z/OS 2.4 IBM Education Assistant (IEA)

Solution (Epic) Name: NFS Enhancements to Aid Migration from DFS/SMB

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

Agenda

- Trademarks
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- Create z/OSMF Workflows for NFS
- NFS-SMB Server Equivalency
- NFSv3 Supports Kerberos Authentication
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Trademarks

- See URL http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - UNIX is a registered trademark of The Open Group.
  - Microsoft, Active Directory, and Windows are registered trademarks of Microsoft Corporation.
  - Linux is a registered trademark of Linus Torvalds.
  - Kerberos is a trademark of the Massachusetts Institute of Technology (MIT).
  - Solaris is a registered trademark of Oracle Corporation.

Session Objectives

- Epic 245481: Create z/OSMF Workflows for NFS
  - z/OS Management Facility workflows will be created to guide the system administrator through initial configuration of the z/OS NFS server as well as basic steps involved in migrating a z/OS DFS/SMB configuration over to z/OS NFS.
- Epic 210641: NFS-SMB Server Equivalency
  - Windows binary versions of the z/OS NFS Client Utilities will be provided to enable Windows authentication to the z/OS NFS server.
- Epic 233355: NFSv3 Supports Kerberos Authentication
  - z/OS NFS Server will be updated to support the use of Kerberos authentication over the NFSv3 protocol.

Overview

- Who (Audience)
  - Current users of z/OS DFS/SMB.
- What (Solution)
  - Provide functional equivalence to enable transferring current SMB workloads to NFS.
- Wow (Benefit / Value, Need Addressed)
  - With the removal of z/OS DFS/SMB in V2R4, customers need an equivalent remote file system for Microsoft Windows clients.

Create z/OSMF Workflows for NFS

- Two z/OSMF workflows have been created in order to ease the transition from z/OS DFS/SMB to z/OS NFS.
  - Workflow for Installing and Configuring the z/OS NFS Server
  - Workflow for Migration from z/OS DFS/SMB to z/OS NFS
- Workflows are accessible through z/OSMF.

