



IBM Systems and Technology Group

## **RACF Update**

**Carolina RACF Users Group  
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# Agenda

## **z/OS V1R8 RACF Update**

- RACF Support for DB2 Version 9
- IRRUT200 and IRRUT400 Enhancements
- Enhancements to the RACF Health Checks
- Virtual Key Rings
- Group Change Logging
- Password Phrases
- Remote Authorization and Audit (EIM)
- PKI Services Enhancements

## **z/OS V1R9 RACF Update**

- Password Phrase enhancement
- Kerberos AES support
- Java RACF User and Group administration interface
- Writable SAF Keyring support
- PKI Updates

# Agenda...

## **z/OS Release 10 Preview**

- Custom fields
- Password phrase exploitation
- More granularity in allowing password reset
- Enhanced RACF Health Checks

## **RACF for z/VM**

# **RACF Support for DB2 Version 9 (FASTAUTH Enhancements)**

## Roles and the Network Trusted Context

- **DB2 V9 introduces a new access control mechanism: The ROLE**
  - ▶ CREATE ROLE TELLER
    - 1 to 128 character value
  - ▶ GRANT SELECT ON TABLE USER01.ABCD TO ROLE TELLER;
  - ▶ Roles can only be used within a **TRUSTED CONTEXT**

## Roles and the Network Trusted Context...

- **TRUSTED CONTEXT is a new DB2 V9 construct which allows the assignment of authorization information to a connection.**
- **Example: Assign the role TELLER to any job named MARKN which connects using the authID MARKN:**

```
CREATE TRUSTED CONTEXT CONTEXT_01
    BASED UPON CONNECTION USING SYSTEM AUTHID MARKN
    ATTRIBUTES (JOBNAME 'MARKN')
    DEFAULT ROLE TELLER
    ENABLE;
```

## Network Trusted Context

- **Example: Assign the role TELLER to a connection established from IP address 9.12.20.152 and the auth ID SRVR001**

```
CREATE TRUSTED CONTEXT CONTEXT_02
  BASED UPON CONNECTION USING SYSTEM AUTHID SRVR001
  ATTRIBUTES (ADDRESS '9.12.20.152')
  DEFAULT ROLE TELLER
  ENABLE
```



## Network Trusted Context...

- **When DB2's native authorization mechanisms are used, RACF is completely uninvolved in the access control decision**
- **When RACF is used to control access to DB2 objects...**
  - ▶ DB2 V9 passes the ROLE name to DSNXRXAC
  - ▶ DSNXRXAC passes the ROLE name to RACF on a REQUEST=FASTAUTH
  - ▶ Access can be allowed if the ROLE was specified on a PERMIT command

## Changes to REQUEST=FASTAUTH

- **RACROUTE REQUEST=FASTAUTH has been enhanced to accept the specification of a CRITERIA**
  - ▶ CRITERIA= causes FASTAUTH to check a new conditional access list entry
  - ▶ There are two parts to the criteria specification:
    - The CRITERIA name
      - For DB2, the CRITERIA name is SQLROLE
    - The CRITERIA value
      - For DB2, this is the ROLE that is associated with the thread

## Changes to REQUEST=FASTAUTH...

- **The new AUTHCHKS= parameter on REQUEST=FASTAUTH allows an application to tell FASTAUTH to use \*only\* the CRITERIA for an authorization request**
  - ▶ **AUTHCHKS=CRITONLY** causes FASTAUTH to ignore UACC and standard access list. Mandatory access checks are performed.
  - ▶ **AUTHCHKS=ALL** is the default

