

IBM Education Assistance for z/OS V2R2

Item: NFS Enhancements Part II

Element/Component: z/OS Network File System (NFS)



Agenda

- Trademarks
- Presentation Objectives
- For each the 5 items covered in Part II, as necessary
 - Overview
 - Usage & Invocation
 - Interactions & Dependencies
 - Migration & Coexistence Considerations
 - Installation
- Presentation Summary
- Appendix



Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.



Presentation Objectives

- Introduce the following enhancements:
 - - Dynamic change of Ctrace buffer size
 -
 - Remove restriction of 10 lines on console
 -
 - Cache for UID / GID name mapping
 -
 - NFS Ctrace without MODESET SVC
 -
 - Add YYDDD (date) to error log



Overview – Dynamic change of Ctrace Buffer Size

■ Problem Description

- Before V2R2, to change the NFS CTRACE buffer's size, it is necessary to:
 - stop the NFS application (the Server or the Client)
 - update BUFSIZE parameter in CTINFxyy parmlib member (CTINFSxx for NFS Server, CTINFCxx for NFS Client) for appropriate application with a new value
 - restart the NFS application
- This can be very disruptive for the customer environment when 24x7 service is expected.



Overview – Dynamic change of Ctrace Buffer Size

Solution

- This item introduces an enhancement that allows to change NFS CTRACE buffer's size dynamically. This can be done by issuing the operator command TRACE CT. A new value of the trace buffer's size can be defined in the operator command or in CTINFxyy parmlib member.

Benefit / Value

- Altering NFS CTRACE buffer size no longer requires recycling NFS thus enhances 24 x 7 NFS service



Usage & Invocation – Dynamic change of Ctrace Buffer Size

Use of TRACE CT operator command to change the buffer size:

```
TRACE CT,xxxY,COMP=startup_name
```

Where xxx – the value of the new size (from 600 kilobytes to 600 megabytes).

Y – K-kilobytes, M-megabytes

Examples:

```
TRACE CT,10M,COMP=MVSNFS
```

```
TRACE CT,800K,COMP=MVSNVSC
```

```
TRACE CT,ON,COMP=MVSNFS,PARM=CTINFS01
```

```
TRACE CT,ON,COMP=MVSNFSC,PARM=CTINFC52
```



Interactions & Dependencies – Dynamic change of Ctrace Buffer Size

- **Software Dependencies**

- None

- **Hardware Dependencies**

- None

- **Exploiters**

- Any system programmer / administrator who wants to adjust z/OS NFS Ctrace buffer size
 -



Migration & Coexistence Considerations – Dynamic change of Ctrace Buffer Size

For the previous releases (V1R13, V2R1) dynamic change of the size of the trace buffer is not supported. The message GFSN5032I is introduced to inform the user about it by toleration APAR OA45165.



Overview – Remove restriction of 10 lines on console

▪ Problem Statement / Need Addressed/ User Stories

- Before this item NFSS operator command LIST=MOUNTS printed on console only 10 lines. NFSS operator commands LIST=DSNAMES, LISTLOCK had no limits on printed console messages. Customer wanted to see full output of the command LIST=MOUNTS on console.
- Addressed customer's request "GFSA910I – remove restriction of 10 lines on console"

▪ Solution

- The new NFSS attribute **consolemsgs** is defined to specify max. amount of output lines on console for the NFSS operator commands. The new NFSS operator command is introduced to change the above NFSS attribute without NFSS restart.

▪ Benefit / Value

- Provided control over console messages output of some NFSS operator commands, which could generate large output
- Enhanced serviceability



Usage & Invocation – Remove restriction of 10 lines on console

- New NFS Server attribute **consolemsgs** is introduced to limit output on console of the NFSS operator commands **LIST=MOUNTS**, **LIST=DSNAMES**, **LISTLOCK**.
- The new NFSS operator command can be used to change NFSS attribute **consolemsgs** without the NFSS restart:
F mvsnfs,CONSOLEMSGs=[10..100 | ALL]
Option ALL means “print all messages on console”
- NFS Client's utility showattr can be used to see a current value of the NFSS attribute **consolemsgs**.
- The next 3 slides show console outputs of the same NFSS operator command **LIST=MOUNTS** for various values of the server attribute **consolemsgs = 10, 15 and ALL**.



