NetIQ®

Identity Governance 3.6
User and Administration Guide

March 2021

Legal Notice

Contents

About this Book and the Library 11

1 Introduction 13

1.1 Understanding Installation and Configuration 14
1.2 Understanding Key Administration and User Tasks 14
1.3 Understanding Reporting 14
1.4 Understanding Licenses 15
1.5 Understanding REST Services for Identity Governance 15

2 Adding Identity Governance Users and Assigning Authorizations 17

2.1 Understanding Authorizations in Identity Governance 17
2.1.1 Global Authorizations 18
2.1.2 Runtime Authorizations 20
2.2 Adding Identity Governance Users. 24
2.3 Assigning Authorizations to Identity Governance Users 24
2.4 Using Coverage Maps 26
2.4.1 About Coverage Map Rules 26
2.4.2 Using Criteria Definitions in Rules 26
2.4.3 Using Operators, Conditions, Filters, Relationships, and Attributes in Rules 27
2.4.4 Creating Rules for Coverage Maps 27
2.4.5 Creating a Coverage Map. 27
2.4.6 Exporting and Importing a Coverage Map 29
2.4.7 Creating Coverage Map Using a CSV File 30
2.4.8 Loading a Coverage Map CSV File 34
2.4.9 Editing a Coverage Map 34
2.4.10 Deleting a Coverage Map. 35

3 Customizing and Configuring Identity Governance for Your Enterprise 37

3.1 Enabling and Disabling Auditing Events. 37
3.2 Managing Logging Levels 38
3.2.1 Setting Logging Levels by Module and Package 38
3.2.2 Setting the Exception Level 39
3.3 Changing Advanced Configuration Settings. 39
3.4 Customizing Email Notification Templates 39
3.4.1 Modifying Email Templates 40
3.4.2 Adding an Image to the Email Template 45
3.5 Customizing the Collector Templates for Data Sources 46
3.6 Customizing Categories. 46
3.7 Disabling Review Email Notifications 47
3.8 Extending the Identity Governance Schema 48
3.8.1 Adding or Editing Attributes to Extend the Schema 48
3.8.2 Adding Attributes to a Collector 50
3.8.3 Viewing Available Attributes in Business Roles 50
3.9 Customizing Download Settings 50

3.10 Customizing Access Request Landing Page 51

4 Using Advanced Filters for Searches 53

4.1 Using the Expression Builder to Create Advanced Filters 53
4.1.1 Choosing Search Attributes 53
4.1.2 Using Operators, Conditions, and Filters 54
4.2 Creating and Saving an Advanced Filter — Example 54
4.3 Using and Managing Saved Filters 55
4.3.1 Using a Saved Filter 55
4.3.2 Managing Existing Filters 55

5 Understanding Data Administration 57

5.1 Checklist for Collecting, Publishing, and Managing Data 59
5.2 Understanding Collection and Publication Configuration Utility Settings 60
5.2.1 Collection and Publication Batch Sizes 60
5.2.2 Collection and Publication Settings 60
5.3 Understanding the Identity Governance Catalog 61
5.4 Understanding Data Sources 62
5.5 Understanding Cloud Bridge 63
5.6 Understanding Collectors 64
5.6.1 Understanding Collector Configuration 64
5.6.2 Transforming Data During Collection 66
5.6.3 Testing Collections 67
5.6.4 Creating Emulation Packages 68
5.6.5 Downloading and Importing Collectors 68

6 Collecting Identities 71

6.1 Understanding Collector Templates for Identity Sources 71
6.1.1 Understanding Identity Collector Views 71
6.1.2 Understanding Publication Behavior 72
6.2 Understanding the Variations for Identity Sources 73
6.2.1 Collecting from Active Directory with Azure Active Directory 73
6.2.2 Collecting from a CSV File 74
6.2.3 Collecting from Google Apps 74
6.2.4 Collecting from Identity Sources with Change Events 74
6.2.5 Collecting from Microsoft SharePoint 76
6.3 Creating Identity Sources 76
6.3.1 Assigning Identity Manager as the Primary Identity Source 78
6.3.2 Understanding Change Event Collection Status 79
6.3.3 Supported Attribute Syntaxes for eDirectory and Identity Manager Change Events Collection 79
6.4 Migrating an Identity Collector to a Change Event Identity Collector 80

7 Collecting Applications and Application Data 83

7.1 Understanding the Application Definition Template 83
7.2 Understanding Collectors for Application Data Sources 83
7.2.1 Understanding Account Collector Views 84
7.2.2 Understanding Permission Collector Views 84
7.2.3 Understanding the Identity Manager AE Permission Collector 85

7.3 Creating an Application Source 86
7.4 Collecting Application Data from a Single Application Source 87
7.5 Collecting Application Data for Multiple Applications 87

8 Publishing the Collected Data 89

8.1 Publishing Identity Sources 89
8.1.1 Planning for Publishing and Merging Identities 89
8.1.2 Setting the Merge Rules for Publication 89
8.1.3 Publishing the Identity Sources 90
8.2 Publishing Application Sources 91

9 Creating and Monitoring Scheduled Collections 93

9.1 Creating a Scheduled Collection 93
9.2 Monitoring Scheduled Collections 94
9.3 Understanding the Cron Expression for a Custom Interval of Collection 94

10 Creating and Managing Data Policies 97

10.1 Understanding Data Policies 97
10.2 Creating and Editing Data Policies 98
10.3 Scheduling Data Policy Calculations 99
10.4 Manually Calculating Data Policy Metrics 99
10.5 Comparing Collections and Publications 100
10.6 Detecting and Remediating Violations in Published Data 101
10.7 Exporting and Importing Data Policies 102

11 Managing Data in the Catalog 103

11.1 Configuring the Data Source for Post Authentication Matching 103
11.2 Understanding Identity, Application, and Permission Management 104
11.2.1 Managing Identity Information 104
11.2.2 Managing Application Information 105
11.2.3 Reviewing Application Fulfillment Settings 106
11.2.4 Managing Permission Information 106
11.3 Editing Attribute Values of Objects in the Catalog 107
11.3.1 Understanding Bulk Data Update 108
11.3.2 Editing Attribute Values in Bulk 108
11.4 Searching for Items in the Catalog 109
11.4.1 Supported Wildcards and Handling Wildcards as Literal Characters 109
11.4.2 Searching within Catalog Items 111
11.4.3 Using Advanced Filters for Searches 112
11.5 Analyzing Data with Insight Queries 112
11.6 Downloading Catalog Entities 114

12 Database Maintenance 115

12.1 Understanding Database Maintenance 115
12.2 Creating an Archive Destination 116
12.3 Performing Database Maintenance 117
12.4 Disabling and Enabling Archiving 119

12.5 Scheduling Data Maintenance 119
12.5.1 Scheduling Data Maintenance with Concurrent Archiving 119
12.5.2 Create a Data Maintenance Schedule 120
12.6 Identifying Purgeable Data 121

13 Creating and Managing Delegation 127

13.1 Understanding Delegation 127
13.2 Assigning and Managing Delegates for Yourself 127
13.3 Assigning and Managing Delegation for All Users 128

14 Setting up Fulfillment Targets and Fulfilling Changesets 129

14.1 Understanding the Fulfillment Process 130
14.2 Configuring Fulfillment 130
14.2.1 About Fulfillment Types 131
14.2.2 Configuring a Fulfillment Target 134
14.2.3 Configuring Multiple Fulfillment Targets for Applications 136
14.2.4 Transforming Data from Fulfillment Targets 137
14.2.5 Configuring Identity Manager and Manual Fulfillment Targets 138
14.3 Monitoring Fulfillment Status 139
14.3.1 Understanding Fulfillment Status 140
14.4 Customizing Fulfillment Target Templates 142
14.5 Specifying Additional Fulfillment Context Attributes 143
14.6 Fulfilling Changesets 143
14.6.1 Manually Fulfilling the Changeset 143
14.6.2 Using Workflows to Fulfill the Changeset 144
14.6.3 Automatically Fulfilling the Changeset 145
14.6.4 Using Service Desk Fulfillment. 145
14.7 Reviewing Fulfillment Requests 146
14.8 Confirming the Fulfillment Activities 146

15 Instructions for Fulfillers 147

15.1 Understanding the Fulfillment Process 147
15.1.1 Managing the Fulfillment Process 147
15.1.2 Understanding the Fulfiller Authorization 148
15.2 Performing Manual Fulfillment. 149

16 Creating and Managing Technical Roles 151

16.1 Understanding Technical Role States 152
16.2 Understanding Technical Role Mining 152
16.3 Understanding Technical Roles Detection and Assignments 153
16.4 Understanding Technical Role Revocations 154
16.5 Creating Technical Roles 154
16.6 Activating Technical Roles 156
16.7 Promoting Detected Roles to Assigned Roles 156
16.8 Editing and Deleting a Technical Role. 157
16.9 Downloading and Importing Technical Roles 158

17 Creating and Managing Business Roles 161

17.1 Overview of Roles 161
17.2 Understanding Business Roles 163
17.2.1 Understanding Business Role Access Authorizations 163
17.2.2 Understanding Business Role Mining 164
17.2.3 Understanding Role Hierarchy with Role Mining 165
17.2.4 Understanding Business Role States 166
17.3 Defining Business Roles. 167
17.4 Authorizing User Access Through Business Roles 173
17.5 Adding Authorizations to a Business Role 174
17.6 Adding a Business Role Approval Policy. 175
17.7 Publishing or Deactivating Business Roles. 176
17.8 Analyzing Business Roles. 177
17.9 Editing Business Roles 178
17.10 Approving Business Roles 179
17.11 Automated Access Provisioning and Deprovisioning 179
17.11.1 Understanding Business Role Detections 181
17.11.2 Automatic Provisioning Requests 183
17.11.3 Automatic Deprovisioning Requests 184
17.11.4 Managing Compensating Requests 185
17.11.5 Understanding Inconsistencies 187
17.11.6 Detecting and Resolving Inconsistencies 189
17.11.7 Monitoring Business Role Detections 190
17.12 Downloading and Importing Business Roles and Approval Policies 191

18 Creating and Managing Separation of Duties Policies 195

18.1 Understanding Separation of Duties 195
18.2 Understanding the Separation of Duties Policy Options 196
18.2.1 Providing Resolution Instructions for the Separation of Duties Policies 196
18.2.2 Overriding Global Potential SoD Violation Approval Policy. 196
18.2.3 Deciding what Occurs when the Separation of Duties Policy is Violated. 197
18.2.4 Defining Separation of Duties Conditions. 197
18.3 Creating and Editing Separation of Duties Policies 198
18.4 Downloading and Importing Separation of Duties Policies 199

19 Managing Separation of Duties Violations 201

19.1 Understanding SoD Violation versus SoD Case 201
19.2 Listing SoD Violations or SoD Cases 201
19.3 Viewing SoD Case Details 202
19.4 Understanding SoD Case Status 202
19.5 Approving and Resolving an SoD Violation 204
19.6 Closing an SoD Case. 204
19.7 Understanding Potential SoD Violations 204
19.8 Approving or Resolving Potential SoD Violations 205

20 Calculating and Customizing Risk 207

20.1 Understanding Risk Levels and Risk Scoring 207
20.1.1 Risk Levels 208

20.1.2 Risk Scoring 208
20.1.3 Risk Factors 209
20.1.4 Risk Score Calculation Details 211
20.1.5 Visualizing Risk 213
20.2 Configuring Risk Levels 213
20.3 Configuring Risk Scores 214
20.4 Setting and Viewing Risk Calculation Schedules and Status. 215
20.5 Viewing Calculated Risk Scores. 215
20.6 Exporting and Importing Risk Policies 216

21 Administering Access Request 217

21.1 Understanding Access Request. 217
21.2 Configuring Access Request 218
21.2.1 Creating Request Policies. 219
21.2.2 Creating Request Approval Policies. 220
21.2.3 Assigning Resources to Request and Approval Policies 220
21.2.4 Setting Global Potential SoD Violation Approval Policy. 221
21.3 Creating and Editing Request and Approval Forms 221
21.3.1 Customizing Default Application or Permission Forms 222
21.3.2 Creating Custom Forms for One or More Permissions and Applications 223
21.3.3 Editing Custom Form Components and Forms. 224
21.4 Assigning Request to Identity Governance Users 224
21.5 Downloading and Importing Access Request and Approval Policies 225
21.6 Disabling the Access Request Service 226

22 Instructions for Access Requesters and Approvers 229

22.1 Reviewing Current Access and Requesting Access Removal 229
22.2 Requesting Access 230
22.3 Monitoring, Retracting, or Retrying Your Requests 232
22.3.1 Monitoring Requests 232
22.3.2 Retracting Access Requests 233
22.3.3 Retrying Failed Access Requests 233
22.4 Approving Access Requests 233
22.5 Approving Potential SoD Violations 234
22.6 Comparing Access of Multiple Users 235

23 Creating and Modifying Review Definitions 237

23.1 Viewing the Catalog. 238
23.2 Understanding the Review Process 239
23.2.1 Understanding Review Definitions 240
23.2.2 Adding Selection Criteria for Review Items 241
23.2.3 Setting Review Notifications 241
23.2.4 Setting Review Expiration Policy 242
23.2.5 Previewing a Review. 242
23.2.6 Reviewing Items 243
23.2.7 Downloading Reviewers and Review Item Lists 243
23.2.8 Escalating Review Items. 244
23.2.9 Completing or Terminating a Review 244
23.2.10 Fulfilling Changes and Audit Acceptance 245
23.2.11 Creating Certification Policies and Remediating Violations 245

23.3 Understanding Micro Certification 245
23.4 Creating a Review Definition 246
23.4.1 Expanding and Restricting Review Items 251
23.4.2 Specifying Self-Review Policy 252
23.4.3 Scheduling a Review 252
23.5 Modifying a Review Definition 253
23.6 Customizing Review Display 253
23.7 Configuring Reasons for Review Actions 254
23.8 Specifying Reviewers 255
23.8.1 Understanding Multistage Reviews 256
23.9 Downloading and Importing Review Definitions 257
23.10 Creating a New Review Definition from an Existing Review Definition 258
23.11 Improving Performance in Large Scale Reviews 258

24 Running a Review Instance 261

24.1 Completing Review Tasks 261
24.2 Verifying and Approving a Review Instance 261

25 Instructions for Review Owners 263

25.1 Understanding the Review Process for Review Owners 263
25.1.1 Understanding the Review Definition 263
25.1.2 Understanding Reviewers and Escalation 264
25.1.3 Understanding the Fulfillment Process for Review Changes 264
25.2 Managing a Review in Preview Mode 264
25.3 Managing a Review in Live Mode 265
25.3.1 Checklist for Managing a Review in Live Mode 266
25.3.2 Starting a Review Run 267
25.3.3 Managing a Review Run 268
25.3.4 Modifying the Settings of a Review Run 269
25.3.5 Managing the Progress of Reviewers 270
25.3.6 Approving and Completing the Review 271
25.3.7 Viewing Fulfillment Status 271
25.3.8 Managing the Audit Process 271
25.3.9 Viewing Run History 272

26 Instructions for Reviewers 273

26.1 Understanding Reviews 273
26.1.1 Understanding the Steps in a Review Run 273
26.1.2 Understanding the Reviewer Authorization 275
26.2 Performing a Review 276
26.3 Viewing Completed Reviews 277

27 Creating and Managing Certification Policies 279

27.1 Understanding Certification Policies 279
27.2 Creating and Editing Certification Policies 279
27.3 Scheduling Calculations and Calculating Certification Policy Violations 280
27.4 Exporting and Importing Certification Policies 281
27.5 Managing Certification Policy Violations 282

27.5.1 Understanding Violation Types 282
27.5.2 Searching for Specific Violations 283
27.5.3 Remediating Certification Policy Violations 283

28 Analyzing Data and Monitoring Governance System 285

28.1 Configuring Analytics and Role Mining Settings 285
28.1.1 Understanding Role Mining Settings. 287
28.1.2 Understanding Metrics. 287
28.1.3 Understanding Supported Storages and Data Types 288
28.1.4 Configuring Metrics Data Stores for Custom Metrics 288
28.1.5 Creating Custom Metrics 289
28.1.6 Downloading and Importing Custom Metrics Definitions. 291
28.2 Monitoring Your Identity Governance System 291
28.2.1 Viewing Data Collection Statistics and Summary. 292
28.2.2 Viewing Number of Policies and Related Violations 292
28.2.3 Viewing Entitlement Assignments Statistics to Leverage Roles 292
28.2.4 Viewing Account Statistics and Details 292

About this Book and the Library

The *User and Administration Guide* provides conceptual information about the Identity Governance product and step-by-step guidance for compliance administration and governance tasks.

Intended Audience

This book provides information for Identity Governance compliance administrators and other product users who are responsible for a variety of governance tasks including collecting and publishing identity and application data, creating policies, analyzing data, reviewing access, fulfilling change requests, and verifying changes in your environment. Specifically, it provides conceptual information and instructions for the following Identity Governance users:

- Administrators such as Data Administrator, Review Administrator, and Insight Query Administrator
- Policy owners such as Separation of Duties (SoD) policy owners
- Application owners, managers, or supervisors
- Auditors
- Other users such as Review Owners, Reviewers, and Fulfillers

Other Information in the Library

The library provides the following information resources in addition to this guide. Visit the Identity Governance Documentation Web site to access all the documents in this library.

Release Notes

Provides information specific to this release of the Identity Governance product, such as known issues.

Installation and Configuration Guide

Provides installation and configuration information for the Identity Governance product. This book also provides upgrade information for current product installations.

Reporting Guide

Provides information about Identity Reporting for Identity Governance and how you can use the features it offers.

NetIQ Identity Manager Driver for Identity Governance

Provides information about how to install and configure the Identity Manager Driver for NetIQ Identity Governance. The Identity Governance driver allows you to provision application-specific permission catalog data from Identity Governance to Identity Manager, giving you the ability to review and certify permission assignments using Identity Governance, as well as to request and provision these permissions using Identity Manager. The driver also can provision users in the Identity Vault for Identity Manager.

Administrator's Guide to Form Builder

Provides information about creating custom forms for specific permissions or applications.

Technical References

Provide specific details about narrow topics relevant to few use cases.

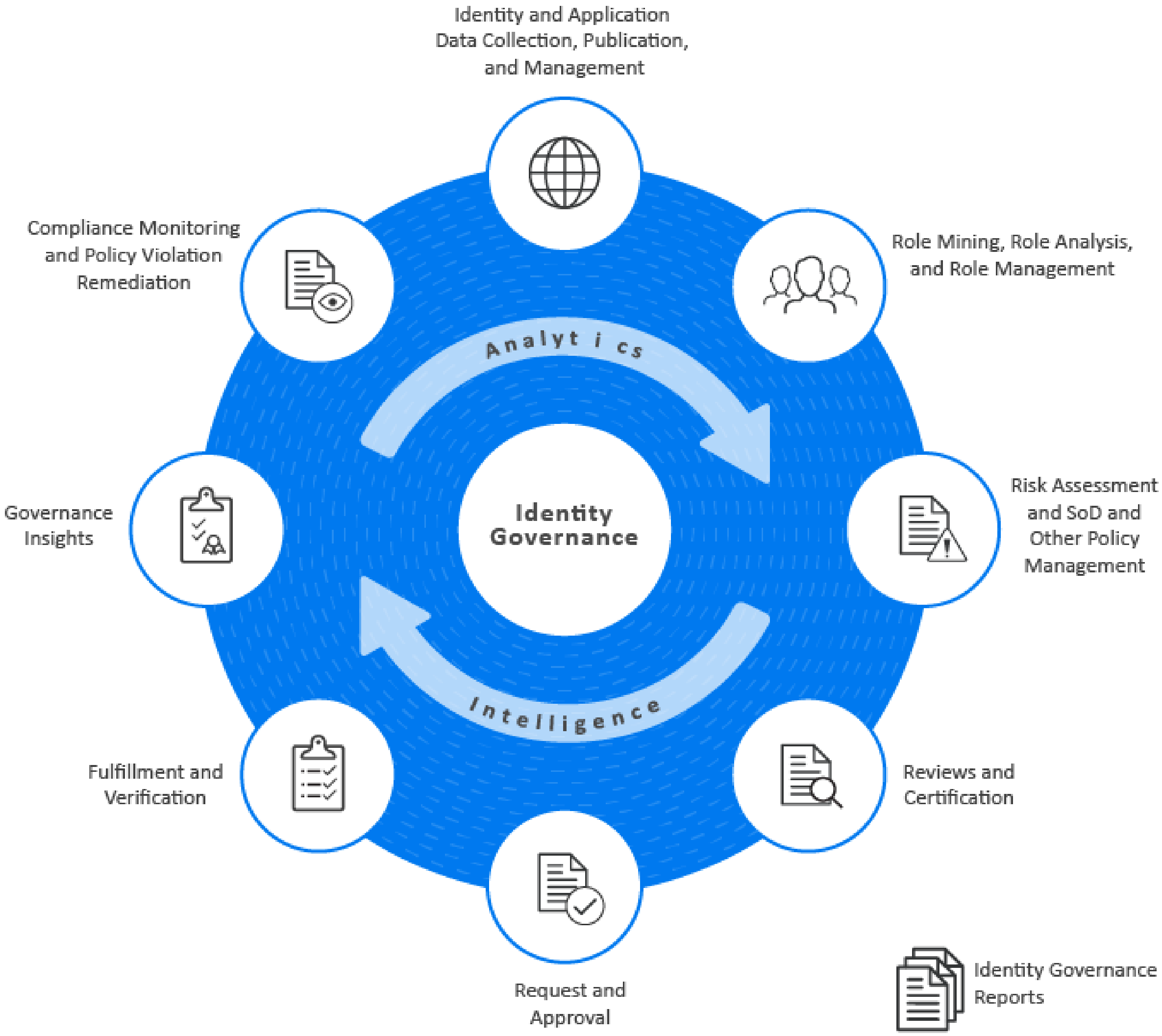
Videos

Provide supplemental information about Identity Governance and Micro Focus products. For more information, see the Micro Focus YouTube site (https://www.youtube.com/c/MicroFocus/featured).

1 Introduction

The Identity Governance product enables organizations to define policies, calculate risk, define and run reviews, and manage identity and access throughout your organization. With Identity Governance, administrators and business managers can prioritize governance activities based on risk and ensure that your employees, either individually or as a group, have the appropriate set of permissions. Identity Governance collects information from various identity and application data sources and guides the **authorized users** through the key phases of the governance process. You can install Identity Governance on premises or access it as a Service.

Figure 1-1 *Identity Governance Capabilities*



- Section 1.1, "Understanding Installation and Configuration," on page 14
- Section 1.2, "Understanding Key Administration and User Tasks," on page 14
- Section 1.3, "Understanding Reporting," on page 14

- Section 1.4, “Understanding Licenses,” on page 15
- Section 1.5, “Understanding REST Services for Identity Governance,” on page 15

1.1 Understanding Installation and Configuration

You can install the components for Identity Governance in a distributed environment. Several of the components can also run in a high-availability cluster. You can also install Identity Reporting with Identity Governance. For information about installation and configuration, see *Identity Governance 3.6 Installation and Configuration Guide*.

1.2 Understanding Key Administration and User Tasks

Identity Governance enables authorized users to:

- Collect identities, application, and application data
- Create application entities
- Transform, publish, and manage data
- Mine data and create technical and business roles
- Assign governance responsibilities
- Set risk thresholds and create SoD, data, and other policies
- Review users, accounts, technical and business roles, business role definitions, and relationships
- Request access and access removal
- Fulfill or deny requests, and verify changes
- Run analytics and gain governance insights
- Manage compliance and remediate violations

This guide provides detailed information about the various governance tasks and specific instructions about review owner, reviewer, requester, request approver, and fulfiller tasksFor information about how to log in to the Identity Governance application, see “How to Log in to Identity Governance” in the *Identity Governance 3.6 Installation and Configuration Guide*.

NOTE: If you are logged in and your access token times out, a message appears stating that you must re-authenticate or log out of the application. If you re-authenticate, Identity Governance displays the login screen in a separate window or browser tab. You must log in again to continue working in the Identity Governance application.

1.3 Understanding Reporting

You can launch Identity Reporting from the Identity Governance application or access it directly from a browser. Identity Reporting enables you to generate reports about identity and application data, data collection and publication, reviews, and fulfillment status. Users with the Global, Customer, or Report Administrator role can create, run, and view the reports. For information about installing and configuring Identity Reporting, see *Identity Governance 3.6 Installation and Configuration Guide.* For information about using Identity Reporting, see *Identity Reporting Quick Start* and *Identity Governance Reporting Guide*.

1.4 Understanding Licenses

Qualified Identity Manager customers who have a limited access license for Identity Governance are entitled to install and use the identity catalog based features of Identity Governance to create and manage identities, accounts, groups, applications, permissions, and business roles. All other features are provided on a preview basis and cannot be fully enabled or used in production without the purchase of a full “per managed identity” license for Identity Governance 3.6 or later.

Some examples of Identity Governance features NOT covered by the limited access license are: Reviews, Delegation, Risk policies, SoD policies, Certification policies, Data policies, Analytics settings and fact collections, Review display customization, Coverage map loading, Change reviewer reason customization, and Governance Insights.

When the Limited License is installed you will see the following text in red at the top of the product page:

```
This feature requires a full Identity Governance license. Enter your
license in the About page to remove this message.
```

Enter your license in the About page to remove the message and get full access to Identity Governance features.

1.5 Understanding REST Services for Identity Governance

Identity Governance supports REST API functionality. The REST APIs use the OAuth2 protocol for authentication. The installation program deploys a special API WAR file, `apidoc.war`, which contains the documentation of REST services needed for Identity Governance. On Tomcat the `doc.war` file is automatically deployed when Identity Governance is installed.

The REST API documentation can be found at *protocol*://*server*:*port*/apidoc. For example, http://myserver.netiq.com:8080/apidoc.

NOTE: You should manually move or delete the API WAR files and folders from the Tomcat webapps directory in your production environment.

2 Adding Identity Governance Users and Assigning Authorizations

Individuals who can log in to Identity Governance are **Identity Governance users**. The authentication server for Identity Governance must include login information for all Identity Governance users. The source of data, or identity source, for these users could be your Human Resources directory or a CSV file. To ensure that users have a fixed set of permissions in Identity Governance, you can assign them to one of the built-in authorizations using the **Configuration > Authorization Assignments** menu.

- Section 2.1, “Understanding Authorizations in Identity Governance,” on page 17
- Section 2.2, “Adding Identity Governance Users,” on page 24
- Section 2.3, “Assigning Authorizations to Identity Governance Users,” on page 24
- Section 2.4, “Using Coverage Maps,” on page 26

2.1 Understanding Authorizations in Identity Governance

Identity Governance relies on authorizations to define a fixed set of access permissions. After installation of Identity Governance on premises and after deployment of Identity Governance as a service, the bootstrap administrator collects and publishes the initial set of identities and assigns a user as a Global or Customer Administrator who then assigns other authorizations. In SaaS environment, the Customer Administrator will work with a SaaS operations administrator to configure services and plan maintenance tasks. The SaaS operations administrator is a member of the Micro Focus SaaS team responsible for customer tenancy operations including data center configurations.

Identity Governance authorizations can be global or runtime:

- **Global authorizations** are constant within Identity Governance and assigned through the Identity Governance **Configuration** settings. Identity Governance maintains the set of privileges granted by the authorization. For more information, see Section 2.1.1, “Global Authorizations,” on page 18
- **Runtime authorizations** are those that users assume as needed to perform tasks specific to a governance area such as request, review, or fulfillment. For example, you assign a Review Owner as needed during an access review and validation cycle. You can reassign these authorizations with each review run. For more information, see Section 2.1.2, “Runtime Authorizations,” on page 20.

If a user does not have the required authorization or does not have an assigned task, the user will be redirected to the Access Request interface. For more information about requesting access, see Chapter 22, “Instructions for Access Requesters and Approvers,” on page 229. For more information about the bootstrap administrator, see “Understanding the Bootstrap Administrator for Identity Governance” in the *Identity Governance 3.6 Installation and Configuration Guide*.

2.1.1 Global Authorizations

After collecting and publishing an initial set of identities, assign the Global Administrator authorization in an on-premises environment and Customer Administrator in a SaaS environment to one of these identities. The Global or Customer Administrator can then assign the rest of the global authorizations. For more information, see Section 2.3, “Assigning Authorizations to Identity Governance Users,” on page 24.

Customer Administrator (Identity Governance as a Service only authorization)

The Customer Administrator is the primary authorization for Identity Governance as a Service. This authorization is responsible for day-to-day business operations of the product and can:

- Perform all Identity Governance actions
- Assign all Identity Governance global and runtime authorizations for users in the enterprise

Global Administrator (Identity Governance on-premises only authorization)

The Global Administrator is the primary authorization for Identity Governance on-premises deployments. This authorization can:

- Perform all Identity Governance actions
- Assign all Identity Governance global and runtime authorizations

Access Request Administrator

The Access Request Administrator manages policies that define who can request access in your enterprise. This authorization can:

- Create, modify, and delete Access Request Policies
- Create, modify, and delete Access Request Approval Policies
- Edit the default Access Request Approval Policy
- Customize default request and approval forms
- Create custom request and approval forms for one or more permissions or applications

Auditor

The Auditor has read-only rights to the catalog, reviews, Separation of Duties (SoD) policies and violations, business roles, risk, certification policies, fulfillment statuses, and the **Overview**. However, this authorization can configure and run insight queries and an account assigned to the Auditor authorization might also be specified as a Review Auditor in a review definition. For more information, see Section 2.1.2, “Runtime Authorizations,” on page 20.

Business Roles Administrator

The Business Roles Administrator performs all administrative functions for all business roles. A Business Roles Administrator can delegate administrative privileges. This authorization can:

- Administer the business role schema under **Data Administration**
- Mine for business roles and promote role candidates
- Create a business role
- Modify a business role
    - Add or change role owners, role managers, fulfillers, and categories
    - Add or change the business role approval policy

    - Add users and groups to the business role
    - Exclude users and groups from the business role
- Publish a business role
- Delete a business role
- Analyze business roles
- Configure the business roles default approval policy
- Create and modify business roles approval policies

Data Administrator

The Data Administrator manages the identity and application data sources. This authorization can:

- Create, add, modify, and review data sources
- Create custom metrics
- Create scheduled collections
- Execute data collection and publishing
- Create and map attributes in the catalog
- Review and edit data in the catalog
- Create custom request and approval forms for one or more permissions or applications
- Configure and run governance insight queries
- Delegate responsibility by assigning application administrators, application owners, or manual fulfillers to applications in the catalog
- Assign delegates for users
- View data collection, data summary, and system trends in the **Overview**
- Perform data maintenance tasks including archiving and data cleanup

Maintenance Administrator

The Maintenance Administrator configures and performs data maintenance tasks such as archiving and data cleanup.

Governance Insights Administrator

The Governance Insights Administrator manages data queries. This authorization can:

- Configure and run governance insight queries
- Download and import insight queries

Fulfillment Administrator

The Fulfillment Administrator manages fulfillment and verification of requests that result from reviews. This authorization can access real time and historical data for provisioning activities, including fulfillment status and verification management.

Report Administrator

The Report Administrator can access Identity Reporting. This authorization can:

- Create, view, and run reports for Identity Governance
- Add, remove, and modify data sources on which you want to run reports

Review Administrator

The Review Administrator manages the review process but does not have access to data collection or fulfillment settings. This authorization can:

- Create, schedule, and start reviews in preview mode or live mode
- Modify a review schedule
- Assign all the runtime authorizations as part of a review, thereby delegating certain rights pertaining to the review to those authorizations
- View reviews in progress
- View data summary and system trends in the **Overview**
- View the **Catalog**, but cannot modify it

Technical Roles Administrator

The Technical Roles Administrator mines for technical role candidates and manages technical roles. A Technical Roles Administrator can delegate administrative privileges. This authorization can:

- Mine for technical roles and promote role candidates
- Create and delete technical roles
- Add or remove permissions from a technical role
- Add or remove categories
- Promote, activate, or deactivate technical roles
- Assign technical role owners
- Assign access request and approval policies
- Assign technical roles to users detected to have all the permissions included in a technical role
- Download or import technical roles

Security Officer

The Security Officer has read-only rights to the catalog and can:

- Assign authorizations for all functions in Identity Governance
- View data summary in the **Overview**
- View the **Catalog**, but cannot modify it

NOTE: Ensure that the users assigned to the Security Officer authorization can also be trusted with global privileges in Identity Governance.

Separation of Duties Administrator

The Separation of Duties Administrator creates and manages SoD policies and violation cases.

2.1.2 Runtime Authorizations

Assign runtime authorizations when you need them. For more information, see Section 2.3, “Assigning Authorizations to Identity Governance Users,” on page 24.

Access Requester

Access Requesters request application access, permissions, and technical role assignment. Identity Governance Access Request Administrator, Customer Administrator, and Global Administrator define the Access Request policy that specifies who can request access, what can they request, and for whom can they make their requests.

Access Request Approver

Access Request Approvers confirm whether to approve or deny requested access in the Request application. Identity Governance assigns this authorization if an Access Request Approval policy specifies approvers. Access request approvers can also reassign their task to another approver.

Application Owner

The Application Owner manages all assigned applications. This authorization can:

- View and manage the following information in the catalog:
    - The applications in the catalog for which they are an owner or administrator
    - The accounts associated with those applications
    - All identities in the system, but details of the identities are restricted to only the permissions and account for which they are an owner or administrator.
    - All groups
- Create custom request and approval forms for assigned applications and permissions under the assigned applications
- Perform data editing for assigned applications
- Review data and access within the assigned applications if assigned as a reviewer
- (Conditional) Review access entitlements or remediate access policy violations within the application if assigned this responsibility by the review definition

Application Administrator

The Application Administrator validates published data and performs data cleanup, or editing, for all assigned applications. This authorization can:

- Modify the configuration of a data source
- Execute collections for the data source
- Edit data within the scope of the data source
- Review data and access within the data source
- View the catalog but edit only items related to the assigned data source
- Create custom request and approval forms for assigned applications and permissions under the assigned applications

Business Role Owner

The Business Role Owner can review a business role and approve a business role depending on whether the assigned approval policy specifies **Approved by owners**. Business role owners cannot edit business roles, they can only view them. For more information about approval policies, see Chapter 17, “Creating and Managing Business Roles,” on page 161.

Business Role Manager

A Business Role Manager is an optional participant in the business role process. This authorization can:

- Edit assigned business roles
- Submit business role for approval, if approval is required based on approval policy
- Promote role candidates
- Publish roles
- Deactivate roles

NOTE: Role Managers cannot delete a role. Only Global or Business Role Administrators can delete roles.

Escalation Reviewer

The Escalation Reviewer is an optional participant in a review. All tasks not completed on time are forwarded to the Escalation Reviewer for resolution. Otherwise, the tasks are forwarded to the Review Owner. This authorization can:

- View user, permission, application, and account details in the context of the review
- Decide whether to keep, modify, or remove access privileges for a user under review
- Edit review decisions before submitting those items

For more information about assigning an escalation reviewer in a review definition, see Section 23.8, “Specifying Reviewers,” on page 255.

Fulfiller

The Fulfiller performs manual provisioning for access changes. This authorization can:

- View the changeset, identity, permission, and application details for each fulfillment request
- View guidance from collected analytics data about the requested change
- View the reason for the requested change and the source of the request, such as a review run, business role fulfillment, or SoD policy
- Fulfill, decline to fulfill, or reassign requests

Review Auditor

The Review Auditor verifies a review campaign. Each review can have its own Review Auditor. This authorization can:

- Accept or reject the review after the Review Owner marks the review complete
- View the data related to the review, but cannot modify the data

Review Owner

The Review Owner manages all assigned review instances. The Review Owner can view the details of any user, permission, or application entity within the context of the review. This authorization does not have general access to the catalog.

The Review Administrator who initiates a review automatically assumes the authorization of Review Owner if no Review Owner is specified.

NOTE: If you assign a new owner to a review, both the previous and new owners can access the review. The previous owner continues to see review instances run before the ownership change. The new owner sees only the instances run after the ownership change.

For an active Review, the Review Owner can:

- Start and monitor the review progress
- Resolve access policy violations in the review
- Reassign certification tasks within the review
- Run reports against the review
- Declare the review complete
- View the review status in **Overview**
- View **Quick Info** details about a catalog item
- View the fulfillment status of a review item
- View the run history

Reviewer

The Reviewer authorization reviews sets of access permissions or memberships as part of a review run. This authorization can:

- Decide whether to keep, modify, or remove access privileges for a user under review
- Decide whether to keep or remove the business role membership for a user under review
- Change the reviewer for any assigned review items
- View user, permission, application, and account details in the context of the review
- View a history of review decisions in the context of the review
- Edit review decisions before submitting them

For more information about assigning reviewers, see Section 23.8, “Specifying Reviewers,” on page 255.

SoD Policy Owner

The SoD Policy Owner is responsible for managing assigned Separation of Duties policies. This authorization can:

- Manage assigned policies
- Manage violation cases for assigned policies

Technical Role Owner

The Technical Role Owner is responsible for managing technical roles for which they are the owner. Owners cannot import, create, promote, delete, or assign access request policies to a role. This authorization can:

- Add or remove permissions from a technical role
- Add or remove categories
- Activate or deactivate technical roles
- Assign technical role owners

- Assign technical roles to users detected to have all the permissions included in a technical role
- Download technical roles

2.2 Adding Identity Governance Users

Until you collect data for your Identity Governance users, they cannot log in to the application. For more information about the bootstrap administrator account, see “Understanding the Bootstrap Administrator for Identity Governance” in the *Identity Governance 3.6 Installation and Configuration Guide*.

NOTE: In a test environment that does not also use Identity Manager, you might not have an LDAP authentication server to use for your data source. Instead, you can use a CSV file that contains login information for Identity Governance users. The CSV file must use UTF-8 encoding.

To add Identity Governance users:

1. Log in to Identity Governance with an Identity Governance Bootstrap, Customer, or Global Administrator account.
2. Select **Data Sources > Identities**.
3. Under **Identity Sources**, select the LDAP authentication server specified during installation.

   Alternatively, you can specify a CSV file.

   NOTE: If Identity Governance does not list the authentication server, select **+** to add the identity source. For more information, see Section 6.3, “Creating Identity Sources,” on page 76.
4. To collect the identities from the authentication server, select the icon for **Collect Now**. Later, you can set up scheduled collections to update your catalog.

   For more information, see Chapter 9, “Creating and Monitoring Scheduled Collections,” on page 93.
5. When collection completes, select the icon for **Publish identities now**.
6. Assign Identity Governance authorizations to the appropriate identities that you collected.

   For more information, see Section 2.3, “Assigning Authorizations to Identity Governance Users,” on page 24.

2.3 Assigning Authorizations to Identity Governance Users

The method for assigning authorizations in Identity Governance depends on the type of authorization and your environment.

Authorization	Assignment Method	Assigned By
Access Request Approver	Access Request Approval policy	Access Request Administrator, Customer Administrator, or Global Administrator

Authorization	Assignment Method	Assigned By
All global authorizations	Authorization Assignment (**Configuration** > **Authorizations**)	Bootstrap Administrator, Customer Administrator, or Global Administrator
Application Administrator	Application in the catalog	Application Owner, Data Administrator, Customer Administrator, Global Administrator, or Security Officer
Application Owner	Application in the catalog or review definition	Data Administrator, Customer Administrator, Global Administrator, or Security Officer
Business Role Manager	Business role definition	Business Roles Administrator, Customer Administrator, Global Administrator, or Security Officer
Business Role Owner	Business role definition	Business Roles Administrator, Customer Administrator, Global Administrator, or Security Officer
Escalation Reviewer	Review definition	Review Administrator, Customer Administrator, or Global Administrator
Fulfiller	Application setup in **Fulfillment > Configuration** or Business role definition	Business Roles Administrator, Fulfillment Administrator, Customer Administrator, Global Administrator, or Security Officer
Permission Owner	Review definition	Customer Administrator, Global Administrator, Data Administrator, or Security Officer
Review Auditor	Review definition	Review Administrator, Customer Administrator, or Global Administrator
Review Owner	Review definition	Review Administrator, Review Owner, Customer Administrator, or Global Administrator
Reviewer	Review definition	Review Administrator, Customer Administrator, or Global Administrator
SoD Policy Owner	SoD policy definition	Separation of Duties Administrator, Customer Administrator, or Global Administrator
Technical Role Owner	Technical role definition	Technical Roles Administrator, Customer Administrator, or Global Administrator

2.4 Using Coverage Maps

Coverage maps allow administrators to map review or access request items to respective reviewers or approvers when creating a review definition or an access request approval policy. Coverage maps use one or more rules to specify:

- An entity type or attribute based on the item under review
- Different entity and attribute criteria in a single column
- Secondary or related entity or attribute of related entity referenced by entity-entity relationships

For more information, see:

- Section 2.4.1, "About Coverage Map Rules," on page 26
- Section 2.4.2, "Using Criteria Definitions in Rules," on page 26
- Section 2.4.3, "Using Operators, Conditions, Filters, Relationships, and Attributes in Rules," on page 27
- Section 2.4.4, "Creating Rules for Coverage Maps," on page 27
- Section 2.4.5, "Creating a Coverage Map," on page 27
- Section 2.4.6, "Exporting and Importing a Coverage Map," on page 29
- Section 2.4.7, "Creating Coverage Map Using a CSV File," on page 30
- Section 2.4.8, "Loading a Coverage Map CSV File," on page 34
- Section 2.4.9, "Editing a Coverage Map," on page 34
- Section 2.4.10, "Deleting a Coverage Map," on page 35

2.4.1 About Coverage Map Rules

Coverage maps comprise one or more rules that define and specify the following:

- Reviewers of a **User Access** or **Account Review** definition

  NOTE: To specify a coverage map as a reviewer for unmapped accounts, ensure that **All unmapped accounts** is selected for the review items, and then specify **Review by Coverage Map** as the reviewer.

- Approvers for requested access in the **Request** application

To create coverage map rules, Identity Governance uses an interface similar to the advanced filter for searches. Though the interface uses conditions and subconditions to define rules for coverage maps, you cannot save rules. You can, however, export the coverage map that you create, and you can import coverage maps that others have created.

2.4.2 Using Criteria Definitions in Rules

Criteria options in the rules interface correspond with the criteria that you define in your rules. For example, if you want to create a condition for your rule that specifies users with specific titles, select **User: Title**.

2.4.3 Using Operators, Conditions, Filters, Relationships, and Attributes in Rules

The rules interface uses the **operators** AND, OR, and NOT to create expressions that direct the rule definition to include, respectively, ALL of the conditions you define, ANY of the conditions you define, or NONE of the conditions you define in the search filter. Select one of these operators to start building a filter. The operator you select applies to every condition you create.

Conditions allow you to specify a criteria option as a criterion for a rule, and then use additional operators, such as “equal to,” “not equal to,” “greater than,” “less than,” and “greater than or equal to,” to define how the rule includes, or if it excludes, the defined item in the coverage map as a result of the condition.

Filters are subconditions that allow you to fine-tune a condition with additional AND, OR, and NOT statements.

Relationships and **attributes** appear as options only when you define reviewer or approver criteria. Relationships require that you also assign and define an attribute for the relationship.

2.4.4 Creating Rules for Coverage Maps

Rule creation requires that you create expressions to define and add criteria for your coverage map. Click **Define Criteria** to define conditions that create expressions for one or more of the following review or approval items:

- User
- Account
- Permission
- Application

Click **Add Criteria** to define conditions or relationships that create expressions for one or more of the following reviewer or approver criteria:

- User
- Group

2.4.5 Creating a Coverage Map

When you create a coverage map, Identity Governance searches for a matching statement in the order defined in the coverage map. When one or more review items match all defined review item criteria, the users or groups matching the respective user or group criteria become reviewers for those items.

To create a coverage map:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policies** > **Coverage Maps**.
3. Click the add icon (**+**).
4. Type a name and a description for the coverage map.

5 Specify the coverage map type.

6 (Conditional) Create the Review Type coverage map rules.

6a Select **Review**.

6b Click the plus icon (**+**).

6c Under **Review Item Criteria**, click **Define Criteria**.

NOTE: You are not required to define review item criteria. A rule may contain only a reviewer criteria.

6d Click the plus icon (**+**) for the criteria you want to define, and then use operators, conditions, and filters available to create one or more expressions for each criteria.

NOTE: Some condition expressions require 1:1 mapping. For example, if the condition "User: Display Name **equals** `<Account Holder Display Name>`" returns more than one possible result, Identity Governance displays an error message. You should configure "User: Display Name **equals one of** `<Account Holder Display Name>`."

6e Click **Save**.

6f Under **Reviewer Criteria**, click **Add Criteria**, and then select either **Define Criteria** or **Define Relationship**.

6g Choose the criteria you want to define, and then use operators, conditions, and filters to create one or more conditions for each criteria.

6h Click **Save**.

Perform these steps for each rule you want to add to your Review Type coverage map.

7 (Conditional) Create the Request Type coverage map rules.

7a Select **Request**.

7b Click the plus icon (**+**).

7c Under **Approval Item Criteria**, click **Define Criteria**.

NOTE: You are not required to define approval item criteria. A rule may contain only an approver criteria.

7d Click the plus icon (**+**) for the criteria you want to define, and then use operators, conditions, and filters available to create one or more conditions for each criteria.

NOTE: Some condition expressions require 1:1 mapping. For example, “equals” is not valid if the rule could return more than one possible result. In those cases, “equals one of” is a valid choice.

7e Click **Save**.

7f Under **Approver Criteria**, click **Add Criteria**, and then select either **Define Criteria** or **Define Relationship**.

7g Choose the criteria you want to define, and then use operators, conditions, and filters to create one or more conditions for each criteria.

7h Click **Save**.

Perform these steps for each rule you want to add to your Request Type coverage map.

8. Click **Save**.

2.4.6 Exporting and Importing a Coverage Map

Identity Governance allows you to export one or more coverage maps to a file that you can download and share with others in your enterprise.

To export a coverage map:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policies** > **Coverage Maps**.
3. Select one or more coverage maps.
4. Click **Actions** > **Export Coverage Maps**.
5. On the Coverage Maps dialog box, enter a description for your export file, and then click **Download**.
6. On the title bar, click the Download icon.
7. On the Your Downloads dialog box, select the coverage map file you want to download, and then click the Download icon.

Identity Governance saves the following files to a ZIP archive in your browser download directory:

- A JSON file containing information for the coverage maps you chose to export
- A JSON file containing information for review definitions or access request approval policies (depending on the coverage map type) that use the coverage map(s)

You can share the downloaded file with others, who will extract the coverage map file before importing it. For information about importing review definitions and access requests, see Section 23.9, "Downloading and Importing Review Definitions," on page 257 and Section 21.5, "Downloading and Importing Access Request and Approval Policies," on page 225.

To import a coverage map:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policies** > **Coverage Maps**.
3. Click **Import Coverage Maps**.
4. Browse to the local directory where you extracted the coverage map file.
5. Select the file, and then click **Open**.
6. On the Import Coverage Maps page, select the coverage maps you want to import.
7. Click **Import**.

NOTE: Before you run a review, verify all mappings in the review definitions to ensure the coverage map associations are correct.

2.4.7 Creating Coverage Map Using a CSV File

Identity Governance allows you to create coverage maps using CSV files, which you can then load into Identity Governance. You can use these files to map review or request items to respective reviewers or approvers by specifying:

- An entity type or attribute based on the item under review
- Different entity and attribute criteria in a single column
- Secondary or related entity or attribute of related entity referenced by entity-entity relationships

You should understand Identity Governance supported coverage map types, keywords, syntax, and entity-entity relationships to create and load coverage maps.

If you prefer to manually create a coverage map, you can create a CSV file with header and criteria cells. For greater flexibility use only keywords. For more information, see:

- "Supported Coverage Map Types and Keywords" on page 30
- "Supported Syntax" on page 30
- "Supported Relationships" on page 32
- "User Access Review Coverage Map Examples" on page 32
- "Account Review Coverage Map Examples" on page 33
- "Access Request Coverage Map Example" on page 34

Supported Coverage Map Types and Keywords

Identity Governance supports the following coverage map type attributes and keywords:

Type	Description	Keywords
`REVIEW`	Maps for user access and account review based reviews	`Reviewer` `ReviewItem`
`REQUEST`	Maps for request based approver determination	`Approver` `RequestItem`

Supported Syntax

Header and Criteria Cells Syntax

For	Syntax
USER or GROUP based reviewer header cell	`<Reviewer.user|Reviewer.group>[.related user or group attribute key]`
Review item header cell	`<Approver.user|Approver.group>[.related user or group attribute key]`

For	Syntax
USER or GROUP based approver header cell	`<Application|Permission|User]>[.entity-attribute-key]`
Request item header cell	`[RequestItem.]<Application|Permission|ROLE_POLICY|User>.<entity-attribute-key>`
Keyword(s) only header	`<Reviewer|ReviewItem>` or `<Approver|RequestItem>`
Attribute based criteria cell	`[<entity-name>.]<attribute-name> <Op> <value(s)>`
Attribute and relationship based criteria cell	`[<entity-name>.]<attribute-name> <Op> ReviewItem.<entity-name>.[<relationship-name>.]<attribute-name>`

TIP: Specifying only keywords in the header column, and specifying other entity and attributes details in the criteria cells provides more flexibility than other formats.

Operator Syntax

Value entries for attributes that have numeric data types support the following list of comparison prefixes: `>, >=, <, <=, !=, <>`. For example: `"Permission.risk","< 40"`.

Value entries for attributes with string data types support multiple values by using the pipe `(|)` symbol. For example, `"Reviewer.user.displayName","Sue Smith|Jerry Jones|Tom Carter"`. Additionally, you can use the following operators:

- `!IS_EMPTY!` or `!NULL!`
- `!IN!`
- `!CONTAINS!`
- `!MATCHES!`
- `!ENDS_WITH!`
- `!STARTS_WITH!`
- `!NOT!`

Date Type

The system evaluates date types in comparisons using ISO 8601 date and time format. The following are some examples of January 31, 2017:

- 2017-01-31
- 2017-01-31T10:00Z
- 2017-01-31T10:00-05:00

NOTE: Though the format allows for time to be specified, Identity Governance stores only the date in the catalog for date entity types.

Supported Relationships

Relationships can be nested in coverage maps. However, relationships cannot be referenced in the ReviewItem criteria cell; they can be accessed only from the Reviewer or Approver criteria cell.

The supported predefined relationships appear below:

Coverage Map Type(s)	Entity	Relationship	Related Entity
REVIEW and REQUEST	USER	supervsior	USER
REVIEW and REQUEST	USER	affiliate	USER
REVIEW and REQUEST	APPLICATION	applicationOwners	applicationOwners (table)
REVIEW and REQUEST	applicationOwners	owner	USER
REVIEW and REQUEST	applicationOwners	groupOwner	GROUP
REVIEW and REQUEST	PERMISSION	permissionOwners	resolved_spermission_owner (table)
REVIEW and REQUEST	resolved_spermission_owner	owner	USER
REVIEW only	ACCOUNT	accountHolders	saccount_user (table)
REVIEW only	saccount_user	holder	USER
REVIEW only	ACCOUNT	accountOwners	resolved_saccount_owner (table)
REVIEW only	resolved_saccount_owner	owner	USER
REQUEST only	ROLE_POLICY (technical role)	role_policyOwners	policy_owner (table)
REQUEST only	policy_owner	owner	USER
REQUEST only	policy_owner	groupOwner	GROUP

NOTE: Any of the relationships that resolve to a table would need another segment to resolve to an ENTITY. For example, APPLICATION.applicationOwners is incomplete, because it resolves to a table. The complete expression should be: APPLICATION.applicationOwners.USER.<attributeName> or APPLICATION.applicationOwners.GROUP.<attributeName>

User Access Review Coverage Map Examples

USER based reviewer with risk and location as criteria

```
"Reviewer.user.displayName","Permission.risk","User.location"
"Sue Smith",">90","Boston"
"Charles Smith",">70","New York"
```

The first line is the header row and contains the column headers that identify the entity attributes that Identity Governance will use to determine reviewers.

The example uses the risk attribute from the permission entity and the location attribute from the user entity to match against review items. When a review item matches, the example uses the `displayName` attribute from the `User` entity to select a reviewer.

All the review item criteria columns must match for that row to be considered a match to the review item. In this example, the second line only matches a review item where the permission risk is greater than 90 and the user's location is Boston.

USER based reviewer with multiple criteria

```
"Reviewer.user.displayName","User.department"
"Armando Colaco","!STARTS_WITH! Opera"
"Charles Ward","!NOT! !MATCHES! Finance"
"Henry Morgan","!NOT! !NULL!"
```

The reviewer assignment attempts to perform a match on each row of the coverage map until a match has been found. The first line is the header row and contains the entity attributes that are being evaluated. The second row assigns Armando Colaco as reviewer if the department of the user under review starts with `Opera`. The third row assigns Charles Ward as reviewer for users who are not members of the Finance department. The fourth row assigns Henry Morgan as reviewer for users who are members of a department.

During coverage map processing, a matching row is searched for in the order they appear in the CSV file. After a match is found for a review item, the reviewers are assigned based on that matching row, and no further rows are processed for that review item.

NOTE: Any review items that do not find a match are assigned to the review exception queue.

Keywords only header with review item referenced in criteria cells

```
"ReviewItem", "Reviewer"
"user.department !IN! Transportation|Tours", "user.location ==
ReviewItem.user.supervisor.location"
"user.department !NULL!", "user.uniqueUserId !IN!
ReviewItem.application.applicationOwners.owner.uniqueUserId"
```

In this example, the header cells use only keywords, and the first criteria row uses relationships to assign a reviewer. Note that the `ReviewItem` is referenced within the `Reviewer` criteria cells. For users under review who are in the Transportation or Tours department, a reviewer is assigned based on the location of the supervisor.

The second criteria row specifies multiple reviewers based on the owners of the application under review if the department attribute is null.

Account Review Coverage Map Examples

Self and account owners as reviewers

```
"ReviewItem.account.relationToUserType","Reviewer.user.uniqueUserId"
"==SHARED","!IN!ReviewItem.account.accountOwners.owner.uniqueUserId
"==SINGULAR","!IN!ReviewItem.account.accountHolders.holder.uniqueUserId"
```

In this example, the header cells use keywords and the criteria cells uses relationships to specify that all shared accounts are reviewed by the account owner, and single assigned accounts are reviewed by the holder of the account (self).

Supervisors as reviewers

```
"ReviewItem.account.relationToUserType","Reviewer.user.uniqueUserId"
"==SHARED",
"!IN!ReviewItem.account.accountOwners.owner.supervisorUniqueId"
"==SINGULAR","!IN!ReviewItem.account.accountHolders.holder.supervisorUniqu
eId"
```

In this example, the supervisor of the account owner is specified as the reviewer for all shared accounts and the supervisor of the holder of the account is specified as reviewer for single accounts.

Access Request Coverage Map Example

Policy owners as approvers

```
"Approver.user.uniqueUserId","Approver.group.uniqueGroupId","RequestItem"
"!IN! RequestItem.role_policy.policyOwners.owner.uniqueUserId","!IN!
RequestItem.role_policy.policyOwners.groupOwner.uniqueGroupId","role_polic
y.risk > 30"
```

In this example, for access requests to technical roles, if risk is greater than 30, then the policy owner is assigned as the approver.

2.4.8 Loading a Coverage Map CSV File

To load a coverage map CSV File:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policy** > **Coverage Maps**.
3. To load a new coverage map:
   - **3a** Click the load icon.
   - **3b** Select the coverage map type: **REVIEW** or **REQUEST**.
   - **3c** Type coverage map name and description.
   - **3d** Click the upload icon, and then browse for the coverage map CSV file.
   - **3e** Select **Save**.
4. Repeat the above steps to add additional coverage maps.

2.4.9 Editing a Coverage Map

Identity Governance allows you to edit your coverage maps as needed.

To edit a coverage map:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policy** > **Coverage Maps**.

3. Click the name of the coverage map you want to edit.
4. Click **Edit**.
5. Make the desired changes.
6. Click **Save**.

2.4.10 Deleting a Coverage Map

Identity Governance provides two methods for deleting coverage maps.

To delete a coverage map from the Coverage Maps page:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policy** > **Coverage Maps**.
3. Select one or more listed coverage maps.
4. Click **Actions** > **Delete Coverage Map**.

To delete a coverage map from a coverage map detail page:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Policy** > **Coverage Maps**.
3. Click the name of the coverage map you want to delete.
4. Click **Edit**.
5. Click the delete icon.

NOTE: You can delete only coverage maps not in use.

3 Customizing and Configuring Identity Governance for Your Enterprise

You can customize the displayed names of attributes and risk levels in the Identity Governance interface. You can also customize the content in the templates for the email notifications.

- Section 3.1, “Enabling and Disabling Auditing Events,” on page 37
- Section 3.2, “Managing Logging Levels,” on page 38
- Section 3.3, “Changing Advanced Configuration Settings,” on page 39
- Section 3.4, “Customizing Email Notification Templates,” on page 39
- Section 3.5, “Customizing the Collector Templates for Data Sources,” on page 46
- Section 3.6, “Customizing Categories,” on page 46
- Section 3.7, “Disabling Review Email Notifications,” on page 47
- Section 3.8, “Extending the Identity Governance Schema,” on page 48
- Section 3.9, “Customizing Download Settings,” on page 50
- Section 3.10, “Customizing Access Request Landing Page,” on page 51

3.1 Enabling and Disabling Auditing Events

Identity Governance generates common event format (CEF) events that you can forward to an audit server to analyze the events and to create reports. These reports allow you to provide evidence that you are in compliance with regulations.

If you did not enable auditing during Identity Governance installation, a Global Administrator can use the Configuration menu to enable and disable specified audit events for specified packages after installation.

To enable auditing after installation:

1. Log in to Identity Governance as a Global Administrator.
2. Select **Configuration > Audit Enablement**.
3. Click the toggle switch for each listed package for which you want to change the status to either **Enabled** or **Disabled**.
4. (Optional) Use the search field to search for a specific package on the list and change its status.

3.2 Managing Logging Levels

You can manage the logging levels for Identity Governance and the Identity Governance clients to have a more granular view of the events occurring. Use the following information to enable or increase the logging levels for Identity Governance and Identity Governance clients.

3.2.1 Setting Logging Levels by Module and Package

Identity Governance allows you to set logging levels for the packages in each available module. The product includes a short list of packages for each selected module to which you can assign a logging level. You can also search for and add packages to each module, or delete packages from each module.

Identity Governance allows you to set the following logging levels for each package:

- Info
- Warning
- Error
- Fatal
- Debug
- Trace
- None

Identity Governance displays a list of packages associated with each module.

To set the logging level:

1. Log in to Identity Governance as a Global Administrator.
2. Select **Configuration > Logging Levels**.
3. From the drop-down list, select one of the following modules:
    - Client WAR
    - CX WAR
    - DaaS WAR
    - DTP WAR
    - Health WAR
    - Server WAR
    - Workflow WAR
    - RPT WAR
4. Specify the logging levels for the packages in the selected module.
5. (Optional) If you want to add a logger package to a selected module:

    5a Next to **Logging levels by module and package**, click **+**.

    5b In the **Add New Logger** window, type the name of the package you want to add.

    5c Select the logging level for the package you want to add.

    5d Click **Add**.

3.2.2 Setting the Exception Level

The exception level in Identity Governance specifies the level at which exception messages appear in the console. By default, the logging exception level is set to **Debug**. Global Administrators who want stack trace, should set the exception level to **Error**.

NOTE: The exception level applies to all modules and packages.

3.3 Changing Advanced Configuration Settings

After installing Identity Governance, you might need to change your default configuration settings under the guidance of support engineers. You can change the application configuration and enable features using the Identity Governance **Advanced** menu and configuration utilities.

WARNING: Changing advanced configuration settings can impact the performance, security, and overall function of Identity Governance. Some settings will require Tomcat Server restart. Consult Identity Governance support engineers for additional details.

To change configuration settings after installation using the Advanced menu:

1. Log in to Identity Governance as a Global Administrator.
2. Select **Configuration > Advanced**.
3. Search for a global configuration property key.
4. Click the edit icon to change the default value or to add a value.
5. Click the save icon.
6. (Conditional) Restart Tomcat Server. Consult support engineers about when you will need to do this.
7. (Optional) Click **+** to add a configuration property key and value.

For more information about the configuration utilities, see “Using the Identity Governance Configuration Utility” and “Using the Identity Governance Configuration Update Utility” in the *Identity Governance 3.6 Installation and Configuration Guide*.

3.4 Customizing Email Notification Templates

Identity Governance notifies users of tasks in their queue, as well as other review events, as specified in review definitions. Depending on your configuration, various events associated with functional areas, such as bulk data update, business role approval, request, review, Separation of Duties (SoD), and fulfillment, might trigger email notifications. For example, the Bulk Data Administrator can be notified when a bulk data template is generated and when a bulk data update occurs; and an SoD Policy Owner can be notified when a new SoD violation is detected after data source collection and publication. The application supplies default templates with preconfigured tokens for the email notifications and uses the templates as is unless you customize them for your environment.

TIP: When setting up and testing Identity Governance notifications or testing preview review notifications, make sure you are using a test email system or test email addresses. For example, use fake mail, mail catcher, or test corporate mail server. *Do not send emails to a live server while testing your system*. If you have real email accounts in your test system you can inadvertently send spam email to people in your company.

For information about configuring Identity Governance to send email notifications, see "Enabling Email Notifications for Identity Governance" in the *Identity Governance 3.6 Installation and Configuration Guide*. For information about Review related notifications, see "Setting Review Notifications" on page 241.

- Section 3.4.1, "Modifying Email Templates," on page 40
- Section 3.4.2, "Adding an Image to the Email Template," on page 45

3.4.1 Modifying Email Templates

Identity Governance allows you to modify an XML file that contains the email text in the languages supported for Identity Governance. You can edit the XML file with one of the following programs to customize it for your organization:

- XML editor
- Text editor
- Designer for NetIQ Identity Manager

To modify an email template content:

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Configuration > Notification Emails**.
3. Select a download option:
   - To customize all email templates in a single file, select **Download XML**. Depending on your browser settings, you might be prompted for the download path.

     NOTE: If prompted, do not rename the `EmailTemplates.xml` file. Identity Governance cannot upload a file that does not match the expected name.

   - To download the XML file for all the emails of a functional area in a single locale, select **Implemented Locale** from the **View functional area** drop-down list, then select the locale.
   - To download the XML file for a single email in all the implemented locales, select **Email** from the **View functional area** drop-down list, then click an email name.

     Optionally, select **Email source preview (en)** to view the template. Specify an email address to **Send notification preview**.

     Click **Download XML**.
4. Modify the content in the email templates you have downloaded.

   NOTE: Do not modify any text in the code strings in the file. Identity Governance might not function correctly if you change the code strings. For descriptions of the email tokens, see "Email Tokens" on page 41.

