Steadfast Software Security
Endevor® & RACF Unite

December 2009

Rose A. Sakach

Endevor Practice Leader - RSH Consulting, Inc.

R.Sakach@RSHConsulting.com - 617-969-9050 - www.rshconsulting.com

Agenda

Software Change Control

A Brief Endevor® Overview

Dataset Security vs. Functional Security

External Security Interface (ESI)

The Alternate ID

Configuration and Implementation

The Administration Evolution

Got Security?

Sample RACF Profiles

Software Change Control

- **Change Control - The process of controlling software changes throughout an application life cycle to ensure only approved, tested software is implemented into production**
- **Life Cycle - The phases through which an application passes from conception to the termination of its use, including design, development, test, implementation, operation, maintenance, and modification**
- **Change Management Tool - allows you to automate and control the movement of application software through your applications Life Cycle**
- **Sample Application Life Cycle:**
  - **Test – Individual programs are developed and unit tested**
  - **QA - Applications are system tested and approved for production**
  - **Production - Production applications are stored and executed**

A Brief Endevor Overview

EN-DEV-OR is an acronym!

- Environment for Development and Operations
- Developed in 1980's
- Introduced in 1986 by Condor Technology (NYC)
- Subsequent owners BST, Legent, CA
- Renamed to CA - Software Change Manager for Mainframe (SCM for Mainframe) in 2007

Automated Mainframe Software Configuration Management

- Inventory Management
- Source Management
- Output Management
- Configuration Management

A Brief Endevor Overview

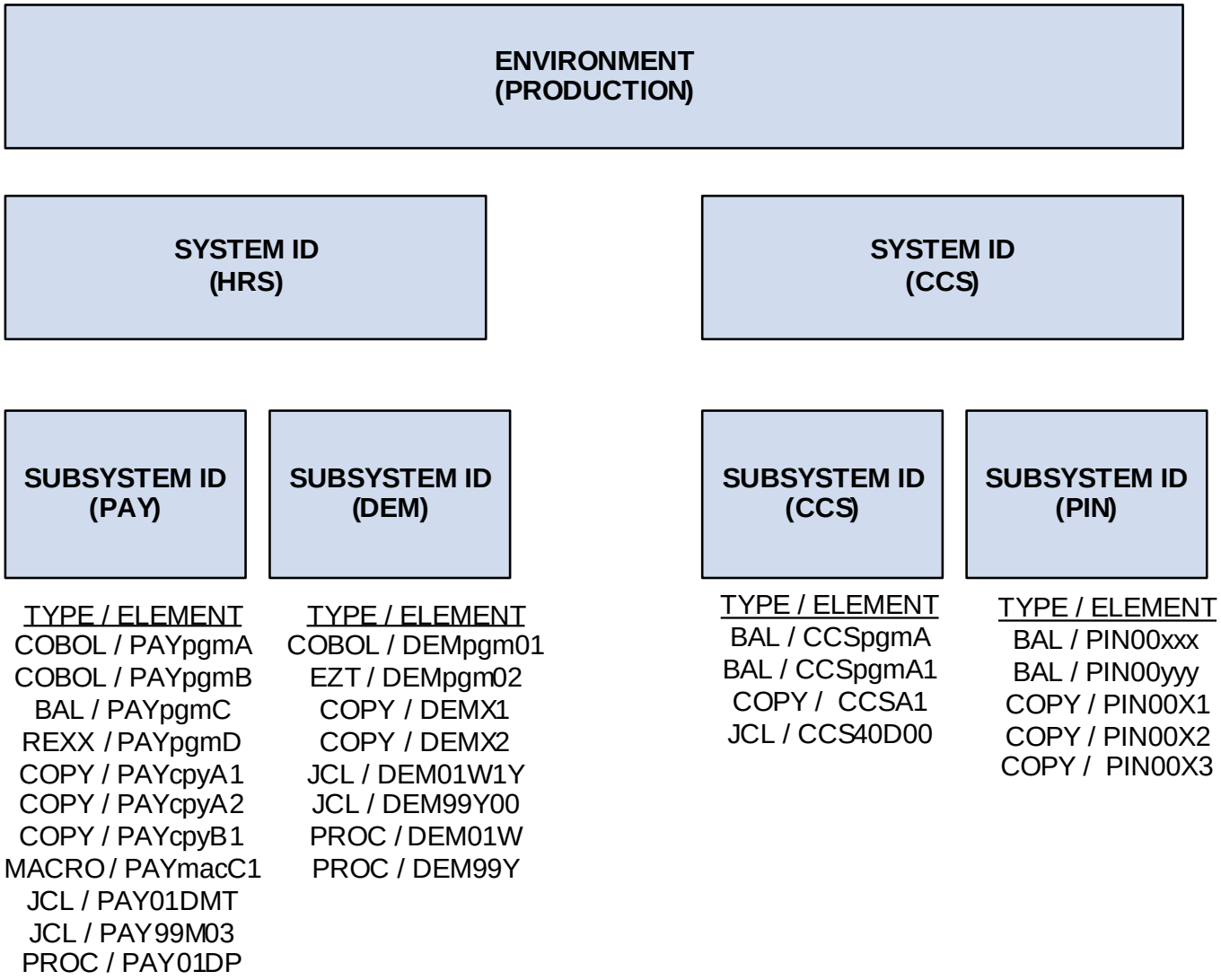
Comprised of:

- Software – CLIST driven panels, Programs, MACROs, Utilities
- Files (MCF, Package, Output, ACMQ)
  - C1DEFLTS Options (Environment & Map specifications)
  - Base / Delta (Source Code Versioning)

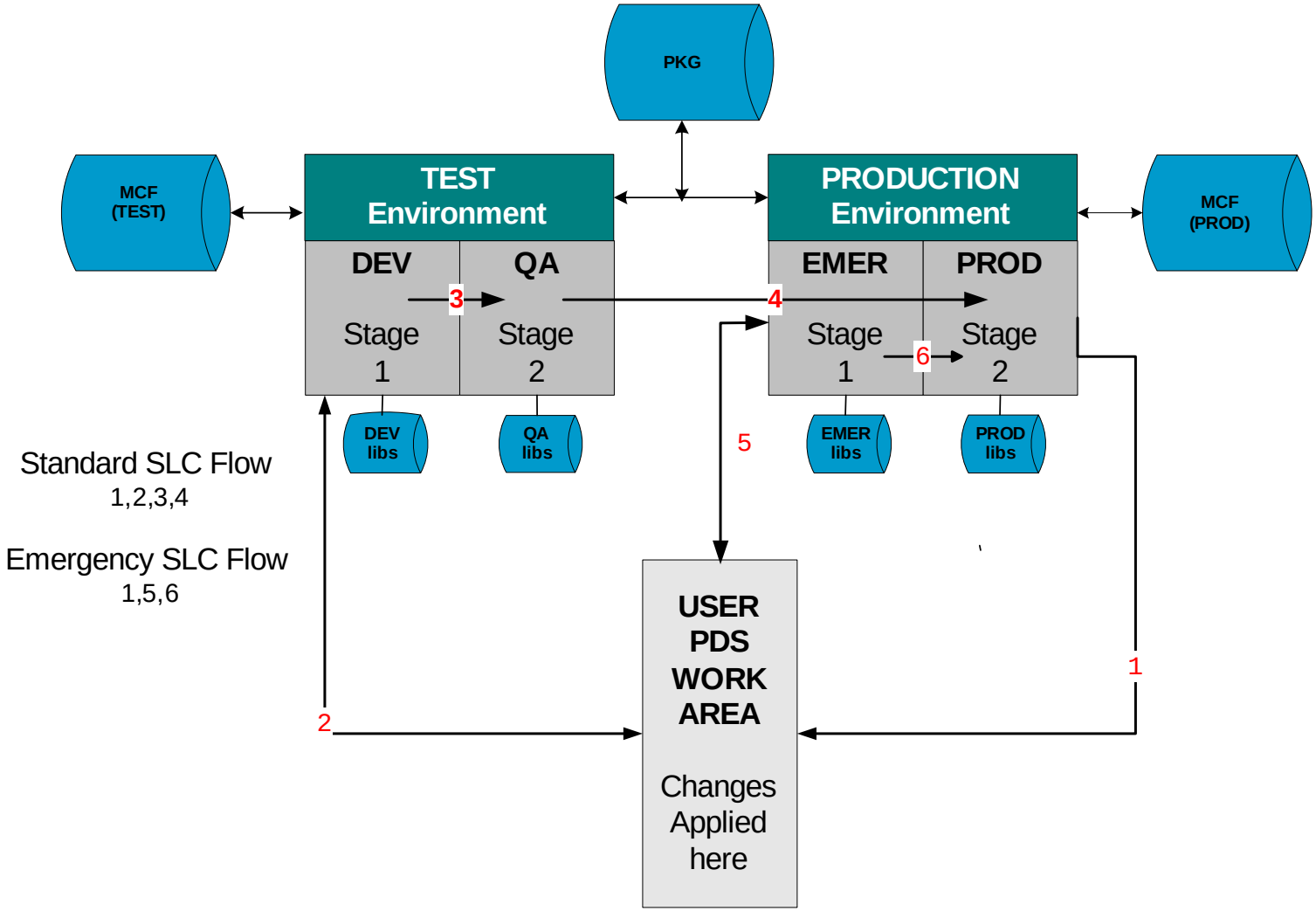
Functional Users:

- Developer (Application or Systems Programmer)
- CCA (Change Control Administrator)
- Approver (Authorized signoff)
- Endevor Administrator

A Brief Endevor Overview



A Brief Endevor Overview



A Brief Endevor Overview

RACF Can Secure:

- **Endevor ISPF Panels and/or specified menu selections**
  - **Environment Access (entry into Endevor)**
  - **Primary Options**
  - **Foreground Options**
  - **Package Menu**

- **Endevor Actions**
  - **Display, Add, Generate, Move, Retrieve, Update, Signin, Delete, Override Signout, Archive, Transfer, Environment Manager**
  - **Package Display, Package List, Package Review, Package Create, Package Modify, Package Cast, Package Commit, Package Execute, Package Utility**

A Brief Endevor Overview

```
------- AllFusion Endevor Environment Selection ------- Row 1 to 4 of 4
Option ===>                                    Scroll ===>       PAGE

Select an environment to continue.  Enter the END command to exit.
 --      -------- ----------------------------------------
 1       TEST     Unit Test / QA
 2       PROD     Production
 3       ADMIN    Endevor Administration
 4       TRAIN    Training

*************************** Bottom of data ***************************
```

A Brief Endevor Overview

```
--------------  AllFusion Endevor Primary Options Panel  ------------
Option ===>
0         DEFAULTS       - Specify Endevor ISPF default parameters
1         DISPLAY        - Perform Display functions
2         FOREGROUND     - Execute Foreground Actions
3         BATCH          - Perform Batch Action processing
4         ENVIRONMENT    - Define or Modify Environment information
5         PACKAGE        - Perform Foreground Package processing
6         BATCH PACKAGE  - Perform Batch Package SCL Generation
U         USER MENU      - Display user option menu
T         TUTORIAL       - Display information about Endevor
C         CHANGES        - Display summary of changes for this release of
                           Endevor
X         EXIT           - Exit the Endevor dialog

                      Current environment: TEST
          (C) 2005 Computer Associates International, Inc.
          Use the EXIT option to terminate Endevor
```

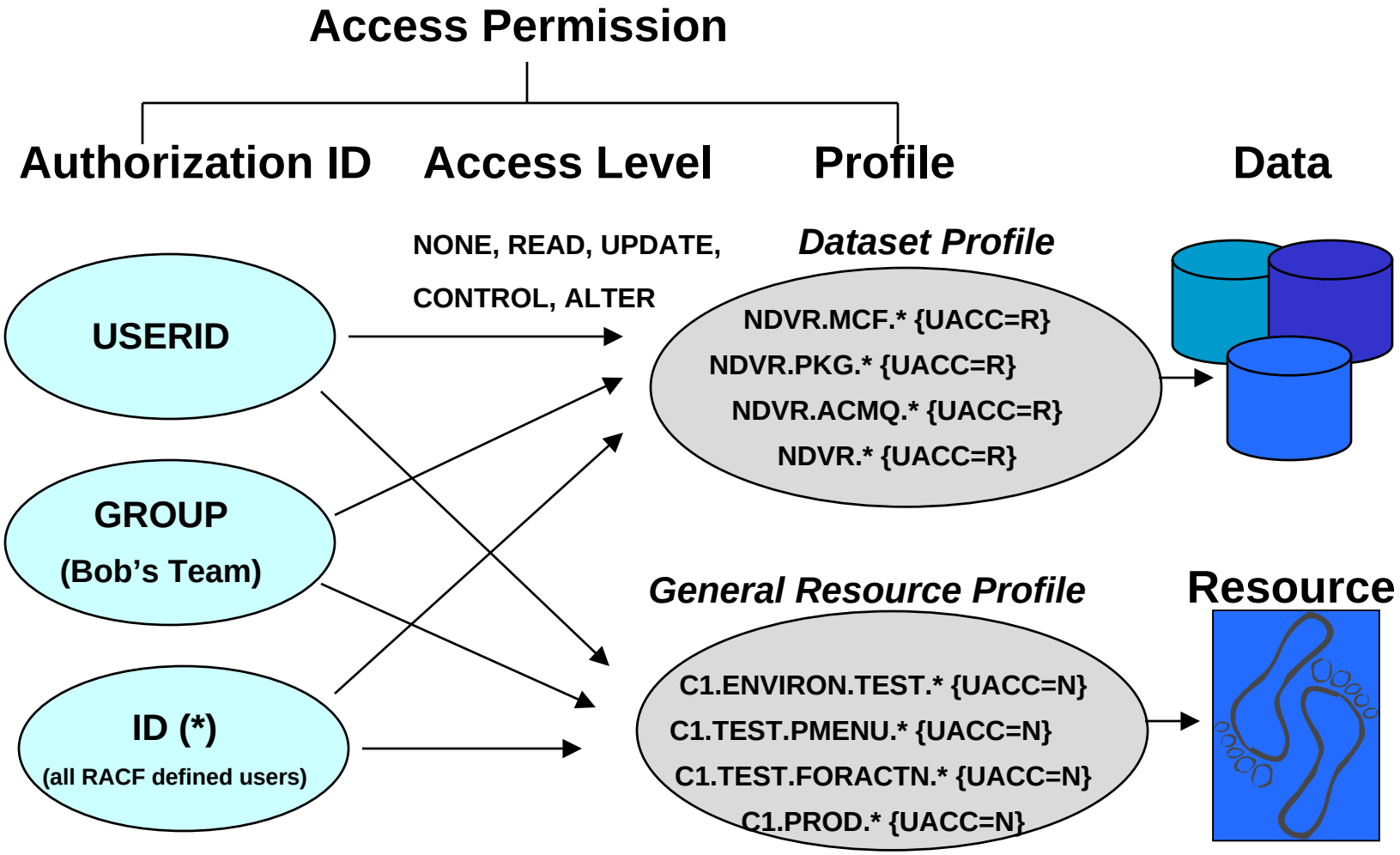
A Brief Endevor Overview

```
------------------- Foreground Options Menu ---------------------------
Option ===>
1         DISPLAY    - Display an element
2         ADD/UPDATE - Add or update an element into entry stage
3         RETRIEVE   - Retrieve or copy an element
4         GENERATE   - Execute the Generate Processor for this element
5         MOVE       - Move an element to the next inventory location
6         DELETE     - Delete an element
7         PRINT      - Print elements, changes and detail change history
8         SIGNIN     - Explicitly sign-in an element
```