Usage & Invocation (continuation) – Remove restriction of 10 lines on console

- 09.03.11 SYSTEM1 f mvsnfs,consolemsgs=10
- 09.03.11 SYSTEM1 STC00112 GFSA796I (MVS NFS) CONSOLEMSGs=10: completed successfully.
- 09.03.16 SYSTEM1 f mvsnfs,list=mounts
- 09.03.16 SYSTEM1 STC00112 GFSA910I (MVS NFS) /MVS/VNDRCVF.NFS.R22.PARTS ACTIVE = 3 :
- tinsun.tuc.stglabs.ibm.com, vkireichev.moscow-lux.ru.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.03.16 SYSTEM1 STC00112 GFSA910I (MVS NFS) /MVS/VNDRCVF.NFS ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.03.16 SYSTEM1 STC00112 GFSA910I (MVS NFS) /MVS/VNDRCVF.NFS.R12 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.03.16 SYSTEM1 STC00112 GFSA910I (MVS NFS) /MVS/VNDRCVF.NFS.R21 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.03.16 SYSTEM1 STC00112 GFSA907I (MVS NFS) There is more information in the Network File System log.
- 09.03.16 SYSTEM1 STC00112 GFSA932I (MVS NFS) LOG DATA SET MVS NFS.W15B.LOG2 IS FLUSHED.



Usage & Invocation (continuation) – Remove restriction of 10 lines on console

```
- 09.09.36 SYSTEM1      f mvsnfs,consolemsgs=15
- 09.09.36 SYSTEM1 STC00112 GFSA796I (MVS/NFS) CONSOLEMSGs=15: completed successfully.
- 09.09.38 SYSTEM1      f mvsnfs,list=mounts
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS.R22.PARTS ACTIVE = 3 :
- tinsun.tuc.stglabs.ibm.com, vkireichev.moscow-lux.ru.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS.R12 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS.R21 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS.R13 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF.NFS.R17 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA910I (MVS/NFS) /MVS/VNDRCVF ACTIVE = 4 : tinsun.tuc.stglabs.ibm.com,
- vkireichev.moscow-lux.ru.ibm.com, mumble.tuc.stglabs.ibm.com,
- nfsaix2.tuc.stglabs.ibm.com
- 09.09.38 SYSTEM1 STC00112 GFSA907I (MVS/NFS) There is more information in the Network File System log.
- 09.09.38 SYSTEM1 STC00112 GFSA932I (MVS/NFS) LOG DATA SET MVS/NFS.W15B.LOG2 IS FLUSHED.
```



Usage & Invocation (continuation) – Remove restriction of 10 lines on console

```
- 09.11.02 SYSTEM1          f mvsnfs,consolemsgs=all
- 09.11.02 SYSTEM1 STC00112 GFSA796I (MVSNFS) CONSOLEMSGs=ALL: completed successfully.
- 09.11.04 SYSTEM1          f mvsnfs,list=mounts
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS.R22.PARTS ACTIVE = 3 :
- tinsun.tuc.stglabs.ibm.com, vkireichev.moscow-lux.ru.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS.R12 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS.R21 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS.R13 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF.NFS.R17 ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /MVS/VNDRCVF ACTIVE = 4 : tinsun.tuc.stglabs.ibm.com,
- vkireichev.moscow-lux.ru.ibm.com, mumble.tuc.stglabs.ibm.com,
- nfsaix2.tuc.stglabs.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /HFS/ ACTIVE = 1 : vkireichev.moscow-lux.ru.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /HFS/usr/share/lib ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /HFS/usr/vndrcvf ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
- 09.11.04 SYSTEM1 STC00112 GFSA910I (MVSNFS) /HFS/usr/test ACTIVE = 3 :
- vkireichev.moscow-lux.ru.ibm.com, tinsun.tuc.stglabs.ibm.com,
- mumble.tuc.stglabs.ibm.com
```



Migration & Coexistence Considerations – Remove restriction of 10 lines on console

- For lower releases, APAR OA45165 provides a toleration of the new key word introduced by this item in NFSS site attribute: **consolemsg**s.



Overview – Cache for UID / GID name mapping

▪ Problem Statement

- z/OS NFS uses RACF to convert NFSv4 "name@domain" string to UID or GID and vice versa while NFSv3 uses plain UID or GID numbers. Thus a longer path length in NFSv4 processing. This was identified as a potential performance impact to the z/OS NFS Server and Client.

▪ Solution

- Caching the most recently used values (UID/GID numbers and Owner/Group name strings) on z/OS NFS Server and Client. The Cache for UID / GID name mapping reduces the number of RACF calls.
- Adding the options of cache control on z/OS NFS Server and Client.

