MICRO FOCUS

Change Guardian™ 6.1

Installation and Administration Guide

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Legal Notice

Contents

About this Book and the Library

The *Installation and Administration Guide* provides instructions about installing and upgrading Change Guardian. This book also includes guidance for initial configuration to get you started.

Intended Audience

This book provides information for administrators who are responsible for installing and administering Change Guardian.

Additional Documentation

The Change Guardian documentation library includes the following resources:

User Guide

Provides information about the tasks that can be performed by a Change Guardian user who analyzes the change events.

Release Notes

Provides additional information about the release, resolved issues and known issues.

System Requirements

Provides the list of hardware and software requirements, and the supported applications.

1 Introduction

Change Guardian monitors critical files, systems, and applications in real-time to detect unauthorized activities of privileged users, helping you significantly reduce organizational risk to critical assets.

Change Guardian helps you achieve compliance with regulatory and privacy standards, such as:

- Payment Card Industry Data Security Standards (PCI DSS)
- Health Insurance Portability and Accountability Act (HIPAA)
- International Organization for Standardization's latest standards (ISO/IEC 27001)

This section provides information about the following:

- "What is Change Guardian?" on page 11
- "How Change Guardian Works" on page 12

What is Change Guardian?

Change Guardian provides security intelligence to rapidly identify and respond to unauthorized activities of privileged users that indicate a security breach or compliance gaps. Change Guardian helps security teams to detect and respond to potential threats in real-time. Change Guardian achieves this by using intelligent alerting of authorized and unauthorized access, and helps detect changes to critical files, systems, and applications.

To manage sophisticated threats and complex computing environment, organizations must take a layered and integrated approach to defend their critical systems and sensitive data.

Change Guardian provides the following protection measures:

- **Privileged-user monitoring:** Audits and monitors the activities of privileged users to reduce the risk of insider attacks.
- **Real-time change monitoring:** Identifies and reports changes to critical files, platforms and systems to help prevent security breaches and ensure policy compliance.
- **Real-time change alerting**: Provides immediate visibility to unauthorized changes that could lead to a security breach, and enables a quick response to threats.
- **Compliance and best practices attainment:** Helps satisfy compliance mandates by demonstrating the ability to monitor access to critical files and data.

Change Guardian helps you reduce the time and complexity required to analyze different platform logs in the following ways:

- **Centrally recording and auditing changes**
- **Creating easy-to-use monitoring policies**
- **Automating daily change auditing and reporting**

Change Guardian also integrates with your existing security information and event management (SIEM) solution, such as Sentinel. Change Guardian extends the ability of SIEM solutions to detect and respond to security incidents by providing information about who did what, when, where, and how, along with providing before and after values. With this comprehensive security intelligence, you can mitigate the impact of an attack before severe damage or compliance gaps can occur.

Change Guardian monitors the following endpoints or assets: Windows Active Directory, Group Policy, Windows, Microsoft Azure Active Directory, AWS (Identity), Office 365, Dell EMC, Microsoft Exchange, NetApp, UNIX, and Linux.

How Change Guardian Works

There are innumerable activities that take place on an asset, and their corresponding events are logged in by the operating system. However, all events do not require attention or pose a threat to the organization. A policy defines filters, based on which Change Guardian collects events. A policy definition contains information about the type of events to collect, the users who are allowed to make the change, event severity, and so on. Change Guardian collects the events details such as who, what, when, and where. You can configure emails or alerts to receive notifications about the desired events.

You can forward Change Guardian events to other software for further analysis and long term retention. You can forward events to another Change Guardian server, Sentinel server, Splunk Enterprise Security, or Micro Focus Security ArcSight Logger.

This section provides the following information:

- "Change Guardian Workflow" on page 12
- "Change Guardian Architecture" on page 14
- "Top User Scenarios" on page 15

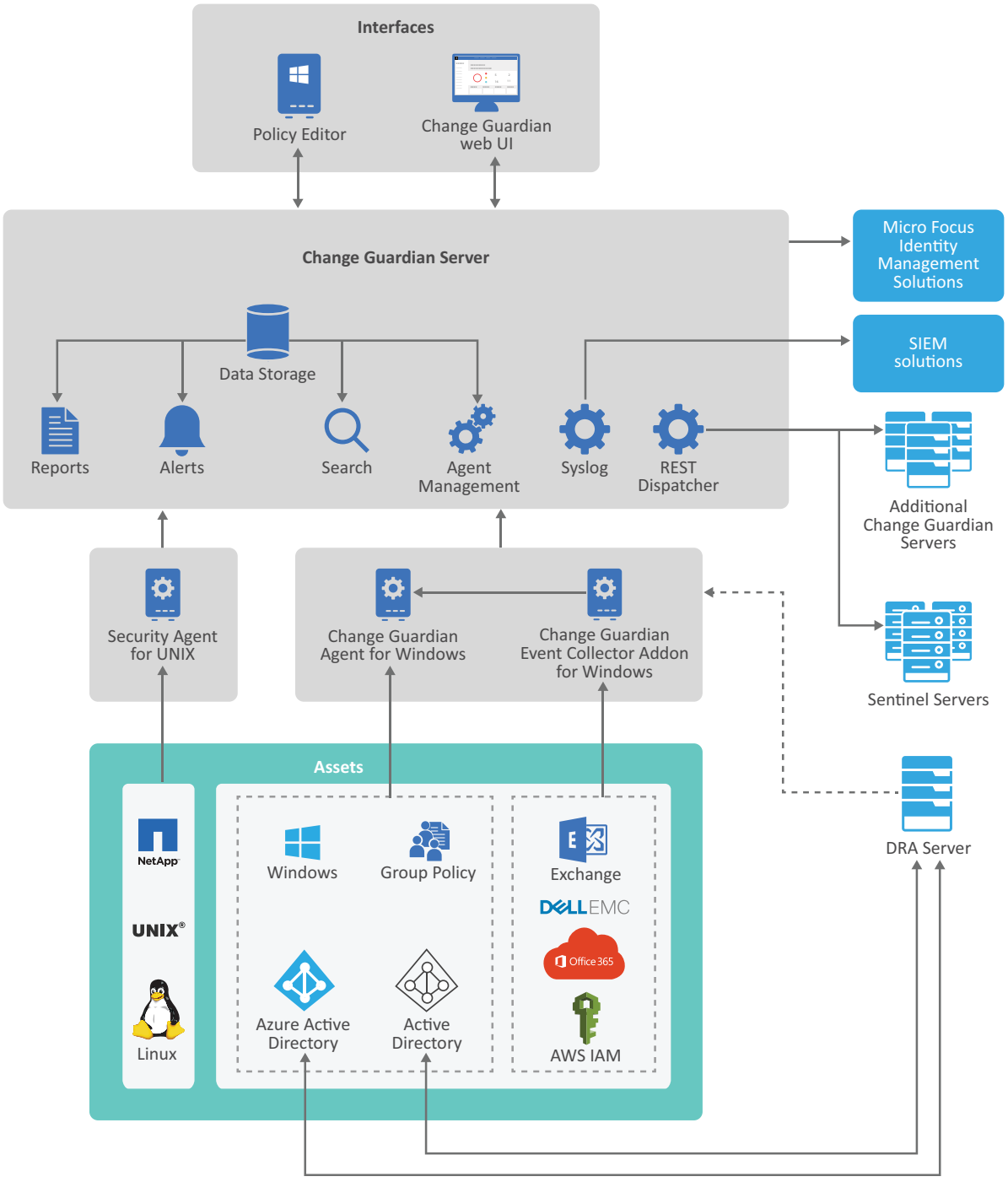
Change Guardian Workflow

The following diagram illustrates how Change Guardian interacts with different components:


Install
Change Guardian
Server
Install
Change Guardian
Components
Configure
Change Guardian
Server
Configure Assets
for Monitoring
Create and
Assign Policies
Create and
Assign Alert Rules
Manage Alerts
Create Reports
Receive
Email Reports
and Alerts
Analyze
Events
Change Guardian

Change Guardian Architecture

The following diagram illustrates how Change Guardian works:



Components in the Diagram	Description
Assets	Endpoints from where Change Guardian agents collect events.

Components in the Diagram	Description
Change Guardian Agents	Windows or UNIX based software that collects event data from the assets and forwards them to the Change Guardian server.
Change Guardian Event Collector Addon for Windows Agent	Collects event data in the Common Event Format (CEF) from Dell EMC, Microsoft Exchange, AWS Identity and Access Management and Office 365. The Change Guardian Agent for Windows reads the event details in the CEF.
Change Guardian Server	A Linux-based computer that receives and stores the event data. The server also stores the policies that you create. You can also search for events, and create alerts and reports.
Agent Management	A central location where you can manage agents. You can deploy and manage your agents directly on the agent host machine, or remotely install agents using Agent Manager.
Policy Editor	A Windows-based console in which you can configure and manage policies, create and assign alert rules, configure event destinations, configure emails, and schedule monitoring.
Change Guardian Web UI	Interfaces to dashboards and management consoles where you can view event details and agent status, view and triage alerts, create event routing rules and alert routing rule, manage users, and so on.

Top User Scenarios

Monitoring a Privileged User Account

Problem Statement: Adam Mandari is the Change Guardian administrator. His organization is required to adhere to the CIS policy "Audit Account Lockout is set to include Failure" for Microsoft Windows Server 2016. The policy mandates that multiple failed login attempts should be monitored. The Head of Security investigates such incidents for any breach of security.

Resolution: Adam has to monitor the user account 'Payroll' and monitor multiple failed logins associated with that account. Adam wants to configure an alert that notifies him when five unsuccessful login attempts made using 'Payroll' account.

Adam creates an Active Directory policy for Users Accounts `payroll_login_activity` with the following definition:

```
Monitors users accounts matching these user IDs Payroll
include only user account logged in events
include only failed events
```

Adam creates an alert rule specifying that an alert `alert_user_activity` should be generated when five events within 30 minutes are generated against the `payroll_login_activity` policy. He also configures an email server to be able to receive emails about the user account logged events.

Adam logs in to the Threat Response Dashboard to check the real-time alerts. When he receives the alert `alert_user_activity` in the dashboard, he finds the details of the `user account logged in` event. The event provides information about the machine from where the event occurred, the time at which the event occurred. Using the Threat Response Dashboard, he can decide to set a custom priority and assign it to another administrator to investigate the event.

To monitor this event regularly, Adam uses the Event Dashboard and looks for the `user account logged in` event. Every week, Adam exports the event details as a report and shares with the Head of Security.

Monitoring Changes to File Integrity

Problem Statement: Adam Mandari must ensure that his organization adheres the CIS policy “Audit Policy Change is set to include Success” for Microsoft Windows Server 2016. The policy mandates that critical Human Resource files are modified within the domain of the organization.

Resolution: Adam wants to use the real-time change monitoring feature in Change Guardian. Being the Change Guardian administrator, he creates a Change Guardian for Windows policy to monitor the changes to the specific folder, having the following definition:

```
Monitors changes to contents in files in c:\payroll whose patterns match *
include only file content difference events
```

When an attempt is made to modify any files in the `C:\payroll` directory, Change Guardian Agent for Windows collects the “File integrity was changed” event from the Windows machine and sends it to the Change Guardian server. The event contains the name of the event, the Windows machine details, the user who triggered the event, the time at which the write action was performed, and the old and the changed content. He logs in to the web console and uses the Event Dashboard to view the event. Adam configures an alert that notifies him whenever “File integrity was changed” event is generated. To analyze the real-time alerts he uses the Threat Response Dashboard.

Adhering to a Standard Benchmark

Problem Statement: Adam Mandari is the Change Guardian administrator and he would like to ensure that all assets are running and they are constantly monitored by Change Guardian policies. He has to ensure that the company adheres to the CIS for Microsoft Windows Server 2016.

Resolution: Before creating a Change Guardian policy to monitor the computers, Adam ensures that the computers are communicating with the Change Guardian server and that there are no auditing related issues. Adam logs in to the web console and uses the Agent Health Dashboard to identify the status of Change Guardian agents. He reviews the diagnostic information of the agents in the warning state and identifies the auditing related issue. After resolving the issues, he logs in back to

the Agent Health Dashboard to view the updated status. When all Change Guardian agents are online, Adam uses Policy Editor to create policies in Change Guardian that ensure that the company adheres to CIS standards. He assigns the policies to agents to enable continuous monitoring.

2 Preparing for Installation and Upgrade

This section provides information about planning Change Guardian installation and upgrade.

Implementation Checklist

Use the following checklist before you begin installing or upgrading Change Guardian server:

	Task	See
❑	Ensure that you have the necessary license keys	Understanding Licensing
❑	Review the hardware and software requirements, and the supported applications	Change Guardian System Requirements
❑	Determine the method to install or upgrade the Change Guardian server	Install and Upgrade Options
❑	Determine whether you want to **install** or **upgrade** the Change Guardian server	Install the Change Guardian server Upgrade the Change Guardian server
❑	**Install** or **upgrade** the Change Guardian components	Install the Change Guardian components Upgrade the Change Guardian components
❑	Configure Change Guardian after the **installation** or **upgrade**	Configure the Change Guardian server after installation Complete the post upgrade configurations
❑	Configure Policies	Configure Policies
❑	Manage Events	Manage Events
❑	Configure Alerts	Configure Alerts

Installation and Upgrade Options

Use this section to determine the option to installation or upgrade the Change Guardian server.

Traditional method

The traditional installation or upgrade provides the following:

- The flexibility to select the operating system vendor of your choice
- The flexibility to manage your own licenses and patch updates
- The flexibility to set firewall yourself
- More customization options for product configuration during installation

Appliance method

The appliance installation or upgrade provides the following:

- A ready-to-run Change Guardian software appliance with inbuilt SLES operating system
- An integrated update service for both product and the operating system that are available by Micro Focus
- Preconfigured firewall
- A web interface to configure and manage the appliance and receive the patch updates

Security Considerations

The following sections provide information about secured installations:

- "Traditional Installation" on page 20
- "Appliance Installation" on page 21

Traditional Installation

- Close all unnecessary ports. To review the list of ports, see "Understanding Ports Used" on page 22.
- Service port listens preferably only for local connections, and does not allow remote connections.
- Files are installed with least privileges so that the least number of users can read the files.
- Reports against the database are run as a user that only has `select` permissions on the database.
- All web interfaces require HTTPS protocol.
- All communication over the network uses SSL by default, and is configured to require authentication.
- User account passwords are encrypted by default, when they are stored on the file system or in the database.

Appliance Installation

The appliance has undergone the following hardening:

- Only the minimally required packages are installed.
- The firewall is enabled by default and all unnecessary ports are closed in the firewall configuration.
- Change Guardian is automatically configured to monitor the local operating systems syslog messages for audit purposes.

Understanding Licensing

This section provides information about the following:

Evaluation Licenses

By default, a new installation of Change Guardian server includes evaluation licenses for Change Guardian and all applications. The default evaluation license allows you to use all the features of Change Guardian during for a specific evaluation period.

When you restore events from the server whose license expired to a server having a new license, the event dates are adjusted according to the new license.

NOTE: To prevent any interruption in functionality, you must add an enterprise license before the evaluation license expires. To purchase the enterprise license, contact Micro Focus Customer Care.

Enterprise Licenses

When you purchase the Change Guardian enterprise license, you receive the license keys and registration codes through the customer portal, including the following:

- HTML license key for the Change Guardian server
- XML license keys for each licensed applications (such as Active Directory or NetApp share)
- For appliance installation, you will also get an alphanumeric registration code to register your Change Guardian appliance to the appliance update channel

There might be additional license terms not enforced by the license key, therefore, read your license agreement carefully. To make changes to your licensing, contact Micro Focus Customer Care.

You can add the enterprise license key either during the installation or any time thereafter.

Application Licenses

You require an application license to enable Change Guardian to monitor the specific application. For information about the number of licenses required for each application, see the following table:

Application Name	License Count
Windows	Number of monitored Windows servers or workstations
UNIX	Number of monitored UNIX, Linux, or UNIX-derivative servers or workstations
Microsoft Active Directory and Group Policy	Number of enabled active users in Active Directory
	Number of enabled active users in Group Policy
NetApp	Number of monitored NetApp instances
Microsoft Azure Active Directory	Number of enabled active users in Azure Active Directory
Microsoft Exchange Server	Number of active Exchange users
Dell EMC	Number of monitored Dell EMC instances
AWS (Identity)	Number of active AWS identities
Office 365 (Exchange Online)	Number of active users in Exchange Online

Understanding Ports Used

The Change Guardian server uses several ports for internal and external communication. Ensure that you open the appropriate ports for your environment.

Component	Ports	Direction	Required/ Optional	Description
Policy Editor Console	TCP 8443	Outbound	Required	Connects to the Change Guardian server for the following actions: ◆ Configuring email in Change Guardian or Sentinel. ◆ Updating policies to the Change Guardian server.
	TCP 2620	Outbound	Optional	Allows remote object browsing to UNIX-based monitored assets.
	TCP 389 or TCP 636	Outbound	Optional	Allows remote object browsing to Active Directory.

Component	Ports	Direction	Required/ Optional	Description
	TCP 8443	Inbound	Required	Allows the Change Guardian server to receive events from monitored assets. **NOTE:** This port might not be needed if you are sending events from monitored assets to an alternate destination.
Change Guardian Server	TCP 389 or TCP 636	Outbound	Required	Enables the LDAP authentication and the expansion of Active Directory groups. The port initiates a connection to the LDAP server.
	TCP 25	Outbound	Optional	Default email port. This port may be different based on the specific email implementation.
	TCP 1099 and 2000	Inbound	Required	Used together by monitoring tools to connect to Change Guardian server process using Java Management Extensions (JMX).
	TCP 5432	Inbound	Optional. By default, this port listens only on loopback interface.	Used for the PostgreSQL database.
	TCP 137, 138, 139, 445	Outbound	Optional	Used if secondary storage is configured to CIFS.
	TCP/UDP 111 and TCP/UDP 2049	Outbound	Optional	Used if secondary storage is configured to NFS.
	UDP 514 or TCP 1468	Outbound	Optional	Used when Change Guardian forwards events to the system receiving Syslog messages. If the port is UDP, it sends a packet to the receiver. If the port is TCP, it initiates a connection to the receiver.
	TCP 32000			Used for internal communication between the wrapper process and the server process.
	TCP 9200			Used for communication with alert indexing service using REST.

Component	Ports	Direction	Required/ Optional	Description
	TCP 9300			Used for communication with alert indexing service using its native protocol.
	TCP 443	Inbound	Optional	Forwarded to 8443 for HTTPS communication.
	TCP 61616	Inbound	Optional	Used for incoming connections from Correlation Engines.
	TCP 9443	Inbound	Required	Used by the Change Guardian Appliance Management Console.
JAVOS	TCP 8094	inbound	Required	Allows the JAVOS service to accept connections from agents that are retrieving their assigned monitoring policies.
	TCP 9094	Inbound (loopback)	Required	Allows the Change Guardian server to call JAVOS on this port to signal/reset the event destination cache.
	TCP 9095	Inbound (loopback)	Optional	Allows users to see runtime metrics and active threads.
Active Directory Accounts/ LDAP Expander	TCP 8088	Inbound (loopback)	Required	Allows the Change Guardian server to retrieve information about Active Directory accounts.
	TCP 8089	Inbound (loopback)	Optional	Allows users to see runtime metrics and active threads.
Windows Monitoring Agents	TCP 8094	Outbound	Required	Allows the agent to connect to the Change Guardian server to retrieve assigned monitoring policies.
	TCP 8094	Inbound	Optional	Allows the Policy Editor to connect to the agent to browse objects on the monitored asset.
	TCP 8443	Outbound	Required	Allows the agent to connect to the Change Guardian server or Sentinel to send events.

Component	Ports	Direction	Required/ Optional	Description
UNIX Monitoring Agents	TCP 8094	Outbound	Required	Allows the agent to connect to the Change Guardian server to retrieve assigned monitoring policies.
	TCP 2620	Inbound	Optional	Allows the Policy Editor to connect to the agent to browse objects on the monitored asset.
	TCP 8443	Outbound	Required	Allows the agent to connect to the Change Guardian server or Sentinel to send events.
UNIX Agent Manager	TCP 2620	Outbound	Required	Allows the UNIX Agent Manager to connect to a UNIX agent to get status and diagnostic information.
	TCP 2222	Outbound	Required	Allows the UNIX Agent Manager client to connect with the UNIX Agent Manager server.
	TCP 22	Outbound	One of these is required.	Used by UNIX Agent Manager in SSH connections that required SSH+SFTP access to computers targeted for remote agent deployment.
	TCP 21/23	Outbound		Used by UNIX Agent Manager in Telnet/FTP connection that requires Telnet+FTP access to computers targeted for remote agent deployment.
Agent Manager	TCP 8082	Inbound	Required	Allows the agent to communicate with the Agent Manager.
	TCP 445	Outbound	Required	Allows the Agent Manager to deploy agents to Windows computers.
	TCP 22	Outbound	Required	Allows the Agent Manager to deploy agents to Windows computers.

3 Installing Change Guardian Server

This chapter guides you through installing the Change Guardian server.

Traditional Change Guardian Server Installation

This section provides the following information:

Prerequisites

Ensure that your system meets the following:

- Review the latest Change Guardian release notes to understand new features and known issues.
- Review the System Requirements to understand the memory and CPU requirements.
- FIPS mode is supported only for Change Guardian. Change Guardian is not supported if the operating system is in FIPS mode. Therefore, ensure that the operating system is not in FIPS mode.
- NTP synchronized your computer time with the network time.
- The operating system for the Change Guardian server must include at least the Base Server components of the SLES server or the RHEL server. Change Guardian requires the 64-bit versions of the following RPMs:
  - bash
  - bc
  - curl
  - expect
  - coreutils
  - gettext
  - glibc
  - grep
  - libgcc
  - libstdc
  - lsof
  - net-tools

- openssl
- python-libs
- samba-client
- samba-common-libs
- samba-common-tools
- samba-libs
- sed
- tcl
- zlib
- fontconfig
- dejavu-fonts
- insserv-compat (applicable on SLES server)
- pam-modules (available only when you install Legacy-Module on SLES server 15.x)
- Packages applicable for installation on RHEL and SLES 15 SP2 command-line interface:
  - libX11
  - libXext
  - libXi
  - libXrender
  - libXtst
  - libwbclient
  - cups-libs
  - libtdb
  - libldb
  - gnutls
- zlib (up to SLES 12.x and RHEL 7.x, 8.x)
- python-libs (up to SLES 12.x and RHEL 7.x)
- netstat (up to SLES 12.x and RHEL 7.x) or ss (for SLES 15 and later)

NOTE: If there was a previous installation of Change Guardian, ensure that there are no files or system settings remaining from a previous installation.

Installing the Change Guardian Server

You can use either of the following methods to install Change Guardian server:

- "Performing an Interactive Installation" on page 29
- "Performing a Silent Installation" on page 32

NOTE: If you change the IP address of the Change Guardian server, there is a break down of communication between the server and agent. This requires reconfiguration of the server to restore communication. Therefore, consider using static IP addresses in your Change Guardian deployment.

Performing an Interactive Installation

This section provides information about standard and custom installation.

Standard Installation

Use the following steps to perform a standard installation:

To install the Change Guardian server:

1. Download the Change Guardian installation file from the Downloads website.
2. On the command line, log in as the `root` user and type the following command to extract the installation file:

   `tar zxvf change_guardian-<version>.tgz`
3. Run the Change Guardian server installation program as `root` by typing the following command in the root of the extracted directory:

   `./install-changeguardian.sh`

   NOTE: To see additional installation script options, run the command: `./install-changeguardian.sh -h` to display the Help.

   Or

   If you want to install Change Guardian on more than one system, you can record your installation options in a file. You can use this file for an unattended Change Guardian installation on other systems. To record your installation options, specify the following command: `./install-changeguardian.sh -r <response_filename>`
4. (Conditional) If NTP could not synchronize your computer time with the network time, make the required changes to the computer.
5. (Conditional) If your system does not meet the recommended disk space, make the required changes to the computer.

   NOTE: Ensure that the disk has the recommended space for Change Guardian installation files. Allocate recommended space in `/`, `/var/opt`, and `/opt`.
6. Specify the language as English, then press Enter. The end user license agreement is displayed in the selected language.
7. Press the space bar to read the license agreement. You must scroll through the entire agreement before you can accept it.
8. When prompted, select the standard configuration.

The installation proceeds an evaluation license key included with the installer. You can replace the evaluation license with a license key you purchased.

9 Create an admin account password for global system administration.

NOTE: While setting the admin password, only the following non-alphanumeric characters are allowed:` ! @ $ ^ _ { } [ ] \ : " , . / ?

---

10 Create a password for the `cgadmin` user.

Use this account to log in to Policy Editor. `cgadmin` has administrative rights to monitor configurations.

NOTE: The `cgadmin`, `dbauser`, and `appuser` accounts use this password.

---

11 If you want to email reports, configure the default email host using the following information:

- **SMTP Host:** The full name, including domain name, of the email server from which you want to send scheduled reports by email. Change Guardian server should be able to resolve the hostname.
- **SMTP Port:** The remote SMTP port, where the default number is 25. Use port 587 for a secure connection.
- **From:** The return email address.
- **SMTP User Name (Optional):** The user name to connect to the SMTP server.
- **SMTP Password (Optional):** The password that corresponds to the SMTP user name.
- **Secure Connection:** The connection mechanism for STARTTLS protocol.

NOTE: If you later decide to email reports and events, you must use the `configure.sh` script to update this configuration. For more information, see "Configuring Email Server to Receive Email Alerts" on page 66.

11a (Conditional) If the SMTP server certificate is self-signed or if not signed by a well-known CA, such as VeriSign, you have to import the certificate to the server trust-store. To import the self-signed certificate or CA certificate, complete the following steps:

11a1 Download the certificate to the server.

11a2 To store the certificate in `activemqkeystore`, run the following command on the server:

```
/opt/novell/sentinel/jdk/jre/bin/keytool -import -alias
<appropriate_alias> -keystore /etc/opt/novell/sentinel/config/
.activemqkeystore.jks -file <certificate_file_path> -storepass
password
```

11a3 Restart the server:

```
rcsentinel restart
```

After the Change Guardian server installation completes, the server starts. It might take a few minutes for all services to start after installation. Wait until the installation finishes and starts all services before you log in to the server.

To install the Change Guardian components, see "Installing Change Guardian Components" on page 39.

Custom Installation

To install the Change Guardian server:

1. Download the Change Guardian installation file from the Downloads website.
2. On the command line, log in as the `root` user and type the following command to extract the installation file:

   `tar zxvf change_guardian-<version>.tgz`
3. To install from a custom path, specify the following command:

   `./install-changeguardian.sh --location=<custom_CG_directory_path>`

   NOTE: This custom path must have 0755 permissions. Ensure that you allocate the recommended disk space in `/` and `/home`.

   Or

   If you want to install Change Guardian on more than one system, you can record your installation options in a file. You can use this file for an unattended Change Guardian installation on other systems. To record your installation options, specify the following command: `./install-changeguardian.sh --location=<custom_CG_directory_path> -r <response_filename>`
4. Specify the language as English, then press Enter. The end user license agreement is displayed in the selected language.
5. Press the space bar to read the license agreement. You must scroll through the entire agreement before you can accept it.
6. When prompted, select custom configuration, and provide the following information:

   Add a production license key: Installs a production web console license key

   Assign admin account password: Account for global administration of the system

   ---

   NOTE: While setting the admin password, only the following non-alphanumeric characters are allowed: ` ! @ $ ^ _ { } [ ] \ : " , . / ?

   Assign dbauser account password: Account for PostgreSQL database maintenance

   Assign appuser account password: Account for connections with PostgreSQL database at runtime

   Customize port assignments: Change the default ports used by the system

   ---

   NOTE: Changing the default database service port 5432 might cause Change Guardian to behave inconsistently.

   Configure LDAP authentication: Configure an LDAP user repository to handle authentication

   ---

   NOTE: Configuring FIPS using the custom configuration is currently not supported. For more information about configuring Change Guardian to run in FIPS mode, see "Configuring FIPS 140-2" on page 70

   ---
7. Create a password for the `cgadmin` user.

   Use this account to log in to the Policy Editor. This account has the privilege to administer monitoring configuration.

NOTE: The `cgadmin`, `dbauser`, and `appuser` accounts use this password.

8 Configure the default email host using the following information:

- **SMTP Host:** The full name, including domain name, of the email server from which you want to send scheduled reports by email. Change Guardian server should be able to resolve the hostname.
- **SMTP Port:** The remote SMTP port, where the default number is 25. Use port 587 for a secure connection.
- **From:** The return email address.
- **SMTP User Name (Optional):** The user name to connect to the SMTP server.
- **SMTP Password (Optional):** The password that corresponds to the SMTP user name.
- **Secure Connection:** The connection mechanism for STARTTLS protocol. Set the value to `true` if you want to configure SMTP server for STARTTLS.

NOTE: If you later decide to email reports and events, you must use the `configure.sh` script to update this configuration.

8a (Conditional) If the SMTP server certificate is self-signed or not signed by a well-known CA, such as VeriSign, you have to import the certificate to the server trust-store. To import self-signed certificate or the CA certificate, complete the following steps:

8a1 Download the certificate to the server.

8a2 To store the certificate in `activemqkeystore`, run the following command on the server:

```
/opt/novell/sentinel/jdk/jre/bin/keytool -import -alias
<appropriate_alias> -keystore /etc/opt/novell/sentinel/config/
.activemqkeystore.jks -file <certificate_file_path> -storepass
password
```

8a3 Restart the server by running the following command:

```
rcsentinel restart
```

After the Change Guardian server installation completes, the server starts. It might take a few minutes for all services to start after installation. Wait until the installation finishes and starts all services start before you log in to the server.

To install the Change Guardian components, see “Installing Change Guardian Components” on page 39.

Performing a Silent Installation

The silent or unattended installation is useful if you need to install more than one Change Guardian instance in your deployment. You can record the installation parameters during the interactive installation and then run the recorded files on other systems.

Ensure that you have recorded the installation parameters to a file. For more information about creating the response file, see:

- Standard Installation
- Custom Installation

To enable FIPS 140-2 mode, ensure that the response file includes the following parameters:

- ENABLE_FIPS_MODE
- NSS_DB_PASSWORD

To perform a silent installation:

1. Download the installation files from the Downloads website.
2. Log in as `root` to the server where you want to install Change Guardian.
3. Specify the following command to extract the install files from the tar file:

   `tar -zxvf change_guardian-<version>`
4. To install in silent mode, specify the following command:

   `./install-changeguardian -u <response_filename>`

   The installation proceeds with the values stored in the response file.

   After the installation finishes, you can log in to the server. To install the Change Guardian components, see "Installing Change Guardian Components" on page 39.

NOTE: To see additional installation script options, run the command: `./install-changeguardian.sh -h` to display the Help.

Change Guardian Server Appliance Installation

The Change Guardian server appliance is a ready-to-run software appliance. The appliance combines a hardened SUSE Linux Enterprise Server (SLES) operating system and the Change Guardian server software integrated update service to provide an easy and seamless user experience that allows you to leverage existing investments. You can install the software appliance on a virtual environment.

NOTE: If you change the IP address of the Change Guardian server, there is a break down of communication between the server and agent. This requires reconfiguration of the server to restore communication. Therefore, consider using static IP addresses in your Change Guardian deployment.