A Brief Endevor Overview

```
---------------------- Package Foreground Options Menu ----------------

Option  ===>

1          DISPLAY         - Display Package Information
2          CREATE/MODIFY   - Create or Modify Package
3          CAST            - Prepare Package for Review
4          REVIEW          - Approve or Deny Package
5          EXECUTE         - Submit or Execute Package
6          SHIP            - Ship Packages
7          BACKOUT         - Perform Backout or Backin Processing
8          COMMIT          - Clear Backout Information
9          UTILITIES       - Reset, Delete, or Export Package

                             Package ID ===>

Limit selection list options. These options are used by the DISPLAY and
UTILITIES functions:

           In-Edit.........  Y              In-Execution....      Y
           In-Approval.....  Y              Executed........      Y
           Denied..........  Y              Committed.......      Y
           Approved........  Y              Enterprise Pkg..      A
```

A Brief Endevor Overview



A Brief Endevor Overview

RACF enhances and enforces Endevor's software controls:

- ✓ **Controls access to managed software items**
- ✓ **Controls use of Endevor functions**
- ✓ **Limits access to MCF, package dataset, ACMQ and all output libraries to authorized USERIDs only**
- ✓ **Offers RBAC group structure which serves a dual role in providing:**
  - **Access authorization to managed software items**
  - **Authorization to signoff or approve software changes**
- ✓ **Provides the ability to properly manage and administer software access and software change approval**

Dataset vs. Functional Security

Dataset Security

- Controls all access to Endevor's data files
  - Master Control Files (MCF)
  - Package Control Files (PCF)
  - Processor Output Libraries
  - Base / Delta Libraries
  - Output Listing Libraries
  - ACMQ Files
- Uses RACF DATASET class profiles
- Can be implemented regardless of ESI
- Should follow data security standards in creating dataset class profiles, establishing groups and granting access:
  - Structured Endevor dataset naming standards should help ensure minimal RACF profile requirements
  - Access should be granted via RACF Groups (not users)
- Access authorization can be limited by utilizing the Endevor Alternate ID

Dataset vs. Functional Security

Functional Security

- Controls user access in to Endevor menus and actions
  - Environment Selections
  - Primary Options Selections
  - Interactive and batch actions
  - Package actions
- Can use either RACF Dataset or General Resource class profiles
- Provides the capability to restrict user access into specific software inventories (Endevor Systems) *
- Provides the mechanism to align Endevor access with a specific business function
- Requires use of the ESI

*SOX (Sarbanes-Oxley) Requirement

External Security Interface

What is it?

- An optional feature which provides the capability to integrate and customize Endevor's functional security with RACF
- Without ESI, aligning Endevor access to job function would require Native Security table configuration, implementation, maintenance and in some instances, user exits; or may not be possible

ESI Components

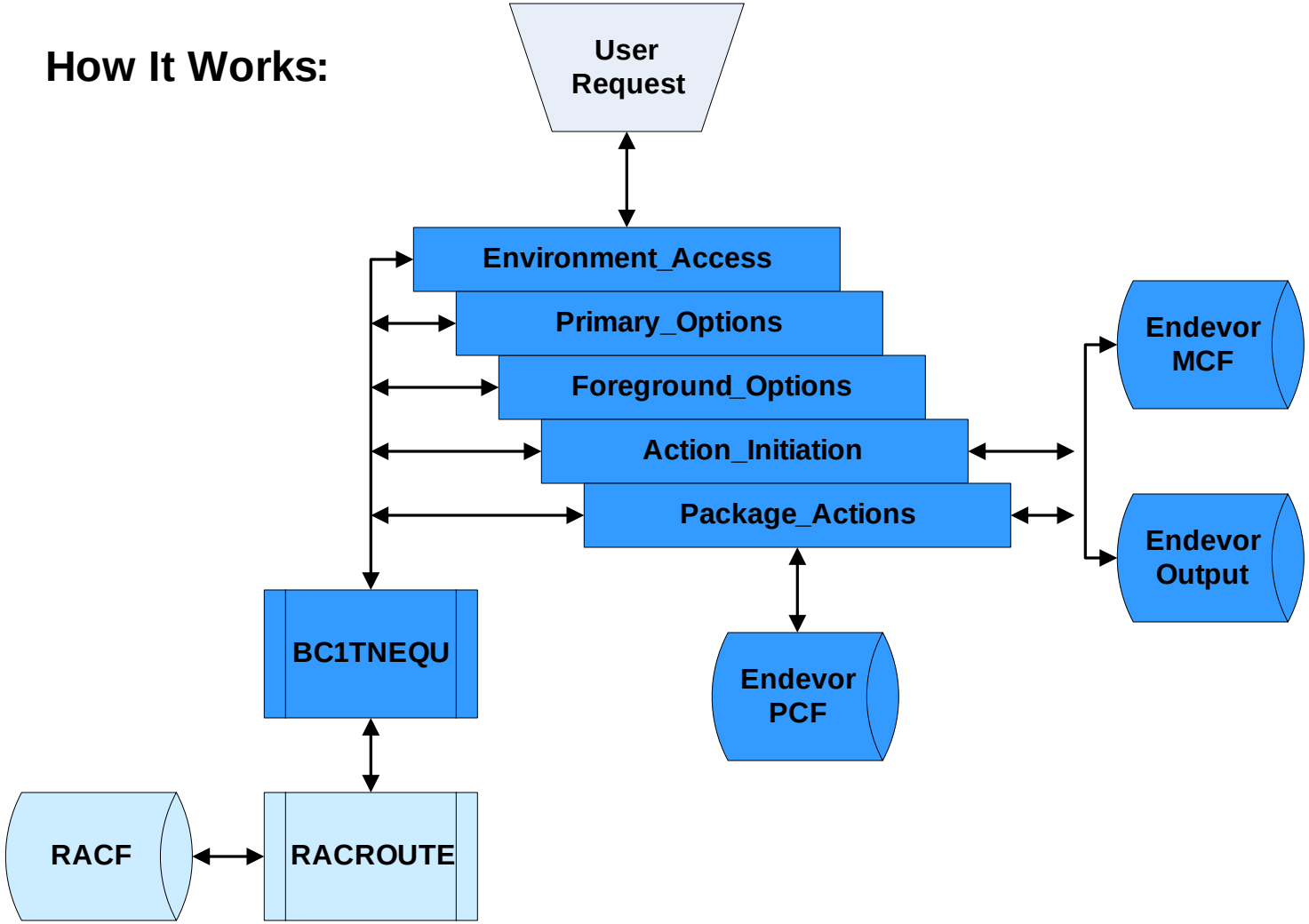
- Default Table (C1DEFLTS)
- Security Table (BC1TNEQU)
  - ESIDFLTS
  - FUNCEQU
  - NAMEQU

Activated via C1DEFLTS parameters

- ESSI=Y
- ACCSTBL=BC1TNEQU

External Security Interface

How It Works:



External Security Interface

Prior to configuration:

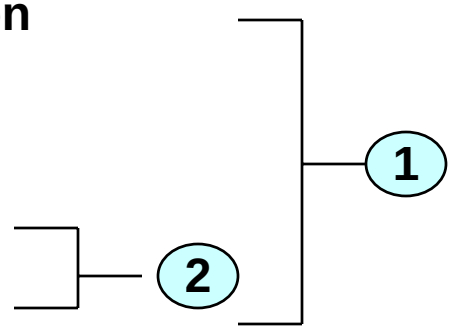
- **Understand how the function equates translate to access levels**
- **Understand how the name equates translate to resource names**
- **Organize access according to functional requirements (i.e. roles)**
- **Review Appendix A -** ***Endevor Change Manager Security Guide***

Business Function	Action Requirement
Endevor Administrator	All
Technical Support	Primary, Limited Foreground, Limited Actions, All Package Options
Operations	Environ (PROD), Limited Primary Options, Limited Package
Application User	Limited Primary, Foreground, Actions, Limited Package
Application Approver	Environ (PROD), Limited Primary, Limited Package
Endevor Sweep Job	All Actions, Package Options

External Security Interface

ESI Security Control Points:

- **Environment Selection**
- **Primary Options**
- **Foreground Options**
- **Action Initiation**
- **Package Actions**



1 Name Equates Entries: Construct resource names to represent Endevor menu options and the actions that can be initiated from them.

2 Function Equates Entries: Assign a RACF access level permission requirement (e.g. READ) to the action initiation and/or package action control points (I.e. DISPLAY, ADD, UPDATE, PCREATE, PREVIEW etc.)

Note: Environment Selection, Primary Options, and Foreground Options control points are automatically assigned a permission requirement of READ.

External Security Interface – BC1TNEQU

A Closer Look at BC1TNEQU:

ESI Defaults

```
TITLE 'BC1TNEQU - EXTERNAL SECURITY INTERFACE TABLE.'
*********************************************************************
* DEFINE ESI DEFAULTS.  THE LABEL IDENTIFIES THE TABLE MODULE NAME.   *
*********************************************************************
BC1TNEQU ESIDFLTS WARN=NO,              NORMAL EXECUTION MODE          X
               HEADER=YES,              PRINT TABLE IN TRACE           X
               LATSIZE=10,              40K (10*4K) LOOK ASIDE TABLE   X
               DESC=6,                  DESCRIPTOR                     X
               ROUTCDE=11,              AND ROUTING CODES              X
               TITLE='ENDEVOR 4.0 Security Table'
```

WARN: {YES|NO} Warn mode for entire table - *Note: Individual formats can override*

HEADER: {ALL|YES|NONE} Write header info to trace DSN upon open of EN$TRESI DD

LATSIZE: {2-10|0|blank} Cache RACF responses – 0 turns off – recommend 10

DESC: {WTO|code} Descriptor code when trace is directed to operator console

ROUTCDE: {WTO|code} Routing code when trace is directed to operator console

External Security Interface - FUNCEQU

ESI FUNCEQU - Sample

```
*********************************************************************
*        MAP E/MVS AUTHORITIES TO SAF AUTHORITIES                   *
*********************************************************************
         FUNCEQU SAFAUTH=READ,                                      X
               C1ACTNS=(PDISPLAY,PLIST,PREVIEW)
         FUNCEQU SAFAUTH=UPDATE,                                    X
               C1ACTNS=(ADD,GENERATE,MOVE,RETRIEVE,UPDATE,SIGNIN,   X
               DELETE,PCREATE,PMODIFY,PCAST)
         FUNCEQU SAFAUTH=CONTROL,                                   X
               C1ACTNS=(SIGNOVR)
         FUNCEQU SAFAUTH=ALTER,                                     X
               C1ACTNS=(ENVRNMGR,ARCHIVE,TRANSFER,                  X
               PBACKOUT,PCOMMIT,PEXECUTE,PUTILITY)
         FUNCEQU TYPE=END
```

*** RACF permissions (NONE,READ,UPDATE,CONTROL,ALTER) specified in the FUNCEQU statements determine the minimum level of access authority users require in order to perform specific actions.**

External Security Interface - FUNCEQU

ESI FUNCEQU

Sets the level of access permission (e.g., UPDATE) required to perform a specific action or package action (e.g., MOVE)

Endevor includes this in the RACROUTE call to RACF

SAFAUTH=auth

- **Where 'auth' = NONE | READ | UPDATE | CONTROL | ALTER**
- **NONE - no security check is issued**

C1ACTNS=(c1access,c1access,...)

- **Where 'c1access' =**

DISPLAY	RETRIEVE	ADD	ENVRNMGR
UPDATE	MOVE	GENERATE	SIGNIN
SIGNOVR	ARCHIVE	DELETE	P…

Each 'c1access' can only be associated with one SAFAUTH

External Security Interface - NAMEQU

ESI NAMEQU - Sample

```
NAMEQU ENVIRONMENT_ACCESS,                    X
      L1=('C1'),                              X
      L2=('ENVIRON'),                         X
      L3=(ENVIRONMENT),                       X
      LOG=NOFAIL,                             X
      WARN=NO,                                X
      CLASS='$ENDEVOR'
NAMEQU PRIMARY_OPTIONS,                       X
      L1=('C1'),                              X
      L2=(ENVIRONMENT),                       X
      L3=('PMENU')                            X
      L4=(MENUITEM),                          X
      LOG=NOFAIL,                             X
      WARN=NO,                                X
      CLASS='$ENDEVOR'
NAMEQU ...
```

External Security Interface - NAMEQU

ESI NAMEQU – Format Statement Syntax

Defines the construct of resource names for RACF calls

FORMATn | name

- **FORMAT statement number, where n = 1-5 (Pre-3.9 structure)**
- **FORMAT name, where name =**
  - **ENVIRONMENT_ACCESS**
  - **PRIMARY_OPTIONS**
  - **FOREGROUND_OPTIONS**
  - **ACTION_INITIATION**
  - **PACKAGE_ACTIONS**

Ln=(field1[[(begin,length)],…fieldn[(begin,length)]])

- **Index level number, where n=1-10**
- **'Fieldn' is a literal (e.g., ‘PMENU’) or keyword variable (e.g., SYSTEM)**
- **'Begin,Length' optionally specifies a keyword substring**

External Security Interface - NAMEQU

KEYWORD	NAMEQU STATEMENT WHERE APPLICABLE				
VARIABLE	ENV	PRI	FOR	ACTS	PKG
ENVIRONMENT	X	X	X	X	
ACTION		X	X	X	X
MENUITEM		X	X	X	X
MENUAUTH		X	X	X	X
SYSTEM				X	
SUBSYSTEM				X	
STAGEID				X	
STAGENO				X	
STAGENAME				X	
TYPE				X	
ELEMENT				X	
ELM-10				X	
CCID				X	
PKGSUBFC					X
PKGID					X
PKGTYPE					X
PKGSTAT					X
PKGAPPGR					X
PKGBOE					X

External Security Interface - NAMEQU

ESI NAMEQU – Format Statement Syntax (more…)

CLASS=DATASET | classname (e.g., $ENDEVOR)

LOG=NONE | ASIS | NOFAIL | NOSTAT

- **Determines LOG= keyword on RACROUTE Macro**
- **Recommend NOFAIL for menu-related and ASIS for all others**

WARN=YES | NO

- **Overrides ESIDFLTS option**
- **If not coded, ESIDFLTS option is used**

External Security Interface - NAMEQU

ESI NAMEQU - RACF Resource Class Options

DATASET Class {default}

- Limits length of profile to 44 chars (dataset name limitation)
- Updates involve communication and coordination of class refresh
- Can cause an increase in RACF I/O:
  - Can't be RACLISTED (each user must fetch set of profiles)
  - REFRESH forces every user to drop & rebuild all DATASET profiles

