Using NetView for z/OS for Enterprise-Wide Event Management and Automation

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ABSTRACT

IBM Tivoli NetView for z/OS is more just than an SNA or TCP/IP network management tool. It integrates with a variety of event sources and event managers to support event consolidation and automation across the System z and distributed environment. This session will show how NetView on z/OS can exchange information, automate, and correlate events and information from sources such as:

- DB2 and other relational databases
- Event managers such as Netcool/OMNIbus
- J2EE applications
- SNMP traps
- Web services

Examples of integrating NetView with these sources, as well as general considerations for enterprise event management integration, will also be provided.
Agenda

• Tivoli NetView for z/OS Automation Overview

• Integration Interfaces

• Integration Examples

• General Event Management Integration Considerations

“Explore the Possibilities”
Why Does Event Integration/Automation Matter?

- Events indicate changes in the environment that might impact service delivery
- Technologies are creating events from more sources
  - From a “nice to have” to a “critical requirement”
  - From both infrastructure and business event sources
- Modern applications span technologies
  - No single resource can give a true picture of overall application status
  - Events must be gathered (and sometimes correlated) across multiple technologies
- Automation required for efficient management
  - Processes
  - IT Service Management Visibility, Control, and Automation
NetView Perception vs. NetView Reality

“It is only a SNA Network Management product”
- It is that and much more
- Provides extensive system automation and TCP/IP management functions

“It takes a lot of overhead”
- Anything takes overhead… if it is not tuned
- Filter out events and turn off interfaces not needed
- Spread the functions across multiple address spaces
- Prioritize tasks within NetView manually or using WLM
- Use the NetView Tuning Guide – it contains a wealth of information

“It does not integrate with other technologies”
- Direct integration with TCP/IP applications
- Provides web and web services access
- Programmable in various languages
- Access to DB2, Unix System Services, TSO, and cross-platform environments
NetView Integration Interfaces Summary

- Messages
- Commands
- Exits
- Sysplex

Operating System

TCP/IP
- SNMP
- Sockets
- FTP
- Mail
- Remote Commands
- Web
- SOAP

NetView Functions

SNA (VTAM)
- Events
- Alerts
- Commands
- Applications

APPLICATIONS
- SNA
- Unix System Services
- DB2
- Netcool OMNIbus
- Tivoli Enterprise Console
- Tivoli Event Pump
- Systems Manager
- OMEGAMON
- IBM Tivoli Monitoring
- Info/Management
- Remote NetViews
- Remote Commands

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NetView Automation

NetView Automation Table

Automation actions can be triggered by:

- Message contents
- SNA Message Service Unit (MSU) Contents
- SNMP Traps
- UNIX syslog protocol (RFC 5424)
- Event Integration Facility (EIF) events
- Time (specific or interval)

Additional data obtained from:

- Event contents
- NetView Global Variables

Actions invoked include:

- Commands (NetView, VTAM, z/OS, custom)
- CLIST and REXX procedures
- Correlation
- Activating/deactivating automation
SNA Automation Interface

- SNA Management Service Units (MSUs) captured from VTAM
  - Alerts are the most common ones captured
  - Automation can be driven based on MSU content
- Programmatic access to 3270 screen applications

```
* AUTOMATION TABLE STATEMENTS FOR GENERIC ALERTS
******************************************************************************
IF MSUSEG(0000) => ' ' THEN BEGIN;
*
* REACT TO ALERT WITH 'CSAJOB' AT TOP OF HIERARCHY
* IF HIER(2) = 'CSAJOB' . &
  MSUSEG(0000.31.30.3) = AMSG
  THEN EXEC(CMD('MSU2WTO ' AMSG) ROUTE(ONE AUTO2)) CONTINUE(Y);
*
* REACT TO ALERT FROM NETFINITY
* IF MSUSEG(0000.10) = . '5642010'
  THEN EXEC(CMD('NETFIN01 ') ROUTE(ONE AUTO2)) CONTINUE(Y);
*
* SEND ALERT WITH 'BONETT' TO ALERT-TO-TRAP ADAPTER
* IF MSUSEG(0000.10) = . '5695001'
  THEN EXEC(CMD('TECROUTE PIPE SAFE * | PPI (TRAPROUT) NYC4TEC')
         ROUTE(ONE AUTO1)) CONTINUE(Y);

