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New VBS Using Oracle Fine-Grained Access Control

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Introduction

- Introduce Oracle Fine-Grained Access (FGAC) as a working tool in SCT Banner for row level security
- When is this being implemented in Banner
  - Banner 7.0
- Scope of what FGAC will secure
  - Value Based Security (VBS)
  - Personally Identifiable Information (PII)

Definitions

- FGAC - Fine Grained Access Control
  - FGAC is meant for row level security
    - It works by dynamically modifying a SQL statement in a way transparent to users
    - Adds a condition (WHERE predicate clause) which restricts the rows shown to the user

Definitions

- Enabling technology used to implement VPD and other more flexible security
  - Used to achieve application security.
  - Users know of other users, and can possibly see data outside their area but be restricted from database modifications
- Our project defines it as GOKFGAC FGAC
  - GOKFGAC is the package that owns all of the processing.

Definitions

- VBS
  - Value Based Security
  - Defined for individual users as needed
- PII
  - Personally Identifiable Information.
  - Philosophy of PII: User can access PII for records in their processing area (you can only view PII for Student Applicants if you work in Admissions)

Definitions

- PII secures General Person identifiable information, and is only on the selection of data – delivering PII on SPRIDEN
- To have access to a SPRIDEN row, the PIDM must have a row in one of the PII Domains the user is assigned
- When turned on, affects all users of the system. Certain users and program objects can be exempt.
- PII and VBS do not require each other, can implement one or the other

Definitions

- Domain
  - Area in Banner that has a common driving table
    - Example of a VBS domain is Student Admissions
    - The driver is SARADAP
    - All lesser tables in Admissions are part of the domain and will follow restrictions based on the rules defined for the Admissions domain
  - PII domain determines where PIDM must exist
    - The domain driver for Admissions is SARADAP and the PIDM values must exist in this table for the user to have access.

Definitions

- Predicate
  - The SQL clause for a domain and group that defines the access restriction
- Policy
  - ORACLE object on a table that makes FGAC work
  - Must create policy before PII and VBS will work
  - Policy created by process the DBA runs after Users define domain and its tables
  - One policy per table in the GOKFGAC FGAC schema

Definitions

- Business Profile
  - Lets you group users together that have the same access restrictions. Introduced to reduce data entry of access restrictions.
  - Different than BANSECR Roles. Maintenance of Business Profiles is meant to be distributed and moved out of the BANSECR schema.

Example of VBS

- The institution has two colleges: College of Arts and Sciences and College of Education.
- Each college has a separate Admissions Office.
- The Admissions Office can insert, update, delete and select all applications in their own college.
  - They can also admit their applicants into their college, but they cannot change the Student record.
  - In addition they can only query the applications in the other college.

Example of VBS (cont.)

- Benefits of VBS
  - Restrictions at the row level not the table or object
  - Security checking has to happen when rows are accessed
  - Restrict SARADAP tables access based on college code value

Example of PII

- Back to my institution with the Admissions Office
- Staff in Admissions Office can view people's names/IDs only if the person has an application
- Solution:
  - Identify PII domain that is associated with User's office (like Admissions)
  - PII Policy on SPRIDEN will filter based on PII Domain assigned to individual users.
    - PIDM must have row in PII domain driver table for User to view SPRIDEN data

PII and Multiple PIDM prevention

- Can exempt USER from all PII processing
  - May be needed for users who create SPRIDEN rows
- Can exempt objects that perform searches from all PII and VBS restrictions

PII and protecting sensitive data

- Deliver limited masking rules for Forms
  - Turn visibility off on displayed fields on page
  - Change format of dates and numbers
    - To show only month/day of a date, use DD-MON
  - Conceal character data with '*'
  - Utilize on any Banner Form
  - Partial concealment of char data post 7.0 release
    - E.g.: show just the first three characters of the SSN like 123******

How does FGAC work?

