



# SNOWFLAKE RBAC

## Access to Sensitive Objects

Version 1.0

# OVERVIEW

## Security Patterns

This pattern is part of a series of Architecture Patterns covering Security. The patterns are:

- Access to Sensitive Objects
- Authentication
- Network Architecture

## Access To Sensitive Objects

This pattern provides an approach for granting access to schemas containing sensitive data without creating a fork in the RBAC role hierarchy. Forking the RBAC hierarchy is commonly prescribed in order to provide one role set which grants access to non-sensitive data and another with sensitive data access. This privileged role must then be properly inherited and/or activated by the end user, and it results in a duplication of the privileges set; one for non sensitive data and one for sensitive.

This pattern proposes alternatively, to instead grant a privilege set to all objects in a database regardless of their sensitivity. It is then only the USAGE privilege, which is controlled by a separate database specific sensitive role, that would be inherited by the top level role. This effectively eliminates the fork in the hierarchy and simplifies the number of roles a user must request access to. Instead of the user having to request a sensitive role with its own access privileges, they can simply request the enabling of sensitive data access.

This pattern does not prescribe how to populate these objects, perform row or column level security, or grant roles to users; each of which may also be required. The scope of this pattern is simply how to provide visibility to the objects themselves.

## WHEN TO USE THIS PATTERN

Pattern Status	ACTIVE
Pattern Superseded by	NONE

This pattern implements well when the following conditions are true:

1. Within a database, datasets are grouped by schema by which access must be controlled
2. Access to these schemas is controlled by an identity governance & access management system.

3. User request access to specific data sets which must be approved
4. Access roles are inherited by some level of functional role. The functional role could be at a group or individual level.

## PATTERN DETAILS

Objects in Snowflake are contained in a hierarchy of containers. Databases contain schemas which contain objects. Each level of the hierarchy has its own set of privileges. In order to be able to successfully access data in the lowest level objects which contain data - such as table or a view - the role must have the appropriate privileges on all objects higher in the hierarchy. A role must first have the privilege to view a database, commonly granted with the database usage privilege. Then the role can only see schemas for which the schema usage privilege has been granted. Finally the user must have privileges on the underlying objects.

Although the object containers - meaning database, schema and tables (for example) - are hierarchical, the privileges can be granted out of order, which is what this pattern is suggesting. A role inherits a certain privilege set on all objects in a database - this privilege set can be any combination of CRUD privileges. The role is then granted usage on the database. At this point the role can see the database, and has common privileges on objects - but is unable to view the underlying objects because no schema level privileges have been granted. Now, a user can request permissions to specific schemas. The only privilege the security admin must grant is the usage privilege. Once that usage is granted and properly inherited by a functional role to aggregate the object level privileges along with the usage privilege, the user will be able to access the data set.

The granting of these schema level roles is commonly managed by an enterprise identity governance and access management system. Within this enterprise system, a user requests access to specific data sets which then follows an approval process. Once the proper approvals have occurred, the role containing the usage privilege on the approved schema is assigned to the requesting user's functional role. This granting and inheritance can be implemented using either SCIM2.0 API, JDBC calls to customer stored procedures, or calling procedures or executing SQL directly in Snowflake.

### Key Points

1. Even if a role has privileges on an object, if it does not have the USAGE privilege on the database and schema containing the object it will not be visible to that role.
2. For each schema containing sensitive data a role is created and granted the USAGE privilege on that schema
3. This sensitive role is then granted to the functional role which has been approved to access the sensitive data.

# PATTERN EXAMPLE - SENSITIVE RBAC HIERARCHY

This is a working example of how this pattern could be implemented, within a particular context.

## Business Scenario

1. Snowflake will integrate with an enterprise permissions management catalog system. All roles in Snowflake which a customer will be granted need to be listed in this catalog. Given the volume of databases in schemas for the project, an emphasis on role reduction must be made.
2. The data set in snowflake will include two sensitivity classifications. Sensitive, which will have limited access, and non sensitive which all users will have access to.