Prerequisite: Ensure the following:

- the machine meets the hardware requirements. For hardware information, see the System Requirements page.
- NTP synchronized your computer time with the network time.

To install:

1. Download the base appliance image to a local server from the Downloads website.

   The OVF file name is `change_guardian_appliance_<version>.tar.gz`

   The ISO file name is `change_guardian_appliance_<version>.iso`

   The VHD file name is `change_guardian_appliance_<version>.zip`
2. (Conditional) If you are using VMware, use the OVF template to complete the following steps:

   2a Extract the appliance image to your local server.

   If you are extracting to a Windows server, you need a program, such as WinRar:

If you are extracting to a Linux server, use the following command:

`tar -zxvf <filename>`

2b Log in to the vSphere client and deploy the OVF template. For more information, see the VMware documentation.

3 (Conditional) If you are installing directly to hardware, use the ISO image to complete the following steps:

3a Burn the ISO file to a DVD or mount the image.

NOTE: Change Guardian does not support mounting the ISO image from a network share.

3b Start or reboot your computer and check the BIOS configuration of your machine. The BIOS should allow you to start from the CD/DVD drive and change the order of the media.

3c (Conditional) If you have not mounted the image, boot the DVD.

4 (Conditional) If you are using Hyper-V, see "Configuring Microsoft Hyper-V Appliance" on page 35.

NOTE: To expand the `/var/opt` partition, see "Expanding Disk Space in Hyper-V Virtual Machine" on page 193.

5 Power on the appliance server.

6 Select the language and keyboard layout.

7 Read and accept the SUSE End User License Agreement.

8 Read and accept the Change Guardian End User License Agreement.

9 On the Change Guardian Appliance Passwords and Time Zone screen, specify the following:

- Change Guardian `root` and `vaadmin` passwords
- NTP server details
- Region and time zone of the virtual machine

10 On the Change Guardian Server Configuration screen, specify the following:

- Global `admin` password

  NOTE: Only the following non-alphanumeric characters are allowed for `admin` user: ` ! @ $ ^ _ { } [ ] \ : " , . / ?

- `cgadmin` user password
- Deselect `Use IP Address for event routing`

  Change Guardian server should be able to resolve the hostname.

- (Optional) If you want to email reports, configure the default email server:
  - Specify the full name, including the domain name, of the email server as the SMTP `server hostname`. This is the server from which you want to send email notifications.

    Change Guardian server should be able to resolve the hostname.
  - Specify the SMTP `server port`. The default port is 25. Use port 587 for a secure connection.

- Specify the return address in `From Address`.
- Specify the SMTP username and password to connect to the SMTP server.

11 On the Change Guardian Appliance Network Settings, specify the hostname and the mechanism to assign the IP address of the virtual machine.

Optionally, you can configure the network proxy.

12 The script checks whether your system meets the minimum requirement of CPU core and memory. Specify `Next` to continue or `Abort` to stop the installation.

13 (Conditional) If javos service does not run after completing this step, reconfigure Change Guardian by using configure.sh.

This completes the Change Guardian server installation. To install the Change Guardian components, see "Installing Change Guardian Components" on page 39.

NOTE: If the server time appears out of sync immediately after the installation, restart NTP:

```
service ntp stop
service ntp start
```

Configuring Microsoft Hyper-V Appliance

You can install Change Guardian appliance on Hyper-V 2016 and Hyper-V 2019.

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

To configure:

1 Log in to the host server either locally or from a remote workstation.

You can use Windows Remote Desktop to log in to the host server from a remote workstation.

2 Create a new directory in the location where you want the virtual machine to reside.

As a best practice, use the same name for the directory and the appliance virtual appliance.

3 Download the software to the new directory, and extract the Change Guardian appliance `.zip` file.

4 Open Hyper-V Manager.

5 On the left pane, right-click the host name and click **New > Virtual Machine**.

This is the host where you want to create the new virtual machine.

6 Follow the wizard and provide the following information:

- Specify the name of the virtual machine
- In **Specify Generation** page specify the generation as Generation 1
- In **Assign Memory** page, specify the amount of memory (in MB) to allocate to the virtual machine. For details, see the Change Guardian System Requirements page.

- In **Configure Networking** page, specify the connection mechanism.
- In **Connect Virtual Hard Disk** page, select **Use an existing virtual hard disk,** and browse to the .vhd file.

7 Right-click on the newly created virtual machine, and click **Settings > Processor** and specify the number of virtual processors.

8 Right-click on the virtual machine and click **Connect** to open it.

9 Right-click on the virtual machine and click **Start**.

10 Continue to step 6 to complete installing the Change Guardian appliance.

NOTE: Change Guardian Hyper-V appliance deploys a virtual machine with 100 GB disk. To expand the disk space, check the recommended disk space in the System Requirements page. You must expand the disk immediately after installing the Change Guardian Hyper-V appliance. To expand the `/var/opt` partition, see "Expanding Disk Space in Hyper-V Virtual Machine" on page 193.

Registering the Appliance for Updates

You must register the Change Guardian appliance with the appliance update channel to receive Change Guardian and latest operating system updates. To register the appliance, you must first obtain your appliance registration code or the appliance activation key from the Customer Care Center.

Register Using the Change Guardian Appliance Management Console

To register the appliance for updates:

1 Log in to the Change Guardian Appliance Management Console as `vaadmin` or `root`.

2 Click **Home > Online Update > Register Now**.

3 In the **Email** field, specify the email ID to which you want to receive updates.

4 In the **Activation Key** field, enter the registration code.

5 Click **Register**.

6 Verify whether updates are available.

Register Using Commands

Use the following steps to register the appliance using the command line:

1 Log in to the Change Guardian Appliance Console as `root`: `https://IP_Address_Change_Guardian_server:9443`.

2 Clean existing registrations for SLES (11 and 12) based clients:

```
suse_register -E
```

3 Register the server for SLES (11 and 12) based clients:

```
suse_register -a regcode-change-guardian="<registration_code>" -a
email="<email_ID>"
```

4 Verify whether updates are available.

Verifying the Installation

You can determine whether the installation is successful by performing one of the following:

- Ensure the server is up: `netstat -an | grep LISTEN | grep <port_number>`

  The possible *port_number* are 8443, 9443, 8094, or 8082. For example, running the command with ports 8443 and 9443 might provide the following output:

  - `tcp6 0 0 :::8443 :::* LISTEN`
  - `tcp 0 0 :::9443 :::* LISTEN`

- Ensure the server ports such as 8443, 8094, 8082 and 9443 are open:
  - On SLES, run the following command in the server:

    ```
    iptables -I INPUT -p tcp --dport <port_number> -j ACCEPT
    iptables-save
    ```

  - On RHEL, run the following command in the server:

    ```
    iptables -I INPUT -p tcp --dport <port_number> -j ACCEPT
    service iptables save
    ```

  For more information about the ports used, see “Understanding Ports Used” on page 22.

- Access the Change Guardian dashboard:

  `https://IP_Address_Change_Guardian_server:8443/cg-main-ui/`

4 Installing Change Guardian Components

After installing the Change Guardian server, you must install a combination of Change Guardian components. Following are Change Guardian components:

Policy Editor: Allows you to configure Change Guardian policies.

Change Guardian Agent for Windows: Collects event data for the supported assets, such as Windows, Windows Active Directory, and Azure Active Directory.

Change Guardian Event Collector Addon for Windows Agent: Collects event data in Common Event Format (CEF) from assets, such as Dell EMC, Microsoft Exchange, and Office 365, which is used by Change Guardian Agent for Windows.

Security Agent for UNIX: Collects event data for Linux, UNIX, and NetApp.

For information about requirements and recommendations, see the System Requirements page.

Install the components using Agent Manager. To open Agent Manager, open the Change Guardian web console and click **AGENTS**.

This chapter provides the following information:

Installing Policy Editor

To install Policy Editor:

1. In Agent Manger, click **All Assets > Manage Installation > Download Package**.
2. Download the available version of Policy Editor.
3. Copy the `ChangeGuardianPolicyEditor.zip` file to the computer where you want to install Policy Editor and extract the files.

   The package includes `NetIQCGPolicyEditorInstaller.exe` and `NetIQCGPolicyEditorInstaller.config`. Both files must be in the same directory.
4. Install Policy Editor as an administrator.

Verifying the Installation

To verify:

- Ensure that Policy Editor is available in the list of installed programs in Windows Control Panel

- Launch Policy Editor and log in with an account in the local administrators group

  When Policy Editor starts, it connects to the Policy Repository with an account that is a member of the administrator or Change Guardian administrator role. The Policy Repository runs on the Change Guardian server.

Installing Change Guardian Agent for Windows

For troubleshooting information about Change Guardian Agent for Windows, see "Issues on Change Guardian Agent for Windows" on page 178.

Interactive Installation

You can install Change Guardian Agent for Windows in the following ways:

- Install agents remotely by using Agent Manager
- Install agents manually on a local computer

NOTE: Agent Manager and the Change Guardian Agent for Windows are in FIPS mode, by default.

Remote Installation

Remote installation using Agent Manager provides a convenient and uniform method for installing one or more Change Guardian Agent for Windows. When you use Agent Manager to install, Agent Manager communicates with the agent through the Agent Management service.

Prerequisite: Using Agent Manager, you must first add the assets where you want to install agents. You can either import assets from Active Directory or from a text file, or add assets manually. For more information, see "Adding Assets" on page 74.

To install Change Guardian Agent for Windows using Agent Manager:

1. In Agent Manager, select the asset where you want to deploy the agent. If you select multiple assets, they must use the same credentials.
2. Click **Manage Installation > Install Agents**.
3. For newly added assets, specify the `root` credentials and click **Next**.

   NOTE: Log in to the newly added asset as an administrator to the deploy agent. The account must be a local administrator or a domain account in the Local Administrators group.

   ---
4. Select the available version of the agent.
5. For agent configuration, select any one option: default agent configuration, customize the configuration, or add new.
6. Click **Start Installation.**

Manual Installation

Manual installation includes installing the agent certificates and artifacts, along with the agent.

- "Downloading the Agent Certificates and Artifacts" on page 41
- "Installing the Agent" on page 41

Downloading the Agent Certificates and Artifacts

Use Agent Manager to download and install agent artifacts and certificates on one or more hosts.

NOTE: You must install agent artifacts and certificates for each host separately.

To download:

1. In Agent Manager, click **All Assets > Manage Installation > Download**.
2. Select the **Agent certificates and artifacts** package.
3. Specify the hostname and the IP address, and then click **Start Download**.
4. Copy and extract the `ChangeGuardianAgentCertificates_<hostname>.zip` file to the agent artifact directory, before installing the agents.

Installing the Agent

To install:

1. From Agent Manager, download the available version of Change Guardian Agent for Windows.
2. Copy `ChangeGuardianAgentforWindows.zip` to the computer where you want to install the Change Guardian Agent for Windows and extract the files.

   Agent artifacts include: `NetIQCGAgentSilentInstaller.exe` and `NetIQCGAgentSilentInstaller.config`. The configuration file contains the configuration you chose when you downloaded agent artifacts.

   NOTE: Both agent artifacts and certificates should be in the same directory to successfully complete the installation.

   ---
3. Run the `NetIQCGAgentSilentInstaller.exe` file as an administrator.

Verifying the Installation

To verify:

- Ensure that Change Guardian Agent is available in the list of installed programs in Windows Control Panel
- Ensure that the service NetIQChangeGuardianAgent is running in Windows Services
- If you used Client Agent Manager to install, ensure that Client Agent Manager is available in the list of installed programs in Windows Control Panel. Also ensure that the service NetIQClientAgentManager is running in Windows Services

Installing Change Guardian Event Collector Addon for Windows Agent

Change Guardian Event Collector Addon for Windows Agent collects events in the common event format (CEF). Change Guardian supports events only in CEF.

Before installing the Change Guardian Event Collector Addon for Windows Agent, set up the required connectors.

NOTE: Change Guardian documentation provides the configuration steps about third-party products AWS, Office 364, Dell EMC, and Exchange for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

Prerequisites for AWS

This section provides the following information:

For information about AWS concepts, see *AWS Documentation* (https://docs.aws.amazon.com/).

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance.

Setting the AWS Account

If you are using Elastic Compute Cloud (EC2) role-base credentials, then you must use an IAM role with `AmazonS3ReadOnlyAccess` and `AmazonSQSFullAccess` policies. If you are using access key or secret key as credentials, complete the following steps:

To setup:

1. Create an Amazon Web Services account.
2. Log in to the **AWS Management Console** and open **IAM**.
3. From **Dashboard**, click **Access Management > Groups > Create New Group.**
4. Specify **Group Name** and attach the policies **AmazonS3ReadOnlyAccess** and **AmazonSQSFullAccess** to the group.

The group requires necessary permissions to access the CloudTrail logs through APIs.

5 To add new user to the group, select **Users > Add Users**.

6 Specify the user details.

7 Ensure that you download the credentials as `.csv` file.

NOTE: The file contains the **Access Key ID** and **Secret Access Key** that you have to use when installing the connector.

---

8 Click **Groups > *group_name* > Group Action > Add Users to Group**.

9 Select the users to add to the group and click **Add Users**.

10 To view or create an Access key ID, open user summary and click **Security Credentials > Create Access key**.

Configuring CloudTrail

Create a new Amazon Simple Storage Service (S3) bucket and a new Amazon Simple Notification Service (SNS) topic.

To configure CloudTrail:

1 From the AWS Management Console, open **CloudTrail**.

2 Click **Create trail**.

3 Specify **Trail name**.

4 Select **Create new S3 bucket** and specify **Trail log bucket and folder**.

5 Select **SNS notification delivery**.

6 Select **Send SNS notification for every log file delivery**.

7 Specify a new SNS Topic.

Make a note of the **AWS S3 Region** name available at the browser address box of the SQS page.

Creating and Subscribing an Amazon Simple Queue Service (SQS)

To create an SQS:

1 In the AWS Management Console, open **Simple Queue Service**.

2 Click **Create New Queue** and specify the details.

3 Select the new queue.

4 Under **Queue Actions**, select **Subscribe Queue to SNS Topic**.

5 From **Choose a Topic**, select the new topic and click **Subscribe**.

Important Parameters

You should have the following parameters after setting up AWS. Use these parameters to install Change Guardian Event Collector Addon for Change Guardian:

Parameter	Description
Proxy Host	(Optional) The proxy configuration settings
Proxy Port	
Proxy User Name	
Proxy Password	
AWS SQS URL	The SQS URL from which you want to pull the CloudTrail notification
AWS Access Key	The credentials for the IAM user
AWS Secret Key	
AWS SQS Region	The locations of AWS data centers
AWS S3 Region	
AWS SQS Visibility Timeout	The time during which Amazon SQS prevents other consuming components from receiving and processing that message
AWS SQS Max Received Count	The maximum number of attempts to receive an SQS message

Prerequisites for Office 365

Register the connector in Azure AD and configure it with appropriate permissions. Ensure that you have enabled and configured Office 365 subscription account. Also, ensure that the subscription is associated with an Azure AD Tenant Domain account.

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance

Registering the Application in Azure AD

To register:

1. Log in to the Azure Management portal using the credentials of your Microsoft tenant that has the subscription to Office 365 you wish to use.
2. Click **Azure Active Directory**.
3. Under **Manage**, click **App registrations > New registration**.
4. Specify a logical name, supported account types, redirect URI (optional), and then click **Register**.

   Make a note of the **Application (Client) ID**, which is the **Client ID**.
5. Under **Manage > Certificates and secrets > New client secret**, specify the client secret details and click **Add**.

   Make a note of the **Client secret value (ID)**, which is the **Client Secret**.

6 Click **API permissions > Add a permission > Office 365 Management APIs > Delegated permissions and Application Permissions**.

7 Select **ActivityFeed.Read**, **ActivityFeed.ReadDlp** and **ServiceHealth.Read** and click **Add permissions**.

8 On the API permissions page, click **Grant admin consent for <*organization name*>**.

Important Parameters

You should have the following parameters after setting up Office 365. Use these parameters to install Change Guardian Event Collector Addon for Change Guardian:

Parameter	Description
Azure Tenant Domain	The domain name of the Office 365 Azure tenant
Client ID	The Client ID of the registered application in Azure Active Directory
Client Secret	The Client Secret of the application registered in Azure Active Directory
Proxy Host	(Optional) Proxy configuration setting
Proxy Port	
Proxy User Name	
Proxy Password	

Prerequisites for Dell EMC

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance

Installing Common Event Enabler

To install Common Event Enabler (CEE):

1 Log into the machine with the account that has administrator privilege.

2 Ensure that .NET Framework 3 is enabled.

3 Run the file `EMC_CEE_Pack` for either the 32-bit (WIN32) or the 64-bit (X64) version of the software.

4 Follow the prompts and complete the installation.

NOTE: Do not change the location of the temporary directory.

5 When installer prompts you to restart the server, Click **No**.

6 Open `services.mcs` and search for `EMC  CAVA` in the services list.

7 Right click **Properties** and click **Log On > This Account > Browse > Advanced > Find Now**.

8 Select the administrator or the account with administrative privilege and set the password.

9 Restart the machine.

10 Access the CEPA server from a browser.

Use the same format that you provided in the Dell EMC web console, for example, `http://1.1.1.1:12228/cee`.

If the CEPA server is running, it displays the version of CEE.

To set up application access:

1 Open Windows registry and open **HKEY_LOCAL_MACHINE > SOFTWARE > EMC > CEE > CEPP > Audit > Configuration**.

2 Specify `ArcSightConnector` in **Endpoint**.

3 Specify 1 in **Enable**, and restart the machine.

Important Parameters

You should have the following parameters after setting up Dell EMC. Use these parameters to install Change Guardian Event Collector Addon for Change Guardian:

Parameter	Description
Domain Name	The domain controller details to perform SID translation of users
Domain Host Name	
Domain User Name	
Domain Password	

Prerequisites for Exchange

The Exchange Management Shell is built on Windows PowerShell technology. With the Shell, you can manage every aspect of Exchange, including enabling new e-mail accounts, configuring SMTP connectors, storing database properties, storing transport agents, and more. The Shell can perform every task that can be performed by the Exchange Management Console and the Exchange Web interface, in addition to tasks that cannot be performed in those interfaces.

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance

This section provides the following information:

Enabling Mailbox Audit Logging

To understand mailbox audit logging, see *Messaging policy and compliance permissions* in the Microsoft Exchange Documentation.

Use the Shell to specify Mailbox Audit Logging Settings, and specify logging settings for Administrator, Delegate, and Owner access.

1. Enable mailbox audit logging for Ben Smith's mailbox:

   ```
   Set-Mailbox -Identity "Ben Smith" -AuditEnabled $true
   ```

2. For detailed syntax and parameter information, see *Set-Mailbox* in the Microsoft Exchange Documentation.
3. Specify that the SendAs or SendOnBehalf actions performed by delegate users are logged for Ben Smith's mailbox:

   ```
   Set-Mailbox -Identity "Ben Smith" -AuditDelegate SendAs,SendOnBehalf -
   AuditEnabled $true
   ```

4. Specify that the MessageBind and FolderBind actions performed by administrators are logged for Ben Smith's mailbox:

   ```
   Set-Mailbox -Identity "Ben Smith" -AuditAdmin MessageBind,FolderBind -
   AuditEnabled $true
   ```

5. Specify that the HardDelete action performed by the mailbox owner will be logged for Ben Smith's mailbox.

   ```
   Set-Mailbox -Identity "Ben Smith" -AuditOwner HardDelete -AuditEnabled
   $true
   ```

Enabling Administrator Audit Logging

To understand administrator audit logging, see *Administrator audit logging in Exchange Server* and *Exchange and Shell Infrastructure Permissions* in the Microsoft Exchange Documentation.

Use the Shell to specify Administrator Logging Settings, and specify logging settings for Administrator, Delegate, and Owner access.

1. Enable administrator audit logging:

   ```
   Set-AdminAuditLogConfig -AdminAuditLogEnabled $True
   ```

2. Enable administrator audit logging for every cmdlet and every parameter in the organization, with the exception of Get Cmdlets:

   ```
   Set-AdminAuditLogConfig -AdminAuditLogEnabled $true -
   AdminAuditLogCmdlets * -AdminAuditLogParameters *
   ```

3. Enable administrator audit logging for specific Cmdlets run in the organization:

   ```
   Set-AdminAuditLogConfig –AdminAuditLogEnabled $true -
   AdminAuditLogCmdlets *Mailbox* -AdminAuditLogParameters *Address*
   ```

   Any parameter used on the specified Cmdlet is logged. Every time a specified cmdlet is run, a log entry is added to the audit log.

Enabling Execution of Microsoft Exchange PowerShell Scripts

Allow Microsoft Exchange PowerShell scripts to execute so that it can collect information about mailboxes and events from Microsoft Exchange.

To enable:

1. Open **Local Group Policy Editor.**
2. Go to **Local Computer Policy > Computer Configuration > Administrative Templates > Windows Components > Windows PowerShell**.
3. Set **Turn on Script Execution** to Enabled.
4. Set **Execution Policy** to **Allow local scripts and remote signed scripts**.

Configuring Microsoft Exchange PowerShell

You must configure Microsoft Exchange PowerShell services to run with a privilege to receive exchange audit log.

To allow the services to run as a domain administrator:

1. Open Windows services, and select **ArcSight Microsoft Exchange PowerShell**.
2. Open **Properties**, click **Log On**.
3. Click **This Account > Browse > Locations**, and select the domain name.
4. Specify the domain administrator credentials.

Locating the Fully Qualified Domain Name

To allow Change Guardian Event Collector Addon for Windows Agent to retrieve events from the correct source, find the FQDN. Go to **System** in Windows Control Panel. Under Computer name, domain, and workgroup settings, and find the Full computer name.

Important Parameters

You should have the following parameters after setting up Exchange. Use these parameters to install Change Guardian Event Collector Addon for Change Guardian:

Parameter	Description
Server FQDN	The fully qualified domain name to the Exchange Server
Frequency	The frequency, in seconds, at which each mailbox audit log is retrieved
PowerShell Path	The location of the PowerShell application

Installing Change Guardian Event Collector Addon for Windows Agent

To install Change Guardian Event Collector Addon for Windows Agent:

1. In Agent Manager, click **Manage Installation > Download Package**.
2. Download Change Guardian Event Collector Addon for Windows Agent.
3. In the installer window, specify the local path in which you want to install Change Guardian Event Collector Addon for Windows Agent.
4. Select the connectors to configure.
5. Specify the location to store events in CEF.

   NOTE: Specify the same path in **CEF Data Output Path** in Agent Manger.

6. Specify the values for **File Rotation Interval** and **File Size**.

   File Rotation Interval is the interval, in seconds, at which a new file is created. A new file is created when either the File Rotation Interval or the file size exceeds the set value. If the EPS is low in AWS IAM, set the file rotation and file size values lower than the default.
7. Specify the parameters for the selected connectors.

If your connector is	Do this
Dell EMC	Specify the following: ◆ Domain name, hostname, user name, and password ◆ Enable SID Translation
Microsoft Exchange	Specify the following: ◆ Server FQDN ◆ Frequency Set any value between 1 and 600
AWS IAM	Specify the following: ◆ (Optional) Proxy details such as host, port, username, and password ◆ AWS Access Key ◆ AWS Secret Key ◆ AWS SQS URL ◆ AWS SQS Region ◆ AWS SQS Visibility Timeout ◆ AWS SQS Max Received Count ◆ AWS S3 Region

If your connector is	Do this
Office 365	Specify the following: ◆ Azure Tenant Domain ◆ Client ID ◆ Client Secret ◆ (Optional) Proxy server, port, username, and password

8 (Optional) Open Windows services, and restart the following services:

- **ArcSight Dell EMC Unity and VNXe Storage**
- **ArcSight Microsoft Exchange PowerShell**
- **Arcsight Microsoft Office 365**
- **Arcsight Amazon Web Services CloudTrail**

NOTE: After the installation, restart the services once to receive the events.

To modify the settings of any connector, launch Change Guardian Event Collector Addon for Windows Agent and click **Modify** against the desired collector name.

Installing Security Agent for UNIX

You can install Change Guardian Agent for UNIX in the following ways:

- Install agents remotely by using Agent Manager
- Install agents manually on a local computer

Following sections guides you through the Security Agent for UNIX installation and configuration:

- "Interactive Installation" on page 50
- "Silent Installation" on page 51
- "Validating the Installation" on page 53

For troubleshooting information about Security Agent for UNX, see "Issues on Security Agent for UNIX" on page 181.

Interactive Installation

This section provides the following information:

- "Remote Installation" on page 51
- "Manual Installation" on page 51

Remote Installation

To install:

1. In Agent Manager click **Asset Groups > All Assets > Manage Assets > Add**.
2. From the assets list, select the machines where you want to deploy the agent.
3. Click **Manage Installation > Install Agents**.
4. Provide the `root` credentials of the machine and click **Next** and start the installation.

   If you select multiple machines, ensure that the `root` user shares the same password.

NOTE: When you are installing Security Agent for UNIX for Change Guardian, the IP address of the Change Guardian server is automatically populated in the configuration window. If you replace the Change Guardian server in future, the new Change Guardian server must use the same IP address to maintain connection with all the agents deployed.

Manual Installation

To install:

1. Download the agent artifacts and certificates. For more information, see "Downloading the Agent Certificates and Artifacts" on page 41.
2. Log in to the machine, where you want to install the agent, with superuser privileges.
3. Click **All Assets > Manage Installation > Download**, and download the required package.

   Agent Manager downloads `SecurityAgentForUnix.zip` to your computer.
4. Extract `SecurityAgentForUnix.zip` to the computer where you want to install the Security Agent for UNIX.
5. Provide file execute permission to the `install.sh` file and execute the `install.sh` script.
6. Follow the prompts to complete the installation.
7. Continue with the installation steps. The installation might take a few minutes for all services to start after installation.

NOTE: Manual Installation of Security Agent for UNIX downloaded from Change Guardian Agent Manager accepts the agent certificate configuration even if there is a mismatch of the agent hostname and IP address. You must ensure that you use the correct configuration before installing Security Agent for UNIX.

Silent Installation

The silent or unattended installation is useful if you need to install more than one agent. Silent installation allows you to install the agent without interactively running the installation script.

IMPORTANT: To perform silent installation, ensure that you have recorded the installation parameters during the interactive installation and then run the recorded file on other endpoints. Silent installation uses an installation file that records the information required for completing the installation. Each line in the file is a *name*=*value* pair that provides the required information, for example, `HOME=/usr/netiq`.

The installation script extracts information from the installation file and installs the agent according to the values you specify.

If you use the deployment wizard to perform local installation on one computer, you can create a silent installation file based on your requirement. A sample installation file, `SampleSilentInstallation.cfg`, is located in your agent download package.

To install:

1. Download the installation files from the Downloads website.
2. Download the package in the `root` folder and specify the following command to extract the install files from the tar file:

   ```
   tar -zxvf <install_filename>
   ```

   Replace <*install_filename*> with the actual name of the install file.
3. After you create the installation file, you can run silent installation on the endpoints from command line using the following command:

   ```
   ./install.sh <Target_Directory> -s <SilentConfigurationFile>.cfg
   ```

   Where Target_Directory is the directory you want to install the agent and `SilentConfigurationFile` is the file name used to specify the installation options. You can also use the default configuration file, `SampleSilentInstallation.cfg`. The installation file name must be specified as an absolute path. By default, `SampleSilentInstallation.cfg` is located in the agent install directory.

Following is the list of parameters that you can use during silent installation:

Parameter	Description
`FRESH_INSTALL`	Specifies whether you want to install or upgrade the agent. Valid entries are `1` (install) and `0` (upgrade). The default value is `1`.
`CREATE_TARGET_DIR`	Specifies whether you want the install program to create the target installation directory if it does not already exist. Valid entries are `y` and `n`. The default value is `y`.
`CONTINUE_WITHOUT_PATCHES`	Specifies whether the install program stops or continues when the operating system is not a supported version. Valid entries are `y` and `n`. The default value is `n`.
`IQCONNECT_PORT`	Specifies the port that the agent uses to listen for communications from UNIX Agent Manager. The default value is `2620`.

Parameter	Description
IQ_STARTUP	Specify restart method for the agent process. For information about the options, see "Validating the Installation" on page 53. Valid entries are rclink and inittab. The default option is rclink.
CGU_STARTUP	Specifies restart method for the detected process. For information about the options, see "Validating the Installation" on page 53. Valid entries are rclink and inittab. The default value is rclink.
MANAGE_AUDIT_LOGS	Specifies whether the agent reduces the size and removes old audit logs. Valid entries are y and n.
AUDIT_LOG_SIZE	Specifies the maximum size, in bytes, that the agent allows an audit log to reach before starting a new log.
AUDIT_LOG_RETENTION	Specifies the number of audit logs that the agent keeps. Once this number of audit logs exists, the agent deletes old logs when making new ones.
KEEP_OLD_AGENT_DIR	Specifies whether to keep the previous installation directory when you are upgrading the agent. Valid entries are y and n.
OLD_INSTALL_DIR_MOVED	Specifies the directory where you want the installation program to move to the previous installation directory.

Validating the Installation

To validate the installation, check if the services detectd, vigilent, auditd, and nqmagt are running:

```
ps –ef | grep -i <service_name>
```

Where *service_name* can be detectd, vigilent, auditd, or nqmagt

The output in Linux is as follows:

```
root 10447 1 0 14:39 ? 00:00:00 /usr/netiq/common/bin/nqmagt -g /usr/netiq/
common/log/nqmagt.log
root 10449 10447 0 14:39 ? 00:00:02 VigilEntAgent -config vigilent -load
va:VigilEntAdapter -d
root 135 2 0 Nov01 ? 00:00:41 [kauditd]
root 6133 1 0 Nov01 ? 00:03:12 /sbin/auditd
root 10358 1 0 14:39 ? 00:00:00 ./perl - ../local/cache/detect.xml vrun
detectd
root 10430 10358 0 14:39 ? 00:00:00 detectd[10358] -p local4.err
root 10445 10358 0 14:39 ? 00:00:00
detect_group:LinuxAuditObject__singleton
```

- detectd: Monitors tasks and retrieves data.
- vigilent: Sends events to the Change Guardian server.

- `auditd`: Writes audit records to the disk. It is an operating system service that is required by the services specific to Security Agent for UNIX. If `auditd` is not running, follow the operating system instructions to enable it.
- `nqmagt`: Monitors the status of the other agent processes and restarts them if necessary. This process should run continuously after the agent is installed.

Reconfiguring the Agent

Reconfigure the agents if you have deployed the agents using Agent Manager:

To reconfigure:

1. In Agent Manger, do one of the following:
   - (Conditional) If you have not added assets previously, in Agent Manager, under **Asset Groups**, click **All Assets** and then click **Add Assets**.
   - (Conditional) If you have added assets previously, in Agent Manager, click **All Assets**, then **Manage Assets**, and then **Add**.
2. From the assets list, select the computers where you want to deploy the agent. If you select multiple computers, you must use the same credentials in all computers.
3. Log in as `root` to the computer that you want to connect and click **Next**.
4. Click **Manage Installation**, and then select **Reconfigure**.
5. Select the version and then select the default configuration, edit it or add a new configuration.