1. User selects from saradap

Select * into saradap_c.rowtype from saradap

Where saradap_pidm = :pidm and saradap_term_code_entry = :term_code

2. FGAC executes GOKFGAC predicate function and retrieves predicate

3. FGAC Appends Predicate to SQL statement

saradap_coll_code = 'AS' and saradap_resd_code = 'M'

4. Row retrieved or no records found message

How does FGAC work?

1. User inserts into saradap

Insert into saradap
(saradap_pidm, …..)

Values (1234, …..)

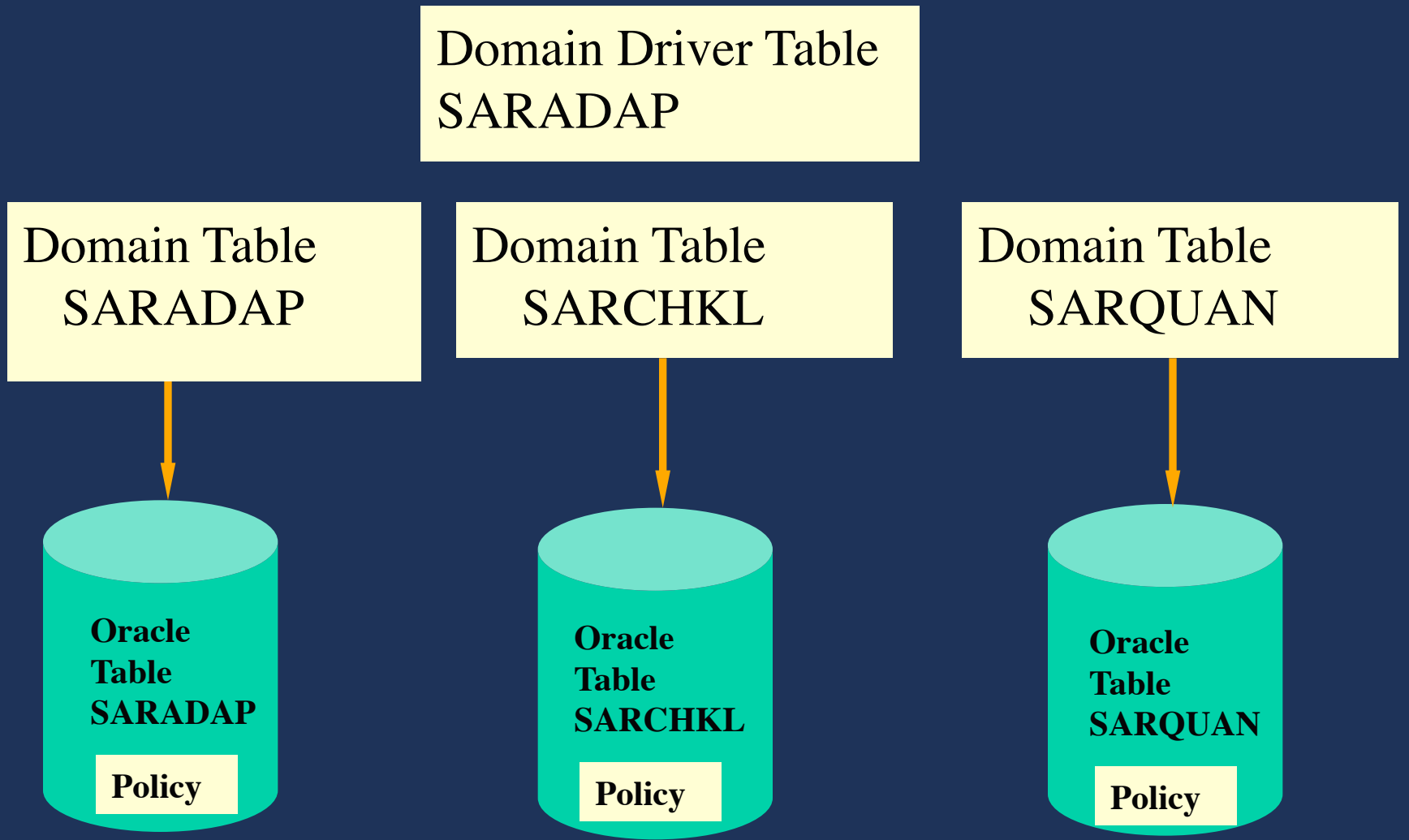
2. FGAC executes GOKFGAC predicate function and retrieves predicate