# Changes to REQUEST=FASTAUTH...

- **Example: A REQUEST=FASTAUTH with a ROLE**

```
RACROUTE REQUEST=FASTAUTH,
      WORKA=RACROUTE_worka,
      REQSTOR=XAC,
      SUBSYS=XAPLGPAT,
      DECOUPL=YES,
      WKAREA=FAST_wkarea,
      ENTITYX=FAST_ENTX,
      CLASS=FAST_CLASS,
      ACEE= (R4) ,
      ACEEALET= (R5) ,
      ATTR= (R8) ,
      LOG=NOFAIL,
      MSGSUPP=NO,
      LOGSTR=LOGSTR,
      CRITERIA=FAST_CRITERIA_COUNT,
      AUTHCHKS=CRITONLY,
      RELEASE=7730,
      MF= (E, FASTD)
*      . . .
*      . . .
FAST_CRITERIA_COUNT  DC F'1'
                    DC CL8' SQLROLE '
                    DC F'6'
                    DC CL128' TELLER'
```

## Changes to the PERMIT Command

- **CRITERIA are specified on the RACF PERMIT in the conditional access list**

- ▶ `PERMIT DSND.SYSADM CL(DSNADM) ID(MARKN)  
WHEN(CRITERIA(SQLROLE(TELLER)))`

# **IRRUT200 and IRRUT400 Enhancements**

## **RACF: IRRUT200 and IRRUT400 enhancements**

### **Problem 1: When copying from primary into backup to resynchronize them you can lose updates:**

- ▶ (1) IRRUT200 to copy from active primary to inactive backup;
- ▶ (2) some update happens (only to primary)
- ▶ (3) Use RVARY to activate the backup.

### **▪ Solution: IRRUT200 now supports a new parameter, PARM=ACTIVATE**

- ▶ If SYSRACF is an active primary, and SYSUT1 is the inactive backup, and PARM=ACTIVATE, then
- ▶ IRRUT200 will issue an internal RVARY ACTIVE before it releases its database serialization.
- ▶ Result: no updates can occur before the RVARY completes, and the backup and primary remain synchronized.

## **RACF: IRRUT200 and IRRUT400 enhancements**

- **Problem 2: Database corruption will occur if**

- ▶ You use IRRUT200 or IRRUT400 with input DD and output DD pointing to same data set
- ▶ You use IRRUT200 or IRRUT400 to copy into an active RACF data set

- **Solution: Both utilities will now detect these conditions and terminate before performing the copy operation.**

- **Available as APAR OA14916 for z/OS R7.**



# Enhancements to RACF's Health Checks

# The RACF Health Checks

- **The RACF Health Checks examine key system resources and verify that:**
  - RACF's serialization requests are not altered by global resource serialization (GRS) resource name lists (RNLs)
    - RACF\_GRS\_RNL check
  - **Key system resources have a proper baseline set of protections**
    - RACF\_SENSITIVE\_RESOURCES check
- **With z/OS V1R8, the existing RACF checks are enhanced and seven new checks are added.**

# What's New?

- **With z/OS V1R8, these checks are new:**
  - **RACF\_IBMUSER\_REVOKED**
    - Verifies that the user ID IBMUSER is revoked
    - Defaults: Severity(Medium), Interval (24:00)
  
  - **RACF\_<class-name>\_ACTIVE**
    - Verifies that the class <class-name> is active
      - Check is performed for FACILITY, OPERCMDS, TAPEVOL, TEMPDSN, TSOAUTH, UNIXPRIV
    - Defaults: Severity(Medium), Interval(24:00)

# What's New? ...

- **With z/OS V1R8, these checks have been modified:**
  - **The RACF\_SENSITIVE\_RESOURCES now:**
    - Reports on PARMLIB and LINKLIST datasets
    - Reports on key sensitive general resources
  - **The RACF\_GRS\_RNL check honors the Health Checker “verbose” mode in addition to “debug” mode**
    - Running the RACF\_GRS\_RNL check in either verbose mode or debug mode causes it to list all of the ENQ names that it is validating.

