28.nat.data” (no cmds), to get the data set attributes.
    - Then pf3 out and then allocate “A” the “sharcxx.nat.data” data set.
  - ▶ Repeat the same for creating the “sharcxx.nat.data120”.
    - Get the data set attributes from “sharc28.nat.data120”.

## LAB SETUP.....

- Create the PDS data set containing the JCL.....
  - ▶ Repeat the same for the PDS data set “sharcxx.nat.jcl”.
    - Select “sharc28.nat.jcl” to pick up the data set attributes.
    - Verify that the “directory blocks” field is set to “1”.

## ISGECJES....

- Copy the PDS members (“ENQRESP” & “IEFBR14”) into the JCL data set.
  - ▶ Go to ISPF opt 3.3, select “C” copy, and enter “sharc28.nat.jcl” for the “from” data set.
  - ▶
  - ▶ Enter your “sharcxx.nat.jcl” for the “to” data set. Hit enter. The member list for the “from” data set will be displayed.
  - ▶ Select the two members from “sharc28.nat.jcl” (enter “/” next to each member). Hit enter, then exit (pf3).

# GRS Monitor



## Data Space (Preferred) vs Dasd Output Data Sets (Informational)

```
/** Distribution Library:  ASAMPLIB
//JOBNAME  JOB CLASS=A,MSGCLASS=A,TIME=NOLIMIT
/**
/**  JOB TO START THE MONITOR
/**
/**
//JOBLIB DD DSN=SYS1.LINKLIB,DISP=SHR
//STEP001 EXEC PGM=ISGAUDIT,PARM='DSP=32'
/**OUTPUT1 DD DSN=USERID.AUDIT.OUT1,DISP=SHR
/**OUTPUT2 DD DSN=USERID.AUDIT.OUT2,DISP=SHR
//OUTPUT1 DD DUMMY
//OUTPUT2 DD DUMMY
//SYSUDUMP DD SYSOUT=*
```

## STARTING THE MONITOR

- ▶ ISPF MAIN PANEL CMD LINE - enter **6** (TSO option)
- ▶ TSO panel – enter **ISGACLS0**

# Main Menu: Star Mode

ENQ/DEQ Monitor - Main Menu

Select an option:

___ 1.	MAJOR Names	Date & Time	: 99.049	09:36
2.	Resource Name List	Monitor started at	: 99.049	09:10
3.	Volume List	Elapsed seconds	:	1557
4.	Filter List	SMF System ID	:	SP21

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GRS Star -> Number of Lock Entries: 1048576 NUMSYS: 2

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		Time of Delay High. . .	: 99.049	09:32:36
Global Requests . . . .	: 364	Enqueue Delay Hi - Low:	18241262	1030
Local Requests . . . .	: 1494	Enqueue Delay mic-sec:	1030	
Major Names . . . . .	: 29			
Minor Names . . . . .	: 196			
Volumes . . . . .	: 3	Data Space Used .bytes:	28664	0 %
Number of Events. . . .	: 3716	Active Filter. . . . .	08	
Lost Events . . . . .	: 0	Events Rate . . . . .	22	

# OPTION 1 – MAJOR Names

## Considerations when using the “Major Names” option

- **PFSHOW** - If the “pf keys” for the Monitor are not displayed, then on the cmd line enter “PFSHOW ON”. This will display the “pf keys”.
- “PF KEY 6” – (sort\_scp) will list resources by the following order of scope (reserves, global enqs, local enqs).
- **LOCATE** cmd – “L xxxx” can be entered on the cmd line to quickly find a particular resource name.

# EXERCISES

Find the “pgm-name” for your ISPF Profile data set.

- Major name is “SYSDSN”.
- The ISPF “Locate cmd” can be used to speed up the search for the data set.
- The ISPF profile data set is “sharcxx.xxx.ISPFPROF”.

Which resource has the greatest impact (affecting CPU and performance) for the GRSplex?

Hint 1 – It might not always be the resource with the highest resource count.

Hint 2 – Reserves have more of an impact on a system than global enqs.



Is SPFEDIT being issued as a “Reserve”, “Global Enq”, or both?

- Hint - “\*SSYS” is a global enq that has been converted.