▪ Benefit / Value

- This item is a performance enhancement that will benefit customer environments that use z/OS NFS Server or z/OS NFS Client. The users that will benefit from this support include NFS Client Applications/Users that use NFS v4 Protocol mounts to the z/OS NFS server or from the z/OS NFS client.



Usage & Invocation – Cache for UID / GID name mapping

- The purpose of this item is to provide fast (without RACF call) UID/GID to/from Owner/Group name conversion for NFS v4 operations.
- The item introduces the following options of cache control:
 - The new z/OS NFS server site attribute ID2NAME(CACHE|CALLSAF) is introduced to enable or disable the cache. The default value is CALLSAF.
 - The new operands ID2NAME=[CACHE|CALLSAF|RESET] of the MODIFY command are introduced to enable, disable or clear the server cache correspondingly.
 - The new option "-p {callsaf|cache|reset}" of the nfsstat command is introduced to enable, disable or clear z/OS NFS Client cache correspondingly (the new flag "p" means "Performance").



Usage & Invocation (continuation) – Cache for UID / GID name mapping

▪ **z/OS NFS Server command sample and output:**

1) F MVS NFS, ID2NAME=RESET

GFSA796I (MVS NFS) ID2NAME=RESET: completed successfully.

2) F MVS NFS, ID2NAME=CACHE

GFSA796I (MVS NFS) ID2NAME=CACHE: completed successfully.

3) F MVS NFS, ID2NAME=CALLSAF

GFSA796I (MVS NFS) ID2NAME=CALLSAF: completed successfully.



Usage & Invocation (continuation) – Cache for UID / GID name mapping

z/OS NFS Client command sample and output:

IBMUSER:>nfsstat -p

GFSC854I usage: nfsstat [-csrn234zmi <mount point>]

For Uid/Gid Cache control: nfsstat -p {callsaf|cache|reset}

IBMUSER:>nfsstat

GFSC857I z/OS Network File System Server : (MVS NFS)

Uid/Gid Cache is not used. <-- (it is the last line of 'nfsstat' output)

IBMUSER:>nfsstat -p callsaf

Uid/Gid Cache is disabled.

IBMUSER:>nfsstat -p cache

Uid/Gid Cache is enabled.

IBMUSER:>nfsstat -p reset

Uid/Gid Cache is cleared.



Interactions & Dependencies – Cache for UID / GID name mapping

- **Software Dependencies**

- None

- **Hardware Dependencies**

- None

- **Exploiters**

- Any person who tunes z/OS NFS Server attributes and executes MODIFY console operator command.
- Any person who executes nfsstat command.



Migration & Coexistence Considerations – Cache for UID / GID name mapping

- This item does not involve migration.
- There is a coexistence scenario - tolerate/ignore z/OS NFS server R2.2 site attribute id2name, APAR OA45165 (HDZ1D1N, HDZ221N).



Installation – Cache for UID / GID name mapping

- The cache is limited to 64 UID entries and 16 GID entries. There are no specific requirements, but the customer should be informed that for efficient use of UID/GID cache the owner/group names must be defined to RACF with appropriate UID/GID values. Absence of owner/group names in RACF DB leads to dramatical delays in v4 processing, and such values are not cached.



Overview – NFS Ctrace without MODESET SVC

▪ Problem Description

- Currently the z/OS NFS CTRACE Data Space is created by both zNFSS and zNFSC with a storage protection key 0 and SCOPE=COMMON.
- For NFS Server, which runs in Problem State, this leads to switching to Supervisor State with protection key 0 using MODESET SVC operation each time the trace record is to be placed into the trace buffer.
- This results in:
 - the Server's performance degradation when ctrace options are enabled;
 - overwriting the Master trace with unnecessary MODESET records.



Overview – NFS Ctrace without MODESET SVC

- Solution

- - By this change the data space with CTRACE buffers is created with user protection key.
 - There is a requirement that the data space with user protection key should be created with SCOPE=SINGLE parameter to be referenced only by the owning address space.



Overview – NFS Ctrace without MODESET SVC

- Benefit / Value
- - Improve z/OS NFS Server performance with all (or some) Ctrace options enabled.
 - the Master trace is not flooded with unnecessary MODESET records



Usage & Invocation – NFS Ctrace without MODESET SVC

- There are no changes in operator's set of commands and operations.
- Since the NFS data space is created with SCOPE=SINGLE to view the NFS component trace via IPCS in ACTIVE mode it is necessary to execute a set of RACF commands:

```
rdefine FACILITY BLSACTV.ADDRSPAC UACC(none)
```

```
rdefine FACILITY BLSACTV.SYSTEM UACC(none)
```

```
permit BLSACTV.ADDRSPAC CLASS(FACILITY) ID(userID) ACCESS(READ)
```

```
permit BLSACTV.SYSTEM CLASS(FACILITY) ID(userID) ACCESS(READ)
```

```
SETROPTS RACLIST(FACILITY)
```



Overview – Add YYDDD (date) to error log

▪ Problem Statement / Need Addressed

- z/OS NFS Server and Client take DD:NFSLOG1(NFSLOGC1) as starting error log data set. Most recent error log data set can be destroyed.
- There is a customer requirement to add DATE to message's time stamp.

