Security in the Datacom™ World

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Abstract

- In this world of hyper sensitivity to security, understanding how to implement Datacom external facility security is critical. This session will provide the user with a basic setup to get started with external security.

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- Robert has been part of the Datacom/DB Engine Development team since ADR days in 1987
- He became involved with External Security as it replaced internal security over 30 years ago
- He is a SME in Index Processing and DB internals
- He holds Multiple Patents and loves tinkering with code
- Robert is a history buff who has spent many years restoring a large house built in 1908

Agenda

- Show the available Datacom components used to set a secured environment
- Highlight two use cases
- Not get too bogged down in details
  - But have the details in this presentation for your reference
- For those who have not yet set up Security a cookbook
- For experienced users interesting things you may not have considered
- Questions and comments welcome in the chat window

External Security Risks and Rewards

- Without External Security
  - Anyone who can get to a MUF can do anything they want!
    - Accidently or maliciously corrupt data
    - Steal or copy data
    - Accidently or maliciously harm the MUF
  - A few non external security tools exist inside MUF for protection
    - Such as Open Exit
    - Simplify Mode
- Startup message

```
DB00270W - ACCESS TO DATACOM TABLES NOT PROTECTED BY EXTERNAL SECURITY
DB00201I - MULTI-USER ENABLED, CXX=yourcxx ...
```

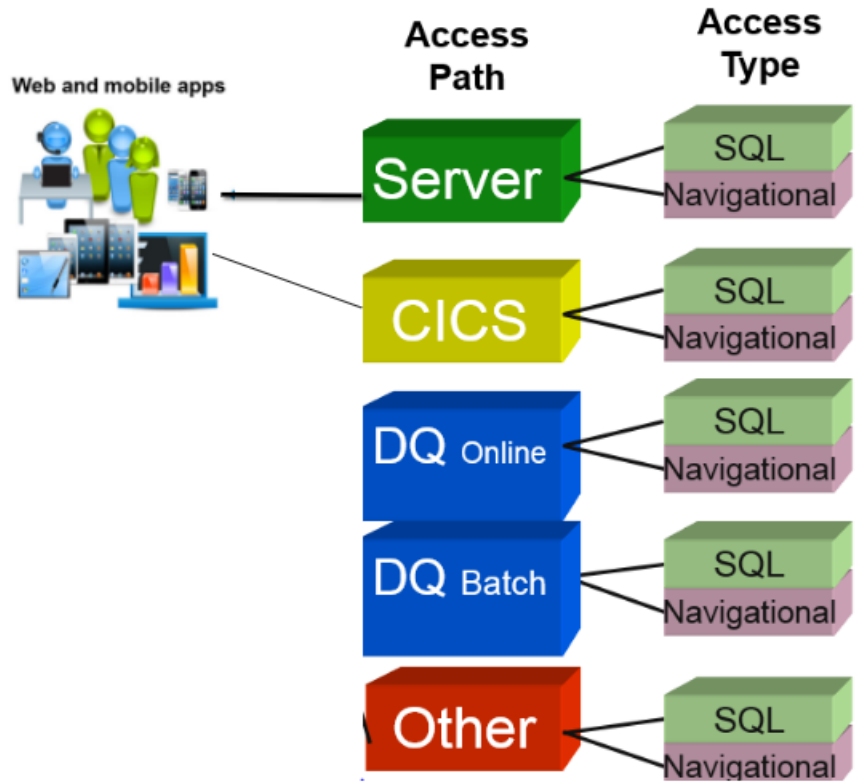
Steps for Implementing External Security

- Decide how the data needs to be secured
  - Data access Paths
- Analyze roles and departments for logical groupings
- Set up Table Classes and Rules
  - Which are checked when the table is accessed
- Set up Function Security using DTUTIL class
- Decide if other External Security Protocols needed
  - Such as XCF, Plan Security, …
  - Can be done before or after turning on
- Set up DTSYSTEM resources to turn it on

Table Access Path Security

- MUF recognizes different ways data is accessed
- Which can have independent security rules
- Including some (or all) paths which can be set up with NO external security

The ten recognized paths



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Two sample Use Cases Securing Table Access