Verifying After Reconfiguration

- Ensure that the service NetIQChangeGuardianAgent is running in Windows Services
- If you used Client Agent Manager, ensure that the service NetIQClientAgentManager is running in Windows Services

5 Configuring Change Guardian Server

After installing the Change Guardian server, you must perform configurations such as add server and application licenses, configure server date and time, add SMTP servers, add assets, and configure LDAP. This chapter provides information about using the Change Guardian server prompt, the web console, Policy Editor, and Agent Manager to perform these configurations. For some configurations, such as adding a license or adding an email server to Change Guardian, can be performed using either the web console or the command prompt.

- "Configurations Using Web Console" on page 55
- "Configurations Using the Server Command Prompt" on page 64
- "Configurations Using Policy Editor" on page 72
- "Configurations Using Agent Manager" on page 74

For troubleshooting information about Change Guardian server configuration, see "Issues in Change Guardian Server" on page 169.

Configurations Using Web Console

You can configure the following using the web console:

To access the web console, open the following URL:

`https://<IP_Address_Change_Guardian_server>:<port_number>`

The default port is 8443. You can use a custom port if Change Guardian was installed with custom configurations.

- "Configuring LDAP for AD Browsing" on page 56
- "Adding the Server License Key" on page 57
- "Creating Event Routing Rules" on page 57
- "Configuring LDAP for Authentication" on page 58
- "Configuring Users and Roles" on page 61

You can add license keys, configure email servers by using the server command prompt also.

Configuring LDAP for AD Browsing

Change Guardian provides the user name of the event initiator and the ObjectSID of an event during auditing activities. Configuring AD allows the Change Guardian server to retrieve user information from AD and map with associated incoming events. Change Guardian synchronizes AD user to provide user information associated with a particular event, such as the user name, the email address and contact details of the user.

Additionally, configuring AD with Change Guardian provides the following benefits:

- Receive delta values from AD
- Support for adding additional attributes
- Support for mapping custom attributes
- Synchronize users from multiple user containers concurrently
- Synchronize deleted users

Adding AD Servers

You can add, modify, delete an AD server configuration, and add a server as default from the Change Guardian web console. When you add an AD server as default, Policy Editor uses the default server and displays the objects of that server. Similarly, Agent Manager uses the server as the default server to display the list of computers when you add assets.

NOTE: You cannot configure LDAP connections in AD using Policy Editor. However, to use the configured LDAP connections in Change Guardian policies, upgrade to Policy Editor 6.1.

To add a server:

1. Click **CONFIGURATION > LDAP CONNECTIONS > ADD.**
2. Specify the required details.
   - Specify the certificate file path to allow SSL connection
   - Specify the polling interval between 30 to 120 minutes to set the interval at which Change Guardian server synchronizes all objects and groups with AD

     NOTE: In Change Guardian 6.0 and earlier, the polling interval between Change Guardian server and AD servers was hourly, weekly, or daily. For Change Guardian 6.1, the previously configured AD servers have a default polling interval of 120 minutes.

   - (Conditional) If you want to synchronize AD user profiles with Change Guardian, specify the user container details.

Adding AD servers allows you to perform the following:

- Browse AD objects when creating policies using Policy Editor.
- Manage both secured and non-secured AD servers.
- Use a domain to add multiple computers as assets using Agent Manager.

  You can install Change Guardian agents on the assets in one step using Agent Manager.
- Use AD User Container details to filter events by users names.

NOTE: When you update an AD object, the change is available with Change Guardian server after the specified polling interval has passed. Events from an updated AD object is displayed only after the interval. Similarly, you can view the updated user profiles after the interval has passed.

Mapping User Profile Fields

To synchronize AD user accounts to Change Guardian, Change Guardian needs to map the user account field names in AD to an attribute in your directory service. By default, Change Guardian maps the most commonly used field names, but you can add or remove mappings as necessary.

To modify user profile mapping, from the web console, click **ADMINISTRATION > Integration > AD Accounts > User Profile Mapping**.

Adding the Server License Key

If you are using the evaluation license key, you must add the enterprise license key before the evaluation key expires to avoid any interruption in the Change Guardian functionality. For information about how to purchase the license, see the Change Guardian Product Web site.

To add a license key:

1. In the web console, click **ADMINISTRATION**.
2. Click **Help > About > Licenses > Add License**.
3. Specify the license key and save.

NOTE: After a license expires, Change Guardian Web Console appears blank. You can add the license key by using only the command line. For more information, see "Adding the Server License Key" on page 64.

Creating Event Routing Rules

To send email messages, you must create an event routing rule and you must configure an email serve. If you do not configure an email server, notification groups do not appear.

To create an event routing rule:

1. From the web console, click **Administration > Routing**.
2. Click **Create**, then use the following information to create a new event routing rule:

   Name: Specify a unique name for the event routing rule.

   Criteria: Select a saved criteria to use in creating event routing rule. This criteria determines which events are stored in the event store.

   Select tag: (Optional) Select a tag for tagging the filter. The tag makes the filter more specific.

   Route to the following services: Select where the information is routed. The options are:

   - **All:** Routes the event to all services including Correlation, Security Intelligence, and Anomaly Detection.
   - **Event store only:** Routes the event to the event store only.

- **None (drop):** Drops or ignores the events.

Perform the following actions: Select an action to be performed on every event that meets the filter criteria. The following default actions are available for event routing rules:

- Log to File
- Log to Syslog
- Send Events via Sentinel Link
- Send SNMP Trap

NOTE: When you associate an action with routing rules, ensure that you write rules that match a small percentage of events, if the rule triggers a Javascript action. If the rules trigger actions frequently, the system might backlog the actions framework. This can slow down the EPS and might affect the performance of the Change Guardian server.

For the actions to work, you must have configured the Integrator associated with each action for your environment.

Select the email configuration that you already created using Policy Editor. For more information see "Configuring Email Servers" on page 66.

The actions listed here are different than the actions displayed in the **Event Actions** tab (web console > **ADMINISTRATION**), and are distinguished by the <EventRouting> attribute in the `package.xml` file created by the developer.

Adding or Removing Actions You can add more than one action to perform on the events that meet the filter criteria:

3 Click **Save** to save the event routing rule.

NOTE: You can assign more than one email alert to a specific event by assigning more than one action to the event routing rule. Ensure that you set correct filters to avoid unnecessary flow of emails.

Configuring LDAP for Authentication

You can configure a Change Guardian server for LDAP authentication to enable users to log in to Change Guardian with their LDAP directory credentials. With LDAP, Change Guardian processes each user group in a policy as group members.

You can perform LDAP authentication by either using an SSL connection or by using an unencrypted connection to the LDAP server. You can configure the Change Guardian server for LDAP authentication with or without using anonymous search on the LDAP directory:

- **Anonymous:** When you create Change Guardian LDAP user accounts, specify the directory user name. However, you do not have to specify the user distinguished name (DN).

  When an LDAP user logs in, the Change Guardian server performs an anonymous search on the LDAP directory based on the specified user name. The Change Guardian server finds the corresponding DN and then authenticates the user against the LDAP directory by using the user DN.

- **Non Anonymous:** When you create Change Guardian LDAP user accounts, you must specify the user DN along with the user name.

  When an LDAP user logs in, the Change Guardian server authenticates the user against the LDAP directory by using the specified user DN.

NOTE: If anonymous search is disabled on the LDAP directory, you must not configure the Change Guardian server to use anonymous search.

- "Setting up LDAP Authentication" on page 59
- "Logging in Using LDAP User Credentials" on page 61

Setting up LDAP Authentication

To set up LDAP authentication:

1. In the web console, click **ADMINISTRATION**.
2. Click **Users > LDAP Settings**.
3. Specify the options to configure LDAP authentication:

   Host: Hostname or IP address for SSL connections.

   SSL: SSL connection to the LDAP server.

   Port: Port for the SSL connection. The default SSL port number is 636 and the default non-SSL port number is 389.

   Certificate File Path: The path of the CA certificate file for the LDAP server.

   Specify the certificate file path when you are using an SSL connection, and if the LDAP server certificate is not signed by a well-known CA and is not trusted by default.

   Anonymous Search: Option to perform anonymous searches or non-anonymous searches on the LDAP directory.

   Base DN: The root container to search for users.

   For example. set `o=netiq` for eDirectory.

   For anonymous search, specify the root container of the LDAP directory. This is optional for eDirectory, but mandatory for Active Directory. For eDirectory, if you do not specify the Base DN, Change Guardian searches the entire directory to locate the users.

   For non-anonymous search, specify the root container in the LDAP directory that contains users. This is mandatory if you are using Active Directory and if you set a domain name.

   Search Attribute: The LDAP attribute having the user name to search for users.

   For example, the search attribute for eDirectory is `uid` and for Active Directory it is `sAMAccountName`.

   Domain Name: The Active Directory domain.

   Change Guardian can perform anonymous search in Active Directory. Change Guardian uses the username@domainname (userPrincipalName) to authenticate the user before searching for the LDAP user object.

   NOTE: If **Base DN** is set and **Domain Name** is not set, the **Base DN** is appended to the relative user DN to construct the absolute user DN.

For example, if the Base DN is set to o=netiq and the absolute user DN is cn=sentinel_ldap_user,o=netiq, Change Guardian uses the relative user DN cn=sentinel_ldap_user when you create an LDAP user account.

4 Click **Test Connection** to test the LDAP connection.

- Specify the domain name and password if you did not specify earlier. The user DN can be relative to the Base DN.
- According to LDAP standards, when you use reserved special characters as literals in a **User DN**, you must use "\". eDirectory or Active Directory might require additional escape characters. You must use "\" as the escape character for the following scenarios:
  - A space or # occurring at the beginning of the string
  - A space occurring at the end of the string
  - Any one of the following characters: +, ", \, <, >, or ;

    For example, if the **User DN** contains a comma as a literal, specify the **User DN** as follows:

    ```
    CN=Test\,User,CN=Users,DC=netiq,DC=com
    ```

If there is an error, review the configuration details you provided and test the connection again. To learn about the errors, examine the /var/opt/novell/sentinel/log/server0.0.log file.

NOTE: You must ensure that the test connection is successful before saving the LDAP settings.

5 Click **Save** to save the LDAP settings.

Verify the configuration:

- Check that the LdapLogin section in the /etc/opt/novell/sentinel/config/auth.login file is updated. For example:

```
LdapLogin {
        com.sun.security.auth.module.LdapLoginModule required
java.naming.ldap.factory.socket="com.esecurity.common.communication
.ProxyLdapSSLSocketFactory"
        userProvider="ldap://10.0.0.1:636/o=netiq"
        userFilter="(&(uid={USERNAME})(objectclass=user))"
        useSSL=true;
};
```

- If you provided the LDAP server CA certificate, it is added to the /etc/opt/novell/sentinel/config/.ldapkeystore.jks keystore.

After saving the LDAP settings successfully, you can create LDAP user accounts to enable users to log in to Change Guardian by using their LDAP directory credentials.

NOTE: You can also configure the Change Guardian server for LDAP authentication by running the ldap_auth_config.sh script in the /opt/novell/sentinel/setup directory.

The script also supports command line options. To view the options, run the script as follows:

```
/opt/novell/sentinel/setup/ldap_auth_config.sh --help
```

Logging in Using LDAP User Credentials

After configuring the Change Guardian server for LDAP authentication, create Change Guardian LDAP user accounts and log in to Change Guardian by using your LDAP user name and password. For more information about creating LDAP user accounts, see “Creating Users” on page 63.

Configuring Users and Roles

You can create user roles in Change Guardian and assign them permissions. Assigning roles helps you control users access to functionality, data access based on fields in the incoming events, or both. Each role can contain any number of users. Users belonging to the same role inherit the permissions of the role they belong to. You can set multiple permissions for a role.

Following sections provide information about configuring users and roles:

Understanding the Roles

Change Guardian has the following roles by default:

Administrator: A user in this role has administrative rights in Change Guardian. Administrative rights include the ability to perform user administration, data collection, data storage, search operations, rules, report, dashboard, and license management.

You cannot modify or delete the administrator role.

Change Guardian Administrator: A user in this role can view all event data including raw data.

Event Dispatcher: A user in this role can send only events and attachments to the Change Guardian server.

Operator: A user in this role can manage alerts, share alert and event views, run reports, view reports, rename reports, and delete report results.

Compliance Auditor: A user in this role has access to view events that are tagged with at least one of the regulation tags such as PCI, SOX, HIPAA, NERC, FISMA, GLBA, NISPOM, JSOX, and ISO/IEC_27002:2005. You can view system events, view the Change Guardian configuration data, and search data targets.

User: A user in this role can manage dashboards, run reports, view reports, rename reports, and delete report results.

NOTE: If the web console displays roles other than the listed ones, you can ignore such roles.

Configuring Roles

Roles allow you to define what a user can manage and what data they can view. You can grant permissions to the role and then assign the user to the role.

To create a role:

1. In the web console, click **ADMINISTRATION**.
2. Click **Users > Users and Roles**.
3. Under **Roles**, click **Create**.
4. Specify the required information.

   Review the following additional permissions that you can assign to the new role:

   - **Edit knowledge base:** Allows users to view and edit the knowledge base in the **Alert Details** page
   - **Manage Tags:** Allows all members to create, delete, and modify tags, and associate tags to different event sources
   - **Manage roles and users**: Allows non-administrative users to administer specific roles and users
   - **Proxy for Authorized Data Requestors**: Allows users to accept searches from remote data sources
   - **Send events and attachments:** Allows users to send events and attachments to the server

     ---

     NOTE: You can manually assign this permission to a user who needs to forward events to the server.

   - **View and execute event actions:** Allows members to view events and execute actions on the selected events
   - **View detailed internal system state data:** Allows members to view detailed internal system state data by using a JMX client
   - **View knowledge base:** Allows users to view the knowledge base in the **Alert Details** page

To create users, see "Creating Users" on page 63.

Understanding Password Complexity

Change Guardian provides a set of password validation rules that help you maintain a complex password for all local user passwords. You can select the desired validation rules as applicable for your environment.

You can configure the password validation rules in the `/etc/opt/novell/sentinel/config/passwordrules.properties` file. The validation rules apply only to the local user passwords but not LDAP user passwords. For existing users, validation rules apply only after the users update their password.

By default, all the validation rules are disabled and commented with "#". To enable validation rules, uncomment the rules, specify the values for the rules, and save the file.

The following table describes the password complexity validation rules:

Table 5-1 *Password Complexity Rules*

Validation Rule	Description
MINIMUM_PASSWORD_LENGTH	Specifies the minimum number of characters required in a password.
MAXIMUM_PASSWORD_LENGTH	Specifies the maximum number of characters allowed in a password.
UNIQUE_CHARACTER_LENGTH	Specifies the minimum number of unique characters required in a password. For example, if the UNIQUE_CHARACTER_LENGTH value is 6 and a user specifies the password as "aaaabbccc", Change Guardian does not validate the password because it contains only 3 unique characters a, b, and c.
LOWER_CASE_CHARACTERS_COUNT	Specifies the minimum number of lowercase characters required in a password.
UPPER_CASE_CHARACTERS_COUNT	Specifies the minimum number of uppercase characters required in a password.
ALPHABET_CHARACTERS_COUNT	Specifies the minimum number of alphabetic characters required in a password.
NUMERIC_CHARACTERS_COUNT	Specifies the minimum number of numeric characters required in a password.
NON_ALPHA_NUMERIC_CHARACTERS_COUNT	Specifies the minimum number of non-alphanumeric or special characters required in a password. The rule considers only the following non-alphanumeric characters: `` ` ~ ! @ # $ % ^ & * ( ) - _ = + [ { ] } \ | ; : ' " < , > . / ? ``
RESTRICTED_WORDS_IN_PASSWORD	Specifies the words that are not allowed in a password. The restricted words are case-insensitive. You can specify multiple words separated by a comma. For example, `RESTRICTED_WORDS_IN_PASSWORD= admin,` password, test

Creating Users

When you add a user in the Change Guardian, it creates an application user. You can assign roles when you create the user.

To create a user:

1. In the web console, click **ADMINISTRATION**.
2. Click **Users > Users and Roles**.
3. Under **Users**, click **Create**.

   You can use special characters to set the user name. However, the user name should be within 30 characters.

NOTE: For local user password, ensure that the password adheres to the password complexity validation rules. For more information, see "Understanding Password Complexity" on page 62.

4 Select an authentication method:

4a (Conditional) To authenticate the user against the internal database, click **Local**.

4b (Conditional) To authenticate the user against an LDAP directory, select **Directory**.

NOTE: Ensure that you have configured the Change Guardian server for LDAP authentication. For more information, see "Configuring LDAP for Authentication" on page 58.

Configurations Using the Server Command Prompt

This section provides the following information:

Adding the Server License Key

If you are using the evaluation license key, you must add the enterprise license key before the evaluation key expires to avoid any interruption in the Change Guardian functionality. For information about how to purchase the license, see the Change Guardian Product Web site.

You can also add a server license by using the Change Guardian web console.

To add a license key:

1 Log in to the Change Guardian server as `root`.

2 Change to the `/opt/novell/sentinel/bin` directory.

3 Change to the novell user:

```
su novell
```

4 Run the `softwarekey.sh` script:

```
./softwarekey.sh
```

5 Enter 1 to insert the license key.

6 Specify the license key, then press Enter.

Configuring Memory Settings

The SHMMAX setting configures the maximum size, in bytes, of a shared memory segment for PostgreSQL. Desirable values for SHMMAX ranges from hundreds of megabytes to a few gigabytes.

To change the kernel SHMMAX parameter, append the following information to the `/etc/sysctl.conf` file:

```
# for Postgresql
kernel.shmmax=1073741824
```

NOTE: By default, in RHEL SHMMAX is a low value, so it is important to modify it when installing to this platform.

Configuring Server Date and Time Synchronization

To determine the current date and time configured on the Change Guardian server, run the following command: `date -u`

To synchronize the Change Guardian server date and time with an external time service, configure NTP.

Verifying Server Hostname

You have the option to install the Change Guardian server using a static IP address or a dynamic (DHCP) IP address mapped to a hostname. For the Change Guardian server to work correctly when configured to DHCP, ensure that the system can return its hostname correctly by using the following procedure:

1. Verify the hostname configuration:

   `cat /etc/HOSTNAME`

2. Check the server hostname setting:

   `hostname -f`

3. Verify the DHCP configuration:

   `cat /etc/sysconfig/network/dhcp`

   NOTE: The `DHCLIENT_HOSTNAME_OPTION` setting should reflect the fully-qualified hostname of the Change Guardian server.

   ---

4. Resolve the hostname to the IP address:

   `nslookup` *`FULLY_QUALIFIED_HOSTNAME`*

5. Resolve the server hostname from the client by running the following command entered from the remote server:

   `nslookup` *`FULLY_QUALIFIED_CHANGEGUARDIANSERVER_HOSTNAME`*

Configuring Email Servers

Complete the following steps to configure SMTP:

- “Configuring Email Server With Change Guardian in FIPS Mode” on page 66
- “Configuring Email Server With Change Guardian in Non-FIPS Mode” on page 66

You can also configure email servers by using Policy Editor.

Configuring Email Server With Change Guardian in FIPS Mode

To configure:

1. Export the certificate from the respective SMTP server site.
2. Browse to the Sentinel bin directory. The default location is `/opt/novell/sentinel/bin`.
3. Import the certificate:

   ```
   convert_to_fips -i <certificate_path>
   ```
4. Restart the Change Guardian server using the following command:

   ```
   rcsentinel restart
   ```

Configuring Email Server With Change Guardian in Non-FIPS Mode

To configure:

1. Export the certificate from the respective SMTP server site.
2. Import the certificate:

   ```
   /opt/novell/sentinel/jdk/jre/bin/keytool
   ```

   NOTE: If you have used a custom path for installation, modify the command accordingly.
3. Restart the Change Guardian server:

   ```
   rcsentinel restart
   ```

Configuring Email Server to Receive Email Alerts

To receive alerts on emails, complete the following steps:

1. Add Email Servers.
2. Create Notification Groups.
3. Create Event Routing Rule to send emails.

Adding Email Servers

To add email servers to Change Guardian server and change the default email host settings:

1. Change directory:

   ```
   cd /opt/netiq/cg/scripts
   ```

2 Set the email host settings:

```
configure.sh udei --admin-account=<admin_account> --admin-
password=<admin_account_password>  --mail-host=<SMTP_hostname>  --mail-
port=<SMTP_port>  --mail-from=<e-mail_address>   --secure-
connection=<true/false>
```

NOTE: To configure secure connection with STARTTLS, set the following option:

```
--secure-connection=true
```

Configuring Security Settings

Change Guardian uses the `profile_javos` profile for secure communication.

This section provides the following information:

- "Enabling TLS 1.1" on page 67
- "Configuring Certificates" on page 67
- "Applying Updates for Security Vulnerabilities in Embedded Third-Party Products" on page 70

Enabling TLS 1.1

By default, TLS 1.1 is disabled for new installations. Enable TLS 1.1 if you want Change Guardian to run on FIPS mode.

To enable TLS 1.1:

1 Log in to the Change Guardian server as `root`.

2 Edit the `/opt/novell/sentinel/jdk/jre/lib/security/java.security` file.

3 Remove `TLSv1.1` from the following list of disabled algorithms:

```
jdk.tls.disabledAlgorithms=TLSv1,TLSv1.1,SSLv3, RC4, DES, MD5withRSA,
DH keySize < 1024, EC keySize < 224, 3DES_EDE_CBC, anon, NULL
```

4 Restart the Change Guardian server:

```
/opt/netiq/cg/scripts/cg_services.sh restart
```

Configuring Certificates

Install valid certificates on the Change Guardian server by configuring trusted connections. This is required when authenticating to both the Change Guardian web console and the console that opens by clicking **ADMINISTRATION** from the web console.

Following sections provide information about configuring certificates:

- "Installing the Certificates" on page 68
- "Using CA-Signed Certificate" on page 68

Installing the Certificates

To install certificates:

1. Log in to the Change Guardian server as `root`.
2. Switch user to `novell`.
3. Go to the `/opt/novell/sentinel/setup` directory.
4. (Optional) Generate request to sign certificate:

   `./ssl_certs_cg`

   4a. Select **Web Server**.

   4b. Specify the certificate signing request (`.csr`) filename.

   4c. Specify to get the `.csr` file signed by a certificate authority (CA).
5. Copy the CA root certificate chain (`ca.crt`) and the signed certificate (`.crt`) to `/opt/novell/sentinel/setup`.
6. Import the CA root certificate chain and the web server certificate:

   6a. Generate request to sign certificate:

   `./ssl_certs_cg`

   6b. Select **Import certificate authority root certificate**.

   6c. Enter the CA root certificate chain file name (`ca.crt`).

   6d. Select **Import certificate signed by certificate authority**.

   6e. Select **Web Server**.

   6f. Specify the name of the file that contains the CA signed digital certificate.

   6g. Select another service if necessary or select **Done** and exit from the service option.
7. Select **Exit** to exit from the TLS/SSL certificate configuration.
8. Restart the Change Guardian server:

   `service sentinel restart`
9. Import the CA root certificate change to the computer where you want to use the Change Guardian web console.

Using CA-Signed Certificate

You can use CA-signed certificates in place of the self-signed certificates provided by Change Guardian.

To replace the self-signed certificates on the server:

1. Log in to the Change Guardian server as `root`.
2. Switch user to `novell`.
3. Backup of the existing `certs` folder, which is located at `/opt/netiq/cgutils/certs`.
4. Create a new `certs` folder at `/opt/netiq/cgutils/`.
5. Copy the CA-signed certificates to `/opt/netiq/cgutils/certs`.
6. Change the permission of the `certs` folder:

   `chmod 700 /opt/netiq/cgutils/certs`

7 Rename the CA-signed certificate files as below:

- `cgca-cert.pem`: Root CA certificate
- `cgca-pk.pem`: Private key
- `cgca-pk.pem.pass`: Private key password

8 Change the ownership of the CA-signed files:

```
chown novell:novell /opt/netiq/cgutils/certs/*
```

9 Go to the `/opt/netiq/cgutils/bin` directory and run the following command:

```
./cg_cert_setup.sh
```

The required certificates are created in the `/opt/netiq/cgutils/certs/` directory.

10 Verify that the new certificates have the new CA name in the issuer field:

- `openssl x509 -in amsca-cert.pem -noout -text`
- `openssl x509 -in javosca-cert.pem -noout -text`

11 Go to the `/opt/netiq/ams/ams/bin` directory, and run the following commands:

```
./ams_cert_setup.sh --setup --profile=ams_new_profile_name
./ams_cert_setup.sh --enable --profile=ams_new_profile_name
```

NOTE: Consider not changing default profile names and create profile with a new name.

---

12 Confirm that the profile is enabled:

```
./ams_cert_setup.sh --show
```

13 Go to the `/opt/netiq/cg/javos/bin/` directory and run the following commands:

```
./javos_cert_setup.sh --setup --profile=javos_new_profile_name
./javos_cert_setup.sh --enable --profile=javos_new_profile_name
```

14 Confirm that the profile is enabled:

```
./javos_cert_setup.sh --show
```

15 (Conditional) If the Change Guardian server is in FIPS mode, run the following commands:

```
./opt/netiq/ams/ams/bin/convert_to_fips.sh
./opt/netiq/cg/javos/bin/convert_to_fips.sh
```

16 (Optional) To test if the certificates are replaced successfully, remotely deploy an agent using Agent Manager and generate an event.

Applying Updates for Security Vulnerabilities in Embedded Third-Party Products

Change Guardian contains embedded third-party products such as JRE, Jetty, PostgreSQL, and ActiveMQ. Change Guardian includes patches to address security vulnerabilities (CVE) for these products with Change Guardian releases.

The third-party products have their own release cycles and new CVEs might be discovered before a Change Guardian release. You must review the CVEs for each embedded third-party product and decide whether to apply these updates to your Change Guardian deployment before getting a corresponding Change Guardian patch from Micro Focus. If you decide to apply patches to address these CVEs, contact Technical Support.

Configuring FIPS 140-2

Change Guardian offers enhanced protection against security threats and compliance with United States federal government standards by supporting FIPS. Change Guardian leverages the FIPS 140-2 compliant features to meet the security requirements of United States federal agencies and customers with highly secure environments. Change Guardian is re-certified by Common Criteria at EAL3+ and provides FIPS 140-2 Inside.

Complete the following steps to configure FIPS:

1. Convert Change Guardian server to FIPS
2. Convert javos services to FIPS
3. Convert ams service to FIPS

To convert Change Guardian server:

1 As a `root` user, ensure that Mozilla Network Security Services (NSS) and Mozilla NSS Tools are installed on the Change Guardian server.

NOTE: To enable FIPS mode in SLES 12 SP3, you must install `libfreebl3-hmac` and `libsoftokn3-hmac` packages.

---

2 Enable TLS 1.1.

3 (Conditional) If you want to change the keystore password:

3a At the Change Guardian server command prompt, switch to `novell` user.

3b Change directory to `/opt/novell/sentinel/bin`, and run the following command:
`chg_keystore_pass.sh`

Follow the on-screen prompts to change the `web server` keystore passwords. You need this password later during this procedure.

4 Switch to `root` user.

5 Change directory to `/opt/novell/sentinel/bin`, and run the following command:

```
./convert_to_fips.sh
```

5a Specify n to backup the server.

5b Provide a password that meets the stated criteria. This password is required later during this procedure.

5c Specify y to insert external certificates in the keystore database.

6 Specify the path of the Elasticsearch certificate:

```
<installation_path>/opt/novell/sentinel/3rdparty/elasticsearch/config/
http.pks
```

7 Specify the alias name of the certificate.

8 Specify y to restart the Sentinel server.

9 Ensure that the file `/var/opt/novell/sentinel/log/server0.0.log` contains the following entry:

```
Date_Timestamp|INFO|JAVOS
listener|com.netiq.cg.capi.dao.UpgradeDao.upgrade

Upgrading EventDestination.Upgrade to fips compatible

Date_Timestamp|INFO|JAVOS
listener|com.netiq.cg.capi.dao.UpgradeDao.upgrade

records updated=1 data={"service-
host":"Server_Name","password":"Encrypted_Password","protocol":"vosres
tdispatcher:rest
```

To convert javos services:

1 Change directory to `/opt/netiq/cg/javos/bin`, and run the following command:

```
./convert_to_fips.sh
```

1a Provide the password for the FIPS keystore database (the password you created in Step 5b on page 71).

1b When prompted to restart the javos service, select y.

2 Ensure that the following entry is present in the `opt/netiq/cg/javos/log/javos.log` file:

```
Creating a FIPS SSL listener on 8094
```

To convert ams service:

1 Change directory to `/opt/netiq/ams/ams/bin`, and run the following command:

```
./convert_to_fips.sh
```

1a Specify a password for the FIPS keystore database.

1b When prompted to restart the Agent Manager service, select y.

2 Ensure that the `/opt/netiq/ams/ams/log/ams.log` file contains the following entry:

```
INFO [Date_Timestamp,446] com.netiq.commons.security.FIPSProvider:
Running in FIPS mode. Changing the SSL security provider from JSSE to
FIPS. /opt/netiq/ams/ams/security/nss
```

Configurations Using Policy Editor

Use Policy Editor to perform the following tasks:

Adding License for Applications

Module Manager provides you information about licensed applications and allows you to import application licenses to Policy Editor.

When you install Change Guardian, all available applications are installed automatically on Policy Editor. However, you must add a new application to Policy Editor. To allow Change Guardian to start monitoring, import the license key for each application.

To add a new application to Module Manager:

1. In **Module Manager**, click **Install > From Local Directory**.

To import a license:

1. Log in to Policy Editor, click **Change Guardian**.
2. Select **Module Manager**.
3. Click **Import License Key**.
4. Select the license key for the required application.

To create a report the application licenses, in Policy Editor click **Administrative Reports > License Utilization > Run**.

Adding Email Servers to Change Guardian

After you ensure each event destination computer in your Change Guardian environment hosts an email server, you can add each email server to Change Guardian. Change Guardian can send email notifications to specified administrators and operators.

You can also configure email servers by using the Change Guardian command prompt.

1. In the Policy Editor, select **Settings > Email Configuration**.
2. Under **Email Servers**, click **Add**.
3. Specify the name and description of the email server you want to add.
4. Specify values for the following fields:
   - **SMTP Host:** The fully qualified domain name of the email server computer.
   - **SMTP Port:** The remote SMTP port to use when communicating with the email server.

- **Secure:** Specifies whether the connection to the SMTP computer must be a secure connection. If **Yes**, specify the protocol type. If you select **No**, the **SMTP Port** is set to **25** by default.
- **From**: The return email address appearing on each email alert for this email server.
- **Authentication Required:** Specifies whether the email server requires SMTP authentication to send email. If **Yes**, specify the following:
  - **User Name:** The user name to use when connecting to the SMTP server.
  - **Password:** The password corresponding to the specified SMTP user name.
- **Protocol:** Specifies which protocol can be used for the email communication. You can select **SSL** or **STARTTLS**.

NOTE: If you select **SSL**, the **SMTP Port** value must be set to **465**.

If you select **STARTTLS**, the **SMTP Port** value must be set to **587**.

Creating and Configuring Notification Groups

For each email server you add to Change Guardian, you must create one or more notification groups specific to that email server. A notification group specifies one or more recipients of the email alerts and contains change event information. When you assign email alerts to events (web console > **ADMINISTRATION**), you can choose from the notification groups available for that email server. For more information, see "Creating Event Routing Rules" on page 57.