## Pattern Details

1. Database PROD\_DB contains two schemas, PUBLIC\_SCHEMA and SENSITIVE\_SCHEMA.
2. A PROD\_DB\_RO role is created. The following privileges are granted to the role
  - a. USAGE on PROD\_DB
  - b. USAGE on PUBLIC\_SCHEMA
  - c. SELECT on all TABLES in PROD\_DB
3. A PROD\_DB\_RW role is created. The following privileges are granted to the role
  - a. INSERT & UPDATE on all TABLES in database PROD\_DB
  - b. PROD\_DB\_RO is granted to PROD\_DB\_RW
4. A PROD\_DB\_SENSITIVE is created. The following privileges are granted to the role:
  - a. USAGE on schema SENSITIVE\_SCHEMA
  - b. Note there are no lower level object grants to the SENSITIVE schema role. It also is not inherited nor does it inherit other object access roles.
5. A functional role, IT\_ANALYTICS\_ROLE is created. This role will inherit the access level roles and be granted to users. This role will be activated by the user.
6. Within the enterprise identity governance and access management solution, the following roles will be listed for a user to request, with a user required to select at least one from each category:
  - a. Access roles:
    - i. PROD\_DB\_RO
    - ii. PROD\_DB\_RW
    - iii. PROD\_DB\_SENSITIVE
  - b. Functional Roles
    - i. IT\_ANALYTICS\_ROLE
7. Scenario 1: Bill, an IT Business Analyst, requires read write access to non sensitive data in PROD\_DB.
  - a. Bill already has the IT\_ANALYTICS granted to his user.
  - b. Bill requests PROD\_DB\_RW.

- c. The PROD\_DB\_RW, after following the approval process, is granted the IT\_ANALYTICS role. Bill now has the read/write on all objects in the public schema.
- 8. Scenario 2: Alice, an HR Business Analyst, requires read access to PROD\_DB but also requires access to payroll data kept within the sensitive schema.
  - a. Alice already has the HR\_ANALYSTS functional role granted to her user.
  - b. Alice requests the PROD\_DB\_RO role
  - c. Alice requests the PROD\_DB\_SENSITIVE role
  - d. After the appropriate approval process, the roles are granted to the HR\_ANALYSTS role and Alice can now read all tables in both the PUBLIC and SENSITIVE schemas.