3. FGAC Appends Predicate to SQL statement

(new)saradap_coll_code = ‘AS’
and (new)saradap_resd_code = ‘M’

4. Row inserted or oracle error message displayed

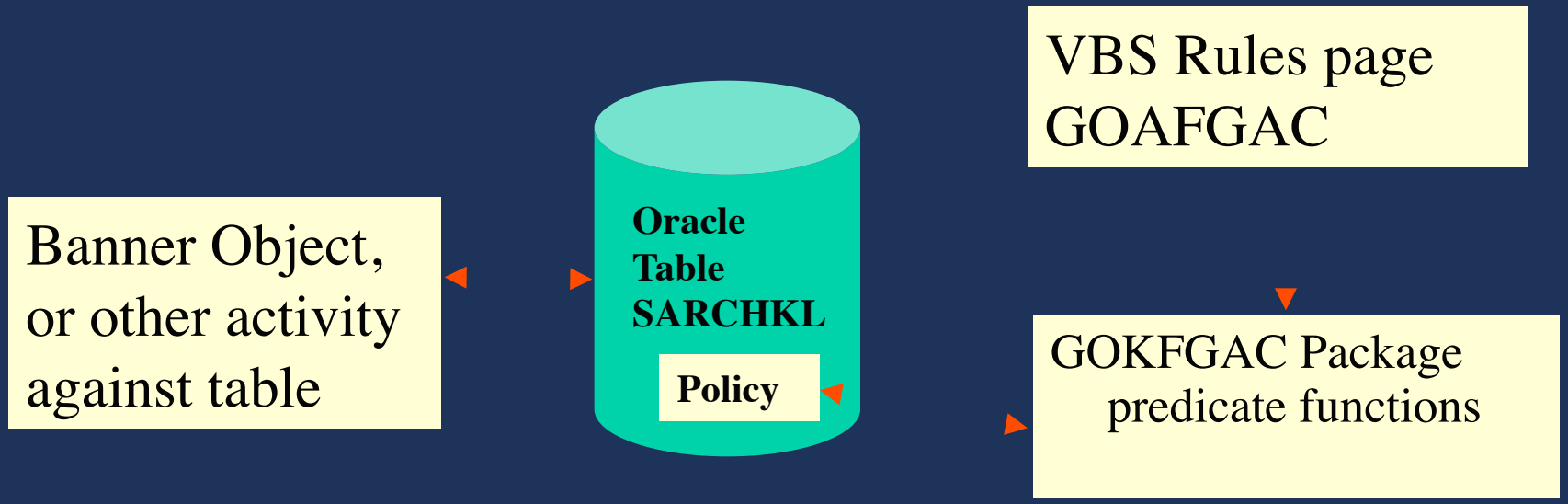
Banner/GOKFGAC FGAC set up



New processes in Banner

- Setting up Policies using new GOKFGAC FGAC rules forms
  - Identify domain and its driver table
  - Define tables under each domain
  - Tables can be a part of multiple domains
  - Run gorfdpl.sql using BANINST1 ID to create the table policies in ORACLE