To create and configure a notification group:

1. In the Policy Editor, select **Settings > Email Configuration**.
2. Select the email server for which you want to create a notification group.
3. Under **Notification Groups**, click **Add**.
4. Specify the name and description of the notification group you want to create.
5. Specify values for the following fields:
   - **From**: The return email address appearing on each email alert for this email server.
   - **To**: A list of email addresses, separated by commas or semicolons, that receive email alerts.
   - **CC**: A list of email addresses, separated by commas or semicolons, that receive copies of email alerts.
   - **BCC**: A list of email addresses, separated by commas or semicolons, that receive blind copies of email alerts.
   - **Subject**: The subject for the alert email.
   - **Maximum Events per Email**: Specifies the maximum number of events in the email alert.
   - **Include Change Details**: Specifies whether the email contains the details of the change detected by Change Guardian.
   - **Email Format**: Specifies either text or HTML.

Viewing Assets

In Policy Editor, asset groups allow you to assign policies to the group instead of to each individual computer. When you add an asset to a group, Change Guardian automatically deploys the policies assigned to the group to the new asset.

Change Guardian provides the following types of asset groups:

- **Default groups:** Assets specific to platforms.

  You can view the members of default groups, but you cannot modify or delete the groups.
- **Static groups:** Assets you manually add.

  To add or remove members, manually update the group.
- **Dynamic groups:** Assets that match the filter criteria you specify for the group.

Policy Editor does not show an asset group if the group does not contain registered assets.

Change Guardian refreshes the group membership every 30 minutes based on the specified criteria.

Configurations Using Agent Manager

You can use Agent Manager to manage assets, install agents on the assets, apply agent packages, and collect agent logs. This section provides the following information:

For troubleshooting information, see "Issues in Agent Manager" on page 177.

Adding Assets

An asset is a device that you can monitor using Change Guardian.

An **asset group** is a set of assets or devices that you want to associate with one another. Each asset group can contain assets, another asset group, or a combination of assets and asset group. Asset groups allow you to assign policies to the group instead of to each individual computer. When you add an asset to a group, Change Guardian automatically deploys the policies assigned to the group to the new asset.

To add assets:

1. Open the following URL:

   `https://<IP_Address_Change_Guardian_server>:<port_number>`

   The default port is 8443. You can use a custom port if Change Guardian was installed with custom configurations.
2. In the web console, click **AGENTS**.
3. Click **All Assets > Manage Assets > Add**.
4. (Conditional) To import assets from an Active Directory server, use the **Active Directory** tab.

NOTE: If you are using Active Directory over SSL or TLS connection, ensure that you have imported the Active Directory SSL certificate to the Change Guardian server. For more information, see "Configuring Certificates" on page 67.

5 (Conditional) To import assets from a text file, use the **Hosts List** tab.

Create a text file with a header line containing the columns Hostname, MajorType, and Addresses, and use a tab to separate the columns. In the Hostname column, specify the fully-qualified domain names of the computers where you want to deploy agents. Optionally, you can specify the IP addresses under the Addresses column. In the MajorType column, specify whether the operating system is UNIX or Windows.

6 (Conditional) To manually add an asset, use the **Host** tab.

Viewing Assets

Agent Manager displays assets in the following asset groups:

All Assets: Assets added or imported to Agent Manager.

Approved Assets: Assets to which Agent Manager successfully deployed a Change Guardian agent.

You have to authenticate an asset once after installing an agent.

Assets that have not communicated: Assets in which Client Agent Manager service cannot communicate with the Agent Management Service.

To move an asset to **Approved asset**, check whether the Client Agent Manager service is communicating with Agent Management Service.

Assets not in any group: Assets in which Agent Manager installed an agent, but they are not part of user-defined group.

To move assets from this group to any user defined group, select the asset, go to **Manage Asset > Move Assets to a Group**, and then select the required group.

User defined groups: A list of user defined groups and user-defined categories.

To organize and manage assets, you can create asset groups under **User defined groups** and copy assets from **Approved Assets** group to **User defined groups**.

6 Setting Up Assets For Monitoring

Change Guardian monitors events of your assets such as Windows Active Directory, Group Policy, Windows, and so on. Change Guardian provides monitoring of specified asset objects. There are Change Guardian policies for each asset type that you can use to monitor the asset objects.

Configure assets to allow Change Guardian agents to collect events from the assets.

This section provides information about configuring the following assets:

Configuring Windows Active Directory Monitoring

Change Guardian monitors the following in Active Directory (AD):

- AD objects
- Computer accounts
- Configurations
- Contacts
- Groups
- User accounts
- Organization units
- Trusts

This chapter provides information about the following:

Implementation Checklist

Complete the following tasks to start monitoring Windows Active Directory audit events:

Task	See
Review requirements and recommendations for computers running the AD Domain Service	Change Guardian System Requirements
Complete the prerequisites	"Prerequisites" on page 78
Add the license key	"Adding License for Applications" on page 72
Configure Change Guardian for monitoring	"Categories of Change Guardian Policies for Windows Active Directory" on page 82
	"Assigning Policies and Policy Sets" on page 124
Triage events	Chapter 7, "Configuring Events," on page 115
	Chapter 9, "Configuring Alerts," on page 127

Prerequisites

Ensure that you have completed the following:

- Install Change Guardian Agent for Windows
- Install Policy Editor
- Configure Active Directory

Configuring Active Directory

Complete the following tasks to allow Change Guardian to monitor Active Directory events.

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

- "Configuring the Security Event Log" on page 78
- "Configuring AD Auditing" on page 79
- "Configuring User and Group Auditing" on page 80
- "Configuring Security Access Control Lists" on page 81

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance.

Configuring the Security Event Log

Configure the security event log to ensure that Active Directory events remain in the event log until Change Guardian processes them.

To configure the security event log:

1. Log in as an administrator to a computer in the domain that you want to configure.
2. To open Group Policy Management Console, enter the following at the command prompt: `gpmc.msc`
3. Open **Forest > Domains** > ***domainName***> **Domain Controllers**.
4. Right-click **Default Domain Controllers Policy**, and then click **Edit**.

   NOTE: Changing the default domain controllers policy is important because a GPO linked to the domain controller (DC) organizational unit (OU) with a higher link order can override this configuration when you restart the computer or run `gpUpdate` again. If your corporate standards do not allow you to modify the default domain controllers policy, create a GPO for your Change Guardian settings, add these settings to the GPO, and set it to have the highest link order in the Domain Controllers OU.

5. Expand **Computer Configuration > Policies > Windows Settings > Security Settings**.
6. Select **Event Log** and set:
   - **Maximum security log size** to 10240 KB (10 MB) or more
   - **Retention method for security log** to **Overwrite events as needed**
7. To update policy settings, run the `gpUpdate` command at the command prompt.

To verify the configuration is successful:

1. Open a command prompt as an administrator to the computer.
2. Start Event Viewer: `eventvwr`
3. Under Windows logs, right-click **Security**, and select **Properties**.
4. Ensure that the settings show maximum log size of 10240 KB (10 MB) or more and that "Overwrite events as needed" is selected.

Configuring AD Auditing

Configure AD auditing to enable logging of AD events in the security event log.

Configure Default Domain Controllers Policy GPO with Audit Directory service access to monitor both success and failure events.

To configure AD auditing:

1. Log in as an administrator to a computer in the domain that you want to configure.
2. To open Group Policy Management Console, run `gpmc.msc` at the command prompt.
3. Expand **Forest > Domains** > ***domainName*** > **Domain Controllers**.
4. Right-click **Default Domain Controllers Policy**, and click **Edit**.

   NOTE: Changing the default domain controllers policy is important because a GPO linked to the domain controller (DC) organizational unit (OU) with a higher link order can override this configuration when you restart the computer or run `gpUpdate` again. If your corporate

standards do not allow you to modify the default domain controllers policy, create a GPO for your Change Guardian settings, add these settings to the GPO, and set it to have the highest link order in the Domain Controllers OU.

5 Expand **Computer Configuration > Policies > Windows Settings > Security Settings > Advanced Audit Policy Configuration > Audit Policies**.

5a To configure AD and Group Policy, under **Account Management**, and **Policy Change**, select the following for each subcategory: **Configure the following audit events**, **Success**, and **Failure**.

5b To configure only AD, under **DS Access**, select the following for each subcategory: **Configure the following audit events**, **Success**, and **Failure**.

6 Click **Computer Configuration > Policies > Windows Settings > Security Settings > Local Policies > Security Options,** enable **Force audit policy subcategory setting on the default domain policy**.

7 Under **Computer Configuration > Policies > Windows Settings > Security Settings > Local Policies > Audit Policy**.

8 Under **Audit account management**, **Audit directory service access**, and **Audit policy change**, select the following for each subcategory: **Define these policy settings**, **Success**, and **Failure**.

9 To update policy settings, run the `gpUpdate` command at the command prompt.

For more information, see *Monitoring Active Directory for Signs of Compromise* in the Microsoft Documentation site.

Configuring User and Group Auditing

Configure user and group auditing to audit the following activities:

- Logon and logoff activities of local users and Active Directory users
- Local user settings
- Local group settings

To configure user and group auditing:

1 Log in as an administrator to a computer in the domain that you want to configure.

2 Open Microsoft Management Console, select **File > Add/Remove Snap-in**.

3 Select **Group Policy Management Editor** and click **Add**.

4 In the Select Group Policy Object window, click **Browse**.

5 Select **Domain Controllers.*FQDN***, where *FQDN* is the Fully Qualified Domain Name for the domain controller computer.

6 Select **Default Domain Controllers Policy**.

7 In the Microsoft Management Console, expand **Default Domain Controllers Policy *FQDN* > Computer Configuration > Policies > Windows Settings > Security Settings > Local Policies > Audit Policy**.

8 Under **Audit Account Logon Events** and **Audit Logon Events**, select **Define these policy settings**, **Success**, and **Failure**.

9 In the Microsoft Management Console, expand **Default Domain Controllers Policy *FQDN* > Computer Configuration > Policies > Windows Settings > Security Settings > Advanced Audit Policy Configuration > Audit Policies > Logon/Logoff**.

10 Under **Audit Logon**, select **Audit Logon**, **Success**, and **Failure**.

11 Under **Audit Logoff**, select **Audit Logoff**, **Success**, and **Failure**.

12 To update policy settings, run the `gpupdate /force` command at the command prompt.

Configuring Security Access Control Lists

Security Access Control Lists (SACLs) describe the objects and operations to monitor.

To allow Change Guardian to monitor changes of current and future objects inside Active Directory, follow the steps in "Configuring SACLs for AD" on page 81. However, if you are using Change Guardian for only Group Policy in your environment, see "Configuring SACLs for GPO" on page 84.

Configuring SACLs for AD

To monitor all changes of current and future objects inside Active Directory, configure the domain node.

To configure SACLs:

1 Log in as an administrator to a computer in the domain that you want to configure.

2 To open ADSI Edit configuration tool, run `adsiedit.msc` at the command prompt.

3 Right-click **ADSI Edit**, and select **Connect to**.

4 In the Connection Settings window, specify the following:

- **Name** as `Default naming context`.
- **Path** to the domain to configure.
- If you are performing this step for the first time, select **Default naming context**.
- If you are performing for the second time, select **Schema.**
- If you are performing for the third time, select **Configuration**.

NOTE: You must perform Step 4 through Step 11 three times, to configure connection points for **Default naming context**, **Schema**, and **Configuration**.

---

5 In **Connection Point**, set **Select a well known Naming Context** to **Default naming context**.

6 In the ADSI Edit window, expand **Default naming context**.

7 Right-click the node under the connection point (begins with DC= or CN=), and click **Properties**.

8 On the **Security** tab, click **Advanced > Auditing > Add**.

9 In **Applies to** or **Apply onto**, select **This object and all descendant objects**.

10 Configure auditing to monitor every user:

10a Click **Select a principal**, and type `everyone` in **Enter the object name to select**.

10b Specify the following options:

- **Type** as **All**
- Select **Permissions** as:
  - **Write All Properties**
  - **Delete**
  - **Modify Permissions**

- **Modify Owner**
- **Create All Child Objects**

  The other nodes related to child objects are selected automatically
- **Delete All Child Objects**

  The other nodes related to child objects are selected automatically

11 Deselect the option **Apply these auditing entries to objects and/or containers within this container only**.

12 Repeat Step 4 through Step 11 two more times.

Categories of Change Guardian Policies for Windows Active Directory

AD objects: Policies about creating and deleting a domain, modifying connection object, and so on

Computer accounts: Policies about disabling and moving a computer account, and changing permission to accounts

Configurations: Policies about creating and deleting GPOs

Contacts: Policies about creating, deleting, moving, and changing permission of contacts

DNS Configuration: Policies about modifying DNS configurations, and monitoring the node and zone

Groups: Policies about the following:

- Creating distribution group and security group
- Membership changes to distribution group, privilege group, and security group

Organization units: Policies about creating, deleting, moving, and changing permission of organization unit

Schema: Policies about the following:

- Creating and changing schema attributes and classes
- Deactivating and reactivating schema objects
- Changing schema permissions
- Changing schema settings

NOTE: If you want to receive all events related to Schema, create more than one policy having related Schema events as policy definition. For example, create a policy to monitor events about schema attribute created and schema attribute modified.

Trusts: Policies about creating, deleting, and modifying trust

User accounts: Policies about the following:

- Changing administrator or guest accounts
- Failure to reset user password

- Disabling and moving user accounts
- Changing permission to user accounts

For more information about creating policies, see “Creating Policies” on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

NOTE: If you assign the Active Directory schema policies created for Attribute and Class schema monitoring together, the AD schema events are not generated successfully. Create separate policies for Attribute and Class schema.

Configuring Group Policy Monitoring

Change Guardian monitors the following in Group Policy:

- Group policies objects
- Preferences
- Settings
- Starter group policy objects
- SYSVOL

This section provides the following information:

Implementation Checklist

Complete the following tasks to start monitoring Group Policy events:

Task	See
Complete the prerequisites	“Prerequisites” on page 84
Add the license key	“Adding License for Applications” on page 72
Configure Change Guardian	“Categories of Change Guardian Policies for GPO” on page 85
	“Assigning Policies and Policy Sets” on page 124
Triage events	Chapter 7, “Configuring Events,” on page 115
	Chapter 9, “Configuring Alerts,” on page 127

Prerequisites

Ensure that you have completed the following:

- Install Change Guardian Agent for Windows
- Install Policy Editor
- Configure GPO

Configuring GPO

Complete the following tasks to configure Change Guardian server to monitor GPO events.

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

- “Configuring the Security Event Log” on page 78
- “Configuring AD Auditing” on page 79
- “Configuring SACLs for GPO” on page 84

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance.

Configuring SACLs for GPO

Configure SACL to generate events for operations that can result in, or are related to, changes in GPO data stored in Active Directory.

To configuration SACL:

1. Log in as an administrator to the computer in the domain you want to configure.
2. To open ADSI Edit configuration tool, run `adsiedit.msc` at the command prompt.
3. Right-click **ADSI Edit**, and then select **Connect to**.
4. In the Connection Settings window, specify the following:
   - **Name** as `Default naming context`.
   - **Path** to the domain to configure.
   - If you are performing this step for the first time, select **Default naming context**.
   - If you are performing for the second time, select **Schema.**
   - If you are performing for the third time, select **Configuration**.
5. In **Connection Point**, set **Select a well known Naming Context** to **Default naming context**.
6. In the ADSI Edit window, expand **Default naming context**.
7. Right-click the node under the connection point (begins with DC=), and select **Properties**.
8. On the **Security** tab, click **Advanced > Auditing > Add**.

9 Configure auditing to monitor every user:

9a Click **Select a principal** and type `everyone` in **Enter the object name to select**.

9b Specify the following options:

- **Type** as **All**
- Select **Permissions** as:
  - **Delete**
  - **Create Organizational Unit objects**
- Select **Properties** as:
  - **Write gPLink**
  - **Write gPOptions**

10 Deselect the option **Apply these auditing entries to objects and/or containers within this container only**.

11 In **Connection Point**, select **Select a well known Naming Context**, and **Configuration**.

12 Expand **Configuration**.

13 Right-click the node under the connection point (begins with CN=), and select **Properties**.

14 On the **Security** tab, click **Advanced > Auditing > Add**.

15 Configure auditing to monitor every user:

15a Click **Select a principal** and type `everyone` in **Enter the object name to select**.

15b Specify the following options:

- **Type** as **All**
- Select **Permissions** as:
  - **Delete**
  - **Create Sites Container objects**
- Select **Properties** as:
  - **Write gPLink**
  - **Write gPOptions**

16 Deselect **Apply these auditing entries to objects and/or containers within this container only**.

17 In **Applies to** or **Apply onto**, select **This object and all descendant objects**.

Categories of Change Guardian Policies for GPO

Group Policy Objects: Policies about deleting and modifying group policies and domain policies

Group Policy Preferences: Policies about changes to local user and group preferences to GPO

Group Policy Settings: Policies about modifying software settings

Starter Group Policy Objects: Policies about creating, deleting, and modifying starter group policies

SYSVOL: Policies about changing Central Store and SYSVOL folder

For information about creating policies, see "Creating Policies" on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

Configuring Windows Monitoring

Change Guardian monitors the following in Windows:

- File integrity
- File shares
- File systems
- Local users and groups
- Processes
- Registry
- Removable media

This section provides the following information:

Implementation Checklist

Complete the following tasks to start monitoring Windows events:

Task	See
Complete the prerequisites	“Prerequisites” on page 87
Add a license key	“Adding License for Applications” on page 72
Configure Change Guardian for monitoring	“Categories of Change Guardian Policies for Windows” on page 87
	“Assigning Policies and Policy Sets” on page 124
Triage events	Chapter 7, “Configuring Events,” on page 115
	Chapter 9, “Configuring Alerts,” on page 127

NOTE: Change Guardian monitors removable media events only on USB flash drives. To monitor external hard disk drive (HDD), create a file system monitoring policy on the mounted drive.

Prerequisites

Ensure that you have completed the following:

- Install Change Guardian Agent for Windows
- Install Policy Editor

Categories of Change Guardian Policies for Windows

File integrity: Policies about changes to critical startup file

File shares: Policies about creating file shares and monitoring permission changes

File systems: Policies about monitoring binary files and permission changes to system directories, privileged profiles, and security analysis database

Local users and groups: Policies about the following:

- Changes to administrator group membership and administrator group privileges
- Creating, deleting user account, and changes to password
- Enabling, disabling, modifying administrator, and changing administrator privilege

Processes: Policies about executing undesirable processes

Registry: Policies about changes to application installation, changes to service registration, and so on.

Removable media: Policies about attaching removable media and file writing to the removable media

For Change Guardian to monitor the registry enable the Registry Browser. Set the `HKLM\Software\Wow6432Node\NetIQ\ChangeGuardianAgent\repositoryEnabled` flag to 1 and restart the agent. If you do not manually set the flag to 1, Registry Browser displays the error message: “Could not connect to Windows Data Source.”

To create a policy to monitor Local Users and Groups, in Policy Definition, select **event list**, or **Privilegelist**, or both.

For information about creating policies, see “Creating Policies” on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

Configuring Microsoft Azure Active Directory Monitoring

Microsoft Azure Active Directory (Azure AD) is a cloud based directory and identity management service. Change Guardian allows you to monitor Azure AD along with on-premises Active Directory.

The Azure AD monitoring capability in Change Guardian is built in with Microsoft Graph API.

Change Guardian monitors the following in Azure AD:

- Administrative units

- Applications
- Devices
- Directories
- Groups
- Policies
- User accounts

This section provide the following information:

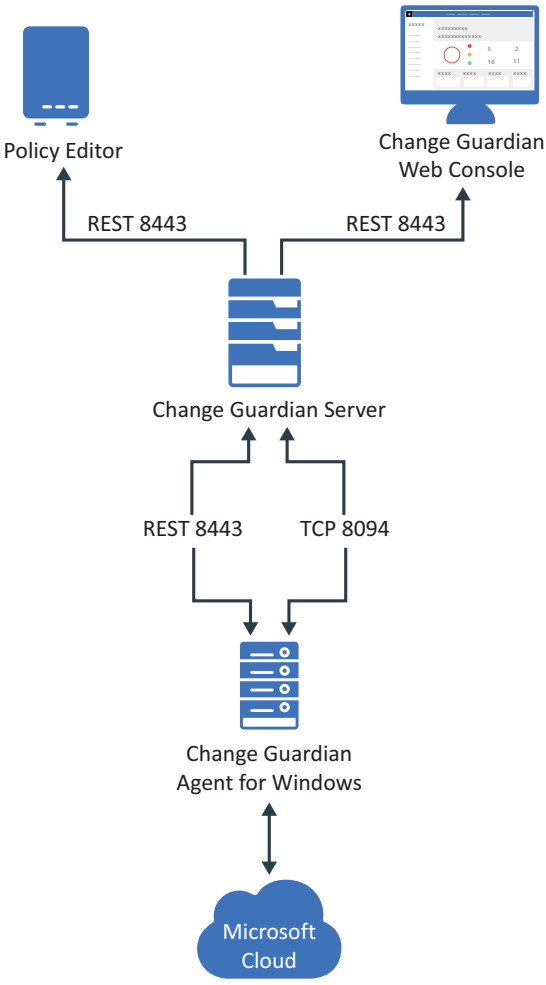
Implementation Checklist

Complete the following tasks to start monitoring Azure AD audit events:

Task	See
Complete the prerequisites	“Prerequisites” on page 89
Add the license key	“Adding License for Applications” on page 72
Configure Change Guardian for monitoring	“Categories of Change Guardian Policies for Azure AD” on page 92
	“Assigning Policies and Policy Sets” on page 124
Triage events.	Chapter 7, “Configuring Events,” on page 115
	Chapter 9, “Configuring Alerts,” on page 127

The following illustration explains the workflow of various components with Azure AD:

Figure 6-1 *Azure AD Monitoring using Change Guardian*



The deployment diagram illustrates the following:

- Change Guardian Agent for Windows collects events from Azure AD
- Change Guardian Agent for Windows sends the event details to the Change Guardian server

Prerequisites

Ensure that you have completed the following:

- Install Change Guardian Agent for Windows
- Install Policy Editor
- Configure Default Windows Registry Keys

Configuring Default Windows Registry Keys

Change Guardian has defined the default values for the Windows registry keys. To modify the registry key values, see the following sections:

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

- “Configuring Azure AD Event Fetching Interval” on page 90
- “Configuring Azure AD Access Token Refresh Time Interval” on page 90
- “Configuring Azure AD Event Collection Interval” on page 91

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance.

Configuring Azure AD Event Fetching Interval

Change Guardian fetches events at a given time interval. The default interval is set to 120 minutes. If the agent starts at 10 a.m., event fetching starts 120 minutes before the *current system time*, that is, from 8 a.m. to 10 a.m.

WARNING: If the time interval is set to more than 1440 minutes, the system resets it to 1440 minutes automatically because it is the maximum permitted value. If the latency from Microsoft is more than this value, there might be data loss.

If you observe a different latency time in your environment, you can change this value to the observed interval.

While processing Azure AD events, Change Guardian removes duplicate events. For more information, see Azure Active Directory reporting latencies.

To modify the time interval:

1. In Windows registry settings, navigate to the Change Guardian agent installation directory: `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NetIQ\ChangeGuardianAgent`
2. Right click the `AzureADEventFetchInterval` key.
3. Under **Base**, select **Decimal**.
4. (Conditional) If you notice a higher latency value in your environment, you can configure this value based on your observed value. The value range is between 120 minutes and 1440 minutes.
5. Go to **Services > NetIQ Change Guardian Agent**.
6. Select the Change Guardian Agent for Windows application, and click **Restart**.

Configuring Azure AD Access Token Refresh Time Interval

Access token is the interval at which Change Guardian connects to Azure AD. By default, Change Guardian refreshes the access token every 30 minutes with a maximum interval of 50 minutes. If you configure this value below 15 minutes or above 50 minutes, the system automatically resets to either 15 or 50 minutes respectively.

To modify the time interval:

1. In Windows registry settings, navigate to the Change Guardian Agent installation directory: `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NetIQ\ChangeGuardianAgent`
2. Right click the `AzureADTokenRefreshInterval` key.
3. Select **Decimal** under **Base**.
4. Specify the time interval to any required value range between 15 minutes and 50 minutes.
5. Go to **Services > NetIQ Change Guardian Agent**.
6. Select the Change Guardian Agent for Windows application, then click **Restart**.

Configuring Azure AD Event Collection Interval

By default, Change Guardian fetches event logs every 10 minutes from Azure AD and processes them based on applied AD policies.

You can configure the event collection interval to be any duration between 5 minutes and 30 minutes. If you configure the duration to below 5 minutes or above 30 minutes, the system automatically resets it either to 15 or 30 minutes respectively. However, you can consider a fetch interval of 10 minutes.

To modify this time interval:

1. In Windows registry settings, navigate to the Change Guardian Agent installation directory: `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NetIQ\ChangeGuardianAgent`
2. Right click the `AzureADEventCollectionInterval` key.
3. Select **Decimal** under **Base**.
4. Specify the time interval to any required value range between 5 minutes and 30 minutes.
5. Go to **Services** > **NetIQ Change Guardian Agent**.
6. Select the Change Guardian Agent for Windows application, then click **Restart**.

Configuring Change Guardian for Monitoring

Complete the following tasks on Change Guardian server to monitor Azure AD events:

- “Enabling Azure AD Monitoring” on page 91
- “Configuring Azure AD Tenant” on page 92

Enabling Azure AD Monitoring

Reconfigure the Change Guardian Agent for Windows to enable Azure AD monitoring.

Ensure that you have added Azure AD assets in Agent Manager.

To reconfigure:

1. In Agent Manager, select the asset and click **Manage Installations > Reconfigure Agents**.
2. On the Reconfigure Agents page, select **Enable Azure AD Monitoring** under **Edit Agent Configuration**.

Configuring Azure AD Tenant

In Azure AD, a tenant is a representative of an organization. You have to configure a tenant and its credentials, such as Domain Name, Authentication Key, and Application ID to make it available to Change Guardian. Change Guardian connects with Azure AD using the Microsoft Graph API. It supports a single tenant.

To configure the Azure AD tenant:

1. Log in to Policy Editor.
2. Under **Azure AD**, open **Azure Tenant Configuration**.
3. Specify values for the following fields:
   - **Domain Name**: Specify the name of the Azure AD domain.
   - **Application ID**: Enter the Application ID that was displayed in the Azure portal during configuration.
   - **Authentication Key**: Enter the Authentication Key that was displayed in the Azure portal during configuration.

Categories of Change Guardian Policies for Azure AD

Administrative Unit: Policies about adding, deleting, and updating administrative units, and modifying administrative unit attributes

Applications: Policies about adding, deleting, and updating applications and application owners

Devices: Policies about adding, deleting and, updating devices, and modifying device attributes

Directories: Policies about adding verified and unverified domains, and modifying directory attributes

Groups: Policies about adding, deleting, updating, and restoring groups, adding and removing group owner and group member, and so on

Policy: Policies about adding, deleting, and updating policies, and modifying policy attributes

User Accounts: Policies about adding, deleting, restoring, and updating user accounts, disabling and enabling accounts, and changing user license and user password, and so on

For information about creating Azure AD policies, see “Creating a Policy for Azure AD Groups” on page 92. For information about creating policies in Change Guardian, see “Creating Policies” on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

NOTE: You cannot assign Azure AD policies by using Asset Groups.

Creating a Policy for Azure AD Groups

To create a policy:

1. In Policy Editor, select **Azure AD > Azure AD Policies**.

2 Select **Groups** and specify the information in the Groups Policy window.

NOTE: You must provide the specific group event type from the event list.

Configuring AWS Identity and Access Management

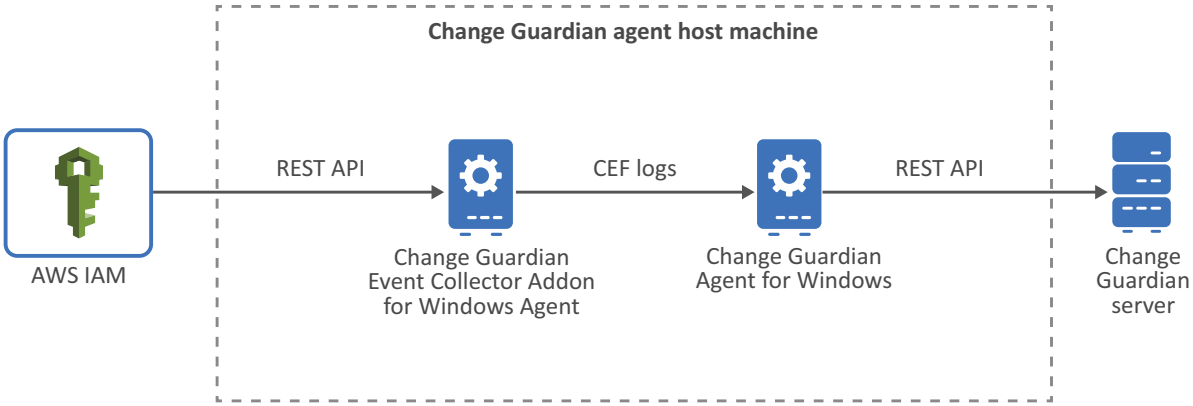
Change Guardian monitors the following in AWS IAM:

- Access Control
- Groups
- Identity and Profiling
- Policies
- User Accounts

This section provides the following information:

- "Implementation Checklist" on page 94
- "Prerequisites" on page 94
- "Configuring Change Guardian for Monitoring" on page 94
- "Categories of Change Guardian Policies for AWS IAM" on page 95

The following diagram illustrates how Change Guardian collects events from AWS IAM:



Implementation Checklist

Complete the following tasks to start monitoring AWS IAM events:

Task	See
Complete the prerequisites	“Prerequisites” on page 94
Add the license key	“Adding License for Applications” on page 72
Configure Change Guardian for monitoring	“Configuring Change Guardian for Monitoring” on page 94 “Categories of Change Guardian Policies for AWS IAM” on page 95 “Assigning Policies and Policy Sets” on page 124
Triage events	Chapter 7, “Configuring Events,” on page 115 Chapter 9, “Configuring Alerts,” on page 127

Prerequisites

Ensure that the following is complete:

- Install Change Guardian Event Collector Addon for Windows Agent
- Install Change Guardian Agent for Windows
- Install Policy Editor

Configuring Change Guardian for Monitoring

You must configure the Change Guardian server to receive AWS IAM event logs from Change Guardian Event Collector Addon for Windows Agent.

Enabling AWS IAM Monitoring

To enable monitoring:

1. In Agent Manager, select the asset and click **Manage Installations > Install Agents**.

   Or

   In Agent Manager, select the asset and click **Manage Installations > Reconfigure Agents.**
2. In the Reconfigure Agent page, select **Enable Collector Plugin** under **Edit Agent Configuration**.
3. Specify the location to store CEF events in **CEF Data Output Path**.

NOTE: Ensure that the value in **CEF Data Output Path** matches the **CEF data path** you specify during Change Guardian Event Collector Addon for Windows Agent installation. You can get the CEF data path from the `ceffolder` parameter in `<install_directory>\current\user\agent\agent.properties`.