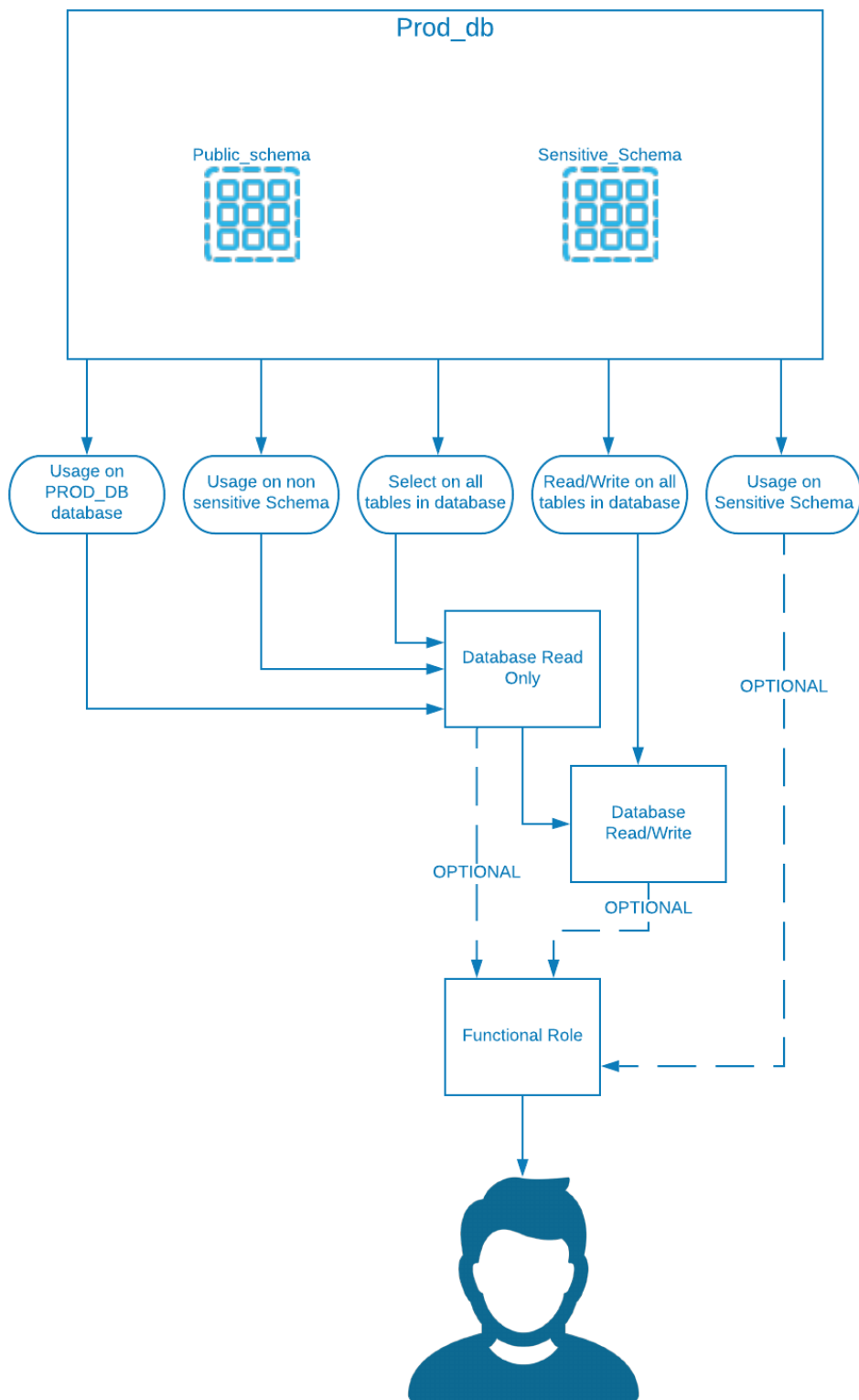


Fig 1.0 Suggested Approach

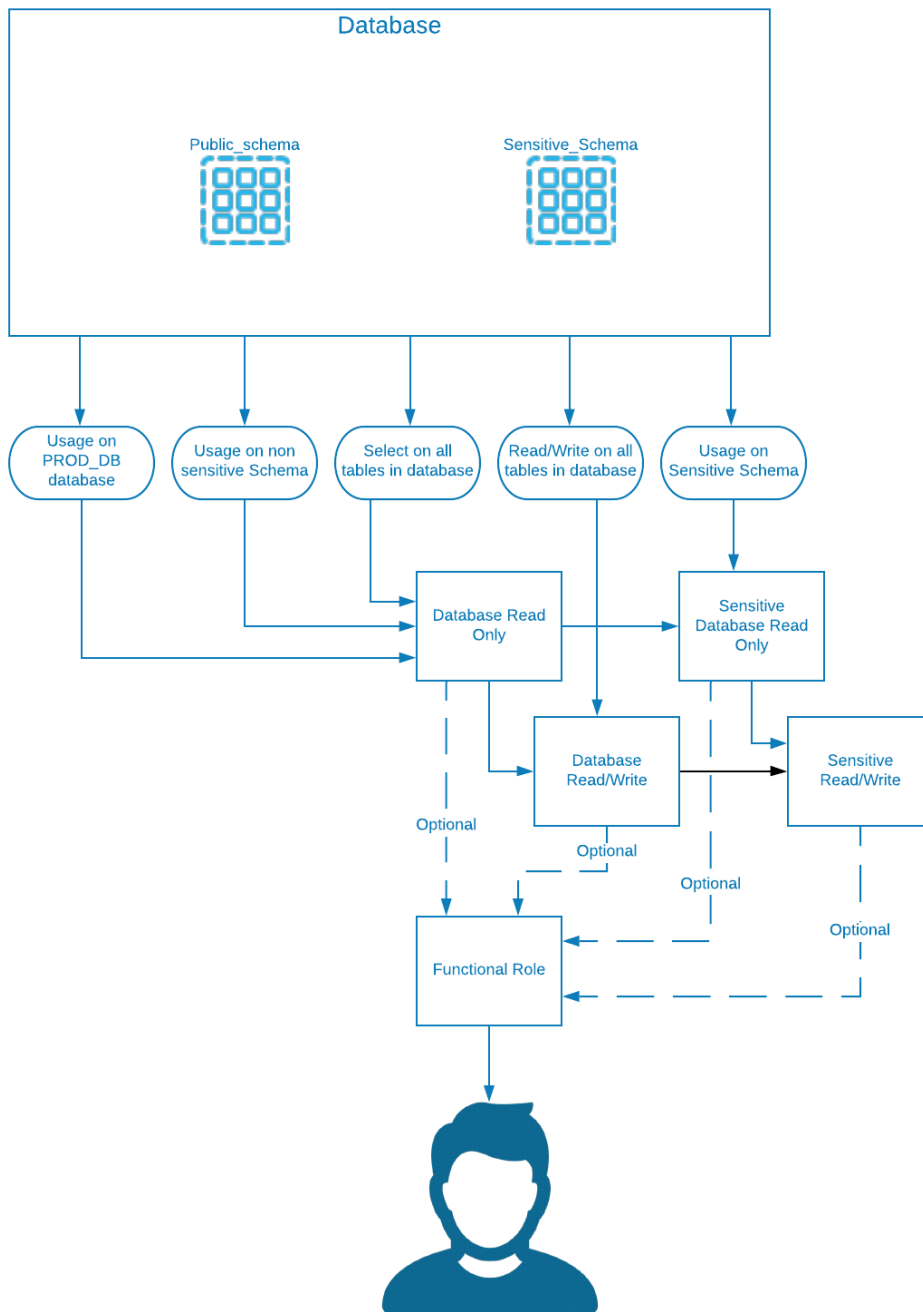


Fig 2.0 Traditional Pattern

## GUIDANCE

### MISAPPLICATIONS TO AVOID

TBD

### INCOMPATIBILITIES

1. This pattern assumes a user should have the same access level permissions on objects in a database. If the user indeed requires separate permissions levels for schemas contained within the same database the model may need to be extended or a different model used.

### OTHER IMPLICATIONS

1. Some applications which integrate with SCIM may not support all functionality required to properly manage this approach requiring custom SCIM or JDBC integration.

## DESIGN PRINCIPLES ENABLED BY THIS PATTERN

With a traditional approach of having non-sensitive and sensitive versions of RBAC roles for a database and/or schema, the user must determine both which dataset they should have access to as well as which level of access they should have to this data - and request access to that role. This may not be intuitive to users not properly trained and experienced with Snowflake RBAC. With the model proposed in this pattern, the access level has already been determined, likely based on the organizational role of the user. The only request the user is making is which datasets the user should be able to view.