Installation into z/OSMF

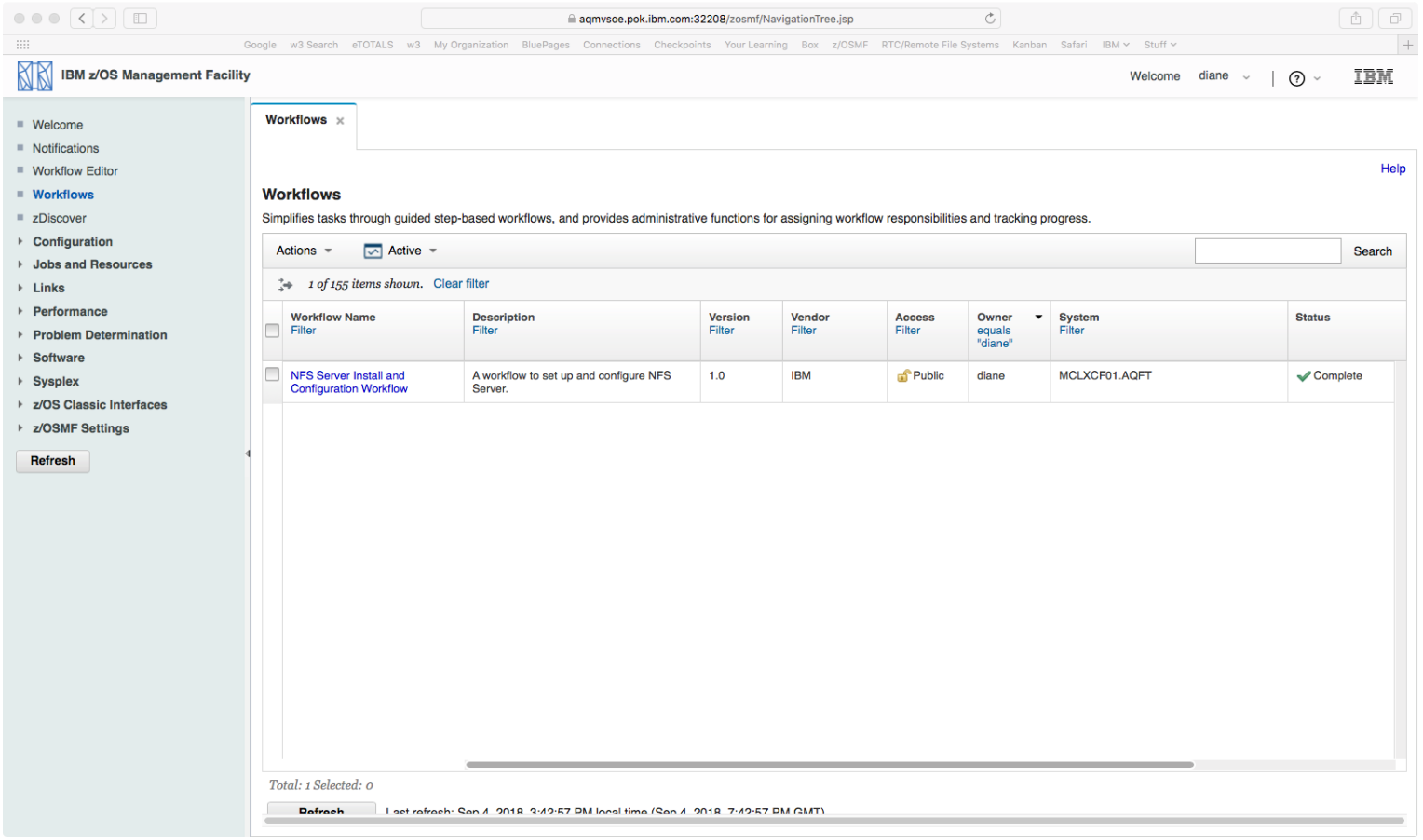
1. Log into z/OSMF
2. Select **Workflows** from the menu items
3. On the newly displayed **Workflows** tab, select the **Actions** dropdown
4. Select the **Create Workflow…** option
5. Select the **Workflow Definition File** dropdown. If the name of the file does not appear, type in the full path and filename that appears in the following slides
6. Select the **System** dropdown, and select the system that you will be installing onto
7. Click the **Next** button

Installation into z/OSMF (continued)

8. On the newly displayed dialog, you can change the **Workflow Name**, **Owner User ID**, and **Access** fields, or just accept the default values.
9. Check the **Assign all steps to owner user ID** box.
10. Click **Finish**. Your workflow will open.