```
Operating System Automation Interface

- Connection into z/OS to capture events and issue commands and messages
- NetView V6R1 – CANZLOG consolidates Subsystem interface (SSI) and Multiple Console Support (MCS) messages for automation
- Message Processing Facility (MPF) command exit for commands
- Detects console and joblog messages from all OS components and subsystems
- Message Revision Table (MRT) and Command Revision table (CRT) for actions before message automation and issuing commands
- Invokes automated actions

IF MSGID = 'IEF'. THEN
  BEGIN;
  *
  * IEF404I , IEF450I FOR OFFLOADING SYSLOG DATASET
  *
  IF MSGID = 'IEF404I' & (TOKEN(2) = 'JWTR')
    THEN EXEC(CMD('MWBSYSL1') ROUTE(ONE AUTO3));
  *
  IF MSGID = 'IEF450I' & (TOKEN(2) = 'JWTR')
    THEN EXEC(CMD('MWBSYSL1') ROUTE(ONE AUTO3));
  *
  * IEF176I JWTR JOB FINISHED - CANCEL IT
  *
  IF MSGID = 'IEF176I' & TOKEN(3) = WTRID
    THEN EXEC(CMD('MVS P ' WTRID) ROUTE (ONE AUTO2 AUTO3));
  *
  END;
******************************************************************************
SNMP Trap Interface

- Task that receives SNMP traps and converts to a SNA CP-MSU for automation
- Supports SNMP v1, v2, v2c, and v3
- Supports TCP and UDP across IPV4 and IPV6
- Multiple tasks can run concurrently
- Defined via CNMSTYLE COMMON.CNMTRAP and TASK statements

```
SNMP Trap

NetView

z/OS

COMMON.CNMTRAP.STAUTO1.TCPPORT = 1162
COMMON.CNMTRAP.STAUTO1.UDPPORT = 1162
COMMON.CNMTRAP.STAUTO1.MAXTCPCONN = 50

TASK.STAUTO1.MEM=CNMTRAPI
TASK.STAUTO1.PRI=5
TASK.STAUTO1.INIT=Y
```
UNIX syslog Interface

- DSIIPLOG task receives syslog (RFC 5424) messages and converts to a message for automation
  - BNH703I (multiline) if host is registered
  - BNH710I if host is not registered
- REGIP command maintains host registration list
- Coexists with z/OS Communications Server syslog

```
TASK.DSIIPLOG.INIT=Y
IPLOG.TCPANAME = &CNMTCPN.
IPLOG.PORT     = 514
IPLOG.SOCKETS  = 100
```

```
linux117:~ # logger -p local4.info "important message regarding application running on Linux"
```

```
/etc/syslog.conf: local4,local5.*   @hasl125
```

```
BNH703I SYSLOGD MESSAGE RECEIVED. FACILITY= LOCAL4. PRIORITY= INFO. ORIGIN= 10.1.1.117
root: important message regarding application running on Linux*
```

*NetView can also send syslog messages using the PIPE IPLOG stage*
Program-to-Program Interface (PPI)

- Application Programming Interface (API) to integrate with applications running on same operating system image
  - Programmable in Assembler, PL/I, C, REXX
  - Applications register to be PPI receivers for exchanging information
    - Between NetView and other applications
    - Between 2 applications using NetView as the data transport
- Four basic functions
  - OPEN
  - SEND
  - RECEIVE
  - CLOSE
RMTCMD and RUNCMD

- **RMTCMD** sends a command to another NetView
  - Uses either SNA or IP transport
  - Recommended method of communication
  - Foundation for NetView Sysplex Management control
- **RUNCMD** sends a command to another platform via SNA
  - Service Point application required to receive and execute command
  - Both methods capture the command response
  - Can drive automated actions
TCP/IP Services

- Socket applications
  - SOCKET command as client or server
- SNMP
  - Native SNMP commands
  - MIBs accessible via SNMP manager, 3270, or Web Interface
  - Generate SNMP traps
  - Act as a SNMP manager
- TCP/IP commands
  - Native
  - Indirect (via z/OS or USS)
  - Packet traces
TCP/IP Services - Socket Server Example