# RACF\_FACILITY\_ACTIVE Successful Execution Output

```
CHECK (IBMRACF,RACF_FACILITY_ACTIVE)
START TIME: 03/02/2006 14:50:57.305795
CHECK DATE: 20051111 CHECK SEVERITY: MEDIUM
CHECK PARM: FACILITY
```

```
IRRH228I The class FACILITY is active.
```

```
END TIME: 03/02/2006 14:50:57.314865 STATUS: SUCCESSFUL
```

## RACF\_UNIXPRIV\_ACTIVE Exception Output

```
CHECK (IBMRACF, RACF_UNIXPRIV_ACTIVE)
START TIME: 03/02/2006 14:50:57.304859
CHECK DATE: 20051111 CHECK SEVERITY: MEDIUM
CHECK PARM: UNIXPRIV
```

\* Medium Severity Exception \*

IRRH229E The class UNIXPRIV is not active.

**Explanation:** The class is not active. IBM recommends that the security administrator at your installation activate this class and define in it the profiles to properly protect your system.

**System Action:** The check continues processing. There is no effect on the system.

# RACF\_SENSITIVE\_RESOURCES New Output

## Current Link List Dataset Report

S	Data Set Name	Vol	UACC	Warn	ID*	User
E	ASM.SASMMOD1	ZDR18				
E	ATC.V2R1M4.SATGBMOD	D94RF1				
E	RACF318.LINKLIB	D97107				
E	RACF318.MIGLIB	D97107				
	SYS1.CMDLIB	ZDR18	None	No	****	
	SYS1.CSSLIB	ZDR18	None	No	****	
	SYS1.DFQLLIB	ZDR18	None	No	****	
	SYS1.DGTLLIB	ZDR18	None	No	****	
	SYS1.LINKLIB	ZDR18	None	No	****	
	SYS1.MIGLIB	ZDR18	None	No	***	

# RACF\_SENSITIVE\_RESOURCES New Output

## Sensitive General Resources Report

S	Resource Name	Class	UACC	Warn	ID*	User
	BPX.DAEMON	FACILITY	None	No	****	
	BPX.FILEATTR.APF	FACILITY	None	No	****	
	BPX.SERVER	FACILITY	None	No	****	
	BPX.SUPERUSER	FACILITY	None	No	****	
	ICHBLP	FACILITY	None	No	****	
	IRR.PASSWORD.RESET	FACILITY				
	MVS.SET.PROG	OPERCMDS				
	MVS.SETPROG	OPERCMDS				
E	ACCT	TSOAUTH	Updt	No	****	
E	CONSOLE	TSOAUTH	None	Yes	****	
E	OPER	TSOAUTH	None	No	Updt	
E	PARMLIB	TSOAUTH	None	No	Read	
E	TESTAUTH	TSOAUTH	None	No	Read	
	SUPERUSER.FILESYS	UNIXPRIV				
	SUPERUSER.FILESYS.CHANGEPERMS	UNIXPRIV				
	SUPERUSER.FILESYS.CHOWN	UNIXPRIV				



# Rollback

- **These checks have been rolled back to z/OS V1R6 with APAR OA16514**
  - V1R6 PTF: UA29221
  - V1R7 PTF: UA29222

# Virtual Key Rings

## RACF: Virtual Key Rings

### ▪ Scenario:

- ▶ z/OS user wants to use FTP to an SSL-enabled FTP server
- ▶ Today each such user must have a certificate key ring containing the certificate of the trusted certifying authority (CA) that signed the server's certificate.

### ▪ Problem: Many users may want to use SSL-based client applications. All will need their own key rings, probably with identical contents, causing extra administration

### ▪ Solution: Virtual key rings

- ▶ RACF will treat all the certificates that belong to a user as a key ring, without the administrator having to physically create a ring
- ▶ Especially valuable for the case of certificates "owned" by the CERTAUTH user

# Group Change Logging

## Overview: Problem and solution

- **z/OS LDAP currently supports the query and update of USER, GROUP, and group connection attributes using the SDBM back end to talk to RACF**
- **RACF currently supports LDAP change logging of updates to USER profiles**
- **Thus, there is a functional gap in RACF change logging with respect to the RACF functions supported by z/OS LDAP**
- **Solution – Support change logging of group and connection updates**