## KEY BENEFITS ENABLED BY THIS PATTERN

The benefit of this pattern is when a user is reviewing the possible roles to request access to, they only see three roles and must decide 1) what privilege level do I need and 2) do I need access to sensitive data. These decisions are made independently of each other. In a typical model, this same hierarchy would require at least 4 roles, and each role would be a distinct set of combined privileges. More importantly, a legacy model would require at least 9 grants to be made of privileges to roles whereas the suggested pattern only requires 5. These numbers may seem insignificant, however as implementations of snowflake grow and evolve, simplification of RBAC hierarchies will be critical to successful extensibility and ease of management.

1. Simplified RBAC Hierarchy
2. Simplified enterprise catalog of available roles
3. More intuitive access selections for common users



4. Simplified integration with IAM (Identity and Access Management) or IGA (Identity Governance and Administration) tools

## RELATED RESOURCES

The following related information is available.

Snowflake Related Patterns	
Snowflake Community Posts	<ul style="list-style-type: none"><li>• <a href="#">Role Inheritance and Role Composition in Snowflake</a></li></ul>
Snowflake Documentation	<ul style="list-style-type: none"><li>• <a href="#">Access Control in Snowflake</a></li><li>• <a href="#">Overview of Access Control</a></li><li>• <a href="#">Access Control Considerations</a></li><li>• <a href="#">Access Control Privileges</a></li><li>• <a href="#">Configuring Access Control</a></li><li>• <a href="#">User Management</a></li><li>• <a href="#">User &amp; Security DDL</a></li></ul>
Partner Documentation	