IBM Systems and Technology Group

RACF Update

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z/OS V1R10 RACF Preview

RACF for z/VM Update

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 datatsets
    - 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 (see also V1R9 changes)
  - 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 user's 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.**

For more information, see:
z/OS Integrated Security Services Enterprise Identity Mapping (EIM) Guide and Reference

PKI Services Enhancements

PKI Services: Multiple Certificate Authority (CA) Support

- **Before z/OS V1R8:**
  - You could run only one instance of PKI Services daemon on a z/OS image
  - That single PKI Services daemon could act as (operate as) only a single certificate authority
- **This made 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.)**
- **Before z/OS V1R8, PKI Services accepted requests only via a web page**
  - Required too much manual work to get certificates for devices
- **z/OS V1R8: PKI Services can 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 support

- **z/OS's Kerberos has been extended to support the AES encryption algorithm.**
  - z/OS Kerberos interoperability with other implementations improved.
- **These functions are designed to support RFC3962** Advanced Encryption Standard (AES) Encryption for Kerberos 5

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.

Coming Soon

z/OS V1R10 RACF Preview

Planned for V1R10: Password Phrase Exploitation

- Password Phrase exploitation
  - TSO/E
  - z/OS UNIX rlogin, BPX1PWD, BPX1SEC, BPX1TLS
  - z/OS UNIX su & passwd commands
  - z/OS Kerberos
  - z/OS LDAP for z/OS SDBM backend
    - Password Phrase search
    - Password Phrase change logging
  - OpenSSH (IBM Ported Tools for z/OS)

Planned for V1R10: Password Reset Enhancements

- More granularity in allowing password reset
  - Can be scoped by OWNER or Group Tree
- Before V1R10: FACILITY profile IRR.PASSWORD.RESET allowed password resets for users without SPECIAL/AUDITOR/ OPERATIONS or PROTECTED
  - READ authority: can set an expired password or resume user
  - UPDATE: can also set a non-expired password
  - CONTROL: can also reset password within MINCHANGE window

Planned for V1R10: Password Reset Enhancements ...

- V1R10: New FACILITY profiles:
  - IRR.PWRESET.OWNER.owner-of-user
    - Grants authority based on the user or group that owns the user
  - IRR.PWRESET.TREE.owner-of-group-tree
    - Grants authority based on group tree scope
    - That is, if “owner of group tree” owns the user being reset, or owns a group that owns the user, or owns a group that owns a group that ...
- Authorities to these work the same as for IRR.PASSWORD.RESET:
  - READ authority: can set an expired password or resume user
  - UPDATE: can also set a non-expired password
  - CONTROL: can also reset passwords within MINCHANGE window

Planned for V1R10: Custom Fields

- RACF will allow administrators to define new fields in USER and GROUP profiles
  - New fields can be used in:
    - RACF commands
    - RACF ISPF panels
    - LDAP SDBM
- Profiles in CFIELD class define the field names and allowable data format
- USER and GROUP profiles have a new CSDATA segment to hold the new fields
- Profiles in FIELD class determine who can view or modify the new data, as for other segments

Planned for V1R10: Custom Fields ...

- Example 1:
  - RDEFINE CFIELD USER.CSDATA.EMPSER UACC(NONE) +

    CFDEF(TYPE(NUM) FIRST(NUMERIC) OTHER(NUMERIC) +

    MAXLENGTH(8) MINVALUE(100000) MAXVALUE(99999999) +

    HELP('EMPLOYEE SERIAL NUMBER, 6-8 DIGITS') +

    LISTHEAD('EMPLOYEE SERIAL='))
  - ADDUSER U1 CSDATA(EMPSER(234567))

Planned for V1R10: Custom Fields ...

- Example 2:
  - RDEFINE CFIELD USER.CSDATA.ADDRESS UACC(NONE) +

    CFDEF(TYPE(CHAR) MAXLENGTH(100) +

    FIRST(ANY) OTHER(ANY) +

    HELP('HOME ADDRESS, UP TO 100 CHARACTERS') +

    MIXED(YES) +

    LISTHEAD('HOME ADDRESS ='))
  - ALTUSER U1 CSDATA(+
    ADDRESS('123 Main St., Home Town, NY, USA'))

Planned for V1R10: RACF Health Checks

- Customer-specified resource checks
  - Extends RACF Sensitive Resources checks
  - Allows specification of additional resources important to an installation
  - Uses profiles in GXFACILI class to specify the resources and checks to perform
- ICHAUTAB checks
  - IBM recommends not using ICHAUTAB (authorized caller table)
  - Improper use can compromise system security and integrity
  - Presence of entries in ICHAUTAB will trigger a medium exception
  - Presence of LPA entries in ICHAUTAB will trigger a severe exception

Planned for V1R10: Other Items

- RACDCERT – replace BSAFE with IBM Crypto Library in C (CLIC)
  - Allow 4096 bit RSA keys through software
- PKI services – additional Distinguished Name attribute types and additional UTF-8 character set support

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