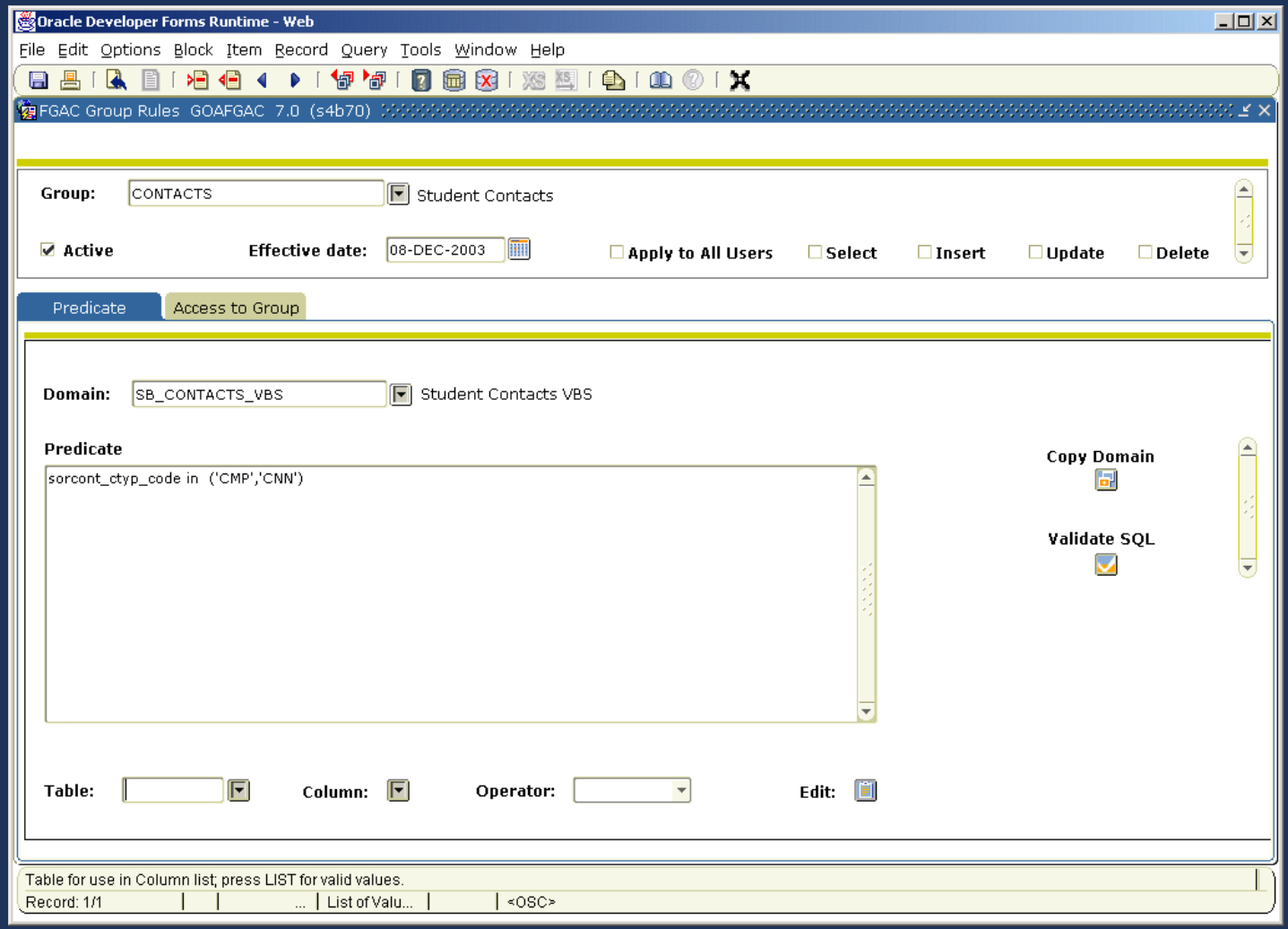
VBS Restrictions and Banner



New processes in Banner

- Defining VBS restrictions
  - Add new group rule and activate on page GOAFGAC
  - Enter predicate (SQL) statement for each domain you want restrictions defined
  - Add Business Profiles or User IDs that are restricted by rule