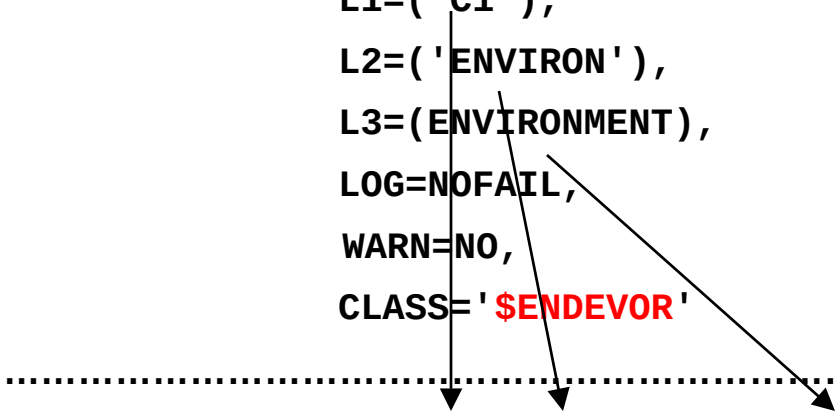
General Resource Class {i.e. $ENDEVOR}

- Permits 246 char profile length (more descriptive names)
- Can improve performance:
  - Able to utilize discrete profiles more easily
  - Able to be RACLISTED if class is properly configured
  - REFRESH is less disruptive (eliminates logoff/logon user requirement)
- Offers better stability and affords faster change process

External Security Interface - NAMEQU

ESI NAMEQU - ENVIRONMENT_ACCESS

```
************************************************************************
*        SPECIFY SAF DATASET NAME FORMATS                              *
************************************************************************
         NAMEQU ENVIRONMENT_ACCESS,                                    X
               L1=('C1'),                                              X
               L2=('ENVIRON'),                                         X
               L3=(ENVIRONMENT),                                       X
               LOG=NOFAIL,                                             X
               WARN=NO,                                                X
               CLASS='$ENDEVOR'
```



Translates to: C1.ENVIRON.environment

Where: 'environment' = TEST, PROD, etc.

Example: C1.ENVIRON.TEST

Profile: C1.ENVIRON.* (* - PROD,TEST)

External Security Interface - NAMEQU

ESI NAMEQU - PRIMARY_OPTIONS

```
NAMEQU PRIMARY_OPTIONS,                                          X
               L1=('C1'),                                        X
               L2=(ENVIRONMENT),                                 X
               L3=('PMENU'),                                     X
               L4=(MENUITEM),                                    X
               LOG=NOFAIL,                                       X
               CLASS='$ENDEVOR'
```

Translates to: C1.environment.PMENU.menuitem

Where: 'environment' = TEST, PROD, etc

'menuitem' = DISPLAY, FOREGRND, BATCH, PACKAGE, BATCHPKG, USER, ENVRMENT, UNLOAD, RELOAD

Example: C1.TEST.PMENU.DISPLAY

External Security Interface - NAMEQU

ESI NAMEQU - PRIMARY_OPTIONS

SAMPLE RESOURCES

C1.PROD.PMENU.BATCH
C1.PROD.PMENU.BATCHPKG
C1.PROD.PMENU.DISPLAY
C1.PROD.PMENU.ENVRMENT
C1.PROD.PMENU.FOREGRND
C1.PROD.PMENU.PACKAGE
C1.PROD.PMENU.USER
C1.TEST.PMENU.BATCH
C1.TEST.PMENU.BATCHPKG
…
C1.TEST.PMENU.USER

SAMPLE PROFILES

C1.PROD.PMENU.PACKAGE
C1.*.PMENU.PACKAGE
C1.*.PMENU.USER
C1.*.PMENU.ENVRMENT
C1.*.PMENU.BATCHPKG
C1.*.PMENU.*

External Security Interface - NAMEQU

ESI NAMEQU - FOREGROUND_OPTIONS

```
NAMEQU FOREGROUND_OPTIONS,                                    X
               L1=('C1'),                                     X
               L2=(ENVIRONMENT),                              X
               L3=('FORACTN'),                                X
               L4=(MENUITEM),                                 X
               LOG=NOFAIL,                                    X
               CLASS='$ENDEVOR'
```

Translates to: C1.environment.FORACTN.menuitem

Where:

- 'environment' = TEST, PROD, etc.
- 'menuitem' = DISPLAY, ADDUPDT, RETRIEVE, GENERATE, MOVE, DELETE, PRINT, SIGNIN

Example: C1.TEST.FORACTN.RETRIEVE

External Security Interface - NAMEQU

ESI NAMEQU - FOREGROUND_OPTIONS

SAMPLE RESOURCES

C1.PROD.FORACTN.ADDUPDT
C1.PROD.FORACTN.DELETE
C1.PROD.FORACTN.DISPLAY
C1.PROD.FORACTN.GENERATE
C1.PROD.FORACTN.MOVE
C1.PROD.FORACTN.PRINT
C1.PROD.FORACTN.RETRIEVE
C1.PROD.FORACTN.SIGNIN
C1.TEST.FORACTN.ADDUPDT
C1.TEST.FORACTN.DELETE
…
C1.TEST.FORACTN.SIGNIN

SAMPLE PROFILES

C1.PROD.FORACTN.DISPLAY
C1.PROD.FORACTN.PRINT
C1.PROD.FORACTN.SIGNIN
C1.PROD.FORACTN.*
C1.TEST.FORACTN.*
C1.*.FORACTN.*

External Security Interface - NAMEQU

ESI NAMEQU - ACTION_INITIATION

```
NAMEQU ACTION_INITIATION,                                    X
               L1=('C1'),                                    X
               L2=(ENVIRONMENT),                             X
               L3=(SYSTEM),                                  X
               L4=(SUBSYSTEM),                               X
               L5=(MENUAUTH),                                X
               LOG=ASIS,                                     X
               CLASS='$ENDEVOR'
```

Translates to: C1.environment.system.subsystem.menuauth

Where:

- 'environment' = TEST, PROD, etc
- 'system' = HRS, ...
- 'subsystem' = PAY, ...
- 'menuauth' = ADD, ARCHIVE, DELETE, …

Example: C1.TEST.HRS.PAY.DELETE

External Security Interface - NAMEQU

ESI NAMEQU - ACTION_INITIATION

SAMPLE RESOURCES	SAMPLE PROFILES
C1.PROD.HRS.PAY.ADD	C1.PROD.HRS.PAY.DELETE
C1.PROD.HRS.PAY.ARCHIVE	C1.*.HRS.PAY.*
C1.PROD.HRS.PAY.DELETE	C1.*.HRS.*.*
C1.PROD.HRS.PAY.DISPLAY	
C1.PROD.HRS.PAY.ENVRNMGR	C1.*.*.*.ENVRNMGR
C1.PROD.HRS.PAY.GENERATE	C1.**
C1.PROD.HRS.PAY.MOVE	
C1.PROD.HRS.PAY.RETRIEVE	
C1.PROD.HRS.PAY.SIGNIN	
C1.PROD.HRS.PAY.SIGNOVR	
C1.PROD.HRS.PAY.UPDATE	
C1.TEST.HRS.PAY.ADD	
C1.TEST.HRS.PAY.ARCHIVE	
…	
C1.TEST.HRS.PAY.UPDATE	

External Security Interface - NAMEQU

ESI NAMEQU - PACKAGE_ACTIONS

```
NAMEQU PACKAGE_ACTIONS,                                    X
               WARN=YES,                                   X
               L1=('C1'),                                  X
               L2=('PACKAGE'),                             X
               L3=(MENUAUTH),                              X
               LOG=ASIS,                                   X
              CLASS='$ENDEVOR'
         NAMEQU TYPE=END
```