5 Save and close the files.

6 To submit the modified files, click **Import XML.**

Email Tokens

When customizing emails, be careful in handling the tokens. Identity Governance allows the use of entities and their attributes in your email templates. Entity tokens *must* appear in the `form:token-descriptions` section to be processed. If it only appears in the <body/> section of the template it will stay unresolved.

Some email templates expect only certain processing and entity tokens. Therefore, the product might not be able to replace a token with a value in some situations. For example, when an unexpected token is present in the template, a entity token is evaluated as `null` during notification preview, or an entity attribute was not collected and was resolved as `null`, the generated email might contain blank values or might contain token as-is. Notifications sent during review preview mode that enable administrators and review owners to preview notifications, might not always replace tokens with values, and names seen in the preview might not be the name that is sent in the live mode email.

The email templates use the following processing tokens:

Token	**Notes**
applicationId	Application ID, unused in the Certification External Provisioning Start Error template
applicationName	Application name
appName	Application name
approverName	Business role approver
certifierFullName	Reviewer's full name
certifyTaskLink	Link to task
changesetId	Unused in the Certification External Provisioning Start Error template
content	Used in the generic email template
curatorFullName	Bulk data feed curator
error	Fulfillment error
errorMessage	Error message text
externalPrdLink	Unused in the Certification External Provisioning Start Error template
feedName	Bulk data update definition
fulfillerName	Full name of the fulfiller
host	The workflow hostname
inputFile	Bulk data CSV file
link	URL link

Token	Notes
message	The output message from a system process.
newTaskType	Used in the Certification Auto Provisioning Start Failed template
ownerName	Owner of the SoD policy
permissionsToLose	List of application permissions
prdName	Workflow name used in the external fulfillment template
prevReviewerFullName	User that the task was reassigned from
productName	Configured product name, such as Identity Governance or Access Review
reassignedByFullName	User who reassigned the task
reassignComment	Optional comment entered at reassignment
retryCount	Number of fulfillment items in a retry state
reviewLink	URL link to review
reviewName	Name of the review
reviewOwner	Review owner’s name
reviewOwnerPhone	Review owner’s phone number
roles	List of business approval roles
subject	Found in Certification Started and Certification Changed email templates with no reference to the token in the templates.
taskTimeoutDays	Task timeout in days
theTerminator	The user that terminated a review
userFullName	Identity Governance user's full name
violations	Used in the Detected SoD Violation email template.

The email templates use the following entity and role-based tokens:

Entity Token	Entity Type	Notes
ADDRESSEE	USER	Primary (TO) address. Resolves to one of the following role: - Review Owner - Reviewer - Auditor - Escalation Reviewer
REVIEW	REVIEWINSTANCE	Review instance
REVIEWDEF	REVIEW_DEFINITION	Attributes for the review definition
REVIEWER	USER	Task owner of a current review instance. Used only in notifications to task owners.
PAST_REVIEWER	USER	Reviewer of the previous review instance. Used only in task reassignment notifications.

The following table shows the current attribute definitions for the review based entity types.

Entity Type	Attributes
REVIEWINSTANCE	◆ certificationDate ◆ endDate ◆ expectedEndDate ◆ startDate ◆ lastStatusChange ◆ validToDate ◆ taskCount ◆ taskCompleteCount ◆ itemCount ◆ itemCompleteCount ◆ itemApproveCount ◆ statusComment ◆ auditorComment ◆ startMessage ◆ approvedBy ◆ canceledBy ◆ approvedByPolicy ◆ status ◆ owners ◆ auditor

Entity Type	Attributes
REVIEW_DEFINITION	◆ name ◆ description ◆ activeFromDate ◆ activeToDate ◆ latestValidToDate ◆ startDate ◆ isActive ◆ duration ◆ escalationTimeout ◆ validFor ◆ repeat ◆ expirationExtension ◆ reviewType ◆ durationUnit ◆ escalationTimeoutUnit ◆ validForUnit ◆ repeatUnit ◆ expirationExtensionUnit ◆ owners ◆ auditor

3.4.2 Adding an Image to the Email Template

In addition to modifying an email template, you can also add an image or logo to the email template.

To add an image to the email template:

1 Select the image you want to add to the template and encode it in base64 string format.

TIP: Use the base64encode website or similar encoders to encode the image.

2 Download the email template.

3 Add the `<img src="data:image/png;base64, %base64-value% "/>`t ag where you want the image to appear. For example, <p>`Powered by <img src="data:image/png;base64,iVBORw0KAAA..."/></p>`.

4 Upload the modified email template.

3.5 Customizing the Collector Templates for Data Sources

A collector template typically includes predefined attribute mappings and value transformation policies suitable for the target data source. To create a custom collector template, you can download and edit an existing template. Collector templates use JavaScript Object Notation (JSON) format to specify the collection behavior. You can use a JSON formatter or text editor to modify the content of the template file.

When you import a new or modified template for an application source, you must specify whether the template is designed for collecting accounts or permissions from the source. If a new or customized template replaces an existing template, you can disable the template that you no longer need.

1. Log in to Identity Governance as a Customer, Global or Data administrator.
2. Select **Configuration**.
3. Expand the **Identity Source Collector Templates**, **Application Source Collector Templates**, or **Application Definition Source Collector Templates** section.
4. (Conditional) To customize an existing template, complete the following steps:

   4a Select the template that you want to customize.

   4b Click **Download**.

   4c Specify where you want to save the downloaded file.

   4d Edit the template and save the JSON file.
5. (Conditional) To import a new or modified collector template, select **+** and then specify the template that you want to import.
6. (Conditional) To disable a template that you do not use, complete the following steps:

   6a Select the template that you want to disable.

   6b Select **Disable**.

3.6 Customizing Categories

Identity Governance allows you to set up categories to organize applications, permissions, business roles, and technical roles. You can define these categories in Identity Governance and assign them to entities. To customize your categories offline and upload them in bulk, you can export a JSON file, edit it, and import it to modify categories and category assignments.

1. Log in to Identity Governance as a Customer, Global or Data Administrator.
2. Select **Configuration** > **Categories**.
3. To add new categories, select **+** and specify a name and description for the category.
4. (Optional) Assign the category to entities:

   4a Select **+** next to **Assign entities**.

   4b Select the entity type and then select specific entities to assign the category to.

   4c When you have selected all the entities, select **Add**.

   4d Each entity type with that category assigned now has a tab on the **Category** window. From this window you can remove the category assignment, if needed.

5 Select **Save** and then close the window.

6 To edit categories in bulk, select **Export Categories** and save the JSON file.

NOTE: The exported JSON file consists of only categories. Entities assigned to the categories such as applications, permissions, business roles, or technical roles are not included in the exported file. Use the entity export feature to export entity with category reference.

7 After you have edited the file, select **Import Categories** to import the file.

NOTE: Use the entity import feature to import entity with category reference.

3.7 Disabling Review Email Notifications

Identity Governance enables you to customize and set up various event notifications. Administrators can also disable notifications during access governance life cycle using the Identity Governance Configuration Utility.

To disable review email notifications:

1 Stop Tomcat. For examples, see "Starting and Stopping Apache Tomcat" in *Identity Governance 3.6 Installation and Configuration Guide*.

2 Launch the Identity Governance Configuration Utility in console mode. For more information, see "Using the Identity Governance Configuration Utility" in *Identity Governance 3.6 Installation and Configuration Guide*.

3 Specify suppress commands for the emails you want to disable as shown in the following examples.

WARNING: Disabling review notifications is a global change and is applied to *all* reviews.

3a To stop review termination notifications being sent out to the Review Owner and Reviewers when a running Review is terminated type the Configuration Utility console mode command: `add-property GLOBAL com.netiq.iac.reviews.suppressReviewTerminationEmail true`.

3b To disable losing permission notification from being sent to the employee that is about to have a permission revoked type the Configuration Utility console mode command: `add-property com.netiq.iac.reviews.fulfillment.suppressLosingPermissionEmail true`.

4 Exit the console mode.

5 Delete the `localhost` folder from the `tomcat/work/Catalina` directory.

6 Start Tomcat. For examples, see "Starting and Stopping Apache Tomcat" in the *Identity Governance 3.6 Installation and Configuration Guide*.

3.8 Extending the Identity Governance Schema

Identity Governance contains a default schema for entities that you collect in the catalog. If the default schema provided does not meet your needs, you can extend the Identity Governance schema. Extending the schema is a simple process.

To extend the schema, add attributes to the default schema. You can view the default schema for Identity Governance in the console. Log in as a Global or Data administrator to view the schema, which is listed under the **Data Administration** menu.

- Section 3.8.1, "Adding or Editing Attributes to Extend the Schema," on page 48
- Section 3.8.2, "Adding Attributes to a Collector," on page 50
- Section 3.8.3, "Viewing Available Attributes in Business Roles," on page 50

3.8.1 Adding or Editing Attributes to Extend the Schema

Identity Governance provides a simple way to extend the schema for the different entities. You can add additional attributes and define properties. You can also download attributes as JSON files to edit the properties. After editing, you can import the attributes to the page that lists all attributes for a given entity.

1. Log in to Identity Governance as a Customer, Global or Data Administrator.
2. Under **Data Administration**, select the entity where you want to add or edit the attribute.
   - **Identity**
   - **Account**
   - **Permission**
   - **Business Roles**
   - **Application**

   NOTE: Identity Governance does not allow you to extend the schema for groups and permission assignments.

3. Select the plus sign **+** to add a new attribute or select an existing attribute to edit the properties.
4. Add or edit the attribute by configuring the following:

   NOTE: Some values might not be editable, depending on the Attribute Behavior settings.

   Attribute name and Key

   Specify the attribute name and key. Use the same value for both fields. The attribute name must be unique to your Identity Governance environment.

   Type

   Select the type of attribute you want to create. The types are **String**, **Boolean**, **Double**, **Long**, **Date**, and **Locale**.

   Maximum size

   Specify the number of characters allowed for the value of this attribute.

Truncate to size

Enable to allow the system to handle values longer than the attribute's maximum size. If you do not enable this option, and the value is longer than the maximum size, an error will occur and the record is not collected.

Attribute Behavior

Select the behavior of the attribute. The attribute can be required, allowed to change, allowed to have multiple values, or allowed to have a static value. Static values enclosed in double quotes allow you to provide the same attribute value for all collected objects. For example, to set the same values of `cost = 10`, `type = regular`, and `privileged = false` for all collected Accounts, configure the account collector with the static values in double quotes for these attributes. This is a great way to set a default value that you can override using collector transforms or by editing the attributes as needed after collection.

Listable Options

Select how you want the attribute displayed in Identity Governance.

Display in Quick Info views

Allows anyone with rights to view reviews to see the attribute. This option does not allow the attribute to be changed.

Display in lists and detail views

Allows administrators to view and change the information in the Identity Governance console.

Sortable in table columns

Allows administrators to store the attribute in the table columns.

Allow to be reviewed

Allows administrators to specify which attributes to review when creating User Profile Review definition.

Searchable Options

Select how you want the new attribute to be searched for in Identity Governance.

- Available in catalog searches. Changes take effect after publication.
- Display as refine search option.
- Display in review item selection criteria.
- Display in business role selection criteria.

IMPORTANT: For all attributes that you have configured for authentication matching rules using the Identity Governance Configuration Utility, ensure that you enable the following list and search options for identity attributes:

- Display in lists and detail views.
- Available in catalog searches. Changes take effect after publication.

5 Select **Save**.

3.8.2 Adding Attributes to a Collector

If a collector you use does not contain the schema you need, you can add attributes to extend the schema of the collector. You must have already created and configured the collector before performing the following steps.

1. Log in to Identity Governance as a Customer or Global Administrator.
2. Select **Data Sources**.
3. Select **Identities**, **Applications,** or **Application Definitions**.
4. Select ***Your Data Source***.
5. In the collector page, select the collector name to view details.
6. Based on your collector, select **Collect Identity**, **Collect Permission**, or **Collect Application**.
7. Scroll down the list of parameters and click **Add attribute**.
8. Configure parameters to define the attribute.
9. Select **Save**.

3.8.3 Viewing Available Attributes in Business Roles

When you create a business role, you define a membership expression that searches for all users who meet a certain criteria to be added to the business role. For more information, see Section 17.3, "Defining Business Roles," on page 167.

The **Membership expression** lists all of the available attributes you can match under the **Title** field. This list matches the list displayed under **Data Administration** > **Business Roles**. If you want to add more items to this list, you must add a new attribute to the business roles schema.

NOTE: Only Bootstrap, Customer, Global, Data or Business Role Administrators have rights to administer the business role schema. For more information, see Section 3.8.1, "Adding or Editing Attributes to Extend the Schema," on page 48.

3.9 Customizing Download Settings

Identity Governance enables you to export and download data related to various function areas as JSON or CSV files. Based on your authorization, you can download items such as: data sources, review, role, and policy definitions, reviewer, review item, and business roles lists, and technical and business roles. The download is performed asynchronously, and users can continue to work on the page or switch to a different page and not affect the download process.

TIP: For description of the internal ENUM values from the database that might appear in the CSV files, see *Identity Governance ENUM Values Technical Reference*.

All your downloads except templates and categories are saved to a download area and retained for the interval specified in the **Configuration > Download Settings** menu. Use the download icon on the top menu bar to download files and also manually delete download files before the end of the retention interval.

Use the **Configuration > Download Settings** menu to view the default download settings and optionally customize:

- Attributes used to *uniquely* identify Identity Governance users, groups, permissions, or accounts when references to these entities are exported with other entities or definitions such as review definitions, request policies, SoD policies, and roles.

  NOTE: You should select an attribute that appears in the type ahead list, is enabled as **Available in catalog searches** in the **Data Administration >** ***Entity*** **Attributes >** ***Attribute*** definition page, and has unique relationship with the entity. Additional attributes might exist in the system but they cannot be used as uniqueness attribute. For example, you can select attributes such as Permission ID Digest which has a 1-1 relationship with permission. However, attributes such as titles, job codes, or departments would not be good candidates since they do not uniquely identify the entity.

- Number of hours to retain downloads before they are deleted (**Download retention period**)
- Delimiter used to separate multi-valued attributes in the CSV (**CSV Multi-value Delimiter**)

3.10 Customizing Access Request Landing Page

The default Access Request landing page is Current Access page. To change the default landing page, use the following steps:

1. Log in to Identity Governance as a Global Administrator.
2. From the Identity Governance home page, click **Configuration** > **General Settings**.
3. Under **General Settings**, select the desired landing page for **Access Request landing page**.
4. Click **Save**.

4 Using Advanced Filters for Searches

If you have a large data set, a simple search could return a list of results too large to be helpful or relevant to your needs. Many Identity Governance search fields include an advanced filter option that allows you to create search filters that include one or more conditions and subconditions.

- Section 4.1, “Using the Expression Builder to Create Advanced Filters,” on page 53
- Section 4.2, “Creating and Saving an Advanced Filter — Example,” on page 54
- Section 4.3, “Using and Managing Saved Filters,” on page 55

4.1 Using the Expression Builder to Create Advanced Filters

The filter icon, where available for searches, appears to the right of the search field. Click the filter icon to activate an expression builder, which lets you create advanced filters by selecting and combining search attributes, operators and expressions, values, and filters that Identity Governance uses to create a focused list of search results.

- Section 4.1.1, “Choosing Search Attributes,” on page 53
- Section 4.1.2, “Using Operators, Conditions, and Filters,” on page 54

4.1.1 Choosing Search Attributes

The search attributes available from the drop-down list varies across searches, depending on the data columns available to select for display in the results list. For example, if you want to create a search for specific Business Role approval policies, you can choose from the following search attributes:

- Name
- Changed By
- Created By
- Description
- Name
- Type

4.1.2 Using Operators, Conditions, and Filters

Advanced search filters use the **operators** AND, OR, and NOT to create expressions that direct the search to include, respectively, ALL of the conditions you define, ANY of the conditions you define, or NONE of the conditions you define in the search filter. Select one of these operators to start building a filter. The operator you select applies to every condition you create.

Conditions allow you to specify search attributes and use additional operators, such as "equal to," "not equal to," "greater than," "less than," and "greater than or equal to," to define how or if the search item appears as a result of the condition.

Filters are subconditions that allow you to fine-tune a condition by further filtering results using additional AND, OR, and NOT statements.

4.2 Creating and Saving an Advanced Filter — Example

Filters can be as simple or complex as needed. For example, the procedure below creates a simple filter that narrows the list of Business Role approval policies by searching for and listing:

- All the Business Roles approval policies that include the word "Approval," and
- Were created by either of two specific people in your organization, but
- Are not the policy named "Default approval policy."

To create a search filter for the example:

1. Click **Policy** > **Business Roles**.
2. Click the **Approval Policies** tab, then click **Approval Policies**.
3. Click the Filter icon to the right of the search field, then select **New Filter**.
4. Create a condition with the following options:

    4a Select **ALL of the following (AND)** as the operator.

    4b Select **Name** and **Contains**, then type `Approval` in the catalog attribute field.

    4c Click **Filter**, to use the OR operator and add a subcondition to narrow results to two specific people.

    4d Click **Condition** at the root layer of the expression and select **Name**, **not equal to**, then type `Default approval policy` in the catalog attribute field.

5. To apply the advanced search filter, click **Apply**.

NOTE: Some advanced filters allow you to save the filter for future use. If the save option is available, type the filter name, then click **Save**.

4.3 Using and Managing Saved Filters

When you save an advanced filter, it becomes available for use when you click the filter icon, along with options to manage saved filters and to create a new filter.

- Section 4.3.1, "Using a Saved Filter," on page 55
- Section 4.3.2, "Managing Existing Filters," on page 55

4.3.1 Using a Saved Filter

To use a saved filter:

1. Click the Filter icon, then select the filter you want to use.
2. (Optional) Make changes to the filter.
3. Click **Apply**.

4.3.2 Managing Existing Filters

Identity Governance provides a Manage Filters window, which looks like the expression builder to make changes to or delete your saved filters.

To edit a saved filter:

1. Click the Filter icon, then select **Manage saved filters**.
2. In the Manage Filters window, click **Filter**, then select the filter you want to edit.
3. Make the desired changes to the saved filter.
4. Click **Save**.

TIP: If you want to create a new saved filter from an existing filter, you can change the name of the saved filter as part of your edits.

To delete a saved filter:

1. Click the Filter icon, then select **Manage saved filters**.
2. In the Manage Filters window, click **Filter**, then select the filter you want to delete.
3. Click the Delete icon.

5 Understanding Data Administration

After installing Identity Governance, the bootstrap administrator collects and publishes an initial set of identities and provides global authorization to one of these users. Alternately, the bootstrap administrator can also have the global authorization. The Customer Administrator or Global Administrator assigns users other authorizations such as the data administration authorization.

As a Data Administrator, you are responsible for the entire data administration process including the key phases of data preparation, collection, publication, and management. Data collection and publication is the first critical step in the governance process, and it is an ongoing process that is needed to ensure that the access information that is being reviewed is up to date.

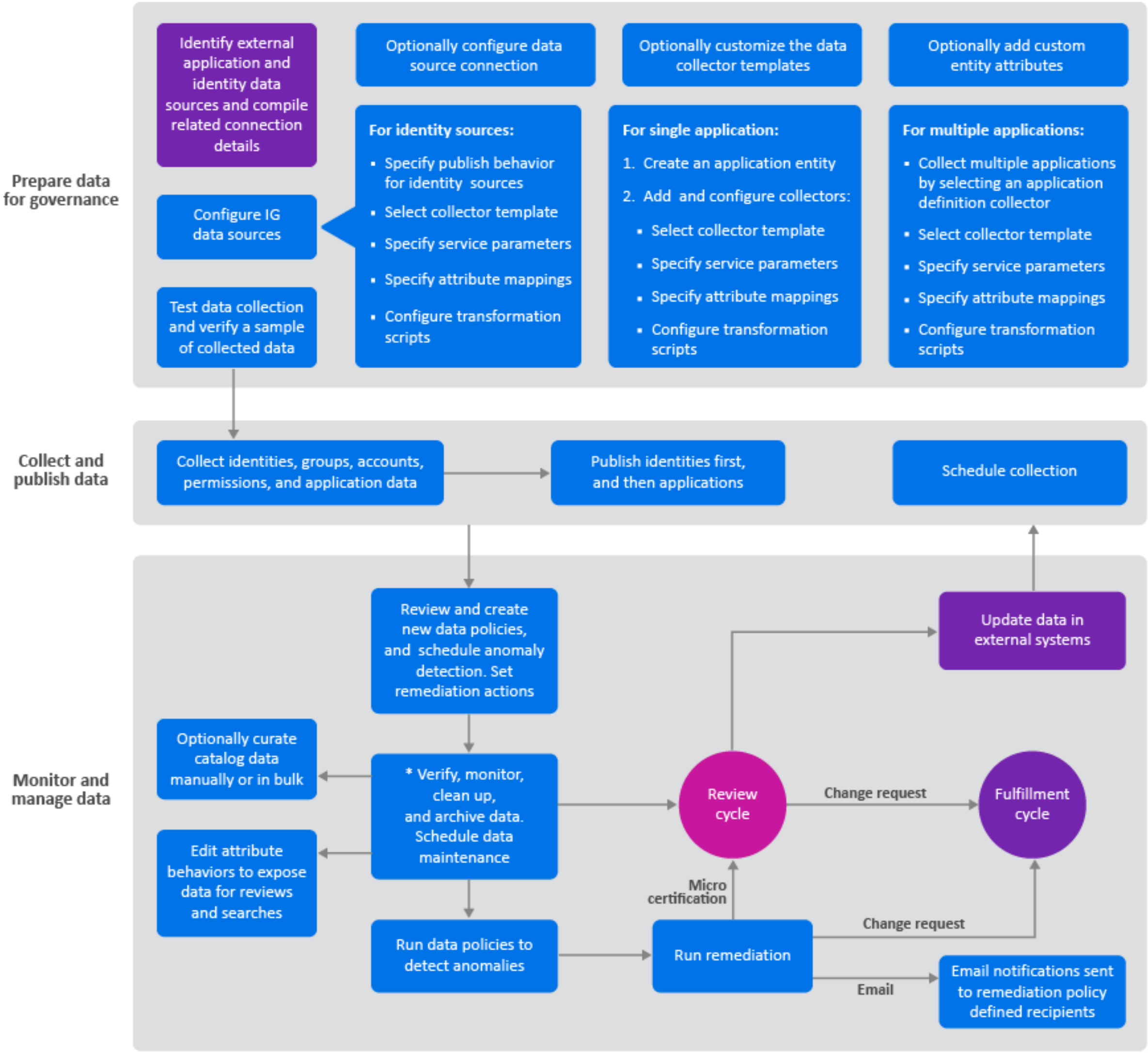
Identity Governance processes require clean, up-to-date data obtained from a variety of sources such as Identity Manager, Active Directory, and other enterprise applications in the data center and the cloud. Identity Governance can obtain the data by directly connecting to the systems through protocols such as LDAP and JDBC, or it can simply periodically extract the data from a file such as a Comma Separated Value (CSV) formatted file. The features and processes Identity Governance uses to retrieve, validate, and format entity (Identity, Group, Application, Account, and Permission) data from desired data sources is referred to as **data collection** and the connectors/collection templates you use to collect data are referred to as **collectors**.

Data Publication refers to the processes used to transfer the collected data to the Identity Governance **catalog** which makes the data available for governance operations.

Identity Governance provides default collector templates to get you started with the configuration process for data collection. However, each environment has custom requirements that might require unique transformation and configuration options.

As a Data Administrator, you need a thorough understanding of the sources from which the data is retrieved, as well as the Identity Governance data administration concepts and tasks. The following figure provides a brief overview of the data administration process.

Figure 5-1 *Data Administration Process Overview*


Prepare data for governance
Identify external application and identity data sources and compile related connection details
Configure IG data sources
Test data collection and verify a sample of collected data
Optionally configure data source connection
Optionally customize the data collector templates
Optionally add custom entity attributes
For identity sources:
▪ Specify publish behavior for identity sources
▪ Select collector template
▪ Specify service parameters
▪ Specify attribute mappings
▪ Configure transformation scripts
For single application:
1. Create an application entity
2. Add and configure collectors:
▪ Select collector template
▪ Specify service parameters
▪ Specify attribute mappings
▪ Configure transformation scripts
For multiple applications:
▪ Collect multiple applications by selecting an application definition collector
▪ Select collector template
▪ Specify service parameters
▪ Specify attribute mappings
▪ Configure transformation scripts
Collect and publish data
Collect identities, groups, accounts, permissions, and application data
Publish identities first, and then applications
Schedule collection
Monitor and manage data
Review and create new data policies, and schedule anomaly detection. Set remediation actions
Update data in external systems
Optionally curate catalog data manually or in bulk
* Verify, monitor, clean up, and archive data. Schedule data maintenance
Review cycle
Change request
Fulfillment cycle
Edit attribute behaviors to expose data for reviews and searches
Micro certification
Change request
Run data policies to detect anomalies
Run remediation
Email
Email notifications sent to remediation policy defined recipients

* In a SaaS environment, archiving and data maintenance tasks will be performed by the Maintenance Administrator

For additional information about the data collection and publication concepts and an overview of related tasks, see the following sections:

- Section 5.1, “Checklist for Collecting, Publishing, and Managing Data,” on page 59
- Section 5.2, “Understanding Collection and Publication Configuration Utility Settings,” on page 60
- Section 5.3, “Understanding the Identity Governance Catalog,” on page 61
- Section 5.4, “Understanding Data Sources,” on page 62
- Section 5.5, “Understanding Cloud Bridge,” on page 63
- Section 5.6, “Understanding Collectors,” on page 64

5.1 Checklist for Collecting, Publishing, and Managing Data

	Checklist Items
❑	1. Ensure that you understand your data sources and Identity Governance concepts and processes.
❑	2. Identify external data sources from which data must be imported into the Identity Governance catalog and determine which entity data you want to retrieve.
❑	3. Compile information needed to collect data from each source such as server DNS name or IP address, server connection ports, administrative account user name and password, and the type of data you want to collect. **NOTE:** You can use the default collector templates as a guide for the type of information you need to gather.
❑	4. Select data sources and appropriate collector templates.
❑	5. (Optional) If the Identity Governance default templates do not meet your needs, download and customize collector templates. For more information, see Section 3.5, “Customizing the Collector Templates for Data Sources,” on page 46.
	6. (Optional) If the Identity Governance schema does not meet your needs, create custom attributes as needed to map entities. For more information, see Section 3.8.1, “Adding or Editing Attributes to Extend the Schema,” on page 48.
❑	7. Configure collector options for your data source. For more information, see Chapter 6, “Collecting Identities,” on page 71 and Chapter 7, “Collecting Applications and Application Data,” on page 83.
❑	8. (Conditional) If your data is not in the correct format, configure transformation scripts. For more information, see Section 5.6.2, “Transforming Data During Collection,” on page 66.
❑	9. Test the data collection and preview the raw or transformed data. For more information, see Section 5.6.3, “Testing Collections,” on page 67.
❑	10. Collect data.
❑	11. Publish data. For more information, see Chapter 8, “Publishing the Collected Data,” on page 89.
❑	12. (Optional) Schedule collection and publication. For more information, see Chapter 9, “Creating and Monitoring Scheduled Collections,” on page 93.

	Checklist Items
❑	13. Create and run data policies to compare collection metrics, validate data, and detect anomalies. For more information, see Section 10.2, “Creating and Editing Data Policies,” on page 98 and Section 10.5, “Comparing Collections and Publications,” on page 100.
❑	14. Run remediation to resolve anomalies. For more information, see Section 10.6, “Detecting and Remediating Violations in Published Data,” on page 101.
❑	15. (Optional) Run Insight Queries to examine your data. For more information, see Section 11.5, “Analyzing Data with Insight Queries,” on page 112.
❑	16. (Optional) Edit (curate) data manually and in bulk. For more information, see Section 11.3, “Editing Attribute Values of Objects in the Catalog,” on page 107.
❑	17. (Optional) Create custom metrics for data analysis. For more information, see Section 28.1.5, “Creating Custom Metrics,” on page 289.

5.2 Understanding Collection and Publication Configuration Utility Settings

The following settings in the Identity Governance Configuration Utility allow you to control the collection and publication of the data sources. For information about the Configuration Utility, see “Using the Identity Governance Configuration Utility” in the *Identity Governance 3.6 Installation and Configuration Guide*.

5.2.1 Collection and Publication Batch Sizes

These settings allow an administrator to tune the size of the record chunks that Identity Governance uses for the data collection and publication operations to achieve optimal performance in each environment.

5.2.2 Collection and Publication Settings

Do not clear **Clean DAAS Configuration post collection**. The **Max supported Depth of permission relations** field prevents loops of relationship mappings in deeply nested permissions environments. The default setting should be best for most environments.

5.3 Understanding the Identity Governance Catalog

The Identity Governance **catalog** is the repository of all collected data. The catalog reflects the current state of the operations database. It includes information about the following entities:

- **Identities**

  Identities, also referred to as Users, represent the people who are at the core of the processes within Identity Governance. They are the *who* in the review process of "*who* has access to *what*." Identities also represent the people who manage and perform the reviews, or who serve as the administrators of Identity Governance.

  Identities are the first part of the catalog. Identity Governance can collect, correlate, and publish the identities. Plus, if you integrate with Identity Manager, you can leverage all the capabilities of Identity Manager to provide a synchronized, composite view of the people or things in your organization from multiple changing systems of record. Identity Governance can collect identities from multiple sources but it logically publishes the identities to a single name space in the catalog.

  Identity Governance maps the identity and entitlement data to a minimum standard schema. The schema can be extended to include custom attributes to match the shape of your identity and entitlement data.

- **Groups**

  Groups, also referred to as User Groups or Identity Groups, are comprised of collected identities and are a useful entity for assigning administrative roles or reviews to a set of people without incurring the administrative overhead of direct assignment.

- **Applications**

  Applications in Identity Governance are the source of information about accounts and permissions. Identity Governance provides application definition templates to collect applications.Also, the Identity Manager Advanced Edition Permission collector gathers entitlement-enabled Identity Manager driver objects as applications.

  Applications have their own namespaces. Identity Governance can collect and publish the application data (accounts and permissions) per application in parallel. Identity Governance uses the latest published identities in the catalog to map who has what access to permissions in each application when it is published.

- **Accounts**

  Accounts generally represent entities that provide access to applications. If you log in to Netflix, you are using an account. If you log in to Gmail, you are using an account. Accounts are *not* identities. They are the representation of system, application, or data source access *by* an identity. Accounts often specify the type of permissions granted to a user.

- **Permissions**

  Permissions, from an Identity Governance perspective, have multiple facets. Permissions can describe any of the following:

  - Actions that you can take within an application

    For example, finance department employees have access to the SAP Finance application (accounts). One employee has the rights granted to run Accounts Payable functions; another employee has the rights granted to run the Accounts Receivable functions. Both have accounts, but different permissions within the same application. This is a case where the Permissions (Accounts Receivable, Accounts Payable) are granted to the application user (account).

  - Items that you possess to access things

    For example, all employees have an electronic badge that allows them access to their office building. These employees do not have an account on the Building Access application to which they must log in, They simply have the access granted to their person via the badge. This is a case where the Permission (badge) is granted directly to the Identity (person).

- **Roles (Technical Roles)**

  Technical roles allow business owners to simplify the review process by grouping permissions, and reduces the number of items for business leaders to review. For example, a role called *Sales Employee* might have permissions associated with sales software applications and financial data and one or more permissions that apply to all employees, such as *Garage Access*, *Building Access*, and *Read Access to Company Intranet*.

  Technical roles can be detected if the user has all the permissions defined by the role. Technical roles can also be directly assigned to users and groups. Identity Governance does not collect technical roles.

  NOTE: Technical roles can be authorized by business roles. Business roles are higher-level roles focused around common access requirements for business role members. For example, a manager in the Sales Department might need all the permissions associated with a *Sales Employee* technical role, and need access to the management resources. Identity Governance provides details of business role associated with identities, applications, permissions, and technical roles as separate tabs in the catalog view.

5.4 Understanding Data Sources

To certify that your users have the appropriate levels of access to resources and applications, you need to populate the Identity Governance catalog with the identities, applications, application accounts, and application permissions that exist in your environment.

Data sources are external data repositories located on-premises or on the cloud from which Identity Governance collects data using collector templates. Identity Governance uses these sources to collect and merge data from a variety of sources and adds them to the catalog to facilitate governance operations.

Identity Governance supports the following types of data sources:

- **Identity data sources** to collect, merge, and publish identities and groups.
- **Application data sources** to collect and publish accounts and permissions from a single application source using one or more collector templates.
- **Application definition sources** to collect application entities. Application definition data sources collect application records, but do not collect application data such as accounts and permissions. When you publish an application definition data source, the associated applications appear in the catalog. The application definition data source itself does not appear in the catalog. To collect and publish the associated applications' data (accounts and permissions), you will need to configure collectors on the application source.

5.5 Understanding Cloud Bridge

NOTE: Micro Focus supports Cloud Bridge only in Identity Governance as a Service deployments.

In Identity Governance as a Service environments, **Cloud Bridge** is a data transfer bridge between Identity Governance in the cloud and data sources in on-premises environments. The **Cloud Bridge Agent** is the entity that responds to the Identity Governance collection and fulfillment commands and directs them to the proper data source for execution.

The Cloud Bridge Data Center configurations will be provided as part of your Identity Governance tenancy based on the information you provide in the technical questionnaire. **Data Centers** are conceptual representation of your Cloud Bridge Agent instance. Download the Data Center configuration files from the portal and follow the instructions to configure Cloud Bridge agents on your local systems, and then configure Identity Governance Data Source Connections and Data Sources as needed to connect to your on-premises data sources. If you need to collect data from multiple data centers, you will need to install a Cloud Bridge agent in each on-premises data center. For more information about Cloud Bridge workflow and system requirements, see *Identity Governance as a Service Quick Start*.

To start using the Cloud Bridge agent to collect data from on-premises data centers, authorized administrators will need to perform the following tasks:

1 Log in as a Customer or Data Administrator.

2 Click **Data Sources > Data Centers** to view previously configured data centers.

3 Create data source connections:

3a Select **Data Sources > Data Center Connections**.

3b Click **+**.

3c Add a name and description.

3d Use the **Data Centers** drop down to select the data center in which the Data Source Connection resides.

3e Save the data source connection.

3f Repeat the above steps to create additional data source connections to the same data center or another data center. Note that each data source connection has a unique ID.

4 Create data sources with Cloud Bridge data source connection:

4a Click **Data Sources > Identities** or **Data Sources > Applications**.

4b Click **+** and select a collector template.

4c Enable the Cloud Bridge connection and specify a data source connection. Note that the **User Name** and **Password** are no longer configurable.

4d Specify other fields as required and save the collector configuration.

5 At the command prompt on the server where you installed Cloud Bridge agent, enter the following command to create credentials for a data source connection:

```
docker-compose exec agent java -jar ./daas-remote.jar credential create
-i unique_id -u username -p password daas-remote.yml
```

6 On the collector page, click **Test Connection** below the Service Parameters fields to test the credentials.

7. (Conditional) If authentication fails, delete the credentials and repeat Step 5. To delete credentials, enter the following command:

   ```
   docker-compose exec agent java -jar ./daas-remote.jar credential delete
   -i unique_id
   ```

   NOTE: Use the above command to delete expired credentials or delete credentials for collectors that are no longer in use.

8. Test collection. For more information, see Section 5.6.3, “Testing Collections,” on page 67.
9. Collect and publish data.

5.6 Understanding Collectors

Identity Governance provides templates to simplify the collection of data. Collection templates or **collectors** are the default mappings of identity, account, or permission data from identity and application sources to the core Identity Governance schema. Each collector has one or more views that allow you to specify which data you will collect from your identity or application source, and describe how that data will be linked together in the catalog. Each collector has one or more views that describe the characteristics of the data source that you could collect. The views are different for identity and application sources. For example, the JDBC Identity (Oracle) collector template can collect data for users, groups, group-to-group associations, and group-to-user associations. Collectors for application sources gather either account or permission data.

For each collector, you can collect data from on-premises data centers by enabling Cloud Bridge connection.

- Section 5.6.1, “Understanding Collector Configuration,” on page 64
- Section 5.6.2, “Transforming Data During Collection,” on page 66
- Section 5.6.3, “Testing Collections,” on page 67
- Section 5.6.4, “Creating Emulation Packages,” on page 68
- Section 5.6.5, “Downloading and Importing Collectors,” on page 68

5.6.1 Understanding Collector Configuration

Identity Governance provides a large set of collector templates that contain default data and configuration settings for many common enterprise and cloud data sources. Every collector has the following common elements:

Collector template

Collector templates include predefined attribute mappings and value transformation policies for specific data source types. Select a template that best suits the data source. For example, select **AD Identity** to collect identities from Active Directory. The templates support the following types of data sources:

- Active Directory
- Azure Active Directory
- CSV file

The CSV collector supports TSV files. You enter the word `tab`, in uppercase, lowercase, or any combination thereof in the **Column Delimiter** field. To collect from a CSV file, you must specify the full path to the file.

- eDirectory
- Google Apps
- Identity Manager
- JDBC, such as Oracle or PostgreSQL
- Resource Access Control Facility (RACF)
- Salesforce.com
- SAP HR
- SAP User Management
- ServiceNow
- SharePoint

NOTE: Template names that end in **with changes** can be enabled for processing incremental change events.

NOTE: Micro Focus does not currently support SAP collectors in the SaaS environment.

To see all the data source types, select **Collector Template** when you create the data source.

To collect data from a JDBC or SAP source, Identity Governance needs the appropriate third-party connector libraries to be installed on the Identity Governance server.

Also, ensure that the JAR files are placed in the `/opt/netiq/bridge/lib` folder.

For more information, see "Identity Governance Server System Requirements" in the *Identity Governance 3.6 Installation and Configuration Guide*.

You can also customize an existing template or create your own. For more information, see Section 3.5, "Customizing the Collector Templates for Data Sources," on page 46.

Service Parameters

These are the configurable parameters that allow the collector to connect and, if required, authenticate to the target data source. These typically include file locations, server host and port specifications, or service URLs. This view also includes Cloud Bridge related parameters and a **Test connection** button to verify the settings.

NOTE: Micro Focus supports Cloud Bridge only in Identity Governance as a Service deployments.

Cloud Bridge Connector The **Use Cloud Bridge connector?** option enables you to collect data from on-premises data centers when using Identity Governance as a Service. After enabling a Cloud Bridge connection, you must select the data source pertaining to your data center for credentials to be passed through automatically based on the data source unique ID.

NOTE: Once you enable a Cloud Bridge connection, you do not need to specify user name and password for the data host server as credentials will be passed through automatically based on your data source unique ID. Verify this by testing the connection.

Collect Views

Each collector is comprised of one or more collector “views” that can be customized to match the characteristics of the data source being collected. These views enable you to map attributes and add transformation scripts. When collecting identities, they also enable you to select match rule when publishing and merging.

For information about identity collect views, see Section 6.1, “Understanding Collector Templates for Identity Sources,” on page 71 and for information about application (account and permission) collect views, see Section 7.2, “Understanding Collectors for Application Data Sources,” on page 83.

Transformation Scripts View

This view in the collector template allows you to view transformation script usage information.

Test Collection and Troubleshooting

This option allows you to preview data before running a full collection, preserve the configuration for a data source, or create an emulation package for a data source. You can use generated files to validate and troubleshoot collections, send results to support engineers, and to import data source configurations to a different environment.

For more information about test collections and troubleshooting, see Section 5.6.3, “Testing Collections,” on page 67 and Section 5.6.4, “Creating Emulation Packages,” on page 68.

For more information about configuring data source collector templates, see:

- Chapter 6, “Collecting Identities,” on page 71
- Chapter 7, “Collecting Applications and Application Data,” on page 83

5.6.2 Transforming Data During Collection

Because each application might have its own format for the data that you plan to collect, you might need to transform the data during the data collection process. For example, the application might store dates as a string (`20151202`) that needs to be converted to the Identity Governance date format, which is the Java Date format in milliseconds. Also, an application might use field lengths that do not match the field length in Identity Governance. These variations in collected data affect your ability to use the data or merge it with data collected from other sources.

Transformation scripts may be added to any mapped data field in any data collector by clicking on the ‘{}’ icon next to the field mapping. This will expand the dialog to allow you to either upload a transformation file or paste in transformation text. If required, you can also delete a transformation script after removing all references to the script from the attribute mapping(s) that use it.

The transforms are done through Nashorn-compatible Javascript. Within the Javascript, you can access the collected value by creating a variable name `inputValue`. After manipulating the collected value, you can return the value to Identity Governance by assigning the value to a variable name `outputValue`.

The following example translates the values `true` and `false` from the connected system to `active` and `inactive` in the Identity Governance catalog.

```
if (inputValue == 'true') {
    outputValue = 'active';
}
else {
    outputValue = 'inactive';
}
```

To add or delete a transformation script:

1. Log in as a Customer, Global, or Data Administrator.
2. Select a configured data source, and then expand a collector view to view related attributes.
3. Click ‘{}’ icon next to the field mapping to add a script.

   or
4. Delete a script.

   NOTE: You must remove all references to the script from the attribute mappings to delete a script.

   4a Expand the Transformation scripts view of the data collector to see its usage.

   4b Expand the collector view(s) mentioned in the usage information.

   4c Click ‘{...}’ icon next to the field mapping and choose **Select a script...** to clear the script usage from the attribute mapping.

   4d Repeat the above step to remove all usage of the script.

   4e Expand the Transformation script view and select the delete icon to delete the script.

For more information about transformations, see *Collected Data Transformations reference*.

5.6.3 Testing Collections

When creating, updating, or troubleshooting data collectors, you can test all or part of the collections without publishing the results to the catalog. When you test a collection, you either ensure that the collector is correctly configured, or you have the ability to change the collector configuration and quickly test again to check the results.

You can view the collected data as soon as the test collection completes, or you can download the results to view later. Results of test collections remain available in Identity Governance until you delete them.

When you run a test collection, you have some options for the test data:

- All records
- Some records

  When you select a subset of records to collect, you cannot control which records to collect. You could use this option if you want to quickly spot check a collector configuration rather than waiting for all the data to be collected.

- Raw data

  Raw data contains attribute names from the native application. These attributes have not yet been transformed based on the mappings in the collector. Testing the raw data collection lets you verify that you are collecting the data you intend to collect before Identity Governance transforms it.

- Transformed data

  Transformed data contains attribute names that you have mapped from the native application to the attribute names you are using within Identity Governance. Testing the transformed data collection lets you verify that your mappings within the data collector meet your expectations.

To test a sample collection from a data source:

1. Log in as a Customer, Global, or Data Administrator.
2. Select a configured data source.

   NOTE: Test connection is not supported when the CSV collector is accessed via an HTTP or HTTPS connection.

3. Select **Test Collection and Troubleshooting**.
4. Under **Test Collection**, select the collectors, and then select **Run Test Collection**.
5. Select the specific entities to collect.
6. (Conditional) To collect a subset of records, type the number of records to collect.
7. (Conditional) To collect all records, make no changes to the default **All** value.
8. Select raw data or transformed data collection to run.
9. After the test collection shows **Complete**, select **Action** to view, download, or delete the test collection results.

5.6.4 Creating Emulation Packages

You can more easily troubleshoot collection configuration outside your production environment by creating emulation packages for data collectors. An **emulation package** contains CSV files with the raw collected data from the data source and a CSV file containing data source configuration details. Emulation packages remain available in Identity Governance until you delete them.

To create an emulation package:

1. Select a configured data source.
2. Select **Test Collection and Troubleshooting**.
3. Under **Download and Emulation**, select **Create emulation package**.
4. When the emulation status shows **Complete**, select **Action** to view, download, or delete the emulation package.

5.6.5 Downloading and Importing Collectors

The ability to download and import collectors helps you manage your environment in several ways.

- Back up a working collector

- Replicate an environment
- Update collector details in a text editor
- Troubleshoot collections

Configuring collectors can take time, and you might go through several iterations of trial and error. When you have configured a collector that achieves the results you want, you should download it and save it with your other backup files. You can also use downloaded collectors to replicate an environment, either in a test environment or to use in another office location.

You could decide that you need to change the predefined attribute mappings and value transformation policies of a template to meet your specific environment. If you find that you need to customize a collector template, rather than only editing the values in a collector, you can download and import collector templates under **Configuration** in Identity Governance. For more information, see "Customizing the Collector Templates for Data Sources" on page 46.

NOTE: To correctly import data, you must download data sources from the current version of Identity Governance.

When you download a data source, the zipped file has the name of the data source. For example, `AD_Identities.zip`. The files within the zipped file are generically named in English and can include the following files:

- `Identity_Source.json` or `Application_Source.json` file (depending on type of data source) which contains the configuration of the data source and all of its collectors.
- Attribute files containing the schema elements used by the collectors within the data source. For example, `USER_Attributes.json`, `PERMISSION_Attributes.json`, and `APPLICATION_attributes.json`.
- Template files containing the collector template name and version used to create the collectors in the data source. For example, `Template_AD-Account_3.6.0.json`.
- `Categories.json` file when categories are applied to the source.

To download data source and associated files:

1. Select a data source, then select **Test Collection and Troubleshooting**.
2. Select **Download and Emulation**.
3. Click **Download Data Source Configuration**.

   3a Type a meaningful description such as the collector name.

   3b (Optional) Download included templates, assigned categories, and associated attribute definitions.

   3c Select the download icon on the top title bar to access the saved file and download the file.

   TIP: We recommend creating a folder for *each* data source zipped file and extracting the contents into that folder. This ensures that the similarly named files from different sources are not mixed together or overwrite those from other sources.

To import associated files and data source:

1. (Conditional) If your data source has custom schema or categories associated with it, import the previously downloaded schema files or category files before importing the data source. To import attributes definitions, navigate to the respective attribute page under **Data Administration** and import respective attribute file. To import categories and templates, select respective options under **Configuration**.
2. Under **Data Sources**, select **Identities** or **Applications**.
3. Select **Import an identity source** or **Import an application source**.
4. Based on the type of data source, select the `Identity_Source.json` or the `Application_Source.json` file.

6 Collecting Identities

To certify that your users have the appropriate levels of access to your resources and applications, you need to populate the Identity Governance catalog with the identities, application accounts, and application permissions that exist in your environment. Identity Governance organizes data according to their type of source: identity or application. When you create a data source, you also configure the settings for data collection.

Identity Governance must collect information about users from identity sources. After Identity Governance collects this information, you must publish the information to populate the catalog. You can then assign these users administrative authorizations in the product. For more information, see Section 2.2, “Adding Identity Governance Users,” on page 24.

- Section 6.1, “Understanding Collector Templates for Identity Sources,” on page 71
- Section 6.2, “Understanding the Variations for Identity Sources,” on page 73
- Section 6.3, “Creating Identity Sources,” on page 76
- Section 6.4, “Migrating an Identity Collector to a Change Event Identity Collector,” on page 80

6.1 Understanding Collector Templates for Identity Sources

Identity collectors populate the catalog with identities and group data. Identities are at the core of the functions of Identity Governance. All collectors share some common elements and features. In addition, identity collectors also include identity specific collector views and publication behavior settings.

- Section 6.1.1, “Understanding Identity Collector Views,” on page 71
- Section 6.1.2, “Understanding Publication Behavior,” on page 72

6.1.1 Understanding Identity Collector Views

Each identity collector comprises of one or more of the following views that you can customize to match the characteristics of the data source being collected.

Collect Identity

To ensure that you can create a unique identity from the data that you collect, you tell Identity Governance how to map the data collected from an application to the data that you collect from identity sources. Collect as much information as you need to fulfill your business needs. Also ensure that you collect enough information to allow application account and permission data to be joined to your identities. Some common join attributes that are available from most application sources include `email address`, `workforceId`, and name attributes.

Collect Group

Identity Governance always uses the `userID` attribute for an identity to join to the membership of collected groups. If a data source does not support group collection, Identity Governance does not allow you to configure this option.

An identity in the catalog can have attributes for one or more organizational group. For example, you might group employee identities by their department, such as Finance or Human Resources. You can use the collected group attribute to set the scope of a review, such as reviewing employees only in the Finance group. For example, Active Directory, eDirectory, and Identity Manager support this type of collection.

Collect Group to User Membership

Collects the relationship that joins users to groups from identity sources that maintain these relationships separate from the basic group information. For example, the JDBC Identity collector runs a SQL query that parses the table that contains the links between groups and users.

Collect Parent Group to Child Group Relationships

Collects the relationship that joins groups to subordinate groups from identity sources that maintain these relationships separate from the basic group information. For example, the eDirectory Identity collector uses this view to obtain nested group members of groups.

6.1.2 Understanding Publication Behavior

When you create an identity source, you can specify a publication option. The catalog contains data collected from multiple data sources. To create a unified identity for each person, you need to merge, or unify, the different sets of collected information. Merging occurs during the publication process. For each identity source, you can specify one of the following publication option:

Publish and merge

Use this option when you collect data for the same identity from different data sources. For example, both Active Directory and Salesforce.com have the same `first_name` and `last_name` attributes for Jane Smith. This option allows you to combine the duplicate attributes from the sources into one identity for Jane in the Identity Governance catalog.

When you edit the configuration of a publish and merge collector, the schema mapping user interface presents a **Match rule** check box next to each attribute mapping row. You must select at least one matching attribute before you can save the configuration.

You must also specify the rules for merging. Only one of your data sources can be an authoritative source for each identity attribute. To help you specify the **attribute authority**, Identity Governance numbers the data sources within each collection. The first source listed becomes the default authoritative source for all attributes in the collection. However, you can reorder the priority of the data sources or override the default setting for specific attributes. For more information, see Section 8.1, “Publishing Identity Sources,” on page 89.

Publish without merging

Use this option if you have only one identity source or your data sources do not contain the same identities. Since Identity Governance does not perform any merging activities during publication, you might observe faster performance. However, if your sources do contain the same identity, Identity Governance will treat those identities as separate people.

Do not publish

Use this option when you are configuring the identity source. For example, you might not want to publish any collected data when you are testing the process.

6.2 Understanding the Variations for Identity Sources

In Identity Governance, you associate user identities gathered from identity sources to the accounts and permissions assigned in the application sources. Many user identities are categorized by groups and have parent-child relationships with other identities or accounts. However, some application sources might define groups or parent-child relationships in a different way than Identity Governance. Also, some identity sources might be configured to generate incremental change events.

This section explains how to use the collector templates for the following sources:

- Section 6.2.1, “Collecting from Active Directory with Azure Active Directory,” on page 73
- Section 6.2.2, “Collecting from a CSV File,” on page 74
- Section 6.2.3, “Collecting from Google Apps,” on page 74
- Section 6.2.4, “Collecting from Identity Sources with Change Events,” on page 74
- Section 6.2.5, “Collecting from Microsoft SharePoint,” on page 76

6.2.1 Collecting from Active Directory with Azure Active Directory

When your environment uses both Active Directory and Azure AD, some user identities might be unique to one of the applications while other identities might exist in both applications. If you use Active Directory and Azure AD with DirSync or AD Connect, you can create a single identity source for both applications by using the Azure AD User collector template.

In the collector template, specify an attribute that you want to use for merging duplicate identities and for matching identities to accounts and permissions. The attribute for the matching rule should contain a value that is unique to each identity. For example, in AD and Identity Manager, each user tends to have a unique `Distinguished Name`.

If you are using the Azure AD User collector, complete the following steps:

1. Enable the Azure Active Directory Graph API for your site and grant the following permissions to an account to access the API:
   - `Directory.Read.All`
   - `User.Read`
2. Generate an OAuth2 client and secret for API access.
3. Check that you can browse your Azure domain with the graph explorer using the account from Step 1. For more information, see https://developer.microsoft.com/en-us/graph/graph-explorer.

6.2.2 Collecting from a CSV File

A CSV file provides a simple method for storing user account or permissions information that cannot be collected from other data sources. You can include group, account, permission, or user data in the file.

If you use a CSV file as an identity source, you might want to instruct Identity Governance to map the collected users to their collected group memberships. The **Group Members (Users and Groups)** setting allows you to specify an attribute in the CSV file that you want to use for mapping users and groups to groups. However, you can use this setting only when a given value for the specified attribute is not used to identify both a user and a group. For example, if you export data from Active Directory to the CSV file, you can use DN as the Group Members attribute. Otherwise, you can use **Collect Group to User Membership** or **Collect Parent Group to Child Group Relationships** to map users or groups to groups. These two settings match the specified attribute in the collected user or group data, respectively.

In preparing a CSV file, ensure that any values written into a column of the file do not contain any carriage returns and line feeds, since these characters define record boundaries in the CSV file.

NOTE: The CSV collector support TSV file. In the **Column Delimiter** field, you enter the word `tab` in uppercase, lowercase, or any combination. Test connection is not supported when the CSV collector is accessed via an HTTP or HTTPS connection.

6.2.3 Collecting from Google Apps

Google Apps manage users, groups, and organizational units, including assigned roles and privileges. Collecting identities from Google Apps is similar to other data sources. However, to collect permissions, Identity Governance pulls information from Google Groups, which resembles discussion-based groups similar to those available in Usenet.

To gather information about actual user groups, Identity Governance collects from the Organizations (organizational units) in Google Apps. These organizational units can contain nested units. The top level organization is always called ‘root.’ During collection, Identity Governance translates the organizational units into Identity Governance-style groups. In Identity Governance, the root group lists all the users in that organizational unit. If you select one of the nested groups under the root group, Identity Governance lists only the individuals assigned to that group.

6.2.4 Collecting from Identity Sources with Change Events

Identity sources with change events provide incremental change events for user and group data from certain identity sources to incrementally update the identity catalog. To periodically pull change events and incrementally make changes to your identity catalog, the following conditions must be met:

- An identity source is configured as an identity event source, either by having created an identity source from a suitable template, or by having migrated a non-event-aware identity source by using the Identity Governance Migration Utility and selecting enabling event collection. For more information, see “Creating Identity Sources” on page 76 and Section 6.4, “Migrating an Identity Collector to a Change Event Identity Collector,” on page 80.

- The identity source is the primary identity source. For example, it is either the sole identity source or an unmerged identity source.
- The identity event source has been collected and published.
- The configuration of the identity source and its collector has not changed since the last publication.
- Identity event source collection, identity publication, or application publication is not in progress.
- (Conditional) For eDirectory, the Change-Log module must be installed to support event processing. For more information, see "Installing the Change-Log Module on a Remote eDirectory server " in the *NetIQ Driver for Bidirectional eDirectory Implementation Guide*.
- (Conditional) For Identity Manager, the Identity Gateway Integration Module must be installed on the target Identity Manager server. Using Designer, install the following packages to support event processing:
  - Identity Gateway Integration Module Base
  - Identity Gateway Integration Module Default
  - Identity Gateway Identity Governance Integration Package

  For more information, see the *NetIQ Identity Manager Driver for Identity Gateway Integration Module Implementation Guide*.

Once you enable event collection, Identity Governanceuses the global configuration parameters: `com.netiq.iac.rtc.event.polling.interval` and `com.netiq.iac.rtc.max.polling.timeout` to determine the polling frequency for the identity context change event and time limit for batch event collection. Typically, events are collected in batches of up to 100 events. However, if the identity source's **Batch Size Limit** as configured in the **Service Parameters** is less than 100, then that batch size is the upper limit for event collection.

IMPORTANT: The identity source with change event collectors is not intended to handle large-scale changes to the source directory, such as changes to the user population resulting from mergers or spin-offs, major changes to group memberships, or major reorganizations of any kind. In such cases, you should disable event processing and enable it after the major changes.

During event collection, Identity Governance treats a user record move in the underlying LDAP tree from *outside of* to *inside of* the scope of the configured Search Base as an ADD event. Likewise, Identity Governance treats a user record move to the *outside of* the Search Base scope as a DELETE event. The **Data Sources > Activity** page reports the number of events of each type that were processed in the most recent event processing period as part of the detail of the most recent collection for that collector.

For more efficient event processing, Identity Governance does not generate change events for any dynamic changes in eDirectory or Identity Manager dynamic groups. Also, removing a member from an eDirectory or Identity Manager group will not remove that member from any of the group's super groups if those groups have been configured to report nested members in membership query.

If you have upgraded from a previous version of Identity Governance, use the Identity Source Migration utility to update your Active Directory data collector, eDirectory data collector, and Identity Manager data collector to accept change events. For more information, see Section 6.4, "Migrating an Identity Collector to a Change Event Identity Collector," on page 80.

6.2.5 Collecting from Microsoft SharePoint

Microsoft SharePoint is a browser-based collaboration and document management tool that allows administrators to grant specified access rights to individual users and groups.

To gather information from SharePoint, the Service Account you use to configure SharePoint collection must be a member of the WSS_ADMIN_WPG local group on the SharePoint server.

NOTE: You cannot use the SharePoint collector for SharePoint Online.

6.3 Creating Identity Sources

Identity sources provide the information to build a catalog of the people within your organization. The information that you collect from your data sources can add as much personally identifiable information as you need to create the unique identity for each person.

- Section 6.3.1, "Assigning Identity Manager as the Primary Identity Source," on page 78
- Section 6.3.2, "Understanding Change Event Collection Status," on page 79
- Section 6.3.3, "Supported Attribute Syntaxes for eDirectory and Identity Manager Change Events Collection," on page 79

NOTE

- If you are using the Identity Manager Identity collector, it must always be first in the list of collectors. Otherwise user authorizations will fail. For more information, see Section 6.3.1, "Assigning Identity Manager as the Primary Identity Source," on page 78.
- If you collect data from two or more identity sources that have duplicate information for the `Primary Supervisor ID from Source` attribute, Identity Governance cannot merge or publish the data. After collecting each identity source, you must define extended attributes, such as `Source1_userID` and `Source2_userID`, for the `Primary Supervisor ID from Source` attribute. Then, to merge the information, specify the extended attributes as the "Join to" attribute for `Primary Supervisor ID from Source`.
- Identity Governance provides Custom Collector SDK to create collectors. For more information about installing the Custom Collector SDK, see *Identity Governance 3.6 Release Notes*.

To create a identity source and collect identities and groups:

1. Log in to Identity Governance as a Customer, Global, or Data Administrator.
2. Select **Data Sources**.
3. (Conditional) To create an identity source collector, select **Identities**.
4. Select **+** to create a identity source collector from a template.

   or

   Select **Import an Identity Source** to specify a JSON file to import.

IMPORTANT: To import a data source, you must first export the data source from the current version of Identity Governance. Data source files exported from earlier versions of Identity Governance do not import correctly to the current version. Hence, the data source must be recreated in the current version of Identity Governance.

5 (Conditional) To collect from a CSV file, specify the full path to the file.

The CSV collector supports TSV files. To use a TSV file, enter the word `tab`, in uppercase, lowercase, or any combination in the **Column Delimiter** field.

6 (Conditional) To configure an identity source with change events collector, select a template name ending in **with changes** and observe the conditions listed in Section 6.2.4, "Collecting from Identity Sources with Change Events," on page 74. For more information, see "Understanding Change Event Collection Status" on page 79 and "Supported Attribute Syntaxes for eDirectory and Identity Manager Change Events Collection" on page 79.

NOTE: Only one event collector is allowed per data source. A change to the collector configuration suspends change event processing, which does not resume until a full batch collection and publication completes.

IMPORTANT: For large scale changes, disable event collection, and enable it only for incremental change events.

7 Specify all the mandatory fields for the data source.

For more information, see the following content:

- Section 5.6.1, "Understanding Collector Configuration," on page 64
- Section 6.1, "Understanding Collector Templates for Identity Sources," on page 71
- Section 6.2, "Understanding the Variations for Identity Sources," on page 73

8 Configure publication behavior.

9 (Conditional) To merge the collected data from an identity source, specify which attributes to match by selecting **Match rule** check box.

As each identity source collector configured for publish and merge can potentially create new Identities in the catalog, you should always ensure that the mandatory **User ID from Source** attribute mapping is configured to collect an acceptable unique identifier that is appropriate for the catalog.

IMPORTANT: When collecting identities using the publish and merge setting, matching attributes are mandatory for Identity Governance to include the user when publishing. If a secondary identity source has users that do not have the matching attribute defined in the collector, they will be collected, but they will not be published. For information about merging examples, see the *Data Collection and Publication Technical Reference*. For information about setting merge rules before publishing identities, see Section 8.1.2, "Setting the Merge Rules for Publication," on page 89.

10 Save your settings.

11 Select **Test Collection and Troubleshooting**.

   11a To ensure your settings are correct run test collections. For more information, see Section 5.6.3, “Testing Collections,” on page 67.

   11b (Optional) To preview data, create emulation package. For more information, see Section 5.6.4, “Creating Emulation Packages,” on page 68.

12 Select Collect now icon on the Identities page individually.

13 (Optional) Schedule a collection. For more information, see Chapter 9, “Creating and Monitoring Scheduled Collections,” on page 93.

The first time you set up Identity Governance, you must collect and publish data after creating your data sources so that your catalog contains the data. For information about publishing identities, see Section 8.1, “Publishing Identity Sources,” on page 89.

6.3.1 Assigning Identity Manager as the Primary Identity Source

You must assign Identity Manager as your primary identity source. If Identity Manager is not assigned as the primary identity source, user authorizations will fail with the following error:

```
You are authenticated and logged in, but you do not have access to the
Identity Governance application. This means you logged in as a user who was
valid in your authentication source, but has never been collected in
Identity Governance or does not have access to the Identity Governance
application.
```

Identity Governance expects the Identity Manager Collector to be the first collector in the list of Identities Collectors.

You can use one of the following workarounds to resolve this issue:

Workaround 1

1 Log in to Identity Governance as the Bootstrap Administrator.

2 Select **Data Sources** > **Identities**.

3 Expand the **Merging Rule**.

4 In the LDAP Distinguish Name field, change the value from **None** to **Identity Manager Collector**.

5 Click **Save**, and then publish the change.

Workaround 2

1 Log in to Identity Governance as the Bootstrap Administrator.

2 Select **Data Sources** > **Identities**.

3 Drag and drop the Identity Manager Identities Collector to be first in the list.

4 Click **Save**, and then publish the change.

6.3.2 Understanding Change Event Collection Status

The event collection displays the following status:

Change Event Collection Status	Description
DISABLED	Event processing is not enabled for this collector and identity source. If event processing is enabled from this state, the state becomes BLOCKED, and the identity source must be collected and published before it can become READY.
BLOCKED	Event processing is enabled, but cannot proceed because the preconditions for processing change events were not met. For more information, see Section 6.2.4, "Collecting from Identity Sources with Change Events," on page 74.
READY	Event processing is enabled and not blocked, but awaiting scheduling to proceed.
IN_PROGRESS	Events are being polled for and processed. **NOTE:** Event processing will be in progress either until a polling request returns no events or until the configured maximum event processing time is reached.