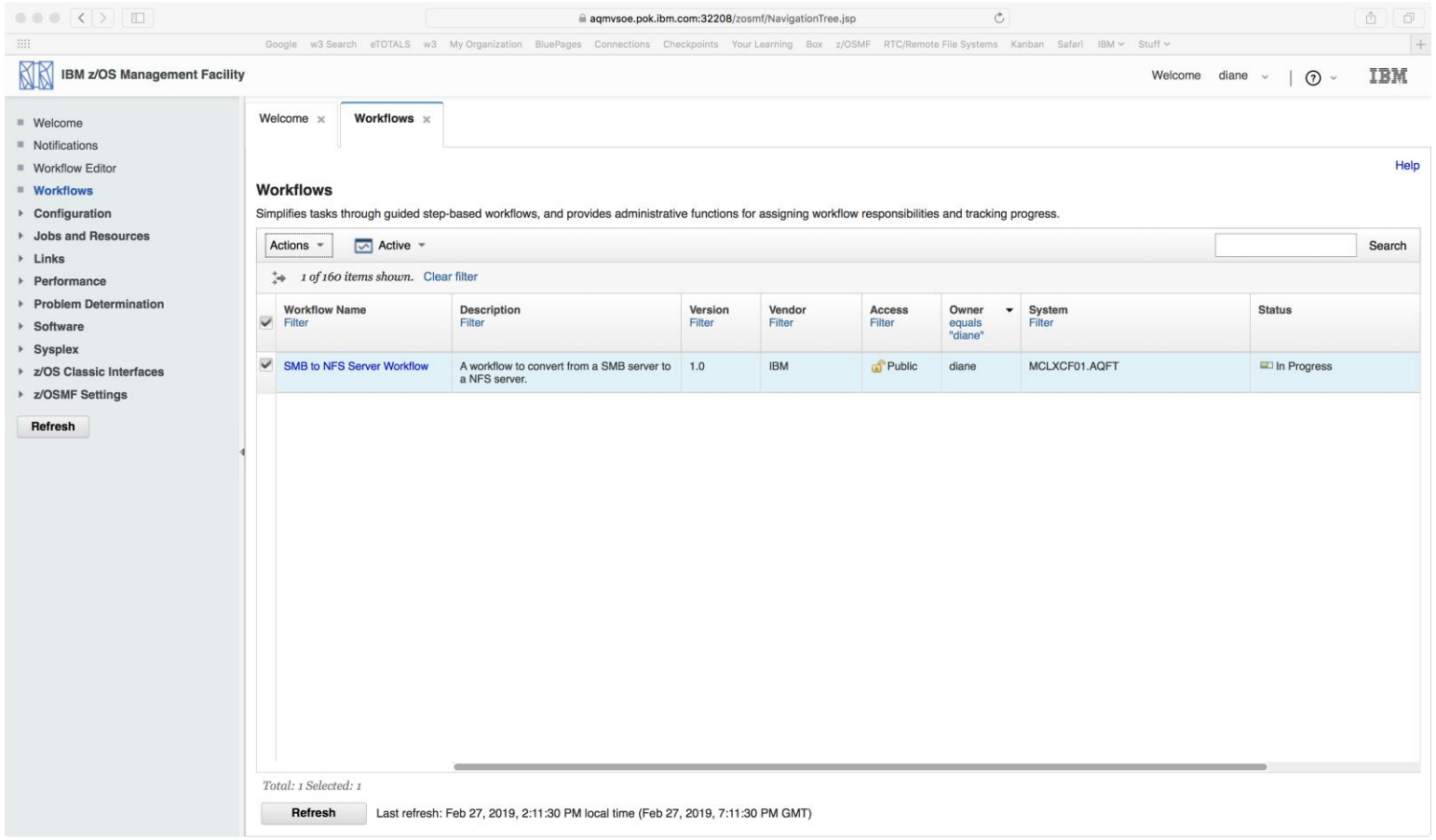
NFS Server Installation and Configuration Workflow

- The *Workflow for Installing and Configuring the z/OS NFS Server* can be found in `/usr/lpp/NFS/workflow/nfs_server_config.xml`



DFS/SMB to NFS Workflow

- The *Workflow for Migration from z/OS DFS/SMB to z/OS NFS* can be found in `/usr/lpp/NFS/workflow/smb_to_nfs_server_migration.xml`



NFS-SMB Server Equivalency

- z/OS NFS Client Utilities enable users to access the z/OS NFS server and to display server attributes
  - Source for these utilities has been provided for AIX, Solaris, and Linux clients
  - IBM is now providing Windows binary versions of these utilities with the same syntax and capabilities
- IBM Infoprint Port Monitor for Windows can be used to replace DFS/SMB printer sharing