2:56:21 * TESTSKSV 9999 1
2:56:21 - BNH623I SOCKET INTERFACE HAS ALREADY BEEN INITIALIZED ON TCP/IP TCPI
2:56:21 C INIT: 8
2:56:21 C SOCKET: 0 BNH606I SOCKET REQUEST COMPLETED SUCCESSFULLY. SOCKET 3 H
2:56:21 C SOCKET ID 3
2:56:21 C BIND: 0 3 9.82.56.125 9999
2:56:21 - BNH614I BIND REQUEST ON SOCKET 3 COMPLETED SUCCESSFULLY
2:56:26 C LISTEN: 0
2:56:26 C ACCEPT RC: 0 LINES: 1
2:56:37 C j* BNH612I SOCKET 3 ACCEPTED CONNECTION FROM 9.54.139.58 PORT 1423.
2:56:37 C ===INCOMING! 4 9.54.139.58 1423
2:56:37 C EBSTRING 1: This was sent from a windows socket client
2:56:37 C SHUTDOWN CLIENT: 0
2:56:37 C CLOSE CLIENT: 0
2:57:04 C ACCEPT RC: 0 LINES: 1
2:57:04 C j* BNH612I SOCKET 3 ACCEPTED CONNECTION FROM 9.54.139.58 PORT 1424.
2:57:04 C ===INCOMING! 4 9.54.139.58 1424
2:57:04 C INSTRING: ëçèàãï+
2:57:04 C EBSTRING 1: SHUTDOWN
2:57:04 C SHUTDOWN CLIENT: 0
2:57:04 C CLOSE CLIENT: 0
2:57:04 C ALL DONE!
2:57:04 C SHUTDOWN SERVER: 0
2:57:04 C CLOSE SERVER: 0
zAware Integration via TCP/IP

- zAware analyzes console messages to detect patterns of anomalies
- NetView uses the zAware API to request data (XML format) for automation, correlation, or escalation
- Sample NetView REXX automation procedures for accessing zAware and retrieving data are available via the web
Unix System Services

- Exchange information between USS based applications and NetView
  - NetView can issue USS commands via the PIPE UNIX function
  - Responses can be captured for automation purposes
  - USS applications can issue NetView commands using the REXX DSIPHONE interface and the CMDSERV PPI command server

```
HCN53    PIPE UNIX df -k | wait 20 | separate | loc /WebSphere/ | console
```

- \( /zOSV1RD/shared/WebSphere610 \) (IBM.WAS610.SBBOHFS) 113764/1684800 4294945687 Available
- \( /zOSV1RD/shared/WebSphere700 \) (IBM.WAS700.SBBOHFS) 27188/504000 4294961409 Available
- \( /zWebSphere/V610/config \) (IBM.WAS610.CONFIG.HFS) 193612/300000 4294931936 Available
- \( /zWebSphere/V700/config1 \) (WAS700.WAS.CONFIG1.HFS) 209280/468000 4294947865 Available
General Database Access via Java Database Connectivity (JDBC)

1. Using PPI and USS Interface
2. Using SOCKET command as a socket client to a server
DB2 for z/OS Interface

- NetView can directly access DB2 subsystems running on the same zO/S image
  - Built on the NetView PIPE function
  - Run DB2 BIND command using supplied packages for access
- NetView can indirectly access DB2 systems running on other systems
  - via Unix System Services
    - Invoking a Java JDBC program
  - via RMTCMD
    - Invoke a command on another NetView running on DB2 z/OS image
- Via SOCKET command
  - Connect to a server with access to the DB2 subsystem
**DB2 coding example**

*SQSELECT is a supplied REXX procedure that calls PIPE SQL and formats the retrieved data for display*

<table>
<thead>
<tr>
<th>Time</th>
<th>Lastname</th>
<th>Firstname</th>
<th>Zipcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:21:04</td>
<td>TASH</td>
<td>CHARLES</td>
<td>11111</td>
</tr>
<tr>
<td>12:21:04</td>
<td>BRIDGES</td>
<td>NASH</td>
<td>22222</td>
</tr>
<tr>
<td>12:21:04</td>
<td>FUDD</td>
<td>ELMER</td>
<td>33333</td>
</tr>
<tr>
<td>12:21:04</td>
<td>TANNER</td>
<td>DAN</td>
<td>44444</td>
</tr>
<tr>
<td>12:21:04</td>
<td>GUNN</td>
<td>PETER</td>
<td>55555</td>
</tr>
<tr>
<td>12:21:04</td>
<td>LONGSTREET</td>
<td>JAMES</td>
<td>66666</td>
</tr>
<tr>
<td>12:21:04</td>
<td>WISE</td>
<td>STEVEN</td>
<td>39208</td>
</tr>
<tr>
<td>12:21:04</td>
<td>GONZALES</td>
<td>LEO</td>
<td>93406</td>
</tr>
<tr>
<td>12:21:04</td>
<td>BROWN</td>
<td>JAMES</td>
<td>08836</td>
</tr>
<tr>
<td>12:21:04</td>
<td>CLARK</td>
<td>JAMES</td>
<td>94611</td>
</tr>
<tr>
<td>12:21:04</td>
<td>SMITH</td>
<td>SARAH</td>
<td>10021</td>
</tr>
<tr>
<td>12:21:04</td>
<td>WILSON</td>
<td>PATRICIA</td>
<td>92663</td>
</tr>
<tr>
<td>12:21:04</td>
<td>GARCIA</td>
<td>JASON</td>
<td>11509</td>
</tr>
<tr>
<td>12:21:04</td>
<td>YOUNG</td>
<td>MARIA</td>
<td>20854</td>
</tr>
<tr>
<td>12:21:04</td>
<td>YOUNG</td>
<td>MARIA</td>
<td>20854</td>
</tr>
<tr>
<td>12:21:04</td>
<td>MILLER</td>
<td>SHARON</td>
<td>06903</td>
</tr>
</tbody>
</table>
Event/Automation Service (EAS)