New VBS rules page in Banner



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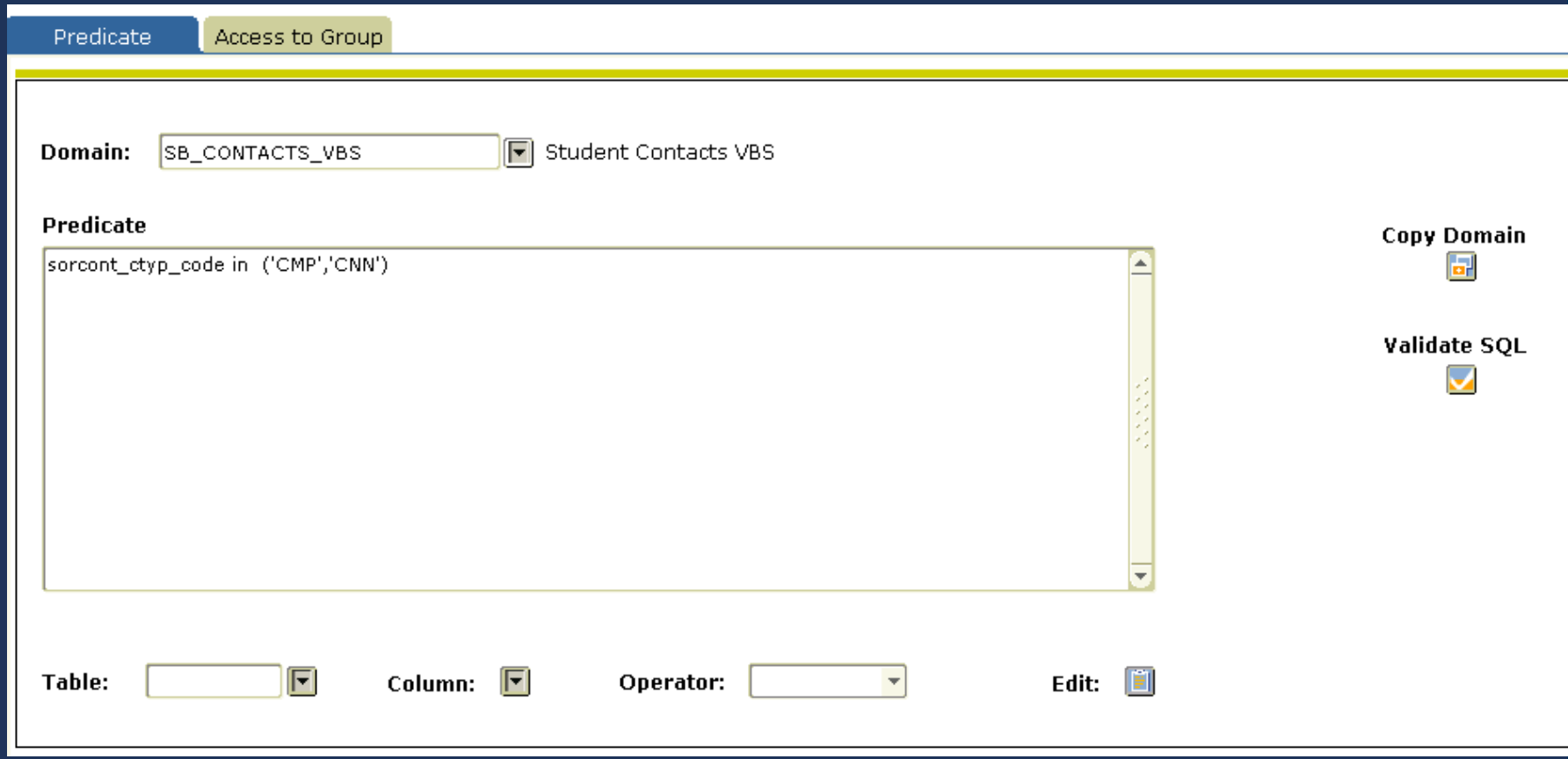
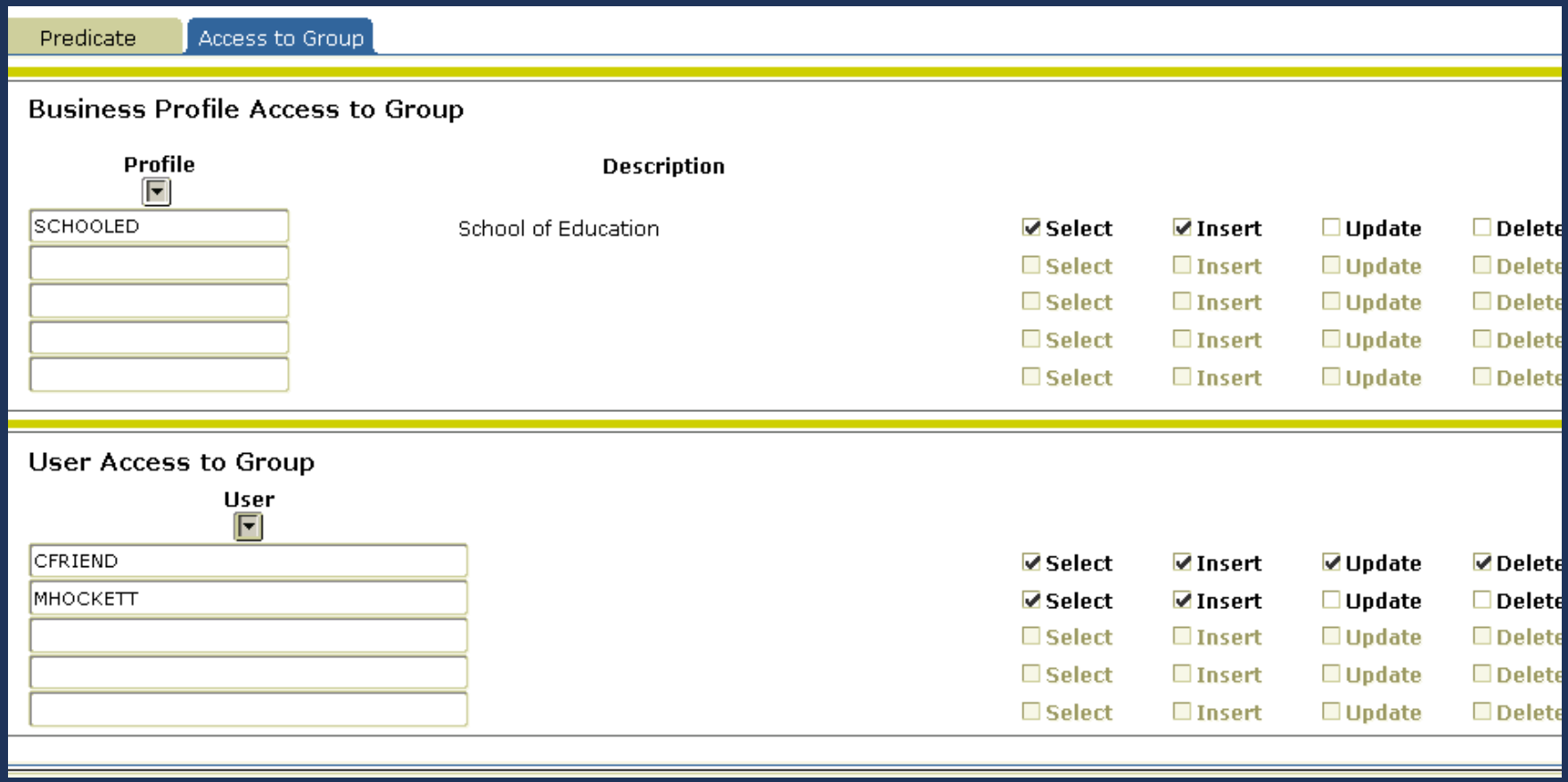
New VBS rules page in Banner