## Overview: Problem and Solution ...

- **Customer and other feedback for Password Enveloping function revealed some deficiencies**
  - ▶ No indication in LISTUSER as to existence of password envelope
  - ▶ No change log entry created for a new password which is not enveloped
  
- **Solution – New line of LISTUSER output, and unconditional change logging of password updates**

## **R\_Proxyserv Callable Service (IRRSPY00)**

- **Can be invoked by applications which perform their own profile updates (not using RACF commands) in order to get an LDAP change log entry created**
  
- **Extended to support group and connect “profiles”**
  - ▶ Internal-only change. No change to parameter list.
  - ▶ Some documentation tweaked to describe contents of profile name, which is not automatically a user anymore

## Password Enveloping Enhancements

- **LISTUSER indicates presence of password envelope when:**
    - ▶ RACFEVNT class active and PASSWORD.ENVELOPE profile exists
  - \*OR\*
  - ▶ User has a (residual) envelope
- 
- **Documentation beefed up to describe how to “phase out” enveloping function**
    - ▶ Residual envelopes get cleaned out of the RACF database



# Password Enveloping Enhancements ...

```
USER=ACE  NAME=UNKNOWN  OWNER=WELLIE
CREATED=92.162
DEFAULT-GROUP=KINGS  PASSDATE=00.000  PASS- INTERVAL=N/A  PHRASEDATE=N/A
PASSWORD ENVELOPED=NO
ATTRIBUTES=NONE
REVOKE DATE=NONE  RESUME DATE=NONE
LAST-ACCESS=06.044/12:26:08
CLASS AUTHORIZATIONS=NONE
NO-INSTALLATION-DATA
NO-MODEL-NAME
... ..
```

# Password Phrases

## RACF Password Phrases

- **RACF allows you to specify a password phrase for a user:**
  - ▶ 14 to 100 characters in length
  - ▶ Mixed-case, including alphabetic, numeric, and a large selection of special characters including blanks
  - ▶ Basic syntax rules: user ID can not appear in phrase; must contain at least two alphabetic and at least two non-alphabetic characters; must not contain more than two consecutive identical characters.
- **Can provide better interoperability with other systems that allow longer passwords**
- **Can provide better security than 8-character passwords**
- **Requires changes in applications that support passwords and want to support phrases**
  - ▶ TSO/E, z/OS UNIX System Services, IMS, CICS, etc. require changes
  - ▶ Changes will occur over time. Not in z/OS R8 for IBM applications.
- **Users can have both a password phrase and a password**
  - ▶ Will probably need both until all applications they use support phrases

## Some externals you will see

- **PHRASE** operand on **ADDUSER/ALTUSER**. **NOPHRASE** on **ALTUSER**
- **ATTRIBUTES=PASSPHRASE** on **LISTUSER**
- **SETROPTS PASSWORD** options which apply to phrases
  - ▶ **INTERVAL**
  - ▶ **REVOKE**
  - ▶ **HISTORY**
  - ▶ **MINCHANGE**

## Some externals you will see ...

- **New RACROUTE REQUEST=VERIFY/X keywords**
  - PHRASE=
  - NEWPHRASE=
  
- **New Password Phrase exit – ICHPWX11**
- **YES/NO field in IRRDBU00 output indicates presence of password phrase for user**
- **New ICH408I message texts for failed phrases**
- **New event code qualifiers for RACINIT/JOBINIT SMF record**

# Remote Authorization and Audit

## Remote Authorization and Audit

- **Two remote services were added to z/OS v1R8 in the EIM component to enable distributed applications to access security functions on z/OS.**
  - ▶ The Remote Authorization Service allows applications to remotely query a z/OS system to check a users authority to a resource.
  - ▶ The Remote Audit Service allows applications to remotely write audit records to the z/OS Systems Management Facility (SMF).
  