- Integrates with Netcool/OMNIbus, IBM Tivoli Monitoring, Tivoli Enterprise Console (TEC) and SNMP managers
  - Receives Event Integration Facility (EIF) events directly from the event source
    - Tivoli products (IBM Tivoli Monitoring, OMNIbus, TEC…)
    - Third party products that generate EIF events
- Send messages or alerts to an EIF Event Receiver
- Receive SNMP traps and convert to alerts
- Send messages or alerts as SNMP traps
Event/Automation Service Details

Event Sources
- IBM Tivoli Monitoring
- Event Adapters
- EIF senders
- EIF postmsg/postzmsg

SNMP Agent
SNMP Manager
EIF Event Receivers

NetView Alert
TRAPROUTE Filter
TECROUTE Filter
TECROUTE PPI
Automation Table
z/OS Messages
Hardware Monitor (NPDA)
Alert Rcvr
Event Receiver
Trap-to-Alert Adapter
Alert-to-Trap Adapter
Alert Adapter
Message Adapter
z/OS
z/OS Messages
TCP/IP
Send Event Results

EVENT: AppEvent; source='EIF Application'; probe='test'; msg='Sample Event Message'; probevalue='100'; sub_origin='J2EE Application'; hostname=test.com; origin='WebSphere'; probearg='testarg1'; sub_source='EIF servlet'; severity=HARMLESS; END

sendEvent worked! rc = 225

Return to Send Event Page
EAS – ITM Situation to NetView z/OS Alert

Tivoli Enterprise Monitoring Server (TEMS)

Event Receiver
EAS – z/OS Message to Netcool/OMNibus

IF MSGID = 'IEF450I' & (TOKEN(2 1 4) = 'CICS') & (TEXT = MESSAGE)
THEN EXEC(CMD('PPI2EAS3 NVC5TEC ' MESSAGE)
ROUTE(ONE AUTO1 AUTO2))
CONTINUE(Y);

WHEN (word(msg,1)='IEF450I') & (left(word(msg,2),4)='CICS')
THEN do
  bsm_identity=word(msg,2)||':HCB$:CICSRegion'
  bsm_subsource='CICS'
  bsm_severity='CRITICAL'
  bsm_status='OPEN'
end

msg1 = msg 'BSM_ID='||bsm_identity 'BSM_SV='||bsm_severity
msg1 = msg1 'BSM_ST='||bsm_status 'BSM_SS='||bsm_subsource
msg1 = msg1 'BSM_HN='||bsm_hostname

SAY "PPI2EAS3: MESSAGE IS" msg1
"PIPE VAR MSG1 | PPI TECROUTE" ppiname
say "message sent:" msg1
exit
EAS - NetView z/OS Alert to SNMP trap

Event Details

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
</table>

Alert-to-Trap Adapter
EAS - SNMP trap to NetView z/OS Alert

Trap to Alert Adapter
NetView Tivoli Enterprise Management Agent

- Integrates NetView with the Tivoli Enterprise Portal Environment
  - DVIPA information
  - Hipersockets
  - OSA
  - Packet Trace
  - TCP/IP Stack and connections
  - SNA Sessions
  - NetView health and log information
- NetView commands can be issued from the TEP desktop
- Transfer in context to OMEGAMON XE for Mainframe Networks
- Replaces old NetView TEP Agent (V5R2)
NetView TEMA – Portal View