- An AD CA 7 MUF
  - A single table class to protect CA 7 tables from being accessed or changed outside CA 7
- A full DB MUF
  - Datacom Server access
    - Use a different rule set and table class
  - CICS no table security
    - Because I have implemented CICS transaction security outside Datacom
  - All other table access (including Dataquery™ CICS)
    - Use a separate or different class than Server
- For these samples I will be using Top Secret
  - And assuming it has been set up as a closed system

Table Classes used by Datacom

- 10 Available classes just as there are 10 paths
  - DCTABLE DFTABLE DGTABLE DHTABLE DPTABLE
  - DQTABLE DRTABLE DSTABLE DTTABLE DXTABLE
- You pick the classes you will use
- Table Access Levels used by Datacom
  - ADD DELETE READ UPDATE
  - Autonomous in ACF2 and Top Secret
  - Hierachical in RACF
- Resource name's format
  - cxxname.DB0nnnn.ttt
    - nnnn 4 character DBID
    - ttt 3 character Datacom table name

CA 7 AD MUF

Using DCTABLE Resource Class

- Example CXXname is CA7CXX
- Allow access to CA 7 support tables for User Id associated with the CA 7 started task
- TSS PER(CA7STC) DCTABLE(CA7CXX.DB00770.) ACCESS(ALL)
- Allow read access to Dynamic System Tables containing metadata which CA 7 uses
- TSS PER(CA7STC) DCTABLE(CA7CXX.DB01000.) ACCESS(READ)
- Allow a SYSPROG maintenance access to CA 7 support tables
- TSS PER(CA7SPG) DCTABLE(CA7CXX.DB00770.) ACCESS(ALL)
- Allow user read access to CA 7 support tables
- TSS PER(userid1) DCTABLE(CA7CXX.DB00770.) ACCESS(READ)

Datacom Component Rules

DD, SQL, etc.

- For both AD and full DB
- A Datacom component has implicit rights to its support tables
  - Hence an SQL request has rights to read and update the DDD database as needed to run SQL
  - An SQL or Datadictionary catalog request (Create, etc.) has rights to update the DD Database
- Meaning you do not have to give table rights to these support databases
  - So they are still protected from corruption via direct user requests
- Datacom Server has rights to what it needs, including the Dynamic System Tables
- AD products in general *do not* piggyback on this for their own supports tables
  - Allows AD products can flexibly change their code in an agile way

Full DB System Sample

- I will use DTTABLE to secure Datacom Server table access
- And DCTABLE to secure non CICS non SERVER access
- Rule format the same, just a different CXXname
  - For my Defaults:
  - *Close down Server:* TSS PER(ALL) DTTABLE(TESTCXX.) ACCESS(NONE)
  - Open up others: TSS PER(ALL) DCTABLE(TESTCXX.) ACCESS(ALL)
- Then through analysis add special rules for some DBIDs and perhaps tables within DBIDs
  - TESTCXX.DB0nnnn.ttt
  - In DCTABLE for Server and DTTABLE non Server non CICS
  - With Access Levels of NONE, READ, ADD, UPDATE, DELETE, or ALL
    - TSS PER(usera) DTTABLE(TESTCXX.DB00111.ORD) ACCESS(READ)

Function Security the DTUTIL Resource Class

- Most function security is defined in the DTUTIL resource class
- For DBUTLTY
  - Resource name is cxxname.DBUTLTY.function.subfunction
  - DBUTLTY secured if any non SQL (i.e. RAAT) path is secured
  - If it is, MUF must be enabled when DBUTLTY runs
    - Security layer is in MUF
    - Similar to Simplify mode
- Other components also use DTUTIL for functional security such as
  - Datadictionary™
    - cxxname.DD….
  - SQL
    - cxxname.SQ…

DBUTLTY Security, DTUTIL

- Need rights to run the function
  - And if a table is involved, appropriate rights for each affected tables
- DBUTLTY functions broad categories
  - Reporting with no data exposure
    - Likely needed by app developers and DBAs
    - Example TSS PER(appuser) DTUTIL(CXXTEST.DBUTLTY.REPORT.CXX)
    - With underlying table DISPLAY rights
    - Example in TSS PER(appuser) DTUTIL(CXXTEST.DB00001.PAY,DISPLAY)
  - Note from above table rights of
    - BACKUP, DISPLAY, CATALOG, LOAD and OPR are defined in DTUTIL
  - DBA functions which could affect the health of the MUF and are needed by DBAs and operators
    - Examples