Translates to: C1.PACKAGE.menuauth

Where: 'menuauth' = PCREATE, PCAST, PDISPLAY, …

Example: C1.PACKAGE.PUTILITY

External Security Interface - NAMEQU

ESI NAMEQU - PACKAGE_ACTIONS

Requires additional activation in C1DEFLTS table:

- **PKGSEC=ESI or PKGSEC=MIGRATE**

Take advantage of FUNCEQU and control access authorization via 1 profile instead of 10 using varying access levels

Example Package_Actions Profile = C1.PACKAGE.*

READ	UPDATE	ALTER
C1.PACKAGE.pdisplay	C1.PACKAGE.pcreate	C1.PACKAGE.pcommit
C1.PACKAGE.plist	C1.PACKAGE.pmodify	C1.PACKAGE.pbackout
C1.PACKAGE.preview	C1.PACKAGE.pcast	C1.PACKAGE.pexecute
		C1.PACKAGE.putility

The Alternate ID

Feature that can be used to restrict update access to Endevor managed software libraries

An Alternate ID, specified in the customer default table, is used like a surrogate to update Endevor libraries on behalf of, and instead of, individual USERIDs

Used to ensure updates to controlled datasets can only be performed through Endevor and not outside of Endevor, thereby ensuring Endevor file integrity

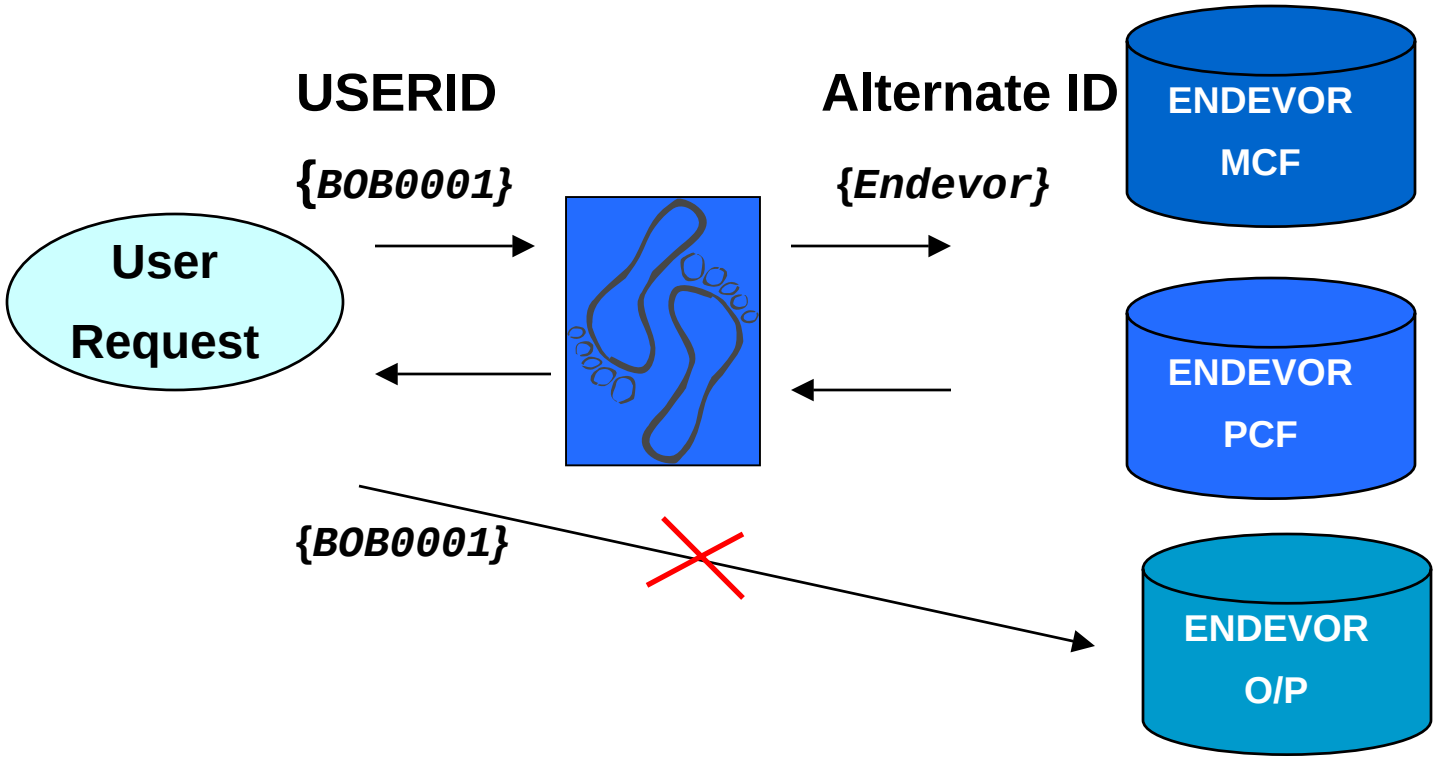
Eliminates requirement to maintain Endevor dataset access for all users

Utilized for dataset security (and functional security if used as the "sweep job" USERID)

Recommended by CA

The Alternate ID

How it works:



Direct access attempts will always utilize the USERID

The Alternate ID

Parameters in the C1DEFLTS table

- **RACFUID** USERID used for dataset authorization checking
- **RACFPWD** Password for the RACFUID (optional)
- **RACFGRP** RACF group associated with the RACFUID (optional)

Example of the C1DEFLTS TABLE

```
C1DEFLTS   TYPE=MAIN
           ESSI=Y
           RACFUID=USERID
           RACFPWD=clear-text password
           RACFGRP=logon groupid
```

Datasets containing C1DEFLTS TABLE source code and assembly module should be protected with a UACC of NONE and strictly limited access if a password is coded

The Alternate ID

A password used to be required but recent changes to Endevor made it unnecessary - do not use / remove if currently in use

Coding a group unnecessarily locks the Alternate ID to a particular group

In RACF

- **Make the Alternate ID PROTECTED (no password logon allowed) assuming no RACFPWD is coded in C1DEFLTS**
- **Grant it access to Endevor datasets**

If PKGSEC = APPROVER, include it in all Approver groups

The Alternate ID

Endevor switches to the Alternate ID to access the following:

- **Master Control File**
- **Package Control File**
- **ACMQ root and XREF data sets (Note: R4.0 - R7.4 requires ICHRCX01)**
- **Base/Delta libraries**
- **Source Input libraries (e.g. include libraries)**
- **Source output libraries (e.g. load libraries)**
- **All processor datasets (not created or deleted)**
- **CCID validation dataset**
- **Package ship staging data sets**

The Alternate ID requires appropriate access to these datasets

The USERID performing the action requires no access

Note: No Alternate ID swap occurs when ELIB datasets are controlled by CA-L-Serv

The Alternate ID

The Alternate ID is not used to access the following:

- **Foreground ISPF work data sets (e.g. uid.C1TEMPRnMSGS, uid.C1TEMPncntl, uid.C1#NTMPL.LIST, etc.)**
- **ADD/UPDATE FROM: data set**
- **RETRIEVE TO: data set**
- **ARCHIVE/TRANSFER TO: data set**
- **COPY FROM: data set**
- **RESTORE FROM: data set**
- **LIST FROM: data set**
- **TRANSFER FROM: data set**
- **PRINT TO: data set**
- **BATCH request data sets**