- **Both services are accessed via requests sent to the IBM Tivoli Directory Server (ITDS) running on z/OS. ITDS is the latest version of the z/OS LDAP server.**

## **Remote Authorization and Audit...**

- **The Remote Authorization service can be thought of as a remote interface to the RACROUTE REQUEST=AUTH service.**
- **The Remote Audit service can be thought of as a remote interface to the R\_AUDITX SAF callable service.**



# PKI Services Enhancements

## PKI Services: Multiple Certificate Authority (CA) Support

### ▪ **Today:**

- ▶ You can run only one instance of PKI Services daemon on a z/OS image
- ▶ That single PKI Services daemon can act as (operate as) only a single certificate authority

### ▪ **This makes it difficult to**

- ▶ Operate a certificate authority hierarchy
- ▶ Host multiple certificate authorities as a service bureau

### ▪ **z/OS V1R8: You can run multiple PKI Services daemons on one z/OS system**

- ▶ Each can operate as a different CA to resolve the above difficulties

## **PKI Services: SCEP Support**

- **Certificates are used by humans today, but increasingly also used by hardware (routers, VPN devices, etc.)**
- **Today, PKI Services accepts requests only via a web page**
  - ▶ Leads to much manual work to get certificates for devices
- **z/OS V1R8: PKI Services will accept requests via the Simple Certificate Enrollment Protocol (SCEP) directly from the devices, reducing the need for manual administrative actions**

# **z/OS V1R9 RACF Update**

# Password Phrase Enhancement

## Password Phrase Support Enhancements

- **With z/OS V1R8, password phrases could be from 14-100 characters in length. There was no support for a password or password phrase from 9 to 13 characters in length**
  - This presents an interoperability issue with some other platforms
- **With z/OS V1R9, password phrases from 9 to 13 characters are allowed only if an ICHPWX11 password phrase exit is coded which accepts the shorter phrase.**
  - If ICHPWX11 is not present at all, the minimum acceptable password phrase length remains 14.
- **A sample ICHPWX11 exit is provided which is coded to utilize the System REXX facility.**

# Kerberos AES support

## Kerberos AES support

- **z/OS's Kerberos has been extended to support the AES encryption algorithm.**
  - ▶ This increases compatibility between z/OS Kerberos and implementations of Kerberos on other systems for improved interoperability.
  
- **These functions are designed to support RFCs:**
  - ▶ RFC3962 — Advanced Encryption Standard (AES) Encryption for Kerberos 5
  - ▶ RFC2025 — The Simple Public-Key GSS-API Mechanism (SPKM)
  - ▶ RFC2253 — UTF-8 String Representation of Distinguished Names
  - ▶ RFC2459 — X.509 Public Key Infrastructure
  - ▶ RFC2847 — LIPKEY — A Low Infrastructure Public Key Mechanism Using SPKM



# Java RACF user and group administration interface

## Java RACF User and Group administration interface

### ▪ New Java interfaces

- ▶ Allow administration and querying of users, groups and user-group connection information via JAVA API calls.
- ▶ These APIs internally call the z/OS LDAP (ISS or ITDS) server to perform the functions.
- ▶ This makes these APIs callable from applications running on or off the z/OS platform.

# Writable SAF keyring and certificate support

## Writable SAF Keyring and Certificate support

- **R\_datalib SAF callable services updated to allow programs to perform additional certificate functions.**
  - ▶ Keyrings may now be created and deleted
  - ▶ Certificates can be added and deleted to RACF
  - ▶ Certificates can be added and deleted from keyrings
  
- **Prior to this support, the only way to perform these functions was via the RACF RACDCERT TSO command.**

# PKI updates

## PKI updates

### ▪ PKI Updates

- ▶ Certificates containing 2-byte UTF-8 characters which can be mapped to code page 1047 characters are supported.
- ▶ The use of SDBM credential for the LDAP administrator in PKI Services will be allowed.
- ▶ The maximum limit of the certificate validity period will be changed from 3650 days (10 years) to 9999 days (approx. 27 years).
- ▶ Automated certificate renewal will be designed to send renewal certificates via e-mail when the expiration dates for older certificates are approaching.
- ▶ New e-mail notification for the PKI administrator will be provided for pending certificate requests.