      TSS PER(opuser) DTUTIL(CXXTEST.DBUTLTY.COMM.CLOSE)
      TSS PER(opuser) DTUTIL(CXXTEST.DBUTLTY.DEFRAG)
      Neither of which has table rights

DBUTLTY Data Exposure

- But some DBUTLTYs create data exposure and should be treated with care
  - Example 1 EXTRACT which creates a flat file with table's data rows
    - TSS PER(userx) DTUTIL(CXXTEST.DBUTLTY.EXTRACT)
    - With appropriate table READ privileges in the RAAT table class
  - Example 2 BACKUP data which creates a Datacom backup file
    - Which can be compressed, etc. so maybe less exposure
    - TSS PER(userx) DTUTIL(CXXTEST.BACKUP.DATA)
    - TSS PER(userx) DTUTIL(CXXTEST.DB00001.PAY,BACKUP)
- Some affect the contents of data and index areas and system areas
  - Examples INIT, LOAD
- You could use special security user ids for running defined or scheduled DBUTLTYs
- Likely start with relatively open or closes system and work in special cases

Cataloging SQL Create Table

- SQL Create Table may be needed at either AD or DB sites
  - In DTUTIL
  - cxxname.DB0nnnn.999.CATALOG
  - Example allow SQL Create into the CA 7 database
    - TSS PER(userid) DTUTIL(CA7CXX.DB00770.999.CATALOG)
  - No Dictionary access needed
    - Since being done on SQL's behalf

Console Like Commands an Important Aside

- Since these can be issued in a host of ways be cognizant of who can issue them and how
- Example EOJ a MUF
  - Through actual console
    - z/OS console privileges
    - No additional Datacom external security
  - DBUTLTY COMM OPTION=EOJ (older protocol)
    - DTUTIL resource cxxname.DBUTLTY.COMM.EOJ
  - Through DBUTLTY “console-like” facility
    - DBUTLTY COMM OPTION=CONSOLE,OPTION2='EOJ ‘
    - DTUTIL resource cxxname.DBUTLTY.COMM.CONSOLE
  - Through SQL Insert into the Dynamic System Tables
    - Table right to DnTABLE (SQL other path)
    - cxxname.DB01000.SQX ACCESS(ADD)

LEVEL concept and DTSYSTEM

- Datacom asks a pair or questions to prove it is not just reacting to defaults
- A Level is an architectural level
  - We have been at level 5 for awhile. If just setting up, choose LEVL05
- Must have access denied in DBSYSTEM resource class to
  - ACTIVATE.LEVEL05.FAIL
- And access allowed to
  - ACTIVATE.LEVEL05.PASS
- For USERID associated with MUF job or started task
- Note no CXXname as part of this resource name!
- Set up levels after at least some minimal Datacom rule set has been defined

Turn on Security with Access Denied in DTSYSTEM

- Counterintuitive: access denied = security on
- Resource name is cxxname.DBccppp
  - cc is the resource class
    - For instance DC is DCTABLE
  - ppp is the access path,
- Since for CA 7 sample we want all 10 to use the same class
  - Sample rule set
    - TSS PER(ALL) DTSYSTEM(CA7CXX.DBDC*) ACCESS(NONE)
    - TSS PER(ALL) DTSYSTEM(CA7CXX.*) ACCESS(ALL)
  - This forces MUF to use DCTABLE class for all path

Turn on Security with Access Denied Full DB Sample

- In first line below
  - DT is DTTABLE class
  - SSR is access path SQL Server (paths codes listed in the Security Doc)
- TSS PER(ALL) DTSYSTEM(DBCXX.DBDTSSR) ACCESS(NONE)
- TSS PER(ALL) DTSYSTEM(DBCXX.DBDTRSR) ACCESS(NONE)
- TSS PER(ALL) DTSYSTEM(DBCXX.DBNOSCI) ACCESS(NONE)
- TSS PER(ALL) DTSYSTEM(DBCXX.DBNORCI) ACCESS(NONE)
  - NO means no security for this path (SCI SQL CICS, RCI RAAT CICS)
- TSS PER(ALL) DTSYSTEM(DBCXX.DBDC*) ACCESS(NONE)
  - All others paths use DCTABLE
- TSS PER(ALL) DTSYSTEM(DBCCXX.*) ACCESS(ALL)