The USERID performing the action requires appropriate access to these datasets

Configuration and Implementation

Design Endevor BC1TNEQU entries and corresponding RACF profiles

Add General Resource class to RACF if necessary

Create RACF profiles

- **Define Alternate ID**
- **Define groups**
- **Add members to groups**
- **Define resource profiles**
- **Grant access permissions**

Update Endevor BC1TNEQU

Update C1DEFLTS

Configuration and Implementation

On Testing

- **Utilize WARN mode - this ensures all access is allowed and will not disrupt normal activity**
  - **BC1TNEQU ESIDFLTS WARN=YES**
  - **ALD profile-name WARNING**
- **Utilize the Endevor TRACE facility for ESI:**
  - **To review entity names (i.e. pseudo data sets) and the SAF return codes at each security control point**
  - **Ensure the entity names are being constructed and evaluated as intended**
- **Monitor security reports and adjust access accordingly**
  - **ENRASW00 = Endevor ESI Exception Warning report**
  - **RACFRW = RACF Report Summary of all warnings by resource name (use SELECT PROCESS WARNINGS; EVENT ALLSVC)**

Remember! RACF resource profile modifications may require the user to logoff/logon TSO and/or a SETROPTS REFRESH in order to take effect

Configuration and Implementation

The Endevor Trace Facility

- Don’t be afraid to use it!
- Getting Started (see Using the Trace facility in the Endevor Security Guide manual – ENSECnnn for details)
  - Activate ESI
  - Ensure you have access to Endevor CLIST library (or utilize the TSO allocate command)
  - Determine foreground or batch mode (determined by how you will be submitting Endevor actions)
  - Foreground
    - %ESITRACE START
      - Writes trace records to your terminal
    - %ESITRACE DATASET DSN(ESI.TRACE) NEW CAT
      - Writes trace records to dsn = userid.ESI.TRACE
    - %ESITRACE STOP

Configuration and Implementation

The Endevor Trace Facility (more…)

- **Batch**
  - **Pre-allocate your trace file; DCB=(RECFM=FBA, LRECL=133, BLKSIZE=1330 {or any multiple of 133})**
  - **Complete JOB STATEMENT INFORMATION on the BATCH OPTIONS MENU panel**
  - **Select option #5 (BUILD JCL – Enter additional JCL to be included with the job) from the Batch Options Menu panel**
  - **Include one of the following JCL statements:**
    - **//EN$TRESI DD SYSOUT=***
    - **//EN$TRESI DD DSN=userid.ESI.TRACE, DISP=SHR**

The Endevor Trace Facility (more…)

- Sample output
  - The first “n” ENCS001I: statements will include a listing of the BC1TNEQU table – including the TITLE, the date/time of the last assembly, the ESIDFLTS values, the FUNCEQU entries, and the NAMEQU entries
  - The ENCS101I statements follow, and these statements contain the trace information – beginning with the format number:

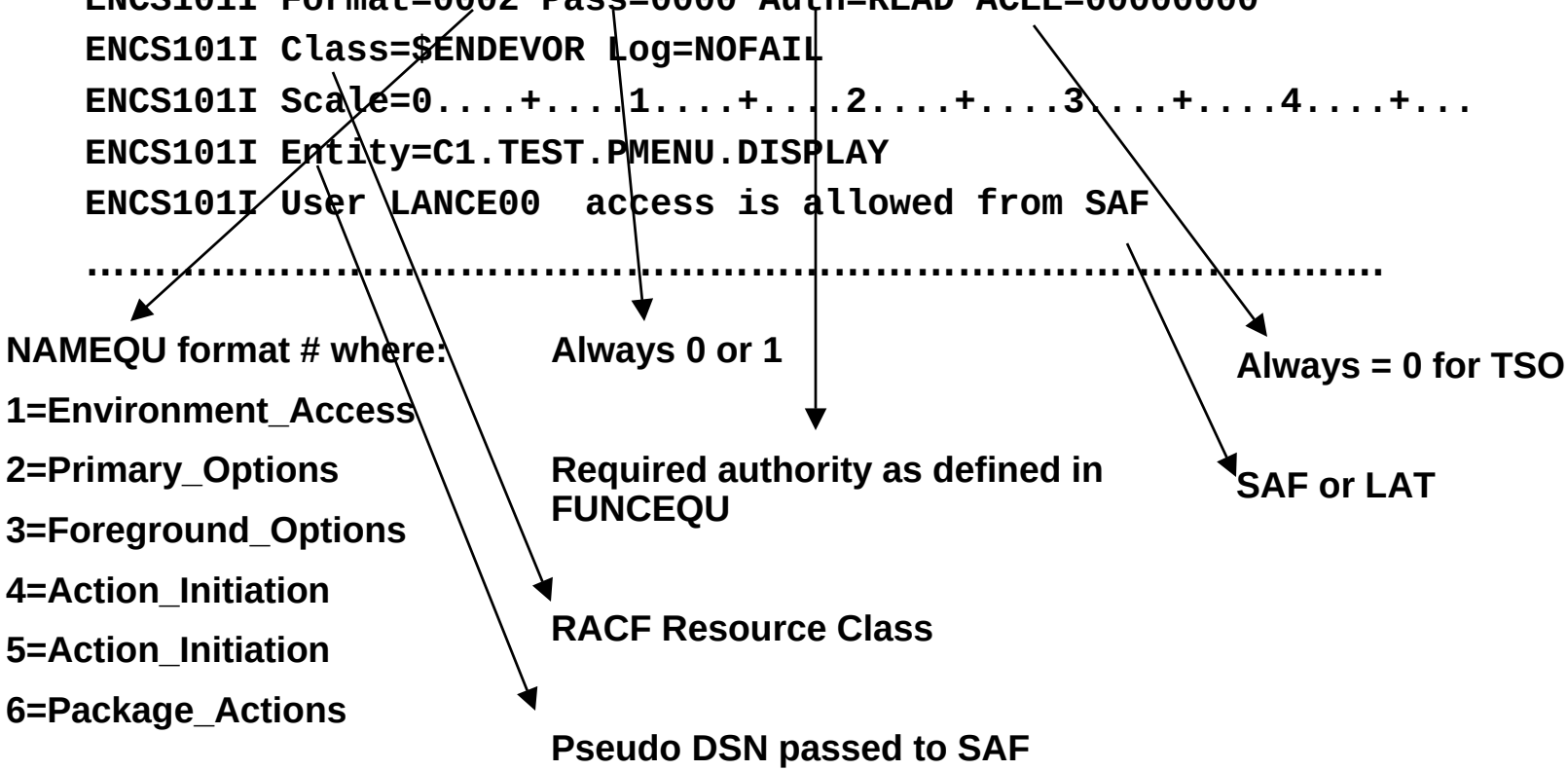
```
ENCS101I Format=0001 Pass=0000 Auth=READ ACEE=00000000
ENCS101I Class=$ENDEVOR Log=NONE
ENCS101I Scale=0....+....1....+....2....+....3....+....4....+...
ENCS101I Entity=C1.ENVIRON.PROD
ENCS101I User LANCE00  access is denied from SAF
ENCS101I RACROUT RC=0008 RACHECK RC=0008 REASON=0000
```

Configuration and Implementation

The Endevor Trace Facility (more…)

- Sample output (more…)
  - What does it mean?

```
ENCS101I Format=0002 Pass=0000 Auth=READ ACEE=00000000
ENCS101I Class=$ENDEVOR Log=NOFAIL
ENCS101I Scale=0....+....1....+....2....+....3....+....4....+...
ENCS101I Entity=C1.TEST.PMENU.DISPLAY
ENCS101I User LANCE00  access is allowed from SAF
.....................................................................
```



The Administration Evolution

“An achievement, no matter how magnificent, will eventually decay if not preserved with proper care” -George Sheehan

“Proper security administration does not happen overnight. It is a dynamic process which continuously evolves and must never be marked complete.” -RSH Consulting

The Administration Evolution

Guidelines to ensure security controls function efficiently, effectively and remain in tact:

- **Produce and monitor security reports regularly (statistical reports always gain management attention)**
- **Perform annual Endevor security reviews**
  - **Ensure functional security rules continue to map to real functions (reorganizations can eliminate functional areas)**
  - **Ensure appropriate USERIDs are permitted access to groups while inappropriate USERIDs are removed**
  - **Modify the security table when necessary**
- **De-centralize security administration**
  - **Data Owners determine access and/or approval authorization**
  - **Team Leads grant access to groups and maintain access via group member connect authority**

Got Security?