6.3.3 Supported Attribute Syntaxes for eDirectory and Identity Manager Change Events Collection

Identity Governance supports the collection of the following attribute syntaxes during eDirectory and Identity Manager change events collection:

- `Boolean`
- `Case Exact String`
- `Case Ignore List`
- `Case Ignore String`
- `Class Name`
- `Counter`
- `Distinguished Name`
- `Integer`
- `Integer 64`
- `Interval`
- `Numeric String`
- `Object ACL`
- `Octet String`
- `Path`

- `Postal Address`
- `Printable String`
- `Telephone Number`
- `Time`
- `Typed Name`
- `Unknown`

6.4 Migrating an Identity Collector to a Change Event Identity Collector

If you have upgraded from a previous version of Identity Governance or if you want to migrate an existing identity collector to one that accepts change events, use the Identity Source Migration utility to update your Active Directory, eDirectory, or Identity Manager data collector to accept change events. The identity collector you are migrating must publish using the **Publish without merging** or the **Do not publish** setting.

NOTE: Identity Governance 3.0.1 and later support change event identity collectors.

1. Upgrade to Identity Governance 3.6 and make sure that Identity Governance is up and running.
2. Verify that the `idgov/bin/rtc-migration.sh` (Linux) or `c:\netiq\idm\apps\idgov\bin\rtc-migration.bat` (Windows) file references the jar file `idgov/lib/ig-migration.jar` (Linux) or `c:\netiq\idm\apps\idgov\lib\ig-migration.jar` (Windows).
3. Run the command-line utility from the server where Identity Governance is installed.
   - **Linux:** Default location of `/opt/netiq/idm/apps/idgov/bin/rtc-migration.sh`, then enter `./rtc-migration.sh`
   - **Windows:** Default location of `c:\netiq\idm\apps\idgov\bin\rtc-migration.bat`, then enter `rtc-migration.bat` from a command line.
4. Provide the information needed to connect and authenticate to Identity Governance and the authentication server. When the utility successfully connects, it displays a numbered list of discovered identity sources.
5. Enter the number displayed next to the identity source to migrate.
6. After the utility runs checks to determine migration suitability, either confirm to proceed with the migration, if the checks succeeded, or review messages for failed checks and either address the problem areas, select a different source, or quit the utility.
7. (Conditional) If you confirm to proceed with migration, enter a local file name for the utility to back up the current collector configuration.
8. After the utility applies updates and exits with a success message, review the following updates to the collector configuration when viewed in Identity Governance:
   - The template (just under the name of the collector) has been changed to the **with changes** template corresponding to the one prior to the update.

- After the **Collector name** is a new **Enable Change Event Collection** option, which is unchecked. To enable event processing, select this option, and then collect and publish the identity source.
- The **Service Parameters** remain unchanged.
- Under **Collect Identity** (the user view):
  - The **Base Dn** parameter is no longer required, but the value has not been changed. Omitting a value here will cause the entire LDAP tree to be collected.
  - (Conditional) For Active Directory identity change event source, a new parameter, **LDAP Search Filter for Identity Object Changes**, has been added, with the value `(objectClass=user)`. This parameter identifies events in Active Directory DirSync or AD Connect that should be delivered in this view to Identity Governance. Only modify this parameter if you have other object classes in the local AD that correspond to users and only by adding other `objectClass` terms to an LDAP expression.
  - (Conditional) For Active Directory identity change event source, a new parameter, **AD Object Categories for Changes**, has been added with the value `user`. You can modify this value if needed by adding other object category names in a comma-separated list.
  - **User ID from Source** has been set to `OBJ_ID`. Do not change.
  - The **Object GUID** parameter is now required. Its value is set to `objectGUID`. Do not change.
  - **LDAP Distinguished Name** has been set to `OBJ_ID`. You can remove this value if you do not need to collect the `dn` separately from the `userId`. Do not assign any other value.
- Under **Collect Group** (the group view):
  - The **Base Dn** parameter is no longer required, but the value has not been changed. Omitting a value here will cause the entire LDAP tree to be collected.
  - A new parameter, **LDAP Search Filter for Identity Object Changes**, has been added with the value `(objectClass=group)`. This parameter identifies events in Active Directory DirSync or AD Connect that should be delivered in this view to Identity Governance. Modify this value only if you have other object classes in the local AD that correspond to groups and only by adding other `objectClass` terms to an LDAP expression.
  - A new parameter **AD Object Categories for Changes** has been added with the value `group`. You can modify if needed by adding other object category names in a comma-separated list.
  - **Group ID from Source** has been set to `OBJ_ID`. Do not change.
  - A new parameter, **Object GUID**, has been added with value `objectGUID`. Do not change.

7 Collecting Applications and Application Data

Identity Governance enables data administrators to separate the process of defining an application in the governance system from collecting the data for the application. You can configure application definition data sources to collect application entities from a CSV file or a Configuration Management Database (CMDB) using an application definition template. You can also configure application data sources to collect accounts and permissions data using account and permission collectors.

- Section 7.1, “Understanding the Application Definition Template,” on page 83
- Section 7.2, “Understanding Collectors for Application Data Sources,” on page 83
- Section 7.3, “Creating an Application Source,” on page 86
- Section 7.4, “Collecting Application Data from a Single Application Source,” on page 87
- Section 7.5, “Collecting Application Data for Multiple Applications,” on page 87

7.1 Understanding the Application Definition Template

Identity Governance uses an **application definition template** to create application entities. This feature enables you to collect application configuration items from ServiceNow and from a CSV file. You can include information about one or more applications, such as their name, description, risk, classification, and vendor in a CSV file, and add these applications as an application source on the **Data Sources > Applications page**. You can then configure any of the applications to collect data from one or more applications.

To configure an application as a multi-application collector, you must specify a unique ID when configuring the application source. If you do not specify a unique ID, Identity Governance will create a unique ID and recognize it as a single application data source. For an application to be eligible for collection using the multi-application collector, the subordinate applications must have no collectors, must also have a unique ID (Application ID from Source), and its permissions must not be collected by any other application.

For more information about defining a application and collecting from applications sources, see Section 7.5, “Collecting Application Data for Multiple Applications,” on page 87 and Section 7.4, “Collecting Application Data from a Single Application Source,” on page 87.

7.2 Understanding Collectors for Application Data Sources

In general, application data stores do not maintain personal information about the account holders since it is not needed for operation of the application. These applications might hold basic information such as an Account Identifier (or login ID), a password, and the set of permissions that have been granted to the account users (group memberships, roles, ACLs, and so forth). In a typical enterprise, there will also be some account attribute (or combination of them) that can be used to associate (or “join”) the account to the identity that uses the account. However, this is not true for all accounts. Many applications have “admin” or “system” accounts that IT staff and administrators use to maintain the application, grant access to others, and so forth. Often, these “admin/system” accounts are granted the greatest level of permissions for the application. Additionally, sometimes these “superuser” accounts are shared by a group of individuals. As a result, it is very important to collect and review *all* accounts from the data source whether they can be joined to an identity or not.

Account collectors gather information about the application users, such as their name, account ID, login name, and login time. Permission collectors gather information about the application access rights of the account users. Since there is no universal method for linking accounts and permissions to identities, these collectors also provide the attributes and optional views necessary to join application accounts to Identity Governance identities and to join application permissions to either Identity Governance identities or to the application accounts as needed.

- Section 7.2.1, “Understanding Account Collector Views,” on page 84
- Section 7.2.2, “Understanding Permission Collector Views,” on page 84
- Section 7.2.3, “Understanding the Identity Manager AE Permission Collector,” on page 85

7.2.1 Understanding Account Collector Views

Depending on the type of data that you want to collect, the account collector template might provide the following elements:

Collect Account

Accounts represent entities, such as a system, application, or data source, that an identity might access. For example, your employees might have an account that lets them log in to your company email system. An account in Identity Governance is similar to an association in Identity Manager.

Collect Provisioning Applications

Applies only to Identity Manager data sources

Collect Connected Accounts

Applies only to Identity Manager data sources

7.2.2 Understanding Permission Collector Views

Permission collectors gather the following types of information:

- The set of permissions and descriptive attributes for each permission type
- The hierarchical relationship (if any) among permissions
- The data that will allow Identity Governance to join permission assignments to Identities or Accounts

There are a great number of variations in the way that permissions and their various relationships are described within each application source. To accommodate this variety, Identity Governance provides a large number of ways to configure Permission collectors by using views.

Collect Permission

Used to collect the available permission values and descriptive information about the permission. If the permission schema contains the information needed to establish permission hierarchy and/or join permission values to Identities or Accounts, this view can be utilized to perform those functions also – with the benefit of configuration simplicity and better performance. Some examples of applications that utilize this type of combined view are the Active Directory and eDirectory “Group” permission collectors.

Collect Holder to Permission Mapping

Used when the information about assigned permissions is contained within a source that has the holder-to-permission relationship defined on the holder (Account of Identity) records. Some examples of applications that use this method exclusively are Salesforce.com and SAP. An example of this relationship would be the “memberOf” attribute on Active Directory User objects.

Collect Permission to Holders Mapping

Used when the information about assigned permissions is contained within a source that has the holder-to-permission relationship defined on the permission records. An example of this relationship would be the User “members” attribute on eDirectory Group objects.

Collect Permission hierarchy based on parent to child view

Used to collect top-down permission relationships. An example of this relationship would be the Group “members” attribute on eDirectory Group objects.

Collect Permission hierarchy based on child to parent

Used to collect bottom-up permission relationships. An example of this relationship would be the Group “memberOf” attribute on eDirectory Group objects.

7.2.3 Understanding the Identity Manager AE Permission Collector

The Identity Manager AE Permission collector is a unique type of Application Source collector. In addition to creating the base Identity Manager application in Identity Governance, it also automatically generates subordinate applications that represent IDM Drivers, such as CloudAD Driver and SAP User Management Driver, that support Identity Manager Entitlements. Any User record collected from the Identity Manager application that is associated with a subordinate application (via the DirXML-Association attribute on the User) will also receive an Account assignment for that application and be automatically mapped to the Identity Manager User.

No other application source permission collector provides automatic generation of subordinate applications or accounts. Due to the complexity of the relationships managed by this collector, the template intentionally blocks customization to ensure the integrity of the data collections.

7.3 Creating an Application Source

Application sources provide the information to build a catalog of the permissions and accounts within your organization. These data sources are configured with one or more collectors to gather the information from that source.

Identity Governance enables you to create application sources in the following ways:

- Using the application definition templates provided with Identity Governance

  Application definition source templates enable you to create an application that can collect permissions from other eligible applications as well as collect accounts and permissions from a variety of application sources.
- Manually creating an application
- Importing a JSON file

To create an application source using the application definition template:

1. Log in to Identity Governance as a Customer, Global or Data Administrator.
2. Select **Data Sources > Applications Definitions**.
3. Specify a name and description.
4. Select an application definition template such as ServiceNow or CSV.
5. Specify all the mandatory fields.
6. Save your settings.
7. Select **Application Definition Sources**.
8. Click the Collect icon.
9. Click the Publish icon.
10. Select **Data Sources > Applications**.
11. Check that all the defined applications are listed as applications.

To create an application manually:

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Select **Data Sources > Applications**.
3. Select **+** to create a data source.
4. Specify a name.
5. (Optional) Specify other fields as needed.
6. Save the settings.
7. Select **Data Sources > Applications** and configure the newly collected application.

To create an application by importing a JSON file, select **Import an application source** on the Applications page and import the application JSON file.

IMPORTANT: To import data sources, you must first export the data source from the current version of Identity Governance. Data source files exported from earlier versions of Identity Governance do not import correctly to the current version. Hence, the data source must be recreated in the current version of Identity Governance.

7.4 Collecting Application Data from a Single Application Source

You can configure the default collector templates to collect application data from an application.

To create a application source and collect accounts and permissions:

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Select **Data Sources > Applications**.
3. Edit an application.
4. Select **+** to create a data source collector from a template.

   NOTE: You can select and configure more than one account or permission collector for application collection.

5. Specify all the mandatory fields for the data source.

   For more information, see the following content in:

   - Section 5.6.1, "Understanding Collector Configuration," on page 64
   - Section 7.2, "Understanding Collectors for Application Data Sources," on page 83
6. Save your settings.
7. (Optional) To preview all or part of the data, select **Test Collection and Troubleshooting**. For more information, see "Testing Collections" on page 67.
8. Select Collect Now icon for each data source on the Applications page.
9. Select Publish Now icon for each application data source on the **Applications** page.
10. When you see that publication has completed, go to **Catalog** to view the collected information.

7.5 Collecting Application Data for Multiple Applications

To collect application data for multiple applications, you must specify a unique ID.

To create a multi-application collector:

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Select **Data Sources > Applications**.
3. Edit an application source.
4. Specify unique ID.
5. Save the changes.
6. Add eligible applications.

NOTE: For an application to be eligible for collection using the multi-application collector, the subordinate application must have no collectors, must also have a unique ID (Application ID from Source), and its permissions must not be collected by any other application.

7. Specify all the mandatory fields for all the data sources.
8. Save your settings.
9. (Optional) Select + and add collectors. For more details about collecting accounts and permission data see, Section 7.4, “Collecting Application Data from a Single Application Source,” on page 87.

8 Publishing the Collected Data

Publication makes the most recently collected data, and the relations among that data, available in the catalog. When you publish identity data, you can configure Identity Governance to merge the attributes of a unified identity. Application publication uses the most recent identity publication to resolve permission and account holder relationships. Identity Governance always publishes the current snapshot of the collection. For example, if a collection is in process, Identity Governance publishes the previously collected data.

- Section 8.1, "Publishing Identity Sources," on page 89
- Section 8.2, "Publishing Application Sources," on page 91

8.1 Publishing Identity Sources

Identity Governance publishes all identity sources concurrently to ensure that each unified identity receives the latest merged information. Identity sources always get published before application sources.

- Section 8.1.1, "Planning for Publishing and Merging Identities," on page 89
- Section 8.1.2, "Setting the Merge Rules for Publication," on page 89
- Section 8.1.3, "Publishing the Identity Sources," on page 90

8.1.1 Planning for Publishing and Merging Identities

When using the Publish and merge option for your Identity Collectors, you will need to plan the following actions:

- Specify the order in which your identity sources will be published
- Specify the attribute(s) that will be used to match records from each source to identities in the catalog
- Designate which identity source will be used as the preferred (authoritative) source for the attributes that will be used to match records

For information about setting the merge rules, see Section 8.1.2, "Setting the Merge Rules for Publication," on page 89.

8.1.2 Setting the Merge Rules for Publication

Merge rules allow you to control which values will be stored when multiple identity sources provide information for the same fields. For example, if two sources provide an email address, data from the selected source will be saved as the primary value. If you do not select a identity source as the authoritative source for merging, Identity Governance uses the first collected value.

IMPORTANT: When collecting identities using the publish and merge setting, matching attributes are mandatory for Identity Governance to include the user when publishing. If a secondary identity source has users that do not have the matching attribute defined in the collector, they will be collected, but they will not be published. For information about merging examples, see *Data Collection and Publication Reference*.

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Select **Data Sources > Identities**.
3. Drag and drop the identity sources to their desired positions to set their priority for merging the published attributes. In general, it is desirable to place your most complete and authoritative source in position 1.
4. To use a specific identity source as the attribute authority, complete the following steps:

   4a Under **Publish and merge**, expand **Set merging rules**.

   4b For the attribute that you want to modify, specify the identity source.

   The **None (go by order)** option instructs Identity Governance to use the first identity source as the attribute authority.
5. Select the **Save** icon.
6. Publish your pending changes.
7. Verify the changes that you published to the catalog.

8.1.3 Publishing the Identity Sources

Since the Identity Governance catalog is comprised of the data contributed by all published sources of Identity data, you must perform a publication of Identity data only after you have performed a collection from all sources. The publication process will unify your collected data sources and populate the catalog.

If you have a scheduled collection, Identity Governance publishes the collected identities at the end of the run. You can also manually publish the identity sources.

Identity Governance uses a red diamond icon to indicate that an identity source has been collected but not published. Identity Governance shows any collection errors or warnings on the **Identities** and **Applications** data source pages.

To manually publish the identities:

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Select **Data Sources > Identities**.
3. Make sure you have collected all the identities.
4. Select the Publish identities now icon.
5. When you see that publication has completed, go to **Catalog** to view the collected information.

8.2 Publishing Application Sources

If you have a scheduled collection, the scheduled run publishes the collected application data at the end of the run. You can also manually publish the application data source independently from other application data sources. However, before publishing an application data source, you must publish your identity sources.

To manually publish applications:

1. Log in to Identity Governance as a Customer or Data Administrator.
2. Publish your identity sources.

   For more information, see Section 8.1.3, “Publishing the Identity Sources,” on page 90.
3. Select **Data Sources > Applications**.
4. For each application source that you want to publish, select the Publish now icon.

TIP: You might intermittently experience extended delays in publishing eDirectory permissions due to hardware, operating system performance, database performance, disk space, network speed, or other environmental factors. If you experience significant delay, cancel the current publication and start a new publication of the same source. In most cases, the new publication will complete as expected.

---

9 Creating and Monitoring Scheduled Collections

You can collect data on individual sources at any time. To enhance the collection and publication process, you can schedule collections to run at regular intervals. Each collection can contain one or more identity and application sources. For example, you might want to update identities associated with your human resources application every week. Instead of manually collecting and publishing those identities, you can create a scheduled collection.

To see the status of all recent and pending collections, go to **Data Sources > Activity**.

NOTE: After each run of a scheduled collection, Identity Governance automatically publishes the data.

- Section 9.1, "Creating a Scheduled Collection," on page 93
- Section 9.2, "Monitoring Scheduled Collections," on page 94
- Section 9.3, "Understanding the Cron Expression for a Custom Interval of Collection," on page 94

9.1 Creating a Scheduled Collection

You can schedule collections to run at regular intervals. For example, if you want to collect data from Workforce and SAP identity sources every week, specify the start and end dates for the collection and how often it repeats. Alternatively, you can specify a custom string to run the scheduled collection on a specific set of dates.

1 Log in as a Customer, Global or Data Administrator.

2 Under **Data Sources**, select **Schedules**.

3 (Conditional) When adding a new scheduled collection, complete the following steps:

3a Select **+** to create a new schedule.

3b Specify a name and description.

3c Specify the identity and application sources for collection.

NOTE: You cannot schedule collection for applications without collectors.

4 (Conditional) To modify an existing scheduled collection, select its name.

5 (Optional) To customize the interval for running the collection, complete the following steps:

5a For **Repeat**, select an interval or specify **custom**.

IMPORTANT: If using the hourly interval, specify at least 24 hours between collections to avoid errors when a new collection starts before a previous one completes.

5b Specify values for the starting and ending dates and the time zone.

5c For **Custom**, use the following syntax to indicate the collection time:

`second minute hour day_of_month month year`

For example, `0 20 10 ? * *`. For more information about specifying the parameter values, see Section 9.3, "Understanding the Cron Expression for a Custom Interval of Collection," on page 94.

6 (Conditional) To see a list of the first 10 scheduled runs, select **Preview**.

7 To ensure that the schedule runs, select **Active**.

8 Save the schedule.

9.2 Monitoring Scheduled Collections

The **Data Sources > Schedules** page provides an overview of each scheduled collection. You can find the times for the most recent and next activity of the collection. If a scheduled collection is inactive, Identity Governance displays the collection in a gray field.

To observe the details of a scheduled collection, select its name. Identity Governance lists the settings for the collection. You can modify the settings, such as adding and removing sources. Alternatively, you might want to deactivate the scheduled collection. If you modify the settings, ensure that you save the change.

To review the details for a recent run of the specified collection, select the run. Identity Governance indicates the success and time of collection and publication for each data source. If you select a data source, Identity Governance takes you to the details page for that source or an overview, if a group of sources. For example, if your schedule collects data from all identity sources, Identity Governance displays the **Identity Sources** overview page.

9.3 Understanding the Cron Expression for a Custom Interval of Collection

Identity Governance uses a cron expression to create the custom schedule. The cron expression is a string of parameters in the following syntax:

`second minute hour day_of_month month year`

For example:

```
0 20 10 ? * *
```

Use the following values to specify the parameters in the expression:

n

Specifies a numeric value for the parameter. For example `12` for `day_of_month` or `2015` for `year`.

*****

Specifies that the parameter uses all available values. For example, to run at 10:20 AM every day in July 2015, specify `0 20 10 * 7 2015`.

-

Specifies a range of values. For example, to run the collection during consecutive months, specify `0 20 10 ? MAR-OCT *`.

/

Specifies that you want to run the collection at a particular interval. Use the following syntax: `first_instance/increment`. For example, to run the collection on the first day of the month and every third day after, specify `0 20 10 1/3 * *`.

?

Applies only to `day_of_month`

Specifies that `day_of_month` does not have a specific value. For example, to run the schedule at 10:20 AM on any day of May, specify `0 20 10 ? MAY *`.

L

Applies only to `day_of_month`

Specifies that you want to run the collection on the last day of the month. For example, `0 20 10 L * *`.

To specify multiple values for a parameter, use commas. For example, to run the collection every six hours at specific days during specific months, specify `0 0 0/6 5,7,21,24 MAR-JUN,OCT *`. The schedule runs on the 5th, 7th, 21st, and 24th days of March, April, May, June, and October. This example also combines values to specify the month: `MAR-JUN,OCT`.

10 Creating and Managing Data Policies

Data policies can help you prove to auditors and internal risk partners that the data collected and published into the Identity Governance catalog is complete and accurate. Having data policies in place can promote confidence in your data collection processes, help you with decision support, and show others that your processes and configuration comply with a set of standards.

- Section 10.1, "Understanding Data Policies," on page 97
- Section 10.2, "Creating and Editing Data Policies," on page 98
- Section 10.3, "Scheduling Data Policy Calculations," on page 99
- Section 10.4, "Manually Calculating Data Policy Metrics," on page 99
- Section 10.5, "Comparing Collections and Publications," on page 100
- Section 10.6, "Detecting and Remediating Violations in Published Data," on page 101
- Section 10.7, "Exporting and Importing Data Policies," on page 102

10.1 Understanding Data Policies

Customer, Global, or Data administrators can use default data policies or select the type of data to monitor and specify criteria to create additional data policies to generate collection and publication details to help them make informed governance decisions. Data policies enable administrators to:

- Detect data with specific conditions such as permissions with permission assignment end date as today or accounts with privileged account status
- Detect anomalies or inconsistencies in the published data such as detect users without supervisors or permissions with risk > 100
- Generate statistics such as number of groups in collected data or number of permissions without owners
- Monitor changes to attribute values such as cost or risk
- Monitor changes to entities such as 25% increase in number of accounts or number of users added to the catalog since last collection or publication
- Initiate remediation action for anomalies or inconsistencies such as email alerts, micro certification, or change request
- Compare collection and publication details from the same data source at two different collection or publication times

Scenario 1: To discover accounts that are not being used actively, an administrator can create an account data policy and specify that the policy should detect any accounts have a last logged in date which is earlier than a desired time period before the current date and that an immediate micro certification review should be done for these accounts.

Scenario 2: To detect permissions that are being inherited in applications, an administrator can create a permission assignment data policy and specify that the policy should detect application permission and add condition that the permission assignment type should be inherited. To narrow results they can add other conditions such as permission name, permission unique application ID, or permission risk. Administrators can also trigger change requests for these inherited permissions if needed.

10.2 Creating and Editing Data Policies

Identity Governance provides default collection data policies and publication data policies. In addition, it enables you to create and edit data policies.

1. Log in as a Customer, Global, or Data Administrator.
2. Select **Data Administration > Data Policy**.
3. (Optional) Click the gear icon to customize display settings for collection and publication data policies. For example, you choose to display Analysis Type column.
4. In the **Collection Data Policies** or **Publication Data Policies** tab, select **+** to create a new policy.
5. Select the type of metric you want to run:
   - **Attribute Changes** to monitor changes to attribute values based on your specified criteria in published data.

     If you configure only **Entities which changed to match the following criteria**, the simple criteria policy returns all entity types that match the criteria.

     For example: "All users whose location is Boston."

     You can **Add optional criteria** to this data policy to configure **Entities which changed from the following criteria** and narrow the results to list only changes from a specified value.

     For the previous example: If you also configure the optional criteria to specify users whose location changed from Chicago, the policy returns only "Users currently located in Boston who previously were located in Chicago."
   - **Criteria** to detect and monitor user, permissions, or accounts based on your specified criteria in collected or published data.

     NOTE: Data collection policies use only collected values, and exclude curated values from the policy. To include data for extended attributes, you must first collect that data.
   - **Entity Changes** to detect changes such as addition or removal of entities such as identities, accounts, and permissions, and permission assignments, or monitor changes based on the number of entities in collected or published data.
   - **Statistics** to detect the number of specified entities such as users, groups, permissions, or accounts in collected or published data .

     NOTE: You cannot calculate violations for these types of statistics and the number of entities is displayed in the **Data Sources > Activity** page.
6. Select the desired data source type, analysis type, and entity type for the policy, and specify additional criteria.

NOTE: When specifying criteria, press Enter after typing a value for it to be included as a parameter in data policy analysis and calculations.

6a (Conditional) If you select entity analysis type and choose to analyze permissions and account changes in application sources or to analyze user changes in identity sources, add and remove respective data sources as needed to expand or constrain analysis.

TIP: When selecting dates, in addition to selecting a specific date using the date picker, you can also create date formula that calculates the date based on your criteria.

7. Save your settings.
8. Select **Data Administration > Data Policy**.
9. (Optional) Select the policy, then select **Edit** to edit the policy.
10. (Optional) When editing a policy, select the trashcan icon to delete the policy.
11. (Optional) If available, select **Estimate impact** to show estimated violations for the policy.

10.3 Scheduling Data Policy Calculations

After creating data policies, you can schedule data policy calculations or calculate data metrics including violations on demand.

To schedule data policy calculation:

1. Log in as a Customer, Global, Review, or Data Administrator.
2. Select **Data Administration > Data Policy**.
3. Select **Schedule** tab, add or remove appropriate policies, and set the schedule.

NOTE: By default, all data policies will be included in the scheduled detection process. However, once you remove a policy from the schedule, Identity Governance will detect anomalies (violations) only for the policies included in the schedule. To detect violations of other policies, you can either manually calculate policy violations or add the policy to the schedule.

4. Select **Active** and then select **Save** to activate the schedule.

10.4 Manually Calculating Data Policy Metrics

In addition to scheduling data policy calculations, you can also manually calculate data policy metrics including violations.

To manually calculate data policy violations:

1. Log in as a Customer, Global, or Data Administrator.
2. Select **Data Administration > Data Policy**.
3. Select **Publication Data Policies** tab.
4. Select one or more policies, and then select **Actions > Calculate Policy Violations**.

NOTE: You can cancel calculations in progress by selecting **Cancel** next to the progress status.

5 Observe numbers of violations and click the number to view the list of violations with additional information such as violation detection time, and last action performed on the item.

10.5 Comparing Collections and Publications

When you need to show that you have complete and accurate data, you can compare collection and publication details from the same data source at two different collection or publication times. Identity Governance uses the defined data policies to produce the comparison details. For information about defining the data policies, see Section 10.2, “Creating and Editing Data Policies,” on page 98.

To compare collections and publications from the same source:

1 Select **Data Sources > Activity**.

2 (Optional) To focus the list on a specific time period, select the calendar icon.

3 (Optional) To show a longer list, change the number of rows per page.

4 To quickly compare a collection or publication with the previous collection or publication, select the item from the **Date and status** column.

5 To compare two collections or publications from non-consecutive times:

   5a Click on the advanced filter icon.

   5b To focus the list on a specific data source, select a data source name from the search drop-down list.

   5c Click **Apply.**

   5d Select two listed collections or publications using the check boxes.

   5e Click **Compare**.

6 View changes and select links to view additional information about the changes. For example, if the number of changes is not zero, that number is a link. Selecting that link opens a quick view of the items that changed.

7 (Optional) In the comparison view, to quickly view or open the applicable data policies, complete the following:

   7a Select the Refine comparison options gear icon.

   7b Select or clear listed policies to change your comparison results.

   7c Select **Edit Policies** to open the **Data Administration** > **Data Policy** page.

8 (Optional) Select **Overview** to see Data Policy Status details. For more information, see Section 28.2, “Monitoring Your Identity Governance System,” on page 291.

NOTE: The Overview page data summary numbers such as the number of permissions will not always match the number of collected and published objects in the Activity page. The Activity page shows the number of objects collected or published by Identity Governance. The Overview page Data Summary widget shows only the number of objects that are visible in the catalog. Based on your collector configuration, Identity Governance might exclude objects such as Users who are flagged as inactive or permissions objects that represent items like resource parameters from the catalog resulting in a different number of objects than the number of collected or published objects.

10.6 Detecting and Remediating Violations in Published Data

Identity Governance enables you to check your collected and published data using data policies. In addition to looking at statistical information, you can also take remediation action for data policy violations (anomalies) in published data by:

- Sending an email notification
- Reviewing items in violation or in other words creating a micro certification or focused reviews
- Creating change request

Once a micro certification is complete or once a change request has been fulfilled, you can recalculate the number of data policy violations. For more information about micro certification and fulfillment, see Section 23.3, “Understanding Micro Certification,” on page 245 and Chapter 15, “Instructions for Fulfillers,” on page 147.

If after the initial remediation type selection, administrators would like to change the remediation type for future violations then they can select the link under the Remediation column on the Data Policy page and edit the remediation setup.

To remediate data policy violations:

1. Log in as a Customer, Global, or Data Administrator.
2. Select **Data Administration > Data Policy**.
3. Select the **Publication Data Policies** tab.
4. Select **Set Remediation**.
5. Select **Remediation Type**.

   5a (Conditional) If you selected **Email Notification**, select **Email source** and specify a user or group as the recipient of the email.

   5b (Conditional) If you selected **Change Request**, select violation types, and provide instructions for fulfilling the change requests generated for selected violation types. Based on your policy type, additionally select **Modify** or **Remove**.

   5c (Conditional) If you selected **Micro Certification**, configure the following settings:

   - **Review Definition**: Search and select a review definition from the selection dialog or specify the review definition name. Note that Identity Governance applies filters based on data policy and enables selection of only relevant review definitions.
   - **Review Name**: Specify a name for the micro certification.
   - **Start Message**: Specify the message that will be displayed in the header area of reviews describing why the review was started.
   - **Review Period**: Leave this blank if you want to use the duration specified in the review definition. Otherwise specify a duration.

6 Select the **Run Remediation on new violations when calculated** check box to automatically run remediation after saving your remediation setup.

7 **Click** Save.

8 To run remediation, select **Actions > Run Remediation**.

10.7 Exporting and Importing Data Policies

Once you have created your data policies based on your business requirements, you can easily export the data policies and publication policies related review definitions as a zipped file and save it with your backup files. You can also use exported policies in another location or environment.

To export or import data policies:

1 Log in as a Customer, Global, or Data Administrator.

2 Select **Data Administration > Data Policy**.

3 Select **Collection Data Policies** or **Publication Data Policies**.

4 Select the policy or policies you want to export.

5 Export the policies.

5a Select **Actions > Export Data Policies**. A zipped file containing data policies in JSON format will be saved. When you export publication data policies, review definitions in JSON format will also be included in the zipped file.

5b Select the Download icon on the top title bar to access the saved file and download the file.

5c (Optionally) Delete the file from the download area in Identity Governance after downloading.

If you do not manually delete the file. Identity Governance will automatically delete the file based on your default download retention day settings. For information about customizing download settings, see Section 3.9, "Customizing Download Settings," on page 50.

6 Extract the files.

7 To import data policies, click **Import Data Policies** on the Data Comparison Policies page.

8 Navigate to the folder where your data policies file is located, and click **Open**.

9 Identity Governance detects whether you are importing new or updated policies and whether the updates would create any conflicts or have unresolved references.

10 Select how to continue based on what information is displayed. For example, under **Updates**, you can compare the imported values with current values for each entity by selecting the respective policy before selecting policies to import.

11 Select the policies you want to import, and then click **Import**.

11 Managing Data in the Catalog

The Identity Governance catalog contains all of the identities and permissions in your organization that you choose to collect. You use this information to create a unified identity for each person in your organization so you can review the permissions assigned to them.

To manage the Identity Governance catalog, you must have Bootstrap, Customer, Global, or Data Administrator authorization.

Identity Governance helps you create a unified identity for each user that combines all permissions that have been assigned by your identity and application sources. To build the unified identity, Identity Governance must know how to map incoming identity attributes. The catalog needs at least one identity source, such as Active Directory, and at least one application source. Otherwise, you cannot map identity attributes to permissions. When using a comma-separated value (CSV) file as a data source, the file must use UTF-8 encoding.

- Section 11.1, “Configuring the Data Source for Post Authentication Matching,” on page 103
- Section 11.2, “Understanding Identity, Application, and Permission Management,” on page 104
- Section 11.3, “Editing Attribute Values of Objects in the Catalog,” on page 107
- Section 11.4, “Searching for Items in the Catalog,” on page 109
- Section 11.5, “Analyzing Data with Insight Queries,” on page 112
- Section 11.6, “Downloading Catalog Entities,” on page 114

11.1 Configuring the Data Source for Post Authentication Matching

A user is a valid Identity Governance user when the user is authenticated by a One SSO provider (OSP) and has been mapped to a published Identity Governance catalog user. The post authentication mapping occurs based on the User Mapping configuration.

IMPORTANT: Identity Governance evaluates only collected attribute values for the authentication matching rules, not edited values. For more information, see “Changing the Values for Authentication Matching and Identity Governance Services” in *Identity Governance 3.6 Installation and Configuration Guide*.

You can also add your own custom attributes to the catalog. For example, if your data source is eDirectory, you must extend the schema for the catalog because eDirectory contains more attributes than are built into the catalog.

By default, all Identity Governance users must have the **LDAP Distinguished Name** attribute mapped in the attribute catalog. Identity Governance uses this attribute to authenticate users who log in to the application.

1 Log in to Identity Governance as a Customer, Global, or Data Administrator.

2 Select **Data Sources > Identities**.

3 Select the authentication server that you specified during installation.

4 Ensure that you have collected data from the data source and it is enabled for user view. For more information, see Section 2.3, "Assigning Authorizations to Identity Governance Users," on page 24.

5 Scroll down to the **Collect User** or the **Collect Identity** section.

6 For **LDAP Distinguished Name**, specify the attribute in your identity source that you want to map to the login attribute for Identity Governance users.

For example, your identity source points to a container in Active Directory. Users log in to your network with an AD attribute called `username`. For **LDAP Distinguished Name**, specify the `username` attribute. Identity Governance maps `username` to the **LDAP Distinguished Name** attribute in the catalog.

7 (Optional) Map the other attributes in your identity source to the built-in attributes in the catalog.

8 (Optional) To add custom attributes, complete the following steps:

8a Select **Add Attribute**.

8b Specify the settings for the new attribute, and then select **Save**.

8c Specify an attribute from your identity source that you want to map to the new custom attribute.

8d Select **Save**.

9 (Optional) Add the new login users to authorizations in Identity Governance. For more information, see Section 2.3, "Assigning Authorizations to Identity Governance Users," on page 24.

11.2 Understanding Identity, Application, and Permission Management

This section discusses changing identity, application, and permission information:

- Section 11.2.1, "Managing Identity Information," on page 104
- Section 11.2.2, "Managing Application Information," on page 105
- Section 11.2.3, "Reviewing Application Fulfillment Settings," on page 106
- Section 11.2.4, "Managing Permission Information," on page 106

11.2.1 Managing Identity Information

Identity information includes:

- The attributes and relationships you collect through the identity collectors
- Status in Identity Governance, such as role assignments and risk factors
- Identity source information, such as the collector mappings, and curated and effective values for the identity attributes

To view or edit identity details:

1 Navigate to **Catalog > Users** and select a user. For example, Lisa Haagensen.

2 View basic information about that user, and select **More** to see more details.

3 Select available tabs to view items such as group membership, role assignments, and source for the user information.

4 (Optional) Select the **Edit** icon next to the user.

5 Modify the available attribute values, and then select **Save**.

11.2.2 Managing Application Information

Application information includes:

- The application photo, name, and description
- The identities of the application owner and administrators
- The method for fulfilling changeset items

You can also specify the risk level for the application and whether reviews include the permission hierarchy of the application.

To manage the application information:

1 Navigate to **Catalog > Applications**.

2 Select the name of an application. For example, `Safe Financials`.

3 Select the **Edit** icon.

4 Modify the application settings, such as:

Risk

Specifies the importance of the application in terms of limited access and security.

For example, you might want to review access to applications with a **high** risk more often than applications with a **mild** risk.

Administrators

Specifies users who can access the Catalog and can manage data.

Tags

Specifies a string that creates a new tag or shows existing tags from another application that match the string.

Owners

Specifies a user who is responsible for reviews where the review definition references the Application Owner.

Show permission hierarchy in review

Specifies whether you want to see the permission that was assigned in a permission hierarchy of relationships when this application is included in a review.

Show account name in review and fulfillment details

Specifies whether you want to hide account names.

You can use this setting in review definitions as criteria for permissions to be included in the review. For example, if the collected accounts names are obscure names, you might not want to use them.

Permission ID for granting accounts

Specifies whether you want to use an autocompleter of permissions published in the system.

11.2.3 Reviewing Application Fulfillment Settings

Identity Governance allows you to specify a fulfillment target for each application. In the catalog, you can see the fulfillment settings for each application.

To review current fulfillment settings:

1. Log in to Identity Governance.
2. Under **Catalog**, click **Applications**, and select an application.
3. Under **Fulfillment Information**, view the fulfillment type and details.

For information about configuring fulfillment, see Section 14.2, "Configuring Fulfillment," on page 130.

11.2.4 Managing Permission Information

Permission information includes:

- The permission photo, name, and description
- Identity of the permission owners
- The risk level for the permission

You can also observe permission relationships if the permission contains other permissions, has holders, or is part of Separation of Duties (SoD) policies.

When you save changes, Identity Governance displays an icon next to a changed setting. Select the icon to reset the setting to the originally collected value.

To manage permission information:

1. Navigate to **Catalog > Permissions**.
2. Select a permission.
3. Select the **Edit** icon.
4. Modify the permissions settings, such as:

   Risk

   Specifies the importance of the permission in terms of limited access and security.

   For example, you might want to review access to permissions with a **high** risk more often than permissions with a **mild** risk.

   Permission Owner

   Specifies one or more users responsible for reviews where the review definition references the Permission Owner.

   Hide Permission from Review

   Specifies whether you want to exclude this permission from reviews.

11.3 Editing Attribute Values of Objects in the Catalog

After you have published data, you can view the items, such as users and applications, along with their attributes, such as a user's phone number. Identity Governance attribute values are generally displayed as plain text. The Description field allows additional option to display text in HTML. For example, when HTML or Markdown elements are collected, curated, or entered when creating a permission, the description will render as HTML and other fields will display as plain text in the catalog and within other functional areas such as reviews and policies.

To view the attributes of a specific item in the catalog, select **Catalog**, the type of data you want to view, and the object you want to view.

To edit attribute values individually, select the pencil icon for that item. Identity Governance displays any attributes that the Data Administrator has designated as editable, along with the current attribute value. When you edit the data, you override the originally collected content and Identity Governance shows an icon next to the value to indicate the change. Any attribute that you edit will be persisted through subsequent collection and publication, even if the original value for the attribute changes. You can later reset the attribute value to its collected value. You can also associate tags, or metadata, so you can more easily identify the information when you create and perform a review.

To edit multiple attributes at the same time, see the following sections:

- Section 11.3.1, "Understanding Bulk Data Update," on page 108
- Section 11.3.2, "Editing Attribute Values in Bulk," on page 108

NOTE

- You can edit only the attributes that are marked as editable.
- You can add new external attributes each time you collect data from a data source. However, after you publish the data for that collector, you cannot remove the attributes.
- When you specify a string type for a new extended attribute, Identity Governance always truncates the string at 2000 characters.
- You can reset only the attribute values that are collected. Attributes that are configured such as Last Account Review Date or Last Unmapped Account Review Date cannot be reset.
- If you edit any permission records to set the `excludeFromCatalog` attribute to `true`, the only way to see these records in the catalog again is to manually change the `permission` table value back to `false`. If bulk editing was used to set the `excludeFromCatalog` attribute to `true`, copy the Bulk Data Update CSV file that made the original edits, and change the edited value to `UNDO_CURATION`.

IMPORTANT: Identity Governance evaluates only collected attribute values for the authentication matching rules, not edited values.For more information, see "Changing the Values for Authentication Matching and Identity Governance Services" in *Identity Governance 3.6 Installation and Configuration Guide*.

11.3.1 Understanding Bulk Data Update

Before you edit attribute values in bulk, a system administrator must have created the Bulk Data Update Base folder and the Input and Output subfolders, provided Identity Governance service read/write access permission to the subfolders, then specified the following parameters using the Identity Governance Configuration Utility:

Base Folder

The full path name of the Base folder in the file system.

Identity Governance creates the CSV data template file in the output subfolder, and you must copy the updated file to the input subfolder.

Batch Size

(Optional) Specifies the maximum number of CSV data rows processed at one time. This option is useful for tuning the memory usage of the Bulk Update process. The default value is 1000.

When you copy the CSV file to the `input` folder, Identity Governance changes the file extension as it processes the file. Here are the different extensions and processes the file goes through during the bulk process:

File Extension Name	Process
`.csv`	Identity Governance starts the bulk process. It is the name on the file when you add it to the `input` folder.
`.ph1`	Phase 1 of the bulk process.
`.fail`	If the bulk process fails, the file name becomes `.fail`.
`.done`	If the bulk process succeeds, the name becomes `.done`.

11.3.2 Editing Attribute Values in Bulk

You can edit *attribute values* for multiple objects at the same time by importing the data into Identity Governance using a CSV file. For example, you might want to add photos for users in the catalog. When adding multiple values to a single attribute, separate the values with the pipe sign (|).

NOTE: When importing a bulk update file, ensure that the file matches a bulk update policy in the system. The generated bulk file that the user edits has an ID in the file that must match a bulk update policy in the system. In addition, that policy must have the same attributes, decision context attributes, and mapping attributes. If the ID and attributes do not match, the bulk update will be rejected.

To edit a number of attribute values:

1. Under **Data Sources**, select **Identities** or **Applications** depending on the type of data you want to edit.
2. In the upper right, select **Bulk data update**.
3. Click **+**.
4. Specify all the mandatory fields.

5. Click **+** next to **Attributes to update** and select the attributes.
6. (Optional) Select **+** next to **Decision context attributes** and select the attributes that will provide context for update decisions.
7. (Optional) Select **+** next to **Mapping attributes** and select the attributes that will be used to identify Identity Governance users by attribute values from other systems.
8. Save your settings.
9. Click the Export file icon to generate the template.
10. Copy the template from the `output` folder on the Identity Governance server.
11. Copy the template from the appropriate location on the Identity Governance server.
12. Edit the template, then copy it to the `input` folder. Identity Governance automatically detects updated files and applies the updated information to your data.

NOTE: You can specify multiple users as permission owners. When performing bulk edits of permission owners, the ID name changes from `uniqueUserId` to `uniqueOwnerId` and `uniqueOwnerId` requires a new flag, `#true`, with each permission owner ID.

You can also undo an edited value or explicitly set a value to null. Identity Governance recognizes certain keywords in cells that perform specific actions:

- **UNDO_CURATION:** Removes any previously edited values for this attribute.
- **SET_NULL:** Sets the appropriate null or empty value on this attribute.

11.4 Searching for Items in the Catalog

Identity Governance provides several ways to find the information in your catalog. All catalog tables support a quick lookup of items by name or description. Some catalog tables also support an advanced filtering capability where users can build complex expressions based on searchable attributes. These complex expressions allow users to add attribute conditions to the search criteria or to add sub-expressions, known as filters, which can contain attribute conditions as well as other filters to refine the search results. Users can also save these filters for future searches. Both the quick lookup and filter expressions search are limited to a specific table. Insight Queries provide flexibility in searching for entities in your system, including searching across entity relationships.

- Section 11.4.1, “Supported Wildcards and Handling Wildcards as Literal Characters,” on page 109
- Section 11.4.2, “Searching within Catalog Items,” on page 111
- Section 11.4.3, “Using Advanced Filters for Searches,” on page 112

11.4.1 Supported Wildcards and Handling Wildcards as Literal Characters

Identity Governance supports the following wildcards in searches and advanced filtering:

- Underscore (_) for single characters
- Asterisk (*) and Percent (%) for multiple characters such as any sequence of zero or more characters

NOTE: The behavior of the wildcards differs based on the type of database and location of the search field or advanced filter. For example, PostgreSQL does not support wild cards for `equal` operations, but it does support wild cards for `like` operations.These wildcards are not supported in typeahead controls.

Table 11-1 *Examples of Valid Wildcards for Advanced Filters and Insight Queries*

Type	To Find
%	All results
*	All results
an%	All results that contain “an”
an*	All results that contain “an”
a_i	All results that have an “a”, followed by any character, then an “i”

You can also use other wildcards and expression capabilities supported by backend databases when searching Identity Governance entity tables. Identity Governance passes them in the search string to the databases. Refer to your database documentation for details about these additional wildcards and expressions.

When using these wildcards as literal characters, you must precede the special character with an escape (\) character in searches and advanced filtering when using the following operators:

- `contains`
- `starts with`
- `ends with`
- `matches`

Operators in advanced search values such as `equal to` or `not equal to` do not need to be preceded by an escape character.

Table 11-2 *Examples of Special Character Usage in Search Strings*

Type	To find
%Admin%	Results that contain Admin, such as Administrative Assistant or Global Administrator.
J_n	Entities where the first character is J and the third character is n, such as Jane Smith or Brad Jones.
Jo\%Doe	Entities that match Jo%Doe, such as Jo% Doe or Jo%Doe Admin.
Acct_AD	Entities that match Acct_AD, such as Acct_AD_01 or Acct_AD Admin.

11.4.2 Searching within Catalog Items

You can search for specific items in the catalog by selecting the type of item under **Catalog**, such as **Users** or **Groups**. Then type your search criteria in the search box, and select the search icon.

Identity Governance attempts to complete your search entry as you type. To ensure that users can more easily find a group, always include a description of the group that matches what users might use as a search term. For example, "Finance Team" for your financial group.

You can add additional criteria to the search by clicking the filter icon, where available, and using the expression builder. The expression builder gives you the ability to use AND, OR, and NOT expressions with the additional search criteria. You can save and reuse filters that you have defined.

The application or owner control provides a type-ahead feature to select applications or users in the system. Searching for applications, groups, or users requires selecting the catalog item.

TIP: You can configure the application wait time in milliseconds after the last time you press a key and before the application performs a typeahead search by selecting **Configuration > General Settings > Typeahead Delay**.

The attributes that appear in the refinement list are fixed for Technical Roles. However, you can configure them for other catalog items.

To add or remove user attributes from the refinement list:

1. Select **Data Administration** and then select the type of catalog item, such as **Identity Attributes**.
2. Select an attribute to edit the attribute definition.
3. Select the desired searchable option for the attribute to have it displayed in the catalog or not:

   Available in catalog searches. Change takes effect after publication.

   Select this option to enable the attribute for quick searches. If the option is selected, the attribute is available in the catalog list for searches. This means the search is performed against this column even if this column is not shown in the catalog list.

   Display as refine search option

   Select this option to enable the attribute for advanced searches.

   Display in review item selection criteria

   Select this option if you want to display the attribute in review items. For more information, see Section 23.2.2, “Adding Selection Criteria for Review Items,” on page 241.

   Display in business role selection criteria

   Select this option if you want to display the attribute when creating a business role membership expression. The membership expression contains the search criteria for membership in a business role.
4. Select **Save**, then publish the changes to the catalog.

11.4.3 Using Advanced Filters for Searches

Where available in Identity Governance, you can add additional criteria to searches by clicking the filter icon and using the expression builder. The expression builder gives you the ability to use AND, OR, and NOT expressions with a set of attribute conditions or sub-expressions and filters that can be used to filter the result set based on specific values. The expression builder also calculates date based on the provided date formula.

If you have filters you want to reuse in your environment, Identity Governance helps you manage these filters. Except for Insight Queries, you can save these filters and edit or delete them as needed for searches, such as identities, permissions, roles, and policies.

For more information, see Chapter 4, "Using Advanced Filters for Searches," on page 53.

11.5 Analyzing Data with Insight Queries

Identity Governance provides the ability to query data interactively by using Insight Queries. You can query the catalog across entity types, such as finding all users that have access to a certain permission. You can also query compliance activity and other information such as finding all users who have outstanding revocations.

To access Insight Queries, you must have one of the following authorizations:

- Customer, Global, Data, or Governance Insights Administrator
- Auditor

Insight queries are interactive, allowing you to change query options and update results without having to open a new window each time. You can download queries and import them and you can also download results of the queries. You can also create custom metrics using a query to populate the SQL statement and the metric columns fields. For more information about custom metrics, see "Creating Custom Metrics" on page 289.

To create Insight Queries:

1. Log in as a Customer, Global, Data, or Governance Insights Administrator or Auditor.
2. Select **Catalog** > **Governance Insights**.
3. Select the **+** icon to create a query.
4. Specify the desired search criteria. The criteria includes a set of entity types, cross references, and additional filters that can be used to filter the result set based on specific entity type.

   4a Select an entity type. For example, for queries related to fulfillment requests, select Change Requests. For queries related to identities, select Identities.

   4b (Optional) Add a cross-reference filter. Cross-reference filters are relationships between the selected entity type being searched and other entities in the system. You can limit the query based on the specified filter using the **with** option or use **with or without** option to expand the search. For example, if you are searching for identities and want to only find all identities that are included as members of business roles, then add **with** Business Role Inclusion as a cross-reference filter. If you want to find users who might or might not have violated a Separation of Duty policy, then add **with or without** Violating SoD cross-reference filter. For a detailed list of cross-reference filters, see the *Identity Governance Insight Query Technical Reference*.

4c (Optional) Select the filter icon to add attribute conditions and sub-expressions using the expression builder. For example, if you are searching for identities with a specific Title attribute, then add a condition specifying Title equal to the desired value, such as Reviewer.

NOTE: When searching for attribute values to include as search criteria, you can use the typeahead feature to select a value from the current catalog that matches your criteria, or type a partial string and press Enter. For information about supported wildcards, see Section 11.4.1, "Supported Wildcards and Handling Wildcards as Literal Characters," on page 109.

5 Select the columns (attributes) to include in the results. The column order for the results matches the order you specify, and you can drag and drop the listed columns to change the order of display.

Default columns display automatically in the selected column list when changing the searched entity type or when adding a cross-reference filter. Columns associated with a cross-reference filter are also automatically removed from the selected column list when you remove the reference filter.

6 Select the **Run** icon to see query results. As you change the query options, select the **Run** icon to update the results.

7 Select the **Save** icon to save the query.

8 (Optional) Select **Download as CSV** to save the results.

8a Type the query name or a meaningful description.

8b Select **Download**.

8c Select the download icon on the top title bar to access the saved file and download the file.

8d (Optional) Delete the file after downloading.

NOTE: The downloaded files will be automatically deleted based on your default download retention day settings. For information about customizing download settings, see Section 3.9, "Customizing Download Settings," on page 50.

If you include columns that contain multi-valued attributes, the query results contain multiple rows for those columns.

Identity Governance combines duplicate rows in the query results lists to avoid showing many rows with same value. For example, a query of identities on the Title attribute lists only one row for each title in your catalog, even though multiple identities might share the same title. In Oracle environments, the following object types and attributes do show multiple rows in the query results if you select any of them as a column:

- User: Geo Location
- Access Request Item: Change Item Comment
- Change Item Action: Item Comment

11.6 Downloading Catalog Entities

You can download the identities, accounts, groups, and permissions in the catalog as CSV files. All the columns displayed in the table will be downloaded. To enable you to continue performing tasks even as the entities are being downloaded, Identity Governance saves the CSV file to a download page from where you can download the saved file at a later time. The download page enables you to search for a file by description or download type (typically, the page where the user initiated the download). You can also use search strings to search for a file. You can cancel a download in progress and delete all files individually or in bulk.

To download catalog identities, accounts, groups, or permissions:

1. Select **Catalog > entity > Download all as CSV** to download all items.

   Or

   Select **Catalog >** ***entity*** and search for specific items. Then click **Download all as CSV**.
2. Type the entity name or a meaningful description.
3. Click **Download**.
4. Click the download icon on the top title bar to access the saved file and download the file.
5. (Optional) Delete the file from the download area in Identity Governance.

NOTE: If you do not manually delete the file, Identity Governance will automatically delete the file based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

12 Database Maintenance

Identity Governance database maintenance features allow Global, Data, Maintenance, and SaaS Administrators to archive data in the database, to clean up old and unused data in the database, and to schedule maintenance. Use these features to maintain your database. Customer Administrators can only view maintenance-related activities. They may not perform them.

- Section 12.1, “Understanding Database Maintenance,” on page 115
- Section 12.2, “Creating an Archive Destination,” on page 116
- Section 12.3, “Performing Database Maintenance,” on page 117
- Section 12.4, “Disabling and Enabling Archiving,” on page 119
- Section 12.5, “Scheduling Data Maintenance,” on page 119
- Section 12.6, “Identifying Purgeable Data,” on page 121

12.1 Understanding Database Maintenance

The operations database (by default, `igops`) maintains a history of activities that occur in Identity Governance. For example, as part of the data collection process, the database stores the previous state of that collection to ensure that Identity Governance can return to that state if an error occurs. Over time, however, the size of the database increases with each new collection, publication, review, and other operations. This can have an adverse effect on the performance of some database queries, because they have to filter through more and more irrelevant historical data. Identity Governance includes the **Database Maintenance feature**, which allows Global, Data, or Maintenance administrator to archive older data in a separate archive database, and then allows historical data to be cleaned up from the operations database.

The Database Maintenance feature provides the following:

- Shows running summaries of database updates and items that can be purged
- Allows you to drill down to more specific data from summary items
- Shows categorized lists of archive and cleanup activities
- Allows you to disable a running archive
- Shows the latest complete archive details
- Allows you to start the database maintenance process, with optional database cleanup
- Allows you to run cleanup in the background concurrently with other operations such as reviews, data collection, and data publishing when archiving is disabled
- Allows you to schedule maintenance

When performing database cleanup, Identity Governance searches the operations database for purgeable items that are older than the number of retention days you specified. If you do not specify a number of retention days, Identity Governance cleans up anything that can be purged. It will not purge data that is still in a state where it might be needed for current operations. For more information about how Identity Governance decides which items can be purged, see Section 12.6, "Identifying Purgeable Data," on page 121. If archiving is enabled, data is archived to the archive database before it is purged from the operations database. Database cleanup will not occur if an archive fails to complete. You can disable archiving to bypass this restriction and to run cleanup in the background while performing other user tasks.

IMPORTANT: Disabling the archive feature purges all your data from the Identity Governance archive database. Be sure you back up your data in your archive system before you disable the archive feature. For more information about disabling archiving, see Section 12.4, "Disabling and Enabling Archiving," on page 119.

When you start database maintenance, Identity Governance selects, by default, the option for concurrent archiving, which allows archiving to occur while operations — such as collections, publications, scheduled processes, and starting reviews — are in progress. If you clear this selection, Identity Governance does not begin archiving until those operations are complete or are idling cleanly, and no new operations will start while archiving is in progress. Identity Governance operations automatically resume when archival tasks are complete or canceled. In addition, Identity Governance cannot update the operations database while an archive is in progress. Clear the selection only if you want to ensure that all updates to the operational database made by normal Identity Governance activities are archived to the archive database, and nothing is purged from the operations database until it has been properly archived.

An administrator has the ability to cancel archive and cleanup tasks while they are running. Usually, both archive and cleanup tasks run automatically, one after the other, and when they are complete, normal Identity Governance operations automatically resume. However, an administrator may also choose to pause after the archive phase, after the cleanup phase, or both. If you choose to pause after the archive phase, you must manually resume and continue to the cleanup phase or cancel the cleanup phase and return to normal operations. If you choose to pause after the cleanup phase, you must manually return to normal operations. These optional pauses give administrators opportunities to suspend Identity Governance maintenance at key points and do other maintenance tasks they may deem important before proceeding. For example, they want to look at the database, copy the database, troubleshoot issues, and so forth. The recommended and default mode of operation for maintenance is to allow Identity Governance to automatically move through the maintenance phases and then automatically return to normal operations.

12.2 Creating an Archive Destination

To archive data, you must first set up a destination database for the archive. Identity Governance supports Oracle, PostgreSQL, MS SQL, and Vertica databases as archive destinations.

NOTE: Identity Governance does not create views for external databases. If you configure an external database as an archive destination, the view will contain only partial information.

To configure an archive destination:

1. Select **Data Administration** > **Maintenance.**
2. Click **Archive Destinations**.
3. Click "+" to add an archive destination.
4. Click **Current Archive Destination** to specify the database as the archive location you want to use.

5 Provide the requested information.

6 Click **Save**.

12.3 Performing Database Maintenance

When you start database maintenance, you can choose whether to perform concurrent database archiving.

If you do not select **Perform concurrent archive**, the Identity Governance server is put in an idle state before starting the archive, and it remains idle while the archive runs. The server does not start the database archive until any active Identity Governance background processes complete, and does not allow new background processes to start until archiving completes. Doing so ensures the database is in a logically consistent state, and that it remains in that state during archiving. No Identity Governance processes will run during archiving, and Identity Governance is not available for use. Therefore, if your archive process takes a a long time, you may want to select **Perform concurrent archive**.

NOTE: Even a concurrent archive eventually must idle the Identity Governance server to finalize the archive.

If you select **Perform concurrent archive**, Identity Governance background processes may continue to run, and Identity Governance remains available. A concurrent archive comprises **iterations**, which are multiple archives. If a change occurs to the database during an archive, another iteration of the archive runs. Because each archive iteration archives only data that has changed since the last iteration, each iteration is an incremental archive that should have less data to archive than the previous iteration, and which reduces the amount of time it takes to archive. Ultimately, to achieve a logically consistent archive, the Identity Governance server must be idled for a final iteration. The final archive iteration is a non-concurrent archive, but because it was preceded by multiple incremental archives, the final archive iteration should not contain as much data to archive, which means Identity Governance is idled for only a very short period of time.

You must specify a time for the final iteration to occur. The final iteration will be produced on or after the specified time. The final archive iteration is, in effect, a non-concurrent archive. In addition to specifying a finalization time, you must specify a time interval to pause between archive iterations to control the number of archive iterations that occur between the time the concurrent archive starts and the time it is finalized.

NOTE: **Perform concurrent archive** is also an available option for scheduled maintenance that ensures Identity Governance processes are not idle during scheduled database maintenance periods.

If you perform a concurrent archive while an archival reader has accessed the archive, Identity Governance informs you that archiving is “Waiting on archival readers.” Click the message to view details about the maintenance you started, including the number of readers in progress. You can click the number for details about the readers and determine whether you want to continue waiting, or if you want to stop the readers and proceed with the archive.

NOTE: Proceeding with the archive while read activities are in progress can result in incomplete or canceled reports, or missing data.

Database maintenance also allows you to choose whether you want to clean up the database after you archive. For more information about database cleanup, see Section 12.6, “Identifying Purgeable Data,” on page 121.

To archive and purge databases:

1. Select **Data Administration** > **Maintenance.**
2. (Optional) Calculate and view:
   - Summary of what will be archived in the next archive
   - Summary of items that could be purged

   NOTE: If your database is large, these summaries can take a long time to calculate and can consume significant server resources to produce. Click the Refresh icon to calculate or recalculate summaries. Calculated summaries expire after an hour, and you must click the Refresh icon to calculate them again. You can cancel a running calculation at any time.
3. Click **Start Maintenance**.
4. To purge data without archiving, select **Clean up without archive**. Identity Governance cleans up only items that were previously archived in the archive database. However, if you disable archiving, all items can be purged. To preserve your data, archive before clean up. You should also make sure your archive data is backed up in your company’s archive system before you disable archive.
5. To archive without stopping any processes currently in progress, select **Perform concurrent archive**, and then select values for the following items:
   - **Finalize On Or After** to specify the date and time to finalize the archive.

     NOTE: At the end of each iteration, Identity Governance checks if the current time is at or past the specified finalization time. If so, Identity Governance immediately starts the final archival iteration. If not, Identity Governance starts the next concurrent archival iteration.
   - **Pause Between Iterations** to specify the amount of time to pause after each archive iteration.
6. To purge data from the operations database after the archive process completes, select **Perform cleanup after archive**.

   NOTE: Identity Governance disables all user operations during the archiving process.
7. Select whether to pause after any of the phases.

   IMPORTANT: If you pause after a phase, the system does *not* automatically transition to the next phase or exit maintenance mode until a user either manually starts the next phase, or exits maintenance mode, even if the archive fails or is canceled.
8. Select the number of days to retain data before it is available to purge.
9. (Optional) Select **Advanced Cleanup Configuration** check box to specify retention days per entity type and select additional types of data to clean up.

NOTE: Users can access the application and perform all governance operations while cleanup is running.

10 Click **OK**.

12.4 Disabling and Enabling Archiving

WARNING: Use this feature cautiously. Disabling archiving deletes all data from your archive database. Ensure you have previously backed up your data in your company's archive system before disabling Identity Governance archiving.

Archiving processes might slow down your operation processes. To prevent this, a Global, Data, or Maintenance Administrator can disable archiving temporarily and then reactivate archiving by selecting **Disable Archiving** and **Enable Archiving**. Disabling archiving not only clears all data from the archive database but also deactivates triggers that capture updates to the operations database.

12.5 Scheduling Data Maintenance

Identity Governance enables SaaS Operations Administrators, Maintenance Administrators, Global Administrators, and Data Administrators to schedule archive and cleanup maintenance tasks to run at times when the archive or cleanup will not interfere with other governance tasks. You can cancel scheduled maintenance tasks while they are running.

- Section 12.5.1, "Scheduling Data Maintenance with Concurrent Archiving," on page 119
- Section 12.5.2, "Create a Data Maintenance Schedule," on page 120

12.5.1 Scheduling Data Maintenance with Concurrent Archiving

You can create scheduled maintenance tasks that perform concurrent archiving. However, specifying the finalization date and time requires configuration not required for concurrent archiving for manual data maintenance. The additional configuration is required, because a schedule could have repeat intervals, so specifying an absolute finalization date and time is not possible. Identity Governance provides the following choices to specify the finalization date and time for maintenance schedules:

- **Run Once (not repeated)** If you set a scheduled archive to run only once, you must enter a date and time for finalization.
- **Run Daily** If you set the scheduled archive to run daily, enter the time of day to finalize. The finalization time of day must be greater than the time of day specified in the scheduled start date and time.
- **Run Weekly** If you run a weekly scheduled archive, you must enter a day of the week and a time of day to finalize. The day of the week must be on or after the day of the week you specified in the schedule start date and time. If the day of week is the same day of week as specified in the start date and time, then the time of day must be after the time of day specified in the schedule start date and time.