New VBS rules page in Banner



GOKFGAC FGAC Internal Processing

- GOKFGAC package contains context variables and functions called by VBS/PII FGAC policies
  - Centralized functions defined in the GOKFGAC package to construct the predicate
    - f_insert_fnc, f_update_fnc, f_select_fnc, f_delete_fnc
  - ALL GOKFGAC Table Policies use the same predicate functions
  - No coding required in Banner object to implement VBS using FGAC, ORACLE and GOKFGAC processing covers it all!

GOKFGAC FGAC Internal Processing

- GOKFGAC construction of the predicate

```
(
   [driver table link AND]
   (Predicate SQL 1 from GOAFGAC
      OR
    Predicate SQL 2 from GOAFGAC)
)
```

  - Above constructed for each domain and 'AND'ed
  - ORACLE automatically 'AND's the entire predicate to the executing SQL statement
  - Page to view constructed predicate per user or business profile and table

GOKFGAC FGAC and performance

- Performance
  - Store constructed predicate statements in context variables
  - Previous version of VBS was based on secured views, not always returning the best performance
  - Testing on production sized database (PII is being tested at McGill)
  - Largest component of performance will be the SQL statement coded on GOAFGAC predicate rule

GOKFGAC FGAC and the Self Service

- Oracle Fine Grained Access works across the entire Oracle Database, including the Self Service
- There are ways to exempt self service from FGAC processing
- Still in Research
  - Requires Oracle ID if FGAC is needed for parts of the self service (SS Faculty)
  - Uses GOAEACC to cross reference the SS login ID and the Oracle ID

Turning GOKFGAC off for processes

- New page to identify objects that are excluded from GOKFGAC FGAC processing
  - Prevent data corruption
- All JOBS in GUBOBJS delivered as ‘exempt’.
- GOKFGAC FGAC has function to turn restrictions off
  - Can be coded in dbprocs, like the ones for Registration and new Common Matching
- Exemptions include both PII and VBS

GOKFGAC FGAC and VPD

- VBS and VPD can co-exist
  - Oracle ANDs multiple predicates together at runtime

```
Select * into saradap_c.rowtype
from saradap where
saradap_pidm = :pidm and
saradap_term_code_entry
= :term_code
```

&

GOKFGAC FGAC Policy ▸ saradap_coll_code = 'AS' &

VPD Policy ▸ saradap_vpdi_code = 'X'

GOKFGAC FGAC vs VPD

- VPD advantages
  - New column to secure data
    - Works for any group of related tables
  - Best for large-scale segmentation of data
    - E.g.: shared Student DB with Financial Aid VPDs

GOKFGAC FGAC vs VPD

- VBS advantages
  - Uses existing columns to secure data
    - Appropriate for sets of tables that contain the data necessary for security
  - Best for securing small sets of data
    - E.g.: in-state and out-of-state admissions officers

Which to Use?

- VBS and VPD on a continuum
  - Choice of which to use made after analysis of institutional needs

Replacing Old VBS with New VBS

- New VBS using FGAC will replace all existing Banner VBS implementations in release 7.0
- Secured views, table triggers and Form triggers removed from the following modules, replaced with Seed data to define domains and domain tables
  - Banner Student
    - Admissions, Recruiting, General Student, Test Scores, GPA, Courses, Schedule
  - Banner Financial Aid
    - RORSTAT

Summary

- Expandable, does not require modification to existing Banner objects to implement new policy.
- Predicate is SQL based and does not have a pre set data dictionary
- Expecting wide adoption of the New VBS using FGAC because it is easier to manage

Questions and Answers

Thank You!

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Thank you