Signs of proper controls and security:

- ✓ **Access to Endevor's control libraries is restricted to the USERIDs of the users responsible for maintaining them**
- ✓ **Access to Endevor's output libraries is restricted to the Alternate ID and Endevor administrators**
- ✓ **Access to Endevor panels, managed software items, and menu actions is granted using role-based security groups corresponding to user job functions**
- ✓ **Joining and removing users on application teams is handled simply by making changes in group membership**
- ✓ **Group changes to join and remove users on application teams automatically updates Approvers as well**
- ✓ **The business area responsible for the application software is the "stopgate" that decides who can view, modify, or delete code and approve packages; they also have an oversight role to ensure access limitations are enforced**

Sample RACF Profiles

External Security Interface

Sample RACF group definitions

```
AG END$     DATA‘Endevor Owner’           OWNER(SYS1) SUPGROUP(SYS1)
AG END$ADMN DATA‘Endevor Administrator’   OWNER(END$) SUPGROUP(END$)
AG END$TECH DATA‘Endevor Tech Support’    OWNER(END$) SUPGROUP(END$)
AG END$USER DATA‘Endevor Menus-All users’ OWNER(END$) SUPGROUP(END$)
AG END$APRV DATA‘Endevor Pkg Approvers’   OWNER(END$) SUPGROUP(END$)
AG END$TRNG DATA‘Endevor Student’         OWNER(END$) SUPGROUP(END$)
AG END$AAA1 DATA‘Endevor AAA Level 1’     OWNER(END$) SUPGROUP(END$)
AG END$ESI  DATA‘Endevor Alternate ID’    OWNER(END$) SUPGROUP(END$)
```

……

Notes:

- Group entries should include a description in the data field, an owner, and a superior group entry
- Names and group structure are examples only - following local naming conventions

Sample RACF Profiles

External Security Interface

Sample RACF general resource profile definitions

```
RDEF $ENDEVOR 'C1.ENVIRON.**'       OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.ENVIRON.PROD**'   OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.ENVIRON.TEST**'   OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.ENVIRON.TRAIN**'  OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.*.PMENU.**'       OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.*.FORACTN.**'     OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.*.*.**'           OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.*.aaa.**'         OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.PACKAGE.**'       OWNER(END$) UACC(NONE) GENERIC
RDEF $ENDEVOR 'C1.**'               OWNER(END$) UACC(NONE) GENERIC
```

Notes:

- "Catch all" profiles - like C1.** - ensure all resources are covered
- Default access UACC specification for ALL users
- Security profiles which include the Endevor SYSTEM id provide limited inventory access
- Security specifications for package actions limit users ability to perform package functions

Sample RACF Profiles

External Security Interface

Sample RACF access permissions

```
PE 'C1.ENVIRON.**' CLASS($ENDEVOR) ACCESS(READ) ID(*)or
                                                ID(END$ADMN)
                                                ID(END$USER)

PE 'C1.ENVIRON.PROD**' CLASS($ENDEVOR) ACCESS(READ) ID(END$USER)
                                                    ID(END$ADMN)

PE 'C1.ENVIRON.TEST**' CLASS($ENDEVOR) ACCESS(READ) ID(END$USER)
                                                    ID(END$ADMN)

PE 'C1.ENVIRON.TRAIN**' CLASS($ENDEVOR) ACCESS(READ) ID(END$TRNG)
                                                     ID(END$ADMN)
```

Notes:

- Determine access requirements – should all users have access to all Endevor menus?
- ID (*) grants access to all users defined to RACF
- ID(END$USER) limits access to ENDEVOR users

Sample RACF Profiles

External Security Interface

Sample RACF access permissions (more…)

```
PE 'C1.*.PMENU.**' CLASS($ENDEVOR) ACCESS(READ) ID(*) or ID(END$USER)

PE 'C1.*.FORACTN.**' CLASS($ENDEVOR) ACCESS(READ) ID(*) or ID(END$USER)

PE 'C1.*.aaa.**' CLASS($ENDEVOR) ACCESS(READ)    ID(END$AAA1)
                                 ACCESS(UPDATE)  ID(END$AAA2)
                                 ACCESS(CONTROL) ID(END$AAA3)
                                 ACCESS(ALTER)   ID(END$ADMN)
                                 ACCESS(ALTER)   ID(END$ESI)
PE 'C1.*.*.**' CLASS($ENDEVOR)   ACCESS(ALTER)   ID(END$ADMN)
                                 ACCESS(ALTER)   ID(END$ESI)
```

……

Notes:

- Application team access will vary depending upon job function
  - Level 1 = display/view element inventory and package approver
  - Level 2 = all functions required to modify elements within the inventory
  - Level 3 = override signout

Sample RACF Profiles

External Security Interface

Sample RACF access permissions (more…)

```
PE 'C1.PACKAGE.**' CLASS($ENDEVOR) ACCESS(READ)   ID(END$AAA1)
                                                  ID(END$APRV)

PE 'C1.PACKAGE.**' CLASS($ENDEVOR) ACCESS(UPDATE) ID(END$AAA2)

PE 'C1.PACKAGE.**' CLASS($ENDEVOR) ACCESS(ALTER)  ID(END$ADMN)
                                                  ID(END$ESI)
```

……

Notes:

- **Package function abilities are determined by access level (see FUNCEQU)**
  - **READ: Package Display, Package List, Package Review**
  - **UPDATE: Create, Modify, Cast**
  - **ALTER: Backout, Commit, Execute, Utility**
- **PKGSEC = ESI must be specified in C1DEFLTS in order to utilize all ESI package action rules. Package actions are usually restricted to users specified in the approver group.**

Sample RACF Profiles

External Security Interface

Sample RACF user-to-group connects

```
CO ROSE001 GROUP(END$ADMN) AUTH(CONNECT) OWNER(END$ADMN)
CO BOB0001 GROUP(END$AAA1) AUTH(CONNECT) OWNER(END$AAA1)
CO MARK001 GROUP(END$AAA2) AUTH(USE)     OWNER(END$AAA2)
CO BOB0001 GROUP(END$AAA2) AUTH(CONNECT) OWNER(END$AAA2)
CO BOB0001 GROUP(END$AAA3) AUTH(CONNECT) OWNER(END$AAA3)
CO BILL001 GROUP(END$AAA3) AUTH(USE)     OWNER(END$AAA3)
```

……

Notes:

- AUTH(CONNECT) enables the user to connect other users to the group
- Team Leads and/or data owners should be granted connect authority
- END$AAA1 Group can serve as the approver group for the application team
- Application specific function abilities are determined by access level (see FUNCEQU)
  - READ (level 1): View / Display
  - UPDATE (level 2): Add, Generate, Move, Retrieve, Update, Signin, Delete
  - CONTROL (level 3): Override Signout
  - ALTER: Envrmgr,Transfer,Archive,Restore