Categories of Change Guardian Policies for AWS IAM

Access Control: Policies about the following:

- Creating and deleting SAML
- Server certificate
- Signing certificate
- Deleting, updating, and uploading SSH
- Enabling, resyncing, and deactivating multi-factor authentication
- Virtual multi-factor authentication

Groups: Polices about creating, changing, and deleting groups

Identity and Profiling: Policies about creating and deleting Instance Profile and OpenID Connect provider

Policies: Policies about the following:

- Attaching and deleting group policy, role policy, and user policy
- Creating and deleting policies and policy versions

User Accounts: Policies about the following:

- Creating, changing and deleting access key, account alias, login profile, role, and user account
- Changing user account password

For information about creating policies in Change Guardian, see “Creating Policies” on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

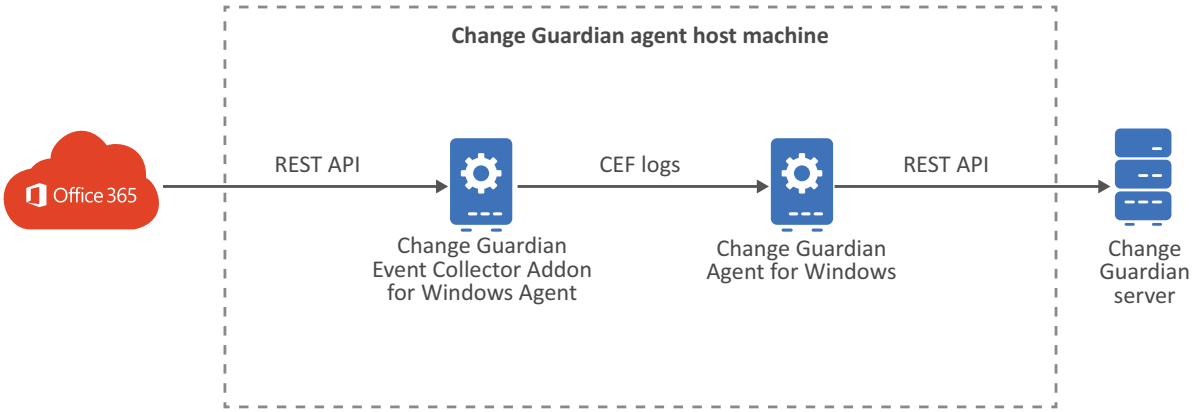
Configuring Office 365 Monitoring

Change Guardian monitors the following in Office 365:

- Exchange Online Settings
- Mailbox Accounts
- Mailbox Messages
- Management Role Groups

This section provides the following information:

The following diagram illustrates how Change Guardian collects events from Exchange Online:



Implementation Checklist

Complete the following tasks to start monitoring Office 365 events:

Task	See
Complete the prerequisites	“Prerequisites” on page 96
Add the license key	“Adding License for Applications” on page 72
Configure Change Guardian for monitoring	“Configuring Change Guardian for Monitoring” on page 96
	“Categories of Change Guardian Policies for Office 365” on page 97
	“Assigning Policies and Policy Sets” on page 124
Triage events	Chapter 7, “Configuring Events,” on page 115
	Chapter 9, “Configuring Alerts,” on page 127

Prerequisites

Ensure that the following is complete:

- Install Change Guardian Event Collector Addon for Windows Agent
- Install Change Guardian Agent for Windows
- Install Policy Editor

Configuring Change Guardian for Monitoring

You must configure the Change Guardian server to receive Office 365 event logs from Change Guardian Event Collector Addon for Windows Agent.

Enabling Office 365 Monitoring

To enable monitoring:

1. In Agent Manager, select the asset and click **Manage Installations > Install Agents**.

   Or

   In Agent Manager, select the asset and click **Manage Installations > Reconfigure Agents.**
2. In the Reconfigure Agent page, select **Enable Collector Plugin** under **Edit Agent Configuration**.
3. Specify the location to store CEF events in **CEF Data Output Path**.

NOTE: Ensure that the value in **CEF Data Output Path** matches the **CEF data path** you specify during Change Guardian Event Collector Addon for Windows Agent installation. You can get the CEF data path from the `ceffolder` parameter in `<install_directory>\current\user\agent\agent.properties`.

Categories of Change Guardian Policies for Office 365

Exchange Online Settings: Policies about creating, deleting, and changing settings, such as role permissions, data loss prevention, anti-malware and retention policies, and mailbox recipients

Mailbox Accounts: Policies about the following:

- Creating and deleting of mailbox accounts
- Enabling and disabling mailbox accounts

Mailbox Messages: Policies about sending on behalf of another user, moving, deleting messages, and so on

Management Roles Groups: Policies about adding, changing, and deleting the following management groups: compliance, discovery, organization, and records

For information about creating policies in Change Guardian, see "Creating Policies" on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see "Working with Policies" on page 123.

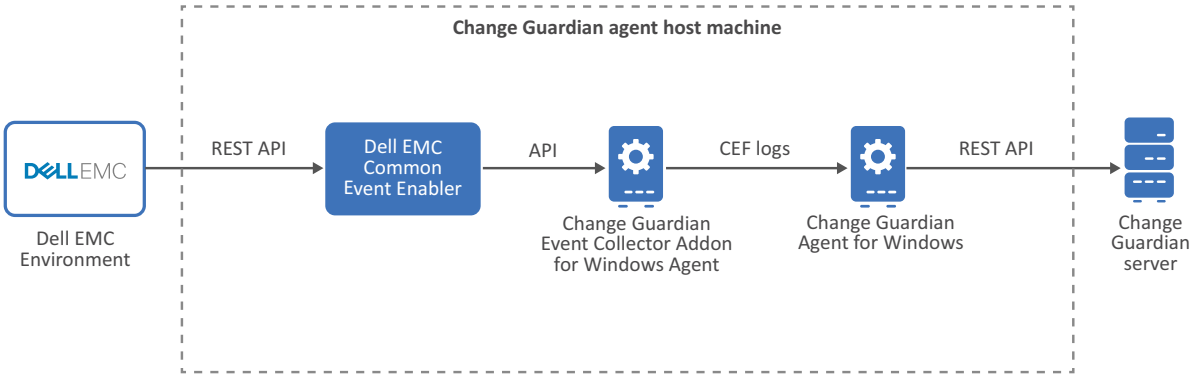
Configuring Dell EMC Monitoring

Change Guardian monitors Dell EMC file systems on Isilon and Unity storage platforms.

This section provides the following information:

The following diagram illustrates how Change Guardian collects events from Dell EMC:

Figure 6-2 *Dell EMC Monitoring using Change Guardian*



The deployment diagram illustrates the following:

- Dell EMC Comment Event Enabler (CEE) collects events from the Dell EMC machine. For more information about Dell EMC CEE, see *"Using the Common Event Enabler for Windows"* in the Dell EMC website.
- Change Guardian Event Collector Addon for Windows Agent acts as the interface between Dell EMC and Change Guardian. Change Guardian Event Collector Addon for Windows Agent pulls change event data from Dell EMC CEE and stores the event details in a CEF log file.
- Change Guardian Agent for Windows reads from the CEF log file and sends the event details to the Change Guardian server.

Implementation Checklist

Complete the following tasks to start monitoring Dell EMC events:

Task	See
Complete the prerequisites	"Prerequisites" on page 98
Add a license key	"Adding License for Applications" on page 72
Configure Change Guardian for Dell EMC monitoring	"Configuring Change Guardian for Monitoring" on page 99
	"Categories of Change Guardian Policies for Dell EMC" on page 99
	"Assigning Policies and Policy Sets" on page 124
Triage events	Chapter 7, "Configuring Events," on page 115
	Chapter 9, "Configuring Alerts," on page 127

Prerequisites

Ensure that you have completed the following:

- Install Change Guardian Event Collector Addon for Windows Agent

- Install Change Guardian Agent for Windows
- Install Policy Editor
- Install Dell EMC CEE, Change Guardian Event Collector Addon for Windows Agent, and Change Guardian Agent for Windows on the same machine

Configuring Change Guardian for Monitoring

You must configure the Change Guardian server to receive Dell EMC event logs from Change Guardian Event Collector Addon for Windows Agent.

Enabling Dell EMC Monitoring

Ensure that you have added Dell EMC assets using Agent Manager.

To enable monitoring:

1. In Agent Manager, select the asset and click **Manage Installations > Install Agents**.

   Or

   In Agent Manager, select the asset and click **Manage Installations > Reconfigure Agents.**
2. In the Reconfigure Agent page, select **Enable Collector Plugin** under **Edit Agent Configuration**.
3. Specify the location to store CEF events in **CEF Data Output Path**.

NOTE: Ensure that the value in **CEF Data Output Path** matches the **CEF data path** you specify during Change Guardian Event Collector Addon for Windows Agent installation. You can get the CEF data path from the `ceffolder` parameter in `<install_directory>\current\user\agent\agent.properties`.

Categories of Change Guardian Policies for Dell EMC

You can create file system policies to generate events about files and directories when they are created, deleted, renamed, permission changed, and so on.

For information about creating policies, see "Creating Policies" on page 122.

While creating file system policies, specify the EMC shared path in the following format: `\\hostname\device type identifier\local sub folder`.

For example,

- For Isilon, specify `\\onefs8104-1\onefs$\ifs\<local sub directory>`
- for Unity, specify `\\onefs8104-1\CHECK$\ifs\<local sub directory>`

Here, `\\onefs8104-1` is the hostname and `\ifs\<local sub directory>` is the directory you want to monitor.

NOTE: You must monitor the file system of Dell EMC Unity storage. For example, specify the path as `\\Unity-1\CHECK$\LocalFS` in Policy Editor, where `LocalFS` is the Dell EMC Unity file system name.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

Configuring Microsoft Exchange Monitoring

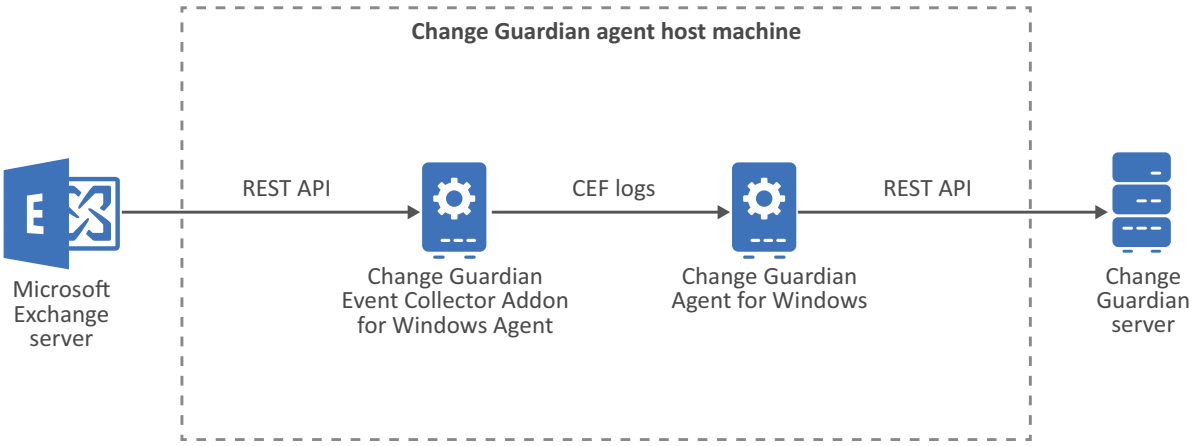
Change Guardian monitors the following in Microsoft Exchange:

- Exchange Settings
- Mailbox Accounts
- Mailbox Messages
- Management Role Groups

This section provides the following information:

The following diagram illustrates how Change Guardian collects events from Exchange server:

Figure 6-3 *Microsoft Exchange Monitoring using Change Guardian*



The deployment diagram illustrates the following:

- Change Guardian Event Collector Addon for Windows Agent acts as the interface between Microsoft Exchange and Change Guardian. Change Guardian Event Collector Addon for Windows Agent pulls change event data from Exchange and stores the event details in a CEF log file.
- Change Guardian Agent for Windows reads from the CEF log file and sends the event details to the Change Guardian server.

Implementation Checklist

Complete the following the tasks to start monitoring Microsoft Exchange events:

Task	See
Complete the prerequisites	“Prerequisites” on page 101
Add the license key	“Adding License for Applications” on page 72
Configure Change Guardian for monitoring	“Enabling Exchange Monitoring” on page 101 “Categories of Change Guardian Policies for Microsoft Exchange” on page 102 “Assigning Policies and Policy Sets” on page 124
Triage events	Chapter 7, “Configuring Events,” on page 115 Chapter 9, “Configuring Alerts,” on page 127

Prerequisites

Complete the following tasks in the same order:

IMPORTANT: Install Change Guardian Event Collector Addon for Windows Agent and Change Guardian Agent for Windows on the same machine as Microsoft Exchange server.

1. Install Change Guardian Event Collector Addon for Windows Agent
2. Install Change Guardian Agent for Windows
3. Install Policy Editor

Configuring Change Guardian for Monitoring

You must configure the Change Guardian server to receive Exchange event logs from Change Guardian Event Collector Addon for Windows Agent.

Enabling Exchange Monitoring

Ensure that you have added Exchange assets in Agent Manager.

To enable monitoring:

1 In Agent Manager, select the asset and click **Manage Installations > Install Agents**.

Or

In Agent Manager, select the asset and click **Manage Installations > Reconfigure Agents.**

2 In the Reconfigure Agent page, select **Enable Collector Plugin** under **Edit Agent Configuration**.

3 Specify the location to store CEF events in **CEF Data Output Path**.

NOTE: Ensure that the value in **CEF Data Output Path** matches the **CEF data path** you specify during Change Guardian Event Collector Addon for Windows Agent installation. You can get the CEF data path from the `ceffolder` parameter in `<install_directory>\current\user\agent\agent.properties`.

Adding Exchange Mailbox Alias

To receive mailbox events add the Exchange mailbox alias in Change Guardian Event Collector Addon for Windows Agent.

To add:

1. Launch Change Guardian Event Collector Addon for Windows Agent.
2. Under **Select the collector to configure**, click **Modify** next to **Exchange**.
3. Click **Next**.
4. On **What would you like to do? screen**, click **Modify Connector > Next**.
5. On **What would you like to do with the connector?** screen, click **Modify connector parameters > Next**.
6. On **Modify table parameters** screen, add the alias name as a new row.
7. On **Would you like to continue or exit?** screen, click **Exit**.
8. Open Windows Services and restart the **ArcSight Microsoft Exchange PowerShell** service.

Categories of Change Guardian Policies for Microsoft Exchange

Exchange Settings: Policies about creating and deleting configuration settings

Mailbox Accounts: Policies about creating, deleting and moving of mailbox accounts, and enabling and disabling mailbox accounts

Mailbox Messages: Policies about sending, moving, deleting messages, and so on

Management Role Groups: Policies about adding, deleting, and modifying role group, adding and removing group member, and so on

For information about creating policies, see “Creating Policies” on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see “Working with Policies” on page 123.

NOTE: While creating mailbox policies, you do not have to configure LDAP settings to browse the Exchange server mailboxes.

Configuring NetApp Storage Monitoring

Storage solutions such as NetApp store a large amount of data and, therefore, can have a large volume of audit events. You can monitor and receive alerts for a variety of malicious behaviors that occur on a Network Attached Storage (NAS) device. For example, unauthorized user accessing confidential files and directories. You can also include or exclude certain files from the audit scope to ensure a faster and more efficient audit process.

Change Guardian monitors file systems in NetApp, and supports both Common Internet File System (CIFS) and Network File System (NFS) protocols.

Implementation Checklist

Complete the following tasks to start monitoring NetApp events:

Task	See
Complete the prerequisites	"Prerequisites" on page 103
Add a license key	"Adding License for Applications" on page 72
Configure Change Guardian for monitoring	"Categories of Change Guardian Policies for NetApp" on page 108
	"Assigning Policies and Policy Sets" on page 124
Triage events	Chapter 7, "Configuring Events," on page 115
	Chapter 9, "Configuring Alerts," on page 127

Prerequisites

Ensure that you have completed the following:

- Install a supported version of Data ONTAP Cluster Mode
- Install Security Agent for UNIX

  NOTE: You should install Security Agent for UNIX on a dedicated system. This ensures that reading files from the agent host machine does not create file read events.

- Install Policy Editor
- Configure NetApp

Configuring the NetApp Native Auditing

Configure the NetApp native auditing solution to monitor file and directory events on your Storage Virtual Machines (SVM) with a FlexVol volume.

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

The security descriptor may contain Discretionary Access Control Lists (DACLs) to apply to file and folder access permissions. On the other hand, the security descriptor may contain System Access Control Lists (SACLs) for file and folder auditing, or even both SACLs and DACLs.

For better performance, store the audit file in a separate volume and mount the complete share on the agent machine.

NOTE: If you use the `cat` command to create and modify a file in quick succession, you might find a missing `file modify` event because NetApp reads and updates audit logs slower than Linux.

Configure NetApp auditing depending on the filesystem it uses:

- "Configuring NetApp Native Auditing for CIFS" on page 104
- "Configuring NetApp Native Auditing for NFS" on page 105

NOTE: Ensure that you have the root user privilege to complete these tasks.

Configuring NetApp Native Auditing for CIFS

Create an auditing configuration on the given SVM for CIFS before you can monitor events on NetApp storage. You can monitor these events on CIFS by setting SACLs on storage objects in NTFS or mixed mode volumes.

To configure auditing for CIFS:

1. Launch the Data ONTAP command-line interface.
2. Create audit configuration for an SVM:

   ```
   vserver audit create -vserver <Name_SVM> -destination "/<Name_Volume>"
   -events file-ops -format xml -rotate-size XB -rotate-limit 10
   ```

   Example: If vserver name is `SVM1`, volume is `vol1` and folder is `audit`, then the command is:

   ```
   vserver audit create -vserver SVM1 -destination /vol1/audit -events
   file-ops -format xml -rotate-size 1MB -rotate-limit 10
   ```

3. Set NTFS audit policies using the Windows Security tab.

   For information about the steps, see *Apply a basic audit policy on a file or folder* in the Microsoft Documentation site.

4. Verify audit configuration:

   ```
   vserver audit show -vserver <Name_SVM>
   ```

   For example, to verify audit configuration for SVM1, run the following command:

```
vserver audit show -vserver SVM1

Vserver: SVM1
Auditing State: true
Log Destination Path: /vol1
Categories of Events to Audit: file-ops, cifs-logon-logoff,audit-
policy-change
Log Format: xml
Log File Size Limit: 100MB
Log Rotation Schedule: Month: -
Log Rotation Schedule: Day of Week: -
Log Rotation Schedule: Day: -
Log Rotation Schedule: Hour: -
Log Rotation Schedule: Minute: -
Rotation Schedules: -
Log Files Rotation Limit: 0
```

5 Enable SVM auditing:

```
vserver audit enable -vserver <Name_SVM>
```

Example:

```
vserver audit enable -vserver SVM1
```

Configuring NetApp Native Auditing for NFS

To configure auditing in NFS:

1 Launch the Data ONTAP command-line interface.

2 Create audit configuration for an SVM:

```
vserver audit create -vserver <Name_SVM> -destination "/<Name_Volume>"
-events file-ops -format xml -rotate-size XB -rotate-limit 10
```

Example: When vserver name is SVM1, volume is `vol1` and folder is `audit`, then the command is:

```
vserver audit create -vserver SVM1 -destination /vol1/audit -events
file-ops -format xml -rotate-size 1MB -rotate-limit 10
```

3 Verify audit configuration:

```
vserver audit show -vserver <Name_SVM>
```

For example, to verify audit configuration for SVM1, run the following command:

```
vserver audit show –vserver SVM1
```

```
Vserver: SVM1
Auditing State: true
Log Destination Path: /vol1
Categories of Events to Audit: file-ops, audit-policy-change
Log Format: xml
Log File Size Limit: 100MB
Log Rotation Schedule: Month: -
Log Rotation Schedule: Day of Week: -
Log Rotation Schedule: Day: -
Log Rotation Schedule: Hour: -
Log Rotation Schedule: Minute: -
Rotation Schedules: -
Log Files Rotation Limit: 0
```

4 To configure Security Agent for UNIX to monitor the NetApp filesystem changes, enable ACL for NFS:

```
vserver nfs modify -vserver <name_SVM> -v4.0 enabled -v4.0-acl enabled
```

Example:

```
vserver nfs modify -vserver SVM1 -v4.0 enabled -v4.0-acl enabled
```

5 Verify whether `nfs4-acl-tools` is installed on the NFSv4 Linux host:

5a Run the `mkdir <Folder_Name>` command to create a mount directory.

5b Mount to the directory:

```
mount -t nfs4 <nas_SVMIP>:/<volume_name> <mount_path>
```

Example:

If SVM IP is `x.x.x.x`, volume name is `vol1`, and mount path is `/mnt/folder1`, run the following command:

```
mount -t nfs4 x.x.x.x:/vol1 /mnt/folder1
```

5c To monitor each folder within a volume, add audit flags recursively on each folder in the mount directory you want to monitor:

```
nfs4_setfacl -R -a U:fdSF:EVERYONE@:rwaDdTNCo <NFS_Share>
```

Example:

If a folder name in the volume is `NFSShare`, run the following command:

```
nfs4_setfacl -R -a U:fdSF:EVERYONE@:rwaDdTNCo NFSShare
```

5d To monitor an entire volume, add audit flags recursively on the mount directory that contains the volume mounted:

```
nfs4_setfacl -R -a U:fdSF:EVERYONE@:rwaDdTNCo <mount directory>
```

Example:

If the mount directory is `/mnt/folder1`, run the following command:

```
nfs4_setfacl -R -a U:fdSF:EVERYONE@:rwaDdTNCo /mnt/folder1
```

6 Enable SVM auditing:

```
vserver audit enable -vserver <Name_SVM>
```

Example:

```
vserver audit enable -vserver SVM1
```

Configuring Change Guardian for Monitoring

After configuring NetApp audit, mount the NetApp volumes into Security Agent for UNIX. Mount one volume for audit logs and another for CIFS or NFS shares to monitor.

Complete the following tasks to configure Change Guardian:

- "Mounting the Audit Logs in CIFS" on page 107
- "Mounting the Audit Logs in NFS" on page 108
- "Creating a Configuration File" on page 108

NOTE: Ensure that you have the required permission to complete these tasks. Check with your network or system administrator for assistance.

Mounting the Audit Logs in CIFS

To mount the audit log:

1. Create a mount directory.

   Example:

   `mkdir /mnt/audit`

2. Go to `/usr/netiq/vsau/etc` and create a file `cifs`.

3. Update the `cifs` file as follows:

   `username=<user name>`

   `password=<password>`

   `domain=<domain name>`

4. Change the permissions of this file to secure its credentials:

   `chmod 600 cifs`

5. Update the `/etc/fstab` in the following format:

   `//<svm_ip>/<volume> <mountlocation> cifs ro,nouser,noexec,nosuid,credentials=/usr/netiq/vsau/etc/cifs 0 0`

   Example:

   `//10.0.0.1/audit /mnt/audit cifs ro,nouser,noexec,nosuid,credentials=/usr/netiq/vsau/etc/cifs 0 0`

6. Mount the audit volume to the mount location:

   `mount /mnt/audit`

   NOTE: You must have read permissions for the audit file.

Mounting the Audit Logs in NFS

Create a mount point in the Security Agent for UNIX computer, enter the NetApp configuration details in `/etc/fstab`, and mount the audit log and the NetApp volume over NFS.

1. Create a mount directory: `mkdir /mnt/audit`
2. Update the `/etc/fstab` in the following format:

   `<svm_ip>:/<volume> <mountlocation> nfs ro,nouser,noexec,nosuid 0 0`

   Example:

   `10.0.0.1:/vol1 /mnt/audit nfs ro,nouser,noexec,nosuid 0 0`
3. Mount the audit volume to the mount location:

   `mkdir /mnt/audit`

NOTE: Make changes to `/etc/fstab` and mount the volume with the NetApp share following the above steps.

Creating a Configuration File

Complete the following steps in the Security Agent for UNIX machine:

1. Go to `/usr/netiq/vsau/etc` and create new file named `netapp-volume-tab`.
2. Update the `netapp-volume-tab` file in the following format:

   `SVM_IP_address, share, mount_directory, volume`

   Example:

   If SVM IP is `x.x.x.x`, share name is `vol1`, mount directory is `/mnt/audit`, volume name is `vol1`, then specify the command as follows:

   `x.x.x.x,/vol1,/mnt/audit,vol1`

NOTE: When you monitor an entire volume, you must update the NetApp volume tab as follows:

`x.x.x.x,/vol1,/mnt/audit,vol1`

Categories of Change Guardian Policies for NetApp

Create policies to monitor creating, deleting, renaming, and changing permission on NetApp files and directories.

NOTE: Specify the `/folder_name` you want to monitor in the **directory** field of the policy definition. If you want to monitor at the SVM level, then just use "/" instead of the folder name.

For information about creating policies, see "Creating Policies" on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see "Working with Policies" on page 123.

Configuring Linux or UNIX Monitoring

Change Guardian monitors the following in Linux and UNIX environments:

- Configuration files
- Local and exported file systems
- File integrity
- Groups
- Mounts
- Processes and daemons
- CRON jobs
- Users

This section provides the following information:

Implementation Checklist

Complete the following tasks to start monitoring Linux and UNIX events:

Task	See
Complete the prerequisites	"Prerequisites" on page 109
Add a license key	"Adding License for Applications" on page 72
Configure Change Guardian for monitoring	"Categories of Change Guardian Policies for UNIX" on page 114
	"Assigning Policies and Policy Sets" on page 124
Triage events	Chapter 7, "Configuring Events," on page 115
	Chapter 9, "Configuring Alerts," on page 127

Prerequisites

Ensure that you have completed the following:

- Install Security Agent for UNIX
- Install Policy Editor
- Configure UNIX or Linux

Configuring Auditing in UNIX or Linux

You must enable the auditing system of your UNIX or LINUX operating systems to allow Change Guardian to start monitoring.

NOTE: Change Guardian documentation provides the third-party configuration steps for ease of use. For more information about the third-party products or for any issues with the configuration, see their documentation.

- "Configuring a UNIX Auditing Subsystem" on page 110
- "Configuring a Linux Auditing Subsystem" on page 113

NOTE: Ensure that you have the root user privilege to complete these tasks.

Configuring a UNIX Auditing Subsystem

This section provides information about configuring auditing on UNIX computers:

- "Configuring the AIX Audit Subsystem" on page 110
- "Configuring the HP-UX Audit Subsystem" on page 113
- "Configuring the Solaris Auditing Subsystem" on page 113

Configuring the AIX Audit Subsystem

Auditing subsystem stores files in the `/etc/security/audit` folder. However, in AIX computers, streaming all events might consume too much memory or processor time and enable only the minimum required auditing.

You can enable AIX audit subsystem either in `STREAM` or `BIN` mode.

To configure AIX audit subsystem:

1 Ensure that the `/etc/security/audit/config` file includes the following lines:

```
bin:
     trail = /audit/trail
     bin1 = /audit/bin1
     bin2 = /audit/bin2
     binsize = 10240
  cmds = /etc/securitsy/audit/bincmds
stream:
  cmds = /etc/security/audit/streamcmds
classes:
     general =
USER_SU,PASSWORD_Change,FILE_Unlink,FILE_Link,FILE_Rename,FS_Chdir,FS_
Fchdir,FS_Chroot,PORT_Locked,PORT_Change,FS_Mkdir,FS_Rmdir,FILE_Symlin
k,USER_Exit,PROC_Create,PROC_Delete,FILE_Fchmod,FS_Rmdir,GROUP_User,GR
OUP_Adms,GROUP_Change,GROUP_Create,GROUP_Remove,USER_Remove,USER_Creat
e,USER_Chpass,USER_Change,FS_Mount,FS_Umount,FILE_Unlinkat,FILE_Symlin
kat
     Kernel =
PROC_Create,PROC_Delete,PROC_Execute,PROC_RealUID,PROC_AuditID,PROC_Re
alGID,PROC_Environ,PROC_SetSignal,PROC_Limits,PROC_SetPri,PROC_Setpri,
```

```
PROC_Privilege,PROC_Settimer,PROC_LPExecute,PROC_Adjtime,PROC_Kill
     files =
FILE_Open,FILE_Read,FILE_Write,FILE_Close,FILE_Link,FILE_Unlink,FILE_R
ename,FILE_Owner,FILE_Mode,FILE_Acl,FILE_Privilege,DEV_Create,FILE_Dup
fd,FILE_Chmod,FILE_Chown,FILE_Utimes,FILE_Truncate,FILE_Mknod,FILE_Sym
link,FILE_Unlinkat,FILE_Fchownat,FILE_Linkat,FILE_Fchown,FILE_Symlinka
t,FILE_Openxat,FILE_Mknodat,FILE_Renameat,FILE_Fchownat,FILE_Fchmod,FI
LE_Fchown,FILE_Fchmodat
     cron =
AT_JobAdd,AT_JobRemove,CRON_JobAdd,CRON_JobRemove,CRON_Start,CRON_Fini
sh
users:
     root = general,kernel,files,cron
     default = general,kernel,files,cron
role:
```

2 (Conditional) To enable STREAM mode, perform the following steps:

2a Add the following to `/etc/security/audit/config` file:

```
start

     binmode = off

     streammode = on
```

2a1 Add the following line to the`/etc/security/audit/streamcmds` file:

```
/usr/sbin/auditstream | /usr/sbin/auditpr -t 0 -r -v -
helRtcrpPTh >> /audit/trail&
```

3 (Conditional) To enable BIN mode, perform the following steps:

3a Disable stream mode and enable bin mode in the `/etc/security/audit/config` file

3b Add the following line to`/etc/security/audit/bincmds` file:

```
/usr/sbin/auditcat $bin | /usr/sbin/auditpr -t 0 -r -v -helRtcrpPTh
>> /audit/trail
```

3c Add the following line to`/etc/security/audit/streamcmds` file:

```
/usr/sbin/auditstream | /usr/sbin/auditpr -t 0 -r -v -helRtcrpPTh >>
/audit/trail&
```

4 Ensure that the `/etc/security/audit/events` file contains the following:

- FS_Mount
- FILE_Unlinkat
- CRON_Finish
- FILE_Linkat
- CRON_JobRemove
- PROC_Kill
- PROC_Execute
- FILE_Unlink
- FILE_Rename

- FILE_Fchown
- FILE_Owner
- USER_Chpass
- FILE_Symlinkat
- USER_Change
- FILE_Symlink
- PROC_LPExecute
- FILE_Open
- FILE_Mknodat
- FILE_Dupfd
- FILE_Chmod
- FILE_Renameat
- USER_Create
- GROUP_Create
- FS_Chdir
- FS_Umount
- FILE_Chown
- FILE_Fchownat
- GROUP_Change
- PROC_Create
- USER_Remove
- FILE_Fchmod
- PROC_Adjtime
- CRON_JobAdd
- FILE_Utimes
- PROC_Delete
- FILE_Openxat
- GROUP_Remove
- FILE_Fchmodat
- FILE_Mode
- PROC_Settimer
- FILE_Mknod
- CRON_Start
- FILE_Link

5 Restart the audit subsystem.

6 Restart `detectd` service from the given location:

```
/usr/netiq/pssetup/./detectd.rc restart
```

Configuring the HP-UX Audit Subsystem

The auditing subsystem on HP computers stores files in the `/etc/rc.config.d` directory. Ensure that the `/etc/rc.config.d/auditing` file includes the following lines:

```
AUDITING=1

PRI_AUDFILE=/.secure/etc/audfile1

PRI_SWITCH=1000

SEC_AUDFILE=/.secure/etc/audfile2

SEC_SWITCH=1000

AUDEVENT_ARGS1=" -P -F   -e admin -s exit -s kill -s vfsmount -s rename -s
unlink -s creat -s symlink -s fchown -s execv -s stime -s link -s
settimeofday -s mount -s clock_settime -s fchmod -s lchown -s umount2 -s
chmod -s execve -s chown -s open -s umount -s fork -s mknod -s vfork -s
chdir -s adjtime -s mkdir -s rmdir  "

AUDEVENT_ARGS2=" "
AUDEVENT_ARGS3=" "
AUDEVENT_ARGS4=" "
AUDOMON_ARGS=" -p 20 -t 1 -w 90"
```

Configuring the Solaris Auditing Subsystem

To configure on Solaris 10:

1. To ensure that the Basic Security Module restarts after reboot, run the following command from the `/etc/security` folder.