- **Run Monthly** If you run a monthly scheduled archive, you must also specify one of the following:
    - **Last Day Of Month** If you schedule an archive to run on the last day of the month, the only option to set is time of day, which must be greater than the time of day specified in the schedule start date and time.
    - **Week of Month and Day Of Week** If schedule an archive to run on a specified week and day of the week, your entry for the finalization date and time depends on which of the following options you specify:
        - **Last Week or Week 4** The only option you may specify for archive finalization is time of day, which must be greater than the time of day specified in the schedule start date and time.
        - **Weeks 1, 2 or 3** You may specify a week of the month, a day of the week, and a time of day for finalization. The week of the month should be the same, or later, week of the month than the week of the month specified for the schedule. However:
            - If you specify the same week of the month as the schedule, the day of the week must be the same, or later, day of the week than the day specified for the schedule.
            - If you specify a week of the month greater than the week specified in the schedule, the day of the week may be any day of the week.
            - If you specify a week of the month and the day of the week the same as the week and day specified for the schedule, time of day must be greater than the time of the day specified for the schedule.

12.5.2 Create a Data Maintenance Schedule

To create a new schedule:

1. Select **Maintenance Schedules**, and then click **+**.
2. Specify a name and description.
3. Select a future time as start time for maintenance task and set recurrence. The first run time will be the current hour, day, week, or month. Then the maintenance task repeats based on the specified schedule.
4. (Optional) Specify the maximum archive time. Maximum archive time is the length of time (in minutes) the archiving task/process runs before automatically stopping. It prevents user operation lock out for extended period and ensures that the archiving task has sufficient time to complete successfully. If unspecified, the archiving continues until it completes.

    Identity Governance calculates the archiving task end time by adding the maximum archive time to the scheduled start time. The end time is an absolute time. Even if a scheduled maintenance task starts later than the specified start time (because a previous maintenance task is still running), the end time remains the same.

    For example, if the schedule start time is 3:00 PM and maximum archive time is 180 minutes, the archiving task ends at 6:00 PM regardless of when the archiving actually started.
5. To archive without stopping any processes currently in progress, select **Perform concurrent archive**.

    NOTE: Scheduling Data Maintenance with Concurrent Archiving describes the available configuration choices.

6 Select the maintenance type.

6a Select **Archive Only** to specify the schedule for automatic data archiving. Once the scheduled run starts, Identity Governance waits for all background processes to complete and then triggers archiving. All user operations are disabled during this process.

NOTE: If archiving is disabled, this schedule is skipped.

6b Select **Cleanup Only** to specify the cleanup schedule, and to specify the entity types to clean up and their retention days. For data to be cleaned up, it should satisfy the conditions described in Section 12.6, "Identifying Purgeable Data," on page 121. You can perform governance operations while cleanup is running.

6c Select **Archive and Cleanup** to schedule archiving and cleanup. Once archiving is complete, cleanup starts automatically based on specified data types.

NOTE: If archiving is disabled, the archive phase is skipped and Identity Governance performs cleanup as if a **Cleanup Only** option was selected. When this occurs, the data must satisfy the conditions described in Section 12.6, "Identifying Purgeable Data," on page 121.

7 Activate the schedule and save the schedule, or save the schedule and activate it later.

12.6 Identifying Purgeable Data

During the cleanup phase of database maintenance, Identity Governance removes the following types of data from the operations database. Optionally, when you choose to start maintenance, you can select **Advanced Cleanup Configuration** to specify different numbers of retention days for each data entity type you want to clean up.

NOTE: The purge conditions for each data type *can change* if a new scenario occurs that determines that the conditions change.

Access request

Can be purged only when the request is complete, which includes one of the following states:

- Request was denied approval
- Request was declined fulfillment
- Request was fulfilled and verified
- Request was fulfilled and verification failed

Analytical facts

Can be purged only when retention time is specified and facts are older than the specified retention time.

Application history

Can be purged at any time.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Auto fulfillment request

Can be purged when the associated change request item is in a final fulfillment state. Final fulfillment states include:

- Request refusal
- Error fulfilling the request
- Request verified
- Request *not* verified and verification ignored
- Verification timed out

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Business role

Can be purged if it:

- Has been deleted or it is an old version of a business role
- Is not referenced from any review definitions or review items
- Is not referenced from any change request items

Business role authorization

Can be purged when they are deleted. Business role authorizations are marked deleted when a business role detection removes them.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Business role detection

Can be purged if the business role detection is not currently running, because detection either completed successfully, failed, or was canceled.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Business role membership

Can be purged when they are deleted. Business role memberships are marked deleted when a business role detection removes them.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Bulk data update definition

Can be purged if it was deleted.

Category

Can be purged if the category was deleted.

Certification policy

Can be purged if policy was deleted.

Collection

Can be purged if:

- It is not currently running, and is in a canceled, failed, completed, or terminated state
- Its data is not part of any snapshot (snapshots containing data from a collection must be purged first)

Data policy

Can be purged if it was deleted.

Data source

Can be purged if it:

- Is not scheduled for collection
- Is not currently being collected or published
- Was deleted
- Is not part of a snapshot (snapshots containing data from data source must be purged first)

Additionally, when the data source is an application, it can be purged if the application:

- Is not a parent of another application
- Is not referenced by a business role
- Has no permissions referenced by a technical role
- Has no permissions referenced by a business role
- Has no permissions referenced by a separation of duty (SoD) policy

Inconsistency detection

Can be purged if the detection has been marked as deleted.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

RTC (Real Time Collection) batch

Can be purged when the data production for the RTC batch (or RTC ingestion) is complete, failed with an error, or was canceled. Real time collection cannot be in progress.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Remediation run

Can be purged if it is old, based on the timestamp. A remediation run will not be deleted if it is the only run for a policy remediation.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Request approval policy

Can be purged if:

- The policy was deleted
- No requests associated with the policy exist (requests associated with the policy must be purged first)

Request policy

Can be purged if:

- The policy was deleted
- No requests associated with the policy exist (requests associated with the policy must be purged first)

Review definition

Can be purged if it:

- Was deleted
- Is not referenced by a review instance (review instances must be purged first)
- Is not referenced by a certification policy (certification policies must be purged first)
- Is not referenced by a remediation from a certification or data policy

Review instance

Can be purged if it:

- Is not running, and was canceled, experienced an error, or completed certification
- Is not referenced by a pending change request item action (is not in a final verified or error state)

NOTE: Materialized views, if any, are purged when review instances are purged.

Risk score status

Can be purged if it:

- Is in the error, canceled, or completed state
- Is in completed state, and there is another completed risk score status of the same entity type with a later start time

Separation of Duties detection

A separation of duties (SoD) detection is information associated with an SoD case that keeps track of the detection history for the SoD case. These detections are also purged if an SoD case itself is purged.

The SoD detection purge allows the detection history to be purged without having to purge the SoD case. SoD detection can be purged only if it is not the most recent detection for the SoD case.

NOTE: The maintenance process does not clean up this data by default. To clean up this data, you must select this option in **Advanced Cleanup Configuration**.

Separation of Duties case

Can be purged if:

- The case is closed
- No change request items were made to resolve the case or, if there are change request items associated with the case, they are all in a final verified or error state and not still pending fulfillment

Separation of Duties policy

Can be purged if it:

- Was deleted
- Is not referenced in an SoD case (SoD cases should be purged first)
- No access requests with potential SoD violations for the policy exist (Such access requests must be purged first)

Snapshot

Can be purged if it:

- Is not the current snapshot of the Identity Governance catalog
- Is not a precursor to another snapshot
- Is not referenced by a review instance
- No Separation of Duties violations exist for users or accounts in the snapshot
- No technical roles exist that reference permissions in the snapshot

Technical role

Can be purged if it:

- Was deleted from the Identity Governance catalog
- Is not referenced by a review instance
- Is not referenced by an SoD policy
- Is not referenced by a Review Definition
- Is not referenced by a business role

Technical role assignment

Can be purged if the technical role assignment was deleted (unassigned).

Unregistered facts

Can be purged when fact tables are available in the schema, even after custom facts are unregistered from fact catalog.

13 Creating and Managing Delegation

Delegation enables a more consistent workflow for managing the reassignment of user tasks by allowing users and administrators to assign delegates for request and approval tasks.

- Section 13.1, “Understanding Delegation,” on page 127
- Section 13.2, “Assigning and Managing Delegates for Yourself,” on page 127
- Section 13.3, “Assigning and Managing Delegation for All Users,” on page 128

13.1 Understanding Delegation

Authorized users can delegate their review and approval tasks. The Customer, Global, or Data Administrator can assign delegates for all users. The delegate then receives tasks and acts on them instead of the original assignee. If the original assignee acts in one of the review or access approval management roles, the delegate also has the proper access permissions to act in that role. For example, if the original assignee was review owner, review auditor, or access request approver, the delegate will also have the related access permissions.

Delegation is a one-to-one mapping between two active users in the catalog. While a user can have only one delegate at any given time, a user can act as delegate for multiple users. Delegate chains are allowed. For example, User A can have a delegate User B, User B can have a delegate User C. However, a cyclical chain, where User A’s delegate is User B, and User B’s delegate is User A, is not allowed and will cause the review startup to fail.

When a review is started, Identity Governance calculates reviewers by the active delegate mappings that exist at the start of the review. If a delegate exists for an original assignee, the delegate for all intents and purposes is now considered the reviewer. To prevent review startup failure related to a cyclical chain, administrators can use the **Validate delegate mapping** bulk action after mapping delegates. The only other times Identity Governance calculates delegates are when review items are escalated, and when a reviewer is reassigned using the **Change Reviewer** option. When using the **Change Reviewer** option during reviews, the option becomes inactive when a cyclical chain is detected.

A delegation continues until it is terminated, a different user is assigned, or when the current date is not in the specified date range. When a delegation is terminated or modified, all future tasks are reassigned to the original assignee or the new delegate. If the delegation is terminated or modified when a review is in progress, outstanding tasks are not impacted. For purposes of historical audit, reviewer information and task activity in preview or live review tabs indicate that the task was assigned to a delegate in place of the original assignee.

13.2 Assigning and Managing Delegates for Yourself

1. Log in to Identity Governance.
2. In the title bar, select ***Your User Name* > My Settings**.
3. Expand the **Delegate Mapping** menu and click **Assign Delegate**.

4 Specify a delegate and select an assignment type.

5 (Optional) Select a reason and specify the start and end date of delegation.

6 Activate the delegate mapping.

7 Click **Save**. Identity Governance automatically checks your mapping and adds a green check mark icon in the Status column to indicate that your mapping is valid.

8 (Conditional) If you see a red error icon in the Status column, edit the mapping and fix the invalid mapping.

NOTE: If you see a gray warning icon, no action is needed. The gray warning icon indicates that the current date is not in the date range you specified. The icon will automatically disappear when the data range becomes active.

9 (Optional) Repeat the above steps if you want to delegate a assignment type (for example, Request Approvals) to another user.

10 (Optional) Select **Edit** to modify the delegate, reason, effective dates, or status.

11 (Optional) Select **Delete** to terminate a delegation.

13.3 Assigning and Managing Delegation for All Users

1 Log in as a Customer, Global Administrator, or Data Administrator.

2 Under **Policy**, select **Delegation**.

3 Click **+** to add a delegate.

4 Search and select a user, assign a delegate, and select an assignment type.

5 (Optional) Add a reason, specify the start and end date of delegation, and activate the delegation.

6 Click **Save**.

7 Repeat the above steps to add delegates for other users.

8 Select rows and then select **Actions > Validate delegate mappings** to ensure delegate mappings, if chained, are chained appropriately. Fix invalid mappings, if any.

9 (Optional) Select **Edit** to change a user, delegate, reason, or status.

10 (Optional) Select **Delete** to terminate a delegation.

11 (Optional) Select rows and then select **Actions > Activate** or **Actions > Deactivate** to change the status of multiple delegations.

NOTE: Review owners and review administrators can bypass delegation for the review management roles (review owner, escalation reviewer, and auditor) by editing the running review instance. These changes are made only for the running review instance. Delegates can also assign another user as a reviewer by using the **Change Reviewer** option on the review tabs. Request approvers can also bypass delegation for the approver role by reassigning approvers on the Approval page.

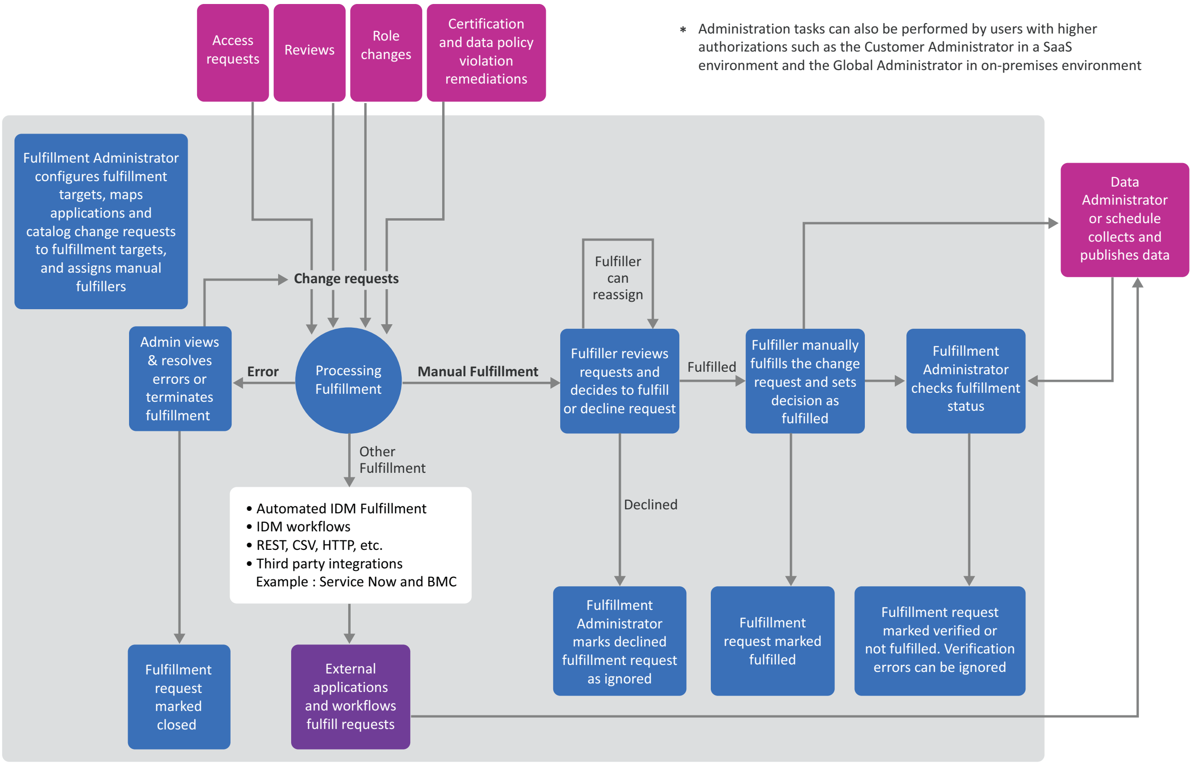
14 Setting up Fulfillment Targets and Fulfilling Changesets

Various activities result in Identity Governance building a list of changes, or **changesets,** that are then submitted for **fulfillment**. Reviews, policy violations, role changes, and access requests can all result in changes that need to be fulfilled. The Identity Governance fulfillment system evaluates the individual permission change items, determines which applications use these permissions, and then sends the changesets to the appropriate fulfillment target for each application. Identity Governance users with Bootstrap, Customer, Global, or Fulfillment Administrator authorization assignments can configure fulfillment options.

- Section 14.1, “Understanding the Fulfillment Process,” on page 130
- Section 14.2, “Configuring Fulfillment,” on page 130
- Section 14.3, “Monitoring Fulfillment Status,” on page 139
- Section 14.4, “Customizing Fulfillment Target Templates,” on page 142
- Section 14.5, “Specifying Additional Fulfillment Context Attributes,” on page 143
- Section 14.6, “Fulfilling Changesets,” on page 143
- Section 14.7, “Reviewing Fulfillment Requests,” on page 146
- Section 14.8, “Confirming the Fulfillment Activities,” on page 146

14.1 Understanding the Fulfillment Process

Figure 14-1 *Fulfillment Process*



Access requests
Reviews
Role changes
Certification and data policy violation remediations
* Administration tasks can also be performed by users with higher authorizations such as the Customer Administrator in a SaaS environment and the Global Administrator in on-premises environment
Fulfillment Administrator configures fulfillment targets, maps applications and catalog change requests to fulfillment targets, and assigns manual fulfillers
Change requests
Admin views & resolves errors or terminates fulfillment
Error
Processing Fulfillment
Manual Fulfillment
Fulfiller can reassign
Fulfiller reviews requests and decides to fulfill or decline request
Fulfilled
Fulfiller manually fulfills the change request and sets decision as fulfilled
Fulfillment Administrator checks fulfillment status
Data Administrator or schedule collects and publishes data
Other Fulfillment
• Automated IDM Fulfillment
• IDM workflows
• REST, CSV, HTTP, etc.
• Third party integrations Example : Service Now and BMC
Declined
Fulfillment request marked closed
External applications and workflows fulfill requests
Fulfillment Administrator marks declined fulfillment request as ignored
Fulfillment request marked fulfilled
Fulfillment request marked verified or not fulfilled. Verification errors can be ignored

Identity Governance refers to the implementation process of a changeset as fulfillment. Many users take part in the overall fulfillment process:

- Fulfillment administrators configure fulfillment targets, monitor fulfillment status, and take as needed actions to complete change requests.
- Requesters, Reviewers, Review Owners, Review Administrators, Business Role Administrators, or Data Policy Administrators take actions that generate change requests that are sent to the fulfillment process.
- Fulfillers manage change requests.

14.2 Configuring Fulfillment

Identity Governance provides three default options for fulfillment targets for provisioning the changeset items from a review: Identity Manager automated, Identity Manager workflow, and Manual (a user or group). You can also integrate and automate Identity Governance fulfillment with your service desk system by adding and configuring a connector, or **fulfillment type**, to your service desk system in Identity Governance **Fulfillment Configuration**.

Identity Governance supports the following fulfillment types:

- Active Directory LDAP
- BMC Remedy Incident

- CSV
- eDirectory LDAP
- Generic HTTP
- Identity Manager Dxcmd Fulfillment for Active Directory
- REST Service
- ServiceNow Generic
- ServiceNow Incident
- ServiceNow Request
- SOAP Service

NOTE: Before you configure a fulfillment target with either an Active Directory LDAP fulfillment type or an eDirectory LDAP fulfillment type, you must ensure Active Directory collects the attributes required for fulfillment. To verify Active Directory or eDirectory LDAP collection, log into Identity Governance and then click **Data Sources** > **Application Definition Sources**.

For more information, see:

- Section 14.2.1, "About Fulfillment Types," on page 131
- Section 14.2.2, "Configuring a Fulfillment Target," on page 134
- Section 14.2.3, "Configuring Multiple Fulfillment Targets for Applications," on page 136
- Section 14.2.4, "Transforming Data from Fulfillment Targets," on page 137
- Section 14.2.5, "Configuring Identity Manager and Manual Fulfillment Targets," on page 138

14.2.1 About Fulfillment Types

Identity Governance includes fulfillment types for various service desk products to enable fulfillment integration with your incident management applications. When you connect to an application for fulfillment, you must configure the connector to map the data fields in the change item to the input fields of the application. In a typical service desk environment, all systems and applications that the service desk manages are input as configuration management items.

Identity Governance exposes the following data fields from each changeset item to the fulfillment target connectors:

changeItemId

A long value containing the internal change item number

changeSetId (optional)

A long value containing the internal changeset number

changeRequestType

A string value containing one of the following values:

- `ADD_USER_TO_ACCOUNT`
- `REMOVE_PERMISSION_ASSIGNMENT`
- `REMOVE_ACCOUNT_ASSIGNMENT`

- MODIFY_PERMISSION_ASSIGNMENT
- MODIFY_ACCOUNT_ASSIGNMENT
- REMOVE_ACCOUNT
- ADD_PERMISSION_TO_USER
- ADD_APPLICATION_TO_USER
- REMOVE_APPLICATION_FROM_USER
- ADD_TECH_ROLE_TO_USER
- REMOVE_ACCOUNT_PERMISSION
- MODIFY_ACCOUNT
- REMOVE_TECH_ROLE_ASSIGNMENT
- REMOVE_BUS_ROLE_ASSIGNMENT
- MODIFY_TECH_ROLE_ASSIGNMENT

fulfillmentInstructions (optional)

Instructions the reviewer and request approver provided for the fulfiller

flowdata

Data item mappings and definitions that are passed through from request workflow to fulfillment workflow

userName

Display name of the user that is the target of the change item

account (optional)

Identifier of the account

accountLogicalId (optional)

Logical system identifier of the account. This only applies to Identity Manager SAP User Management driver accounts.

accountProvId (optional)

The collected identifier that indicates the unique ID of the account

appName

Name of the application to which the permission being provisioned belongs

fulfillerName (optional)

Name of the fallback fulfillment user

reason

Generated description of the action being requested by the change item

requesterName

Display name of the reviewer who requested the change

permName

Name of the permission being provisioned

permProvAttr

Name of the target permission attribute being modified

permProvLogicalId (optional)

Logical system identifier of the permission being provisioned. This only applies to the Identity Manager SAP User Management driver permissions.

permProvId (optional)

The collected unique provisioning identifier of the permission

reviewReasonId (optional)

The internal long value for the reason

reviewReason (optional)

The reason text

userProfile (optional)

Attribute to provide context to the fulfiller on the recipient of the fulfillment item

requesterProfile (optional)

Attribute to provide context to the fulfiller on the requester of the fulfillment item

accountProfile (optional)

Attribute to provide context to the fulfiller on the account if the fulfillment item is an account

permissionProfile (optional)

Attribute to provide context to the fulfiller on the permission if the fulfillment item is a permission

The following shows a sample change item payload:

```
{
    "accountProvId": "d2a293ff-71c5-492f-9415-e08830b635b2",
    "changeItemId": 8300,
    "changeRequestType": "REMOVE_PERMISSION_ASSIGNMENT",
    "userName": "Abby Spencer",
    "accountName": "aspencer",
    "account": "CN=Abby
Spencer,OU=Users,OU=MyServer,DC=mydc,DC=mycompany,DC=com",
    "appName": "Money Honey Financials",
    "reason": "REMOVE_PERMISSION_ASSIGNMENT remove permission Marketing
Portal requested by Aaron Corry while certifying Money Honey Financials",
    "requesterName": "Andrew Astin",
    "permName": "Marketing Portal",
    "permProvAttr": "member",
    "permProvId": "e07db779-5c30-44d2-bc0c-6dfa30cfa6af"
}
```

Fulfillment types use preconfigured templates that map the Identity Governance change item data and application-specific static values into various attributes in the SOAP XML payload. The WSDL from your service catalog request management application indicates any value constraints for input fields. The fulfillment target service can populate all valid fields in the service desk interface, so if you want to extend the set of fields that the Identity Governance template populates or modify the default mappings of the template, contact your Micro Focus technical support representative for details.

The service parameters and other fulfillment target configuration fields vary, depending on the fulfillment type selected for a fulfillment target, and Identity Governance provides default values for many of the fields, but you can choose to customize field values.

For example, the “BMC Remedy Incident” fulfillment type uses the `HPD_IncidentInterface_Create SOAP service Helpdesk_Submit_Service` method for creating incidents in the Remedy application. For example, `http://your-service-host/arsys/WSDL/public/your_server/HPD_IncidentInterface_Create_WS`. In addition, **Fulfillment Item configuration mapping** displays the fields listed in the table below.

BMC Remedy Incident Field	Identity Governance Mapping
`Service_Type`	“User Service Request” (required)
`Reported_Source`	“Direct Input” (required)
`Status`	“New” (required)
`Action`	“CREATE” (required)
`Urgency`	“3-Medium” (required)
`Impact`	“3-Moderate/Limited” (required)
`First_Name`	(required)
`Last_Name`	(required)
`Notes`	Reason, appName, username, account (ecmascript transformation provided)
`Summary`	changeRequestType
`HPD_CI_ReconID`	

Mapping Identity Governance change item data to target application data fields is similar to configuring data source collectors. This includes support for static value mapping and per-field data transformation. Regardless of the fulfillment type you select, you must place quotes around the static values used for fulfillment type configuration.

Since the implementation of any particular service desk application varies widely for each customer, it may be useful to manually create sample incidents using the application user interfaces to validate the desired inputs for each fulfillment target.

14.2.2 Configuring a Fulfillment Target

The Identity Governance fulfillment target configuration allows you to customize your incidents for these various systems. When you create a service desk fulfillment target in Identity Governance, you provide the connection information and credentials for the target system, as well as a default configuration specifying the fields you want Identity Governance to populate in your incidents. After you assign a target fulfillment system to an application, you can then customize that default configuration to appropriately map the application configuration item, assignment group, severity, and other fields for that specific application.

When you configure a fulfillment target using Active Directory/eDirectory LDAP, or CSV fulfillment types, keep in mind the following:

About Active Directory/eDirectory LDAP fulfillment

If a user is present in Identity Governance, but is not present in either Active Directory/eDirectory, you can configure the fulfillment target to create an account through the respective fulfillment targets.

To perform the this action, in Step 3 below, you must provide values for the **first name**, **last name**, **title**, and **workforceID** fields.

In addition, when you configure **Fulfillment item configuration and mapping**, click {...}, and then edit the transform script for **Account name generation payload** to connect to the correct Active Directory/ eDirectory server for the user.

About CSV fulfillment

This fulfillment target creates a CSV file in the specified directory that contains the attributes you configured in the fulfillment target.

To configure a fulfillment target:

1. Log in to Identity Governance as a Bootstrap, Customer, Global, or Fulfillment Administrator.
2. Select **Fulfillment** > **Configuration**.
3. (Conditional) If you want to add a fulfillment target, select **+** and complete the required fields in the template. When adding fulfillment targets, you must configure service parameters to connect Identity Governance to your fulfillment service, and then configure mappings to create an appropriate fulfillment request.

   3a Configure service parameters to connect Identity Governance to your fulfillment service. Conditionally, enable Cloud Bridge connection when fulfilling Identity Governance as a Service requests using on-premise fulfillment services.

   NOTE: Micro Focus supports Cloud Bridge only in Identity Governance as a Service deployments.

   3b Configure fulfillment item and map attributes. Click the search icon to select edit data fields included for a parameter. For example, select **Fulfillment Instructions** for instructions from reviewers and approvers to be passed through to fulfillers. Select **Flow Data** for custom request and approval form information to be received by fulfillment systems. In addition, if required, click {...}, and then edit the transform script or upload a script to map attributes.

   NOTE: When viewing the list of mapped attributes for a field, you could see some items not available to select and marked with a strike-through line across the text. You must enable these attributes in **Configuration** > **Context Fulfillment Attributes** in order to select them here.

4 (Conditional) If you want to modify a fulfillment target, click its name in the **Name** column, and then make necessary changes.

NOTE: Optionally, Customer, Global, or Data administrators can download the fulfillment target templates, edit them, and upload them to Identity Governance prior to fulfillment administrators configuring the service parameters and mappings in the application itself. For more information, see Section 14.4, “Customizing Fulfillment Target Templates,” on page 142.

---

5 Make any additional updates for the selected fulfillment target, such as fulfillment response mapping and specifying change request types, and click the Save icon.

6 Select **Fulfillment > Configuration**, and then click the **Application setup** tab.

7 (Optional) If you want to use the same fulfillment target for multiple applications, you can select and configure them using the **Fulfillment Target** selector at the top of the page. For more information, see Section 14.2.3, “Configuring Multiple Fulfillment Targets for Applications,” on page 136.

8 For each application, click **Edit**, and provide the requested information for the fulfillment targets configured for the application, and then click **Save**.

NOTE: The **Change Request Type** column updates to show whether the fulfillment target handles all change request types or some types for this application.

---

9 Select the **Catalog update setup** tab and select the fulfillment target for each type of catalog update request initiator you have in place.

14.2.3 Configuring Multiple Fulfillment Targets for Applications

You can configure each application to use multiple fulfillment targets, or you can configure multiple applications to use multiple fulfillment targets. For example, you might have one system that processes all requests to add access and a different system that processes all requests to remove access.

To configure multiple fulfillment targets for an application:

1 Log in to Identity Governance as a Bootstrap, Customer, Global, or Fulfillment Administrator.

2 Select **Fulfillment > Configuration** and select the **Application setup** tab.

3 Under the **Actions** column, click **Edit** next to the application for which you want to configure multiple fulfillment targets.

4 On the Application Setup window, click the plus sign (+) to add one or more fulfillment targets to the application.

5 Scroll to, and configure, the new fulfillment target.

6 Under the fulfillment target you want to process change requests, select **Supported Change Requests**, and then select the types of change requests you want the target to process. You can use the same fulfillment target to process all requests, or you can use a different target for certain requests.

NOTE: To assist the Fulfillment Administrator in making sure that the configured fulfillment targets handle all change request types, Identity Governance shows which change request types are configured next to each fulfillment target. If a target does not support any of the change request types, those unsupported types display in red text.

7. When you complete configuration, click **Save**.

If you need to configure multiple applications with the same fulfillment targets, you can use the bulk action to configure multiple fulfillment targets for multiple applications.

To configure multiple fulfillment targets for multiple applications:

1. Log in to Identity Governance as a Bootstrap, Customer, Global, or Fulfillment Administrator.
2. Select **Fulfillment > Configuration** and select the **Application setup** tab.
3. Select the checkbox next to each application for which you want to configure multiple fulfillment targets, and then click **Change fulfillment targets**.

   NOTE: If you want to configure multiple targets for all applications, select the checkbox in the column header.

4. On the Application Setup window, make changes to existing fulfillment targets, or click the plus sign (+) to add one or more fulfillment targets to the application.
5. Scroll to, and configure, any new fulfillment targets.
6. Under the fulfillment target you want to process change requests, select **Supported Change Requests**, and then select the types of change requests you want the target to process. You can use the same fulfillment target to process all requests, or you can use a different target for certain requests.

   NOTE: To assist the Fulfillment Administrator in making sure that the configured fulfillment targets handle all change request types, Identity Governance shows which change request types are configured next to each fulfillment target. If a target does not support any of the change request types, those unsupported types display in red text.

7. When you complete configuration, click **Save**.

14.2.4 Transforming Data from Fulfillment Targets

You can transform the incoming data from fulfillment targets to have Identity Governance display more meaningful information. For example, instead of displaying only the incident number from your fulfillment system, you could display additional text, such as “Incident number 123456 was created in ServiceNow” in Identity Governance.

The transforms are done through Nashorn-compatible Javascript in the **Fulfillment Response mapping** section of the fulfillment target configuration. Within the Javascript, you can access the incoming value by creating a variable name `inputValue`. After manipulating the incoming value, you can return the value to Identity Governance by assigning the value to a variable name `outputValue`.

The following example transforms the incoming value, which is a tracking number from the connected system to `Incident number 123456 created in ServiceNow` in the Identity Governance displays.

```
outputValue = 'Incident number ' + inputValue + ' created in ServiceNow'
```

To change fulfillment target response mapping:

1. Log in to Identity Governance as a Bootstrap, Customer, Global, or Fulfillment Administrator.
2. Under **Fulfillment > Configuration**, select an existing fulfillment target or create a new one.
3. Expand the Fulfillment Response mapping section and select the braces ({ }) next to the attribute you want to transform.

   NOTE: Two dots between the braces ({..}) denotes that a transform script exists for an attribute.

4. Enter or edit the existing transform script in one of the following ways:
   - Select **Edit** and edit the script in the resulting popup window
   - Use the drop down control to either create a new script or edit an existing script
   - Select **Or upload as script file** to upload a script file
5. Save the fulfillment target.

14.2.5 Configuring Identity Manager and Manual Fulfillment Targets

For Identity Manager automated, Identity Manager workflow, and manual fulfillment targets, Identity Governance evaluates and fulfills the change items without the need for extensive configuration. When specifying one of the default methods of fulfillment, observe the following considerations:

For manual fulfillment targets, Identity Governance evaluates and fulfills the change items without the need for extensive configuration. When specifying manual fulfillment as the default method of fulfillment, observe the following considerations:

Identity Manager Automated

Applies only when you integrate Identity Governance with Identity Manager.

Specify whether you want to use automated provisioning with manual fulfillment or a workflow as the fallback method. Then specify the values associated with the fallback method. For more information, see Section 14.6.3, “Automatically Fulfilling the Changeset,” on page 145.

NOTE: Identity Manager Automated fulfillment is not currently supported in SaaS environments.

Identity Manager Workflow

Applies only when you integrate Identity Governance with Identity Manager.

Specify the name of a workflow that already exists in Identity Manager. The Identity Manager workflow must have inputs for the following fields:

- `String: changesetId`
- `String: appId`

To connect to the external provisioning system from Identity Governance, click **Configuration** > **Identity Manager System Connection** (or you can use the Identity Governance Configuration Utility in the console mode). For example:

URL

```
http://$test:8543/IDMProv
```

User ID

```
globaladmin
```

Password

```
adminpassword
```

For information about the Configuration Utility procedures, see "Using the Identity Governance Configuration Utility" in the *Identity Governance 3.6 Installation and Configuration Guide*. For more information about the workflow process, see Section 14.6.2, "Using Workflows to Fulfill the Changeset," on page 144.

Manual

Specify an individual or group of individuals to serve as the fulfiller. For more information about manual fulfillment, see Section 14.6.1, "Manually Fulfilling the Changeset," on page 143.

To have Identity Governance email reminders to the fulfillers, ensure that you configure email notifications using the Identity Governance Configuration Utility. For information about customizing emails to fulfillers, see Section 3.4, "Customizing Email Notification Templates," on page 39.

14.3 Monitoring Fulfillment Status

The fulfillment status list allows you to view the status of fulfillment requests by category, such as fulfillment items that:

- Ended in error or timeout conditions
- Are pending fulfillment
- Were verified
- Were ignored

The fulfillment status area also allows you to retry, or resubmit, fulfillment items that did not succeed.

To monitor fulfillment status:

1. Log in to Identity Governance as a Customer, Global, or Fulfillment administrator.
2. Select **Fulfillment > Status**.
3. Select all status categories you want to review.
4. (Optional) Select again any status categories you want to remove from the list.
5. (Optional) Select any fulfillment items that did not complete successfully, and then select **Retry** to resubmit them to the appropriate fulfiller.

14.3.1 Understanding Fulfillment Status

The following details on fulfillment status conditions can help with troubleshooting fulfillment in your environment. A change item has 11 possible status conditions, listed below in the associated status column. The general status column shows the broad status categories that Identity Governance displays to users. The table includes details on each status and what actions, if any, you can take to move an item to a different status. No user action is required for some status conditions, either because they are intermediate states or terminal states.

General Status	Summary	Associated Status	Entry Conditions	Exit Conditions
Error or timeout	Provisioning was marked as complete, but the status after a collect and publish cycle shows the item as not fulfilled.	Not fulfilled, verification error (`NOT_VERIFIED`)	Change item marked as fulfilled but updated catalog shows that status to be incorrect. This can be valid when fulfillment target is an asynchronous process, such as Service Now. When Service Now opens a ticket, Identity Governance marks the change request item complete. However, the help desk might not have completed the update to the associated application.	Examine the change item and take one of the following actions: ◆ If the fulfillment target is an asynchronous task, such as Service Now, ensure the help desk has fulfilled the item and then run another collect and publish cycle. ◆ If possible, fulfill the item and then run a collect and publish cycle. ◆ If not possible to fulfill the item, mark the item as **Ignore**.
	Fulfiller has marked item as Declined.	Declined by (REFUSED)	Manual fulfiller has marked and submitted item as Declined.	Mark the item as **Ignore**.

General Status	Summary	Associated Status	Entry Conditions	Exit Conditions
	Change item was marked as being in error.	Not fulfilled, verification error (ERROR)	This status will not be reached by normal operation of the system. It is a transitory state on the way to automatic retry in case there was an error detected during fulfillment. However, an API endpoint can set the status to ERROR, so an external system might have caused the item to have this status.	Intermediate status; no action needed.
	Change item has not been successfully verified at the end of verification expiration timeout.	Not fulfilled, verification timed out (VERIFICATION_TIMEOUT)	If Identity Governance is set up to monitor verification timeouts and the change item has not been verified within that time, it moves to this status. By default, this value is set to 365 days.	Mark the item as **Ignore**.
Fulfilled	Fulfillment is reported as complete.	Fulfilled, pending verification (COMPLETED)	Identity Governance has received communication that fulfillment has completed. This status might not mean the item is fulfilled. If the fulfillment target is an asynchronous process, such as Service Now, the status changes to completed when the asynchronous process opens a ticket, not when the tasks in the ticket have been fulfilled.	After the next collect and publish cycle, Identity Governance verifies the item target matches the change item. If so, the item status changes to Verified. If not, the item status changes to Error.
Pending fulfillment	Fulfillment is in progress.	Initializing (INITIALIZED, IN_PROGRESS)	Change request item has been created.	Intermediate status; no action needed.

General Status	Summary	Associated Status	Entry Conditions	Exit Conditions
	Fulfillment has been initiated.	Pending fulfillment by, Sending for fulfillment by external workflow (PENDING)	Identity Governance successfully communicates with provisioning workflow or adds change items to manual fulfiller queue.	Change item is acted on by either an automated fulfillment system or a manual fulfiller. If fulfiller marks item as fulfilled, the item status changes to Fulfilled (COMPLETED). If the fulfiller marks the item as refused, the item status changes to Error (REFUSED).
Verified	Catalog shows item has been fulfilled.	Verified (VERIFIED)	Identity Governance verifies changes in catalog.	Terminal status; no action needed.
Ignored	Fulfiller or review owner has ignored closed-loop verification.	Verification ignored (VERIFICATION_ IGNORED)	Fulfiller or review owner has selected **Ignore** for a change item that was in error or timeout status.	Terminal status; no action needed.
Retry	The change item has had an error during fulfillment and is waiting for administrator action.	Retry	An error is detected during fulfillment.	Customer, Global, or Fulfillment Administrator selects **Retry** or **Terminate** for the item on the Fulfillment Requests page.

14.4 Customizing Fulfillment Target Templates

A fulfillment target template includes predefined service parameters and attribute mappings suitable for the fulfillment target application. To create a custom fulfillment target template, you can download and edit an existing template. Fulfillment target templates use JavaScript Object Notation (JSON) format for specifying the service parameters and mappings. You can use a JSON formatter or text editor to modify the content of the template file.

If a new or customized template replaces an existing template, you can disable the template that you no longer need.

1. Log in to Identity Governance as a Customer, Global, or Data administrator.
2. Select **Configuration > Fulfillment Target Templates**.
3. Select a template, and then select **Download** or **Disable**.
4. Edit the content.

5 Under **Fulfillment Target Templates**, select **+**.

6 Specify a template name and add description, then browse to the location of the updated file.

7 Select **Save**.

14.5 Specifying Additional Fulfillment Context Attributes

The system sends basic information on how to perform fulfillment after a review or a request. Optionally you may specify additional attributes which also should be included when sending instructions to an external fulfillment target.

NOTE: Manual fulfillment target attributes are not affected by this setting.

1 Log in to Identity Governance as a Customer, Global, or Fulfillment administrator.

2 Select **Configuration > Fulfillment Context Attributes**.

3 Specify **Requester**, **Recipient**, **Account**, **Permission**, and **Supervisor** attributes.

TIP: Use wildcard * to search for attributes.

4 Select **Save**.

14.6 Fulfilling Changesets

An application owner can configure the application source to require manual or automated fulfillment. When Identity Governance generates a changeset for fulfillment, Identity Governance determines which applications have change items. Depending on the specified fulfillment type for the application, Identity Governance performs one of the following actions:

- Section 14.6.1, “Manually Fulfilling the Changeset,” on page 143
- Section 14.6.2, “Using Workflows to Fulfill the Changeset,” on page 144
- Section 14.6.3, “Automatically Fulfilling the Changeset,” on page 145
- Section 14.6.4, “Using Service Desk Fulfillment,” on page 145

Fulfillment administrators can configure the fulfillment target for an application, including configuring multiple fulfillment targets for an application based on change request types. For more information, see Section 14.2, “Configuring Fulfillment,” on page 130.

14.6.1 Manually Fulfilling the Changeset

During the fulfillment stage of the review instance, Identity Governance creates a task for each review item that must be changed. The assigned fulfillers complete the requested changes in a domain-specific manner, based on the actual permission. The process of fulfilling the changes might occur over the span of many days and you might need to remove many permissions. To complete the process in a timely manner, Customer, Global, or Data Administrator can specify a group of users to serve as the Fulfiller. Users in the specified group can work concurrently to fulfill the changes.

Identity Governance provides change items, either through a completed review or SoD case review. Following are some examples of the change items:

- Remove user from account (user access review), fulfilled by either removing the user from the account or removing the account
- Modify user access with fulfillment instructions, fulfilled by following the reviewer's instructions
- Remove account (unmapped and mapped account review) fulfilled by removing the account
- Remove permission assignment (user access review or SoD case), fulfilled by removing the permission assignment to the user
- Assign user (unmapped and mapped account review), fulfilled by assigning user to account
- Modify account with fulfillment instructions, fulfilled by following the reviewer's instructions

NOTE: Modify user access and modify account changesets might have a reason, and a user selection might also be required. For more information, see "Configuring Reasons for Review Actions" on page 254. For more information about specific change request types, and fulfillment status, see "Configuring Fulfillment" on page 130.

Identity Governance sends emails to the fulfillers to remind them that they have a manual fulfillment task. The email provides a link to the task. Administrators can customize the message in this reminder. For more information about customizing, see Section 3.4, "Customizing Email Notification Templates," on page 39.

For more information about performing fulfillment tasks, see Chapter 15, "Instructions for Fulfillers," on page 147.

14.6.2 Using Workflows to Fulfill the Changeset

If you integrate Identity Governance with Identity Manager, you can use a custom workflow to remove the permissions. You create the workflow in the identity applications. In Identity Manager, you specify global configuration values (GCVs) to store the connection parameters between the workflow and Identity Governance. The workflow also must have inputs specified in the following fields:

- `String: changesetId`
- `String: appId`

Identity Governance sends the `changesetId` and `appID` to the workflow to process the fulfillment tasks for the review's changeset. The workflow parses the information in the changeset and completes the tasks. When the workflow finishes, Identity Manager informs Identity Governance, which then changes the status of the changes to complete.

For more information, see "Configuring and Managing Provisioning Workflows" in the *NetIQ Identity Manager - Administrator's Guide to the Identity Applications*.

To jump start your progress, use the included sample workflow as a starting point in creating your custom workflow to process the change request. Note there is also a companion download that defines the Global Config Values (GCV) that is used by the workflow to configure Identity Governance connection details.

To access the sample workflow:

1. Go to **Fulfillment** > **Configuration** > **Fulfillment Targets** > **Identity Manager workflow (system)**.
2. In the **Fulfillment Samples** section, download a sample workflow.
3. Import the sample workflow into Identity Manager Designer and deploy to Identity Manager Roles Based Provisioning Module (RBPM).
4. Update the sample workflow to specific details in your environment, including the **To do for Customer** section of the workflow.

14.6.3 Automatically Fulfilling the Changeset

You can assign automated provisioning to any application source that derives from Identity Manager. After you complete a review, Identity Governance sends the requested changes to the Identity Manager Identity Vault. The permission type determines whether Identity Manager can automatically provision the requested change. In the identity applications for identity Manager, you specify whether a permission is a **resource** or a **role**. Identity Manager can automatically deprovision all resources because they are explicitly set for the user. Similarly, if a role is explicitly set, it can be deprovisioned. For example, the user has an `nrfAssignedRole` attribute pointing to that role. However, Identity Manager cannot deprovision roles that a user receives indirectly. For example, the user is a member of a container or group to which the role has been assigned.

NOTE: Identity Manager automated provisioning relies on the Provisioning ID value for an identity to be a valid distinguished name in the Identity Manager system. When using multiple identity sources that are merged, be sure you set the Identity Manager identity source as the authoritative source for the Provisioning ID attribute in your identity merging rules.

If deprovisioning can be done automatically, Identity Manager propagates those updates to the connected systems. For those roles that cannot be deprovisioned automatically, the fulfillment process includes a **fallback method**. You can specify that Identity Governance can revert to manual fulfillment or to using an Identity Manager workflow.

14.6.4 Using Service Desk Fulfillment

You can integrate and automate Identity Governance fulfillment with your service desk system by adding and configuring a connector to your service desk system in Identity Governance **Fulfillment Configuration**. For more information, see Section 14.2, “Configuring Fulfillment,” on page 130.

14.7 Reviewing Fulfillment Requests

Various components of Identity Governance result in the generation of fulfillment requests. You can review and act on these requests in the Fulfillment Requests area.

1. Log in to Identity Governance as a Customer, Global, or Fulfillment administrator.
2. Select Fulfillment > Requests.
3. Select the appropriate category to review and act on the requests.
4. (Optional) Select Fulfillment Errors to review errors from fulfillment requests.

14.8 Confirming the Fulfillment Activities

When the Fulfiller confirms the review fulfillment, Identity Governance updates the fulfillment item status under Fulfillment. Bootstrap, global, and fulfillment administrators can access the Fulfillment tab, as well as any individuals with the Fulfiller authorization in Identity Governance. After the administrator collects and publishes application sources again, Identity Governance updates the status of the fulfillment of all changesets except modify changesets.

The Review Auditor, if assigned, must accept or reject the review. Auditors can see the details and history of the review items. When rejecting a review run, the Auditor must add a comment about the rejection. Before the Auditor can verify fulfillment of the requested changes, you must collect and publish all identities and the application sources related to the review. If the review does not have any fulfillment activities, you do not need to perform this action.

For more information, see Section 14.3.1, "Understanding Fulfillment Status," on page 140.

15 Instructions for Fulfillers

This section provides information for individuals assigned the Fulfiller authorization in Identity Governance. Periodically, individuals in your organization participate in a review to determine whether:

- Permissions granted to users and accounts should be kept or removed
- User identity attributes should be kept or modified
- Users should be kept or removed as members of business roles
- Supervisors assignments should be kept or changed
- Business role definition authorizations, memberships, and attribute values should be kept or modified

Individuals also request access and removal of access. They calculate policy violations and request changes to mitigate policy violations.

For each request, Identity Governance creates a task and routes it to a fulfillment target. When assigned to manually fulfill a request, a fulfiller reviews the request details and fulfills the requests, declines the request, or reassigns the task to another fulfiller.

- Section 15.1, “Understanding the Fulfillment Process,” on page 147
- Section 15.2, “Performing Manual Fulfillment,” on page 149

15.1 Understanding the Fulfillment Process

Identity Governance collects information from a variety of identity and application data sources in your environment. It allows your organization to periodically review and verify that users have only the level of access that they need to do their jobs. The review process, requests for access, business role definition changes, and remediation of policy violations result in a list of changes, or **changeset**, that are then implemented. Identity Governance refers to the implementation process of a changeset as **fulfillment**.

- Section 15.1.1, “Managing the Fulfillment Process,” on page 147
- Section 15.1.2, “Understanding the Fulfiller Authorization,” on page 148

15.1.1 Managing the Fulfillment Process

Fulfillment target configuration, application setup, and catalog update setup by the Customer, Global, or Fulfillment Administrator drives how requested changes are fulfilled. The changes can be fulfilled manually, by a help desk service, or sent to Identity Manager, which automatically makes the changes or initiates external workflows. For manual fulfillment processes, the Customer, Global, or Fulfillment administrator specifies individuals or groups as fulfillers responsible for making the requested changes. For example, your Help Desk group might be assigned to fulfill the changeset.

Fulfillment Administrators also monitor the fulfillment process, and reassign manual fulfillment items if needed. Identity Governance provides the following status conditions for fulfillment items:

- Error or time out
- Fulfilled
- Pending fulfillment
- Verified
- Ignored
- Retry

When the fulfiller confirms the fulfillment activities, Identity Governance updates the status of the fulfillment item. After the administrator collects and publishes application sources, Identity Governance again updates the status of these fulfillment items. Customer, Global, and Fulfillment Administrators and Auditors can access the Fulfillment Status page to view the status of all fulfillment items. For more information about fulfillment targets and fulfillment status, see Chapter 14, “Setting up Fulfillment Targets and Fulfilling Changesets,” on page 129.

15.1.2 Understanding the Fulfiller Authorization

As part of the review, managers might change the permissions assigned to individuals in your organization. Access requests, business role definition changes, and user catalog changes can also generate change requests. Only Customer, Global, or Fulfillment Administrators can assign Fulfillers to complete fulfillment.

As a Fulfiller, you can:

- Sort items by column (the available columns depend on the tab you are accessing)
- Add a comment to a task individually
- Add comment to tasks in a batch by selecting all or multiple tasks, or by filtering tasks by specifying search criteria and selecting all or multiple tasks in the filtered list
- View the details of an item at the list level, including:
    - Where the change request originated
    - Potential SoD violations if any
    - Attribute value or supervisor changes
    - Reason for the request by clicking on the task link
- Reassign your tasks to a different user
- Make the changes to the user account in the affected application
- Declare your tasks complete in Identity Governance

15.2 Performing Manual Fulfillment

Identity Governance sends an email notification when you have tasks in a review run based on your review definition. This section provides the steps required for you to complete Fulfiller tasks associated with a review run after receiving an email to manually fulfill a request.

For more information about your authorization and the review process, see Section 26.1, “Understanding Reviews,” on page 273.

1 In Identity Governance, select **Requests** to view the fulfillment requests.

2 (Conditional) If you have the Fulfillment Administrator authorization, access the **Fulfillment Errors** tab to view fulfillment errors. To resolve the errors:

   2a Click **Fix** to access the **Fulfillment Configuration** page.

   2b Click **Application Setup**, view the settings for the application producing errors, and adjust the settings.

   2c Go back to the **Fulfillment Requests** > **Fulfillment Errors** tab, and click **Retry** to route the item to the correct fulfiller.

   2d If it is not possible to fix the problem, click **Terminate** to remove the change request item from the **Fulfillment Errors** tab.

3 Select **Access Request**, **Business Role**, or **Catalog** tab to view change requests generated from different actions.

4 Click the fulfillment task link on **Access Request**, **Business Role**, or **Catalog** tab to expand the task description and determine the changes to be made, the reason for the change, and any potential SoD violations.

5 In the application affected by the requested change, modify the permission, user, account, or role according to the fulfillment task. This action might impact the SoD policies or uncover unmapped users.

6 Manually fulfill the change request by making the requested changes in the indicated system.

7 Return to Identity Governance and specify an outcome for individual, multiple, or all tasks.

   7a Select **Actions > Fulfilled and submit all** or **Actions > Declined and submit all** to specify an outcome for all items or

   7b Select individual task or multi-select tasks and use the **Actions** menu to specify one of the following outcomes:

   - **Fulfilled** to indicate that you completed the requested changes
   - **Declined** to indicate that you refused to complete the requested changes
   - **Reassign** to assign the fulfillment task to a different user

   NOTE: For fulfilled and declined outcomes, you can also enter comments explaining your action and submit decisions.

   7c (Conditional) To submit fulfillment decisions that were not previously submitted using the **Actions** menu, select **Submit**.

NOTE: Manual fulfillment changes to the fulfillment request do not affect the Review run. Once you specify **Fulfilled** or **Declined** as an outcome, Identity Governance updates the Request status in the Request timeline and when a Review run is complete also updates the fulfillment status of the review item on the Review page.

8 (Conditional) If you have Fulfillment Administrator authorization, you can select **Fulfillment > Status** to view the status of fulfillment requests in the Fulfillment area. For more information, see Section 14.3, “Monitoring Fulfillment Status,” on page 139.

16 Creating and Managing Technical Roles

Technical roles allow business owners to simplify the review process by grouping permissions, which provides a higher level of abstraction and reduces the number of items for business leaders to review. Technical roles allow the business to provide context for the set of items including a business-relevant title and description, risk, cost, and ownership.

To manage the Identity Governance technical roles in the catalog, you must have a Customer, Global, or Technical Roles Administrator authorization. Administrators can also assign an owner for a technical role and delegate certain tasks to the technical owner. For detailed information about the various authorizations, see Section 2.1, “Understanding Authorizations in Identity Governance,” on page 17.

After application data publication by Customer, Global, or Data administrators, you can group permissions that have common or frequent associations to create technical roles. When you have created technical roles, Identity Governance detects users with permissions that match the technical roles you have defined and lists the technical roles a user has in the user catalog. When you have defined technical roles, you can create user access review definitions for technical role reviews.

Users have a technical role either by detection, assignment or both. Having a technical role by detection means that the user was detected to have all of the permissions contained in the technical role. Having a technical role by assignment means that the user was explicitly assigned the technical role by some process in Identity Governance, such as an access request or a business role auto-grant.

Technical roles might be authorized in a business role for the members of the business role. If an authorized technical role was configured for auto-grant, Identity Governance will immediately assign the technical role to members of the business role. In addition, Identity Governance will issue requests for any permissions contained in the technical role for members of the business role. If the authorized technical role was configured for auto-revoke, and a user is removed from business role membership, Identity Governance will immediately remove the technical role assignment from the user and will request that any permissions contained in the technical role be removed from the user. For information about business roles and automatic access provisioning and deprovisioning, see Chapter 17, “Creating and Managing Business Roles,” on page 161.

- Section 16.1, “Understanding Technical Role States,” on page 152
- Section 16.2, “Understanding Technical Role Mining,” on page 152
- Section 16.3, “Understanding Technical Roles Detection and Assignments,” on page 153
- Section 16.4, “Understanding Technical Role Revocations,” on page 154
- Section 16.5, “Creating Technical Roles,” on page 154
- Section 16.6, “Activating Technical Roles,” on page 156
- Section 16.7, “Promoting Detected Roles to Assigned Roles,” on page 156
- Section 16.8, “Editing and Deleting a Technical Role,” on page 157
- Section 16.9, “Downloading and Importing Technical Roles,” on page 158

16.1 Understanding Technical Role States

Administrators can quickly search for a role by name or description in the **Catalog > Roles** page. Identity Governance performs a case-insensitive search of all of the technical roles in the catalog and returns any that contain the string in the technical role name, description, or cost. You can also use the advanced search feature to limit the number of roles. The search results also display the role states.

There are several states in the life cycle of a technical role after it is created manually or mined. From beginning to end, the technical role goes through the following states:

Technical Role State	Description
CANDIDATE	Technical role was created by role mining and must be promoted before it can be activated. This state corresponds to the internal state called MINED.
ACTIVE	Valid, meaning all included permissions are available in the catalog, and the role is included in the detection process.
NOT ACTIVE	Valid, but the role is excluded from the detection process. This state corresponds to the internal state called INACTIVE.
INVALID	Invalid and excluded from the detection process due to a detected error. Detection errors are usually the result of a deleted permission that is included in the technical role.

16.2 Understanding Technical Role Mining

Identity Governance uses advanced analytics to mine business data and identify role candidates. This process of discovering and analyzing business data to logically group permissions to simplify the review process or allow grouping of related permissions under one technical role candidate is called **technical role mining** or **role discovery**. Customer, Global or Technical Roles administrators can use role mining to create technical roles with common permissions. Identity Governance uses two approaches to technical role mining to identify technical role candidates.

- **Automatic Suggestions** approach enables administrators to direct the mining calculations by either saving the defaults, or by specifying the minimum number of permissions that a specified number of users should have in common, coverage percentage, the maximum number of role suggestions, and other role mining options, and saving the options.
- **Visual Role Mining** approach enables administrators to select role candidates from a visual representation of the distribution of users based on permissions. Administrators can click in the user access map and drag to select an area on the map, and then view technical role candidates.

Technical role candidates can also be generated when using mining to create business roles. For more information about business roles, see Chapter 17, “Creating and Managing Business Roles,” on page 161.

NOTE: Mined business or technical roles are created in a candidate state. You can edit and save role candidates, but you must promote them before you can approve or publish them as a role.

TIP: If you have a large catalog of users and technical roles, data mining performance might be very slow and eventually fail. Use the Configuration Utility console mode commands `set-property com.netiq.iac.analytics.roles.technical.MaxPermSize 10000` and `set-property com.netiq.iac.analytics.roles.technical.MaxUserSize 10000` to change the size to 10000 and improve data mining performance. For more information about the utility procedures, see "Using the Identity Governance Configuration Utility" in the *Identity Governance 3.6 Installation and Configuration Guide*.

16.3 Understanding Technical Roles Detection and Assignments

When you activate a technical role, Identity Governance detects users in the catalog that contain the permissions as members of the role. Identity Governance assigns the technical role to the users when:

- Technical Roles Administrators, Global Administrators, or Technical Role Owners promote detected roles and assign users to roles
- Users become members of a business role that is authorized to auto-grant technical role authorization
- Fulfillers or the automatic fulfillment process fulfill technical role assignment requests

NOTE: For access requests, if an effective date is set when requesting access, the user is not assigned the role until the specified date.

Users might be detected in a role without being assigned the role or they might be assigned the role without being detected in the role. Identity Governance Customer, Global, or Technical Roles Administrators can view which users are detected or assigned a role from the catalog Role page by adding **# Users with all Permissions** and **# Assigned Users** as selected columns.

Administrators and owners can also view the details of a technical role assignment in the catalog on the Identity page Roles tab. The assignment details indicate how it was assigned, such as business role, access request, or promotion, as well as when it was assigned. If a role is assigned but not detected, administrators can also see the role permissions that are not held by the user.

Deactivating a role or changing its permissions does not change role assignments. When you deactivate a technical role, Identity Governance no longer detects users as members of the role in the catalog and excludes the technical role from future detection processes. Similarly, if you change the permissions in an active technical role definition, Identity Governance goes through the detection process and updates the catalog. However, users who are assigned the technical role remain assigned independent of detection.

16.4 Understanding Technical Role Revocations

Identity Governance removes assigned technical roles when:

- Automatic fulfillment process revokes technical role assignment based on review or access request
- Users with fulfiller authorization fulfill review or access requests to revoke technical role assignment
- Users lose membership in a business role that authorizes the technical role and is configured to auto-revoke it

By default, when technical roles are removed because of any of the above conditions, Identity Governance triggers fulfillment requests to remove permissions contained in the technical role from users unless the permissions are assigned to the same user by other technical roles or Identity Governance is configured to not generate requests for permissions authorized by business roles.

Administrators can configure Identity Governance to honor business role authorizations so that fulfillment requests are not generated if the permission is authorized by business role membership by setting the `com.netiq.iac.request.honorBRoleAuthorizations` property to `true` using the Configuration Utility console mode procedures. Administrators can also control whether fulfillment requests are generated for both auto grant and non-auto grant authorizations only using the `com.netiq.iac.request.honorBRoleAutoGrantOnly` property.

16.5 Creating Technical Roles

To create technical roles you must have Customer, Global Administrator, or Technical Roles Administrator authorization and you must have collected metrics. You can create technical roles either manually or using role mining analytics. Additionally, the Business Role Administrator can generate technical roles when creating business role candidates.

When using role mining analytics, Identity Governance automatically groups permissions and presents them as role candidates. You must promote role candidates as roles before they can be activated.

When you are creating technical roles manually, an understanding of what permissions you want to assign to the technical role is helpful. You cannot activate a technical role until you have added permissions to the technical role.

To create a technical role:

1. Log in as a Customer, Global, or Technical Roles Administrator.
2. Under **Catalog**, select **Roles**.
3. Click the **Mining** tab.

If	Then
You want to use direct role mining calculations and create more than one technical roles	◆ Select **Automatic Suggestions**. ◆ Save the default options, or specify options, and save. ◆ Select one or more items from the list and click **Create Roles**. **NOTE:** Suggestions are sorted by the number of users multiplied by the number of permissions. For example, if there are five users who match the role mining options and who hold four permissions in common, they will be listed first, followed by a suggestion with four users who hold four permissions in common.
You want to use the user access map to create a role candidate	◆ Select **Visual Role Mining**. ◆ Click the map and drag to select an area. ◆ Click **View Candidate**. ◆ (Optional) Click **more** to add a description, owner, risk, cost, or category. ◆ (Optional) Click **+** to add permissions, or click **Remove** next to a permission to remove permissions. ◆ Estimate the impact. ◆ Click **Create candidate**.

4 On the **Roles** page, click the mined role.

5 (Optional) Edit the role name, description, owner, risk, cost, or category.

6 Estimate the impact by viewing the list of associated users and analyzing SoD violations if SoD policies had been previously defined.

7 (Optional) Add or remove permissions based on the estimated impact and save the changes.

When you add a permission to a role, the dialog displays all application permissions in Identity Governance. You can quickly sort or filter permissions by name, description, or application. You can also click the filter icon and use the expression builder to add additional criteria to the search and limit the displayed permissions further. You can save and reuse the filters that you have defined. For more information about filters, see Section 11.4.3, “Using Advanced Filters for Searches,” on page 112.

8 Select **Yes** to promote the role candidate.

You must promote a role candidate before you can activate and publish it as a role. Instead of individually promoting a role, you can choose to promote multiple role candidates using the **Actions** menu.

9 Alternately, on the **Roles** page, select **+** to create a role manually.

10 Provide the required information.

11 (Optional) Select **+** next to **Permissions** and select the permissions to include in the role, and then select **Add**.

12 (Conditional) If permissions have been added to the technical role, estimate impact and edit role if needed.

13 Save your settings.

14 Click the gear icon to customize column display as needed by selecting columns such as number of assigned users, number of users with all permissions, number of permissions, number of business roles, and number of SoDs.

15 (Optional) Select a role, multiple roles, or all roles and use **Actions** menu to add and remove categories, assign owners, promote or delete candidates, activate or deactivate roles, and download definitions.

16.6 Activating Technical Roles

After you have added permissions to a technical role definition, you can see an estimate of the number of users holding the permissions of the technical role, and you can activate the definition. If you do not activate the definition, Identity Governance does not identify the users that hold the permissions in the technical role.

NOTE: Mined technical roles are created in a candidate state and must be promoted before they can be activated and published. You can promote roles individually or select one or more roles and select **Actions > Promote candidates**.

To activate technical roles:

1 Log in as a Customer, Global, or Technical Roles Administrator.

2 Under **Catalog**, select **Roles**.

3 Select one or more roles from the list, then select **Actions > Activate**.

4 Alternately, you can select a role name and click **Edit**.

5 In the role definition, select **Active**.

Activating and deactivating a technical role both start a detection process and result in automatic updates in the catalog.

16.7 Promoting Detected Roles to Assigned Roles

Identity Governance detects users that hold all the permissions of a role, but it might not have assigned the role to the user. Primarily, fulfillers would assign technical roles to users based on access requests or Business Role authorizations. However, promoting detected roles to assigned roles gives administrators the ability to onboard any initial assignments.

Administrators can promote and assign technical roles to all detected users of a role who were not assigned the role. Additionally, they can choose specific detected users of a role and assign them the technical role.

To promote and assign technical roles to *all* detected users of a role:

1 Log in as a Customer, Global, or Technical Roles Administrator.

2 Under **Catalog**, select **Roles**.

3. Select one or more roles from the list, then select **Actions > Assign role to users**.
4. Add a comment and click **Promote**.