TCP/IP Connection Data Summary
IBM Tivoli Monitoring Custom Integration

- NetView can send data to the ITM Environment either the IBM Tivoli Universal Agent or the Agent Builder Socket Data Source
  - NetView uses SOCKET functions as a socket client to send data
  - Universal Agent and Agent Builder agents can receive data via TCP/IP sockets
  - Any information NetView can detect or create can be sent
    - ITM functions can be applied to data (detecting threshold/content exceptions, situation and policy automation, etc.)
- Commands can be issued to NetView using Situations and Take Action Commands
Take Action Command to NetView

Name: alerttest
Command: NVCB TESTALR2 OMXE_ALERT OMXEMFN,FTP1

Destination System(s):
- HIAVSYS:HCB\:MVSSYS
- HIAVSYS:HFD\:MVSSYS
Take Action Command to NetView...

```
/* Test generating generic alert */
parse arg text hier,
"GENALERT G TYPE=PERM,ALID=3722641,DESC=2000,PSID=5699001 PC=1001",
"TEXT='| |text||'| HIER='| |hier||' ACTS=1012"
say "GENALERT command successfully executed"
exit

NETVIEW SESSION DOMAIN: HCEN5 BONETT 06/27/06 10:17:36
NPDA-30A * ALERTS-DYNAMIC *
DOMAIN RESNAME TYPE TIME ALERT DESCRIPTION:PROBABLE CAUSE
HCEN5 OMXEMFN FTP1 10:17 SW PROGRAM ABNORM TERM:APPLICATION PROGRAM

NETVIEW SESSION DOMAIN: HCEN5 BONETT 06/27/06 10:19:00
NPDA-43S * EVENT DETAIL *

HCEN5 OMXEMFN
DOMAIN FTP1

DATE/TIME: RECORDED - 06/27 10:17
EVENT TYPE: PERMANENT
DESCRIPTION: SOFTWARE PROGRAM ABNORMALLY TERMINATED
PROBABLE CAUSES:
APPLICATION PROGRAM
APPLICATION PROGRAM TEXT: OMXE_ALERT
```
Web Services: NetView SOAP Server

- Web Services Gateway to issue commands to NetView via SOAP over HTTP or HTTPS and receive response
- Provides Web Services Descriptor Language (WSDL) files
- Client requests can be made via
  - SOAP envelope and socket/http/https programming
  - WSDL generated proxy client
  - SOAP with Attachments API for Java (SAAJ)
  - Dynamic Invocation Interface (DII) API

```
<SOAP-ENV:Envelope ... >
<SOAP-ENV:Header ...>
<h:BasicAuth ...>
<Name>myid</Name>
>Password>mypassword</Password>
</h:BasicAuth></SOAP-ENV:Header>
<SOAP-ENV:Body>
<NVCMD><cmd>Usage</cmd></NVCMD>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