Configure Windows

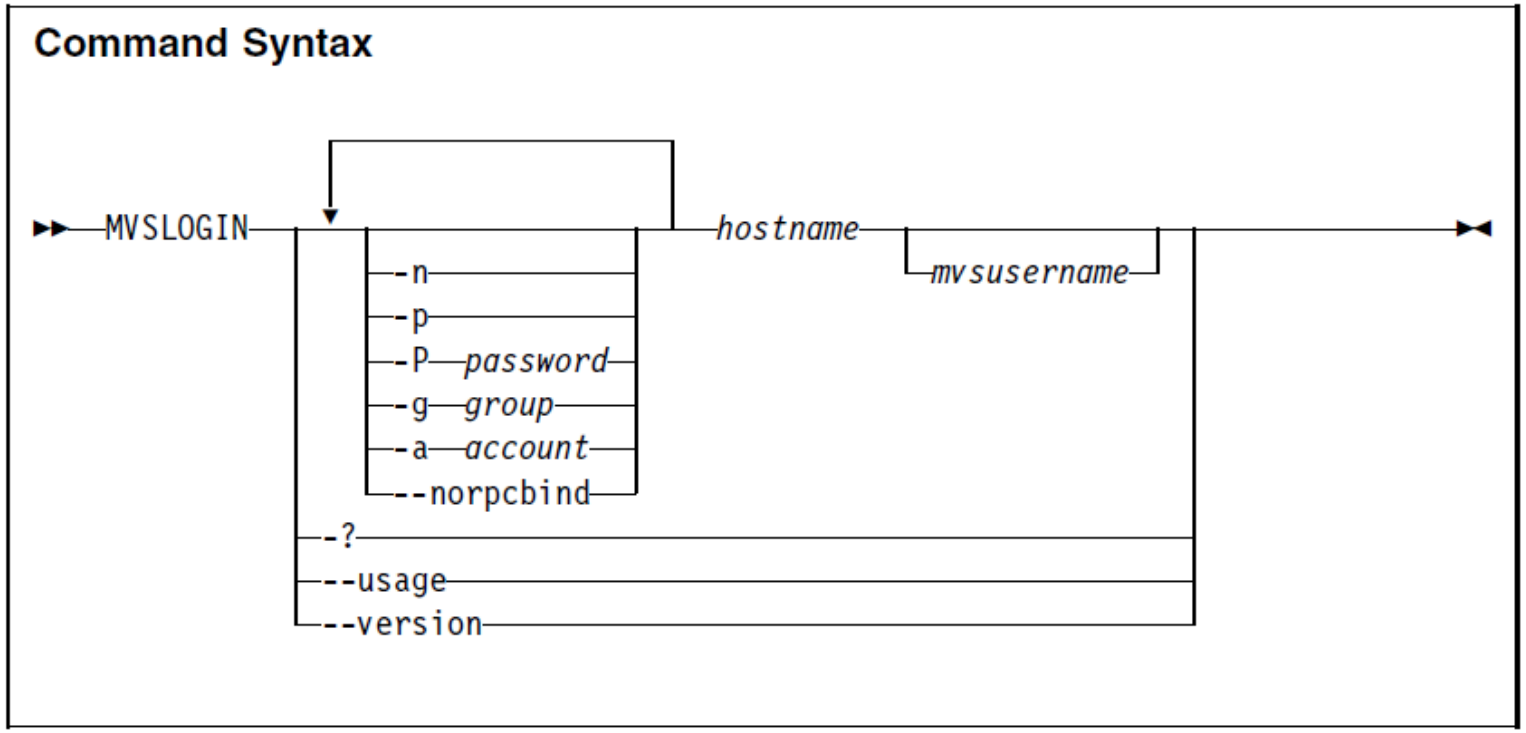
- The **Client for NFS** feature must be installed on the Windows client
- Users on the Windows client must be mapped to UNIX-style UIDs and GIDs
- Windows provides three methods for mapping users:
  - Active Directory
  - Local `C:\windows\system32\drivers\etc\passwd` file
  - `AnonymousUid` and `AnonymousGid` values in the Windows registry
- These values are used by the `mount` and `mvslogin` commands to authenticate to the z/OS NFS server and determine permissions

Download the z/OS NFS Client Utilities

- Windows binaries can be found in the `/usr/lpp/NFS/win` directory on the z/OS system
- Use binary FTP to download the `mvslogin.exe`, `mvslogout.exe`, and `showattr.exe` utilities to the Windows client
- Update the Windows PATH appropriately to access the client utilities
- Antivirus software may need to be updated to allow the downloaded binaries to execute

`mvslogin` Client Utility

- The `mvslogin` command is used to log in to z/OS from your Windows workstation
- `mvslogin` is required when the z/OS NFS server site security attribute is set to `saf` or `safexp` and Kerberos authentication is not being used



`mvslogin` Example

- Windows user `client2` issues `mvslogin` specifying z/OS username `user2` and password `user2`
- Note that GFSA968I indicates that the UID and GID for `client2` were obtained from a local `/etc/passwd` file