To promote and assign technical roles to *specific* detected users of a role:

1. Log in as a Customer, Global, or Technical Roles Administrator.
2. Under **Catalog**, select **Roles**.
3. Add **# Users with all Permissions** to the displayed columns.
4. Click on the number of detected users.
5. Select the users to assign.
6. Click **Assign role to users**.
7. Add a comment and click **Assign**.

16.8 Editing and Deleting a Technical Role

When you edit a technical role, you can change permissions assigned to the technical role and either leave the technical role active or disable the technical role. However, Identity Governance automatically disables a technical role definition if a permission included in the technical role is deleted from the application. The technical role remains in the disabled state until the permission is removed from the technical role definition or restored in the application and then collected and published to the catalog.

When you delete a technical role, Identity Governance deletes the technical role in the catalog. However, if the technical role was authorized by a business role, this deletion triggers additional evaluation and consequent actions. When you add or remove permissions from a technical role that is authorized by a business role, the changes may cause business role authorizations to be gained or lost, which may trigger evaluation and consequent actions. For more information, see Section 17.11, “Automated Access Provisioning and Deprovisioning,” on page 179.

To edit or delete a technical role:

1. Log in as a Customer, Global, or Technical Roles Administrator.
2. Under **Catalog**, select **Roles**.
3. (Optional) Click the gear icon to select additional columns such number of SoDs, number of business roles, and number of users with all permissions.
4. Select the role you want to edit or delete.

   Selecting the role displays a quick overview of the role definition including the name, description, owner, risk, state, and selected permissions.
5. Select **Edit** at the end of the details panel to edit the technical role.
6. (Conditional) Select **Delete** to delete the technical role.

   You must edit the technical role to delete the technical role.

NOTE: When you delete technical roles, Identity Governance removes the role assignments and detections from the users but does not change the permissions held by the users.

16.9 Downloading and Importing Technical Roles

You can download technical roles and import them later into an Identity Governance environment. The download will either generate a single JSON file or a zip file depending on the options you select during download, such as associated applications and assigned categories. In addition to downloading the role definitions, you can download the list of roles as a CSV file.

To download or import technical roles:

1. Log in as a Customer, Global, or Technical Roles Administrator.
2. Under **Catalog**, select **Roles**.
3. To download a list of technical roles with name, description, and state as a CSV file, select **Actions > Download all as CSV** on the **Roles** tab.
4. To download one or more role definitions:

   4a Select one or more policies from the list, then click **Actions** > **Download Definitions**.

   4b Type the role name or a meaningful description.

   4c (Optional) Include references to technical role owners and download associated applications and assigned categories.

   4d Select **Download**.
5. Select the download icon on the top title bar to access the saved files and download the files.
6. (Optional) Delete the downloaded files from the download area in Identity Governance.

   If you do not manually delete files, Identity Governance will automatically delete them based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.
7. If you make changes, or want to import previously downloaded technical roles into another environment, select **Import Technical Roles** on the **Roles** tab.
8. Navigate to the technical roles JSON or zip file, select the file to import, then click **Open**.

   Identity Governance detects whether you are importing new or updated roles and whether the updates would create any conflicts or have unresolved references.

   Identity Governance adds an indicator to technical roles that cannot be resolved because a match for a referenced object was not found in the system. Importing before the roles are resolved will result in incomplete roles with some missing permissions. If an indicator appears next to a role in the import view, inspect these roles and ensure that they map properly in the target system.
9. Select how to continue based on what information is displayed.

   NOTE: After importing roles, you must activate them for Identity Governance to recognize the users that hold the permissions as members of a technical role. For more information, see Section 16.6, “Activating Technical Roles,” on page 156.
10. (Conditional) If you import more than the preconfigured threshold for the number of roles that can be displayed on the import page, Identity Governance will switch to bulk import mode. When in bulk mode, instead of selecting whether to create, update or handle conflicts for specific roles, you can select to import all new roles and update all existing roles. For conflicts, you can choose to either overwrite existing roles or create new roles.

NOTE: The default value for roles that can be displayed is 200 or the value specified in `com.netiq.iac.importExport.maxImportsToDisplay` property.

11 (Optional) Download the auto-generated import report from the download area. The import report will identify what was imported as well as call out any unresolved references.

17 Creating and Managing Business Roles

Business roles are roles whose users have common access requirements within your organization. The set of users is defined by the membership policy of each role.

- Section 17.1, “Overview of Roles,” on page 161
- Section 17.2, “Understanding Business Roles,” on page 163
- Section 17.3, “Defining Business Roles,” on page 167
- Section 17.4, “Authorizing User Access Through Business Roles,” on page 173
- Section 17.5, “Adding Authorizations to a Business Role,” on page 174
- Section 17.6, “Adding a Business Role Approval Policy,” on page 175
- Section 17.7, “Publishing or Deactivating Business Roles,” on page 176
- Section 17.8, “Analyzing Business Roles,” on page 177
- Section 17.9, “Editing Business Roles,” on page 178
- Section 17.10, “Approving Business Roles,” on page 179
- Section 17.11, “Automated Access Provisioning and Deprovisioning,” on page 179
- Section 17.12, “Downloading and Importing Business Roles and Approval Policies,” on page 191

17.1 Overview of Roles

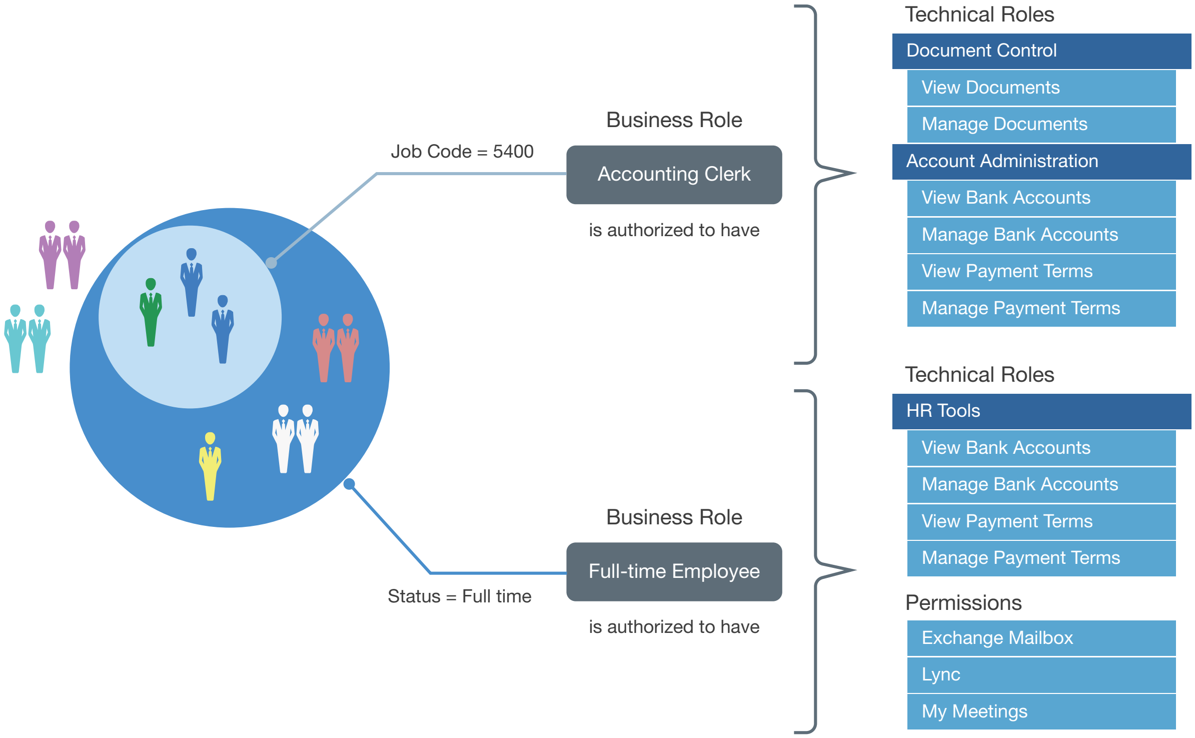
Identity Governance enables you to manage both the technical and business roles in your organization. To enable easier management of these roles, Identity Governance assigns technical role administrators and business role administrators with separate but overlapping responsibilities.

Business roles organize people by their business function and user-based attributes to solve questions of what users should have access to because of who they are or what they need or might have an option to request without additional approval. Business roles authorize **resources** (permissions, technical roles, and applications) for users who are members of the business role. These authorizations also specify whether resources are to be auto-granted to users, auto-revoked from users, or should not be auto-granted and auto-revoked.

Technical roles organize lower-level permissions into sets of permissions that offer enough business value to be reviewed and assigned as a unit or requested as a unit. Technical roles are designed to limit the number of review items and surface permissions in ways that can be presented to typical non-administrator users.

Figure 17-1 contains an example of how the different types of roles overlap. The company’s policies authorize all full-time employees to have access to the HR Tools, Exchange Mailboxes, Lync, and My Meeting. Accounting clerks are authorized to have access to Document Control and Account Administration, a technical role that the technical role administrator created in Identity Governance. When you include a user as a member of a business role of Full-time Employee and Accounting Clerk, Identity Governance authorizes the user to have any of the mandatory or optional technical roles or permissions listed for the given role. Identity Governance could potentially automatically provision mandatory permissions, while it could assign optional permissions at a later time without further approval as they have been pre-approved by the policy. This saves you time, effort, and error and enables controlled access through business roles. To understand how your entitlement assignments conform to your business policies, you can view the **Role Leverage** widget on the **Overview** page. For more information, see "Viewing Entitlement Assignments Statistics to Leverage Roles" on page 292.

Figure 17-1 *Detailed Example of the Overlap between Business Roles and Technical Roles*

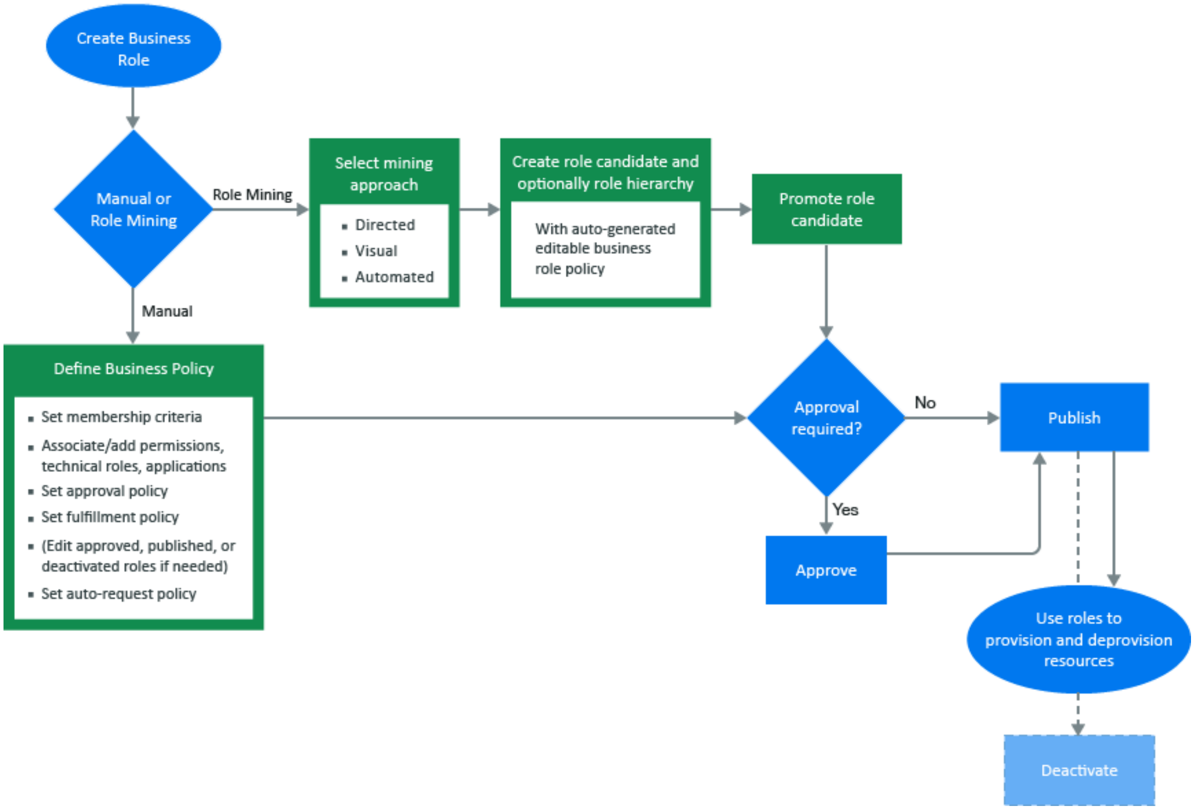


NOTE: This chapter primarily discusses business role policy concepts and procedures. For information about technical roles, see Chapter 16, "Creating and Managing Technical Roles," on page 151.

17.2 Understanding Business Roles

The workflow shows the business role process in Identity Governance.

Figure 17-2 *Business Role Workflow*



The primary purpose of business roles is to specify a set of applications, roles, and permissions that each member of a business role is authorized to access. The set of authorized resources is defined by each business role's authorization policy. A business role authorizes resources and generates requests, but does not assign resources.

- Section 17.2.1, "Understanding Business Role Access Authorizations," on page 163
- Section 17.2.2, "Understanding Business Role Mining," on page 164
- Section 17.2.3, "Understanding Role Hierarchy with Role Mining," on page 165
- Section 17.2.4, "Understanding Business Role States," on page 166

17.2.1 Understanding Business Role Access Authorizations

The Customer, Global, or Business Roles Administrator creates, modifies, and defines business roles and manages business role policies. They can delegate administrative actions by specifying a Role Owner or a Role Manager for each business role. Role Owners can view and approve business roles but cannot edit business roles. Role Managers can edit business role membership and resource authorizations, submit business roles for approval, promote role candidates, publish roles, and deactivate roles. If the administrator did not specify Role Owners in the business role definition, Identity Governance automatically assigns the administrator who created the role as the Role Owner. For more information about access authorizations, see Section 2.1, “Understanding Authorizations in Identity Governance,” on page 17.

17.2.2 Understanding Business Role Mining

Identity Governance uses advanced analytics to mine business data and identify role candidates. This process of discovering and analyzing business data in order to group multiple users and access rights under one business role candidate is called **business role mining**. Customer, Global, or Business Roles administrators can use role mining to reduce complexity in defining roles, and easily select role candidates with authorized users, permissions, technical roles, and applications to create business roles as well as technical roles with common permissions. Identity Governance uses three approaches to business role mining to identify business role candidates.

- **Directed Role Mining** enables administrators to direct the mining based on user attributes they specify when they select this approach. If administrators are not sure which attribute to select, they can search for recommended attributes, and select an attribute from the recommended bar graph which displays the strength of attributes that have data. Additionally, directed role mining enables them to specify a minimum membership and coverage percentage to identify role candidates. For example, when an administrator selects “Department” as the attribute to group candidates by, the mining results display the list of items consisting of department name with the associated users, permissions, roles, and applications as role candidates.
- **Automated Role Mining** enables administrators to enhance business role mining in larger environments by specifying a minimum number of attributes, a minimum number of occurrences, and the maximum number of results. In addition, administrators can specify a coverage percentage to identify role candidates. In this approach, Identity Governance uses the attributes specified in the role mining settings in **Configuration > Analytics and Role Mining Settings** to calculate role candidates.

  NOTE: We recommend that you use this option if you have a large and complex catalog such as a catalog with a greater number of variations in extended attributes, with multiple values of attributes, and a catalog size that slows role mining performance.

- **Visual Role Mining** enables administrators to select role candidates from a visual representation of the user attributes. The attribute circle’s width displays the strength of the recommendation, and the width and darkness of the lines indicate the affinity of the attribute to other user attributes. Administrators can customize the mining results by modifying the default maximum number of results, a minimum potential members, and the number of automatic recommendations. In this approach, Identity Governance uses the attributes specified in the role mining settings in **Configuration > Analytics and Role Mining Settings** to calculate role candidates.

  NOTE: Variations in the number of extended attributes, attributes with multiple values, or overall catalog size may affect the performance of visual role mining. You might see invalid results when mining larger or more complex data. You can disable this option by setting the `com.netiq.iac.analytics.role.mining.visual.hide` global configuration property to `true`. To optimize performance and to avoid invalid results, use the automated role mining option to mine for roles.

NOTE: Role recommendations are dependent on your data and role mining settings. To optimize search results, administrators can modify default role mining settings in **Configuration > Analytics and Role Mining Settings**. For more information see, "Configuring Analytics and Role Mining Settings" on page 285.

After previewing users and their associated permissions, technical roles, and applications, administrators can select one or more items from the list to create either role candidates for each selected item in the list or a single candidate for all of them. Additionally, Identity Governance could group common permissions under a technical role, and generate a technical role candidate for each application.

NOTE: Identity Governance creates the mined business or technical roles in a candidate state. Administrators can edit and save role candidates, but they must promote candidates before they can approve or publish them as roles. Administrators can also select multiple role candidates and submit them for approval, publish them, or delete them using the **Actions** options.

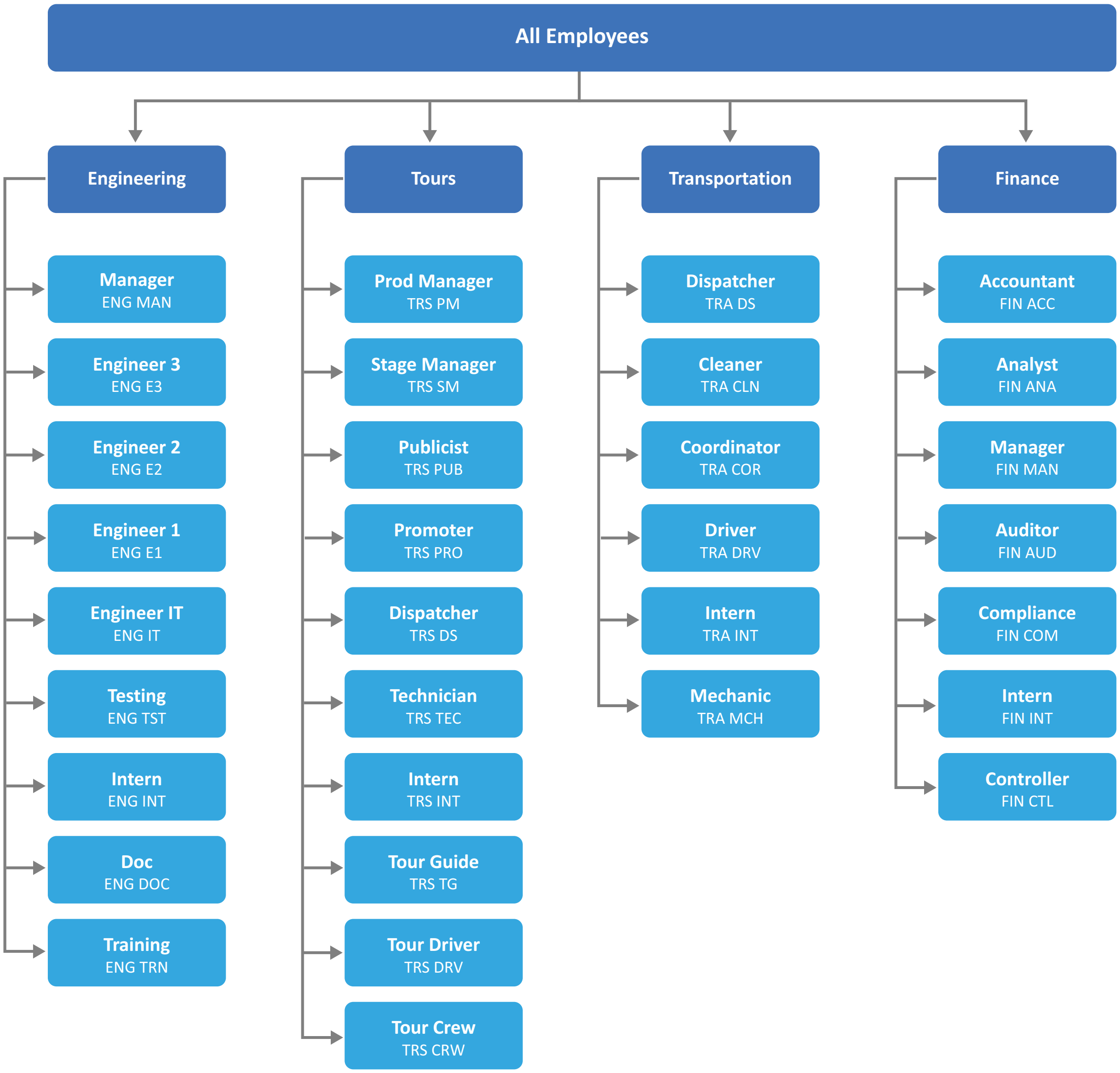
17.2.3 Understanding Role Hierarchy with Role Mining

Business Role mining in Identity Governance creates business roles for each selected candidate, but cannot group the created roles. Role hierarchy allows you to create a hierarchy of roles, based on the mining attributes, that allow you to assign resources either at the candidate level, or by grouping the candidates at a higher level.

NOTE: Role hierarchy is not available for Visual Role Mining.

When you select **Create business role hierarchy**, you can select the attributes used in the role mining as grouping attributes for the role hierarchy. For example, Figure 17-3 on page 166 illustrates a company organization chart in which each department includes job codes that represent positions. The company wants to create departmental Business Roles for Engineering, Tours, Transportation and Finance, as well as roles for each job code. Furthermore, they want an "All Department" role that includes the Engineering Department and all the other top-level departments. Selecting the department attribute as the role hierarchy grouping attribute would create business roles that mirror the organizational chart.

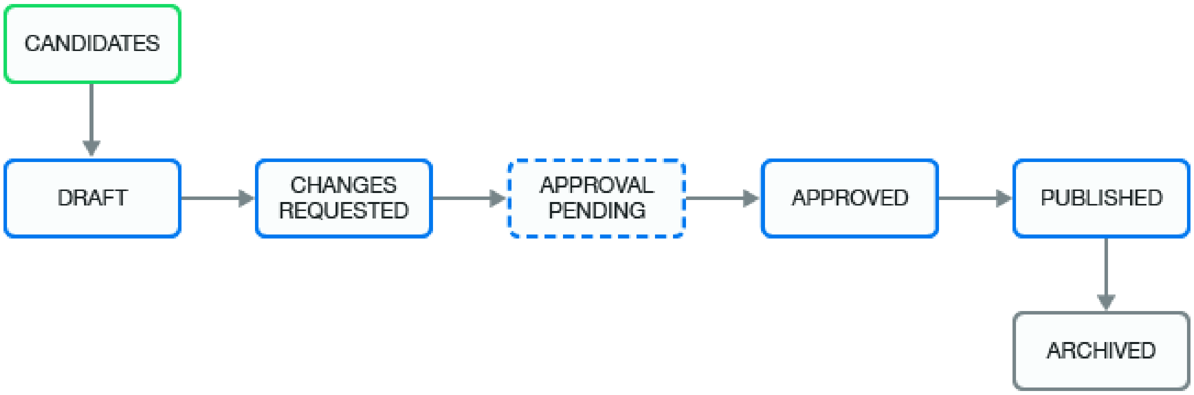
Figure 17-3 Company Organization with Department and Job Codes



17.2.4 Understanding Business Role States

After you create, or after Identity Governance mines a business role, the role contains many states during its life cycle. From beginning to end, the business role goes through the states in Figure 17-4 on page 167. For a detailed description of the states see the following table.

Figure 17-4 Business Role States



Business Role State	Description
CANDIDATES	The mining process created the business role and the administrators must promote it before they or others can approve (depending on the approval policy) and publish it. This state corresponds to the internal state called MINED.
DRAFT	The assigned approval policy requires approval and the administrator has not submitted the changes for approval.
CHANGES REQUESTED	The approver denies approval of a business role. This state corresponds to the internal state called REJECTED.
APPROVAL PENDING	Pending changes are ready for approval by the approver specified in the approval policy. This state corresponds to the internal state called PENDING_APPROVAL.
APPROVED	The approver approved the business role, but the business role has not yet been published.
PUBLISHED	The business role is approved and the administrator has published the role.
ARCHIVED	An administrator deletes the policy or creates a new version. Identity Governance archives the policy for history and reporting purposes. Identity Governance never displays archived business roles in the application.

17.3 Defining Business Roles

To use business roles, you must create a business role and define a membership policy and an authorization policy for the business role based on your business needs. You can create a business role either manually or use role mining analytics.

To define a business role:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Under **Policy**, select **Business Roles**.
3. Select the **Mining** tab if you want the system to recommend role candidates, and based on your selection auto-create membership expressions and authorize associated permissions, technical roles, and applications.

   NOTE: If you are confident about your data and want to define a membership expression manually, select **+** on the **Business Roles** page to create a new business role and then proceed to Step 12.

If	Then
You are not sure about where to start, have a small catalog, and want Identity Governance to mine for roles based on attributes specified in the role mining settings in **Configuration > Analytics and Role Mining Settings** and automatically suggest role candidates.	◆ Select **Visual Role Mining**. ◆ Modify the maximum number of results to display for recommended attributes and the required minimum number of members for each role candidate. ◆ Save the specified values to trigger the user catalog analysis. ◆ (Optionally) Click the gear icon to change the specified values to optimize results and save the values. ◆ Click an attribute node (circle) to select a role candidate. **WARNING:** You might not see any recommendations if the **Settings > Minimum potential members** value is set too high or when the role mining settings in **Configuration > Analytics and Role Mining Settings** do not meet the required conditions. For more information, see "Configuring Analytics and Role Mining Settings" on page 285. ◆ Select the **Mining Results** tab.

If	Then
You do not know where to start, have large and complex data to mine, want Identity Governance to mine the data based on the attributes specified in the role mining settings in **Configuration > Analytics and Role Mining Settings**, and want to include minimum occurrences of attributes as mining criteria without specifying any user attributes.	◆ Select **Automated Role Mining**. ◆ Modify the minimum number of attributes, minimum number of occurrences, and maximum results. ◆ Modify the coverage criteria. **NOTE:** Identity Governance uses the permission, technical role, and application coverage fields to determine which authorizations are auto-populated in the business role candidate. For example, if permission coverage is at 50% then 50% of the members must hold a permission for Identity Governance to add it as an authorization in the candidate. If it is 100%, then all members must hold the permission for Identity Governance to add it as an authorization. ◆ Save the specified values to trigger the user catalog analysis. ◆ (Optionally) Click the gear icon to change values to optimize results and save the values to refresh the candidate suggestions.
You want to direct the mining by specifying user attributes from the catalog. **NOTE:** When using this role mining option, you are not constrained to use only the attributes included in the role mining settings in **Configuration > Analytics and Role Mining Settings**.	◆ Select **Directed Role Mining**. ◆ Specify the user attributes by entering the user attribute names or by searching and selecting the attributes based on the strength of the recommendation. ◆ Specify a minimum number of times the attribute value must occur across users or the percentage of all users who must have the attribute value. ◆ Specify additional coverage criteria. ◆ Save the specified values to trigger the user catalog analysis. ◆ (Optional) Click the gear icon to adjust the values to optimize results, and save the values to refresh the candidate suggestions.

4. Select one or more items from the **Role Candidates** list.
5. Click **Create Candidates**.
6. Select **Create separate candidates for each criteria** or **Create a single business role candidate**. If you select the latter, specify a name for the business role.
7. (Optional) Select **Create associated technical roles for common permissions** to generate the technical roles with users who have the same permissions.
8. (Optional) Select **Group permissions added to technical roles by application** to create application-specific technical roles.

9 (Optional) Select **Create business role hierarchy**, and then select the attributes by which to group values for each available level, to create role hierarchy when mining business roles.

NOTE: The number of available levels is one less than the number of attributes you selected in **Role Mining Options**. For example, if you selected three attributes, you would be able to group the roles for up to two levels.

10 On the **Role** tab, click the newly generated inactive role to view the role description.

11 Click **Edit**.

NOTE: Identity Governance creates the role candidate in a pending state and administrators must promote it before anyone can approve the role candidate or publish it as a role. Ensure that the membership criteria and authorizations are as you want them to be before publishing.

12 Select **Yes** to promote the role candidate.

13 Specify the following information to create the business role:

Name and Description

Modify the auto-generated name to a unique name and edit the description for the business role.

Grace period

Specify a grace period. A grace period specifies the number of days that you want Identity Governance to consider the user as a member of the role when it detects that the member no longer meets the membership policy requirements.

Risk

Specify the importance of the business role in terms of limited access and security.

For example, you might want to review access to business roles with a **high** risk more often than business roles with a **mild** risk.

Included Membership

Optionally, specify business roles whose membership criteria, users, and groups you want to include in the new business role. When combining the included roles, Identity Governance includes only published roles membership and eliminates duplicates. For example, you can include BR1 and BR2 in the membership of BR3. Then, role BR3 becomes the union of BR1 and BR2 along with any membership criteria specified for BR3.

NOTE: Excluded members of the including role take precedence over inclusion of included business role members. For example, when BR3 includes BR1, and BR1 has a member User A, and BR3 excludes User A then Identity Governance also excludes the user.

Also, note that Identity Governance does not allow circular inclusions. For example, you:

- Cannot include BR1 in BR1 (self inclusion)
- Cannot include BR2 in BR1 then include BR1 in BR2
- Cannot include BR2 in BR1 and BR3 in BR2 and then include BR1 in BR3

Membership expressions

Membership expressions are criteria that specify a set of users that are considered members of the business role. Identity Governance converts your specified criteria to create SQL SELECT statements to find the users that match the criteria. When you use the role mining feature, Identity Governance provides recommendations for role candidates based on your data and auto-generates the membership expressions when you create a role candidate. To optimize specific SELECT statements, follow query optimization principles such as creating indexes for attributes you are going to query on. To optimize specific SELECT statements that might not be performing as expected, contact your database administrator. To set effective dates for authorizations, click the calendar icon at the top of the membership expression menu section.

TIP: When adding date attributes such as start date to membership expression, you can specify a date using the calendar date picker or use the date formula. For example, if you want to automatically make new employees a member of a business roles two days before their start date, use the date formula.

Include and Exclude Users and Groups

Optionally, define specific users and groups that you want to include in the business role that might not match any membership expression. You can also specify users and groups to exclude from the business role who would otherwise match membership expressions. For example, you can have a membership expression that matches all managers in engineering, but you do not want John Smith or managers in the CTO group even if they match that criteria. You can also define a time period for when these inclusions or exclusions are valid.

NOTE: Excluding a user or group takes precedence over including them. For example, suppose you include the Sales group and exclude the Contractors group. Then, Identity Governance would exclude a user who belongs to both of those groups because exclusion takes precedence over inclusion.

14 Select the **Authorizations** tab, then define the following:

Permissions

Identity Governance might preauthorize permissions when you mine for roles or you might need to define them. Select permissions from the entire catalog or from a list of permissions held by the business role members. Specify whether the permission is mandatory or optional. Specify whether Identity Governance should automatically grant or revoke permissions. If needed, select the calendar control to set an authorization period for when Identity Governance authorizes these permissions for users in the business role.

If an authorized permission comes from an Identity Manager application and is an Identity Manager role (parent) that contains other Identity Manager roles and Identity Manager resources (children), there will be an option to also authorize the contained permissions (the default is to *not* authorize contained permissions). You can view the hierarchy of contained permissions by clicking **show**.

NOTE: If you specify auto-grant or auto-revoke on this kind of permission, the selected option does *not* apply to any of the contained permissions. This is because if you grant or revoke a permission that is an Identity Manager role that contains other contained Identity Manager roles and Identity Manager resources, the Identity Manager system automatically grants or revokes any contained Identity Manager roles and resources.

Technical Role

Identity Governance might preauthorize technical roles when you mine for roles or you might need to define them. The technical role acts as a grouping for the permissions. If all of the appropriate permissions are included in a technical role, you can add the technical role instead of the individual permissions. If needed, select technical roles from the entire catalog or from a list of technical roles held by the business role members. Determine whether the technical role is mandatory or optional. Specify whether Identity Governance should automatically grant or revoke the technical role authorization. If needed, select the calendar control to set an authorization period for when the permissions in the technical role are valid for the business role.

Permissions contained in a technical role might come from an Identity Manager application and might be an Identity Manager role that contains other Identity Manager roles and Identity Manager resources. For this reason, technical roles have two options for authorizing contained permissions. You can opt to only authorize the permissions that are explicitly specified in the technical role, or you can opt to authorize the permissions contained in the technical role and any permissions that are contained in those permissions. The second option applies only to permissions that are Identity Manager roles that contain other Identity Manager roles or Identity Manager resources. You can view the hierarchy of all contained permissions that Identity Governance authorizes by clicking **show**.

NOTE: If you specify auto-grant or auto-revoke on a technical role, the selected option applies only to the permissions explicitly specified in the technical role. It does *not* apply to any of the permissions that those permissions might contain.

Applications

Identity Governance might preauthorize applications when you mine for roles or you might need to define them. If needed, define which applications the members of the business role are authorized to hold. This means Identity Governance can create accounts for the members of the business role in the listed applications. Select applications from the entire catalog or from a list of applications held by the business role members. Specify whether Identity Governance should or should not automatically grant or revoke the application authorization. If needed, select the calendar control to set an authorization period for when the members of the business role have access to the application.

NOTE: Applications must have an account collector to allow you to specify automatic grant or revoke.

For more information about authorizing permissions, technical roles, and applications, see Section 17.5, "Adding Authorizations to a Business Role," on page 174.

15 Select the **Owners and Administration** tab to assign the following:

- Role owner
- Role manager
- Fulfiller
- Categories
- Approval Policy

If you do not make selections on this tab, Identity Governance makes default assignments for the owner and fulfiller and assigns a default approval policy to the business role.

16 (Optional) On the **Membership** tab, select **View Membership** to view the list of business role members.

NOTE: During migration or upgrades, you must always run publication to refresh the list of business role members. For more information about publishing data sources, see Chapter 8, “Publishing the Collected Data,” on page 89.

---

17 Under **What-if Scenarios**, select **Estimate Publish Impact** and **Analyze SoD Violations** to respectively view types of changes and SoD violations information.

18 (Conditional) Resolve SoD violations or edit the business role definition to resolve any issues. For more information about SoD violations, see “Approving and Resolving an SoD Violation” on page 204.

19 Select **Save** to save your modifications to the mined business role definition.

NOTE: When editing an existing business role, the **Owners and Administration** tab has a separate **Save** button, which allows you to change these items independent of other items pertaining to the business role.

After you have created the business role and assigned owners and administrators, the business role is ready for approval or is ready to be published depending on your approval policy. The approval policy allows you to have people review the business role and approve or request changes to the business role. For more information, see Section 17.6, “Adding a Business Role Approval Policy,” on page 175.

To detect users that meet the business role criteria in reviews or in the catalog, you must publish the business role. For more information, see Section 17.7, “Publishing or Deactivating Business Roles,” on page 176.

17.4 Authorizing User Access Through Business Roles

Membership policy determines which users are members of a business role. Membership policy can include membership expressions, membership policy from other business roles, user or group inclusion lists, and user or group exclusion lists. Regardless of how users become members of a role (matching a membership expression, explicitly included, and so forth), they are authorized to have the resources specified in the business role for as long as they are members of the business role.

NOTE: Business role authorization of a resource (permission, technical role, or application) for a user is independent of assigning the resource to the user. For example, the business role might authorize a user to have a permission, but Identity Governance might not have assigned the permission. Similarly, Identity Governance might have assigned a permission, but the business role might not authorize the permission.

17.5 Adding Authorizations to a Business Role

A **business role authorization policy** defines the permissions, technical roles, and applications authorized by the business role. Users are not automatically assigned the permissions of a business role, nor are business role permissions removed if users no longer meet the criteria for a business role. The business role authorization policy defines only whether the user is authorized the access but does not assign the resource.

A business role can authorize technical roles. That means that the business role authorizes all business role users and groups for all of the permissions included in each technical role. For more information, see Chapter 16, “Creating and Managing Technical Roles,” on page 151.

You add an authorization policy to the business role on the **Authorizations** tab when you create or edit the business role.

There are many different components to an authorization policy. The following information explains the different components.

Authorized Permissions

The authorization policy can authorize a user in the business role for all of the permissions included in the authorization policy. If an authorized permission comes from an Identity Manager application and is an Identity Manager role (parent) that contains other Identity Manager roles and Identity Manager resources (children), the authorization policy can authorize the user for the permission that the Identity Manager role contains.

Authorized Technical Roles

The authorization policy can authorize a user in the business role for technical roles included in the authorization policy. If an authorized technical role comes from an Identity Manager application and is an Identity Manager role that contains other Identity Manager roles and Identity Manager resources, the authorization policy can authorize the member of the business role for both the explicitly specified and contained permissions (direct permissions) and permissions contained within the contained permissions (indirect permissions).

Authorized Applications

The authorization policy can authorize a user in the business role to have accounts in the applications included in the authorization policy.

Mandatory versus Optional

When an authorization policy specifies **Mandatory** on a permission, technical role, or application, it means that a user is expected to have it if the user is a member of the business role. However, there is no enforcement of having the mandatory item. **Optional** means the authorization policy allows a user to have a resource, but the authorization policy does not require it.

Automatic Grant or Revoke Settings

You can select whether to automatically grant or revoke each permission, technical role, and application. Applications must have an account collector to allow you to specify automatic grant or revoke. When the authorization policy applies the auto-grant or the auto-revoke policies in the business roles, Identity Governance might issue grant requests if the user does not have a resource, and revoke requests if the user has a resource. Under certain conditions, Identity Governance might issue grant requests even if a user has a resource, and revoke requests even if a user does not have a resource.

If you specify auto request on a technical role, the auto request applies only to the permissions explicitly specified in the technical role. It does *not* apply to any of the permissions that those permissions might contain. For example, for Identity Manager roles that contain children permissions, Identity Governance issues auto requests only for the top-level role and then Identity Manager rules apply for all children authorizations. For more information, see Section 17.11, "Automated Access Provisioning and Deprovisioning," on page 179.

Authorization Period

The authorization policy can authorize a user in the business role for a set period of time defined in the authorization policy. Typically, you might need to set the authorization period only during transitions like mergers or changes related to compliance. Avoid setting an authorization period for business roles to change a specific role authorization, as you handle it more efficiently using periodic business role membership reviews.

17.6 Adding a Business Role Approval Policy

The approval policy for the business role governs all business role life cycle events. Identity Governance contains a default approval policy that it assigns to each business role that you create.

The approval policy for the business role specifies all approval requirements for each business role defined, including whether the business role requires approval when you create or modify that business role.

Micro Focus recommends that your organization's default policy require approval. A default policy that does not require approval enables Identity Governance to approve roles automatically. When your policy requires approval, you can submit each role for approval or select multiple draft roles and then select **Actions > Submit for Approval** to submit multiple roles for approval.

Identity Governance applies the default approval policy, which specifies that business roles do not require approval, to all business roles that you create. To change this you would have to change the default approval policy to require approval by owners or specify a list of approvers.

Identity Governance provides two additional policies for your convenience. One policy requires approval by the business owner (recommended) and the other policy does not require approval. A Customer, Global, or Business role Administrator can change or delete these sample policies.

You can create additional approval policies and apply them to existing business roles after you have created business roles. To change the default approval policy, select **Default approval policy** on the **Approval Policies** tab.

To create a new approval policy:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Under **Policy**, select **Business Roles**.
3. Click the **Approval Policies** tab.
4. Select **Add approval policy** (**+**).

5. Specify a name and description for the approval policy, then determine whether it is required or not.
6. Save the policy.

You can change the approval policy for a group of business roles at the same time by using the bulk action on the business role list. You can also download business role approval policies as JSON files using the bulk action menu. After editing, you can import the policies on the page that lists all approval policies.

17.7 Publishing or Deactivating Business Roles

Two possible versions of a business role can exist:

- **Published:** Before you can publish a business role, it must go through the approval process and be approved, if it requires approval. A published business role is available for the governance process and in the general catalog.
- **Deactivated:** You can edit published, approved, and deactivated roles. When you edit a published business role, Identity Governance creates a draft of the business role that appears on the **Draft** tab that you can send for approval if required, publish, or discard. However, deactivated roles are not available for the governance process or in the general catalog.

The edit and approve cycle is a single cycle that is independent of the publication cycle. When you edit the published business role, Identity Governance creates a draft version of the business role.

The approval cycle is not independent of the draft. If no approval is required, Identity Governance automatically approves the draft but does not publish the draft. If an administrator publishes the draft, it replaces the currently published version.

When the business role administrator deactivates a published role, Identity Governance takes one of the following actions:

1. If there is an approved draft, Identity Governance archives the active version and the approved draft replaces it.
2. If there is not an approved draft when the published role is deactivated, Identity Governance prompts the administrator to keep the published version or the unapproved draft version of the business role.
3. If there is no draft, Identity Governance moves the published business role to the approved state.

To publish or deactivate a business role:

1. Log in to Identity Governance as a Customer, Global, Business Role Administrator.
2. Under **Policy**, select **Business Roles**.
3. Select the business role to change, then select **Edit**.
4. If you have one version of the business role, select **Publish** or **Deactivate** the business role.

NOTE: Deactivating a business role disables the role from being a part of the review process and removes resource authorizations from its members for its resources. However, deactivation does not issue auto-revoke requests for resources that specify auto-revoke, and does not change or retract any current or pending auto-grant or auto-revoke request.

or

If you have multiple versions of the business role, select the **Draft** or **Published** tab, then select **Publish** or **Deactivate**.

NOTE: You must have two versions of the business role to have the **Draft** and **Publish** tabs appear.

If you have many business roles that need to be published, Identity Governance provides a way to publish all of the roles at the same time. On the Business Roles page, select the business roles to publish, then select **Actions** > **Publish**.

17.8 Analyzing Business Roles

Identity Governance allows you to improve role quality and effectiveness by providing you with various analytical tools. To maintain an effective role model, it is important that organizations are able to understand the quality of the roles that have been implemented. For example, you might create a business role that has all or almost all of the members as another business role. This might indicate that these roles are redundant and are not actually needed. Using role analysis, you can analyze selected business roles, all business roles, or membership expression of existing roles to find:

- Similarity in memberships and authorizations
- Effectiveness of the selected business roles based on the percentage of users that hold the role authorizations
- Members and authorizations in common
- Members without mandatory authorizations
- Members without auto-grant authorizations

To analyze business roles:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Under **Policy**, select **Business Roles**.
3. Click **Analysis** tab.
4. Select an **Analyze** option and configure related parameters. For example, when selecting the similarity analysis, you can modify the default similarity threshold. If you specify 60%, the results display business roles that have 60% similarity with any authorization or membership.

NOTE: You can perform **Business role similarity** and **Common authorizations** analysis on published or unpublished business roles, while you can perform **Authorization effectiveness**, **Mandatory authorizations**, and **Auto-grant authorization** analysis only on published business roles. If there are unpublished business roles in the list selected for **Authorization effectiveness**, **Mandatory authorization**, and **Auto-grant authorization** analysis, Identity Governance highlights them and skips them during analysis.

5 Select **Start Analysis**.

6 Click the links in the analysis results for additional information such as comparison tables of memberships and authorizations in **Business role similarity** analysis, and lists of members in **Mandatory authorization**.

7 (Optional) Select **Download as CSV** to download the results as a `.csv` file for further analysis.

17.9 Editing Business Roles

Identity Governance allows you to edit business roles. If you edit a business role that has been approved, it is changed to a draft when you save your edits and then it must be re-approved. To edit a published business role, a new draft copy is made for editing so that the published role continues to be used in governance processes until the new draft is approved and published. You can also download business roles as JSON files using the bulk action menu. After editing, you can import the roles on the page that lists all business roles.

To edit a business role:

1 Log in to Identity Governance as a Business Role or Global Administrator.

2 Under **Policy**, select **Business Roles**.

3 Select the business role you want to edit, then select **Edit**.

4 (Optional) If the business role is published, on the top of the page, select **Edit**.

NOTE: We recommend that you think through business role definitions and add all members and authorizations before publishing. If you need to make changes after publishing, keep in mind that business role detections compare your last published state with the current state and automatically generate grants and revocations if auto-grants and auto-revoke settings are enabled. Also, note that a business role's membership policy can include members from other published business roles, however, circular inclusions are not allowed.

Identity Governance creates a draft of the business role for you to edit on the **Draft** tab.

5 Make the appropriate changes to the business role.

You can change the name, description, grace period, risk level, memberships, authorizations, owners, and administrators of the business role.

6 Select **Save** to save the draft.

7 (Conditional) Select **Compare with published** to compare the draft version with the published version of the business role to ensure that the changes are correct.

8 (Conditional) If the business role approval policy requires approval, when the draft is ready for approval, select **Submit for approval**. If the business role approval policy does not require approval, the draft is automatically approved whenever you save your edits.

9 After you approve a draft, select **Publish** to publish it.

When deleting a business role that has been published, Identity Governance archives the business role for reporting and auditing purposes.

17.10 Approving Business Roles

Identity Governance provides an approval process for users, groups, or business role owners to approve the business roles they have been assigned to approve. The business role owners can approve the business role if the role's approval policy specifies **Business role owners**. However, you can also specify a list of users or members of a group to be approvers of the business role.

To approve a business role that is pending:

1. Log in to Identity Governance as a user assigned to approve the business role.
2. Under **Policy**, select **Business Roles**.
3. Select the **Pending Your Approval** tab.
4. Select any of the pending approvals, then read and review the content of the business role.
5. Specify a comment in the **Comment** field as to whether you approve the business role or if you want changes to the business role.
6. Select **Approve** to approve the role.

   or

   Select **Request changes** if you want the business role to be modified.

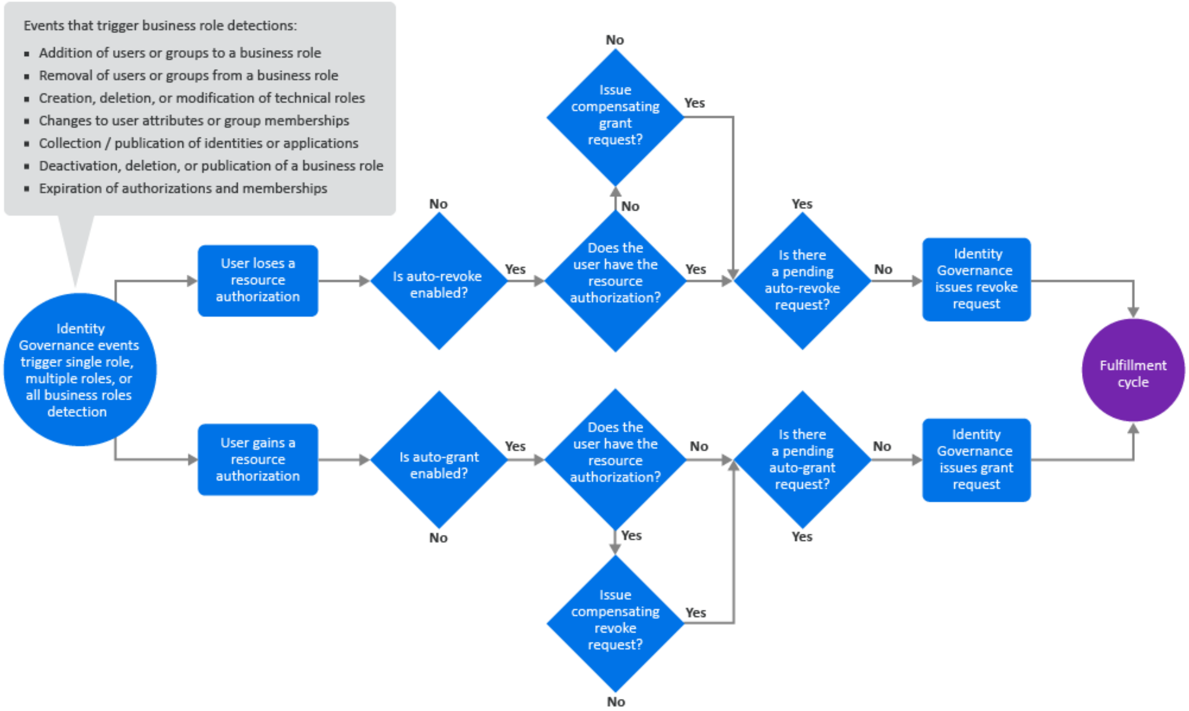
   When you select the **Request changes** option, the creator of the business role receives notification of the change request. After you or an administrator modify the business role, the approval workflow process starts again.

17.11 Automated Access Provisioning and Deprovisioning

You can set up business roles to automatically request provisioning and deprovisioning of authorized resources for users in the business role by selecting the auto-grant or the auto-revoke setting for each resource. Identity Governance performs business role detections and evaluates business role membership changes to determine whether to issue the auto requests. During business role detection, Identity Governance only evaluates whether auto requests should be issued. After all business role detections including checking for pending requests, Identity Governance determines if the auto requests including compensating requests should be issued. Identity Governance then sends permission or application resource requests to the fulfillment system where the fulfillment system handles them according to the rules specified in your system fulfillment configuration.

NOTE: During detection, Identity Governance monitors when a user gains or loses an authorization, or when an authorization changes its auto-grant or auto-revoke policy. When Identity Governance observes these kinds of changes, it triggers an evaluation of whether it needs to issue the auto requests. However, detection does not monitor changes in user resource assignments. Authorization for a resource is not the same thing as being assigned a resource. Since the detection process does not monitor the assignment changes, assignment changes do not trigger an evaluation of whether to issue the auto requests.

Figure 17-5 *Business Role (Permissions and Applications) Automated Access Provisioning and Deprovisioning Process*


Events that trigger business role detections:
Addition of users or groups to a business role
Removal of users or groups from a business role
Creation, deletion, or modification of technical roles
Changes to user attributes or group memberships
Collection / publication of identities or applications
Deactivation, deletion, or publication of a business role
Expiration of authorizations and memberships
Identity Governance events trigger single role, multiple roles, or all business roles detection
User loses a resource authorization
Is auto-revoke enabled?
No
Yes
Does the user have the resource authorization?
No
Issue compensating grant request?
No
Yes
Yes
Is there a pending auto-revoke request?
Yes
No
Identity Governance issues revoke request
Fulfillment cycle
User gains a resource authorization
Is auto-grant enabled?
Yes
No
Does the user have the resource authorization?
No
Yes
Issue compensating revoke request?
Yes
No
Is there a pending auto-grant request?
No
Yes
Identity Governance issues grant request

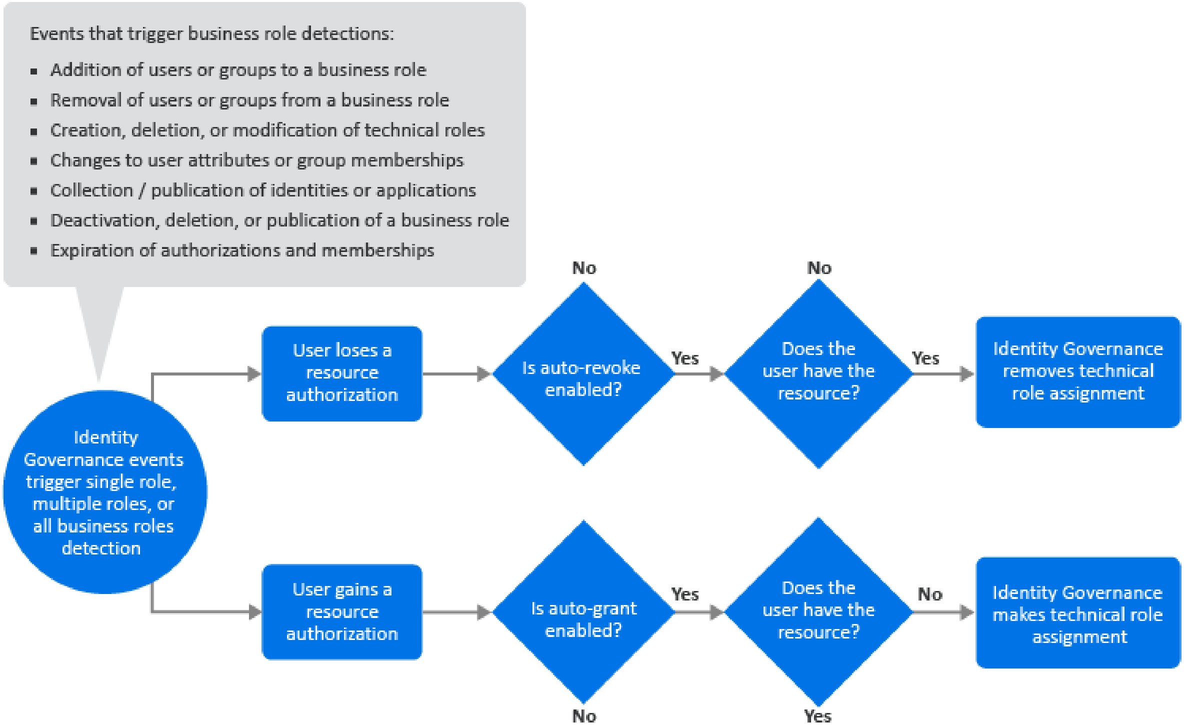
When you specify auto-grant and/or auto-revoke for technical roles, Identity Governance performs two different actions.

- Identity Governance auto-grants and/or auto-revokes the permissions that make up the technical role, and follows the usual process for granting and revoking permissions

  By default, when technical roles are revoked, fulfillment requests are generated to remove permissions regardless of the business role authorization settings. Administrators can configure Identity Governance to honor business role authorizations so that fulfillment requests are not generated if the permission is authorized by business role membership by setting the `com.netiq.iac.request.honorBRoleAuthorizations` property to `true` using the Configuration Utility console mode procedures. Administrators can also control whether fulfillment requests are generated for both auto grant and non-auto grant authorizations only using the `com.netiq.iac.request.honorBRoleAutoGrantOnly` property.

- Identity Governance auto-grants (makes) and/or auto-revokes (removes) a technical role assignment as needed. If Identity Governance determines that a technical role assignment should be made or removed, it makes or removes the assignment during business role detection itself and does not generate a fulfillment request. This is because technical role assignments are not provisioned from external data sources, but are provisioned and maintained by Identity Governance.

Figure 17-6 Business Role (Technical Roles) Automated Access Provisioning and Deprovisioning Process when Business


Events that trigger business role detections:
Addition of users or groups to a business role
Removal of users or groups from a business role
Creation, deletion, or modification of technical roles
Changes to user attributes or group memberships
Collection / publication of identities or applications
Deactivation, deletion, or publication of a business role
Expiration of authorizations and memberships
Identity Governance events trigger single role, multiple roles, or all business roles detection
User loses a resource authorization
Is auto-revoke enabled?
No
Yes
Does the user have the resource?
No
Yes
Identity Governance removes technical role assignment
User gains a resource authorization
Is auto-grant enabled?
Yes
No
Does the user have the resource?
No
Yes
Identity Governance makes technical role assignment

The events that trigger Identity Governance to perform business role detections do not necessarily result in Identity Governance issuing auto-grant or auto-revoke requests. The rules that trigger a detection are different from the rules that govern whether Identity Governance will issue the auto requests. For example, deactivating a technical role that is an authorized resource of a business role triggers a business role detection, but does not result in an auto-revoke request or changes to any current auto-grant or auto-revoke request. Publication of application sources trigger detection but do not necessarily result in Identity Governance issuing the auto requests.

- Section 17.11.1, “Understanding Business Role Detections,” on page 181
- Section 17.11.2, “Automatic Provisioning Requests,” on page 183
- Section 17.11.3, “Automatic Deprovisioning Requests,” on page 184
- Section 17.11.4, “Managing Compensating Requests,” on page 185
- Section 17.11.5, “Understanding Inconsistencies,” on page 187
- Section 17.11.6, “Detecting and Resolving Inconsistencies,” on page 189
- Section 17.11.7, “Monitoring Business Role Detections,” on page 190

17.11.1 Understanding Business Role Detections

Business role detection is a process where Identity Governance updates business role memberships and business role authorizations. After business role memberships and authorizations are updated, Identity Governance might also issue the auto-grant and auto-revoke requests.

There are currently three types of business role detection:

All business roles

Identity Governance processes all published business roles in this type of detection. The following events trigger this type of detection:

- Publication of identities and applications
- Creation, deletion, or modification of technical roles
- Collection of identities after change events (also referred to as real time collection)

Business roles with expiring memberships or authorizations

Identity Governance processes business roles that have memberships or authorizations with an expiration date. Identity Governance automatically runs this type of detection every 24 hours.

Single business role

Identity Governance processes exactly one business role in this type of detection. The following events trigger this type of detection:

- Publication of a business role
- Deactivation or deletion of a published business role
- Curation (manual or bulk update) of users

  During this type of event, Identity Governance determines which business roles have membership expressions involving the attributes that were curated and schedules a business role detection for each of those business roles so that their membership is recalculated.

A business role detection, regardless of its type, has two phases. In phase one, it calculates business role memberships and authorizations. It also keeps track of all of the following types of authorization changes and uses this information in phase two:

- A user gains a new authorization for a resource that is auto-granted.

  This might occur because a user became a member of a new business role, or a new authorization was added to a business role that the user is already a member of.

  NOTE: If a business role authorizes a technical role and a new permission is added to the technical role, it ultimately results in a new authorization for that permission for all of the business role members.

- An authorization that is auto-granted and was *not* previously in its validity period enters its validity period.
- An authorization that is in its validity period changes from not auto-granted to auto-granted.
- A user loses an authorization for a resource that is auto-revoked.

  This might occur because a user lost membership in a business role, an authorization was removed from a business role that the user is a member of, the business role is deleted, or the business role is deactivated.

  NOTE: When evaluating whether to issue an auto-revoke request, Identity Governance ignores the loss of authorizations that occurs because an administrator deactivated the business role.

  If a business role authorizes a technical role and a permission is deleted from the technical role, it ultimately results in the members of the business role losing their authorization for that permission. If the technical role itself is deleted, it ultimately results in the members of the business role losing authorization for all of the permissions that were contained in that technical role. However, if a technical role is simply deactivated rather than being deleted, business role authorizations stemming from that technical role are not lost.

- An authorization that is auto-revoked and was *not* previously in its validity period exits its validity period.
- An authorization that is not in its validity period changes from not auto-revoked to auto-revoked.

During phase one, after Identity Governance calculates a business role's membership and authorizations, it determines what other business roles include the members of the business role and schedules single-role detections for each of those business roles. This occurs whether Identity Governance detects BR1 during an *all* business role detection or during a single-role detection for just BR1 because changes to the membership of a business role affect the membership of any business roles that include it. For example, if BR1 is included by BR2 and BR3, after calculating membership and authorizations for BR1, Identity Governance schedules single-role detections for BR2 and BR3.

In phase two of detection, using the information collected in phase one, Identity Governance determines what, if any, auto requests it should issue. For specific conditions that could result in auto-grant requests being issued, see Section 17.11.2, “Automatic Provisioning Requests,” on page 183. For specific conditions that could result in Identity Governance issuing auto-revoke requests, see Section 17.11.3, “Automatic Deprovisioning Requests,” on page 184.

Some of the conditions that could result in Identity Governance issuing an auto-grant or an auto-revoke request involve compensating for in-progress requests that would change whether a user has a particular resource. An administrator can configure Identity Governance to compensate for in-progress requests. For more information about compensating requests, see Section 17.11.4, “Managing Compensating Requests,” on page 185.

Although Identity Governance might issue auto-grant requests and auto-revoke requests in phase two of a business role detection, the requests might not ever be fulfilled for a variety of reasons. This results in situations where there might be users whose assigned resources are inconsistent with the auto-grant or the auto-revoke policies, or users that have pending grant or revocation requests for resources that, if fulfilled, would cause them to be inconsistent with the auto-grant or the auto-revoke policies. Identity Governance does *not* automatically check for such assignment inconsistencies during normal business role detection because there would be additional overhead to do so, thus slowing down the business role detection process. Instead, Identity Governance enables administrators to manually check for such inconsistencies and fix them. For more information, see Section 17.11.5, “Understanding Inconsistencies,” on page 187.

Depending on a variety of factors, business role detections can potentially take some time to complete. Identity Governance allows administrators to monitor the progress of business role detections and to see detailed information about in-progress and completed business role detections. For more information, see Section 17.11.7, “Monitoring Business Role Detections,” on page 190.

17.11.2 Automatic Provisioning Requests

During phase one of business role detection, Identity Governance gathers various types of authorization change events which trigger an evaluation of whether to issue an auto-grant request. The change events include user gaining a new authorization for a resource that specifies auto-grant, an auto-granted authorization entering its validity period, or an authorization in its validity period changing from *not* auto-granted to auto-granted. In phase two of business role detection, Identity Governance evaluates what, if any, auto-grant requests to issue.

Identity Governance issues an auto-grant request only if *all* of the following conditions are satisfied:

- The user + resource ends up being authorized after phase one business role detection.
- The user either is currently not assigned the resource (for applications assigned means the user has an account in the application) or there is a pending request to revoke the resource from the user and the request is one of the types that an administrator has specified as being compensatable.

  NOTE: Identity Governance considers a request as pending until it is in a **final state**. Final states include the following states: rejected by fulfiller, fulfillment error, fulfillment timed out, completed and verified, completed and not verified and verification ignored, or completed and verification timed out.

- There is no previously issued auto-grant request from a business role detection for the user + resource that is still in-progress. Auto-grant requests in a final state (see above) are obviously no longer in progress. In addition, a request that has completed (marked as fulfilled) is not considered to be in-progress, even though it might not yet be in verified, not verified and verification ignored, or verification timed out state.

  NOTE: When auto-grant option is enabled for a technical role resource, Identity Governance generates fulfillment requests for the permissions that make up the technical role, but does *not* generate fulfillment requests for the technical role assignment itself. Instead, Identity Governance makes a technical role assignment immediately if it determines that the user does not currently have the technical role assignment. Because there is no fulfillment request for making technical role assignments, the previous comments about Identity Governance checking for completed and in-progress pending fulfillment requests do not apply in the case of making technical role assignments.

17.11.3 Automatic Deprovisioning Requests

During phase one of business role detection, Identity Governance gathers various types of authorization change events which trigger an evaluation of whether to issue an auto-revoke request. The change events include a user losing an authorization for a resource that specifies auto-revoke, an auto-revoked authorization exiting its validity period, or an authorization in its validity period changing from *not* auto-revoked to auto-revoked. In phase two of business role detection, Identity Governance evaluates what, if any, auto-revoke requests to issue.

Identity Governance issues an auto-revoke request only if *all* of the following conditions are satisfied:

- The resource is not authorized for the user by any business role.
- The user either is currently assigned the resource (for applications, assigned means the user has an account in the application), or there is a pending request to grant the resource to the user and the request is one of the types that an administrator has specified as being compensatable.

NOTE: Identity Governance considers a request to be pending until it is in a **final state**, which includes the following states: rejected by fulfiller, fulfillment error, fulfillment timed out, completed and verified, completed and not verified and verification ignored, or completed and verification timed out.