   ```
   ./bsmconv
   ```

2. Ensure that the `/etc/security/audit_control` file contains the following lines:

   ```
   flags: ua,fm,pc,fw,fr,ad,as,fc,ps,fd,nf
   naflags: fm,pc,fw,fr,as,ad,fc,ps,fd,nf
   minfree:20
   dir:/var/audit
   ```

To configure on Solaris 11:

1. Set the auditing flags as follows:

   ```
   auditconfig -setflags pm,ps,ua,as,fd,fc,fm,fw,fr
   auditconfig -setnaflags pm,ps,ua,as,fd,fc,fm,fw,fr
   ```

Configuring a Linux Auditing Subsystem

For RHEL and SUSE platforms, configure the audit daemon in the `/etc/audit/auditd.conf` file.

To configure:

1. (Conditional) For RHEL, ensure that the `auditd` service is enabled:

   ```
   chkconfig auditd on
   ```

2 (Conditional) For SUSE, perform the following steps:

2a Check if the audit process is running:

```
ps -ef | grep -i audit
```

2b If the audit process is running in disabled mode, enable the process:

```
/sbin/auditd -s enable.
```

2c Ensure that the PID in the command output matches the PID of the enabled process:

```
auditctl -e 1
```

NOTE: After you upgrade from Security Agent for UNIX 7.4 to 7.5, remove the system calls from the `/etc/audit/audit.rules` file that might have been added for Security Agent for UNIX 7.4.

For agents that are running on Linux platforms, additional audit configuration is performed dynamically as Change Guardian policies are enabled and disabled.

Categories of Change Guardian Policies for UNIX

Configuration Files: Policies about changing hostname resolution and process startup configuration

CRON: Policies to monitor accessing CRON job, and changing CROS task execution

Exported File System: Policies to monitor list of exported file system

File Integrity: Policies to monitor Security Agent for UNIX configuration and system message of the day

File System: Policies to monitor bash shell startup configuration

Groups: Policies to monitor inbuilt groups

Mount: Policies to monitor CD-ROM mounts

Process/Daemons: Policies to monitor system background processes, and execution of su and sudo commands

Users: Policies to monitor built-in users

For information about creating policies, see "Creating Policies" on page 122.

After creating policies, you can assign them to assets. For information about assigning policies, see "Working with Policies" on page 123.

7 Configuring Events

Change Guardian collects events from various assets based on pre-configured Change Guardian policies. Events are collected by Change Guardian agents and are received by the Change Guardian server and displayed in the Dashboard. For information about **viewing** events, see the "Viewing Events in the Events Dashboard" in the *Change Guardian User Guide*.

By default, events are stored in the server temporarily, based on the data retention value. However, you can chose to store all or specified event data to a syslog server or in another Change Guardian server or a Sentinel server.

This chapter provides information about managing events by setting the event destination other than the Change Guardian server, setting event routing rules based on set filters, create event tags, storing events for long-term retention.

Configuring Event Destinations

An event destination is where Change Guardian sends incoming events for a particular policy. You can view information about access and changes to critical files, systems, and applications. It is also where you deploy alert rules to notify you of those changes.

A policy must have at least one event destination. When you create a policy, it automatically uses the default event destination which is the Change Guardian server. You can also assign the policy to the syslog server or a third party security information and event management (SIEM) tool.

You can create and assign additional event destinations to meet your environment and regulatory needs. You can also change the default event destination. If you set another event destination as the default, all new policies automatically use the new default location. Existing policies continue to use their previously assigned event destinations. To change the event destinations for existing policies, see "Assigning Event Destinations" on page 117.

If your environment has multiple event destinations, and the default event destination is FIPS-enabled, some additional configuration steps are required. For more information, see "Configuring Event Destinations to Generate Alerts" on page 130.

You can configure Change Guardian agents to send events to Sentinel, to leverage Sentinel capabilities. Starting with Sentinel 8.2, you can use the HTTP Server Connector and distribute Change Guardian assets across multiple Sentinel Collector Managers and multiple Event Source Servers to scale data collection. For information about the HTTP Server Connector, see the Connector documentation on the Sentinel Plug-ins Website. For information about Sentinel, see Sentinel Documentation.

Following sections provide information about creating event destinations.

Creating Event Destinations

Change Guardian evaluates the event routing rules on a first-match basis in top-down order and applies the first matched event routing rule to events that match the filter criteria. You can configure event routing rules to evaluate and filter all incoming events and deliver selected events to designated output actions. For example, each severity 5 event can be logged to a file.

You can create event destinations using one of the following models:

- **REST Dispatcher**: Forwards Change Guardian events directly from a Change Guardian agent to the Change Guardian or Sentinel server.

  NOTE: If you add an event destination, ensure that the user account associated with that destination has permissions to send events and attachments.

- **Syslog Dispatcher**: Forwards Change Guardian events from Change Guardian agent to Change Guardian server, which in turn forwards events to third-party SIEM or syslog server.

  NOTE: Change Guardian supports the Common Event Format (CEF) specification and could use Syslog Dispatcher to forward events. Related event attributes might contain additional backslash (\) characters to escape the following characters: \, =, and | and allow the event to conform to CEF. To remove them, parse the events with a CEF parser.

To create an event destination:

1. In Policy Editor, select **Settings > Event Destinations**.
2. Click **Add**.
3. Specify a unique name for the event destination.
4. Specify one of the event destination models.
5. Provide system information of the server where you want to send events.

   For Sentinel, if you have deployed remote Collector Managers to receive events from Change Guardian assets, specify the IP address of the Collector Manager and port number of the Event Source Server. Otherwise, specify the IP address and port number of the Sentinel server.

   NOTE: While changing the event destination, ensure that the new destination server is running on FIPS mode, if the Change Guardian server runs on FIPS mode.

6. (Optional) If you want to send Change Guardian system events that only match specific criteria, select the check box above the filter drop-down list, and provide filter criteria.

   NOTE: The filter is applied to all event destinations configured on the server.

Change Guardian uses the Lucene query language for filtering events. For more information, see Apache Lucene - Query Parser Syntax.

7 Click **OK**.

NOTE: If more than one event destinations are configured on a Change Guardian server, specifying one event destination while creating a policy ignores the specified destination and sends events to all the configured event destination.

For Sentinel, if you have deployed Collector Managers to receive events from Change Guardian assets, you must create an event destination for each Event Source Server.

Assigning Event Destinations

When you create a policy, it automatically uses the default event destination. If you want to send event data to another destination, add an event destination to the policy (or policy set). The new event destination can be either in addition to or instead of the default event destination. The updated event destination setting takes effect at the next heartbeat interval, when the asset reads the updated policy information.

To assign event destinations to a policy:

1 Log in to Policy Editor.

2 Click **Policy Assignment**

3 Select an asset or asset group, and click **Assign Policies**

4 Select a policy set or policy and click **Advanced**.

5 Select one or more event destinations to assign to the specified policy or policy set.

6 Click **OK**.

Configuring Event Routing Rules

You can configure event routing rules to filter events based on one or more of the searchable fields. You can associate each event routing rule with one or more of the configured actions. You can also assign tags to group the events logically.

Following sections provide information about configuring event routing rules.

- “Creating Event Routing Rules” on page 117
- “Ordering Event Routing Rules” on page 118
- “Activating or Deactivating an Event Routing Rule” on page 118

Creating Event Routing Rules

You can create a filter-based event routing rule and then assign one or more configured actions that are executed to handle or output the events that meet the event routing rule criteria. For information about creating event routing rules, see “Creating Event Routing Rules” on page 57.

The newly created event routing rule appears at the end of the rules list under the **Event Routing Rules** tab. By default, this new event routing rule is active.

Ordering Event Routing Rules

When there is more than one event routing rule, the event routing rules can be reordered by dragging them to a new location. Events are evaluated by event routing rules in the specified order until a match is made, so you should order the event routing rules accordingly. More narrowly defined event routing rules and more important event routing rules should be placed at the beginning of the list.

The first routing rule that matches the event based on the filter is processed. For example, if an event passes the filter for two routing rules, only the first rule is applied. The default routing rule cannot be reordered. It always appears at the end.

To order event routing rules:

1. From the web console, click **ADMINISTRATION > Routing** in the toolbar.

   The **Event Routing Rules** tab is displayed.

   Existing event routing rules appear on the page.
2. Mouse over the icon to the left of the event routing rule numbering to enable drag-and-drop. The cursor changes.
3. Drag the event routing rule to the correct place in the ordered list.

   When the event routing rules are ordered, a success message is displayed.

Activating or Deactivating an Event Routing Rule

New event routing rules are activated by default. If you deactivate an event routing rule, incoming events are no longer evaluated according to that event routing rule. If there are already events in the queue for one or more actions, it might take some time to clear the queue after the event routing rule is deactivated. If the **On** check box next to the event routing rule is selected, the event routing rule is activated. If the **On** check box is not selected, the event routing rule is deactivated.

1. From the web console, click **ADMINISTRATION > Routing** in the toolbar.

   The **Event Routing Rules** tab is displayed.

   Existing event routing rules appear on the page.
2. To activate the event routing rule, select the check box next to each event routing rule in the **Enabled** column.

   If the event routing rule is activated, a success message is displayed.
3. To deactivate the event routing rule, select the check box next to each event routing rule in the **Enabled** column.

   When the event routing rule is deactivated, a success message is displayed.

Forwarding Events for Long-Term Retention

Change Guardian stores raw data and compressed event data on the local file system. You can configure Change Guardian to store the data in a networked location for long-term storage.

The data files are deleted from the local and networked storage locations on a configured schedule. Raw data retention is governed by a single raw data retention policy. Data retention is governed by a set of event data retention policies, which the Change Guardian administrator configures. By default, Change Guardian retains event data for 30 days.

Change Guardian uses the same data storage and retention policy technology as Sentinel. For more information, see "Configuring Data Storage" in the *Sentinel Administration Guide*.

8 Configuring Change Guardian Policies

Policies allow you to define how Change Guardian monitors assets in your environment. A policy includes one or more criteria to define a specific change event you want to monitor in your enterprise. Change Guardian collects events based on the Change Guardian policies. This chapter provides an overview about policies, information about how to create policies and policy sets, how to assign policies and policy sets, assign event designations to a policy, and so on.

Understanding Policies and Policy Sets

Policies allow you to identify the asset you are monitoring, and then add any combination of the following criteria:

- Add filters to narrow the monitoring target and results
- Define managed users for the activity
- Assign event contexts to categorize policies
- Specify a custom severity that matches the policy

Each Change Guardian application includes several policy types.

You can combine multiple policies from one or more assets to organize and manage monitoring the assets. You can include a policy in multiple policy sets.

Understanding Policy Attributes

Policy attributes provide granular details of a policy such as the purpose, severity, and authorized users.

Event Severity: When you create or edit a policy, you can specify a constant event severity or allow Change Guardian to calculate the severity automatically. If you set Severity to `Automatic`, Change Guardian calculates the severity based on whether the user is authorized and if the action is successful.

NOTE: Change Guardian automatically calculates Event Severity for Security Agent for UNIX events, including events generated by policies configured with a custom severity.

Examples of severity are as follows:

- **Sev 5:**Unauthorized user, successful action
- **Sev 4:**Unauthorized user, failed action
- **Sev 3:** Authorized user, failed action

- **Sev 2:** Authorized user, successful action
- **Sev 0 or 1:** System events

Managed User: Change Guardian allows managed users to make specific changes to assets. When managed users make changes, the generated events appear as managed change events. When creating or editing a policy, use the **Managed Events** to specify the managed users for the policy.

If you specified a user group as a managed user, and the group membership changes, Change Guardian synchronizes associated policies with the new group members.

Event Context: Use the Event Context section to categorize the policy and specify its purpose. Generated events include the event contexts. You can create new event contexts with user-defined values. You can select one or more of the following default event contexts:

- Risk Domain
- Risk
- Sensitivity
- Regulation/Policy
- Control/Classification
- Response Window

LDAP Settings: Change Guardian uses LDAP to process each user group in a policy as a list of the group members. For example, if a policy monitors Group A, LDAP allows Change Guardian to monitor the activity that each user of the Group A performs. If the policy returns an event, the name of the user performing the change is included in the event report.

Configure LDAP server for every grouped resource. You can either add the Active Directory items manually or browse them while creating a policy. A policy cannot monitor the group members correctly if you only specify the grouped resource in a policy, but do not configure LDAP settings for the grouped resource.

Creating Policies

You can create a policy by using one of the following methods:

- Create a fresh policy with no preconfigured settings
- Clone and customize a template

Creating a Fresh Policy

You can create a fresh policy without preconfigured settings.

To create a policy:

1. In Policy Editor, select one of the applications, such as Active Directory.
2. Expand the list of policies and select the policy type you want to create. For example, select **Active Directory Policies > AD Object**.

3 On the Configuration Policy screen, make the appropriate changes.

4 (Conditional) If you want to enable the policy immediately, select **Enable this policy revision now**.

NOTE: For more information about enabling a policy, see "Enabling a Change Guardian Policy Revision" on page 124.

Working with Policies

Change Guardian stores the policies in the Change Guardian policy repository. You can assign policies to assets or asset groups.

After creating a policy, you can perform various activities such as clone a policy, assign the policy to an asset, and schedule policy monitoring. While working with policies, ensure that you follow the order specified below:

1. Submit a policy or make the policy available by cloning from a template
2. Enable the policy
3. Assign a policy revision to an asset or asset group

This section provides the following information:

Cloning a Change Guardian Policy

Cloning a policy allows you to create a policy based on an existing policy and then make changes as required. By default, Change Guardian uses the latest revision of the selected policy when creating a clone. You can also select a specific policy revision.

Cloning a Template

Policy templates provide examples of best configured policies that you can reuse. Applying a policy template from the platform template library clones the policy into your active policy area. Edit the criteria to specify the assets and files to be monitored.

To clone from a template:

1 In Policy Editor, under the desired application, select the template you want to apply.

2 Specify the required information, and click **Submit**.

3 (Conditional) If you want to enable the policy immediately, select **Enable this policy revision now**.

NOTE: For more information about enabling a policy, see "Enabling a Change Guardian Policy Revision" on page 124.

Creating Change Guardian Policy Sets

If you add a policy to a policy set that contains multiple asset types, the policy applies only to the applicable assets. For example, if you apply a UNIX policy to a policy set that contains Windows and UNIX assets, the policy applies to UNIX assets only.

Use the Policy Set Manager to add, edit, or clone policy sets. To open Policy Set Manager, click **Change Guardian > Policy Set Manager**.

Assigning Policies and Policy Sets

To assign a policy or policy set to an asset:

1 Click **Change Guardian > Policy Assignment**.

2 Select an asset or asset group, and click **Assign Policies**.

3 Select a policy set or policy, and click **Apply**.

NOTE: You cannot assign policies using **Asset Groups** for the following asset types: Azure AD, AWS for IAM, Dell EMC, Microsoft Exchange, Microsoft Office 365, and NetApp.

You can edit an existing policy or policy set from the way it was assigned. For example, if you want to add an event destination to a policy that was assigned using policy set, you can edit it in the policy set only. This also applies to group assignments.

Enabling a Change Guardian Policy Revision

When you change a policy, Change Guardian creates a new revision of that policy. Policy revisions allow you to keep and share work that is in progress. You can view all policy revisions and the version number of the currently enabled policy in Policy Editor. You can edit and enable a previous revision of a policy.

To enable an older revision:

1 Select the desired policy under the application name.

2 On the **History** tab, enable the required policy revision.

3 Assign the policy to assets or asset groups.

NOTE: If you update the revision of a policy that is already assigned, Change Guardian automatically updates all associated assets with the new revision of that policy.

Exporting and Importing Change Guardian Policies

Change Guardian allows you to export a policy to a `.xml` file. You can import that policy as a new policy. You can also modify an imported policy to create a new policy with a similar definition. You can export one policy at a time, however, you can import multiple policies at a time.

To export a policy:

1. In Policy Editor, navigate to the policy that you want to export.
2. Right-click the policy, and select **Export**.

To import a policy:

1. In Policy Editor, click **Settings** > **Import Policies**.
2. Select the required `.xml` file, and click **Open**.

Assigning Event Destinations to Change Guardian Policies

When you create a policy, it automatically uses the default event destination. If you want to send event data to another destination, add an event destination to the policy or policy set. You can use the new event destination along with the default event destination or replace it. The updated event destination takes effect when the asset receives the updated policy information at the next heartbeat.

To assign event destinations to a policy:

1. In Policy Editor, click **Change Guardian > Policy Assignment**.
2. Select an asset or asset group, and click **Assign Policies**.
3. Select a policy set or policy, and click **Advanced**.
4. Select one or more event destinations to assign to the specified policy or policy set.

For information about creating event destinations, see "Creating Event Destinations" on page 116.

Scheduling Change Guardian Policy Monitoring

Change Guardian policies monitor assets and asset groups continuously. A monitoring schedule allows you to define specific times at which a policy or policy set monitors assets and asset groups. For example, you can suspend monitoring during scheduled maintenance times, which eliminates events generated as a result of the maintenance. When you assign a policy or policy set to an asset or asset group, you can attach a monitoring schedule.

To create a monitoring schedule, in Policy Editor, click **Settings > Schedule Monitoring Time**. You can set the following schedule during which you want to suspend monitoring: Mondays from 3-5 p.m. and Tuesdays from 4-6 p.m.

9 Configuring Alerts

Everything that happens in your environment creates an event. Most events are everyday occurrences and do not require any action on your part. A set of similar or comparable events in a given period, however, might indicate a potential threat. Alerts notify you of what is most important for you to look at. Alerts can relate to threats to IT resources or performance thresholds, such as system memory full or IT resources not responding.

This chapter provides the following information:

Understanding Alerts

Change Guardian automatically associates the relevant events and identities with the alert to help you determine the root cause of a potential threat. For example, a change to the Windows file system or multiple failed logins within a specified time frame. Change Guardian uses alert rules to help you take appropriate actions to mitigate any problems. To receive instant notification about such potential threats, you can configure alert rules to create alerts.

Creating and Managing Alert Rules

The following provides an overview of creating and monitoring alerts:

1. Configure alert rules to create alerts when a matching event occurs.

   An alert contains almost the same information as the related event and also includes additional information specific to the alert, such as owner, state, and priority.

   As Change Guardian detects subsequent instances of the same alert, the product associates the trigger events to the existing alert to avoid duplication of alerts.

2. View and monitor alerts in the Alert Dashboard.

   As you monitor alerts, you can assign alerts to different users and roles, track the alert from origination to resolution, and annotate the alert rule by adding information to the knowledge base.

3. Configure alert retention policies to specify when to automatically close and delete the alerts from Change Guardian.

NOTE: When you create Office 365 and Exchange alerts based on event names, include the following policy definitions: `" includes events only when event name matches Exchange server/... "` and `"includes events only when generated by policies policies"`. This ensures that you receive separate events for Office 365 and Exchange. If you do not add the conditions in the policy definition, Change Guardian might raise two alerts for the same event, because user operations are common in Office 365 and Exchange.

This section provides the following information:

Creating Alert Rules

Change Guardian automatically associates the relevant events and identities with the alert to help you determine the root cause of potential threat. For example, you can create an alert rule to alert you when the same user violates the same policy a specified number of times on the same asset within a specified time frame.

Configure alert rules to create alerts when a matching event occurs. An alert contains almost the same information as the related event and also includes additional information specific to the alert, such as owner, state, and priority.

NOTE: If you are using Change Guardian in a mixed environment with Sentinel, the alert rules you create in Change Guardian are available as correlation rules in the Sentinel web console. For best results in a mixed environment, use Sentinel to manage these rules.

Policy Editor allows you to create, delete, edit, redeploy, and view alerts.

To create an alert rule:

1. Log in to Policy Editor.
2. To open Alert Rules window, click **Settings** > **Alert Rules**.
3. Select an alert view:
   - All alert rules
   - Alert rules grouped according to the associated event destination
4. Specify the following details:
   - The alert rule name of your choice.

     The alert rule name supports only alphanumeric characters and underscores. Special characters, such as `-!`~#$%^&()+=[],;.` and space, are not supported
   - The policy or policies that you want to be alerted on.

     If you do not specify one or more policies, the alert rule is applicable for all policies.
   - The option to create an alert with a filter for a specific pattern.

     For example to select every policy name with DNS in the title, the alert rule creates alerts for all policies that contain DNS in the policy name, such as `DNS Configuration`.

- Whether you want to be alerted on severity and severity range.
- The event name or event names that you want to be alerted on.

  You can optionally add additional granularity by adding event name as filter criteria when you create any alert rule.

  Following are a few categories for event names:

  - Active Directory
  - Configuration
  - File Systems
  - Group
  - Group Policy
  - Processes
  - User Accounts
  - Windows Specifics
- The event field or event fields that you want to be alerted on.
- Whether you want to be alerted on managed or unmanaged users.
- Whether you want to be alerted on event outcome.
- Whether you want to be alerted on IP address and its subnet.
- Alert criteria that further define the specific circumstances under which the alert rule creates an alert for the specified policies:
  - Generate an alert when an event occurs a specified number of times in a specified time frame.
  - Group alerts according to the specified event attributes.
- The event destinations to which you want to deploy the alert rule. By default, all available event destinations are selected.

NOTE: When you create an alert rule, Change Guardian uses the user account logged into Policy Editor. You can also associate a different user account with an additional event destination. Both of these user accounts must have `Manage all alerts` and `Manage Correlation Engines/Rules` permissions.

Redeploying Alert Rules

When you create an alert rule and save, Change Guardian automatically deploys the alert rule to the event destination you specify.

If you make changes to the alert rule, such as modifying its alert criteria or adding information to the knowledge base and save, the alert rule is also redeployed automatically, to the given event destination. You can also redeploy the alert rule manually. Redeploying an alert rule ensures the event destination has the most recent version of the alert rule. For more information about the alert knowledge base, see the "Viewing and Triaging Alerts in Alert Views" in the *Change Guardian User Guide*.

Configuring Event Destinations to Generate Alerts

To ensure alert rules generate alerts on the alternate event destinations when both the default and the alternate event destinations are FIPS-enabled, you must replicate the certificates from the alternate event destination to the default event destination.

To ensure all event destinations receive alerts:

1. Download the certificates from the following location, and place them in a temporary location, such as `/tmp`:

   `file: /etc/opt/novell/sentinel/config/sentinel.cer`
2. Change the credentials as follows:
   - `# chown novell:novell /path to certificate`
   - `# chmod 644 /path to certificate`
3. At the command prompt and go to `/opt/novell/sentinel/bin`.
4. Run the following command for all alternate event destinations:

   `./convert_to_fips.sh -i /path to certificate`
5. Restart the default event destination server.

Managing Alerts

As you monitor alerts, you can assign alerts to different users and roles, track the alert from origination to resolution, and annotate the alert rule by adding information to the knowledge base.

During the regular life cycle of an alert, a user does the following:

- Opens an alert view and either pick an alert already assigned to them or claim an unassigned alert.
- Views the alert details, such as the metadata, information about the alert rule that generated the alert, the triggering event and its identity information, and any knowledge base information associated with the alert.
- Determines the next step and add comments about the decision:
  - Close as harmless
  - Respond appropriately, and then close
  - Investigate further

Creating and Managing Alerts Routing Rules

You can configure alert routing rules to filter the alerts and choose to either store the alerts in the Change Guardian database or drop the filtered alerts.

- “Creating an Alert Routing Rule” on page 131
- “Ordering Alert Routing Rules” on page 131

Creating an Alert Routing Rule

Change Guardian evaluates the alert routing rules on a first-match basis in top-down order and applies the first matched alert routing rule to alerts that match the filter criteria. If no routing rule matches the alerts, Change Guardian applies the default rule against the alerts. The default routing rule stores all the alerts generated in Change Guardian.

To create an alert routing rule to filter the alerts:

1. From the web console, click **ADMINISTRATION > Routing > Alert Routing Rules > Create**.
2. Specify the following information:
   - Name for the alert routing rule
   - Filter criteria
   - Action to take for alerts that match criteria, either store or drop

     WARNING: If you select **Drop**, the filtered alerts are lost permanently.
3. Specify whether you want to enable the alert routing rule at this time.
4. Save the alert routing rule.

Ordering Alert Routing Rules

When there is more than one alert routing rule, you can reorder the alert routing rules by dragging them to a new position or by using the Reorder option. Alert routing rules evaluate alerts in the specified order until a match is made, so you should order the alert routing rules accordingly. Place more narrowly defined alert routing rules and more important alert routing rules at the beginning of the list.

Change Guardian processes the first routing rule that matches the alert based on the criteria. For example, if an alert passes the criteria for two routing rules, only the first rule is applied. The default routing rule always appears at the end.

Analyzing Alerts

To analyze alerts, see the "Analyzing Alerts" in the *Change Guardian User Guide*.

Configuring Alert Retention Policies

You can configure the alert retention policies to set the duration to automatically close and delete the alerts from Change Guardian.

To configure the alert retention policy:

1. From the web console, click **ADMINISTRATION > Storage > Alert**.

2 Specify the following:

- The number of days from the date of creation of alerts, after which the alert status is set to closed.
- The number of days from the date of closure of alerts, after which the alerts are deleted from Change Guardian.

3 Save the alert retention policy.

10 Configuring Data Federation

The Change Guardian Data Federation feature enables you to search for events, view alerts, and run reports not only on your local Change Guardian server, but also on other Change Guardian servers distributed across the globe.

Understanding Data Federation

When data federation is enabled, you can perform a search or run a report on one server and have it automatically run a search or report across the selected remote servers. The server on which the search is initiated is referred to as the authorized requestor, and the remote servers are referred to as the data sources or data source servers.

When you run a search or report on the authorized requestor, the following happens:

- Search queries are sent to each selected data source server
- Data source server authenticates the authorized requestor server
- Event or alert data is returned to the authorized requestor, where it is merged, sorted, and rolled up for presentation
- The search status for each data source server is displayed.

  Search results contain information about data source servers from which they originated.

Configuring an Authorized Requestor for Data Federation

You must first enable data federation on the authorized requestor server and then add data source servers to the authorized requestor server. You can add data source servers in the following ways:

- If you know the administrator username and password for the data source server, add the data source server directly from the authorized requestor.
- If you do not know the administrator username and password for a data source server, set up the authorized requestor with an opt-in password and share it with the source server. The administrator can use the opt-in password to add the data source servers to the authorized requestor.

To generate a report about the health of agents on federated servers, see "Example - Running Agent Health on Federated Servers Report" in the *Change Guardian Installation and Administration Guide*.

- "Enabling Data Federation" on page 134
- "Using the Administrator Credentials to Add a Data Source Server" on page 135
- "Using the Opt-in Password to Add a Data Source Server" on page 136

For troubleshooting tips, see "Issues on Federated Servers" on page 186.

Enabling Data Federation

To enable:

1. Create a role with **Proxy for Authorized Data Requestors** permission.

   For more information about configuring users and roles, see Configuring Roles and Users.
2. Click **Administration > Integration > Change Guardian**.
3. In the **Data Sources** section, select **Local server and other data sources**.
4. Do one of the following to add data source servers to your authorized requestor:
   - If you are the administrator of the authorized requestor and you know the administrator username and password for the data source server, continue with "Using the Administrator Credentials to Add a Data Source Server" on page 135.
   - If you are the administrator of the authorized requestor and you do not know the administrator user name and password on the data source server, continue with "Using the Opt-in Password to Add a Data Source Server" on page 136.

Configuring Data Federation in FIPS Mode

To allow distributed searches across multiple Change Guardian servers running in FIPS 140-2 mode, add or import certificates used for secure communication to the FIPS keystore.

Adding Certificates

To add:

1. Log in to the distributed search source computer.
2. Browse to the following certificate directory:

   ```
   cd /etc/opt/novell/sentinel/config/
   ```
3. Copy the source certificate (`sentinel.cer`) to a temporary location on the requestor computer.
4. Import the source certificate into the FIPS keystore of the requestor server.

   For more information about importing the certificate, see Importing certificates into the FIPS keystore database.
5. Log in to the distributed search requestor computer.
6. Browse to the following certificate directory:

   ```
   cd /etc/opt/novell/sentinel/config
   ```

7 Copy the requestor certificate (`sentinel.cer`) to a temporary location on the source computer.

8 Import the requestor system certificate into the FIPS keystore of the source server.

For more information about importing the certificate, see Importing certificates into the FIPS keystore database.

Importing Certificates

To import:

1 Copy the certificate file to any temporary location on the Change Guardian server or remote Collector Manager.

2 Change the ownership of the certificate to `novell` user:

```
chown novell:novell /<path to certificate>
```

3 Change the permission of the certificate:

```
chmod 644 /<path to certificate>
```

4 Switch to `novell` user.

5 Browse to the Sentinel bin directory.

The default location is `/opt/novell/sentinel/bin`.

6 Import the certificate into the FIPS keystore database, and then follow the on-screen instructions:

```
./convert_to_fips.sh -i <certificate file path>
```

7 Enter `yes` or `y` when prompted to restart the Change Guardian server or remote Collector Manager.

Using the Administrator Credentials to Add a Data Source Server

If you are the administrator of the authorized requestor and you know the administrator username and password for the data source server, you can add the data source server while you are logged in to your authorized requestor server.

IMPORTANT: Ensure that the data source server that you add is able to communicate with the authorized requestor through TCP/IP. Use a ping command to ensure that the IP address or hostname of the data source server is accessible through firewalls or NATs. If there is a communication failure, an error is displayed in the extended status page. For more information, see "Managing Search Results" in the *Change Guardian User Guide*.

To add a data source server:

1 Complete the steps in "Enabling Data Federation" on page 134.

2 Click the **Add a data source** link.

3 Specify the following information:

IP Address/DNS Name: IP address or the DNS name of the data source server.

Port: Port number of the data source server. The default port number is 8443. The data source server and authorized requestor do not need to be on the same port.

User Name: Name of a user with administrator privileges.

Password: Password associated with the username.

4 Click **Login**, then click **Accept** after verifying that the certificate information is correct.

5 Specify the following information to configure the data source server:

Name: Specify a descriptive name to identify the data source server.

Search Proxy Role: Select a search proxy role that you want to assign to the authorized requestor. This permission is required for the data source server to accept and process incoming search requests from the authorized requestor server.

When the authorized requestor makes search requests to the data source server, the security filter of the proxy role is used. Only those events that pass the security filter of the proxy role are returned to the authorized requestor server.

Only roles that have the `Proxy for Authorized Requestors` permission are listed. This permission is required for the data source server to accept and process incoming search requests from the authorized requestor server.