# **RACF for z/VM Update**

## What's in a Name?

- **RACF Security Server feature Function Level 530 (FL530) for z/VM V5.3**
  
- **Mixed case passwords**
  - ▶ SETROPTS command used to enable mixed case, and to define expanded password quality rules
  
- **Password phrase support**
  - ▶ 9-100 character authenticator with few character restrictions
  - ▶ Immediate support for LOGON, FTP, TELNET
  - ▶ Sample exit uses REXX for quality rules
  - ▶ Can force use of password phrases by deleting passwords
  - ▶ Existing SETROPTS PASSWORD options apply to phrases
    - HISTORY, REVOKE, INTERVAL, WARNING



## RACF for z/VM 5.3 ...

### ▪ **Support for (new) z/VM LDAP server**

- ▶ Query, update RACF user and group profiles via SDBM backend
- ▶ Clients (e.g.Linux) can authenticate to LDAP using RACF password
- ▶ Remote authorization and auditing services
- ▶ Logging of LDAP server events in SMF DATA file

### ▪ **SMF Unload utility (RACFADU) updated**

- ▶ Support for LDAP server and client auditing
- ▶ Output available in XML format

## RACF for z/VM 5.3 ...

- **Support for (new) CP FOR command**
  - ▶ Allows user to run a command under another user's authority
  - ▶ Requires LOGON BY (SURROGAT class) authority
  
- **Support for new subcodes of DIAGNOSE X'88'**
  - ▶ Allows a server to validate a client's password or phrase
    - Server must have VMCMD class authority
  - ▶ Can check for client LOGON BY authority to a target
  
- **Various user-related improvements**
  - ▶ NOPASSWORD users, NOEXPIRED keyword, improved audit of password changes, ALTUSER adds current password to history

# **z/OS Release 10 RACF Preview**

# z/OS V1R10

## ▪ Password Phrase exploitation

- ▶ TSO/E
- ▶ z/OS UNIX rlogin, BPX1PWD, BPX1SEC, BPX1TLS
- ▶ z/OS UNIX su and passwd commands
- ▶ z/OS Kerberos
- ▶ z/OS LDAP for z/OS SDBM backend
- ▶ OpenSSH (IBM Ported Tools for z/OS)

## **z/OS V1R10...**

- **More granularity in allowing password reset**
  - ▶ Can be scoped by OWNER or GROUP
  
- **Before V1R10: FACILITY profile IRR.PASSWORD.RESET allowed password resets for users without the SPECIAL, OPERATIONS, AUDITOR, or PROTECTED attribute**
  
- **With V1R10: New FACILITY profiles:**
  - ▶ IRR.PWRESET.OWNER.owner-of-user
  - ▶ IRR.PWRESET.TREE.owner-of-group-tree

## z/OS V1R10...

### ▪ Custom fields for USER and GROUP profiles

- ▶ Field semantics (names and data formats) defined as profiles in the new CFIELD general resource class
- ▶ New CSDATA segment in USER and GROUP profiles to hold the data
- ▶ FIELD class (“field level access”) can be used to control access
- ▶ Can be processed from
  - RACF commands
  - RACF ISPF panels
  - LDAP SDBM

## z/OS V1R10...

### ▪ **RACF Health Check Enhancements:**

#### ▶ Installation-defined checks

- You decide what the check examines by defining profiles in the GXFACILI class

#### ▶ ICHAUTAB checks:

- IBM recommends not using the RACF Authorized Caller Table (ICHAUTAB)
  - SEV(MED) exception if non-LOA
  - SEV(HIGH) exception if in LPA

### ▪ **RACDCERT: Allow 4096 bit RSA keys through software**

### ▪ **PKI services – additional Distinguished Name attribute types**