- There is no previously issued auto-revoke request from a business role detection for the user and resource that is still in progress. Auto-revoke requests in a final state (see above) are obviously no longer in progress. In addition, Identity Governance does not consider a request that has been completed (marked as fulfilled) to be in-progress, even though it might not yet be in verified, not verified and verification ignored, or verification timed out state.

NOTE: When the auto-revoke option is enabled for a technical role resource, Identity Governance generates fulfillment requests for the permissions that make up the technical role, but does *not* generate fulfillment requests for the technical role assignment itself. Instead, Identity Governance removes a technical role assignment immediately if it determines that the user currently has the technical role assignment. Because there is no fulfillment request for removing technical role assignments, the previous comments about Identity Governance checking for completed and in-progress pending fulfillment requests do not apply in the case of removing technical role assignments.

The above conditions apply only to published business roles. Identity Governance ignores deactivated business roles when determining if all conditions are met. The following scenario provides an example of automatic deprovisioning.

Scenario 1: An authorized permission is removed from a business role

1. BR1 authorizes permission X and specifies auto-grant and auto-revoke on it.
2. User A is a member of BR1 and currently has permission X.
3. A business role administrator removes the permission X authorization from BR1 and re-publishes BR1. This action triggers business role detection on BR1.
4. Identity Governance detects that Permission X is no longer authorized for BR1, which means that all members who had authorizations for permission X from BR1 lose that authorization. User A is one of those members who lose the authorization.
5. The loss of user A's authorization for permission X causes Identity Governance to evaluate whether it should issue an auto-revoke request to remove permission X from user A.
6. Identity Governance issues an auto-revoke request to remove permission X from user A because all conditions for automatic deprovisioning are met:
    a. User A no longer has any authorization for permission X from *any* other business role,
    b. User A currently has permission X, and
    c. There is no in-progress auto-revoke request to remove permission X from user A.

17.11.4 Managing Compensating Requests

Identity Governance examines both the current state of the Identity Governance catalog and pending requests that might alter that state to determine if a user has a resource when it evaluates whether to issue an auto-grant or an auto-revoke request. Identity Governance compensates for pending fulfillment requests that would change whether the user has a resource. Identity Governance could grant a request to compensate for a pending revoke request, and it could issue a revoke request to compensate for a pending grant request.

NOTE: Identity Governance rules for generating compensating requests are applicable to the permissions that make up the technical role but are *not* applicable to technical role assignments.

The technical roles are managed and provisioned by Identity Governance itself. Auto-grant and auto-revoke of technical role assignments do *not* involve generation of fulfillment requests because there is no external data source for technical role assignments. Identity Governance makes or removes a technical role assignment immediately and does not trigger fulfillment requests or compensating requests.

Administrators can configure the types of requests for which Identity Governance might issue a compensating request. The type of request indicates the Identity Governance process from which the request originated. It might be an access request, a review, or a resolution of separation of duties violations.

NOTE: Identity Governance always compensates for pending requests that originated from the business role detection process.

To specify types of request that should generate compensating requests:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Select **Policy > Business Roles > Manage Auto Requests**.
3. Select the additional type of requests for which the system should automatically compensate.

The following scenarios provide a few examples of when Identity Governance would issue compensating requests.

Scenario 1: User gains an auto request enabled permission that was lost but which Identity Governance considers as still authorized

1. Business role BR1 and business role BR2 both authorize permission X and both specify auto-grant and auto-revoke.
2. User A is a member of BR1 and currently has permission X.
3. An administrator or the system modifies user A's attributes so that the user is no longer a member of BR1. Identity Governance's real-time identity collection detects this change and user A loses authorization for permission X.
4. Identity Governance issues a revoke request to remove permission X from user A.
5. The application containing permission X removes permission X from user A.
6. An administrator or the system modifies user A's attributes again so the user becomes a member of BR2 and as such is authorized for permission X. The application containing permission X has removed permission X from user A, but the Identity Governance catalog still

shows that user A has permission X because no one executed collection and publication of that application since Identity Governance issued the revoke request. Therefore, Identity Governance would not normally issue an auto-grant request for permission X.

However, because the revoke request for permission X still shows that it is pending verification, and you configured Identity Governance to issue compensating grant requests for this type of revoke request, Identity Governance issues a compensating grant request for user A to be given permission X.

Scenario 2: User loses an auto request enabled permission that was granted but which Identity Governance considers as not authorized

1. Business role BR1 authorizes permission X and specifies auto-grant and auto-revoke.
2. User A has no permissions but an administrator or the system changes the user’s attributes making the user a member of BR1. Real-time identity collection in Identity Governance detects this change and user A becomes a member of BR1 and gains an authorization for permission X.
3. Identity Governance issues a grant request for user A to have permission X.
4. The application that contains permission X assigns permission X to user A.
5. User A's attributes are changed again so that the user is no longer a member of BR1. User A's authorization for permission X is lost. The application containing permission X has assigned permission X to user A, but the Identity Governance catalog still shows that user A does not have permission X because no one executed collection and publication of that application since Identity Governance issued the grant request. Therefore, Identity Governance would not normally issue an auto-revoke request for permission X.

   However, because the grant request for permission X still shows that it is pending verification and you configured Identity Governance to issue compensating revoke requests for this type of grant request, Identity Governance issues a compensating revoke request to remove permission X from User A.

17.11.5 Understanding Inconsistencies

Although Identity Governance might issue auto-grant requests and auto-revoke requests in phase two of a business role detection, the requests might not ever be fulfilled for a variety of reasons. The fulfillment system might handle the requests in a different order than they were issued, the fulfillment system could reject the request, or there could be an error fulfilling the request. In addition, external systems might change resource assignments without Identity Governance issuing a request to do so. Identity Governance does not examine resource assignment changes when determining whether to issue an auto-grant or auto-revoke request because there would be additional overhead to do so, thus slowing down the business role detection process.

These kinds of scenarios can result in situations where there might be users whose assigned resources are inconsistent with the auto-grant or the auto-revoke policies, or users who have pending grant or revocation requests for resources that, if fulfilled, would cause them to be inconsistent with the auto-grant or the auto-revoke policies.

Inconsistency checking for permissions and applications includes checking for pending requests that might cause the permission or application to be held or not held in the future. A request is considered to still be pending even if its status has been changed to completed by a fulfiller (manual or automated provisioning process) and it is waiting for verification because the request might or might not result in the permission or application being held or not held in the future. Verification happens after a publication occurs. Once verification happens, the request will no longer be considered to be pending. Its status will change to either not verified or verified. Although not a final state, not verified is considered by inconsistency checking to no longer be a pending request and such a request is not considered when determining whether the permission or application might be held or not held in the future.

Administrators can manually initiate inconsistency detection for auto-grant and auto-revoke inconsistencies. Identity Governance displays information about the most recent inconsistency detection for six types of inconsistencies: Auto-grant Permissions, Auto-grant Technical Roles, Auto-grant Applications, Auto-revoke Permissions, Auto-revoke Technical Roles, and Auto-revoke Applications. Information includes status, start time, end time, count of inconsistencies detected, who started the detection, who canceled the detection (if canceled), and so forth. If detection is currently running, a spinner icon will be displayed next to a status of Running. The administrator can click a refresh icon in the Action column to start detection if one is not currently running. Once detection has completed, the status will be changed to Completed and the user will be able to click the value in the inconsistency count column to see and optionally resolve the inconsistencies that were detected. If no inconsistencies were detected, the count column will have a value of zero.

Auto-grant request inconsistencies occur under the following conditions:

- One or more business roles authorize a resource (permission, technical role, or application) and specify that the resource is to be auto-granted to users.
- A user who is a member of one or more business roles either does not currently hold the authorized resource or may not hold the resource in the future due to a pending revoke request. In this context, Identity Governance considers only pending revoke requests that have been configured as compensatable requests.
- There is no in progress auto-grant request that would grant the resource to the user.

NOTE: There will never be pending revoke requests or in-progress auto-grant requests for technical role assignments because Identity Governance always removes and fulfills technical role assignments immediately.

Here is one scenario where an auto-grant request inconsistency could occur:

1. User A becomes a member of BR1 that authorizes permission X and specifies that X should be auto-granted. Identity Governance does not issue an auto-grant request because user A already has permission X.
2. The application that contains permission X removes permission X from user A without Identity Governance issuing any request to do so. This can happen because external applications might assign or unassign resources to or from users without receiving any request from Identity Governance to do so.
3. Identity Governance collects and publishes the application that contains permission X and updates its catalog to reflect that User A no longer has permission X. After the publication, Identity Governance triggers business role detection. However, Identity Governance does *not* issue an auto-grant for user A to have permission X, because detection did not see any authorization changes (the fact that the business role authorizes the user to have permission X did not change), and detection does not check to see if there were assignment changes.

   This results in an inconsistency between the auto-grant policy and the assignment state with respect to user A and permission X.

Auto-revoke request inconsistencies occur under the following conditions:

- A user either has a resource (permission, technical role, or application) or will have the resource in the future due to a pending grant request that is not currently authorized by any business role the user is a member of. In this context, Identity Governance considers only pending grant requests that have been configured as compensatable.
- The user was at one time a member of a business role that auto-revokes the resource. When checking for revoke inconsistencies, Identity Governance only considers the business roles the user was a member of within the last N days. Memberships held earlier than the last N days are not considered.
- There is no in progress auto-revoke request that would revoke the resource from the user.

NOTE: There will never be pending grant requests or in progress auto-revoke request for technical role assignments because Identity Governance always removes and fulfills technical role assignments immediately.

Here is one scenario where an auto-revoke request inconsistency could occur:

1. User A is a member of BR1 that authorizes permission X and specifies that X should be auto-revoked.
2. User A's attributes change in a way that causes the user to lose membership in BR1. The real-time collection process in Identity Governance detects the change. After it processes the change, Identity Governance triggers a business role detection. The detection causes Identity Governance to issue an auto-revoke request to remove permission X from user A.
3. The application that contains permission X removes permission X from user A. Later, however, the application restores permission X to user A. Again, remember that external applications might assign or unassign resources to or from users without receiving any request from Identity Governance to do so.
4. Identity Governance collects and publishes the application that contains permission X. After publication, business role detection is triggered. However, Identity Governance does *not* issue an auto-revoke request to remove permission X from user A, because detection did not see any *authorizations* that were lost (user A is still not authorized by any role to have permission X) and detection does not check to see if there were permission assignment changes.

   This results in an inconsistency in the auto-revoke policy for permission X because user A at one time was a member of BR1, and it specified that permission X should be auto-revoked.

17.11.6 Detecting and Resolving Inconsistencies

Identity Governance does *not* automatically check for inconsistencies during normal business role detection because there would be additional overhead to do so, thus slowing down the business role detection process. Instead, Identity Governance allows an administrator to find these inconsistencies and issue new requests to resolve them if needed. It is not a given that you should resolve all such inconsistencies, so Identity Governance does not do it automatically. This is especially true of the auto-revoke inconsistencies. The fact that a user was at one time a member of a business role that specifies that a permission the user holds should be auto-revoked might or might not be sufficient reason to revoke the permission from the user.

To find and resolve inconsistencies:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Select **Policy > Business Roles > Manage Inconsistencies**.
3. (Optional) Click the gear icon to customize the column display. For example, to view who started the inconsistency detection, select **Started by** in the Available Column list.
4. To start inconsistency detection, click the refresh icon in the Action column.
5. (Conditional) If there are auto-revoke types, specify the number of days to search for lost business role memberships.

   When searching for auto-revoke inconsistencies, Identity Governance searches for authorizations that specify auto-revoke in business roles that users were previously members of. It only looks for business role memberships that the user lost within the last *N* days. Identity Governance ignores business role memberships that were lost before *N* days.
6. Click the number of detected inconsistencies to view the list of inconsistencies in a pop-up window.
7. (Optional) In the pop-up window search bar, specify a user name, a permission, or a business role name to search for related inconsistencies.
8. (Optional) Submit grant or revoke requests for some or all inconsistencies to resolve them.
9. (Optional) Click the refresh icon to recalculate and update the number detected inconsistencies.

17.11.7 Monitoring Business Role Detections

Identity Governance enables administrators and support personnel to troubleshoot issues by looking at the progress and results of business role detections.

During business role detection, in addition to various instance times, Identity Governance stores the number of memberships, authorizations, and auto-requests. You can enable the collection of more detailed information on the exact memberships, authorizations, and auto-requests that were generated during detection by setting the following configuration properties using the Identity Governance Configuration Utility. For more information about the utility procedures, see “Using the Identity Governance Configuration Utility” in the *Identity Governance 3.6 Installation and Configuration Guide*.

IMPORTANT: If you enable the collection of detailed information, business role detections slow down and consume more space in the database to store the detailed information. Generally, you should enable the collection of detailed information only if you are troubleshooting a problem and need more information to determine what is happening.

- `com.netiq.iac.brd.log.detected.members`

  When set to `true` this configuration property causes business role detection to store the list of users who were added to and removed from a business role during the detection.
- `com.netiq.iac.brd.log.detected.auths`

  When set to `true` this configuration property causes business role detection to store the list of authorizations that were added and deleted during the detection.

- `com.netiq.iac.brd.log.detected.autorequests`

  When set to `true` this configuration property causes business role detection to store the list of auto-grant and auto-revoke requests that Identity Governance issued during the detection.

To monitor business role detections:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Select **Policy > Business Roles > Business Role Detections**.
3. (Optional) Specify a business role name in the search bar to search for the detection status and details such as the detection end time, the number of auto-revokes generated for a business role, and so forth.
4. (Optional) Select the number of business roles completed to view additional details such as the number of members that the system added or removed, the number of authorizations that the system granted or revoked, and so forth.
5. (Optional) Select detections to delete. You should *not* delete a detection that is currently running.

You can click the settings icon to customize the columns displayed on the Business Roles Detection tab. For example, to add a column that displays the action that triggered each Business Role detection, click the settings icon, and then select **Detection Triggered By**.

17.12 Downloading and Importing Business Roles and Approval Policies

You can download business roles, approval policies and other referenced objects and import them later into an Identity Governance environment. The download will either generate a single JSON file or a zip file depending on the options you select during download, such as associated applications and assigned categories. In addition to downloading the business role or approval policy definitions, you can download the list of objects as a CSV file.

To download or import business roles and business role definitions:

1. Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.
2. Under **Policy**, select **Business Roles**.
3. To download:
   - A list of business roles with description, owners, and managers as a CSV file, select **Actions > Download all as CSV** on the **Roles** tab.
   - To download all business role definitions, select **Actions > Download Definitions**.
   - To download one or more business role definitions, select **Actions > Download Definitions**.
     - Select one or more roles on the **Roles** tab.
     - Type the business role name or a meaningful description.
     - (Optional) Include references to business role owners, managers, and fulfillers; and download included business roles, associated applications, technical roles, and assigned categories and approval policies.
     - Click **Download**.
4. Select the download icon on the top title bar to access the saved files and download the files.

5 (Optional) Delete the file from the download area in Identity Governance.

If you do not manually delete files, Identity Governance will automatically delete files based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

6 If you make changes or want to import previously downloaded business roles into another environment, select **Import Business Roles** on the **Roles** tab.

7 Navigate to the business roles JSON or zip file, select the file to import, then click **Open**.

8 Identity Governance detects whether you are importing new or updated roles and whether the updates would create any conflicts or have unresolved references.

9 Select how to continue based on what information the application user interface displays. For example, under **Updates**, you can compare the imported values with current values for each role by selecting the respective role before selecting the roles to import.

10 Select the roles you want to import, then click **Import**.

NOTE: Identity Governance does *not* automatically publish imported business roles. You must publish them in order for them to take effect in the system. For more information, see “Publishing or Deactivating Business Roles” on page 176.

11 (Conditional) If you import more than the preconfigured threshold for the number of roles that can be displayed on the import page, Identity Governance will switch to bulk import mode. When in bulk mode, instead of selecting whether to create, update, or handle conflicts for specific roles, you can select to import all new roles and update all existing roles. For conflicts, you can choose to either overwrite existing roles or create new roles.

NOTE: The default value for roles that can be displayed is 200 or the value specified in `com.netiq.iac.importExport.maxImportsToDisplay` property.

12 (Optional) Download the auto-generated import report from the download area. The import report will identify what was imported as well as call out any unresolved references.

To download or import business role approval policies:

1 Log in to Identity Governance as a Customer, Global, or Business Roles Administrator.

2 Under **Policy**, select **Business Roles**.

3 Select a policy or all the policies on the **Approval Policies** tab.

4 Select **Actions > Download Definitions**.

4a Type the approval policy name or a meaningful description.

4b (Optional) Include references to the approval policy approver.

4c Select **Download**.

4d Select the download icon on the top title bar to access the saved file and download the file.

4e (Optional) Delete the file from the download area in Identity Governance.

If you do not manually delete files, Identity Governance will automatically delete files based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

5 If you make changes, or want to want to import previously downloaded approval policies into another environment, select **Import Approval Policies** on the **Approval Policies** tab.

6 Navigate to the approval policy JSON or zip file, select the file to import, then click **Open**.

7 Identity Governance detects whether you are importing new or updated policies and whether the updates would create any conflicts or have unresolved references.

8 Select how to continue based on what information the application user interface displays. For example, under **Updates**, you can compare the imported values with current values for each entity by selecting the respective policy before selecting the policies to import.

9 Select the policies you want to import, then click **Import**.

10 (Conditional) If you import more than the preconfigured threshold for the number of policies that can be displayed in the import page, Identity Governance will switch to bulk import mode. When in bulk mode, instead of selecting whether to create, update, or handle conflicts for specific policies, you can select to import all new policies and update all existing policies. For conflicts, you can choose to either overwrite existing policies or create new policies.

NOTE: The default value for policies that can be displayed is 200 or the value specified in `com.netiq.iac.importExport.maxImportsToDisplay` property.

11 (Optional) Download the auto-generated import report from the download area. The import report will identify what was imported as well as call out any unresolved references.

18 Creating and Managing Separation of Duties Policies

Separation of Duties (SoD) Administrators can create policies to enable Identity Governance to look for users and accounts holding too much access. Identity Governance creates cases when it finds violations, and policy owners review the cases and approve or resolve the violations.

- Section 18.1, “Understanding Separation of Duties,” on page 195
- Section 18.2, “Understanding the Separation of Duties Policy Options,” on page 196
- Section 18.3, “Creating and Editing Separation of Duties Policies,” on page 198
- Section 18.4, “Downloading and Importing Separation of Duties Policies,” on page 199

18.1 Understanding Separation of Duties

When any one person in your organization has access to too many systems, you could have problems proving that your systems are safe from fraud when it is time for audits.

The SoD Administrator should be a business owner who understands the appropriate access levels for individuals in your company. By creating policies to keep any one person from having too much responsibility, the SoD Administrator enables Identity Governance to identify users with access to company assets that should be reviewed. Having these SoD policies puts access control rules over your business systems to give you the ability to show auditors the automated protection that Identity Governance provides.

When you have active SoD policies, Identity Governance provides the ability to check for violations and warns of violations when executing actions such as performing reviews, defining roles, requesting access, approving access, or examining manual fulfillment requests.

Based on your SoD policies, Identity Governance not only enables you to identify SoD violations in your current data, it also enables you to detect SoD violations that *might* occur in the future if a set of access requests is fulfilled. When Identity Governance detects *potential* SoD violations, it lists the violations on the **Access Request > Approvals > SoD Violations** page if approvals are required. The SoD Administrator or policy owners review the requests to determine whether to resolve or approve the violation. If, based on the global potential SoD violation approval policy or a specific SoD policy, potential violations do not require approvals, Identity Governance sends the requests directly to fulfillment.

For any *actual* violations of the policies, Identity Governance creates cases and lists them on the **Policy > Violations** page. The SoD Administrator or policy owners review the cases to determine whether to resolve or approve the violation.

The SoD cases are similar to the standard review process. Instead of a review definition running on a regular schedule, SoD policies run as long as they are active and continuously create cases for violations. For more information about reviews, see Section 23.2, “Understanding the Review Process,” on page 239. For more information about SoD violations, SoD cases, and potential SoD violations, see Chapter 19, “Managing Separation of Duties Violations,” on page 201.

18.2 Understanding the Separation of Duties Policy Options

When you create an SoD policy, you must define which conditions make up the policy, what happens when the policy is violated, and how to resolve the violation. Use the following information to create the SoD policies that work best in your environment.

- Section 18.2.1, "Providing Resolution Instructions for the Separation of Duties Policies," on page 196
- Section 18.2.2, "Overriding Global Potential SoD Violation Approval Policy," on page 196
- Section 18.2.3, "Deciding what Occurs when the Separation of Duties Policy is Violated," on page 197
- Section 18.2.4, "Defining Separation of Duties Conditions," on page 197

18.2.1 Providing Resolution Instructions for the Separation of Duties Policies

When you create an SoD policy, you can add resolution instructions in the **Resolve** field, and you can embed HTML links in those instructions to point to additional information or instructions for a user to follow when reviewing an SoD policy violation. Providing these instructions is optional. If you provide resolution instructions, users can see what to do to solve the violations without having to wait for further instructions.

Identity Governance displays the SoD violations with any instructions you have provided on the **Policy** > **Violations** tab. Users with the proper access can access and review these violations and resolve or approve the violations.

18.2.2 Overriding Global Potential SoD Violation Approval Policy

The global potential SoD violation approval policy determines if approval is required for potential SoD violations and, if required, whether self approval is allowed. Only users with Customer, Global, or Access Request Administrator authorization can set the global potential SoD violation approval policy. However, SoD Administrators and policy owners can select **Override global potential SoD violation approval settings** to specify potential SoD violation approval policies for each SoD policy and override the global policy.

NOTE: The override only applies to potential violations that are detected for that SoD policy. For more information, see Section 19.7, "Understanding Potential SoD Violations," on page 204 and Section 21.2.4, "Setting Global Potential SoD Violation Approval Policy," on page 221.

18.2.3 Deciding what Occurs when the Separation of Duties Policy is Violated

When users review and manage an SoD case, they can resolve the violation or allow the violation to continue for a certain period of time. A user can specify compensating controls for an SoD policy. When allowing a violation to continue, if compensating controls have been defined for the policy, the user can select one or more of them to specify what controls should be in place in order to allow the violation to continue.

When users allow a violation to continue, the user can select one or more of the defined compensating controls to enforce during the continuation period of the violation. They can also specify the amount of time that the violation can continue, but the time must be less than or equal to the maximum control period defined in the policy. The maximum time is 32,768 days.

You add these compensating controls when you create the SoD policy in the **Compensating Controls** field.

18.2.4 Defining Separation of Duties Conditions

An SoD policy allows you to define one or more conditions that specify which combinations of permissions and roles users are not permitted to hold. Most of the time, a single condition suffices, but in some scenarios, you must define multiple conditions to cover more complicated combinations.

Identity Governance tests a user’s permissions and roles against a condition to see if the user holds the combination of permissions and roles specified in the condition. If the user’s permissions and roles match the condition, the user violates that condition. The user violates the SoD policy only if the user’s permissions and roles violate *every* condition in the SoD policy.

Identity Governance also tests unmapped accounts against the SoD policies. Unmapped accounts, or accounts with no associated users, may have permissions assigned to them. As with user accounts, Identity Governance tests if the account has the combination of permissions specified in the condition. If the account's permissions match the condition, the account violates that condition. The account violates the SoD policy only if the account’s permissions violate *every* condition in the SoD policy.

Many simple policies require only a single condition to specify permission and role combinations that are not permitted. More complex combinations require multiple conditions, but you will rarely need more than two conditions.

A condition consists of two parts:

- A list of one or more permissions and roles that Identity Governance tests against a user’s permissions and roles. The list can consist of all permissions, all roles, or a mixture of permissions and roles.
- A condition *type* specifies how Identity Governance evaluates the user’s permissions and roles. There are three types of policy conditions:

User has all of the following

A user violates this condition if the user has all of the listed permissions, business roles, and technical roles specified in the condition. This condition is the most commonly used type. You can use this single condition to specify most combinations of permissions and roles that a user is not permitted to hold.

User has one or more of the following

A user violates this condition if the user has any of the specified permissions, business roles, and technical roles. The condition must always be used in conjunction with one or more of the other conditions. Identity Governance does not allow an SoD policy with a single condition of this type.

NOTE: Identity Governance does not allow an SoD policy that specifies a single permission or role a user is not permitted to hold. For example, a policy with a single **User has all of the following** condition that lists a single permission or role, or a policy with a single **User has one or more of the following** condition is not permitted.

User has more than one of the following

A user violates this condition if the user has two or more of the specified permissions and roles. A condition of this type must list at least two permissions and roles. If the condition lists exactly two permissions and roles, it is equivalent to a **User has all of the following** condition with two permissions and roles.

18.3 Creating and Editing Separation of Duties Policies

After you publish data, you can create separation of duties (SoD) policies that Identity Governance uses to alert you of possible violations. Active SoD policy definitions allow Identity Governance to list violations and create cases for you to review and approve, or to send to fulfillment for correction. Users with the Customer, Global, or Separation of Duties Administrator authorization can create and modify SoD policies.

NOTE: Until you publish data, no permissions are available to include as SoD Conditions for an SoD policy.

By default, Identity Governance calculates SoD violations using detected and assigned technical roles. If you have no assigned technical roles, use the **Violation Options** tab on the SoD Policies to calculate SoD violations using only detected technical roles.

To create an SoD policy:

1. Log in as a Customer, Global, or Separation of Duties Administrator
2. Under **Policy**, select **SoD**.
3. Select **+** to create a separation of duties policy.
4. (Optional) Select **Active** to have Identity Governance discover violations of the policy and create SoD violations and cases.
5. Provide the required information. For more information about defining SoD conditions, see Section 18.2.4, “Defining Separation of Duties Conditions,” on page 197.

NOTE: Policy names must be unique, but they are not case sensitive. Therefore, Identity Governance considers “SoD1” and “SOD1” to be equivalent.

6 (Optional) Specify a potential SoD violation approval policy for the current policy by overriding global policy.

7 (Optional) Specify one or more compensating controls and a maximum control period. Identity Governance displays these compensating controls in SoD cases as a selection for approving a violation to continue for a certain time period.

8 (Optional) Click **Estimate Violations** to see an estimate of the number of violations of this policy. You must add SoD conditions to make this button active.

9 Save your settings.

After you create and activate a policy, some of the permissions or authorizations listed in the policy's conditions might be deleted. When this happens, the policy is marked as invalid, and all of the policy's currently open SoD cases are put on hold. If the policy is not active, deleting its permissions or authorizations has no effect, since no detection is being done for the policy.

18.4 Downloading and Importing Separation of Duties Policies

You can download SoD policies and import them later into an Identity Governance environment. The download will either generate a single JSON file or a Zip file depending on the options you select during download, such as associated applications and referenced roles. In addition to downloading the SoD policy definitions, you can download the list of SoDs as a CSV file.

To download and import SoD policies:

1 Log in as a Customer, Global, or Separation of Duties Administrator

2 Under **Policy**, select **SoD**.

3 To download a list of policies with name, description, and state as a CSV file, select **Actions > Download all as CSV** in the **Separation of Duties Policies** tab.

4 To download one or more policy definitions:

   4a Select one or more policies from the list, then click **Actions** > **Download Definitions**.

   4b Type the policy name or a meaningful description.

   4c (Optional) Download included references, associated applications, business roles, and technical roles.

   4d Select **Download**.

5 Select the download icon on the top title bar to access the saved file and download the file.

6 (Optional) Delete the downloaded files from the download area in Identity Governance.

   If you do not manually delete files, Identity Governance will automatically delete files based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

7 To import policies, click **Import Separation of Duties Policies** on the **Policy > SoD** page.

8 Navigate to the JSON or zip file, select the file to import, and click **Open**.

9 Identity Governance detects whether you are importing new or updated policies and whether the updates would create any conflicts.

10 Select how to continue based on what information is displayed.

11 (Conditional) If you import more than the preconfigured threshold for the number of policies that can be displayed on the import page, Identity Governance will switch to bulk import mode. When in bulk mode, instead of selecting whether to create, update, or handle conflicts for specific policies, you can select to import all new policies and update all existing policies. For conflicts, you can choose to either overwrite existing policies or create new policies.

NOTE: The default value for policies that can be displayed is 200 or the value specified in `com.netiq.iac.importExport.maxImportsToDisplay` property.

12 (Optional) Download the auto-generated import report from the download area. The import report will identify what was imported as well as call out any unresolved references.

19 Managing Separation of Duties Violations

Identity Governance provides the ability for you to define and activate Separation of Duties (SoD) policies so the system can look for actual and potential violations of the policies. SoD policies let you identify combinations of permissions and authorizations that no one person should be granted.

When you have active SoD policies, Identity Governance monitors your environment for violations and creates cases when it finds violations. SoD administrators and policy owners can either approve the violation for a time period or remove enough access to resolve the violation. When you remove access, Identity Governance creates a **changeset** for fulfillment. For more information, see Section 14.6, “Fulfilling Changesets,” on page 143.

- Section 19.1, “Understanding SoD Violation versus SoD Case,” on page 201
- Section 19.2, “Listing SoD Violations or SoD Cases,” on page 201
- Section 19.3, “Viewing SoD Case Details,” on page 202
- Section 19.4, “Understanding SoD Case Status,” on page 202
- Section 19.5, “Approving and Resolving an SoD Violation,” on page 204
- Section 19.6, “Closing an SoD Case,” on page 204
- Section 19.7, “Understanding Potential SoD Violations,” on page 204
- Section 19.8, “Approving or Resolving Potential SoD Violations,” on page 205

19.1 Understanding SoD Violation versus SoD Case

The terms SoD Violation and SoD Case are sometimes used interchangeably. Both refer to a specific user or account violating a specific SoD policy. However, Identity Governance can detect an actual SoD violation multiple times because of the variety of events that trigger SoD violation detection. For example, publishing identities and accounts, creating, changing, or deleting roles all trigger SoD violation detection. Identity Governance creates a new SoD violation record for each of those detections and also notifies the SoD Policy Owner of these violations. All represent the same SoD violation, with different detection times.

An SoD case is the entity that tracks all of the information about an SoD violation, including all of the times the violation was detected. It also keeps track of the actions which users have taken with respect to the violation (approve, resolve). An SoD case is closed when Identity Governance no longer detects the violation. In a sense, an SoD case is the history of an SoD violation from the time it is first detected to the time it is no longer detected.

19.2 Listing SoD Violations or SoD Cases

There are multiple places where actual SoD violations may be listed and the associated SoD case managed. Which you use depends on your needs.

SoD violations for a particular user or account

1. Under **Catalog**, select **Users** or **Account**.
2. Select the user or account you want to see.
3. Select the **Separation of Duties Policy Violations** tab. Identity Governance only displays this tab for a user or account if there are active violations.

   NOTE: This tab shows only the SoD violations whose associated SoD case is currently open.

SoD violations for a particular SoD policy

1. Under **Policy**, select **SoD**.

   Ensure that you display the **# Users** and **# Unmapped Accounts** columns.
2. Select the count in the **# Users** column to see the list of users violating the policy.
3. Select the count in the **# Unmapped Accounts** column to see the list of unmapped accounts violating the policy.

   NOTE: This tab shows only the SoD violations whose associated SoD case is currently open.

SoD violations for a particular SoD case

1. Under **Policy**, select **Violations**.
2. Filter on SoD case state list by selecting any of the state icons. For example **Total**, **Not Reviewed**, or **Approved**. You can also perform advanced searches. For more information, see Section 11.4.3, "Using Advanced Filters for Searches," on page 112.

19.3 Viewing SoD Case Details

After you have a list of the actual SoD violations or SoD cases, you can expand them to see the associated SoD case information. The information displayed is:

- Information about the user or account that is in violation
- Information about the SoD policy being violated, including the conditions
- Information about the SoD case, including status

  You can see the list of actions taken by selecting the count in **# Actions**.

While viewing SoD details, if you have appropriate rights and the SoD case is still open, you can resolve or approve the violation.

19.4 Understanding SoD Case Status

Identity Governance tracks and records all decisions and selections during the life cycle of an SoD case. The following table provides a brief description of the possible status of an SoD case.

SoD Case Status	Description
Not Reviewed	When Identity Governance first detects an SoD violation, it creates an SoD case is created, and it is put into this state. This indicates that nobody has yet determined what to do about the violation. Users may have looked at it, but they have not determined whether to approve it or request that certain permissions be removed in order to resolve it.
Approved	A user has reviewed and approved the SoD case. Approval means the user determined that the SoD violation could continue for a certain period of time – the control period. There might be one or more compensating controls that were specified. Compensating controls are basically the conditions under which the approval was granted. It is expected that the compensating controls will be in effect during the approval period.
Approval Expired	A user approved the SoD case at one time, but the control period has expired.
Resolving	A user reviewed the SoD case and determined that one or more permissions should be removed in order to resolve the SoD violation. Change requests will have been initiated to remove one or more permissions. The SoD case will be in the resolving state until Identity Governance detects that the permission(s) have actually been removed. The resolving state can also be overridden if a user later on decides to approve the case instead of resolving it.
On Hold - Policy Inactive	SoD case is on hold because the policy has been deactivated.
On Hold - Policy Invalid	SoD case is on hold because the policy has become invalid. A SoD policy would become invalid if any of the permissions or technical roles it specified were deleted from the catalog.
Closed - Policy Deleted	SoD case has been closed because the SoD policy has been deleted. Thus, there is no longer an SoD policy to violate.
Closed - Policy Conditions Changed	SoD case has been closed because the SoD policy's conditions were changed.
Closed - Permissions or Roles Removed	SoD case has been closed because the violating user or account no longer has one or more of the permissions or technical roles that was causing the violation.
Closed - User Deleted	SoD case has been closed because the violating user is no longer found in the catalog.

SoD Case Status	Description
Closed - Account Deleted	SoD case has been closed because the violating account is no longer found in the catalog.

19.5 Approving and Resolving an SoD Violation

Approving an SoD violation records that the violation has been recognized and approval has been given to allow the violation to continue for some time period. A comment is always required when approving a violation. You must also specify a time period (days) that the violation is allowed to continue. If the SoD policy has defined compensating controls, you can select one or more controls. This allows you to state what controls you want to be enforced while the violation is allowed to continue.

Resolving an SoD violation allows you to specify what permissions or roles you want removed from the user or account. Upon selecting permissions or roles to remove, changesets are generated which then show up in fulfillment. You can visit the fulfillment pages to perform the usual types of fulfillment actions. For more information, see Section 14.6, “Fulfilling Changesets,” on page 143.

IMPORTANT: Closing an SoD case is not the same as the resolve action. It does not occur automatically because a resolve action has been performed. The resolve action simply initiates fulfillment tasks and notifies appropriate users of the need to perform removal actions and what specific removals are being requested. It does not actually remove permissions or roles. It might be that nobody ends up performing the fulfillment tasks, or rejects them and nothing changes, in which case the SoD violation does not go away and the SoD case remains open.

19.6 Closing an SoD Case

Identity Governance automatically closes an SoD case on any of the following conditions:

- It detects that enough permissions and roles have been removed from the user or account that is in violation so that the SoD violation is no longer detected.
- Someone deletes the SoD policy. All SoD violations for the SoD policy cease to exist when the policy does not exist.
- Someone changes the conditions of the SoD policy such that the SoD violation no longer exists.
- The violating user or account is no longer found in the catalog.

19.7 Understanding Potential SoD Violations

Identity Governance not only enables you to identify SoD violations in your current data, it also enables you to detect SoD violation that *might* occur in the future if a set of access requests are fulfilled. When potential SoD violations are detected, Identity Governance determines if approval is required for the potential SoD violation before processing the request. The SoD policy or the global potential SoD violation approval policy determine if approval of potential SoD violations is required and whether self-approval is allowed. If approval is required, Identity Governance creates a potential

SoD violation approval task that is assigned to SoD policy owners and SoD administrators to handle. SoD policy owners and SoD administrators can see a list of the potential SoD violations they need to approve or deny via **Access Request > Approvals > SoD Approvals** page.

NOTE: Only users with Customer, Global, or Access Request Administrator authorization can set the global potential SoD violation approval policy. For more information, see "Setting Global Potential SoD Violation Approval Policy" on page 221.

19.8 Approving or Resolving Potential SoD Violations

Access requests can contribute to one or more potential SoD violations. If approval is required for potential SoD violations (as specified in the SoD policy or via a global policy), the access request items that contribute to the potential SoD violation will *not* advance to their next phase (approval or fulfillment) until *each* potential SoD violation they contribute to has been either resolved or approved by SoD policy owners or SoD administrators.

All request items that contribute to the potential SoD violation must either be approved or denied to clear the potential violation. Denying request items might cause the potential SoD violation to be resolved. A potential SoD violation is considered to be **resolved** if it would no longer exist after denying one or more of the request items that contribute to it. No further action is required if a potential SoD violation is resolved.

If, on the other hand, the potential SoD violation would still exist after approving or denying all of the contributing request items, the potential SoD violation is considered **preapproved**. Identity Governance will prompt the SoD policy owner or SoD administrator to provide the following information that will be used to automatically approve the actual SoD violation if the potential SoD violation becomes an actual SoD violation:

- **Preapproval expiration period**. If the potential SoD violation is detected as an actual SoD violation within this period, the SoD violation will be automatically approved. If the SoD violation is detected after this period, it is *not* automatically approved and must be resolved or approved manually by the SoD policy owner or the SoD administrator.

  NOTE: The actual SoD violation could be the result of someone fulfilling these specific requests, or because of other provisioning actions that were taken by users. Regardless of the reason, if the SoD violation occurs, preapproval will be given if the SoD violation occurred in the specified preapproval time period.

- **Reason for SoD approval**. Justification for approving a potential SoD violation.
- **Approval control period (days)**. If the preapproved violation is detected before the expiration period, the violation will be approved for the number of days specified here.
- (Optional) **Compensating Control**. If compensating controls were specified in the SoD policy, the selection here indicates which compensating controls apply to the preapproval.

NOTE: If an SoD policy changes its conditions, is deactivated, or is deleted, all potential SoD violation approval tasks associated with the SoD policy will be automatically finalized and submitted. Request items that were tentatively approved will be marked approved, items that were tentatively denied will be marked denied, and items where no decision was made will be marked as cleared. Items that were marked approved or cleared and were not associated with other potential SoD violation approval tasks will be advanced to their next phase (approval or fulfillment). For more information about viewing request status, see Section 22.2, “Requesting Access,” on page 230.

20 Calculating and Customizing Risk

Identity Governance allows custom definition of risk based on your policies and risk tolerance. Customized risk ranges and levels allow Identity Governance to calculate risk scores for your organization, users, applications, business roles, and permissions. Use risk scores to focus reviews and measure impact. Risk scoring supports better context for decision-makers who conduct reviews prioritized by risk scoring based on attribute value, group membership, management relationship, application, permission, cost, risk, and other criteria. For more information about conducting reviews based on risk, see Chapter 23, “Creating and Modifying Review Definitions,” on page 237.

- Section 20.1, “Understanding Risk Levels and Risk Scoring,” on page 207
- Section 20.2, “Configuring Risk Levels,” on page 213
- Section 20.3, “Configuring Risk Scores,” on page 214
- Section 20.4, “Setting and Viewing Risk Calculation Schedules and Status,” on page 215
- Section 20.5, “Viewing Calculated Risk Scores,” on page 215
- Section 20.6, “Exporting and Importing Risk Policies,” on page 216

20.1 Understanding Risk Levels and Risk Scoring

Identity Governance provides **risk levels** to help you classify and label risk factors that matter to your organization. You can configure the number of levels, size of levels, and names of levels to make them appropriate for your organization and stakeholders. **Risk scoring** provides a means for manually setting or calculating risk for the entire organization as well as for catalog objects and policies.

Identity Governance administrators can customize the following risk policies:

- Risk level configuration
- Governance risk score
- Application risk score
- User risk score
- Risk score schedule

Users with the following authorizations can manage and customize risk settings for your Identity Governance environment:

- Customer, Global, or Data Administrator
- Auditor (read only)

See the following sections for more details about how Identity Governance helps you manage risk in your environment:

- Section 20.1.1, “Risk Levels,” on page 208
- Section 20.1.2, “Risk Scoring,” on page 208

- Section 20.1.3, “Risk Factors,” on page 209
- Section 20.1.4, “Risk Score Calculation Details,” on page 211
- Section 20.1.5, “Visualizing Risk,” on page 213

20.1.1 Risk Levels

Identity Governance gives you the flexibility to create a risk scale of your own choosing. If your environment requires a high level of granularity, you can specify up to 10 risk levels. When you set the risk level size, Identity Governance automatically divides the risk levels in even increments and sets the maximum risk value for calculated values to the maximum value specified in your settings. You can further customize the risk levels by providing your own naming system to the levels. A color-code is assigned to each level ranging from blue at the low end to red at the high end.

20.1.2 Risk Scoring

A risk score quantifies the level of risk that an entity, such as a user or account, exposes an organization to. A higher risk score indicates that you have identified that item as riskier to your organization. You can **manually set** risk scores by collecting risk score attributes along with objects you collect or by using Identity Governance to assign risk scores to individual objects.

You can collect risk scores or assign risk scores to the following items:

- Users
- Accounts
- Applications
- Permissions
- Technical roles
- Separation of duties policies
- Business roles
- Certification policies

A **calculated** risk score is based on risk factors and the relative weighting of those factors that you define. You can configure Identity Governance to calculate the following risk scores, either on demand or on a regular schedule:

Governance (your overall system score)

Represents the current level of risk related to access and security that your organization is exposed to based on the risk factors and risk weights you have defined.

Application

Represents the current level of risk related to access and security of each application that your organization is exposed to based on the risk factors and risk weights you have defined.

User

Represents the current level of risk related to access and security for each user that your organization is exposed to based on the risk factors and risk weights you have defined.

NOTE: Objects and policies whose risk was not set are *not* considered in calculations. Only objects and policies with zero or greater than zero value is included in calculations. For example, if a user has two accounts with 50 and “Not set” as respective risk value, then the average **Base Score** calculation for **Risk of accounts assigned to the user** will be 50 as the second account will be ignored as its value was not set.

20.1.3 Risk Factors

Risk factors, metrics that affect a risk score, apply to specific items and can have a positive or negative impact on the item's risk score. The weight of a risk factor is the percentage of an item's risk that the factor comprises. The maximum value for any risk factor component is the maximum risk score for the item multiplied by the percentage weight of the factor. For example, an organization specifies that user risk score has a maximum value of 1000 and 3 risk factors of equal weight. Each risk factor can only account for one third of the user's risk score.

For some risk factors, Identity Governance uses either the average value or the maximum value for that factor, based on which one you select. Other risk factors use a range of values that you set. When you assign a weight to a risk factor, such as **Number of unmapped accounts**, Identity Governance then looks at the range you have specified. If the value of the risk factor is at or above the high range, Identity Governance applies the full weight for that risk factor to the risk score. If the value is below the high range, Identity Governance applies a percentage of the weight that is appropriate to the percentage of the high range for the value. If a risk factor value is at or below the low range, that factor does not add anything to the risk score.

You can use the following risk factors to control how Identity Governance calculates risk scores in your environment.

Governance Risk Factors	Risk Factor Type
User risk scores	Average or Max
Application risk scores	Average or Max
Account risk scores	Average or Max
Business role risk scores	Average or Max
Technical role risk scores	Average or Max
Permission risk scores	Average or Max
Number of unmapped accounts	Low to high range
Number of unauthorized assignment (permission and technical role)	Low to high range
Number of outstanding SOD violations	Low to high range
Number of expired certification violations	Low to high range
Total number of certification violations	Low to high range
Number of no decision certification violations	Low to high range
Number of not reviewed certification violations	Low to high range

Application Risk Factors	Risk Factor Type
Risk of assigned permissions in application	Average or Max
Risk of accounts in application	Average or Max
Number of unmapped accounts	Low to high range
Number of permissions in the application	Low to high range
Number of exceptions (access not authorized by policy)	Low to high range
Number of expired certification violations	Low to high range
Total number of certification violations	Low to high range
Number of no decision certification violations	Low to high range
Number of not reviewed certification violations	Low to high range
Collected application risk score attribute	Application attribute. Typically, application risk.

User Risk Factors	Risk Factor Type
Risk of permissions assigned to user	Average or Max
Risk of accounts assigned to user	Average or Max
Number of outstanding SOD violations	Low to high range
Number of exceptions (access not authorized by policy)	Low to high range
Number of permissions assigned to the user	Low to high range
Number of business roles the user is in	Low to high range
Collected user risk score attribute	Value
Number of expired certification violations	Low to high range
Total number of certification violations	Low to high range
Number of no decision certification violations	Low to high range
Number of not reviewed certification violations	Low to high range
Days past expired certification	Impact

20.1.4 Risk Score Calculation Details

Identity Governance performs separate calculations to determine an overall governance risk score and overall risk scores for each application and user.

NOTE: Large data sets can result in long calculation times. Identity Governance allows you to click **Cancel** to stop a risk score calculation in progress. If you have a large data set, consider scheduling risk score calculation at a time outside of normal business hours. See Section 20.4, "Setting and Viewing Risk Calculation Schedules and Status," on page 215.

The calculations use the following variables:

- **RFV:** raw risk factor value
- **LL:** lower boundary (typically 0)
- **UL:** upper boundary (100)
- **URL:** upper risk level value from risk level configuration
- **FW:** factor weight as a percentage
- **RRFV:** ranged risk factor value
- **RIS:** raw impact score. This is set to the impact value of the first interval range that matches the RFV.
- **NPA:** number of assigned permissions

Calculations include the following scores:

- **FRS:** factor risk score
- **RS:** overall entity risk score calculated as sum of all configured risk factor scores for the specific entity with FW > 0

Count risk factor score

FRS = RRFV * FW/100 where:

- RRFV = URL if (RFV - LL) > 0 is true and (RFV - UL) >= 0 is true
- RRFV = 0 if (RFV - LL) > 0 is false
- RRFV = RFV*URL/(UL-LL) if (RFV - LL) > 0 is true and (RFV - UL) >= 0 is false

Example

When:

- RFV is equal to NPA
- LL = 0
- UL = 50
- URL = 500
- FW = 100

Then:

- For NPA = 15, RFV = 15 and 15 - 0 > 0 is true and 15 - 50 >=0 is false; RRFV = 15*500/(50-0) = 150 and FRS = 150*100/100 = 150

- For NPA = 50, RFV = 50, and 50 - 0 > 0 is true and 50- 50 >=0 is true; RRFV = 500 and FRS = 500*100/100 = FRS = 500
- For NPA = 0, RFV = 0, and 0 - 0 > 0 is false; RRFV = 0 and FRS = 0*100/100 = 0

Aggregate risk factor score

FRS = RFV * FW/100

Interval based impact risk factor score

NOTE: This score is supported only for the overdue violations risk factor.

FRS=RIS * FW/100

Example

User has the following types of certification policy violations:

- No decision violation - 1
- Overdue 5 days violation - 1
- Overdue 15 days violation - 2
- Overdue 100 days violation - 3

Interval is configured as:

- Impact 200 for violations overdue 1 to 100 days
- Impact 400 for violations overdue over 101 days

FW is set to 100.

Based on the above conditions:

- RFV will be set to 100 because the certification policy violations max number of days overdue is 100
- RIS will be set as 200 because RFV = 100 is within the first interval range
- FRS = 200*100/100 = 200

Overall entity risk score

RS = SUM(FRS) where FW > 0

Keep in mind the following notes about raw score values:

- For **average or max risk factor types**, the raw score will be set to either the average or maximum value of all values for a specific calculation. For example, if the administrator has configured that the risk of permissions assigned to users be averaged, Identity Governance averages the permission risk values for each user in the catalog and reports this number as the raw score.
- For **low to high range risk factor types**, the raw score will be the value for a specific measure. For example, for the **Number of outstanding SOD violations** risk factor, the base score will be equal to the total number of outstanding SoD violations.
- For **value risk factor types**, the raw score will be set to a value. For **Collected user risk score attribute** factor it will be set to the value of the user attribute configured in the risk factor. For the **Risk** attribute it will be set to the collected risk value. For any other attribute, it will be set to the collected or curated value at calculation time.
- For **impact risk factor types**, the raw score will be set to a number of days.

Keep in mind the following notes about ranged scores:

- For **low to high range risk factor types**, the ranged score will depend on upper and low boundaries configured for a factor. The upper boundary is the value at which risk is maximal. Risk level has a boundary and factors have a boundary.

  The calculation compares the value to the upper bound to scale it. If the value is at or above the bound, it will apply the full weight to the target raw risk score. If the value is below the upper bound, it will determine the percentage of the upper bound (max risk) that the raw score represents and use that to determine the range to apply.

  The lower bound indicates that this factor is below threshold and should not have any effect on the risk score.
- For **impact risk factor types**, the raw score will be evaluated against the configured interval and proper impact will be determined.

20.1.5 Visualizing Risk

Identity Governance provides several ways you can visualize the risk factors in your environment. In most areas, you can also drill down to details that show you more context for how Identity Governance has assessed the risk.

- As a separate tab on **User** and **Application** details pages
- As a governance risk score, and trend graph if multiple scores exist, displayed on the **Overview** page
- As a governance risk score and context information on the **Risk** policy administration page

Identity Governance assigns a color code to each risk level ranging from blue at the low end to red at the high end. These colors display with risk scores to help you further understand how the score fits into your customized risk level ranges.

20.2 Configuring Risk Levels

Identity Governance provides five risk levels in 20-point increments by default. You can set risk values for most objects in the catalog and for separation of duties policies and business roles. Identity Governance lets you customize the number, size, and name of each risk level. For example, if you set four risk levels with a size of 25, Identity Governance creates four equally sized risk levels of 0-25, 26-50, 51-75, and 76-100.

1. Log in as a Customer, Global, or Data Administrator.
2. Under **Policy**, select **Risk**.
3. Expand **Risk Level Configuration**.
4. Specify the number of risk levels and the size for each level.
5. (Optional) Select a risk level label, such as **Low** or **High**, and type the desired value to customize the label.

When you set risk values on objects and policies, Identity Governance displays these risk level names so you can easily see whether an object has a risk score associated with it and the risk level label as defined in your environment.

20.3 Configuring Risk Scores

You can customize the way Identity Governance summarizes the risk in your environment, either through manual or calculated risk scores. Governance risk score measures risk across your entire system, application risk score measures risk for each application, and user risk score measures the risk for each user. You can assign risk scores manually by editing values in the catalog, either individually or through bulk data updates. If you edit extended attribute risk values that had been collected, Identity Governance uses the edited values for extended attributes for risk calculation instead of the collected values. For more information, see Section 11.3, “Editing Attribute Values of Objects in the Catalog,” on page 107.

To have Identity Governance calculate risk scores for your environment, you select which factors contribute to risk calculation, configure how much weight each risk factor carries in calculations, and then direct Identity Governance to start the calculation process by clicking **Calculate**. Some risk factors that you can select, such as Certification policies, require that you actually have the factor configured for your environment to have Identity Governance use that factor in the risk score calculation. For more information, see “Creating and Editing Certification Policies” on page 279.

To configure risk scoring:

1. Log in as a Customer, Global, or Data Administrator.
2. Under **Policy**, select **Risk**.
3. Click the gear icon on a risk score badge to customize it.
4. For the governance risk score, you must assign weights and risk factor ranges to enable Identity Governance to calculate risk.

   NOTE: The governance risk score depends on application and user risk scores.

5. For applications and users, in **Risk scoring**, select **Calculated** to show the risk factors and weights.

   NOTE: The application risk score depends on user risk score.

6. For each risk factor that you want to use, specify the weight for that risk factor and customize the range values you want to use. When setting a range, any value below the low range will have zero risk set. Any value above the high range will have the maximum risk value set. For more information, see “Risk Factors” on page 209.
7. Continue assigning weight values to risk factors until your risk factor weights add up to your desired amount.
8. Select **Save** and then select **Calculate**.

   Identity Governance shows status when calculation is in progress and completed.

9. View calculated risk scores in the appropriate catalog section, such as users or applications, or on the **Overview** page for the Governance risk score. In the catalog, individual items have a **Risk Factors** tab, if applicable, that shows the calculated risk score details, such as risk score, last calculated date, and risk factors used in the calculation.

20.4 Setting and Viewing Risk Calculation Schedules and Status

You can set a regular schedule for Identity Governance to calculate risk scores in your environment.

1. Log in as a Customer, Global, or Data Administrator.
2. Under **Policy**, select **Risk**.
3. Expand **Risk Score Schedule**.
4. (Optional) View status of recent risk score calculations. Each risk score section also contains the calculation status for that section.
5. Select **Active** and then set the details for Identity Governance to calculate risk in your environment, such as start and end date and time details and whether to repeat on a regular schedule.

20.5 Viewing Calculated Risk Scores

After you configure Identity Governance to calculate risk scores, you can view risk scores of items in the catalog and your overall governance risk score on the **Overview**.

1. Log in as a Customer, Global, or Data Administrator.
2. (Conditional) On **Overview**, view the Governance risk score for your organization if you have configured Identity Governance to calculate the Governance risk score.
3. (Optional) Select the score to display the risk factors and other details of how Identity Governance calculated this score.
4. (Optional) Select **Edit** to change the factors of this calculation.
5. Under **Catalog** select **Users** or **Applications** and select a user or application to see the user's or application's risk score displayed on the right side of the window.
6. Select **Risk Factors** to display the configured details for how Identity Governance calculated the risk score, along with the raw and weighted scores calculated for each risk factor.

   Base Score

   The score for a risk factor based on the configured type, such as average or specified range. For example, if the administrator has configured that the **Risk of permissions assigned to user** be averaged, Identity Governance averages the permission risk values for each user in the catalog and reports this number as the base (raw) score.

   Weighted Score

   The calculated score for a risk factor based on the configured weight for that risk factor. For example, if the administrator has configured that the average value of **Risk of permissions assigned to user** be 50% of the total risk score for each user, Identity Governance takes 50% of the base score and reports this number as the weighted score.

20.6 Exporting and Importing Risk Policies

Once you have configured your risk levels, scores, and schedule, you can also export all the configured policies as a JSON file, edit it if required, and import it into another Identity Governance environment.

To export and import risk policies:

1. Log in as Customer, Global, or Data Administrator.
2. Under **Policy**, select **Risk**.
3. Configure risk levels, scores, and schedule and save each policy.
4. Select **Export Risk Policies**.
5. (Conditional) When you set calculated risk scores for users in the system, export schema definition of user risk attribute if needed.
6. To import risk policies, select **Import Risk Policies**.
7. Identity Governance detects whether you are importing new or updated policies and whether the updates would create any conflicts or have unresolved references.
8. Select how to continue based on what information is displayed. For example, under **Updates**, compare the imported values with current values for each entity by selecting the respective policy.
9. Select the policies you want to import, and then click **Import**.

21 Administering Access Request

The Customer, Global, or Access Request Administrator must configure policies that govern who can request access and who can approve access requests in your environment. Request policies define which applications, permissions and technical roles access can be requested in the Access Request interface. Request approval policies define the approvals needed when users request access.

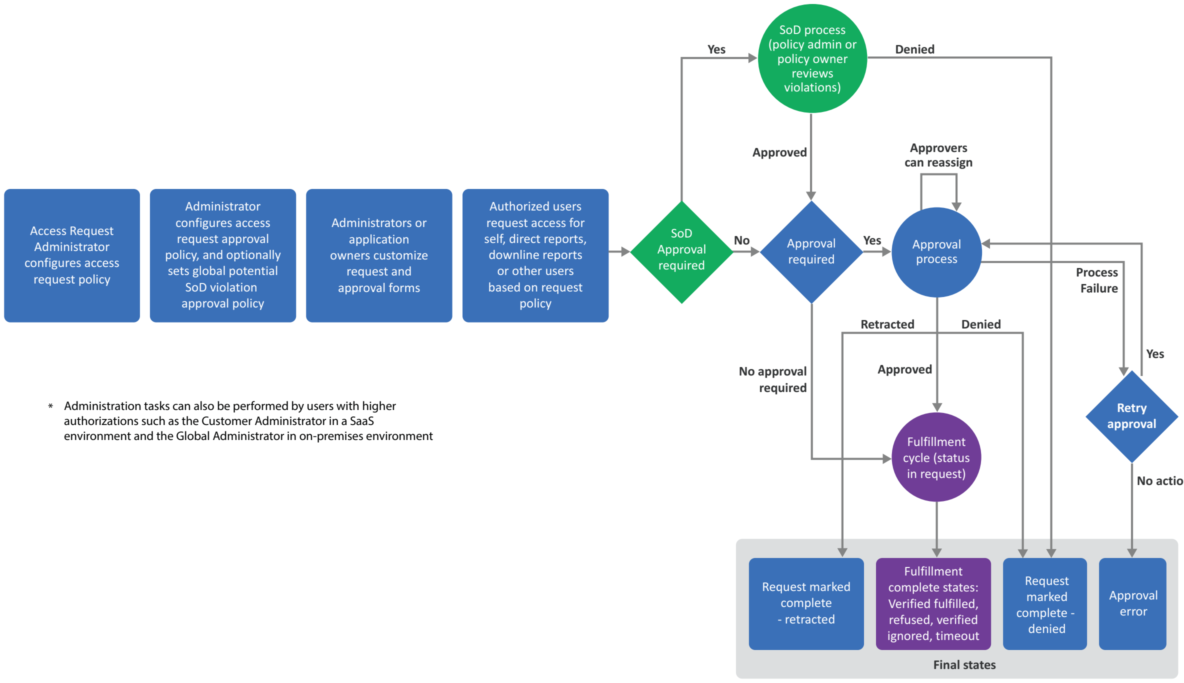
In addition to configuring policies, administrators can also customize the request and approval forms for permissions and applications and simulate the request and approval workflow.

- Section 21.1, “Understanding Access Request,” on page 217
- Section 21.2, “Configuring Access Request,” on page 218
- Section 21.3, “Creating and Editing Request and Approval Forms,” on page 221
- Section 21.4, “Assigning Request to Identity Governance Users,” on page 224
- Section 21.5, “Downloading and Importing Access Request and Approval Policies,” on page 225
- Section 21.6, “Disabling the Access Request Service,” on page 226

For more information about using the Access Request interface, see Chapter 22, “Instructions for Access Requesters and Approvers,” on page 229.

21.1 Understanding Access Request

Figure 21-1 *Access Request Process*


Access Request Administrator configures access request policy
Administrator configures access request approval policy, and optionally sets global potential SoD violation approval policy
Administrators or application owners customize request and approval forms
Authorized users request access for self, direct reports, downline reports or other users based on request policy
SoD Approval required
Yes
SoD process (policy admin or policy owner reviews violations)
Denied
Approved
No
Approval required
Yes
Approvers can reassign
Approval process
Process Failure
Yes
Retry approval
No action
Retracted
Denied
Approved
No approval required
Fulfillment cycle (status in request)
Request marked complete - retracted
Fulfillment complete states: Verified fulfilled, refused, verified ignored, timeout
Request marked complete - denied
Approval error
Final states

* Administration tasks can also be performed by users with higher authorizations such as the Customer Administrator in a SaaS environment and the Global Administrator in on-premises environment

The Access Request capability allows administrators, application owners, supervisors, and other users to perform various tasks based on their authorizations. The Identity Governance users can perform the following tasks based on their runtime authorizations and the request and approval policies:

- Review their current access or the access for other users
- Review access that is recommended for them based on business role policies
- Browse and request application access that is available to request
- Browse and request technical roles to request a group of permissions in a single step
- Retract access request
- Retry failed request after fixing the cause of the error
- Compare access of multiple users when authorized by request policy
- Approve requests when assigned as an approver in approval policy
- Approve or resolve potential SoD violations when assigned as an approver in SoD violation policy
- View a list of current access requests, status of each request, and a timeline of all related events including fulfillment
- View a list of completed requests and approvals

In addition to the above tasks, users with Access Request Administration authorization can:

- Create, edit, preview changes, compare to draft, simulate workflow, and publish customized request and approval forms for permissions and applications.
- Create approval policies to specify requests that need approval or that enable requests to be pre-approved or automatically routed for approval. For example, administrators can make access to an application available for anyone in your organization to request. Upon request, the access might be automatically granted based on the requester’s business role membership or routed to another person for approval, such as the requester’s supervisor or the application owner.

21.2 Configuring Access Request

Setting up Identity Governance for Access Request requires configuring several items:

- (Optional) Business roles
- (Optional) Technical roles
- (Optional) Application and permissions request forms
- (Optional) Application and permissions request approval forms
- Request policies
- (Optional) Request approval policies.
- Request policies assigned to resources and roles

As indicated above, you need not configure all the items. Create business roles if you want to show recommended access to users and do not already have any business roles in your system. For more information, see Chapter 17, “Creating and Managing Business Roles,” on page 161. Create technical roles to group permissions if you want to enable users to request access to many permissions in a single step. For more information, see Chapter 16, “Creating and Managing Technical Roles,” on page 151. Create a request approval policy if you need access requests to require approval. Otherwise, the default approval policy will be in effect. The default approval policy does not require approval. Create and edit request and approval forms if you want to provide custom options to users. For more information about request forms and request approval policies, see the following sections:

- Section 21.2.1, “Creating Request Policies,” on page 219
- Section 21.2.2, “Creating Request Approval Policies,” on page 220
- Section 21.2.3, “Assigning Resources to Request and Approval Policies,” on page 220
- Section 21.2.4, “Setting Global Potential SoD Violation Approval Policy,” on page 221

21.2.1 Creating Request Policies

To allow users to request access, you must create request policies. Request policies define what access can be shown and requested in the Access Request interface. Users with the Customer, Global, or Access Request Administrator authorization can create request policies.

1. In Identity Governance, select **Policy > Access Request Policies**.
2. On the **Request Policies** tab, select **+** to create a new policy.
3. Name the policy.
4. Select types of requests that all users are allowed to make. For example, if you want all users to be able to request access for themselves and their direct reports, select **Self** and **Direct Reports**.

   NOTE: Granting ability to request access for **All Users** automatically provides the user with the ability to request for **Self**, **Direct Reports**, and **Downline Reports**. Granting the ability to request for **Downline Reports** automatically provides the ability to request for **Direct Reports** as well.

5. For more granular control of specific users and groups, use the **Allowed Users** and **Allowed Groups** sections. For example, if you want specific users or groups to be able to request access for all users, specify that here.

   NOTE: If **All Users** are granted the ability to request for a certain type of user, you do not need to grant that same ability to specific users or groups. For example, if **All Users** are granted the ability to request for **Self**, you do not need to grant the ability to request for **Self** to specific users or groups.

6. For exclusions, use the **Disallowed Users** and **Disallowed Group** sections.
7. Use **Allowed Business Roles** to add members of business roles as requesters for self, downline reports, direct reports, or all users.
8. Save the policy.
9. (Optional) Select the gear icon in the **Applications**, **Permissions**, and **Roles** (technical roles) tabs to customize column display. For example, in **Permissions** tab you can drag and drop **Authorized By** column to view if a permission is from an Identity Manager role or application or from an Identity Governance role.
10. Add applications, permissions, and technical roles on the respective tabs.