```
<SOAP-ENV:Envelope ...><SOAP-ENV:Body ...><resp>
<dl>resource</dl>
<dl>DSI386I NETVIEW RESOURCE UTILIZATION 12:36:38</dl>
<dl>TOTAL CPU % = 3.85</dl>
<dl>NVCDAP61 CPU % = 0.00</dl>
<dl>NVCDAP61 CPU TIME USED = 263.31 SEC.</dl>
<dl>REAL STORAGE IN USE = 40092K</dl>
<dl>PRIVATE ALLOCATED < 16M = 1120K</dl>
<dl>PRIVATE ALLOCATED > 16M = 131588K</dl>
<dl>PRIVATE REGION < 16M = 10216K</dl>
<dl>PRIVATE REGION > 16M = 164000K</dl>
<dl>END OF DISPLAY</dl>
```
Web Services Integration: SOAP Client

- Use NetView SOCKET functions to create client for connecting to services via Simple Object Access Protocol
  - REXX programming required but is easily reusable
    - Build HTTP Header
    - Import or create SOAP XML envelope request
    - Send complete request to services port
  - Enables use of web services data within events and automation
- Example white paper on IBM Techdocs website
Common Event Infrastructure (CEI)

- IBM implementation of the WSDM Common Base Event standard
- Imbedded in many products as a key event integration technology (e.g. WebSphere, DB2), particularly for business events
- NetView creates events and passes them to the CEI and can receive from the CEI Infrastructure for automation purposes
Product Integration Examples

• Event Pump for z/OS
  • Command Interface via Event Pump External Data Interface (EDI) to send events which can be escalated to Netcool/OMNibus and Tivoli Business Service Manager (TBSM)
  • EIF events can be sent directly to Netcool/OMNibus and mapped to TBSM events

• Tivoli Application Dependency Discovery Manager (TADDM)
  • NetView Discovery Library Adapter (DLA) sends Resource Object Data Manager (RODM) data to TADDM for inclusion in application relationship and dependency views and actions

• AF/Operator
  • PPI and Command Interface for cross-product command execution and AF/Operator access to Alerts
Event Management Considerations

• What is the Event Management scope?
  • Technology (events from particular components)
  • Application (events from components supporting an application or business system)
• Where and how are the events produced?
  • Directly by the component
  • Indirectly for the component by a component management product
• Which event and event relationships are important?
  • Typically many more events are produced than are used
  • For every exception event, a clearing event must exist (or be created)
Event Management Considerations...

- What are the event sources?
  - Directly usable by NetView
    - z/OS Messages
    - SNA Alerts
    - EIF and Common Base Events
    - SNMP traps
  - Usable by invoking NetView monitoring/automation
  - Require integration with NetView

- What is the integration customization effort?
  - Product definitions and parameters
  - “Script level” code
  - Programming code

- What level of “event capacity” (events to process in an interval) can be supported?
Summary

• There are many ways to integrate with NetView
  • By directly using a NetView interface
  • By indirectly routing through another interface
• Use the power of NetView Automation
  • Standalone on System z
  • In conjunction with other mainframe/distributed automation
• It can be a powerful Enterprise Management Integration product
  • Extremely customizable
  • Platform for integration with other management products
    (System Automation for z/OS, TBSM, ITM, OMEGAMON, OMNIbus…)
• It can make monitoring for and reacting to situations more efficient – which improves IT Service Management
For Further Information

  - Installation: Configuring Additional Components
  - Customization Guide
  - Customization: Using REXX and the NetView CLIST Language
  - Customization: Using PIPES
  - Application Programming Guide
  - Automation Guide

- Redbook
  - Extending z/OS System Management Functions with IBM zAware (include chapter on NetView integration and sample code)
For Further Information…

- White papers with integration examples (all available on [www.ibm.com/support/techdocs](http://www.ibm.com/support/techdocs), use “NetView” as search word):
  - Integrating IBM Tivoli NetView for z/OS with IBM Tivoli Monitoring
  - Options for Sending z/OS Events to Netcool/OMNIbus and TBSM
  - Using Tivoli NetView for z/OS as a TCP/IP Socket Server
  - An IBM Tivoli NetView for z/OS SOAP Client
  - Sending Tivoli Enterprise Console/Event Integration Facility Events to the NetView for z/OS Event Receiver
  - IBM Tivoli NetView for z/OS and IBM Tivoli AF/Operator for z/OS Integration (Parts 1 & 2)
  - Accessing Databases from Tivoli NetView for z/OS using JDBC
  - How to Power Up Distributed Servers Using Tivoli NetView for z/OS and Wake-On-LAN
  - Integrating WebSphere Applications with Event Integration Facility Products
System z Social Media Channels

• Top Facebook pages related to System z:
  • IBM System z
  • IBM Academic Initiative System z
  • IBM Master the Mainframe Contest
  • IBM Destination z
  • Millennial Mainframer
  • IBM Smarter Computing

• Top LinkedIn groups related to System z:
  • System z Advocates
  • SAP on System z
  • IBM Mainframe- Unofficial Group
  • IBM System z Events
  • Mainframe Experts Network
  • System z Linux
  • Enterprise Systems
  • Mainframe Security Gurus

• Twitter profiles related to System z:
  • IBM System z
  • IBM System z Events
  • IBM DB2 on System z
  • Millennial Mainframer
  • Destination z
  • IBM Smarter Computing

• YouTube accounts related to System z:
  • IBM System z
  • Destination z
  • IBM Smarter Computing

• Top System z blogs to check out:
  • Mainframe Insights
  • Smarter Computing
  • Millennial Mainframer
  • Mainframe & Hybrid Computing
  • The Mainframe Blog
  • Mainframe Watch Belgium
  • Mainframe Update
  • Enterprise Systems Media Blog
  • Dancing Dinosaur
  • DB2 for z/OS
  • IBM Destination z
  • DB2utor

Complete your sessions evaluation online at SHARE.org/SFEval
Questions?