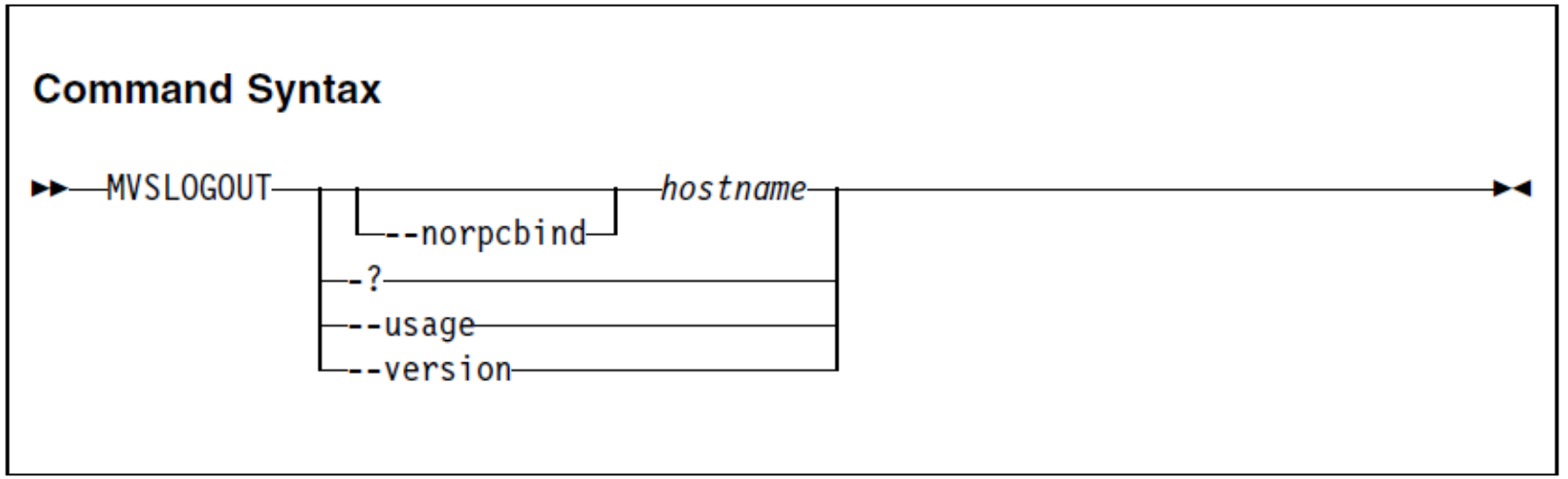
```
Microsoft Windows [Version 10.0.17134.345]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\client2>c:\nfstest\tools\mvslogin -P user2 alps1051.pok.ibm.com user2
GFSA968I UNIX uid=50002/gid=1000 for user client2 obtained from local passwd file.
GFSA988I Remote host does not have AF_INET6 interface.
GFSA955I USER2 logged in ok.

C:\Users\client2>_
```

`mvslogout` Client Utility

- The `mvslogout` command is used to disconnect from a z/OS NFS server
- `mvslogout` is only required when `mvslogin` was used to begin the connection