6 Click **OK**.

The server information is listed in the **Data Sources** list.

You can now search events, view event reports, and view alerts from the data source server. For more information, see Searching for Events, Running Reports in a Federated Setup, and Viewing Federated Alerts respectively in the *Change Guardian User Guide*.

Using the Opt-in Password to Add a Data Source Server

In organizations where administrative control of Change Guardian servers is decentralized, sharing administrator password might lead to violation of the security policy. If you do not have the administrator password for the data source server, Change Guardian allows you to set an opt-in password in the authorized requestor server, then provide the opt-in password to the data source server administrators to allow them to opt in to the authorized requestor server.

During the opt-in process, the authorized requestor and the data source server exchange the appropriate password, which allows the data source server to authenticate the search requests from the authorized requestor.

When a data source server opts in to the authorized requestor, a message is sent to the authorized requestor server requesting to be added to the list of data source servers. The authorized requestor requires an opt-in password to verify that the opt-in request has originated from a valid data source server. The request authorizes the authorized requestor to access data on the data source server.

- "Setting the Opt-In Password" on page 136
- "Allowing Access to an Authorized Requestor Server" on page 137

Setting the Opt-In Password

To set the password:

1 Complete the steps in "Enabling Data Federation" on page 134.

2 Click **Integration > Change Guardian**.

3 In the **Data Sources** section, select **Local server and other data sources**.

4 Click **Set Opt-in Password**.

5 Specify the opt-in password, then click **Set Password**.

6 Continue with "Allowing Access to an Authorized Requestor Server" on page 137 to add the data source server to the authorized requestor.

Allowing Access to an Authorized Requestor Server

To allow access:

1 Log in to the data source server as an administrator.

2 Click **Integration > Change Guardian**.

3 From the **Authorized Requestors** section, check the **Allow authorized requestors to access data from your server** box.

4 Click the **Add** link.

5 Specify the following information:

IP Address/DNS Name: The IP address or the DNS name of the authorized requestor.

Port: Port number of the authorized requestor. This is the port number on which the authorized requestor listens for incoming opt-in requests. The default port number is 8443.

Opt-in Password: The opt-in password that you configured on the authorized requestor. You must obtain this password from the administrator of the authorized requestor.

6 Click **OK**.

7 Verify the certificate information, then click **Accept**.

8 Specify the following information to configure the data source server:

Name : A descriptive name to identify the authorized requestor server.

Search Proxy Role : A proxy role to assign to the authorized requestor.

This permission is required for the data source server to accept and process incoming search requests from the authorized requestor server. When the authorized requestor makes search requests to the data source server, the security filter of the proxy role is used. Only those events that pass the security filter of the proxy role are returned to the authorized requestor server. Only roles that have the Proxy for Authorized Requestors permission are listed.

9 Click **OK**.

The authorized requestor is added to Authorized Requestors list and is enabled by default.

The data source server is also added in the Data Sources list in the authorized requestor server. Alternatively, you can click the **Refresh** link to see the data source server in the Data Sources list.

Viewing Search Activities

You can view the type and frequency of search activities run on the data source server by the authorized requestor server. Based on the search activity, you might want to assign a more or less restrictive proxy role or even disable access to the data source server.

You can also refine the search activity query. For example, you can change the date range to see the queries performed today, yesterday, or in the last hour. You can also see the queries that were made by particular users on the authorized requestor.

To view search:

1. Log in to the data source server as an administrator.
2. Click **Integration > Change Guardian**.
3. From the **Authorized Requestors** section, click the **Search Activities** link for the authorized requestor server for which you want to view the search activities.

   A list of the audit events that are retrieved from all the distributed search requests that a data source server has received from an authorized requestor are displayed.

Modifying the Data Source Server Details

You can modify the name of the data source server and the port number.

To modify the details:

1. From the web console, click **ADMINISTRATION > Integration > Change Guardian**
2. In the **Data Sources** section, click the **Edit** link for the data source server that you want to modify.
3. Make the necessary modifications.
4. (Optional) To change the proxy role on the data source server, complete the following steps:
   - **4a** Click **View/Change**.
   - **4b** Log in to the data source server.
   - **4c** Select a proxy role, then click **OK**.
5. Click **Save**.

11 Configuring Integrations with Other Software

This section provides information about integrating Change Guardian with the Security Information and Event Management (SIEM) solutions to forward event to enhance event analysis, use Identity Management Systems to get user details, and track Active Directory using Directory and Resource Administrator (DRA) as events.

This chapter provides the following information:

Integration with SIEM Solutions

Change Guardian and the SIEM solution products, such as Micro Focus Sentinel Enterprise, Splunk Enterprise Security, and ArcSight Enterprise Security Manager are security monitoring solutions. Change Guardian provides focused security for change details and privilege user monitoring, and can forward these specialized change monitoring details to other SIEM solutions for consolidated monitoring, correlations and analysis.

SIEM Product Name	Event Forwarding Mechanism
Sentinel	REST Dispatcher or Syslog Dispatcher
Splunk Enterprise Security	Syslog Dispatcher
ArcSight Enterprise Security Manager	Syslog Dispatcher

In Sentinel you can analyze the change events forwarded by Change Guardian, while the other SIEM solution products use Change Guardian to analyze the data.

To configure event forwarding to other SIEM solution products, see "Configuring Event Destinations" on page 115.

Integrating with Identity Management Solutions

Change Guardian provides an integration framework for AD or IDM to track identities of each user account and what events those identities have performed.

This integration provides functionality on several levels:

- The People Browser provides the ability to look up the following information about a user:
  - Contact information

- Accounts associated with that user
- Most recent authentication events
- Most recent access events
- Most recent permissions changes

- Reports and Correlation rules provide an integrated view of a user's true identity, even across multiple systems on which the user has separate accounts. For example, accounts like `COMPANY\testuser;` > `cn=testuser,ou=engineering,o=company`, and `TUser@company.com` can be mapped to the actual person who owns the accounts.

By displaying information about the people initiating a given action or people affected by an action, incident response times are improved and behavior-based analysis is enabled.

NOTE: Only administrators can integrate Change Guardian with identity management systems.

Integrating with Active Directory

Integrating AD with Change Guardian provides user information from AD and user mapping with associated incoming events. For more information, see "Configuring LDAP for AD Browsing" on page 56.

To view identity information and view the recent activities of a user, see "Viewing Identity Data" in the *Change Guardian User Guide*.

Integration with Identity Manager

If you have Identity Manager installed, you can use Change Guardian with Identity Manager to view user identity details of events. You must have the View People Browser permission to view identity details

To view user identity details:

1. Perform a search, and refine the search results as needed.
2. In the search results, select the events for which you want to view the identity details.
3. Click **Event operations > Show identity details**.
4. Select whether you want to view the identity of the Initiator user, the Target user, or both.

For more information about integrating identity information with Change Guardian events, see "Integrating Identity Information" in the *Sentinel Administration Guide*.

Searching and Viewing Identity Information

To search and view identity information, see Searching and Viewing User Identities in the *Change Guardian User Guide.*

Integration with Directory Resource Administrator

Change Guardian provides enhanced user monitoring in conjunction with DRA. It provides solution to control, manage and monitor the Active Directory environments.

Change Guardian server captures the unmanaged changes on DRA and displays the *actual* user name (end-user who logged in to DRA) in the event list. You can view events by clicking **ADMINISTRATION** from the web console. As an auditor you can monitor the AD audit logs or events from DRA, and view the corresponding actual user name on the Change Guardian event list.

Prerequisites:

Ensure that you have completed the following:

- Install DRA
- Install Change Guardian

Setting Up Change Guardian

To set up Change Guardian to receive DRA events, perform the following steps:

- Installing Change Guardian Agent for Windows
- Adding License Keys
- Configuring AD
- Creating an AD Policy
- Assigning Policies

Setting Up DRA

To set up DRA, perform the following steps:

- To “manage AD domains”, see the *Directory and Resource Administrator Administration Guide*
- Enabling Event Stamping
- Configuring Unified Change History

Enabling Event Stamping in DRA

Event stamping allows Change Guardian to receive the DRA user details.

When AD Domain Services auditing is enabled, DRA events are logged as having been generated by either the DRA Service account or the Domain Access account if one is configured. Event Stamping takes this feature one step further by generating an additional AD DS event that identifies the assistant administrator who performed the operation.

For these events to be generated you must configure AD DS auditing and enable Event Stamping on the DRA Administration Server. When Event Stamping is enabled, you will be able to view the changes that assistant administrators make in Change Guardian Event reports.

- To configure AD DS auditing, see the Microsoft reference *AD DS Auditing Step-by-Step Guide*.

- To configure Change Guardian integration, see "Configuring Unified Change History Servers" on page 143.
- To enable Event Stamping, open the Delegation and Configuration console as DRA Administrator, and do the following:
  1. Navigate to **Configuration Management** > **Update Administration Server Options** > **Event Stamping**.
  2. Select an object type, and click **Update**.
  3. Select an attribute to use for Event Stamping for that object type.

     DRA currently supports Event Stamping for users, groups, contacts, computers, and organizational units.

     DRA also requires that the attributes exist in the AD schema for each of your managed domains. You should be aware of this if you add managed domains after configuring Event Stamping. If you were to add a managed domain that does not contain a selected attribute, operations from that domain would not be audited with the Event Stamping data.

     DRA will be modifying these attributes so you should select attributes that are not used by DRA or any other application in your environment.

Configuring Unified Change History in DRA

The Unified Change History Server feature enables you to generate reports for changes made outside of DRA.

Delegating the Unified Change History Server Configuration Powers

To manage Unified Change History Server, assign the Unified Change History Server Administration role or the applicable powers below to assistant administrators:

- Delete Unified Change History Server Configuration
- Set Unified Change History Configuration Information
- View Unified Change History Configuration Information

To delegate Unified Change History Server powers:

1. Click **Powers** in the Delegation Management node, and use the search objects feature to find and select the UCH powers that you want.
2. Right-click one of the selected UCH powers and select **Delegate Roles and Powers**.
3. Search for the specific user, group, or assistant administrator group that you want to delegate powers to.
4. Use the **Object Selector** to find and add the objects that you want, and then click **Roles and Powers** in the **Wizard**.
5. Click **ActiveViews**, and use the **Object Selector** to find and add the ActiveViews that you want.
6. Click **Next** and then **Finish** to complete the delegation process.

Configuring Unified Change History Servers

To configure Unified Change History Servers:

1. Log in to the Delegation and Configuration Console.
2. Expand **Configuration Management** > **Integration Servers**.
3. Right-click **Unified Change History**, and select **New Unified Change History Server**.
4. Specify the UCH server name or IP address, port number, server type, and access account details in the Unified Change History configuration.
5. Test the server connection and click **Finish** to save the configuration.
6. Add additional servers as required.

Viewing DRA Events in Change Guardian

To view DRA events, see Events Dashboard. The Change Guardian event details display the application as DRA.

Viewing Change Guardian Reports in DRA

To view the Unified Change History reports on AD objects from Change Guardian, see “Utilizing Unified Change History” in the *Directory and Resource Administrator User Guide*.

Issues Coexisting with Change Guardian

Change Guardian events do not display the actual DRA user name in the following scenarios:

- When you define the computer account enabled or disabled, user account unlock policies.
- When you make any modifications in the Group scope or Group Type.
- When you make changes to the remote access permission in Dial In tab in DRA, two modification events are populated.The event shows User-Parameters in the delta.
- When you make changes in Azure AD and Exchange using DRA.
- When you make changes in the following tabs in DRA:
  - Account tab
  - Password tab
  - Member of tab
  - Terminal Services tab
  - Dial in tab
  - Call back tab

12 Backing Up and Restoring Data

The Change Guardian backup and restore utility is a script that performs a backup of Change Guardian data and also allows you restore the data at any time on the Change Guardian server.

NOTE: To ensure compatibility you must restore backed up data to the same version of Change Guardian, use the same computer (IP address and Hostname match) you used to create the backup and ensure that the install configuration or custom path (if any) and FIPS configuration also match the original.

You can use the backup and restore utility in the following scenarios:

- **System Failure**: If system fails, you must first reinstall Change Guardian and then use the `cgbackup_util.sh` script with the restore parameter to restore the most recent data that you backed up.
- **Data Loss**: If data is lost, use the `cgbackup_util.sh` script with the restore parameter to restore the most recent data that you backed up.

You must back up the following data to make a full restore:

- **Configuration data:** Data stored in the `config`, `data`, `3rdparty/postgresql`, and `3rdparty/jetty` directories, and the data in the Change Guardian database. This data includes configuration files, property files, keystore files, alert rules, all assets and groups in Agent Manager, `.yml` configuration files, database that stores AMS data, AD Domain information, additional event destination information, email settings, users, filters, and dynamic lists.

  NOTE: The configuration data is critical and you should always include the configuration data in the backup.

- **Event data:** Dynamic event data and raw event data stored in the `data/eventdata` and `/var/opt/novell/sentinel/data/rawdata` directories. Event data also includes event associations stored in the `/var/opt/novell/sentinel/data/eventdata/exported_associations` directory. The event associations data includes correlated event association data and the incident event association data.
- **Secondary storage data:** Closed event data files that have been moved to the secondary storage.
- **Change Guardian logs:** Log files generated by Change Guardian and stored in the `/var/opt/novell/sentinel/log` directory.
- **Change Guardian Policies:** Policies and policy assignments that are stored in Change Guardian server. You can also use the Export and Import options to back up policies. However, backup script allows you to include policies as well in the backed up data.

This chapter provides the following information:

Parameters for the Backup and Restore Utility Script

The following table lists the various command line parameters that you can use with the `cgbackup_util.sh` script:

Table 12-1 *Backup and Restore Script Parameters*

Parameters	Description
`-m backup`	Backs up the specified data.
`-m restore`	Restores the specified data. The restore mode of the script is interactive and allows you to specify the data to restore from the backup file. The restore parameter can be used in the following scenarios: ◆ **System Failure:** In the event of a system failure, you must first reinstall Change Guardian and then use the `cgbackup_util.sh` script with the restore parameter to restore the most recent data that backed up. ◆ **Data Loss:** In the event of data loss, use the `cgbackup_util.sh` script with the restore parameter to restore the most recent data that you had backed up. You must restart the Change Guardian server after you restore any data because the script might make several modifications to the database.
`-m info`	Displays information for the specified backup file.
`-m simple_event_backup`	Backs up events located in a specified directory.
`-m simple_event_restore`	Restores events into a specified directory.
`-c`	Backs up the configuration data, Policy Editor settings, policies that are created and assigned, alert configurations, event dashboard configurations.
`-e`	Backs up the event data. All event partitions are backed up except the current online partition. If the backup is being performed with the Change Guardian server shut down, the current online partition is also included in the backup. It backs up event data from all the directories and subdirectories.

Parameters	Description
-dN	Backs up the event data for the specified number of days. The -dN option backs up the primary storage event data stored for the last N days. Based on the current data retention policy settings, many days of events might be stored on the system. Backing up all of the event data might not always be necessary and might not be desirable. This option allows you to specify how many days to include when backing up the event data. For example, -d7 includes only the event data from the last week in the backup. -d0 just includes the data for the current day. -d1 includes the data from the current day and previous day. -d2 includes the data from the current day and two days ago. Online backups (that is, backups performed while the system is running) only back up the closed event partitions, which means partitions one day old or older. For online backups, a value of -d1 is the appropriate specification for the number of days.
-u	Specifies the user name to use when backing up the event associations data. If the user name is not specified, admin is the default value. This parameter is required only when backing up the event associations data.
-p	Specifies the user password when backing up the event associations data. This parameter is required only when backing up the event associations data.
-x	Specifies a file name that contains the user password when backing up the event associations data. This is an alternative to the -p parameter. This parameter is required only when backing up the event associations data.
-f	Specifies the location and name of the backup file.
-l	Includes the log files in the backup. By default, the log files are not backed up unless you specify this option.
-r	Includes the runtime data in the backup. To back up runtime data, you must shut down the Change Guardian server because data is dynamic. This parameter must be used in combination with the -s option (described below). If -s is not specified, this parameter is ignored.
-A	Backs up alerts and the events that triggered the alert.
-s	Shuts down the Change Guardian server before performing the backup. Shutting down the server is necessary to back up certain dynamic data, such as the runtime data and current primary storage partitions. By default, the server does not shut down before the backup. If you use this option, the server restarts automatically after the backup is complete.
-w	Backs up the raw event data.
-z	Specifies the location of the event data directory, such as where the event data is collected during a simple_event_backup and where the event data is placed during a simple_event_restore. Only available with the simple_event_backup and simple_event_restore options.

Running the Backup and Restore Utility Script

You must store the backed up data on a different server. If you use -i or -A options to back up the data, you must restore the configuration data along with alerts. Otherwise, if you restore only alerts data, all the alerts show as remote alerts because the alerts configuration data is not restored.

Prerequisites:

- Ensure that the time and timezone is same on both the source machine from where the backup is taken and the destination machine where the restoration of data will happen.
- Ensure that the IP address of both the source and destination machines are the same.

To backup and restore:

1 Open a console, and navigate to the `/opt/novell/sentinel/bin` directory as the `novell`user.

NOTE: By default, the `novell` user does not have a password.

2 Enter `cgbackup_util.sh`, along with the necessary parameters for the data that you want to back up or restore.

For more information about different parameters, see Table 12-1. The following table lists examples of how to specify the parameters:

Syntax	Action
`cgbackup_util.sh -m backup -c -e -i -l -r -w -s -u admin -x <mypassword.txt> -f /var/opt/novell/sentinel/data/<my_full_backup>.tar.gz`	Shuts down the Change Guardian server and performs a full system backup.
`cgbackup_util.sh -m backup -c -e -i -l -w -u admin -x <mypassword.txt> -f /var/opt/novell/sentinel/data/<my_weekly_backup>.tar.gz`	Performs an online backup without shutting down the server. This backup includes everything except online event data and dynamic runtime data.
`cgbackup_util.sh -m backup -b -c -e -d7 -u admin -x <mypassword.txt> -f /var/opt/novell/sentinel/data/<my_weekly_backup>.tar.gz`	Performs an online backup with event data from the last week. This backup includes configuration data and the event data for the last seven days. Event data older than seven days is not backed up because that data can be extracted selectively, if necessary, from an older backup.

Syntax	Action
`cgbackup_util.sh -m backup -c -f /var/opt/novell/sentinel/data/<my_full_backup>.tar.gz`	Performs a local backup of the configuration data. This is a minimal backup of the system without any event data.
`cgbackup_util.sh -m backup -e -f /var/opt/novell/sentinel/data/events_backup.tar.gz`	Performs a local backup of the event data. This is a minimal backup of the primary storage event data.
`cgbackup_util.sh -m backup -e -d5 -f /var/opt/novell/sentinel/data/events_5days_backup.tar.gz`	Performs a local backup of the event data from the last five days. This is a minimal backup of the primary storage event data from the last five days.
`cgbackup_util.sh -m info -f /var/opt/novell/sentinel/data/<my_full_backup>.tar.gz`	Displays the backup information for the specified backup file.
`cgbackup_util.sh -m simple_event_backup -e -z /opt/archives/archive_dir -f /opt/archives/archive_backup.tar.gz`	Performs a backup of event data on the computer where the secondary storage directory is located. If the `/opt/archives/archive_dir` is not located in the server, you might need to copy the `cgbackup_util.sh` script to the computer where the secondary storage is located and then run the `simple_event_backup` command from that computer. Alternatively, you can also use any third-party backup tool to back up the event directories on secondary storage.
`cgbackup_util.sh -m restore -f /var/opt/novell/sentinel/data/<my_full_backup>.tar.gz`	Restores the data from the specified filename. **NOTE:** To successfully restore the data from backup, ensure that the backup file ownership is set to user `novell` and group `novell`.
`cgbackup_util.sh -m simple_event_restore -z /opt/archives/archivedir -f /opt/archives/archive_backup.tar.gz`	Restores the secondary storage data.

3 (Conditional) If you have restored any data, restart the server because the script might make several modifications to the database.

4 Use the Data Restoration feature to restore the extracted partitions. For more information, see "Restoring Data" on page 150.

Restoring Data

The event data restoration feature enables you to restore old or deleted event data. You can also restore the data from other systems. You can select and restore the event partitions in the Change Guardian web console. You can also control when these restored event partitions expire.

Change Guardian server restarts the services and restores the database after any successful backup and restore.

NOTE: The event data restoration feature is a licensed feature. This feature is not available with the free or trial licenses.

Enabling Event Data for Restoration

To enable event data for restoration, you must copy the event data directories that you want to restore to one of the following locations:

- For primary storage, you can copy the event data directories to `/var/opt/novell/sentinel/data/eventdata/events/`.
- For secondary storage, you can copy the event data directories to `/var/opt/novell/sentinel/data/archive_remote/<sentinel_server_UUID>/eventdata_archive`.

  To determine the Change Guardian server UUID, click **ADMINISTRATION** in the web console and search. In the Search results, click **All** for any local event.

Viewing Event Data Available for Restoration

1. Log in to the Change Guardian web console as a user in the administrator role, and click **ADMINISTRATION**.
2. Click **Storage > Configuration**.

   The event data restoration section does not initially display any data.
3. Click **Find Data** to search and display all event data partitions available for restoration.

   The Data Restoration table chronologically lists all the event data that can be restored. The table displays the date of the event data, the name of event directory, and the location. The **Location** column indicates whether the event directory was found in the primary storage directory of Change Guardian or in the configured secondary storage directory.
4. Continue with "Restoring Event Data Where UID and GID are not the Same on the Source and the Destination Server" on page 151 to restore the event data.

Restoring Event Data

1. Select the check box in the **Restore** column next to the partition you want to restore.

The **Restore Data** button is enabled when the Data Restoration section is populated with the restorable data.

2 Click **Restore Data** to restore the selected partitions.

The selected events are moved to the **Restored Data** section. It might take approximately 30 seconds for the **Restored Data** section to reflect the restored event partitions.

3 (Optional) Click **Refresh** to search for more restorable data.

4 To configure the restored event data to expire according to data retention policy, continue with "Restoring Data" on page 150.

Restoring Event Data Where UID and GID are not the Same on the Source and the Destination Server

There may be a scenario where the secondary storage data of the novell user ID (UID) and the group ID (GID) are not the same on both the source (server that has the secondary storage data) and destination (server where the secondary storage data is being restored). In such a scenario, you need to unsquash and squash the squash file system.

To unsquash and squash the file system:

1 Copy the partition that you want to restore on the Change Guardian server where you want to restore the data in the following location:

```
/var/opt/novell/sentinel/data/archive_remote/<sentinel_server_UUID>/
eventdata_archive/<partition_ID>
```

2 Log in to the Change Guardian server where you want to restore the data, as the `root` user.

3 Change to the directory where you copied the partition that you want to restore:

```
cd /var/opt/novell/sentinel/data/archive_remote/<sentinel_server_UUID>/
eventdata_archive/<partition_ID>
```

4 Unsquash the `index.sqfs` file:

```
unsquashfs index.sqfs
```

The `index.sqfs` file is unsquashed and the squashfs-root folder is created.

5 Assign permission for novell user and novell group to the *<partition_ID>* folder:

```
chown -R novell:novell <partition_ID>
```

6 Remove the index:

```
rm -r index.sqfs
```

7 Switch to novell user:

```
su novell
```

8 Squash the `squashfs-root` folder:

```
mksquashfs squashfs-root/ index.sqfs
```

9 Restore the partitions. For more information, see "Restoring Event Data Where UID and GID are not the Same on the Source and the Destination Server".

Configuring Retention Period

The restored partitions do not expire by default according to any data retention policy checks. To enable the restored partitions to return to the normal state and also to allow them to expire according to the data retention policy, select **Set to Expire** for data that you want to expire according to the data retention policy, then click **Apply**.

The restored partitions that are set to expire are removed from the **Restored Data** table and returned to normal processing.

It might take about 30 seconds for the **Restored Data** table to reflect the changes.

13 Upgrading Change Guardian Server

This chapter provides information about the following sections:

Upgrade Checklist

You can upgrade to Change Guardian 6.1 from Change Guardian 5.2 or later.

For information about appliance upgrade paths, see "Appliance Upgrading Paths" on page 189.

You must upgrade both the Change Guardian server and Policy Editor. The Change Guardian Agent for Windows is backward compatible.

NOTE: Ensure that the latest patch of Microsoft Windows is running on the system on which the Change Guardian Agent for Windows is running.

Use the following checklist to upgrade your Change Guardian installation:

Table 13-1 *Upgrade Checklist*

	Tasks	See
❒	Ensure that the computers on which you install Change Guardian components meet the specified requirements. **NOTE:** Change Guardian is not supported if the operating system is in FIPS mode.	Supported platforms on the System Requirements page.
❒	Understand the order for the upgrade before upgrading the operating system on the Change Guardian server,	"Upgrading the Appliance Installation" on page 157
❒	Review the SUSE Release Notes for known issues related to the supported operating system.	SUSE Release Notes
❒	Review the Change Guardian Release Notes to see the new functionalities and understand the known issues.	Release Notes

	Tasks	See
❒	Upgrade the Change Guardian server.	◆ "Upgrading a Traditional Installation" on page 154 ◆ "Upgrading the Appliance Installation" on page 157
❒	Upgrade the Change Guardian components.	◆ "Upgrading Policy Editor" on page 159 ◆ "Upgrading Change Guardian Agent for Windows" on page 159 ◆ Upgrading Security Agent for UNIX.

Upgrading a Traditional Installation

Ensure that NTP synchronized your computer time with the network time. Perform the upgrade in the following order:

1. Upgrading Change Guardian
2. Upgrading the Operating System

After completing the upgrade, perform the post upgrade configurations.

Upgrading Change Guardian

If you are upgrading the Change Guardian server on a computer running RHEL, ensure that the 64-bit `expect` RPM is installed before you start the upgrade.

To upgrade the Change Guardian Server in a traditional installation:

1 Back up your information using the `cgbackup_util.sh` script.

For information about using the backup utility, see Chapter 12, "Backing Up and Restoring Data," on page 145.

2 Download the latest installer from the Downloads website.

You must be a registered user to download patches. If you have not registered, click **Register** to create a user account in the patch download site.

3 Copy the installer file to a directory that has 0755 permissions.

NOTE: Trying to upgrade from any directory within `/root` fails because certain upgrade commands run as non-root user. Such commands cannot run if the installer is in the `/root` directory.

---

4 Log in as `root` to the Change Guardian server you want to upgrade.

5 Extract install files from the tar file:

```
tar -zxvf <install_filename>
```

6 Change to the directory where the install file was extracted.

7 Start the upgrade:

```
./install-changeguardian.sh
```

8 (Conditional) If you want to upgrade from a custom path, specify the following command:

```
./install-changeguardian.sh --location=<custom_CG_directory_path>
```

NOTE: You can only upgrade from a custom path used for the original installation and the path must have 0755 permissions.

---

9 (Conditional) If NTP could not synchronize your computer time with the network time, make the required changes.

10 (Conditional) If your system does not meet the recommended disk space, make the required changes to the computer.

NOTE: The recommended disk space is for Change Guardian upgrade files. Allocate the recommended space in `/`, `/var/opt`, and `/opt`.

---

11 To proceed with a language of your choice, select the number next to the language.

12 If there are changes to the end user license agreement, read and accept the changes.

13 Specify `yes` to approve the upgrade.

The upgrade might take a few seconds to complete.

14 (Conditional) If you are upgrading from Change Guardian 5.2 to 6.1, perform the following steps:

14a Select the desired migration option. Specify option 1, 2, or 4.

Following options are displayed:

```
[1] --> Migrate both Alerts and Security Intelligence data
(recommended)
[2] --> Migrate only Alerts data
[3] --> Migrate only Security Intelligence data
[4] --> Only upgrade without migrating data
```

WARNING: Ensure that you select the appropriate option because you cannot repeat this procedure after the upgrade is successful.

The data that was stored in MongoDB is retained as a backup.

14b Specify `yes` to process with the migration.

14c If data migration is not successful, clean up data from PostgreSQL.

15 (Conditional) The data in MongoDB is redundant because Change Guardian 6.0 stores data only in PostgreSQL. To remove redundant data from MongoDB, clear the disk space:

```
./mongodb_cleanup.sh
```

16 Verify that you see the migrated content and that you are receiving new alerts by logging in to the Threat Response Dashboard.

17 Verify that you can connect to the Change Guardian web interface by accessing the following URL:

`https://IP_Address_Change_Guardian_server:8443`

Based on your security requirement, perform the post upgrade configurations.

Upgrading the Operating System

If the Change Guardian server is running a version of an operating system that is not certified, some features might not function as expected. Upgrade to a supported operating system for a seamless experience.

To upgrade the operating system:

1 Log in as `root` to the machine running Change Guardian.

2 Stop the Change Guardian services:

```
/opt/netiq/cg/scripts/cg_services.sh stop
```

3 (Conditional) If Change Guardian was in FIPS mode before the operating system upgrade, upgrade the NSS database:

```
certutil -K -d sql:/etc/opt/novell/sentinel/3rdparty/nss -X
```

Follow the on-screen instructions to upgrade the NSS database.

Give full permissions to `novell` user for the following files in the `/etc/opt/novell/sentinel/3rdparty/nss` directory:

```
cert9.db
key4.db
pkcs11.txt
```

4 Upgrade the operating system.

5 (Conditional) If you use Mozilla Network Security Services (NSS) 3.29 or later, install the two dependent RPM files:

- `libfreebl3-hmac`
- `libsoftokn3-hmac`

6 (Conditional) For RHEL 7.x, check whether there are any errors in the RPM database:

```
rpm -qa --dbpath <install_location>/rpm | grep novell
```

Example: `# rpm -qa --dbpath /custom/rpm | grep novell`

- If there are any errors, fix the errors:

  ```
  rpm --rebuilddb --dbpath <install_location>/rpm
  ```

  For example: # rpm --rebuilddb --dbpath /custom/rpm

- Recheck that there are no errors:

  ```
  rpm -qa --dbpath <install_location>/rpm | grep novell
  ```

NOTE: If the base operating system version changes, see "Upgrading Python" on page 165.

Upgrading the Appliance Installation

Ensure that NTP synchronized your computer time with the network time. To upgrade the Change Guardian appliance complete the following steps:

1. “Running the Appliance Configuration Utility” on page 157
2. “Applying Updates” on page 158

After completing the upgrade, perform the post upgrade configurations.

Running the Appliance Configuration Utility

The appliance configuration utility migrates alerts data from MongoDB to PostgreSQL

To run the utility:

1. Download the migration file `change_guardian_appliance_configuration_utility-<version>.tar.gz` from Downloads website.
2. Log in to the server as `root`.
3. Extract the files to your local server:

   ```
   tar -zxvf change_guardian_appliance_configuration_utility-<version>.tar.gz
   ```
4. Change to the directory where the file was extracted.
5. Run the migration utility:

   ```
   ./cg6100_appliance_configuration.sh
   ```
6. To select the desired migration option, enter 1, 2, or 4.

   Following options are displayed:

   ```
   [1] --> Migrate both Alerts and Security Intelligence data
   (recommended)
   [2] --> Migrate only Alerts data
   [3] --> Migrate only Security Intelligence data
   [4] --> Only upgrade without migrating data
   ```
7. (Conditional) If data migration is not successful, clean up data from PostgreSQL.
8. (Conditional) The data in MongoDB is redundant because Change Guardian 6.0 stores data only in PostgreSQL. To remove redundant data from MongoDB, clear the disk space:

   ```
   ./mongodb_cleanup.sh
   ```

WARNING: After you migrate data, you must upgrade Change Guardian before you start or restart Change Guardian.