▪ Solution

- Add YYDDD (date) to error log message.

▪ Benefit / Value

- Most recent error log data set is available for analysis after NFS Server or NFS Client is restarted.
- The date in error log message time stamp helps in error log analysis.



Usage & Invocation – Add YYDDD (date) to error log

- **New NFS Server start up parameter 'LOGSTART' is introduced.**

Options:

- 1 - DD:NFSLOG1 is used as starting error log data set
 - 2 - DD:NFSLOG2 is used as starting error log data set
 - ALT - The oldest one is used as starting error log data set (default value)
- **No new NFS Client start up parameter**
 - NFS Client always uses the oldest error log data set as starting error log data set.



Sample of z/OS NFS Server startup procedure

```
//MVSNFS  PROC MODULE=GFSAMAIN,PARMS='INFO,LOGSTART=ALT'
//*****
//GFSAMAIN EXEC PGM=&MODULE,
//          PARM='&PARMS',
//          REGION=0M,
//          TIME=1440
//*
//SYSTCPD  DD  DISP=SHR,DSN=SYSTCP.ALLUSERS.DATA(DFSLAB08)      @L39A
//STEPLIB  DD  DISP=SHR,DSN=SYS1.NFSLIBE                        @L3LC
//*                                                @L3LD
//SYSPRINT DD  SYSOUT=*
//*****
//OUTPUT   DD  SYSOUT=*
//SYSERR    DD  SYSOUT=*
//*
//NFSLOG1   DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.LOG1              @01A
//NFSLOG2   DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.LOG2              @01A
//*
//NFSATTR   DD  DISP=SHR,DSN=MVSNFS.CNTL(NFSATTRV)
//EXPORTS   DD  DISP=SHR,DSN=MVSNFS.CNTL(EXPORTSK)
//FHDBASE   DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.V1.FHDBASE        @L3LC
//FHDBASE2  DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.V1.FHDBASE2      @L3LA
//LDBASE    DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.V1.LDBASE        @L3LC
//LDBASE2   DD  DISP=SHR,DSN=MVSNFS.DFSLAB08.V1.LDBASE2      @L3LA
//*****
```

■



Sample of z/OS NFS Server and z/OS NFS Client outputs

▪ z/OS NFS Server output

```
05.56.13 SYSTEM1 STC00036 GFSA939I (MVS NFS1) LOG DATA SET MVS NFS.DFSLAB08.LOG1 IS BEING USED.  
05.56.14 SYSTEM1 STC00036 GFSA348I (MVS NFS1) z/OS Network File System Server (HDZ222N, HDZ222N)  
started.  
05.56.15 SYSTEM1 STC00036 GFSA1041I (MVS NFS1) RPCBIND/PORTMAPPER registration complete.
```

▪ z/OS NFS Client output

```
06.15.54 SYSTEM1 STC00037 GFSC507I CLIENT LOG DATA SET, MVS NFS.DFSLAB08.LOGC2, IS BEING USED.  
  
06.15.55 SYSTEM1 STC00037 GFSC700I z/OS NETWORK FILE SYSTEM CLIENT (HDZ222N) started. HDZ222N,  
GFSC4XRW, Jan 28 2015 17:30:55
```



Presentation Summary

- Various NFS enhancements new to V2R2 were covered:
 - Dynamically change Ctrace buffer size
 -
 - Remove restriction of 10 lines on console
 -
 - Cache for uid/gid to/from name mapping
 -
 - Change modeset SVC to inline modeset
 -
 - Add YYDDD (date) To Error Log



Appendix

- **SC26-7417** – *z/OS Network File System Guide and Reference*
- **RFC 3530** – *Network File System Version 4 Protocol*
- **RFC 1813** – *Network File System Version 3 Protocol*
- **RFC 1094** – *Network File System Version 2 Protocol*
- **RFC 1831** – *Remote Procedure Call (RPC) Protocol Specification Version 2*
- **RFC 1832** – *XDR: External Data Representation Standard*