`mvslogout` Example

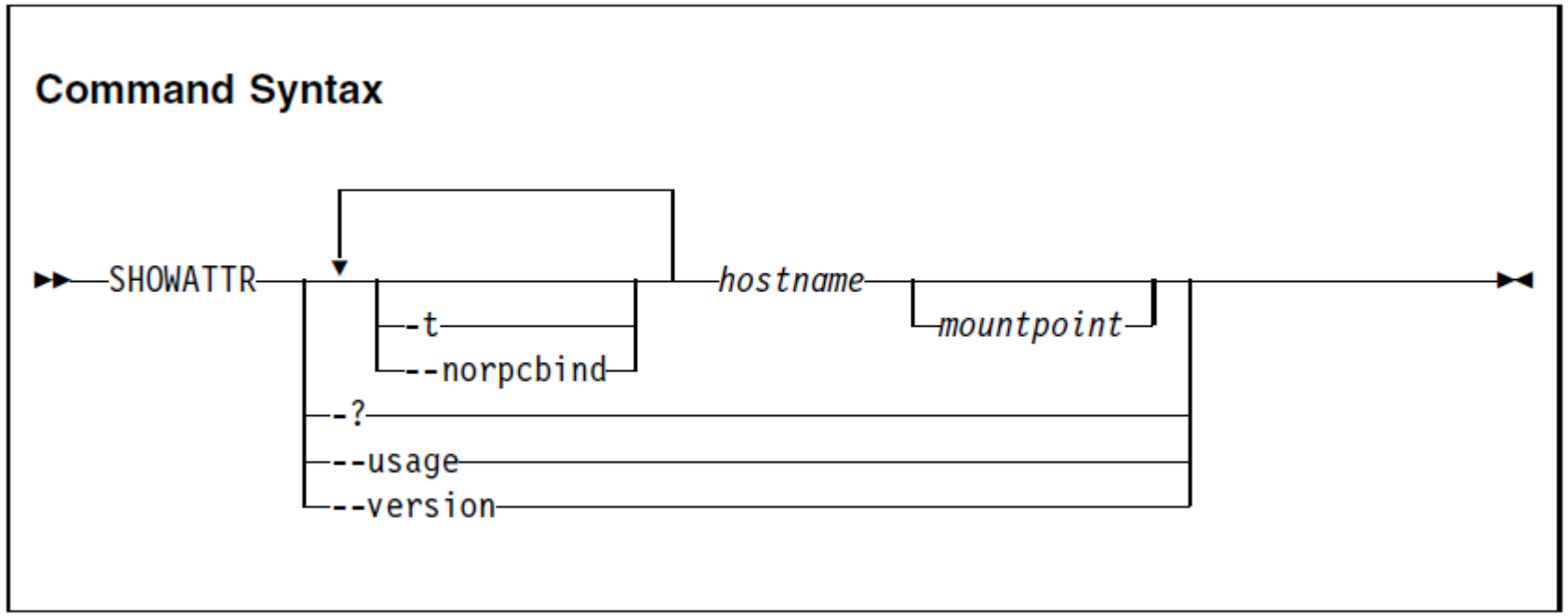
- Windows user `client2` issues `mvslogout` specifying the same host used for `mvslogin`
- Note that GFSA968I indicates that the UID and GID for `client2` were obtained from a local `/etc/passwd` file

```
C:\Users\client2>c:\nfstest\tools\mvslogout alps1051.pok.ibm.com
GFSA968I UNIX uid=50002/gid=1000 for user client2 obtained from local passwd file.
GFSA988I Remote host does not have AF_INET6 interface.
GFSA958I uid 50002 logged out ok.

C:\Users\client2>_
```

`showattr` Client Utility

- The `showattr` command is used to display the global z/OS NFS server attributes



`showattr` Example

- Windows user `client2` issues `showattr` specifying `–t` option for terse output

```
C:\Users\client2>c:\nfstest\tools\showattr -t alps1051.pok.ibm.com
GFSA988I Remote host does not have AF_INET6 interface.
GFSA968I UNIX uid=50002/gid=1000 for user client2 obtained from local passwd file.
lrecl(8196),recfm(vb),blksize(0),space(100,10),blks,dsorg(ps),dir(27),unit(3390),
volume(),recordsize(512,4K),keys(64,0),nonspanned,shareoptions(1,3),mgmtclas(),
dsntype(pds),norlse,dataclas(),storclas()
binary,lf,blankstrip,nofastfilesize,retrieve,maplower,mapleaddot,executebitoff,
setownerroot,attrtimeout(120),readtimeout(90),writetimeout(30,120),sync,
nofileextmap,xlat(),srv_ccsid(1047),cln_ccsid(819),notag,convserv(lre),nordrverf,
sidefile()
mintimeout(1),nomaxtimeout,logout(28800),nfstasks(64,64,32,8,8),restimeout(72,0),
hfsprefix(/hfs),mvsprefix(/mvs),impprefix(hfs,mvs),bufhigh(1G,80%),
readaheadmax(16K),cachewindow(112),percentsteal(20),maxrdforszleft(32),
logicalcache(4096G),smf(none,off),nopcnfsd,security(safexp,safexp,safexp),
leadswitch,sfmax(0),checklist,fn_delimiter(,),readdirtimeout(30),
hfsfbtimeout(60),upcase,rec878,mintasks(32,32,16),remount,fileidsize(64),denyrw,
nlm,nodhcp,stringprep,leasetime(120),nodelegation,DlyDTimeout(10),setgid(posix),
symresolve,mvslogindelay(0),nooemhsm,noalias,chkloop(off),loopthreshold(3),
timethreshold(4),id2name(callsaf),consolemsgs(10),
nfsv4domain(pok.stglabs.ibm.com),public(),mvssec(sys,krb5,krb5i,krb5p),
hfssec(sys,krb5,krb5i,krb5p),pubsec(sys,krb5,krb5i,krb5p)

C:\Users\client2>_
```