21.2.2 Creating Request Approval Policies

To set appropriate approvals for requested access, you must create request approval policies. Identity Governance provides a default approval policy that you can edit. You can also create new request approval policies to further define your approval policies for various situations.

1. In Identity Governance, select **Policy > Access Request**.
2. On the Approval Policies tab, select **+** to add an Access Request approval policy.
3. Name the policy.
4. Add one or more approval steps, depending on how many levels of approval you require. For each approval step:
   - Specify approvers

     NOTE: You can use coverage maps to specify approvers. For information about coverage maps, see "Using Coverage Maps" on page 26.

   - View notification emails, and optionally set reminder email frequency and add recipients
   - Set escalation period and specify escalation approvers
   - Set expiration period and assign default action at the end of the expiration period
5. Save the policy.

21.2.3 Assigning Resources to Request and Approval Policies

After you have created request or approval policies, you can assign resources to them, such as applications, permissions, and technical roles.

1. In Identity Governance, select either the applications, permissions, or roles catalog.
2. Select the applications, permissions, or roles you want to apply request policies to.
3. In **Actions**, select the option you want. You can:
   - Assign access request policy
   - Remove access request policy
   - Assign approval policy

You can also import assignments, assign resources to a policy, or remove resources from a policy while editing the policy definition.

1. (Conditional) If you have an assignments file that you had chosen to export when exporting a access request policy, click **Import Assignments** in the policy details page to import assignments.

   NOTE: If you import more than the preconfigured threshold for assignments, you cannot import assignments using the assignments file and will need to import the policy from the policies list page.

2. Alternately, assign resources.

   2a Select the **Applications**, **Permissions**, or **Roles** tab.

   2b Select **+** under the tab to select resources of the specific type to assign to the policy.

3 (Optional) Specify if a request for a technical role access should be approved at the role level or at the individual permission level.

3a Select one or more technical roles.

3b Select **Actions > Set Role Level Approval** to enable approval of all requests for permissions included in the technical role as a group.

Or

Select **Actions > Set Permission Level Approval** to enable approval of each permission included in the technical role individually.

4 Select the resources to be removed using the check box next to the ones you want to remove.

5 Select **Remove** to remove the selected resources.

NOTE: You cannot remove resources from the default approval policy in this way. A resource can only be removed from the default approval policy by assigning it to another approval policy. Also, removing a resource from a policy other than the default approval policy will re-assign the resource to the default approval policy.

21.2.4 Setting Global Potential SoD Violation Approval Policy

Global potential SoD violation approval policy applies to *all* access requests that if granted might result in Separation of Duties (SoD) violations. It determines if approvals are required for potential violations and if required are self-approvals allowed. For more information about SoD and SoD violations, see Chapter 18, “Creating and Managing Separation of Duties Policies,” on page 195 and Chapter 19, “Managing Separation of Duties Violations,” on page 201

To set global potential SoD violation approval policy:

1 Log in as a Customer, Global, Access Request, or SoD Administrator, or as a policy owner.

2 In Identity Governance, select **Policy > Access Request**.

3 On the **Potential SoD Violation Approval** tab, select **Require approval for potential SoD violations**.

4 (Conditional) If approval is required, select **Allow self approval of potential SoD violations** to allow access requester to approve their own potential violations. Note that regardless of this setting, Customer or Global Administrator can always approve their own potential violations.

21.3 Creating and Editing Request and Approval Forms

Identity Governance provides default request and approval forms for applications and permissions access. When more complex forms are required, authorized administrators, application owners, or their delegates can also customize the default forms or create customized forms for one or more applications and permissions using Forms Builder and Forms Renderer. **Forms Builder** enables you to design forms; add and validate data; edit JSON forms directly in the application; and seamlessly pass the user and approver submissions to Identity Governance request and fulfillment workflows. **Forms Renderer** uses the form JSON schema to render the forms and generate corresponding APIs.

For a detailed description of Forms Builder and its procedures, see *Administrator's Guide to Form Builder*.

- Section 21.3.1, "Customizing Default Application or Permission Forms," on page 222
- Section 21.3.2, "Creating Custom Forms for One or More Permissions and Applications," on page 223
- Section 21.3.3, "Editing Custom Form Components and Forms," on page 224

21.3.1 Customizing Default Application or Permission Forms

Identity Governance provides form sets (request and corresponding approval form) by default. On the Application Default Forms or Permission Default Forms tabs on the Access Request Policies page, you can choose a sample application or permission respectively, and simulate workflow to review default forms. If you want to customize the default forms, you can use Form Builder to customize them.

When you customize a default request form, you also need to add the corresponding controls to the default approval form to facilitate data flow. For example, if you want to add a Supervisor field to the request form, you must also add that field to the default approval form.

To customize default application or permission request and approval forms:

1. Log in to Identity Governance as a Customer, Global, or Request Administrator or an Application Owner.
2. Select **Policy** > **Access Request Policies**
3. Select **Application Default Forms** or **Permission Default Forms**.
4. Choose an application or permission that you can use to simulate a request and approval workflow.
5. Simulate a workflow and review the default fields.
6. Click the default request form to launch Form Builder in a new browser tab.
7. Drag and drop form components, configure related settings, and save the form. For Form Builder procedures, see *Administrator's Guide to Form Builder*.
8. Select the Identity Governance browser tab to return to the policy page.
9. Click the approval form to launch Form Builder.
10. Duplicate the changes you made to the request form and save the form.
11. Select the Identity Governance browser tab to return to the policy page.
12. Publish forms individually or select **Actions > Publish Forms** to publish the request and approval form.
13. Compare the draft to published forms.
14. If needed, make additional changes or revert changes by selecting **Actions > Revert form set to default.**

15 (Conditional) If you had previously created custom forms for permissions or applications, you can select additional actions such as **Change form set**, **Copy existing form set**, or **Assign form set**. For information about creating form sets, see Section 21.3.2, "Creating Custom Forms for One or More Permissions and Applications," on page 223

16 (Optional) Select **Actions** and rename forms or the form set.

21.3.2 Creating Custom Forms for One or More Permissions and Applications

In addition to customizing the default forms, you can further customize forms for specific permissions or applications. As stated earlier, when you customize the request form, you also need to add the corresponding controls to the approval form to facilitate data flow. For example, when you add Select Box and Reason components to your Custom Request Form for laptop permission, you also need to add them to the Custom Approval Form so that the user selection and reason is passed to the approval form.

To create a custom request and approval form:

1 Log in to Identity Governance as a Customer, Global, or Request Administrator, or an Application Owner.

2 Select **Catalog > Applications > *Application Name*** or select **Catalog > Permissions > *Permission Name***.

3 Create a new custom request and approval form:

3a Select **Actions > Add form set**.

3b Click **Create Form Set**.

3c Click the request form to launch Form Builder in a new browser tab.

3d Drag and drop form components, configure related settings, and save the form. For Form Builder procedures, see *Administrator's Guide to Form Builder*.

3e Click the approval form to launch Form Builder.

3f Duplicate the changes you made to the request form and save the form.

4 (Conditional) If you had previously created a custom form set, assign or copy an existing custom form set to another permission or application:

4a Select **Actions > Copy existing form set** or **Actions > Assign form set**.

4b Select a form set from the list of custom form sets, rename the form set and forms' names, and create the new forms.

5 Select the Identity Governance browser tab to return to the catalog page.

6 Select **Actions > Publish Forms** to publish the request and approval form.

7 Compare the draft to published forms.

8 Click **Simulate Request Workflow** to simulate the requester and approver experience.

9 (Optional) Rename a custom form or a custom form set by selecting **Actions > Rename form** or **Actions > Rename Form Set** respectively.

NOTE: If needed, you can always revert to the default forms or default form set by selecting **Actions > Revert to default form** or **Actions > Revert form set to default** respectively.

21.3.3 Editing Custom Form Components and Forms

In addition to the ability to create custom forms using basic, advanced, and custom Form Builder components, you can also edit each form component and edit the form itself using JSON and JS (JavaScript) editors. For example, you can use the editors to construct instructions for fulfillment for laptop permission by adding JSON objects such as `flowdata`, which contains request data.

IMPORTANT: The JSON editor is meant for use by developers and advanced users to customize forms. Do *not* use it if you do not have JSON experience.

For more information about editing form components and using the editors, see *Administrator's Guide to Form Builder*.

21.4 Assigning Request to Identity Governance Users

The method for giving Identity Governance users the ability to request and approve access varies.

Access Request Activity	Configuration Method	Configured By
Add items to Browse list	Create an Access Request policy and add items to the policy.	Customer, Global, or Request Administrator
Add items to Recommended items list	Add items to a request policy that are covered in a business roles policy.	Customer, Global, or Request Administrator
Specify approval rules for request Items	Create a request approval policy and assign permissions, applications, or roles to that policy either while editing the policy definition or in the catalog using bulk select menu.	Customer, Global, or Request Administrator
Specify coverage map for request approvals	Create coverage map using **Policy > Coverage Maps** menu, and then specify approvers in a request approval policy as coverage map. For information about creating coverage maps, see "Using Coverage Maps" on page 26.	
Configure request item text or icons	(Verify) Edit the permission, application, or technical role in the data source, the catalog, or with the bulk edit feature.	Customer, Global, or Request Administrator
Create and edit custom request and approval form	Edit the permission or application in the catalog.	Customer, Global, or Request Administrator, or Application Owner

Access Request Activity	Configuration Method	Configured By
Manage how requests are fulfilled	Identity Governance **Fulfillment > Configuration.** For information about configuring fulfillment targets, see "Configuring Fulfillment" on page 130.	Customer, Global, or Request Administrator
Manage who can request on behalf of others	Requesters tab in appropriate Request Policy.	Customer, Global, or Request Administrator
Manage email notifications for request approvals	Notifications section in each approval step of the appropriate Request Approval Policy	Customer, Global, or Request Administrator
Create an Access Profile to allow requesting collections of authorizations	Technical role in the catalog added to Request Policy	Customer, Global, or Request Administrator
Control approval decision support information	Similarity profile settings in Identity Governance **Configuration > Role Mining and Analytics Settings**. For information about configuring similarity profile settings, see "Configuring Analytics and Role Mining Settings" on page 285.	Customer, Global, or Request Administrator

21.5 Downloading and Importing Access Request and Approval Policies

Once you have configured your request and approval policies, you can download all the configured policies as a zip file containing multiple JSON files and the policy list as a CSV file to back up your policies or to import the exported definition files into an Identity Governance environment.

Identity Governance automatically detects whether you are importing new or updated policies and whether the updates would create any conflicts or have unresolved references and displays the results. Additionally, you can generate an import report to review entities that were created, updated, or have conflicts.

To download and import policies:

1. Log in as a Customer, Global, or Request Administrator.
2. Under **Policy**, select **Access Request Policies**.
3. Select the request policies or approval polices on the respective tab.
4. To download a list of policies with name, description, and state as a CSV file, select **Actions > Download all as CSV** on the request or approval policies tab.

5 To download one or more policy definitions:

   5a Select one or more policies from the list, then click **Actions** > **Download Definitions**.

   5b Type the policy name or a meaningful description.

   5c (Optional) Download technical roles referenced in the policy and the applications associated with the referenced permissions.

   5d Select **Download**.

6 Select the download icon on the top title bar to access the saved file and download the file.

7 (Optional) Delete the downloaded files from the download area in Identity Governance.

   If you do not manually delete files, Identity Governance will automatically delete files based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

8 To import request and approval policies, select the respective import link on the respective tab and navigate to the exported policy definition folder.

9 Select the zip or JSON file you want to import.

10 Review the displayed information and determine whether to import references, which entities to import, and whether to overwrite the conflicts. For example, under **Updates**, compare the imported values with current values for each entity by selecting the respective policy.

11 (Conditional) If you import more than the preconfigured threshold for the number of policies that can be displayed on the import page or if the import fix size exceeds the preconfigured threshold, Identity Governance will switch to bulk import mode. When in bulk mode, instead of selecting whether to create, update, or handle conflicts for specific policies, you can select to import all new policies and update all existing policies. For conflicts, you can choose to either overwrite existing policies or create new policies.

   NOTE: The default value for policies that can be displayed is 200 or the value specified in `com.netiq.iac.importExport.maxImportsToDisplay` property.

12 (Optional) Generate a report of entities to analyze the import data. If you had previously imported assignment data, you will be able to review the assignment data report.

13 Select the entities you want to import, then click **Import**.

21.6 Disabling the Access Request Service

You can prevent displaying the Access Request pages in Identity Governance by disabling the Access Request service. When you disable the service:

- All Access Request options are removed from navigation
- Users with no rights in Identity Governance will not be redirected to Access Request
- All REST API calls for access request will return errors
- Users directly accessing the Access Request interface will see the following error message after login: `Access request services are disabled. Contact your system administrator.`

NOTE: This setting does not affect request and approval polices. Users still will be able to administer and view policies.

To disable the Access Request service:

1. Start the Identity Governance Configuration Utility in console mode.
   - **Linux:** Default location of `/opt/netiq/idm/apps/idgov/bin`, then enter `./configutil -console -password` *`database_password`*
   - **Windows:** Default location of `c:\netiq\idm\apps\idgov\bin`, then enter `configutil -console -password` *`database_password`*
2. Disable the Access Request service:

   ```
   config> add-property GLOBAL com.netiq.iac.access.request.enabled false
   ```
3. Exit the console and restart tomcat.

22 Instructions for Access Requesters and Approvers

Access Request allows you to request access and access removal for the following types of items:

- Applications
- Permissions
- Technical roles

Application access request gives you login privileges to that application. Permission access request gives you more rights within an application. Technical role access request gives you rights to a group of permissions based on the requested technical role definition and assigns you the technical role.

Identity Governance administrators define the policies that govern who can request access, what they can request for, for whom they can request for, and any required approvals. Approvers are notified by email of pending requests according to the approval policies, which allow you to configure the frequency of these notifications. Access Request approval policies may also designate CC and BCC email recipients, as well as an escalation policy in case the approver does not act in a timely fashion.

This section provides instructions for individuals using the Identity Governance Request interface to request or approve access for themselves or others.

- Section 22.1, "Reviewing Current Access and Requesting Access Removal," on page 229
- Section 22.2, "Requesting Access," on page 230
- Section 22.3, "Monitoring, Retracting, or Retrying Your Requests," on page 232
- Section 22.4, "Approving Access Requests," on page 233
- Section 22.5, "Approving Potential SoD Violations," on page 234
- Section 22.6, "Comparing Access of Multiple Users," on page 235

22.1 Reviewing Current Access and Requesting Access Removal

Current Access lists your permissions and technical role assignments. If you have permission to view access for others, you can change to another user to see their access items (permissions and technical role assignments). Additionally, you might also be allowed to remove access items for yourself and others.

1. In the Access Request interface, select **Current Access**.
2. Review the permissions you hold or the technical roles you are assigned to. Dynamic resources appear as a link that you can select to show additional information.
3. (Conditional) If you have permission to view other users, select your name under Current Access and change to the other user to review their permissions and technical role assignments.

4 (Optional) Click the permission or technical to view more information.

5 Select another user to view their current list of access items.

NOTE: The current list of access items is always for the user listed under Current Access.

6 (Optional) Remove access, type a reason, and then select **Add removal request to cart**.

If there is no **X** next to an item, that item is not removable.

NOTE: When you remove technical role access, Identity Governance will remove the technical role assignment and issue requests to remove the permissions of the role held by the user.

7 (Conditional) If you have any items in the shopping cart, select the shopping cart, and then click **Submit**.

NOTE: Selecting **X** next to a request in the shopping cart immediately removes the request from the cart, but does not submit the request.

22.2 Requesting Access

Under **Request**, you can:

- View recommended items in a tile view and request application access, application permission, or a technical role assignment for yourself or for a user for whom you are authorized to request permissions. Note that you *might* see recommended items to request if Identity Governance administrators have created and assigned business roles in your environment
- Browse and request items in table or tile view. Items that you can request are: application, application permission, or a technical role access for yourself or a user for whom you are authorized to request permissions.

NOTE: Dynamic resources, a specific type of permission, might require additional input. For example, if the dynamic resource is a phone, you might have to select a phone model.

To request applications, permissions, or technical role assignments:

1 (Conditional) If administrators have created and assigned business roles:

1a Select **Request > Recommended** to view a list of recommended items.

NOTE: Business role assignments determine these recommended items. If in your environment, Identity Governance administrators have not created and assigned business roles, you might not see any recommended items to request. Assigned technical roles will not be included in the recommended list.

1b (Optional) Search for specific request items using typeahead search or advanced filters.

1c Select an item, select from available options, enter a reason, and select **Add to request**. Repeat this to add more items to your cart.

2 Select **Request > Browse**. Identity Governance request policies determine who can request access and for what they can request. Also, items already assigned to you will not be available for request and can be viewed on your Current Access page.

2a (Optional) Select ***Your Name*** **> My Settings > Enable tile view** to view the Application and Technical Roles as tiles.

NOTE: Once you enable the tile view, you can switch from table to tile view on both request and approval pages.

2b Select the Permissions, Technical Roles, or Applications boxes or Application or Technical Roles tabs to view respective request items and sort them as needed.

NOTE: Technical roles enable you to request multiple permissions in a single step. The Application box enables you to request access to applications, whereas the Application tab lists permissions for each application and enables you to request individual permissions even when you cannot request access to the application itself.

2c Search request items by name, description, or category. Or click the filter icon to search using additional policies and request item attributes such as cost, risk, and owners.

2d Select the item you want to request, review any SoD violations, enter a reason, and select **Add to request**.

NOTE: If Identity Governance warns you of SoD violations, either change your request to resolve the violation or submit the request with the violations for an SoD administrator, SoD policy owner, or SoD or Access Request policy to approve or resolve the violation.

When you request access to a technical role, Identity Governance will generate requests for the missing permissions of the technical role and also assign the technical role to the user. The badges that display the technical roles will display a green check mark icon if the technical role is already assigned and a yellow warning icon if the technical role is assigned to the user, but the user is missing one or more permissions of the technical role.

3 (Conditional) If you have rights to request on behalf of others:

3a Select the current user to change for whom you are making the request.

3b Select an item, enter a reason, and select **Add to request**. Repeat this to add more items.

3c (Optional) Select a different user to review and request items for that user.

4 After you have requested items for all users, select the cart to review your choices.

NOTE: Selecting **X** next to a request in the shopping cart immediately removes the request from the cart.

When you review permissions available to request in the tile view, items have the following icons signifying the state of the item. The default table view has columns conveying the same information using check marks.

Shopping cart

Item was requested and is in the shopping cart, but the request has not yet been submitted.

Lock

Requested item needs approval.

Clock

Item was requested and is awaiting fulfillment or approval.

Check mark

User already owns the item.

5 Click **Submit** to submit your requests.

22.3 Monitoring, Retracting, or Retrying Your Requests

Identity Governance enables you to search, view, sort, and refresh a list of your current and completed access requests. You can also retract or retry a failed request. The status column displays details of the request, approval, and fulfillment events.

- Section 22.3.1, “Monitoring Requests,” on page 232
- Section 22.3.2, “Retracting Access Requests,” on page 233
- Section 22.3.3, “Retrying Failed Access Requests,” on page 233

22.3.1 Monitoring Requests

NOTE: Select the **Refresh** icon next to **My Requests** to refresh the status. Do not refresh the browser because it might lead to an error condition or require you to log in again. Additional administrator actions might also be required for the status to be updated.

To view a list of your requests, their status, and timeline:

1 Select **Requests > Requests**.

TIP: Requests that violate SoD policies have a warning icon next to the request name. Click the icon to view violated SoD policies.

2 Select the calendar icon to specify a date range for your search.

3 (Optional) Search for specific request items using typeahead search or advanced filters.

4 (Optional) Use page control (if shown) to page through all requests.

5 Select a request item status to view the timeline of underlying events associated with the request, including approver feedback to requester and fulfillment information.

NOTE: Identity Governance updates the request fulfillment status when fulfillers fulfill a request, and when the application or a Customer, Global, or Data Administrator collects and publishes the application data source. For example, after a request is manually fulfilled, the fulfilled waiting verification status on the request timeline will change to verified only after a collection and publication.

6 (Optional) Click **Show completed requests** and specify a date range to view historical requests.

NOTE: You can view only historical requests that are still in your operational catalog and have not been purged. The time period of items in the operational catalog depends on your company's data retention policies.

7 (Conditional) If you have the authorization to view other users' request, click **View all requests** at the top corner of the page to view all the requests.

22.3.2 Retracting Access Requests

When you might need to retract an access request that has not been fulfilled, you can revoke it directly in the application. A retracted request item moves from a tentatively retracted state to a completed retracted state.

NOTE: You can revoke a request only for a request item that is either in an approval pending or failed state. After fulfillment, use procedures in "Requesting Access" on page 230 to remove or add access.

1. In the Access Request interface, select **Request > My Requests**.
2. (Conditional) If the **Status** of a request item is Approval Pending or Approval Failed, click **Retract**.

22.3.3 Retrying Failed Access Requests

Occasionally, access requests can fail. For example, if OSP is configured for HTTPS, but the server where the request workflow is running does not have the proper certificate in the cert store to be able to communicate with, the request will fail. After you have fixed the issue, you can retry the failed request item.

1. In the Access Request interface, select **Request > My Requests**.
2. Check the error message for information about the request item with Approval Failed status.
3. Fix the issue or contact your system administrator to fix the issue.
4. After the issue is fixed, click **Retry**.

22.4 Approving Access Requests

If the Access Request policy specifies you as an approver for requests, you might have to approve requested items. Your Access Request administrators define these policies and specify items as needing further approval. Approval for technical role requests will display a single approval for the role if the Access Request Approval policy is configured for role level approval. Approving a role with role level approval, approves all permission requests associated with the role. If the approval policy is configured for permission level approval, approval requests will be generated for each permission the user does not hold. Those permissions will need to be approved individually.

Some administrators require business role members, a person's supervisor, or an application owner to approve requested items, and some items might require multiple approvers. In these situations, you must approve items before the next designated approver receives them.

1. In the Request interface, select **Approvals**.
2. (Optional) Search for specific request items using typeahead search or advanced search filters using the expression builder.

3 (Optional) In the title bar, select ***Your Name*** **> My Settings > Enable tile view** to view the Application and Technical Roles as tiles.

NOTE: Once you enable the tile view, you can switch from table to tile view on both request and approval pages.

---

4 (Optional) Select **Reassign** to delegate an approval task.

5 (Optional) In the title bar, select ***Your Name*** **> My Settings > Delegate Mappings** to delegate all your approval tasks.

6 To approve or deny all items within an approval request:

6a Expand the request and review details such as permission type, application, and request reason.

6b Select all items included in the specific approval request.

6c Select **Actions** and approve or deny requests to make a decision without providing additional information. Or approve or deny with additional information such as fulfillment instructions.

NOTE: Some approval forms for specific resources might have required parameters. In those cases, the only bulk option for that resource will be the approve or deny with info options because you are required to provide a value. When there is a required field, clicking the approve or deny buttons on the right hand side will also open up the approval form.

---

7 To approve or deny requested items individually:

7a Select a requested item and review the details about the request, including information that might be helpful in making a decision.

NOTE: By default, Identity Governance enables decision support information such as application name, permission type, risk, and business role authorization status. If you do not use business roles, and if you are also an administrator, you can disable the business role authorization status display by deselecting the **Administration > Analytics and Role Mining Settings > Show business role authorization status** option.

7b (Optional) Provide fulfillment instructions or feedback to the requester. These instructions are mainly used for manual fulfillment.

7c Select **Approve** or **Deny** for each requested item.

8 Select **Submit items**.

9 (Conditional) If you have the authorization to view other users' approval tasks, click **View all approvals** at the top corner of the page to view all the approval requests.

22.5 Approving Potential SoD Violations

Only users with Customer, Global, or SoD administrator authorization or users assigned as SoD policy owners can approve or deny potential SoD violations. Administrators can view all approval violations by clicking **View all SoD approvals**. For more information, see Chapter 19, "Managing Separation of Duties Violations," on page 201.

22.6 Comparing Access of Multiple Users

If you have permission to see and request items for others, you can also show multiple users with their permissions listed to compare their access. When you are comparing a user to other users, you can request items for the first user in the list, making it easy to ensure that users in the same job role have the same access.

1. In the Access Request interface, select **Compare**.
2. Under **User Access Comparison**, select the user whose access you want to compare with others.
3. Select the permissions tab or the technical roles tab to compare permissions or technical role assignments.
4. Select **Compare to** for a list of users to compare with the first user.
5. (Optional) To continue adding to the table, select **Compare to** and choose additional users.

   As you add users to compare with the first user, Identity Governance adds permissions or technical roles in the first column to reflect the listed users' permissions or technical roles, adds check marks in the appropriate columns to show that a user owns a permission or technical role, and includes a link to add or remove permission or technical role for the first column for any permission or technical role you are allowed to change for that user.
6. (Optional) Select **Add** or **Remove** to change the permissions or technical roles for the first user in the table, enter a reason, and select **Add to request** or **Add removal request to cart**.

   NOTE: Dynamic resources might require additional input. For example, if the dynamic resource is a phone, you might have to select a phone model.
7. (Conditional) If you added access or removal requests to your cart, select the cart and submit the requests.

   NOTE: Selecting **X** next to a request in the shopping cart immediately removes the request from the cart, but does not submit the request.

23 Creating and Modifying Review Definitions

After you have data in your catalog, and (optionally) have customized review display column and configured reasons for review actions by accessing the **Configuration** menu; you can start creating review definitions based on your organization's requirements. The reviews enable a set of reviewers to examine who has access to what in their environment. In the review definition, you can assign runtime authorizations such as review owner and reviewers and specify review objects. Administrators can create review definitions for the following types of objects:

- Access permissions, accounts, or technical roles of a set of users
- Mapped and unmapped accounts
- Permissions assigned to the accounts
- Membership of a set of business roles
- Identity attributes that were previously configured as available for reviews
- Management assignments, specifically direct reports of supervisors
- Business role definition including authorizations, membership, and attributes that were previously configured for reviews

Only users with the Review Administrator, Customer Administrator, or Global Administrator authorization can create and modify review definitions.

- Section 23.1, "Viewing the Catalog," on page 238
- Section 23.2, "Understanding the Review Process," on page 239
- Section 23.3, "Understanding Micro Certification," on page 245
- Section 23.4, "Creating a Review Definition," on page 246
- Section 23.5, "Modifying a Review Definition," on page 253
- Section 23.6, "Customizing Review Display," on page 253
- Section 23.7, "Configuring Reasons for Review Actions," on page 254
- Section 23.8, "Specifying Reviewers," on page 255
- Section 23.9, "Downloading and Importing Review Definitions," on page 257
- Section 23.10, "Creating a New Review Definition from an Existing Review Definition," on page 258
- Section 23.11, "Improving Performance in Large Scale Reviews," on page 258

23.1 Viewing the Catalog

Before creating or editing review definitions, reviewing the data in the catalog will help determine who needs to be included in the reviews and which items should be reviewed. Some examples of the information a Review Administrator, Customer Administrator, or Global Administrator can look for are:

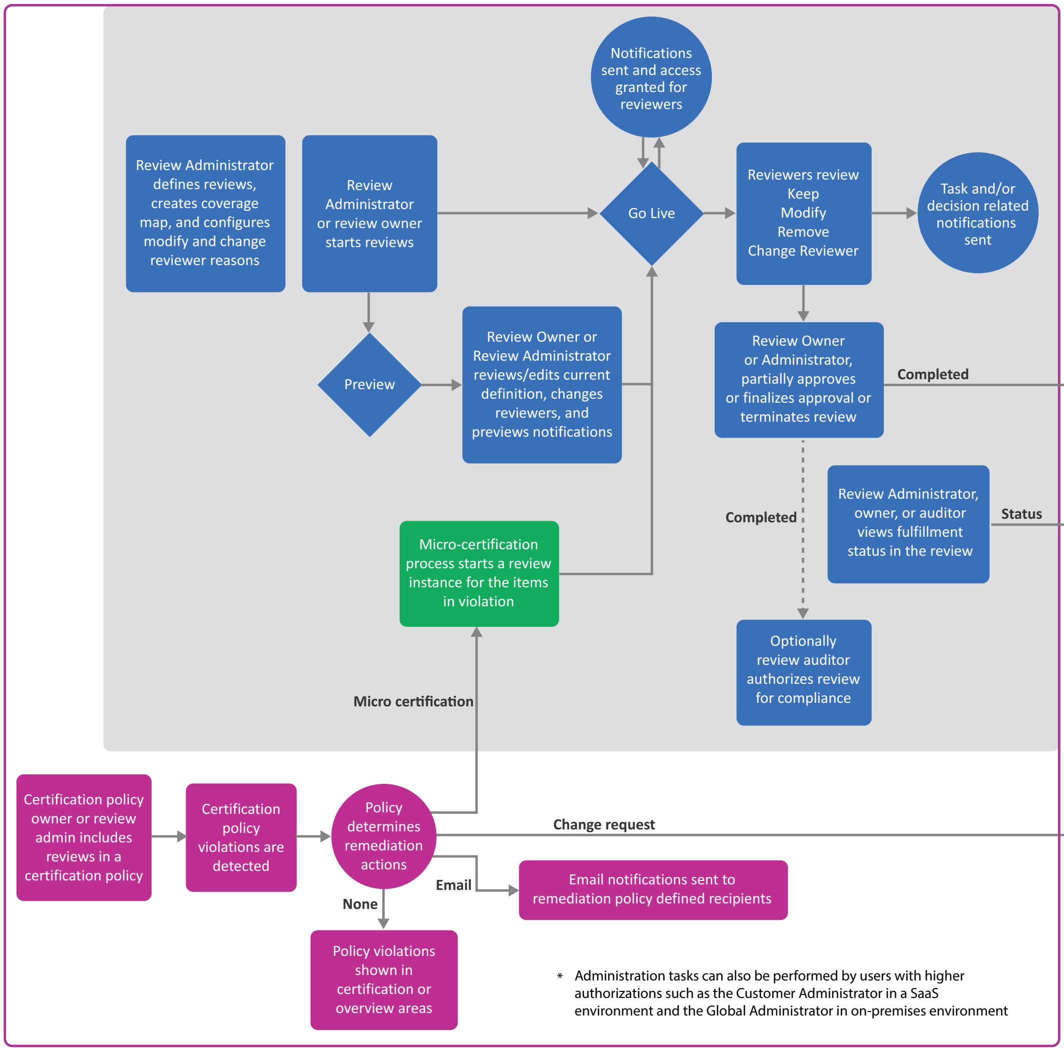
- Attributes of the user that may not be available in the **Quick Info** (view of an item, such as a user or a role, when you click on it) to help determine whether the person should be included in a review or not
- The last review date of an account

  NOTE: This date reflects the date when an account was last reviewed as part of an **Account Review**. Review of a user's access to an account as part of a **User Access Review** does not impact this date.

- Risk levels of users or permissions
- Association with an application
- Group, business role, or technical role membership
- Certification status of a user, specifically the date the user was last certified, and details of last review decisions and certification policy violations

23.2 Understanding the Review Process

***Figure 23-1** Review Process*


Notifications sent and access granted for reviewers
Review Administrator defines reviews, creates coverage map, and configures modify and change reviewer reasons
Review Administrator or review owner starts reviews
Go Live
Reviewers review Keep Modify Remove Change Reviewer
Task and/or decision related notifications sent
Preview
Review Owner or Review Administrator reviews/edits current definition, changes reviewers, and previews notifications
Review Owner or Administrator, partially approves or finalizes approval or terminates review
Completed
Fulfillment cycle
Review Administrator, owner, or auditor views fulfillment status in the review
Status
Completed
Micro-certification process starts a review instance for the items in violation
Optionally review auditor authorizes review for compliance
Micro certification
Certification policy owner or review admin includes reviews in a certification policy
Certification policy violations are detected
Policy determines remediation actions
Change request
Email
Email notifications sent to remediation policy defined recipients
None
Policy violations shown in certification or overview areas

* Administration tasks can also be performed by users with higher authorizations such as the Customer Administrator in a SaaS environment and the Global Administrator in on-premises environment

Reviews provide a way to monitor access to your business systems. Many users take part in the overall review process:

- Review Administrators create review definitions, preview review definitions, and manage reviews.
- (Optional) Review Administrators can request Data Administrators to configure additional selection criteria such as custom identity, permissions, permission assignment, or business role attributes for selecting review items and refine review definitions.
- Review owners start, preview, monitor, complete, and terminate reviews.
- Reviewers, such as supervisors and application owners, act on review items.
- Escalation reviewers review items in the exception queue
- Fulfillers manage change requests.

- Auditors accept or reject completed reviews.
- Review or Data Administrators create certification policies to check for violations and set remediation action which triggers remediations including micro certifications (focused reviews)

NOTE: The Identity Governance server needs a 30-minute gap between runs of the same review. For example, you terminate a scheduled review that is in progress. To schedule that review to run again, allow at least 30 minutes to lapse after terminating the previous run. Otherwise, the second run fails to start and Identity Governance does not notify you of the failure.

- Section 23.2.1, “Understanding Review Definitions,” on page 240
- Section 23.2.2, “Adding Selection Criteria for Review Items,” on page 241
- Section 23.2.3, “Setting Review Notifications,” on page 241
- Section 23.2.4, “Setting Review Expiration Policy,” on page 242
- Section 23.2.5, “Previewing a Review,” on page 242
- Section 23.2.6, “Reviewing Items,” on page 243
- Section 23.2.7, “Downloading Reviewers and Review Item Lists,” on page 243
- Section 23.2.8, “Escalating Review Items,” on page 244
- Section 23.2.9, “Completing or Terminating a Review,” on page 244
- Section 23.2.10, “Fulfilling Changes and Audit Acceptance,” on page 245
- Section 23.2.11, “Creating Certification Policies and Remediating Violations,” on page 245

23.2.1 Understanding Review Definitions

You can run a review once or multiple times either by starting the review manually or by scheduling it to start at the specified time or interval. Each review is based on a **review definition** that is based on a specific type of **review object** and defines all parameters for that particular review. Review Administrators, Customer Administrators, or Global Administrators create review definitions using the provided default review definitions with preselected criteria. These definitions enable you to select what you want to review. For example, you can select review objects such as User profiles, Technical role assigned to users, Accounts and their permissions, or Business roles assigned to users. These review objects are specific to a **review type** (review template). Each review type provides selection criteria that help Review Administrators to focus their reviews based on varying combinations of identity, application, account, permission, permission assignment, or business role attributes. For example, you can focus the User profiles review by specifying that reviewers should review users with risk greater than 80. Identity Governance provides a default list of attributes for selection when creating review definitions. Review Administrators can request Customer, Global or Data Administrators to add other attributes as selection criteria. Items that do not meet the specified criteria in a review definition are filtered out of the review.

Review definitions also assign reviewers based on their relationship to the review items. Often, administrators use review definitions to split up responsibility for reviewing items to prevent bottlenecks and overloading reviewers. Review definitions can also be referenced in certification policies to enable a comprehensive view of your organization's compliance with specific certification controls such as Sarbanes-Oxley Act (SOX) or Health Insurance Portability and Accountability Act (HIPAA).

TIP: For information about certification policies, see Chapter 27, “Creating and Managing Certification Policies,” on page 279. Once a review definition is referenced in an active certification policy, it cannot be deleted. For detailed procedures about creating review definitions, see Section 23.4, “Creating a Review Definition,” on page 246.

23.2.2 Adding Selection Criteria for Review Items

In addition to the default selection criteria, Identity Governance provides the ability to enable other attributes including custom attributes as selection criteria. In the attribute definition editor of the catalog, an administrator with Data, Customer, or Global Administrator authorization can specify whether an attribute can be used as a review criteria by selecting an attribute in the **Data Administration > *Attributes*** pages and specifying **Display in review item selection criteria**. For example, in the Identity Attributes page, a Data Administrator can enable Job Code as selection criteria and then a Review Administrator can create a review of users based on Job Code value. In the Permission Assignments page, a Data Administrator can enable Assignment Type and then a Review Administrator can create a review of permissions based on assignment type.

TIP: When you specify a boolean attribute in your review criteria and there are null attribute/column values in the database these records will be ignored. Customer, Global, or Data Administrators will need to ensure that there are no null values if you intend to use the attribute as review criteria or add transformation code to convert a null to be true or false or use bulk data update settings to change the null values to true or false. For more information see, “Editing Attribute Values in Bulk” on page 108.

23.2.3 Setting Review Notifications

Email notifications let reviewers, escalation reviewers, owners, and others know when a review is at various stages of a review run. The **Notifications** area of a review definition allows you to set up several standard notifications to go to whomever you specify during the various phases of a review. Standard notifications include Reviewer start, Review end, Reviewer task past due and so forth. Review the details of the email notification and update it as needed.

You can click an email name to view who will receive the email, why they will receive it, when they will receive it, and how often they will receive it. You can either accept the default settings or change the settings and add other recipients based on relationships. You can view the name of the email source, preview the email, and email the notification to a specified email address. If you change the default settings, we recommend that you also change the description of the notification. For example, if you change who receives the notification, change the recipient name in the description.

Regarding notifications received by escalation reviewers, when a review item is escalated, Identity Governance sends the reminder notification to the escalation reviewer as it would to any other next reviewer. By default, the escalation reviewer will not receive the **Reviewer task past due** notifications as these are typically emailed to the reviewer and reviewer’s supervisor when overdue tasks remain in the reviewer queue. However, you can add an escalation reviewer as a recipient in the CC field if needed.

In addition to changing the settings when defining a review, you can also remove a default notification, customize the template of a default notification, and add new notifications by selecting an email template provided by Identity Governance. For information about customizing the templates, see Section 3.4, “Customizing Email Notification Templates,” on page 39. For information about disabling email notifications such as notification when a running review is terminated or notification when permissions are revoked, see “Disabling Review Email Notifications” on page 47.

23.2.4 Setting Review Expiration Policy

Review definitions contain an expiration policy. Review Administrators and owners specify the actions that Identity Governance takes when a review expires without being completed:

- Complete the review with any final decisions that have been made and send these to fulfillment and the auditor, if these are defined, and leave all other items with no decision
- Complete the review with any final decisions that have been made and send these to fulfillment and the auditor, if these are defined, and keep all other items with no user profile changes or with assigned accounts, permissions, roles, or direct report relationship
- Complete the review with any final decisions that have been made, assign remove or remove assignment decision to all other items, and send all to fulfillment and the auditor, if these are defined

  NOTE: This option is not available for User Profile Review nor Business Role Definition Review.
- Extend the review for a grace period that will continue to renew each time the review expires without being completed or terminated
- Terminate the review and discard all decisions

For Identity Governance 2.0 and later, review definitions have the default expiration policy set to complete the review. For review definitions migrated from earlier versions of Identity Governance, review definitions have the default expiration policy set to terminate the review and discard any decisions.

23.2.5 Previewing a Review

Administrators can start a review run, or **review instance**, in preview mode or live mode. In preview mode, administrators can:

- Preview review definition version, assigned reviewers, review items, and notification emails
- Change review properties such as review owner, auditor, review options, or duration properties
- If needed, change reviewers per review item or in bulk
- Preview recipients of notifications
- Export review items to CSV
- Track details of review assignment changes
- Go live

NOTE: Review description and reviewer changes made in preview mode will apply only to the current review instance. Changes made to the **Reviews > Definitions**, will apply to future review run instances.

23.2.6 Reviewing Items

When a review run or **review instance** is live, the server generates **review items** based on the criteria. Assigned reviewers decide what action to take on each review item and submit their decisions. If allowed, by the review definition, reviewers might reassign items to a different reviewer instead of making a decision.

In a review with multiple reviewers for each review item, Identity Governance shows decisions made when the first reviewer submits actions for any of the review items. When any reviewer has submitted a decision for a review item, the other reviewers cannot take any action on that item unless the reviewer has authorization as an administrator. Review items with no actions remain in each reviewer's list until someone submits actions for them.

In a review with multiple stages, reviewers must act on review items in the order that the stages are defined in the review definition. For more information about multistage reviews, see Section 23.8.1, "Understanding Multistage Reviews," on page 256.

NOTE: When Identity Governance cannot determine an identity associated with an account or functional assignment, such as supervisor, to assign a review item to a specific person, the review owner becomes the assignee for the review item. All review items assigned in this way show in an exceptions section in the list of reviewers on the review owner view.

23.2.7 Downloading Reviewers and Review Item Lists

Identity Governance enables you to download all or a filtered list of review items assigned to you as reviewers. In addition, Review Administrators and owners can download list of all reviewers, a list of review items in a specific reviewer's queue, and a list of all review items. You can download these lists as a CSV file for manual review and comparison.

The list of reviewers includes rows for each reviewer by queue type. For example, if a reviewer is a supervisor and also an exception reviewer, you will see two rows for the user in the downloaded file. When review items are assigned to multiple reviewers, for example when a reviewer is a group, you will see a row for each reviewer with the same number of review items. In all the scenarios, each row will include columns of all the user attributes that were enabled to display in the quick info view in the **Data Administration > User** menu including custom attributes.

The list of review items you download from the **Review Items** tab will always include all review items. Except for User Profile Review, all other review item lists will include final decisions made on the review items. User Profile Review will include only the original values of the selected attributes.

The list of review items you download from the **Your Review Items** tab includes rows for review items assigned to the reviewer with columns that you, as an administrator, included in the **Configuration > Review Display Customization** menu. You can filter the review items and download only the items you want to review manually.

NOTE: The download list items count will not match the actual number of review items in an Account Review that includes permissions. The count only reflects the number of accounts that match the search criteria. However, all the permissions under each account will also be included in the download resulting in more review items than the number displayed on the review page.

All downloaded files will be saved to a download folder. You can then click the Download icon on the application title bar to access the saved file and download the file to your local machine.

23.2.8 Escalating Review Items

Identity Governance provides escalation options to help Review Owners and Administrators ensure that the review process proceeds in a timely manner. You can set one or more escalation reviewers, and a timeout value to instruct Identity Governance to **escalate the process** and move pending review items to escalation reviewer queues. If a review definition does not set escalation reviewers, the review owner is the default escalation reviewer and in a multistage review, review items will be escalated to the next reviewer in the queue.

NOTE: If a review definition specifies a group as the reviewers and a member of the group is the person being reviewed, Identity Governance uses the self-review policy to determine which group members can review the item. The self-review policy can either allow users to review their own items (self review), send self-review items to the exception queue, or prevent self review but allow other reviewers to complete the item if it is assigned to multiple reviewers in the same stage. For more information about the self-review policy see Section 23.4.2, “Specifying Self-Review Policy,” on page 252.

23.2.9 Completing or Terminating a Review

Aside from letting the expiration policy complete the review run, a review run concludes in one of several ways:

- All specified reviewers submit actions for their review items, and the Review Owner approves or terminates the review run.
- Reviewers do not submit actions for all their review items, and the Review Owner completes the review run.
- Reviewers do not submit actions for all their review items, and the Review Owner terminates the review run.

After reviewers have made decisions and submitted all review items, the Review Owner approves or terminates the review run and Identity Governance moves the review run details to a list of completed reviews.

A Review Owner has the option to complete an in-progress review even if reviewers have not submitted decisions for all review items. When a Review Owner completes a review, Identity Governance takes the following actions:

- Forwards any final decisions that reviewers have made to fulfillment. In multistage reviews, a decision is considered final only when all multi-stage reviewers of a review item have submitted their decisions.
- Marks the remaining review items **Keep**, **Remove**, **Keep Assignment**, **Remove Assignment**, **No profile changes** or as no decision made based on the review definition expiration policy
- Shows the review status as a percentage of completion in review history

A Review Owner also has the option to terminate an in-progress review. When a Review Owner terminates a review, Identity Governance takes the following actions:

- Does not forward anything to fulfillment
- Marks the review run as terminated

23.2.10 Fulfilling Changes and Audit Acceptance

The **fulfillment** process begins when a review run completes or when a review owner approves review items individually. For more information about fulfillment, see Section 14.6, "Fulfilling Changesets," on page 143.

The Review Auditor, if specified, accepts or rejects the review run after the review owner approves it. Although a **review audit** is a legal stamp, accepting a review has no impact on the fulfillment of the requested changes.

23.2.11 Creating Certification Policies and Remediating Violations

A Customer, Global, Review, or Data Administrator creates certification policies and sets remediation action for violations. Identity Governance calculates violations and after initial setup automatically triggers remediation action. Remediation actions include email notifications, change requests, or micro certification.

For more information about micro certification and certification policies, see Section 23.3, "Understanding Micro Certification," on page 245 and Chapter 27, "Creating and Managing Certification Policies," on page 279.

23.3 Understanding Micro Certification

Micro certifications are focused event-driven reviews which involve a smaller number of review items. For example, a micro certification review could involve review items that violated a certification policy or a data policy. Micro certifications are designed to reduce or eliminate the need for full-scale access certification processes which require significant time and effort from business users.

A micro certification review inherits reviewer assignments and settings from the specified review definition and follows a similar life cycle as an on demand or scheduled review run. Currently, all review types support micro certification. Multiple micro certification reviews can run in parallel with on demand or scheduled reviews that use the same review definition.

NOTE: Any changes you make to the review definition when micro certification review is in progress will apply *only* to *subsequent* review instances based on these review definitions. The running review always points to the version of the review definition that you used to start the review. For example, if you change the micro certification review name when running remediation, the new name will be applied to subsequent micro certification reviews based on new violations and not to the micro certification review in progress.

A Customer, Global, or Review Administrator can view status and run history of micro certifications in the Review definition list area by selecting the number of micro certifications when Micro-certification in progress column is included as a display column. You can include the column in

Review definition list area, by selecting the gear icon and dragging and dropping columns to the Available column area. Similarly, in the Review list area, you can include Started by column to view if a review was started by micro certification, on demand, or schedule. For more information, about customizing review display, see "Customizing Review Display" on page 253.

NOTE: For information about setting up micro certification as remediation for policy violations, see "Detecting and Remediating Violations in Published Data" on page 101 and Section 27.5.3, "Remediating Certification Policy Violations," on page 283.

23.4 Creating a Review Definition

The review definition enables you to define and schedule various types of reviews. It contains all of the information required to run a review. You can also modify the definition for subsequent review runs without the need to create additional review definitions. To create a review definition, the catalog must contain published data.

- Section 23.4.1, "Expanding and Restricting Review Items," on page 251
- Section 23.4.2, "Specifying Self-Review Policy," on page 252
- Section 23.4.3, "Scheduling a Review," on page 252

1. Log in as a Review Administrator.
2. Select **Definitions**.
3. Click **+** to create a new review definition.
4. Select the type of objects you want to review, or search based on review type then select type of objects.
5. Name the review and add description.
6. (Optional) Add instructions that explains to reviewers what they need to do. For example, `please review these items or reassign to someone else if necessary.`
7. Accept the default review item selection criteria and skip to Step 8 on page 249. Or refine the selection criteria to focus the review based on your security and compliance needs. For example, you can review accounts based on account custodian or last account review date. Alternately, you can review users, business roles, or accounts based on risk.

   Selection criteria for your entities or business roles include respective attributes that have been previously enabled as a selection criteria. When you choose the **Select** option to specify entities or business roles, click **+** to add conditions for your selection.

   NOTE: In addition to default selection criteria for review items such as risk, you can request your Data Administrator to add other selection criteria including custom criteria for various reviews.

For Review Object:	For Review type:	Specify review items by:
- Permissions assigned to accounts	Account Access Review	- Accounts - Permissions - Users - Applications **NOTE:** *Specifying identities or applications first* will enable Identity Governance to determine if users mapped to accounts or custodians of accounts will be reviewed. For more information, see Section 23.4.1, “Expanding and Restricting Review Items,” on page 251.
- Accounts - Accounts and their permissions **NOTE:** Permissions are grouped by accounts in this type of review. - Accounts, unmapped only	Account Review	- Accounts - Permissions - Users - Applications **NOTE:** *Specifying identities or applications first* will enable Identity Governance to determine if users mapped to accounts or custodians of accounts will be reviewed. For more information, see Section 23.4.1, “Expanding and Restricting Review Items,” on page 251.

For Review Object:	For Review type:	Specify review items by:
- Business role definitions	Business Role Definition Review	- Business roles You can choose to review membership and authorizations for the specified business roles. - Business role attributes Administrators with Data Administration authorization must have selected **Allow to be reviewed** for an attribute in the **Data Administration > Business Role Attributes** page to be available in the review definition page as an option.
- User direct reports	Direct Reports Review	- Users
- Business roles assigned to users	Business Role Membership Review	- Business roles
- Permissions and accounts assigned to users - Permissions assigned to users - Technical roles assigned to users - Technical roles detected on users - Users' permissions, accounts and assigned roles - Users' permissions, accounts and detected roles	User Access Review	- Accounts - Permissions - Users - Applications - Roles (Technical roles) **NOTE:** Optionally, you can further expand or restrict your review items to include items that have been authorized by a business role. For more information, see Section 23.4.1, “Expanding and Restricting Review Items,” on page 251

For Review Object:	For Review type:	Specify review items by:
- User profiles	User Profile Review	- Users - User attributes Attribute selection is required for this review type. You can only select attributes such as title, department, and job code that have been previously selected as **Allow to be reviewed** in **Data Administration > Identity Attributes** by an administrator with Data, Customer, or Global Administrator authorization.

8 (Optional) Select **Estimate Impact** to view the approximate number of review items and depending on the selected review type, the approximate number of users, permissions, roles, accounts, or business roles.

NOTE: Identity Governance calculates the *approximate* number of review targets. Business role authorizations are not included in this calculation. Results in a running review will also vary based on review options and the most recent state of the catalog. Start review in preview mode when authorizations are also calculated, to see all review items.

Based on the number of review targets, you might need to revise the **Review period**. For example, a review with 15 items might be completed within days, but one with hundreds of items could require weeks to accomplish.

9 (Optional) For **Review Options**, select any additional options that apply to this review. For example, you can require comments for certain actions and allow review owners to override decisions. You can also allow or disallow reviewers from changing reviewers and configure self-review policy. For more information about the self-review policy, see Section 23.4.2, “Specifying Self-Review Policy,” on page 252.

10 (Optional) Specify the reviewers you want to participate in the review.

For more information about types of reviewers, see Section 23.8, “Specifying Reviewers,” on page 255.

11 (Optional) To create a serial, multistage review, select **Add Reviewer**.

This allows you to specify multiple individuals who review the review items in the order listed in the definition. For more information, see Section 23.8.1, “Understanding Multistage Reviews,” on page 256.

12 (Optional) For **Monitor Reviews**, specify the review owner and auditor.

If you do not specify the review owner, the person who created the review definition becomes the review owner by default. If you do not specify an auditor, the review will not go through the audit acceptance phase.

(Conditional) If the materialized view is enabled, select **Cache review item names** to cache user, account, permission, and role names to improve performance in large scale reviews.

WARNING: If you enable caching, periodically **Refresh** cache review items to synchronize the review with changes to the catalog. For more information, see "Improving Performance in Large Scale Reviews" on page 258.

---

13 (Optional) For **Task Due Date and Escalation**, select one of the following options:

- **When review is scheduled to end**

  Select this options where you want the reviews to end based on **Duration** settings.

  NOTE: Review Administrators or Owners can change review end date to a specific date and time when they start the review run.

- **Specify maximum queue time**

  Select this option if you want reviewers to have a due date for their items. This due date can trigger notifications and when review items are past their due date show that the items are overdue. Even if this is a multi-stage review, review items will not leave the current reviewer's queue when items reach their due date.

  For **Maximum time in queue**, specify the number of days, weeks, months, or years allowed for the reviewers to complete their tasks. You must use whole numbers for the value. If the review started at the time when the review definition was created, this would be the due date. Secondary reviewer due dates are calculated based on the time the item enters the reviewer's queue.

- **Specify maximum queue time and escalation reviewer**

  Select this option when you want review items to escalate if not completed by the due date. In the case of multistage reviews, items will escalate to the next reviewer. In the case of multistage reviews where the review item is in the final reviewer's queue or in the case of single-stage reviews, the review items will escalate to the specified Escalation Reviewer if not completed by the due date.

  Specify **Maximum time in queue** and the **Escalation Reviewer**. The Escalation Reviewer is the final reviewer in the escalation process. When tasks are past due and no further review stages are defined, all open tasks will move to this reviewer's queue. The Escalation Reviewer can either be the Review Owner or selected users specified by searching and selecting identities, groups, or business roles.

14 (Optional) For **Duration**, set or change any of the following options:

14a For **Review period**, specify the length of time allowed for the review run.

14b For **Expiration policy**, specify what happens when a review expires without being completed.

14c For **Partial approval policy**, specify whether partial approvals are allowed and if so, whether or not partial approvals will occur automatically.

14d For **Validity period**, specify the period of time before the certified items need to be reviewed again. For example, specify `6 months` if you intend to run the review again after six months from the current review schedule.

NOTE: After completing a review, the review renewal data value might display a different time unit than the validity time period specified in the review definition because as the review approaches its next cycle, the time period changes. For example, a validity period of 2 weeks might display a renewal date of 14 days or less to indicate the number of days before the review starts its next cycle.

15 (Optional) For **Notifications**, add notifications based on provided email source templates, view notification description and settings, or remove default review notifications. Customize default notification schedule including recurrence schedule, and add email recipients.

NOTE: Typically, you can specify only one recipient in the **To** field and multiple recipients in the **CC** field. You can specify recipients of CC by specifying relationship and identity attribute for the selected relationship. However, the read-only **Review terminated notice** which is based on the Certification Terminated email source template goes to reviewers, review owners, escalation reviewers, and auditors when a review ends. You cannot change the recipients.

Click **Email source preview** to preview email HTML source and to specify a recipient for the rendered version of the email. For more information, see Section 23.2.3, “Setting Review Notifications,” on page 241.

16 (Optional) For **Schedule**, if you want the review runs to begin automatically and repeat automatically, select **Active** and select the appropriate schedule. Make sure there will be at least a 30-minute gap between runs. Select **Start scheduled review in Preview mode requiring manual go live** to start a review in preview mode. For additional information about scheduling reviews and 30-minute gap requirement between runs, see “Scheduling a Review” on page 252.

17 Save the review.

18 (Optional) After saving the review definition, set the default columns for the current review definition by editing the review definition and specifying **Default Reviewer Display Preferences**. Otherwise, the default grouping and default sort for the reviewer display will use the **Configuration > Review Display Customization** settings you had set for each review type as the default display preference.

NOTE: If needed, the reviewer can change the default grouping for their review instance by using the **Show All** drop-down list, change the sort order by clicking on headings with descending or ascending arrow, and change the column display by using the display options settings menu.

23.4.1 Expanding and Restricting Review Items

In addition to preselected options for specifying review items and additional options based on your review type, you can modify the preselected options and expand or restrict items being reviewed in a User Access Review, an Account Review, or an Account Access Review. The following table provides a few examples of available options and special conditions if any.

If you want to...	Select
Restricts review items to users as account custodians or mapped accounts	Users first, select type of accounts, and specify if the selected users are mapped users or account custodians **NOTE:** The ability to indicate if the selected users are mapped users or account custodians will be available only if you select users first and then accounts.
Restrict review items to items that were not authorized by a business role or to items that were authorized by a business role	**Review only items that have not been authorized by a business role** or **Review only items that have been authorized by a business role**

NOTE: For an account to be authorized by a business role, the application to which the account belongs to should be added as an authorized resource for the business role. Estimate impact calculations display an *approximate* number of review targets and do not include additional options such as business role authorizations in the review target calculations. Start the review in preview mode to get an accurate preview of review items based on all review item selection criteria.

23.4.2 Specifying Self-Review Policy

Identity Governance enables administrators to specify self-review policy when creating review definition based on the following review types:

- User Access Review
- User Profile Review
- Account Review
- Business Role Membership Review

When specifying the self-review policy, you can choose to:

- Allow self review in all stages regardless of the specified reviewers
- Send all items that will result in a self review to the exception queue
- Prevent self review, but allow other reviewers to complete review actions when a review item is assigned to multiple reviewers in a specific review stage

23.4.3 Scheduling a Review

Identity Governance calculates schedule based on specified start time, time interval, and time zone. The time interval can be daily, weekly, monthly, or yearly. For all schedules, the time end date is adjusted automatically based on Java add calendar method. For monthly and yearly schedules, the next review always starts in a month or a year regardless of the number of days in a month or year. The following table provides a few examples of a monthly schedule.

Start time	Next monthly scheduled start time
Tue Jan 01 00:00:00 EST 2019	Fri Feb 01 00:00:00 EST 2019
Wed Jan 30 00:00:00 EST 2019	Thu Feb 28 00:00:00 EST 2019
Sun Mar 31 00:00:00 EDT 2019	Tue Apr 30 00:00:00 EDT 2019

NOTE: The Identity Governance server needs a 30-minute gap between runs of the same review. For example, if you schedule a review to run at frequent intervals, allow at least 30 minutes to lapse between the runs. Otherwise, the subsequent runs might fail to start and Identity Governance does not notify you of the failure.

23.5 Modifying a Review Definition

Administrators can modify the attributes of a review definition at any time, including the Review Owner. If there is a running review instance at the time, that running review instance is not affected by changes to the definition. Identity Governance creates a new version of the definition with the changes and only future runs started since the modified definition will reflect the change.

If you have a review currently running, modifying the review definition does not change the attributes of the current review. The running review always points to the version of the review definition that you used to start the review.

If you assign a new owner to a running review instance, both the previous and new owners can access that specific instance of the review. The previous owner continues to see review runs from before the ownership change and future review runs. The new owner sees only that review run. You can also change the review end date and time for a running review.

23.6 Customizing Review Display

Identity Governance customizes display based on user authorization and the context of your action. It also enables you to customize the review display by:

- Specifying attributes that can be displayed as columns by review type, setting default number of rows per page for reviewers, and setting whether to display Completed Reviews using **Reviews > Review Settings > Review Display Customization** options
- Selecting default grouping, sort, and reviewer columns using **Review Definition > + > Default Reviewer Display Preferences** options

  NOTE: Only attributes selected in **Review Display Customization** will appear as a column in **Default Reviewer Display Preferences**.

- Selecting column options in the review definition and review items list areas by clicking the gear icon and viewing list of columns available for display

To customize review display:

1. Log in to Identity Governance as a Customer, Global, or Review Administrator.

2 Select **Reviews > Review Settings > Review Display Customization**.

3 Specify whether you want the Completed Reviews section on the Reviews page to be shown expanded by default.

4 Type default number of rows per review items page.

> **NOTE:** Reviewers can change this setting for their display as needed. The recommended maximum number of rows is 50.

5 For each review type, add or remove a column from reviewer display and rearrange columns as needed.

6 Click **Save**.

NOTE: To show attribute in expanded details, a Customer, Global or Data Administrator can select the attribute in the attribute type section of the **Data Administration** area, such as the Department attribute in **Data Administration > Identity Attributes**, and then select **Display in Quick Info views** under **Listable Options**.

23.7 Configuring Reasons for Review Actions

Identity Governance allows you to configure reasons for review actions for analytical and reporting purposes. Customer, Global, or Review Administrators can configure reasons for:

- Changing reviewers
- Modifying review items by specifying fulfillment instructions

Once the reasons are configured, they are available as drop-down list options when a review owner or a reviewer changes the reviewer for a review item, and when a reviewer selects **Modify** action in a **User Access Review** or selects **Modify with instructions** in an **Account Review**.

1 Log in to Identity Governance as a Customer, Global, or Review Administrator.

2 Select **Reviews > Review Settings**, and then click **Change Reviewer Reasons** or **Modify Review Item Reasons**.

3 To add a new reason, click **+** and specify a reason. For example, you can add a Reviewer is on vacation as a reason for changing reviewer or Assign account custodian as a reason for modifying a review item in Account Review.

4 (Conditional) If the modify review item reason requires user selection, click the **User selection required** check box.

5 Click **Save**.

6 To edit the reason, select the reason and edit it.

7 To delete a reason, select the reason and click **Delete**.

> **NOTE:** Once a reason has been used in a review, you can see the number of times it has been used in reviews in the respective reason tab. If the reason has been used even once in any review, you can no longer edit or delete it. However, you can **Enable** or **Disable** the reason. Reviewers will not see the disabled reason as an option in the drop-down list.

23.8 Specifying Reviewers

When defining a review, you assign users and roles to perform the review. Depending on the type of review, you can specify any or more than one of the following options as reviewers.

User Access	User Profile	Accounts	Accounts Access	Business Role Membership	Business Role Definition	Direct Reports
Supervisor of the individual being reviewed	Supervisor of the individual being reviewed	Supervisor of the individual being reviewed	Owner of the permission being reviewed	Supervisor of the individual being reviewed	Business role owner	Supervisor of direct reports or supervisors
Owners of the applications being reviewed (not available for role reviews)	User whose profile is being reviewed, called self review	Owner of the application being reviewed	Owner of the application being reviewed	Business role owner	Selected users or groups	Selected users or groups
Owners of the permissions being reviewed (not available for roles reviews)	Selected users or groups	Selected users or groups	Selected users or groups	Selected users or groups	Business role	Business role
Holder of the permission or role being reviewed, called self review	Business role	Business role	Business role	Business role		
Selected users or groups		Account custodian	Account custodian			

User Access	User Profile	Accounts	Accounts Access	Business Role Membership	Business Role Definition	Direct Reports
Coverage map		Coverage map **NOTE:** To specify coverage map as a reviewer for unmapped accounts, make sure **All unmapped accounts** is selected as review items and then specify **Review by Coverage Map** as the reviewer.	Coverage map			
Business role						

For more information about owners of applications and permissions, see Section 11.2, "Understanding Identity, Application, and Permission Management," on page 104. For more information about coverage maps, see "Using Coverage Maps" on page 26.

For additional verification or approvals, you might specify more than one reviewer stage. If you specify more than one stage for reviews, the reviewer assignment workflow will vary based on the specified stages. For more information about multistage reviews, see Section 23.8.1, "Understanding Multistage Reviews," on page 256.

To ensure a timely review process, you can also specify an **Escalation Reviewer**. Escalation Reviewer resolves all review tasks that are not completed on time. You can specify users, groups, and business roles as Escalation Reviewers. If you do not specify an Escalation Reviewer, the Review Owner is the default Escalation Reviewer. Escalated review items also appear in the Exceptions stage. If Identity Governance detects any escalations at the start of a review, all of the review items appear in the Exceptions stage.

For more information about authorizations including Escalation Reviewer, see Section 2.1.2, "Runtime Authorizations," on page 20.

23.8.1 Understanding Multistage Reviews

If you specify more than one reviewer stage, the reviewers must complete the review in the assigned order. For example, you might want the permission holders to verify that they continue to need the assigned permission, then the individual's supervisor can approve that ongoing need. As a final step, the permission owners can review the assigned permission. In this case, you would specify **Self**

review, **Supervisor**, then **Permission owners** as the reviewers. Each stage shows as a separate group of review items to the review owner. When you select **Self Review**, users can review their access for that stage only, unless the Review Options are set to **Allow self review in all stages**.