# OPTION 3 – Volume List

- Is the SHARE LPAR spreading its “reserves” evenly over its shared DASD volumes?
- What is the “major” and “minor” name of the resource that is occupying the most reserve time on a volume?

ISGNQRSP

## ISGNQRSP

- Create and copy the “sharcxx.nat.loadlib” LOADLIB data set.
  - ▶ Select “sharc28.nat.loadlib” to pick up the data set attributes.
    - Verify that the “record format” field is set to “U”.

## ISGNQRSP

- Copy the PDS member “GENGRES” into the LOADLIB data set.
  - ▶ Go to ISPF opt 3.3, select “C” copy, and enter “sharc28.nat.loadlib” for the “from” data set.
  - ▶
  - ▶ Enter your “sharcxx.nat.loadlib” for the “to” data set. Hit enter. The member list for the “from” data set will be displayed.
  - ▶ Select the “gengresp” member from “sharc28.nat.loadlib” (enter “/” next to the member). Hit enter, then exit (pf3).

## ISGNQRSP

- Submit the Batch Job.
  - ▶ Set up two screens for ISPF. Place “cursor” at the top of the screen and hit PF2 (split screen). PF9 (swap key) can then be used to switch between screens.
  - ▶ In either screen, edit the `sharcxx.nat.jc1` “ENQRESP” member. Change all of the “sharc28” to your “sharcxx” userid.
  - ▶ Submit the job (enter “sub” on the command line).
  - ▶ After the job ends, swap screens and edit the “**sharcxx.nat.data120**” data set. The results of the “ISGNQRSP” program should be displayed. Scroll right (pf11) to the end of the data set. The enqueue response performance times will be shown. The response times are in “usec” (**microsecs**).

**ISGECJES**



## ISGECJES....

- Edit the test data set (screen with “sharcxx.nat.data120”).
  - ▶ Go to back to ISPF opt 2 (Edit), and edit “sharcxx.nat.data”.
  - ▶ Add a line of data to it (anything) and hit enter. Do not exit out.
  - ▶ Swap to the other screen and go to opt 2 (Edit).

## ISGECJES....

- Submit the Batch Job.
  - ▶ In the 2<sup>nd</sup> screen (opt 2), edit the IEFBR14 member in “sharcxx.nat.jc1”. Change all of the “sharc28” to your “sharcxx” userid.
    - Hint – On the cmd line, you can enter (f ‘sharc28’ all) to list all of “sharc28” names.
  - ▶ Submit the job (enter “sub” on the command line).
  - ▶ The batch job should go into a wait (trying to allocate the “sharcxx.nat.data” data set which is already allocated in the 1<sup>st</sup> screen). Keep hitting the “enter” key every (20-30) seconds to see if the “contention” msgs are issued. They are issued at certain intervals. After the contention msgs are issued, and while still in contention, go to the next agenda (Display Cmds).

# GRS – “Display Cmds”

## GRS - "Display Cmds"

- Issue the GRS "Display Contention" commands.
  - ▶ After the contention msgs have been display (1 or 2 intervals), exit out of the "IEFBR14 job" and go to option "s" SDSF. Select opt "ULOG" (it's okay if it is not in the list of SDSF cmds).
  - ▶ Enter the following "D GRS cmds", including the "/" (review the results before displaying the next cmd):
    - "/D GRS,C" (compare with the newer "D GRS,AN" cmds")
    - "/D GRS,AN,WAIT".
    - "/D GRS,AN,BLOCK"
    - "/D GRS,AN,DEP"

## GRS - “Display Cmds....”

- Release the “sharcxx.test.data” data set.
  - ▶ Swap (pf9) back to the screen containing the “sharcxx.nat.data” data set and exit out (pf3).
  - ▶ The IEFBR14 job should then complete.

## Lab Setup

- Delete all data sets that were created.
  - ▶ Go to ISPF opt 3.2 and delete (“D”) the data sets.
    - “sharcxx.nat.data”.
    - “sharcxx.nat.data120”.
    - “sharcxx.nat.jc1”.
    - “sharcxx.nat.loadlib”

## Appendix

### ■ References:

- ▶ z/OS Planning: Global Resource Serialization
- ▶ z/OS Initialization and Tuning Reference
- ▶ z/OS Setting Up a Sysplex
- ▶ z/OS System Commands
- ▶ z/OS Installation Exits





# Questions