IBM Infoprint Port Monitor for Windows

- Users of the z/OS DFS/SMB Server have the ability to configure sharing of IBM Infoprint printers in the `smbtab` file
- Similar function can be obtained via the IBM Infoprint Port Monitor for Windows
- The Infoprint Port Monitor can be found in the `/usr/lpp/Printsrv/win/` directory on the z/OS system

NFSv3 Supports Kerberos Authentication

- Users can specify either the NFS version 3 or version 4 protocol on their mount commands when specifying Kerberos security flavors.
  - z/OS client utilities such as `mvslogin` are not required when Kerberos security flavors are used.
- The software requirements for the z/OS NFS server to support Kerberos security flavors have not changed.
  - A properly configured Kerberos Key Distribution Center

z/OS NFS Server Configuration

- The configuration of a z/OS NFS server to support Kerberos security flavors for the NFS version 3 protocol is the same as for the NFS version 4 protocol.
  - The site attributes and exports dataset parameters related to Kerberos configuration have not changed.
    - Site attributes
      - mvssec(sys,krb5,krb5i,krb5p)
      - hfssec(sys,krb5,krb5i,krb5p)
      - pubsec(sys,krb5,krb5i,krb5p)
    - Exports dataset
      - sec=sys|krb5|krb5i|krb5p
- A RACF user ID with an OMVS segment must be defined with the same name as the z/OS NFS Server startup procedure

User Configuration

- Users on the Windows client must be mapped to UNIX-style UIDs and GIDs using Active Directory
- The corresponding z/OS UNIX users must have the appropriate KERB segment defined in the z/OS security product

Interactions & Dependencies

- To exploit this item, all systems in the Plex must be at the new z/OS level: No
- Software Dependencies
  - IBM Infoprint Port Monitor for Windows
  - z/OS Management Facility (z/OSMF) must be configured and running
  - Microsoft Windows 10 Professional or Enterprise
  - Properly configured and running Kerberos KDC
  - z/OS Cryptographic Services (ICSF) must be configured and running
  - Domain name server (DNS) resolver must be configured and running
- Hardware Dependencies
  - None
- Exploiters
  - None

Migration & Coexistence Considerations

- Due to the removal of DFS/SMB in z/OS V2R4, users may need to migrate existing SMB workloads to NFS

Installation

- Support is being made available on z/OS V2R2 and z/OS V2R3 via the following APARs
  - OA56186: Create z/OSMF Workflows for NFS
    - Requires the creation of directory `/usr/lpp/NFS/workflow` prior to application, more information can be found in the ++HOLDs in the APAR
  - OA56187: NFS-SMB Server Equivalency
    - Requires the creation of directory `/usr/lpp/NFS/win` prior to application , more information can be found in the ++HOLDs in the APAR
  - OA56224: NFSv3 Supports Kerberos Authentication
- Appropriate Windows and Kerberos configuration must be performed

Session Summary

- z/OS Management Facility workflows will be available to guide the system administrator through initial configuration of the z/OS NFS server as well as basic steps involved in migrating a z/OS DFS/SMB configuration over to z/OS NFS.
- Windows binary versions of the z/OS NFS Client Utilities will be provided to enable Windows authentication to the z/OS NFS server.
- IBM Infoprint Port Monitor for Windows can be used to replace DFS/SMB printer sharing
- z/OS NFS Server will be updated to support the use of Kerberos authentication over the NFSv3 protocol.

Appendix

- z/OS Network File System Guide and Reference
- z/OS Distributed File Service SMB Administration
- z/OS Infoprint Server User's Guide
- z/OS Management Facility Configuration Guide
- z/OS Cryptographic Services ICSF Overview
- NFS Identity Mapping in Windows