If you specify more than one reviewer (such as a set of users or groups), each reviewer shares the responsibility for submitting a decision within a single reviewer stage. For example, you might want the permission holders to verify that they continue to need the assigned permission, then you want a group of users called **Super group** to approve the ongoing need. In this case, you would specify **Self review** then **Review by Selected Users: Super group** as the reviewers.

You can also specify that a stage is skipped if the prior stage decision is **Keep** or **Remove**. By default, you cannot specify the same reviewer in consequent stages.

At any point during a review run, Identity Governance might not be able to resolve a reviewer. For example, if you specify **Permission owners** as one of the reviewers and no permission owner is actually specified in the catalog, Identity Governance cannot resolve the reviewer to an identity. When this happens, the review item is escalated to the Escalation Reviewer, if one exists, or to the Review Owner, and this reviewer must complete the remaining review tasks for the item. In this situation, the review owner sees an exception section with the review items with the unresolved review items.

23.9 Downloading and Importing Review Definitions

In addition to downloading reviewers and review items lists as CSV files, you can also download review definitions as JSON files and import the review definitions later into another environment.

To download or import review definitions:

1 Log in to Identity Governance as a Review, Customer, or Global Administrator.

2 Under **Reviews**, select **Definitions**.

3 Select a definition or all the definitions.

4 Click **Download Definitions**.

  4a Type the downloaded review definition name or a meaningful description.

  4b (Optional) Download included business roles, technical roles, and associated applications.

  4c Click **Save**.

  4d Click the download icon on the top title bar to access the saved file and download the file.

  4e (Optional) Delete the file from the download area in Identity Governance.

  If you do not manually delete the file, Identity Governance will automatically delete the file based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

5 If you make changes or want to import previously downloaded review definitions into another environment, select **Import Review Definitions**.

NOTE: Review definitions import may result in unresolved references when matching criteria is not collected. To avoid these errors, make sure the global import and export (`com.netiq.iac.importExport`) settings have been configured correctly. For more information about configuration settings, see Identity Governance 3.6 Installation and Configuration Guide.

Identity Governance will use an existing coverage map, and automatically resolve coverage map references. If a coverage map does not exist, Identity Governance creates one.

6 Navigate to the review definitions JSON file, select the file to import, and click **Open**.

7 Identity Governance detects whether you are importing new or updated review definitions and whether the updates would create any conflicts or have unresolved references.

8 Select how to continue based on what information is displayed.

23.10 Creating a New Review Definition from an Existing Review Definition

Instead of specifying review options, reviewers, notifications, and escalation policies for each new review definition, you can now use an existing review that has a similar definition to create a new review definition.

To create a new review definition from an existing review definition:

1 Log in to Identity Governance as a Review, Customer, or Global Administrator.

2 In the Quick Info window, click **Copy to New**.

3 (Optional) Rename and edit the review definition.

4 Click **Save**.

23.11 Improving Performance in Large Scale Reviews

Based on your data, reviews can take significant time and effort and occasionally may need to be terminated and restarted. To improve performance, administrators can either temporarily disable review statistics calculations or enable **materialized view**. Both of these options should be used with caution.

Disabling review statistics calculations

Use the Configuration Utility console mode setting `iac.update.stats.review.disabled` to disable review statistics calculations. If you choose to disable review statistics calculations, you will need to enable it again using the Identity Governance Configuration Utility.

Using materialized view/specialized tables

A materialized view is a snapshot of an instance of time which is used to optimize performance in large scale reviews. Materialized views are supported in Postgres and Oracle environments. When this view is enabled, you can cache user, account, permission, and role names to improve rendering time of review items by selecting **Monitor Reviews > Cache review item names** in a review definition. In MSSQL environment similar capabilities are implemented using specialized tables.

Use the Configuration Utility console mode setting `add-property GLOBAL iac.review.display.materializedViews.enabled true` to enable materialized view. In addition, in Oracle environment, assign the `GRANT CREATE MATERIALIZED VIEW TO IGOPS;` rights to the operations database (`igops`) and *optionally* specify tablespace. Use the command `add-property GLOBAL iac.materializedViews.oracleTableSpace` *`Tablespace`* (example, `add-property GLOBAL iac.materializedViews.oracleTableSpace USERS`) to specify the tablespace in which the materialized view is to be created. If you omit this clause, then Oracle database creates the materialized view in the default tablespace of the schema containing the materialized view. Only use this setting if the Oracle default is not sufficient, in most cases it is.

NOTE: If the materialized view is not initially enabled using the Configuration Utility, **Cache review item names** check box will not be displayed. For small scale reviews, caching of review item names is *not* recommended.

Once materialized view is enabled, the search and sort features will use the values at the time the materialized view was either created or last refreshed. As by definition, a materialized view is a snapshot, the data can become stale and out of sync with the catalog, and your search might not yield accurate results. You can refresh the snapshot data at any time by selecting **More** to expand review instance header, and then clicking **Refresh**. Also, you can **Enable** or **Disable** the caching of review item names for that review instance.

24 Running a Review Instance

When you start a review in live mode (on demand) or when a view is started by defined schedule or when an event triggers micro certification, Identity Governance initiates a running review instance and notifies any person or role specified in the **Notifications** settings of the review definition. A review instance will always be associated with the version of the review definition used to start it. After a review owner approves the review run or individual review items, Identity Governance notifies fulfillers if they have change items. For more information, see Section 25.3, “Managing a Review in Live Mode,” on page 265.

- Section 24.1, “Completing Review Tasks,” on page 261
- Section 24.2, “Verifying and Approving a Review Instance,” on page 261

24.1 Completing Review Tasks

Identity Governance notifies reviewers by email when they have tasks for a review run. When you log in as a reviewer, you can see the assigned tasks for each review. Then you can evaluate the items in the task list. Usually, you either certify the permissions assigned to users for a particular application or the presence of unmapped accounts in the application.

After the reviewers have completed their tasks, a Review Owner must approve the changes to create a change list to be fulfilled. At this point, fulfillers and the review auditor, if one exists, get email notifications that they have tasks to complete in the review. For more information about these authorizations, see Section 2.1.2, “Runtime Authorizations,” on page 20. For automated fulfillment configurations, Identity Governance sends fulfillment changes to configured systems. For more information about automated fulfillment, see Section 14.2, “Configuring Fulfillment,” on page 130.

For more information about completing review tasks, see Section 25.3.6, “Approving and Completing the Review,” on page 271.

24.2 Verifying and Approving a Review Instance

Review owners can review the decisions at any time during a review run. The owner can override the status of any decision if **Allow review owner to override decision** is enabled in the review definition. For example, if the review owner changes a Remove decision to Keep, that decision becomes the final decision for that item.

At any point during the review run, the review owner can end the run by selecting **Complete**, or **Terminate**. When selecting **Approve**, any decisions made before completing an in-progress review are retained and forwarded to fulfillment, if partial approval was allowed in review definition **Duration > Partial approval policy**.

25 Instructions for Review Owners

Identity Governance enables your organization to review and verify that users have only the level of access that they need to do their jobs. As a Review Owner, you are responsible for managing one or more reviews. You can view the details of any user, permission, role (technical or business), or application entity within the context of the review run. However, depending on your authorization assignments, you might not have access to the Identity Governance catalog which provides additional information about the user, permission, application, and technical role.

- Section 25.1, "Understanding the Review Process for Review Owners," on page 263
- Section 25.2, "Managing a Review in Preview Mode," on page 264
- Section 25.3, "Managing a Review in Live Mode," on page 265

25.1 Understanding the Review Process for Review Owners

As a Review Owner, you can view only the review runs that you own. You can start the review run in preview mode or go live. The preview mode enables you to preview review definitions, notifications, and review items before going live. The live review process starts with the initiation of a review run by on-demand action, schedule, or micro certification, and ends when the Review Owner or Auditor, if specified, certifies the review. Between the initiation and the certification of the review run, Reviewers and Fulfillers perform their assigned tasks.

NOTE: Micro certifications are event-driven focused reviews which are always run in live mode. For an overview of the review process and an understanding of micro certification, Section 23.2, "Understanding the Review Process," on page 239 and Section 23.3, "Understanding Micro Certification," on page 245.

This section provides the following information:

- Section 25.1.1, "Understanding the Review Definition," on page 263
- Section 25.1.2, "Understanding Reviewers and Escalation," on page 264
- Section 25.1.3, "Understanding the Fulfillment Process for Review Changes," on page 264

For steps in a review run, see "Understanding the Steps in a Review Run" on page 273.

25.1.1 Understanding the Review Definition

Each review runs according to its **review definition**, which specifies the following items:

- Review type and name
- (Optional) Review description and instructions for reviewers
- Review items, such as user accounts, roles (technical and business), permissions, user access rights, and direct reports to be reviewed by the specified Reviewers
- Review options, such as whether certain actions require comments, and self-review policy

- Review stages and individuals who serve as Reviewers, such as supervisors, permission owners, and application owners
- (Optional) Individuals who monitor reviews, such as owners and auditors
- (Optional) Escalation process for review items
- Review time frame that contains an expiration policy and partial approval policy
- Notifications to be sent throughout the review
- (Optional) A schedule for automatically starting the next review and repeating the review on a regular basis
- (Optional) Default grouping of request items

25.1.2 Understanding Reviewers and Escalation

When you initiate a review run, Identity Governance generates tasks for the assigned Reviewers. The Reviewers are responsible for reviewing a set of users and deciding whether the current user access should be maintained or revoked, or, in some cases, modified. Identity Governance can send reminders to the Reviewer or escalate the review items to the Escalation Reviewer, if one was specified in the Review Definition, or to the Review Owner who is the default Escalation Reviewer. Also, review items in the exception queue (unmapped accounts) are automatically assigned to the Escalation Reviewer if an escalation reviewer was specified for that review. In a multistage review, Identity Governance forwards the task to the next reviewer before it finally moves the tasks to the Escalation Reviewer or Review Owner queue.

Reviews that contain reviewers specified by a coverage map can result in an escalation if no matches could be found from the coverage map. For more information about reviewers, see Section 23.8, "Specifying Reviewers," on page 255. For more information about managing Reviewers, see Section 25.3.5, "Managing the Progress of Reviewers," on page 270. For more information about performing a review, see Section 26.2, "Performing a Review," on page 276.

25.1.3 Understanding the Fulfillment Process for Review Changes

The source of the identities, permissions, accounts, and roles under review drives how review-related requested changes are fulfilled. The fulfillment process can be manual tasks, automated actions in Identity Manager, actions sent to help desk services, or actions initiated by workflows in Identity Manager. Review Owners and Review Administrators can view the fulfillment status of review items as soon as a review run is partially or fully approved.

For more information about fulfillment and viewing fulfillment status, see Section 15.1, "Understanding the Fulfillment Process," on page 147 and Section 25.3.7, "Viewing Fulfillment Status," on page 271.

25.2 Managing a Review in Preview Mode

This section provides the tasks you can perform in preview mode. As the owner or an administrator of a review, you can perform any or all of the following tasks:

- Start the review in preview mode
- Change the review end date calculated based on duration settings in the review definition to a specific date and time

- View review definition version, review items, assigned reviewers, and recipients of notifications
- Change the Review Owner, Escalation Reviewer, or Auditor for the current review run
- Change the review period, escalation timeout period, expiration policy, partial approval policy, or validity period of the current run
- Customize the column display for the review items in the review owner's view
- Change Reviewers individually or for multiple review items within the current review run
- Search for email recipients by name
- Sort notifications by type
- Send a notification preview to a specific recipient

NOTE: Notifications sent during review preview mode, which enable administrators and review owners to preview notifications, might have blanks for values, and names seen in the preview might not be the name that is sent in the real email.

- Download list of all reviewers and their queue summary, list of review items in a selected reviewer's queue, and list of all review items to CSV files
- Cancel the preview if review properties and items were not as expected and the review definition needs to be modified
- Go live

25.3 Managing a Review in Live Mode

This section provides the tasks required to run and complete a review. As the owner or an administrator of an active review, you can perform any or all of the following tasks:

- Start in preview mode and go live, or start the review in live mode and monitor the review
- Change the review end date calculated based on duration settings in the review definition to a specific date and time
- Customize the review definition and the column display for the review items
- Change the end date of the review
- Review details including related micro certification progress in the review definition area based on your column display options
- View the review status in **Reviews**
- View quick info details about a catalog item
- (Conditional) View decision support information if the decision support options in the **Configuration > Analytics and Role Mining Settings** menu have been enabled
- Change Reviewers within the review
- Send reminder emails to Reviewers using the **Nudge** option
- Override Reviewers' decisions
- Change the Review Owner or add more Review Owners
- Change the Escalation Reviewer or Auditor
- Resolve access policy violations in the review

- Download list of all reviewers and their queue summary, list of review items in a selected reviewer’s queue, and list of all review items to CSV files
- Complete a partial review
- Terminate the review before completion
- Approve Reviewer decisions
- Run reports against the review

If you assign a new owner to a review, both the previous and new owners can access the review. The previous owner continues to see instances of a review run before the ownership change. The new owner sees only the instance of a review run after the ownership change.

If you assign a new Review Owner while a review run is in progress, the review definition does not change, and the new review owner is in effect for only that review run. The next review run that starts from the same review definition assigns the review owner specified in the review definition.

For example, a review definition specifies Mary Smith as the review owner. During an instance of the review, or a review run, the global administrator realizes that Mary is on vacation. To keep the review moving, the administrator changes the review owner to Sam Butler, who approves that review run when reviewers have submitted all their final decisions. Both Mary and Sam can see the details of this review run. The next time a review run starts from this review definition, Mary is assigned as the review owner.

For more information, see the following sections:

- Section 25.3.1, “Checklist for Managing a Review in Live Mode,” on page 266
- Section 25.3.2, “Starting a Review Run,” on page 267
- Section 25.3.3, “Managing a Review Run,” on page 268
- Section 25.3.4, “Modifying the Settings of a Review Run,” on page 269
- Section 25.3.5, “Managing the Progress of Reviewers,” on page 270
- Section 25.3.6, “Approving and Completing the Review,” on page 271
- Section 25.3.7, “Viewing Fulfillment Status,” on page 271
- Section 25.3.8, “Managing the Audit Process,” on page 271
- Section 25.3.9, “Viewing Run History,” on page 272

25.3.1 Checklist for Managing a Review in Live Mode

	Checklist Items
❑	1. Ensure that you understand the review process. For more information, see Section 25.1, “Understanding the Review Process for Review Owners,” on page 263.
❑	2. Start the review run if needed and optionally change the review date and time. In addition to manually starting a review, you can initiate a review by schedule or micro certification. For more information about manually starting a review, see Section 25.3.2, “Starting a Review Run,” on page 267.

	Checklist Items
❑	3. (Optional) Modify the duration for the review. For more information, see Section 25.3.4, “Modifying the Settings of a Review Run,” on page 269.
❑	4. Check the progress of each Reviewer. For more information, see Section 25.3.5, “Managing the Progress of Reviewers,” on page 270.
❑	5. Approve the actions taken by the Reviewers. For more information, see Section 25.3.6, “Approving and Completing the Review,” on page 271.
❑	6. (Conditional) Check the status of manual fulfillment activities. If the process is automated or uses external workflows, Identity Governance sends the changeset to Identity Manager for processing. For more information, see Section 25.3.7, “Viewing Fulfillment Status,” on page 271.
❑	7. (Conditional) If you have authorization to view fulfillment status in the fulfillment page, confirm the completion of all fulfillment tasks.
❑	8. (Conditional) If a review run generated a changeset, collect and publish all identities and the application sources related to the review run. You might not have the authorization in Identity Governance to collect and publish. Someone with the Global Administrator or Data Administrator authorization can perform this action.
❑	9. (Conditional) If you are the auditor, check the status of the review audit. For more information, see Section 25.3.8, “Managing the Audit Process,” on page 271.
❑	10. (Optional) View run history. For more information, see “Viewing Run History” on page 272

25.3.2 Starting a Review Run

In Identity Governance, you can see all review definitions assigned to you, including the date that the Review Administrator specified the review should be run.

1 In Identity Governance, select **Reviews > Definitions**.

2 (Optional) Click the gear icon to change column display options. For example, to add the micro certification column to your display drag **Micro-Certifications in progress** to the list of selected columns. You can then view the number of micro certifications and view the run history of the micro certification review.

3 In the Actions column, select **Start Review** on the row of the definition that you want to run.

NOTE: For micro certification reviews, this step is not required and the Actions column is unavailable. Micro certification reviews are triggered automatically based on remediation setup and do not require manual action.

4 (Optional) Change the end date calculated based on your review definition duration settings to a custom date and time.

5 Click **Start and Go Live**.

25.3.3 Managing a Review Run

You can view the status of the review runs in progress, send reminder emails, change the assignments for reviewers and the auditor, override or approve reviewer decisions, complete or terminate the review run, and approve the completed review.

1 In Identity Governance, select **Reviews > Reviews**.

Identity Governance displays a list of runs in progress and their status.

2 (Optional) Click the gear icon to view additional column options and customize column display. For example, you can drag **Started by** to the list of selected columns to view whether a review was started on demand, on schedule, or by micro certification process.

3 Select the review you want to manage.

4 To see the status of each of the review items, select **Review Items** tab.

5 (Optional) Download list of reviewers, a reviewer's queue or review items to a CSV file.

5a Select the **Reviewers** tab and click **Download reviewers** to download list of all reviewers with their queue summary.

5b Select the **Reviewers** tab, select the number of items in the **In Queue** column of a reviewer, then click **Download all as CSV** to download the reviewer's queue details.

5c Select the **Review Items** tab and click **Download all review items as CSV** to download all review items in the review.

5d Select the **Your Review Items** tab, to download all review items assigned to you for review, selectively download review items by selecting a grouping option or searching for values for columns included in **Review Settings > Review Display Customization** menu. For example, if you want to review only items in exception queue, you can select **Group by exceptions**. If you want to include items whose decision you had previously submitted, you can select the filter icon and include submitted items.

NOTE: Type a meaningful description for your file, and save the file to the central download area of the application. Click the download icon on the application title bar and then download the file. For more information about downloading options and examples, see Section 23.2.7, "Downloading Reviewers and Review Item Lists," on page 243.

6 Act on review items either individually or by using the bulk selection options. Actions you can take depend on settings in the review definition and might include:

- **View activity** to see review item details
- **Override** a Reviewer's decision to make a decision final and remove it from all reviewer queues
- **Change reviewer** to transfer the review item to another reviewer
- **Approve** to move the decision to fulfillment while allowing the review to continue
- **View fulfillment status** to view the status of review requests such as removing a permission, or assigning a new user.

7 To complete the review in its current state, accepting all final decisions and marking items without final decisions as **No decision** or as other decision specified in the review definition’s expiration policy, select **Complete** in the review completion overview at the top of the review.

8 To move all final decisions to fulfillment while allowing the review to continue, select **Approve** in the review completion overview at the top of the review.

9 To cancel the review, select **Terminate** in the review completion overview at the top of the review.

Why would I override a Reviewer’s action?

As the owner of the software application being reviewed, you might disagree with a Reviewer’s decision that grants user access to the application. Alternatively, you might see the need for a user to have access where the Reviewer did not. For example, you know that a manager in Human Resources requires administrative permissions to the application.

Why would I complete or approve an in-progress review?

As the owner of a review, you might want to implement decisions that have been made without waiting for all reviewers to complete their tasks. Approving individual review items or the overall review sends final decisions to fulfillment while keeping the review running. Completing an in-progress review accepts final decisions, ends the review, marks items without decisions as **No decision** or other decision specified in the review definition’s expiration policy, and sends items with decisions to fulfillment.

25.3.4 Modifying the Settings of a Review Run

As the Review Owner, you can edit the review time frame and escalation timeout; change the Escalation Reviewer, the assigned Auditor, and the Review Owner; and add multiple Review Owners. Depending on your authorization assignment, you might also be able to modify the full review definition. Any changes you make to the review definition when a review is in progress will apply *only* to *subsequent* review instances. However, this section explains how to perform simple modifications to an active review run.

1 In Identity Governance, select **Reviews > Reviews**.

2 Select the active review run that you want to modify.

3 To determine whether the number of review tasks can be performed in the specified time frame, complete the following steps:

3a Under the review name, select **more**, and then select the edit icon.

3b Observe the number of review items to be completed.

3c Compare the estimated number of review items with the date in **Review end**.

3d Change the end date for the review if needed.

4 Change or add review owners if needed.

5 Modify the appropriate settings, then select **Save**.

Why would I modify the review’s time frame?

When Review Administrators create a review, they can estimate the number of users, permissions, accounts, and review items affected by the review. Then they set the time frame for the review. However, that estimate is based on a snapshot of the Identity Governance catalog at the time that they created the review definition. Depending on when you run the review, the number of accounts might have increased or decreased considerably. The time frame might no longer match the current state of the catalog.

Why would I change the Review Owner?

In general, the Review Owner is the owner of the software application with user accounts that the review run affects. However, your authorization in the organization might have changed. You can assign ownership of the review run to an individual more suited to the task. You might also want to assign multiple Review Owners.

Why would I change the Auditor?

If the assigned Auditor is not available to perform the tasks for the review run, you can assign a different individual as the auditor.

25.3.5 Managing the Progress of Reviewers

To ensure that the review run stays on schedule, you can view the progress of each Reviewer. You can also reassign tasks to a different Reviewer and override a Reviewer's action for a review item. Reviewers can change the reviewer for any items unless otherwise specified in the review definition.

1. In Identity Governance, select **Reviews > Reviews**.
2. Select the active review run that you want to manage.
3. Under **Reviewers**, select the name of the Reviewer that you want to manage.
4. Observe the actions taken by the Reviewer.

   You can view the items that have not been completed or all review items. You can send reminder emails, using the **Nudge** option, for items not yet reviewed. You can also change sorting of the items based on the selectable column headers.
5. (Optional) Click **Nudge** to compose and send a reminder email to the Reviewer or select multiple reviewers and click **Actions > Nudge**.
6. (Optional) To assign a review item to a different Reviewer, select **Change Reviewer** or select multiple reviewers and click **Actions > Change Reviewer**.
7. (Optional) To review a Reviewer's decision, select **View Activity** for the task.

Why would I reassign a review item?

If the Reviewer is not able to perform one or more tasks for the review run, you can assign a different individual to the authorization. For example, the Reviewer might be sick or on vacation. Also, some Reviewers might complete tasks faster than others. You might want to reassign items from the slower Reviewers.

What if I have multiple reviewers?

If the reviewer is listed as **Multiple Reviewers**, then more than one reviewer shares the responsibility for making a decision on the review item. You can see the members of the shared queue and send reminder emails to all of the members or delegates, if a mapping exists. When a reviewer of a review item in a **Multiple Reviewers** queue is changed, the item is no longer under shared responsibility.

25.3.6 Approving and Completing the Review

Review Owners can complete, terminate, review, or partially approve the decisions at any time during a review run. If you want to modify or remove a review item, all access change requests are sent to fulfillment, which is the step where approved changes are implemented. The approval process allows the Review Owner to confirm the actions taken by all Reviewers. After approval, a review can be optionally routed to a Review Auditor for legal acceptance.

1. In Identity Governance, select **Reviews > Reviews**.
2. Select the active review that you want to manage.
3. Observe the actions taken by the Reviewers.
4. (Optional) Override actions as needed.
5. To approve the decisions made in the review run, select **Approve** next to a review item or select multiple review items and select **Actions > Approve**.
6. (Optional) Add a comment.
7. (Conditional) If the review run included changes to user accounts, ensure that the affected data sources are collected and published.

   After the administrator collects and publishes the data sources, Identity Governance updates the status of the fulfillment items.

25.3.7 Viewing Fulfillment Status

The review and validation process that begins with data collection and publishing concludes with change request reconciliation. Identity Governance can track the status of change requests fulfilled manually or through automatic or workflow-based provisioning. As the Review Owner, you can **View fulfillment status** for review items, with decisions like **Remove** or **Modify**, that generate a change request. You can see the fulfillment status for each review item as soon as the review run is partially or fully approved, and the status continues to be updated until the completion of the fulfillment process.

For more information about the fulfillment process, see the following sections:

- Chapter 15, “Instructions for Fulfillers,” on page 147
- Section 14.3.1, “Understanding Fulfillment Status,” on page 140

25.3.8 Managing the Audit Process

Some review definitions require a Review Auditor to certify the results of the review run. Review Auditors are individuals who have read-only access to a review run. They cannot modify or delete decisions. They can:

- View the review definition used for the review run
- View reviewers and decision statistics
- View review items and related activity
- Download list of reviewers and their respective queue statistics as a CSV file
- Download list of all review items as a CSV file
- Accept the review

- Enter comments for rejection and reject the review

NOTE: All decisions and run history are retained even if the review is rejected.

Usually, Identity Governance sends an email notification to the Review Auditor when a review run is waiting for acceptance. The Review Auditor can then log in and can review all details and **Accept** or **Reject** the review. The Review Auditor must enter comments when rejecting a review.

25.3.9 Viewing Run History

Identity Governance tracks all the reviews and maintains a history of review runs associated with a review definition. The run history is searchable and sortable, and displays:

- Start and end date of a review run
- Status including certification percentage
- Review owner
- List of review items and associated actions including change reviewer and modify actions, and remove comments if any
- Fulfillment status of review items

To view the run history:

1. Select **Reviews > Definitions**.
2. Search for the review definition and click the review name, or directly click the review name.
3. Select **View run history**.

26 Instructions for Reviewers

This section provides information for individuals assigned the Reviewer authorization for a review run in Identity Governance. As a Reviewer, you can confirm whether permissions or membership granted to a user or account should be kept or removed or, in some cases, modified. You can also confirm or request modification of business role memberships, supervisor assignments, user identity attributes such as title, email, and location, and business role attributes such as risk.

- Section 26.1, “Understanding Reviews,” on page 273
- Section 26.2, “Performing a Review,” on page 276
- Section 26.3, “Viewing Completed Reviews,” on page 277

26.1 Understanding Reviews

Identity Governance collects information from a variety of identity and application data sources in your environment and allows your organization to periodically review and verify not only users’ level of access, and permissions assigned to accounts, but also other items such as business role memberships, business role attribute values, identity attribute values, and supervisor assignments.

- Section 26.1.1, “Understanding the Steps in a Review Run,” on page 273
- Section 26.1.2, “Understanding the Reviewer Authorization,” on page 275

26.1.1 Understanding the Steps in a Review Run

In Identity Governance, Review Administrators create **review definitions** for a particular set of users, accounts, or roles that need review. A single instance of a review definition is a **review run** or review campaign, which has a Review Owner. The Review Owners can see only the review runs that they own.

Reviews can be started either in a preview mode or a live mode. Review Administrators can set up a review to automatically start in preview mode or they can set up a regular schedule in a review definition so that the review runs start automatically in live mode based on the schedule. Also, live review runs can start automatically when certification or data policy violation remediation is set to micro certification.

Understanding the Steps in the Preview Review Run

When the review owner initiates a review run in preview mode, or when a review run starts automatically in preview mode, the following activities occur:

1. Identity Governance generates lists of **Reviewers**, **Review items**, and **Notifications**.
2. The Review Owner previews the review definition for the current run and optionally, changes the review end date, review owner or auditor, and modifies review options and schedule.
3. The Review Owner reviews all the review items and assigned reviewers, or searches for specific review items, to decide whether the items should be assigned to another reviewer.

4. The Review Owner also previews the emails notification templates and verifies that appropriate notifications are being sent to the correct recipients.

    NOTE: Any changes made by the Review Owner are applied only to the current run. If permanent changes need to be made to the review definition, or reviewers need to be changed for all subsequent runs, the changes must be made by editing the review definition itself.

5. Optionally, the Review Owner can download all or select review items as a CSV file to review it manually.

Understanding the Steps in the Live Review Run

When the owner initiates a review run in live mode, or when a review run starts by the schedule, or when a micro certification review is automatically started, the following activities occur:

1. Identity Governance generates tasks for the assigned Reviewers and notifies them as specified in the review definition.
2. Reviewers review their assigned set of review items and decide whether the items should be kept, modified, or removed. If a review item is assigned to multiple reviewers, the first reviewer who acts on that item becomes the decision maker, and the item continues to the next phase of the review. For more information, see Section 26.2, “Performing a Review,” on page 276.
3. (Conditional) If the review definition specifies that a permission requires multiple stages of approval, Identity Governance forwards the affected review items to the next assigned reviewer.

    For example, the application owner, permission owner, or Review Owner might be required to review the permissions and confirm decisions before action is taken to remove any permissions. Reviewers must complete the review in the assigned order.
4. (Conditional) If a Reviewer does not complete tasks in the specified time frame and the review definition specifies an escalation process, Identity Governance forwards the tasks to the assigned Escalation Reviewer. The Review Owner is the default Escalation Reviewer when an administrator does not specify the Escalation Reviewer in the review definition.

    If there are multiple reviewers, Identity Governance forwards the task to the next reviewer before it finally moves the tasks to the Escalation Reviewer or Review Owner queue.
5. The Review Owner approves the changes.

    NOTE: If specified in the review definition, Review Owners can override reviewer decisions at any point during a review run. When a Review Owner overrides a decision, the review item is locked and can no longer be modified by the reviewer.
6. Identity Governance initiates the fulfillment process to enable the requested changes.
7. (Conditional) In a manual fulfillment process, Identity Governance generates tasks that the assigned Fulfillers must complete and notifies them by email.
8. (Optional) An Auditor might be required to certify the results of the review run.

26.1.2 Understanding the Reviewer Authorization

Reviewers represent individuals who have the information and authority to determine whether assignments such as assigned permissions, reporting relationships, business role memberships, and user attribute values are correct. You might be assigned to review items in multiple active review runs. Depending on how the review is defined, Identity Governance might send you email notifications to remind you of incomplete tasks and approaching deadlines.

As a Reviewer, based on the review definition, you can perform any or all of the following tasks:

- Add, remove, or rearrange columns in reviews and review item displays
- Download all or a filtered set of your review items as a CSV file
- Filter the list to show only incomplete review items
- Sort the review items by characteristics such as user, permission, account, account type, attribute, application, roles (technical and business), supervisor, or action
- Process review items individually
- Group review items, use search filter to filter items, or select multiple items to process review items in batches
- Add a comment to a review item with your decision to keep or remove, individually or in a batch
- View the details of the review item
- View guidance on how the permission was assigned, such as through a direct assignment or authorized by a role
- Choose to keep, modify, or remove review items
- View activity for a review item
- Change the Reviewer of review items, individually or in a batch, if you do not have the information you need to make a decision
- Change the supervisor and also change other identity attributes of a user
- Change values of business role attributes and also request changes to memberships and authorizations of a business role
- Submit decisions for your tasks in the allotted time frame

If you are an Escalation Reviewer you must resolve all review items that are not completed on time.

Secondary reviewers in a multi-stage review can confirm the previous decision or they can override the decision.

For more information, see Section 26.2, “Performing a Review,” on page 276.

26.2 Performing a Review

This section provides the steps required for you to complete Reviewer tasks associated with a review run. Usually, Identity Governance sends an email notification when you have tasks in a review run.

For more information about the Reviewer’s authorization and the review process, see Section 26.1, “Understanding Reviews,” on page 273.

1. In Identity Governance, select **Reviews**.
2. (Optional) Click the gear icon to view additional column options and customize column display. For example, you can drag **Started by** to the list of selected columns to view whether a review was started on demand, on schedule, or by micro certification remediation.
3. Select the review run on which you want to act.
4. (Optional) Adjust display options to help you manage your review items:
   - **4a** (Optional) Select **Include submitted items** to see all review items on the list.
   - **4b** Click **Show all** to see a list of grouping options. The grouping options are especially helpful when you have a long list of review items.
   - **4c** (Optional) Select a grouping option to sort review items by groups and to easily take action on all or selected review items within a group.
   - **4d** (Optional) Enter a search string such as user name, specific review item, or decision to filter review items, and to easily take action on all or selected review items within the filtered list.
   - **4e** Click the gear icon to change the display options by adding, removing, or rearranging columns.
5. For each review item, click the review item link to get help with making your decision, and then select an action. You can also select multiple review items across pages and use **Actions** to select an action.

   NOTE: The review type and definition determines which of the following actions are allowed for a review instance.

   - (Conditional) **Keep** to specify that you believe that the user should have the permission, account, or role
   - (Conditional) **Assign**, if there are unmapped accounts, to map the account
   - (Conditional) **Modify,** if the review definition allows this option, to change attribute value or to provide modification instructions such as account needs an account custodian.
   - (Conditional) **Keep assignment** to specify that the user should have the previously assigned supervisor when reviewing direct reports
   - (Conditional) **Change supervisor** to specify that the user should have a different supervisor when reviewing direct reports
   - (Conditional) **Remove assignment** to remove the supervisor when reviewing direct reports
   - (Conditional) **Remove** to specify that you believe that the user should not have the permission, account, or role
   - (Conditional) **Review user profile** to review user attribute values and either modify values and **Save changes** or confirm **No profile changes**

NOTE: You cannot modify attributes values in bulk.

- (Conditional) **Review business role definition** to review memberships, authorizations, or attribute values and **Save changes** or confirm **No changes**
- **View Activity** to decide what actions to take or what actions have been taken
- **Change Reviewer** to pass the decision to another reviewer

NOTE: If you select User B, who has a delegate User C who has a delegate User B, as the new reviewer, Identity Governance will issue a warning and disable the **Change Reviewer** option to prevent cyclical delegation.

- **Download all review items as CSV** to download all or a selective set of review items as a CSV file for manual review. You can selectively download review items by selecting a grouping option or searching for values for columns included in the **Review Settings > Review Display Customization** menu. For example, if you want to review only items for one application, you can select **Group by application**. If you want to include items whose decision you had previously submitted, you can select the filter icon and include submitted items.

NOTE: The download list items count will not match the actual number of review items in an Account Review that includes permissions. The count reflects the number of accounts that match the search criteria, however, all the permissions under each account will also be included in the download resulting in more items than the number displayed on the review page.

6 Review the changes to ensure accuracy.

7 Select **Submit** to confirm your actions on the review items.

This action locks your decisions and moves the items out of your queue. Identity Governance then moves the items to the next reviewer's queue if this is a multistage review and you are not the last reviewer. If you are the last reviewer, Identity Governance notifies the Review Owner that the review is ready for certification.

If one of your review items is in the **Multiple Reviewers** queues, your decision gets locked in when you **Submit** the decision. If you have not yet submitted a decision and another reviewer makes a decision and submits before you, it is the other reviewer's decision that gets locked. You can select **Include submitted items** if not previously selected and see the decision in the **View Activity** option.

26.3 Viewing Completed Reviews

Review Auditors can only view the instance of a review after it is completed and is waiting on acceptance, and after accepting or rejecting the review instance. Reviewers and Review Owners can view the details of a review instance and review items even after the review instance is completed and, if required, accepted.

Select **Show completed reviews** to view a completed, and completed and accepted, or rejected review's start and end date, status including certification percentage, and review items that you submitted. Optionally, sort review items by decision, and select **View Activity** to view actions related to the review item, including change reviewer and modify reasons, if any.

27 Creating and Managing Certification Policies

Certification policies allow you to produce a comprehensive view of your organization's compliance with specific certification controls, such as Sarbanes-Oxley Act (SOX) or Health Insurance Portability and Accountability Act (HIPAA). A Customer, Global, Review, or Data administrator creates certification policies against review definitions and Identity Governance evaluates the review items and other criteria defined in the policy and reports violations. From the **Overview**, **Catalog > Identities**, and **Certification** pages, you can drill down to see specific violations to policies when they exist.

- Section 27.1, "Understanding Certification Policies," on page 279
- Section 27.2, "Creating and Editing Certification Policies," on page 279
- Section 27.3, "Scheduling Calculations and Calculating Certification Policy Violations," on page 280
- Section 27.4, "Exporting and Importing Certification Policies," on page 281
- Section 27.5, "Managing Certification Policy Violations," on page 282

27.1 Understanding Certification Policies

Identity Governance enables organizations to easily manage multiple compliance processes as a cohesive certification policy. For example, if you are required to review all access to applications that process data related to SOX, you can create a certification policy which could include all related reviews, set a validity period for the policy, and then periodically view all SOX related violations or search for a specific violation related to user access, account access, permissions, or business or technical role memberships. Specifically, a certification policy, can enable organizations to:

- Consolidate reporting and audit queries
- Schedule when certification policy calculation will occur
- Calculate violations and determine compliance status
- Detect items that should be reviewed based on change events since previous review run. Change events could include changes to catalog, risk levels, or review definitions.
- View the status of all access review processes included in the policy
- Get a more comprehensive governance risk overview when risk levels have been configured, and weight and range has been set for certification policy violations related risk factors

27.2 Creating and Editing Certification Policies

NOTE: Reviews should be defined before creating a certification policy. For information about review definitions, see Chapter 23, "Creating and Modifying Review Definitions," on page 237.

After creating review definitions, create certification policies that Identity Governance can use to alert you of possible compliance violations. When a review has been completed, you can view the list of violations.

1. Log in as a Customer, Global, Data, or Review Administrator.
2. Under **Policy**, select **Certification**.
3. Select **+** to create a certification policy.
4. Specify the name of the certification policy, validity period, and single or multiple review definitions.

   NOTE: Policy names must be unique. When Identity Governance checks for uniqueness, case is not considered. Therefore, Identity Governance considers Hippa and HIPPA to be equivalent.

   TIP: Click the search icon to select single or multiple review definitions. You can also enter wildcard * to search for reviews, or just start typing the review name to view suggestions.
5. (Optional) Set risk.
6. (Optional) Specify policy administrator.

   NOTE: Policy administrator role will be functional in a future release of Identity Governance. Currently, Customer, Global, Data, or Review Administrator can function as a policy administrator.
7. (Optional) If you want to prevent Identity Governance to calculate violations automatically, deselect **Run will be triggered by event** and **Run when policy is saved**.
8. Save your settings.
9. Under **Policy**, select **Certification** to view the newly created policy listed with number of violations.
10. (Optional) Select **Set Remediation** to select remediation action. For more information about setting remediation, see "Remediating Certification Policy Violations" on page 283.
11. (Optional) Select the policy, then select **Edit** to edit the policy.
12. (Optional) Select a specific policy or multiple policies, then select **Actions** to delete policies, calculate policy violations, run remediation, or export policies.

27.3 Scheduling Calculations and Calculating Certification Policy Violations

Identity Governance automatically calculates policy violations when:

- An certification policy is defined or modified
- Identity or data application is published
- Reviews included in the policy are completed

In addition, you can also schedule when certification policy violation calculations will occur when defining a policy. However, you will need to manually calculate policy violations after events such as partial reviews and expiration of the certification policy validity period.

NOTE: If certification policy violations and related risk factors are configured, Identity Governance risk scores will be impacted. Therefore, calculate certification policy violations before calculating risk scores. For information about risk scoring, see Chapter 20, “Calculating and Customizing Risk,” on page 207.

To schedule certification policy violation detection:

1. Log in as a Customer, Global, Data, or Review Administrator.
2. Under Policy, select Certification.
3. Select Schedule tab, add and remove policies to the schedule, and set the schedule.

   NOTE: By default, all certification policies will be included in the scheduled detection process. However, once you remove a policy from the schedule, Identity Governance will detect violations only for the policies included in the schedule. To detect violation of other policies you can either manually calculate policy violations or add the policy to the schedule.

4. Select Active and then select Save to activate the schedule.

To manually calculate policy violations:

1. Log in as a Customer, Global, Data or Review Administrator.
2. Under Policy, select Certification.
3. In the Policies tab, select the policy for which you want to calculate policy violations.
4. Select Actions > Calculate Policy Violations.

   NOTE: When a certification policy includes multiple review definitions, and when an entity is included in more than one review definition, then the certification status is defined based on the last review. You can cancel calculations in progress by selecting Cancel next to the progress status.

27.4 Exporting and Importing Certification Policies

Once you have created your certification policies based on your business requirements, you can easily export the certification policies and related review definitions as a zipped file and save it with your backup files. You can also use exported policies in another location or environment.

To export or import certification policies:

1. Log in as a Customer, Global, Review, or Data Administrator.
2. Under Policy, select Certification.
3. In the Policies tab, select the policy or policies you want to export.
4. Select Actions > Export Policies.

   4a Type the policy name or a meaningful description.

   4b Select Download. A zipped file containing certification policies *and* review definitions files in JSON format will be saved.

   4c Select the download icon on the top title bar to access the saved file and download the file.

4d (Optional) Delete the file after downloading.

> **NOTE:** The downloaded files will be automatically deleted based on your default download retention day settings. For information about customizing download settings, see Section 3.9, “Customizing Download Settings,” on page 50.

5 Extract the files if you want to import them later.

6 To import certification policies, click **Import Certification Policies** on the Certification page.

7 Navigate to the folder where your certification policies file is located, and click **Open**.

8 Identity Governance detects whether you are importing new or updated policies and whether the updates would create any conflicts or have unresolved references.

9 Select how to continue based on what information is displayed. For example, under **Updates**, you can compare the imported values with current values for each entity by selecting the respective policy before selecting policies to import.

10 Select the policies you want to import, and then click **Import**.

11 Remediation settings such as email recipients and review definitions can be resolved when policy is imported or it can be resolved manually after import.

27.5 Managing Certification Policy Violations

Identity Governance provides the ability for you to define certification policies so that the system can look for violations to the policies. You can view a summary of these violations and last and next calculation dates on the **Overview** page. You can view a detailed list of these violations on the **Certification** page by selecting the number of violations and if you have access to the catalog, on the **Catalog** > **Identities** > ***Name*** > **Certification** tab.

- Section 27.5.1, “Understanding Violation Types,” on page 282
- Section 27.5.2, “Searching for Specific Violations,” on page 283
- Section 27.5.3, “Remediating Certification Policy Violations,” on page 283

27.5.1 Understanding Violation Types

Identity Governance groups certification policy violations based on the cause of violation. All violations are calculated based on the review definitions included in a certification policy and the certification period. Certification period is based on the validity period you specify in the certification policy settings. Types of violations include:

- **No decision**: Review items that were included in a review during the certification period, but had no decisions made on them when the review ended
- **Expired**: Review items in a review whose certification period had expired
- **Expired with no decision**: Review items that had no decisions made on them during review runs and whose certification period has expired

- **Not reviewed**: Review items that should have been reviewed based on the specified review definitions, but were never part of any running review because the related review was not run or because there were changes to catalog, risk level, or review definition
- **Review in progress**: Review items that were in violation, but are now included in a review run that is in progress. You cannot set remediation for these review items.

27.5.2 Searching for Specific Violations

Identity Governance provides expression builders that enable you to select catalog attributes and custom values as search criteria and save them as filters. You can use these filters to search for certification policies on the Certification page. For more information, see Chapter 4, “Using Advanced Filters for Searches,” on page 53.

For each certification policy that has violations, you can review details by selecting the number of violations. Selecting the number of violations opens a searchable and sortable panel of violations where the tabs are based on the review item selection criteria in the review definition. In each tab of the violations panel, you can search for the related entity and also search violations for a selected entity by user, account, permission, application, role, or business role. You can also sort your search results by selecting a column heading. For example, if you want to search No decision violations for a user who has been assigned to a specific account, specify the user name in the top level search in the User tab, select the user name to expand the search results and to specify account at the second level search, and then click on Violations column heading to sort the results by violation type.

Administrators can also view the last certification date of an identity and violation details if any by selecting the total number in **Catalog > Identities > *Name* > Certification** tab.

27.5.3 Remediating Certification Policy Violations

Certification policy violations can be addressed and resolved by:

- Sending an email notification
- Reviewing items in violation or in other words creating a micro certification or focused reviews
- Creating change request

Once a micro certification is complete or once a change request has been fulfilled, Identity Governance recalculates the number of violations automatically. For more information about micro certification and fulfillment, see Section 23.3, “Understanding Micro Certification,” on page 245 and Chapter 15, “Instructions for Fulfillers,” on page 147.

If after the initial remediation type selection, administrators would like to change the remediation type for future violations then they can select the link under Remediation column on the Certification page and edit the remediation setup.

To remediate certification policy violations:

1. Log in as a Customer, Global, Data, or Review Administrator.
2. Under **Policy**, select **Certification**.
3. Select **Set Remediation**.

4 Select **Remediation Type**.

   4a If you selected **Email Notification**, select **Email source** and enter or search and select user or group as recipient of the email.

   4b If you selected **Change Request**, select violation types, and provide instructions for fulfilling the change requests generated for selected violation types.

   4c If you selected **Micro Certification**, configure the following settings:

   - **Review Definition**: Identity Governance selects the first review definition of the certification policy. Leave the default review definition as is or select a review definition from the drop down list if the policy has more than one review definition.
   - **Review Name**: Specify a name for the micro certification.
   - **Violation Type**: Select violation types based on which violations you want to review.
   - **Start Message**: Provide message that will be displayed in the header area of reviews describing why the review was started.
   - **Review Period**: Leave this blank if you want to use the duration specified in the review definition. Otherwise specify a duration.

5 Select **Run Remediation on new violations when calculated** check box to automatically run remediation after saving your remediation setup.

6 **Click** Save.

7 To run remediation on demand, select **Actions > Run Remediation**.

28 Analyzing Data and Monitoring Governance System

Micro Focus Identity Governance uses advanced analytics to analyze your data and provide you with results that enable you to monitor key aspects of your identity governance system. Results include:

- Governance metrics
- Risk scores
- Policy violations
- Role effectiveness and number of entitlement assignments via roles versus direct assignments
- Accounts statistics

Furthermore, Identity Governance enables authorized administrators to configure and customize analytics and metric definitions.

- Section 28.1, "Configuring Analytics and Role Mining Settings," on page 285
- Section 28.2, "Monitoring Your Identity Governance System," on page 291

28.1 Configuring Analytics and Role Mining Settings

Based on their business needs, authorized administrators can configure analytics, customize decision support visibility and role mining detection, create custom metrics, run metric calculations on demand, and download and import custom metrics in order to optimize your governance system.

- Section 28.1.1, "Understanding Role Mining Settings," on page 287
- Section 28.1.2, "Understanding Metrics," on page 287
- Section 28.1.3, "Understanding Supported Storages and Data Types," on page 288
- Section 28.1.4, "Configuring Metrics Data Stores for Custom Metrics," on page 288
- Section 28.1.5, "Creating Custom Metrics," on page 289
- Section 28.1.6, "Downloading and Importing Custom Metrics Definitions," on page 291

To configure analytics and role mining settings:

1. Log in as a Customer, Global, Data, or Business Roles Administrator.

   NOTE: A Business Roles Administrator does not have the same access permissions as a Customer, Global, or Data Administrator, and can only configure role mining settings and collect business role mining metrics.

2. Select **Configuration** > **Analytics and Role Mining Settings**.

3 (Optional) Under **Decision Support**, specify if the following information is excluded or included in the guidance provided to reviewers, review owners, review administrators, and access approvers.

 3a Deselect **Show business role authorization status** if business roles are not used or if the reviewer or access request approver does not need guidance about whether the review or request item was authorized by a business role.

 3b Deselect **Show similarity statistics in reviews and access requests** if the reviewer of user reviews or access request approver does not need guidance about how many users have similar permissions.

 3c Deselect **Show login statistics for review item users and accounts** if `Last Login` and `Number of Logins` attributes are not configured/collected/logged for the users and accounts.

 3d Deselect **Show review list statistics** if the review related authorized user wants to hide the review item's prior completion details, such as date of completion, name of the review run that included the review item, and decision made about the review item.

4 (Optional) Under **Similarity Profile**, select additional attributes to use in the similarity profile so that Identity Governance can provide decision support.

TIP: Use wildcard * to search for attributes.

5 Under **Role Mining**:

 5a Specify the maximum number of results that should be returned when mining business roles using the directed role mining approach.

 5b Specify which additional user attributes should be used for both directed and visual business role mining. For more information about which attributes to select, see "Understanding Role Mining Settings" on page 287.

6 Select **Save** to save all the settings.

7 (Optional) Next to **Metrics Collection**, click the **+** icon to create custom metrics. For more information, see Section 28.1.2, "Understanding Metrics," on page 287 and "Creating Custom Metrics" on page 289.

8 Under **Metrics Collection**, select one or more items, and then specify **Actions > Set collection interval** to change the default setting of 24 hours between metrics collections or disable collection.

TIP: Click on an item name to view detailed information about the metric, including list of metric columns' aliases and corresponding data types.

9 Specify start date, time, and hours or deselect the **Active** check box to disable collection.

10 Click **Save**.

11 (Optional) Select one or more items and then select **Actions > Collect metrics** to initiate a metrics collection on demand.

TIP: Always collect metrics after a collection and publication to refresh charts on the **Overview** page.

12 (Optional) When a custom metric collection is running and you want to cancel it:

   12a Select the item or items with an asterisk (*), and then select **Cancel Collection**

   12b Click **Cancel Collection** to confirm the cancellation.

13 (Optional) Select one or more default and custom metric items and then select **Actions > Download Metrics** to download the metric results in CSV format.

   NOTE: In addition to downloading the results, you can also download custom metric definitions and import them. For more information, see "Downloading and Importing Custom Metrics Definitions" on page 291.

28.1.1 Understanding Role Mining Settings

Roles in governance systems enable administrators to simplify security administration on systems and applications, by encapsulating popular sets of entitlements and assigning them as packages, rather than individually, to users. Identity Governance uses attributes specified in **Configuration > Analytics and Role Mining Settings** to provide recommendations for creating business roles. If the specifications do not meet certain conditions administrators may not see any recommendations when mining for roles. For more information about role mining, see Section 17.2.2, "Understanding Business Role Mining," on page 164

Log in as a Customer, Global, Data, or Business Roles Administrator. When specifying attributes make sure that:

- Specified attributes have values. User attributes with zero strength will not be displayed in the directed mining recommended attribute bar graph or visual attribute map.

In addition, in order for visual role mining to render recommendations make sure that:

- At least two attributes are selected. For example, "Title" and "Department".
- Selected attributes share commonality. For example, departments A, B, and C have users with the same titles, such as Administrative Assistant and Department Lead.

NOTE: After customizing attributes, select **Collect Metrics > Business Role Mining metrics** to refresh data.

28.1.2 Understanding Metrics

Identity Governance tracks key risk indicators so that administrators can monitor these risk factors in your governance system and make improvements based on the collected metrics. The key risk factors or facts extracted and collected from various data sources are stored in fact tables that are then used to calculate metrics and the results (metric tables) are published to the default or administrator-specified database. Administrators can also download all metric results in CSV format.

Identity Governance default metrics analyze common risk factors and enable you to find answers for questions like how many average number of users are in an account, how many accounts are unmapped, and what proportion of your entitlements are assigned by policies versus assigned directly. In addition, authorized administrators can create custom metrics, using SQL statements and insight queries, to adjust metric calculations based on your business needs. For example, you can create a custom metric for calculating how many role policies are active.

Administrators cannot edit the default metrics but can view associated description and metric columns by selecting the metric name. The default schedule for all metric calculations is 24 hrs. Administrators can change the metric calculation schedule and set a start date for metric calculations by selecting **Actions > Set collection schedule**. Though Identity Governance allows administrators to schedule the collection of metrics, collections might be delayed because Identity Governance manages the number collections running concurrently to optimize performance. Some collections scheduled to run might be delayed until other collections have completed. Identity Governance also delays scheduled calculations after initial startup of the Identity Governance server.

Administrators can control how many metric collection can be collected simultaneously by using the Identity Governance Configuration Utility to configure `com.netiq.iac.fact.collection.thread.pool.size`. Currently, if an administrator chooses to run more than five metric collection then the first five collections will run simultaneously and the other collections will be queued and will run after the previous one finishes calculations. We recommend that administrators override the default 5 setting to a lower number if they observe metric collections impacting the system adversely. For more information about the Configuration Utility, see "Using the Identity Governance Configuration Utility" in the *Identity Governance 3.6 Installation and Configuration Guide*.

28.1.3 Understanding Supported Storages and Data Types

You can store metrics data in Identity Governance databases, Vertica, Oracle, PostgreSQL, Microsoft SQL Server (MS SQL), or Kafka. Identity Governance enables you to select generic data types and translates them to a specific data type based on the type of storage as shown in the table below.

NOTE: Identity Governance publishes facts to Kafka as JSON strings.

Data Type	Read from `igops` as	Published to Vertica as	Published to IG PostgreSQL as	Published to IG Oracle as	Published to IG MS SQL as
Boolean	BOOLEAN	BOOLEAN	boolean	number	bit
Long	INTEGER	INTEGER	integer	number	integer
Float	FLOAT	FLOAT	float	float	float
String	STRING	LONG VARCHAR	text	nclob	nvarchar(max)
Date	TIMESTAMP	TIMESTAMP WITH TIME ZONE	TIMESTAMP WITH TIME ZONE	TIMESTAMP WITH TIME ZONE	TIMESTAMP WITH TIME ZONE

28.1.4 Configuring Metrics Data Stores for Custom Metrics

Identity Governance allows a Global, Data, or Customer Administrator to define data storage locations to reference when creating custom metrics collections. In addition, metrics data stores allow you to easily create multiple metrics collections that use the same metrics data store.

NOTE: Metrics collections can use the same metrics data store, but if the data store is a database, each metrics collection using that data store must specify a different database table.

Identity Governance allows you to configure the following data store types:

- Local Database (Identity Governance databases)
- Vertica
- Kafka
- Oracle
- Postgres
- MS SQL

Before you create a custom data store type, create a database schema that includes a new database and table for the data store you want to create.

To create a metrics data store:

1. Log in as a Global, Data, or Customer Administrator.
2. Select **Configuration** > **Analytics and Role Mining Settings**.
3. Next to **Metrics Data Stores**, click +.
4. Provide the requested Metrics Data Store Details.
5. Provide the configuration information for the selected store type.

   NOTE: If you select Kafka as the data store type, you must click **Import Kafka Configuration**, and then browse to select a JSON file that contains configuration information. You can click the “?” icon to view sample code you can copy and paste into a text editor to modify and create a JSON properties file.

6. Click **Save**.

28.1.5 Creating Custom Metrics

In addition to default metrics, Identity Governance provides the ability to query your operations database for additional statistics that could help you to better monitor the health of your governance system. The product also displays an asterisk (*) in front of the names of the custom metrics to distinguish them from default metrics. You can click the metric name to view the details of the metric.

To create a custom metric:

1. Log in as a Global, Data, or Customer Administrator.
2. Select **Configuration** > **Analytics and Role Mining Settings**.
3. Next to **Metrics Collection**, select the **+** icon and select **New.**
4. Specify a name for the new metric.
5. Optionally, select an existing category or create a custom category by selecting **Add Custom**.
6. Type a short description for the metric.
7. Click **Storage**, select a data store to publish the custom metric results, and then provide additional location information as required. For a Kafka data store, you must specify a topic. All other data store types are databases, which require a table name. The metrics will collect into

the table you specify. For example, for large volume analytics you could define a metrics data store for your Vertica or Kafka database, select that data store for your metric, and then specify a table name or a topic name to store the metrics.

NOTE: If you select a metrics data store that is a Local Database type, Identity Governance collects your metric to a table in the Identity Governance ARA database. In this case you do not have to specify a table name.

If you do not specify a table name, Identity Governance creates a table with `ex_`*`randomGUID`* naming convention. However, it is recommended that you provide a meaningful table name.

8. (Conditional) If you select to store the metric in Vertica, specify the schema name in **Table** before the table name and separate these with a comma.
9. Click **SQL Statement** and enter a SQL select statement. For example, to calculate how many role policies are active enter `select count(id) as active from role_policy where state = 'ACTIVE'`.

NOTE: Identity Governance automatically checks for statement errors and potential SQL injections to prevent invalid or malicious code. However, ensure that you have defined your query correctly, since you cannot edit saved custom metrics. If needed, you will have to delete the custom metric, and then create a new one to change your definition.

10. Click **Metric Columns**.
11. Click **Add Column** and specify an alias and type for each column selected in the SQL statement. When specifying an alias:
    - Do *not* use SQL reserved keywords as an alias for a custom metric column. Using a reserved keyword as a column name will cause an error. If, for example, you use `"end"` as an alias name in your custom metric definition when Identity Governance is connected to a PostgreSQL database, the PostgresSQL client will display the following error message:

      ```
      Fact validation failed: Unable to create table. Verify there are no
      reserved SQL keywords used as column aliases. ERROR: syntax error at
      or near "end" Position: 150.
      ```

      SQL reserved keywords vary based on the database. Refer to your database documentation for a list of database-specific reserved SQL keywords.
    - Ensure that the alias in **Metric Columns** and the SQL query match. For example, add metric column `active` with a type of `Long` for the SQL statement example in Step 9 on page 290.
12. Repeat the above step to add more columns.
13. Address any metric column section warnings that appear.

NOTE: Creating a metric with a warning might not work correctly.

14. Select **Save**.

To create a custom metric from an Insight Query:

1. Log in as a Global, Data, or Customer Administrator.
2. Select **Configuration** > **Analytics and Role Mining Settings**.

3. Next to **Metrics Collection**, select the **+** icon and select **New from Insight Query**. For information about creating insight queries, see Section 11.5, “Analyzing Data with Insight Queries,” on page 112.
4. Select the Insight Query to use, and then select **Add**.
5. Specify a name for the custom metric and adjust any other settings, including those populated based on the Insight Query and storage settings for metrics.
6. Select **Save**.

After creating custom metrics, you can collect them on demand by selecting one or more custom metrics and then selecting **Actions > Collect metrics**. In addition, you can also select **Actions > Delete Custom** to delete custom metrics.

28.1.6 Downloading and Importing Custom Metrics Definitions

In addition to creating a new custom metric using SQL statements or by using an Insight query, Identity Governance provides you the ability to download custom metric definitions so that you can edit and import them.

To download and import custom metric definitions:

1. Log in as a Customer, Global or Data Administrator.
2. Select **Configuration** > **Analytics and Role Mining Settings**.
3. Select names starting with an asterisk (*).
4. Select **Actions > Download Definitions** to download custom metric definitions.
5. To import custom facts, select **Import Custom Metrics**, browse for custom metric JSON files containing exported custom metrics, select entities to import, and then click **Import**.
6. (Conditional) If there is a conflict with an existing metric, resolve the conflict by selecting **Import new** to create a new custom metric or select **Replace Existing** to replace the existing metric.

28.2 Monitoring Your Identity Governance System

Identity Governance provides authorized administrators an overview of real time adaptive statistics related to your governance system on the **Overview** page. The **Overview** page also provides links to the related feature areas such as catalog, risk, and policies. Authorized administrators view details and optionally edit the respective definitions and settings. For configuring detailed queries, see Section 28.1, “Configuring Analytics and Role Mining Settings,” on page 285 and Section 11.5, “Analyzing Data with Insight Queries,” on page 112.

In order to view the widgets on the **Overview** page, requisite tasks must have been completed, and administrators must have the appropriate access authorization. For example, to view the Governance Risk Score widget, you must have previously configured and calculated the governance risk score. Users with Auditor authorization have read-only access to the Governance Risk Score widget. Global and Data Administrators can view the governance risk score and edit risk score configuration. For more information, see Section 20.3, “Configuring Risk Scores,” on page 214 and Section 20.5, “Viewing Calculated Risk Scores,” on page 215.

- Section 28.2.1, “Viewing Data Collection Statistics and Summary,” on page 292
- Section 28.2.2, “Viewing Number of Policies and Related Violations,” on page 292

- Section 28.2.3, "Viewing Entitlement Assignments Statistics to Leverage Roles," on page 292
- Section 28.2.4, "Viewing Account Statistics and Details," on page 292

28.2.1 Viewing Data Collection Statistics and Summary

Customer Administrators, Global Administrators, Data Administrators, and Auditors can view data collection statistics such as the number of identity and application sources and collection schedules in the Data Collection widget. They can also select the sources and schedules to configure application sources and collection schedule. For more information, see Chapter 7, "Collecting Applications and Application Data," on page 83 and Chapter 9, "Creating and Monitoring Scheduled Collections," on page 93.

In addition to collection statistics, administrators can also view the total number of groups, identities, applications, accounts, and permissions in the Data Summary widget. The Data Summary widget displays only the number of objects that are visible in the catalog. This data can be viewed as a bar or pie chart and authorized users can select a parameter to view the respective catalog details.

NOTE: View the **Data Sources > Activity** page for actual number of collected or published data objects that include objects that are not visible in the catalog. You can also use this page to compare collections or publications from two different times.

28.2.2 Viewing Number of Policies and Related Violations

Administrators such as the Separation of Duties Administrator, Review Administrator, and Data Administrator can view respective SoD, Certification, and Data policy violation statistics. In order to view the policy widgets, administrators must have defined review definitions and policies. For more information, see Section 18.3, "Creating and Editing Separation of Duties Policies," on page 198, Section 27.2, "Creating and Editing Certification Policies," on page 279, and "Creating and Editing Data Policies" on page 98.

28.2.3 Viewing Entitlement Assignments Statistics to Leverage Roles

To understand how entitlement assignments conform to business policies, Customer, Global, Data, and Business Roles Administrators can view the Role Leverage widget on the **Overview** page. It includes a graphical overview of effectiveness of roles over a period of time, entitlements assignments using roles versus entitlements assigned directly, and ratio of indirect role-based entitlements versus total entitlement assignments in percentage.

To change the default time range, log in as one of the authorized administrators, select the calendar icon, and select dates. To refresh the graphs, collect metrics for business role mining after publishing new business roles. Based on these metrics, you can then lower risk by using role mining to create more roles. For more information, see "Defining Business Roles" on page 167.

28.2.4 Viewing Account Statistics and Details

On the **Overview** page, administrators can see an account statistics summary for their system in the Account Statistics widget. To see data, administrators must collect and publish data sources and then collect metrics on demand or wait for 24 hours, the default metrics collection interval.

NOTE: To keep statistics up to date, metrics must be collected after every publication.

Identity Governance displays available metrics on the summary panel followed by a chart for each metric per risk levels.

To change the default settings:

1. Log in as an authorized administrator such as a Customer, Global, Data, Review, or SoD Administrator.
2. Select the calendar icon to change the time range for account statistics.
3. Select the change option icon to show or hide risk level series.

To drill down to see many more specific charts relating to your accounts:

1. On the **Overview** page in the Account Statistics widget, select **View statistics details**.

   or

   Select a data point on any chart to drill down to statistics details for that chart.
2. Select the calendar icon to change the date for the statistics.
3. Select a chart or table from the drop down menu to change to a different set of statistics. You can modify or delete these.
4. Drag and drop available metrics from the header to columns or rows.
5. (Optional) To create a customized chart or table:

   5a Start with a chart or table that contains the basic elements you want.

   5b Select the type of table, such as heatmap or line chart.

   5c Select the type of statistics, such as count or average.

   5d (Optional) Select additional options, if needed. Some selections add more options to customize. For example, for risk by application count bar chart you can customize risk levels display and add and customize results display by application.

   5e Customize the row and column headings.
6. Specify a name for the customized view and select **Save**.