Enabling External Security

- Turn on the level
  - TSS PER(ALL) DTSYSTEM(ACTIVATE.LEVEL05.FAIL) ACCESS(NONE)
  - TSS PER(CA7STC) DTSYSTEM(ACTIVATE.LEVEL05.PASS) ACCESS(ALL)
- The SECURITY MUF Startup Option
  - If coded and no choice, must match the DTSYSTETM rule set
    - For full DB
    - SECURITY DBNOSCI,DBNORCI,DBDTSSR,DBDTRSR
    - SECURITY DBDCRAQ,DBDCSQQ,DBDCSCQ,DBDCRCQ,DBDCRAT,DBDCSQL
  - But is optional if no choice

For Test Systems can allow a choice

- TSS PER(ALL) DTSYSTEM(TESTCXX.DB*) ACCESS(NONE)
  - All path class combinations access denied
  - So must code the SECURITY Startup Option
  - And what you code is what will be used (including no)
  - SECURITY DBwwSCI,DBwwRCI,DBwwSSR,DBwwRSR
  - SECURITY DBwwRAQ,DBwwSQQ,DBwwSCQ,DBwwRCQ,DBwwRAT,DBwwSQL
  - Where ww is whatever two character class name of the 10 you choose
- I use this on my personal test system to turn on and off security at will for testing purposes
  - Since I am not a security administrator
  - And it is bothersome to constantly ask for a rule change
- Note other values exist for cxxname. In DTSYSTEM such as cxxname.DD for Datadictionary functional security, hence my rule is cxxname.DB* not cxxname.*

Some Messages

- From my Full DB Example at MUF Startup

```
DB00231I - EXTERNAL SECURITY LEVEL 05 ACTIVE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON SQL OTHER DQ WITH DCTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON RAT OTHER DQ WITH DCTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON SQL CICS DQ WITH DCTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON RAT CICS DQ WITH DCTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON SQL SERVER WITH DTTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON RAT SERVER WITH DTTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON SQL OTHER WITH DCTABLE
DB00220I - EXTERNAL SECURITY ACTIVE FOR TESTCXX ON RAT OTHER WITH DCTABLE
```

Cataloging using DDUPDATE with BTG

- Rights to catalog tables and DBIDs needed at both AD or DB sites
- Datadictionary function security controlled through an independent DTSYSTEM resource
  - Simple name cxxname.DD
    - With Access denied to turn it on
    - DB00220I - EXTERNAL SECURITY ACTIVE FOR PRODCXX ON DATADICTIONARY
- DTADMIN class
  - Access allowed for cxxname.DD
    - A Dictionary Administrator
  - (DTADMIN also has a DB node for things like SQL DROP table)
- Many needed rights in DTUTIL
  - Sample rule TSS PER(CA7DBA) DTTUTIL(CA7CXX.DB00002.) ACCESS(ALL)

Datacom Server Considerations

- LOGON=YES (DEFAULT)
  - SVDBSPR must reside in an APF authorized library
  - USERID is defined in the external security package
  - USERID is passed to the associated Datacom MUF to determine data access privileges
  - If LOGON=NO, ACEE is not accessed and no user info is passed to MUF!
- Datacom Server does NOT perform FACILITY checking. Rather, it simply validates the userid/password with external security and passes it to the MUF where additional access privileges are checked
- CONEXIT and SECEXIT can be used
  - CONEXIT is called BEFORE the call to the external security interface.
  - SECEXIT is called AFTER the call to external security

Useful SQL External Security Tools

- Up to now we have said security is at the table access level
- And my sample suggested since a CICS transaction has a predefined set of resources transaction security may be good enough
- SQL also has Plan and View External Security
  - Somewhat analogous to the CICS transaction security
- With Plan Security
  - You can inherited the binders table rights
    - Via check who, binder or executor and
    - Check when, bind or execute
- A view is a collection or subset of tables, so checking using View instead of table means a user only see the data the view represents
  - Chosen using the VIEWSEC Preprocessor plan option, see doc

Security Product Differences

- Resource Class Names are different
  - ACF2 Class Names are three characters
    - DTSYSTEM is DTS
    - DTUTIL is DTU
    - Table classes are also first three characters
  - RACF Class Names 3rd character is an “@”
    - DTSYSTEM is DT@YSTEM
    - DTUTIL is DT@TIL
    - Table class follow this pattern
  - With Top Secret MUF must be defined as a Facility

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