Applying Updates

The following are the three methods in which you can apply updates:

- “Applying Updates By Using the Change Guardian Appliance Console” on page 158
- “Applying Updates Using Zypper” on page 158
- “Performing Offline Updates” on page 159

Applying Updates By Using the Change Guardian Appliance Console

To apply updates:

1. Register to the Change Guardian appliance update channel.
2. Get the Change Guardian and the operating system updates from the appliance update channel.

   NOTE: Check whether the product and operating system repositories are available and are enabled. If the two repositories are not available, reregister the appliance.
3. Log in to the Change Guardian Appliance Console as `vaadmin` or `root` user using the following URL: `https://IP_Address_Change_Guardian_server:9443`.
4. Click **Online Update**.
5. Select **Needed Patches** from the drop-down list and click **Update Now**.
6. Select **Needed Patches** from the drop-down list to ensure that there are no pending updates.
7. Log in to the Change Guardian server as `root`.
8. Install the operating system package updates:

   ```
   zypper up
   ```
9. Restart the Change Guardian services:

   ```
   rcsentinel start
   ```

   NOTE: If you receive an error message during the restart, see “Applying Updates on Change Guardian Appliance Fails With an Error Message” on page 185 for troubleshooting steps.
10. Restart the Change Guardian server:

    ```
    reboot
    ```

Applying Updates Using Zypper

Zypper is a command-line package manager that allows you to perform an interactive upgrade of the Change Guardian appliance.

To update the appliance:

1. Register to the Change Guardian appliance update channel.
2. Get the Change Guardian and the operating system updates from the appliance update channel.
3. Log in to the Change Guardian server as `root`.

4 (Conditional) Check whether the product and operating system repositories are available and are enabled:

```
zypper lr
```

NOTE: If the two repositories are not available, reregister the appliance.

5 Check for available updates:

```
zypper lp
```

6 Run the following command:

```
zypper patch
```

This checks the installed packages and resolves any file conflicts.

7 Rerun the command to install appliance updates:

```
zypper patch
```

8 Install the operating system updates:

```
zypper up
```

9 Restart the Change Guardian services:

```
rcsentinel start
```

NOTE: If you receive an error message during the restart, see "Applying Updates on Change Guardian Appliance Fails With an Error Message" on page 185 for troubleshooting step

10 Restart the Change Guardian appliance:

```
reboot
```

For more information about Zypper, see Zypper Cheat Sheet.

Performing Offline Updates

You can perform an offline update by using an ISO file. For more information, contact Technical Support.

Upgrading Components

Upgrading Policy Editor

To upgrade Policy Editor, see "Installing Policy Editor" on page 39.

Upgrading Change Guardian Agent for Windows

You can upgrade Change Guardian Agent for Windows manually or by using Agent Manager. You can also roll back an update.

NOTE: The procedure for upgrading the Change Guardian Agent for Windows manually is the same as the procedure for installing them, except that you do not need to repeat the process of adding assets to Agent Manager. Do not rename the default `.msi` installer package. For more information, see "Manual Installation" on page 41.

To upgrade using Agent Manager:

1. From assets list, select the agent you want to upgrade.

   You can select multiple assets if Agent Manager uses the same credentials to connect to them.
2. Provide login credentials to connect to the assets and click **Next**.

   The account must be a local administrator account or a domain account in the Local Administrators group of the asset.
3. Click **Manage Installation > Upgrade**.
4. Select the agent.
5. Click **Start Upgrade**.

Upgrading Security Agent for UNIX

You can upgrade Security Agent for UNIX by using Agent Manager.

To upgrade Security Agent for UNIX:

1. From the assets list, select the asset where you want to upgrade the agent.

   If you select multiple computers, you must use the same credentials in all computers.
2. Click **Manage Installation > Upgrade**.
3. Select the agent.
4. Click **Start Upgrade**.

Applying Updates to Change Guardian Components

You can use Agent Manager to upload the agent packages or the Policy Editor patch. These packages deploy bug fixes and improvements made to Change Guardian Agent for Windows, Security Agent for UNIX, or Policy Editor.

To apply the patch:

1. Download the patch from the Downloads website.
2. Log in to Agent Manager.
3. Click **All Assets > Manage Installation > Upload Package**.

   This uploads the package to the Change Guardian server.
4. To upgrade agents or download Policy Editor, log in to Agent Manager on the machine running the agent or Policy Editor.
5. (Conditional) To upgrade Policy Editor, click **All Assets > Manage Installation > Download Package**, and then begin upgrade.

For more information about upgrading, see Upgrade Policy Editor.

6 (Conditional) To upgrade agents, click **Manage Installation > Upgrade Agents**.

Post Upgrade Configuration

Verify that the following settings are complete:

- Adding Application License
- Configuring LDAP
- Re-indexing Event Data Partition
- Enabling TLS 1.1 (if the Change Guardian server is running on FIPS mode)
- Importing Certificates to FIPS Keystore Database (if the Change Guardian server is running on FIPS mode)
- Updating the Keystore Password
- Setting the Polling Interval in Agent Manager
- Upgrading Python (if the base operating system changed during a traditional upgrade)

Adding Application License

You must import license keys for each application you want to monitor.

To import and assign a license:

1 Login to **Policy Editor**.

2 Click **Module Manager**.

3 In **Licenses**, click the required application name.

4 Click **Import License Key**.

5 Browse and select the module license file.

6 Click **Import**.

Configuring LDAP

If you want to use secure LDAP connections on the previously configured AD server, you have to edit the existing settings.

Change Guardian does not support AD servers that are configured with either IP address or FQDN, and does not support AD user name in the following format: `cn=users,dc=domain,dc=lab`. After upgrading Change Guardian, edit the pre-configured AD servers by specifying the domain name as the **Active Directory Server**. Similarly, modify the user name with an administrator or a user that has access to the domain.

To edit:

1 Open the following URL and click **CONFIGURATION > LDAP CONNECTIONS**:

`https://<IP_Address_Change_Guardian_server>:<port_number>`

The default port is 8443. You can use a custom port if Change Guardian was installed with custom configurations.

2 Select the desired servers and edit the settings.

For more information about configuring LDAP, see "Configuring LDAP for AD Browsing" on page 56.

Re-indexing Event Data Partition

If indexing libraries are upgraded during Change Guardian upgrade, the underlying data formats also get updated and the data cannot be searched. Therefore, all event data partitions in the system should be indexed so that it can be searched. If the partitions are not re-indexed after an upgrade, search results and reports shows inconsistent data.

NOTE: Perform the re-indexing steps if you have upgraded from Change Guardian 5.2 or 6.0.

Re-indexing is required only for the existing event data partitions and not for the new incoming events.

You can re-index using one or both methods:

- "Re-indexing Using the Web Console" on page 162
- "Re-Indexing in the Offline Mode" on page 163

Re-indexing Using the Web Console

1 Open the following URL: `https://<IP_Address_Change_Guardian_server>:<port_number>`

The default port is 8443. You can use a custom port if Change Guardian was installed with custom configurations.

2 Open ADMINISTRATION tab and click **Storage > Event Partition Administration**.

NOTE: You can also the Event Partition Administration page from the Change Guardian web console. Click the Event Partition Administration link in the warning message at the top of the page.

---

3 Select either **Primary Storage** or **Secondary Storage**, depending on the type of event partition that you want to re-index.

4 Select the event partitions to re-index, by clicking **Date Range**.

5 Click **Start Re-indexing**.

The approximate time required to complete the operation is displayed depending on the storage type and the event data time range selected.

After the re-indexing operation completes, all log files related to the operation are available in the following log file: `<installation_path>/var/opt/novell/sentinel/log/reindex0.0.log`

Re-Indexing in the Offline Mode

You can also use a tool to re-index event data partition, in the offline mode. The tool uses minimal number of resources without affecting any of the existing processes. Re-indexing operation in the offline mode takes longer when compared to reindexing by using the online mode.

You can run the tool outside the Change Guardian server. However, you must copy the Java files and the Change Guardian libraries folder to the machine from which you want to run the re-indexing tool.

Before you proceed, ensure that you have the following information:

- The path to the folder where Java 1.8 is located. For a default installation, the path is:

  `<installation_path>/opt/novell/sentinel/jre/bin/java`

- The path to folder where Change Guardian libraries are present. For a default installation, the path is:

  `<installation_path>/opt/novell/sentinel/lib`

- The location of event data partitions. For a default installation, the path for primary partitions is:

  `<installation_path>/var/opt/novell/sentinel/data/eventdata/events/`

To re-index:

1. Log in to the Change Guardian server as `root`.
2. Run the following command:

   ```
   <installation_path>/opt/novell/sentinel/jdk/bin/java -cp /opt/novell/
   sentinel/lib/ccsapp-8.4.0.0-RELEASE.jar
   esecurity.ccs.comp.event.indexedlog.IndexedLogRebuild -forcerebuild
   <partition-directory>/<partition_ID>
   ```

   - `-forcerebuild` is an optional parameter. If this option is not specified, the tool creates a backup of index folder and temporary files, which occupies additional disk-space.
   - <*partition-directory*> refers to the path where all the partitions are present. You can add multiple IDs separated by space.
   - <*partition_ID*> refers to the ID of the partition in the following format: 0200428_6E1CCA35-4BD4-102D-91CD-000C2907C76D or 20200428_6E1CCA35-4BD4-102D-91CD-000C2907C76D_20200607

   If there are more than one partition, specify the IDs separated by space. You can also use the wild cards for ID such as, 202004*.

   For example, to re-index a single event data partition, specify the following command:

   ```
   <installation_path>/opt/
   novell/sentinel/jdk/bin/java -cp /opt/novell/sentinel/lib/ccsapp-
   8.4.0.0-RELEASE.jar
   esecurity.ccs.comp.event.indexedlog.IndexedLogRebuild -forcerebuild /
   var/opt/novell/sentinel/data/eventdata/events/20200428_6E1CCA35-4BD4-
   102D-91CD-000C2907C76D
   ```

For example, to re-index multiple event data partitions for April 2020, specify the following command:

```
<installation_path>/opt/
novell/sentinel/jdk/bin/java -cp /opt/novell/sentinel/lib/ccsapp-
8.4.0.0-RELEASE.jar
esecurity.ccs.comp.event.indexedlog.IndexedLogRebuild -forcerebuild /
var/opt/novell/sentinel/data/eventdata/events/202004*
```

Importing Certificates to FIPS Keystore Database

To import:

1. Change directory to `/opt/novell/sentinel/bin`, and run the following command:

   `./convert_to_fips.sh -i`
2. Specify the password for the FIPS keystore database.
3. Specify the path of Elasticsearch certificate file:

   `<installation_path>/opt/novell/sentinel/3rdparty/elasticsearch/config/http.pks`
4. Specify the certificate alias.

Updating the Keystore Password

The `chg_keystore_pass.sh` script allows you to change the keystore passwords. As a security best practice, change the keystore passwords immediately after upgrading Change Guardian.

NOTE: Do not perform this procedure if Change Guardian server is in FIPS mode.

To change the keystore passwords:

1. Log in to the Change Guardian server as `root`.
2. Switch user to `novell`.
3. Go to the `/opt/novell/sentinel/bin` directory.
4. Run the `chg_keystore_pass.sh` script and follow the on-screen prompts to change the keystore passwords.

NOTE: When you upgrade Change Guardian to 5.1 or later and change the keystore database password with specific special characters, the following exception are displayed: “Failed to initialize Communicator”.

Setting the Polling Interval in Agent Manager

The heartbeat of Change Guardian Agent for Windows (displayed as Polling Interval) and Security Agent for UNIX (displayed as Heartbeat) determines the frequency at which Change Guardian server checks health of agents. It is the interval at which any policy changes on the server is synced to agents. If you have less than 500 agents and configured up to 15 policies per agent, consider setting

Polling Interval to 15 minutes. If you have more than 500 agents or configured more than 15 policies per agent, consider setting the interval to 60 minutes. This ensures that there is no congestion of network traffic due to exchange of policy and agent health data at frequent intervals.

In Agent Manager, click **Manage Installation > Reconfigure**, and set the desired **Polling Interval**.

NOTE: This interval is referred to as Heartbeat in Policy Editor.

Upgrading Python

During a traditional Change Guardian upgrade, when the base operating system version changes, you must check the Python version after upgrading both Change Guardian and the operating system. Change Guardian requires a compatible version of Python library to function properly and to ensure that the Change Guardian agents are upgraded successfully.

For example, consider that the base operating system changes from RHEL 6.10 to RHEL 7.9. If running the `python –V` command at the RHEL 6.10 server prompt shows Python version is 2.6.x, then after upgrading the command shows 2.7.x on RHEL 7.9. Although the operating system is using Python 2.7.x, Python shared object file (`.so`) might be built on Python 2.6.x.

Prerequisite: Before planning to upgrade Python, check which Python version the `plpython2.so` file is built on:

```
ldd <installation_path>/opt/novell/sentinel/3rdparty/postgresql/lib/
postgresql/plpython2.so
```

If the output is as below, it indicates that this `.so` file is based on Python 2.6.x and you must upgrade Python after upgrading both Change Guardian and the operating system.

```
libpython2.6.so.1.0 => /usr/lib64/libpython2.6.so.1.0
```

If the output is as below, it indicates the `.so` file is not linked to a Python version, and you must upgrade Python after upgrading both Change Guardian and the operating system.

```
libpython2.6.so.1.0 => not found
```

To upgrade Python:

1. Stop the Sentinel services:

   ```
   rcsentinel stop
   ```

2. Change to the directory where `plpython2.so` file is present

   ```
   cd <installation_path>/opt/novell/sentinel/3rdparty/postgresql/lib/
   postgresql
   ```

3. Remove the existing `.so` file which is pointing to 2.6.x:

   ```
   rm plpython2.so
   ```

4. Extract the `Python 2.7.x.so` file, which is present in `<installation_path>/opt/novell/sentinel/3rdparty/postgresql/lib/postgresql`

   ```
   tar zxf plpython2.7.so.tar.gz
   ```

5. Set `novell` user permission on the file

   ```
   chown novell:novell plpython2.so
   ```

6 Verify that the file is pointing to the correct Python version:

```
ldd <installation_path>/opt/novell/sentinel/3rdparty/postgresql/lib/
postgresql/plpython2.so
```

7 Start the Sentinel services:

```
rcsentinel start
```

Verifying the Upgrade

To verify if the upgrade was successful, perform any of the following:

- Ensure that the server is running:

  ```
  netstat -an | grep LISTEN | grep <port_number>
  ```

  The possible *port_number* are 8443, 9443, 8094, or 8082. For example, running the command with ports 8443 and 9443 provides the following outputs respectively:

  ```
  tcp6       0      0 :::8443     :::*    LISTEN
  ```

  ```
  tcp        0      0 :::9443     :::*    LISTEN
  ```

- Verify that the latest packages are installed:

  ```
  rpm -qa | grep -i ncg
  ```

  For example, running the command after upgrading to Change Guardian 5.2 displays the following output:

  ```
  ncgUtils-5.2.0.0-12.x86_64
  ncgContent-5.2.0.0-12.x86_64
  ncgPolicyRepository-5.2.0.0-12.x86_64
  ```

- Access the Change Guardian dashboard:

  ```
  https://IP_Address_Change_Guardian_server:8443/cg-main-ui/
  ```

For troubleshooting tips, see “Issues Related to Upgrade” on page 183.

Migrating Agents to Agent Manager

If you plan to use Agent Manager to manage all agent deployments, migrate the agents from UNIX Agent Manager to Change Guardian Agent Manager. Ensure that you have UNIX Agent Manager to 7.5 or later.

To migrate the agents to Agent Manager:

1 In UNIX Agent Manager, navigate to **All Hosts** window and select the agent that you want to export.

2 Navigate to **Manage Hosts > Import/Export Host Lists**.

3 From the Export area select one of the following:

- Selected Hosts
- All Hosts

4 Click **Save**.

5 Log in to the Change Guardian server as an `administrator`.

6 From the User defined groups, click **Add Assets**.

Or

Select **All Assets > Manage Assets > Add > Host List**.

7 Browse to the location where you have saved the exported agent list.

8 Select the `<Host_list>.hosts` file to import the agent to Agent Manager.

14 Troubleshooting

This section contains some of the issues that might occur during installing or using Change Guardian, along with the actions to work around the issues.

Issues in Change Guardian Server

Configuring Change Guardian Appliance to Boot Normally

Issue: Rebooting the Change Guardian Appliance in Hyper-V causes it to go into emergency mode. This issue occurs because the operating system modifies the disk UUID during installation.

Workaround: Install Change Guardian 5.1 appliance in Hyper-V and then upgrade to Change Guardian 6.0 appliance to resolve this issue. Alternately, you can update the UUID.

To update the UUID:

1. (Conditional) If the Change Guardian Appliance rebooted into emergency mode, login as `root`.
2. Run the command `ls -l /dev/disk/by-id/` and note the actual UUID of the disk.
3. Run the command `cat` for each of the following files to identify the disk UUID entries therein:
   - **/etc/fstab**
   - **/etc/default/grub**
   - **/boot/grub2/grub.cfg**

4 Compare the actual disk UUID entries in `/dev/disk/by-id` for the SCSI partitions with those in each of the above files.

5 (Conditional) If the disk UUIDs in each of locations do not match the actual values, you must manually replace the incorrect values with actual values.

Example 14-1 *Modifying Disk UUIDs*

If the UUID entry in the `fstab, grub or grub.cfg` files is `14d53465420202020f21b50e22267274c823e145500a372b7`, but the UUID on disk is `360022480f21b50e22267145500a372b7`, there is a mismatch which you must manually correct.

Therefore, once the UUID entry is replaced with correct values in the `fstab, grub and grub.cfg` files respectively, the entries therein read as below:

- **/etc/fstab**

```
/dev/disk/by-id/scsi-360022480f21b50e22267145500a372b7-part1 / ext3
acl 1 1
```

- **/etc/default/grub**

```
 GRUB_CMDLINE_LINUX=" root=/dev/disk/by-id/scsi-
360022480f21b50e22267145500a372b7-part1 nomodeset quiet"
```

- **/boot/grub2/grub.cfg**

```
 linux /boot/vmlinuz-4.4.131-94.29-default root=UUID=ace9acb3-ac2b-
47f0-960d-5b7cd5b51b47  root=/dev/disk/by-id/scsi-
360022480f21b50e22267145500a372b7-part1 nomodeset quiet
```

6 (Conditional) To exit the emergency mode, reboot the virtual machine.

The SCSI disk partition UUIDs are detected correctly and the appliance boots normally.

Manual Configuration Required to use Registry Browser

Issue: To enable the Registry Browser in Change Guardian, you must set the `repositoryEnabled` flag (under `HKLM\Software\Wow6432Node\NetIQ\ChangeGuardianAgent\repositoryEnabled`) to `1`, and then restart the agent.

Workaround: Manually set the flag to `1`, when you use the Registry Browser, to avoid the error *Could not connect to Windows Data Source*. (`Bug 945225`)

Restarting the Change Guarding server with FIPS Mode Enabled Logs an Exception

Issue: If the Change Guardian server is FIPS-mode enabled and the server is restarted, the server logs an error message:

```
"An unexpected exception occurred while decrypting data failed. Root cause:
CKR_ENCRYPTED_DATA_INVALID (sun.security.pkcs11.wrapper.PKCS11Exception)
java.security.ProviderException: doFinal() failed"
```

(Bug 1129167)

Workaround: You can ignore the exception.

Cannot Connect to AD Hostname, Domain, or IP Address

Issue: The subject alternate name (SAN) in the AD certificate must exactly match the AD hostname, domain, or IP address to which you are trying to connect. If they do not match, the connection fails with an error message such as:

```
server0.0.log - CertificateException: No subject alternative DNS name
matching ip address/hostname/dns found.
```

Workaround: Regenerate the LDAP server certificate so that the SAN or the subject name of the certificate matches that of the LDAP server.

If you are unable to regenerate the LDAP server certificate, update `nq_ldap_expander` and `server.conf` files:

1. Open the `/etc/init.d/nq_ldap_expander` file.
2. Add the following text:

   `-Dcom.sun.jndi.ldap.object.disableEndpointIdentification=true`

   For example:

   ```
   RUNCMD="(cd ${PROCESS_BIN}; nohup  ${JAVA} -
   Dcom.sun.jndi.ldap.object.disableEndpointIdentification=true -jar ./
   ${DAEMON_FILE}.jar server ./${DAEMON_FILE}.yml > ${DAEMON_FILE}.out
   2>&1; rm ${PIDFILE}) &"
   ```

3. Open the `/etc/opt/novell/sentinel/config/server.conf` file.
4. Add the following text next to "`wrapper.java.additional.74=`"

   `-Dcom.sun.jndi.ldap.object.disableEndpointIdentification=true`

   For example:

   ```
   wrapper.java.additional.74=-
   Dcom.sun.jndi.ldap.object.disableEndpointIdentification=true
   ```

5. Go to `/opt/netiq/cg/scripts`.
6. Restart the services:

   `./cg_services.sh restart`

Creating or Modifying an LDAP Connection in FIPS Mode Fails With Certificate Error

Issue: When you create or modify an LDAP connection (**CONFIGURATION > LDAP Connections**) in FIPS mode, and specify a previously uploaded SSL certificate, the LDAP Configuration page displays an error: "File already exists." (`Defect 310249`)

Workaround: Delete the certificate manually and create the LDAP connection.

To delete:

1. List the certificates:

   ```
   certutil -L -d sql:/etc/opt/novell/sentinel/3rdparty/nss/
   ```

2. Delete the SSL certificate:

   ```
   certutil -d sql:/etc/opt/novell/sentinel/3rdparty/nss/ -D -n
   <certificate nickname>
   ```

Issues in Change Guardian Interfaces

After Logging in to the Web Console, Opening ADMINISTRATION tab Displays Blank Page on Internet Explorer

Issue: After logging in to the web console, clicking on **ADMINISTRATION** tab opens a blank page if Internet Security Level is set to High, and if the file download pop-up is blocked by the browser.

Workaround: Set the security level to Medium-high and then change to Custom level as follows:

To change the settings:

1. Navigate to **Tools > Internet Options > Security** and set the security level to **Medium-high**.
2. Make sure that the **Tools > Compatibility View** option is not selected.
3. Navigate to **Tools > Internet Options > Security tab > Custom Level**, then scroll down to the **Downloads** section and select **Enable** under the **Automatic prompting for file downloads** option.

Unable to View Alerts in the Alerts Dashboard and Alert Views

Issue: The Alert Dashboard and the charts in the alert view do not refresh or display new alerts. This issue could happen because of a corrupt alert index.

Workaround: Use the table in the alert view to see the newly generated alerts.

Cannot View Alerts with IPv6 Data in Alert Views

Issue: Change Guardian alert views do not display alerts that have IPv6 addresses in IP address fields. `(Defect 170317)`

Workaround: To view alerts with IPV6 addresses, perform the steps mentioned in NetIQ Knowledge base Article 7016555.

Cannot Expand Grouped Events if Event Name Contains “Filter”

Issue: In the Change Guardian dashboard, expanding grouped events fails with the following error message: `Data Loading Error`. The error occurs when the event name contains “filter”. `(Defect 172355)`

Workaround: Search events by name if it contains “filter”.

Issues Related to Events

Managed Events are Displayed as Unmanaged

Issue: When you create policies specifying managed users, events generated by such users might be wrongly displayed as unmanaged. This happens when a new user is added to AD and AD users are not synchronized with Change Guardian. Events generated by the newly added user is displayed as unmanaged events till the polling interval with AD has passed. `(Defect 313058)`

Workaround: Allow the polling interval with AD to pass so that events generated by the new users are displayed correctly as managed.

“Pathname Modified” Events in AWS IAM Does Not Display the Path Change

Issue: When AWS IAM generates “Pathname Modified” events for users and groups, Change Guardian displays the change in username and groupname, but does not display the change in path. (Defect 172063)

Workaround: None.

Change Guardian Receives an Invalid Configuration Event

Issue: Change Guardian receives Invalid Configuration event because of the incorrect Domain Name, Authentication Key, or Application ID used to access Azure AD.

Workaround: Use the correct Domain Name, Authentication Key, or Application ID to access Azure AD.

NOTE: Severity of Insufficient Access Permission and Invalid Configuration events vary based on the severity of the first policy assigned.

Change Guardian Is Unable to Receive Azure AD Events

Issue: Change Guardian is unable to receive events because of the following:

- Tenant is not reachable
- Invalid remote web application

Workaround:

- Enter a valid tenant name in the tenant configuration page
- Check if the tenant is accessible from the Change Guardian Agent computer

Source Name is Not Displayed When AD Events are Generated Using RDP

Issue: Change Guardian Event Dashboard displays the source name as “N/A” or is blank when AD events are generated while logged in to the source machine using RDP. (Defect 301102)

Workaround: None.

Change Guardian Receives an Insufficient Access Permission Event

Issue: Change Guardian receives Insufficient Access Permission event because *Read directory data* permissions are not assigned to the Azure AD web application for both Application and Delegated permission types.

Workaround: Assign *Read directory data* permission for both Application and Delegated Permission types to Azure AD web application to receive events.

Cannot Generate Some Azure AD events in Change Guardian

Change Guardian cannot generate events from Azure Active Directory for the following events and attributes:

- Create Group Settings
- Update Group Settings
- Delete Group Settings
- Set group managed by
- Group Attributes
  - Is Membership Rule Locked

Change Guardian also does not support the following:

- Consolidating multiple events into a single event for Update user and Update group events
- Monitoring managed groups

Asset Monitoring Failure Reports are not Captured for All Event Types

Issue: The Asset monitoring failure reports are not captured for all event types, such as audit failures, registry failures or system failures.

Workaround: To view the failure reports you must apply the policy where auditing mechanism of the specific event mentioned in the policy has failed.

Azure AD Monitoring Events are not Captured for All Event and Attribute Types

Issue: When you upgrade Change Guardian 5.0 to Change Guardian 5.1 or later, Change Guardian server is unable to fetch events for the newly added events and attributes. The events are not captured if you have selected “All Events” or “All Attributes” when you created the policy using Change Guardian 5.0.

Workaround: Perform the following procedure to overcome this issue:

1. . In the left pane of the Policy Editor window, select Azure Active Directory > Azure Active directory Policies.
2. Expand the Azure Active directory Policies and select the policy where you are monitoring “All Events” or “All Attributes”.
3. Click Edit and modify the description.
4. Click Submit.
5. Enable the policy revision.

Change Guardian is not Receiving Events from Dell EMC

Issue: Change Guardian does not receive Dell EMC events if the CEPA server is not running. Accessing the CEPA from a browser shows that the site cannot be reached.

Workaround:

Start the CEPA server:

1. Open `services.mcs` and run the EMC CAVA service.
2. In the Dell EMC web-console, check if the CEPA IP is provided in the following format: `http://1.1.1.1:12228/cee`

Change Guardian Server Does not Generate Events After Password Change

Issue: After you change the Change Guardian password, events are not generated because the REST dispatcher password is not updated in Policy Editor. (Bug 1121890)

Workaround: Enter the new password for the REST dispatcher by using Policy Editor, then restart the Change Guardian server:

```
rcsentinel restart
```

Events Dashboard Does not Display UNIX Events

Issue: UNIX events are not generated even though all the configuration settings are successful.

Workaround: Verify if the spool file entry is frequently updated in the following directory:

/usr/netiq/vsau/local/spool/<*unix_platform*>AuditObject__singleton/*.udetect_events

Change Guardian Server Does Generate Events When Write Permissions Are Modified

Issue: When you modify the write permission to rule group of a file on a UNIX system, Change Guardian fails to generate events for file monitoring.

Workaround: None.

Failed Events From Some Assets are Categorized with Severity 2

Issue: When authorized users perform actions that fail, such events are categorized with severity 2. This happens for events generated at AWS IAM, Dell EMC, Office 365, and Microsoft Exchange. (Defect 165010)

Workaround: Use appropriate filters to receive alerts from such assets.

Issues in Agent Manager

- "Unable to Browse File Locations and AD Using Policy Editor File Browser" on page 177
- "Manually Uninstalling an Agent Does Not Remove the Version Details of an Agent" on page 177

Unable to Browse File Locations and AD Using Policy Editor File Browser

Issue: Following are the conditions:

- Unable to browse to file locations within a policy.
- Unable browse active directory from within a policy. (Bug 995355)

Workaround: To enable LDAP browsing in policy editor, perform the steps mentioned in NetIQ Knowledgebase Article 7017291.

Manually Uninstalling an Agent Does Not Remove the Version Details of an Agent

Issue: If you manually uninstall an agent, Agent Manager continues to display version details for the agent. (Defect 170283)

Workaround: In Agent Manager, select the agent in the 'All Assets' group and delete it.

Issues on Change Guardian Agent for Windows

Installing Change Guardian Agent for Windows Fails with SMB Protocol Mismatch

Issue: Change Guardian Agent for Windows installation fails displaying the following error message in failed task logs:

```
Protocol negotiation failed...
```

The error might occur due to the following reasons:

- SMB1 protocol is disabled on Change Guardian Agent for Windows.
- Change Guardian server is installed on a Linux version that does not support SMB Version 2 (such as SLES 11.x or RHEL 6.x that has kernel version 2.6.x or lower), but only supports SMB Version 1. (`Bug 1155405`)

Workaround: Upgrade the operating system, on which Change Guardian server is running, to a version that supports SMB Version 2.

Alternatively, you can manually install the latest version of Change Guardian Agent for Windows. For more information, see Installing Change Guardian Agent for Windows.

Change Guardian Agent for Windows Installation Using Agent Manager Fails

Issue: Change Guardian Agent for Windows installation using Agent Manager fails and displays the following error in the failed task logs:

```
protocol negotiation failed...
```

This error might occur due to following reasons:

- SMB1 protocol is disabled on Change Guardian Agent for Windows.
- Change Guardian server is installed on SLES 11 SP4 or RHEL 6.7 platforms which supports SMBv1 only.

Workaround: Install Change Guardian Agent for Windows manually. For more information see "Manual Installation" on page 41.

Collecting Agent Logs

You can use Agent Manger to collect logs from Change Guardian Agent for Windows. For more information, see "Collecting Agent Logs" on page 183.

Change the Agent Package Version

Issue: You have a requirement to roll back to an older version of the agent package, but Agent Manager does not allow you to change the agent package version. (Bug 1155538)

Workaround: You can enable a new package, and disable the previous package by using the following file: `/opt/netiq/ams/ams/repository/packageActiveStatus.new.example`.

Troubleshooting Agents in Warning State

The following table gives you information about how to resolve the agent issues reported in the agent health dashboard:

Issue as shown the Dashboard	Error Code	Workaround
Driver initialization failure	Change Guardian Agent for Windows: 00002053 Group Policy: 00001546 AD: 00000778	Check if the driver is loaded in the registry
Driver Configuration failure	Change Guardian Agent for Windows: 00002052 Group Policy: 00001546 AD: 00000778	Check if the driver registry key is set for the specific policy
General Error setting up monitoring policy	Change Guardian Agent for Windows: 00002053	Check if the policy is loaded in the registry
Unable to write to baseline	Change Guardian Agent for Windows: 00002053	Check if the system has read and write permissions in the following folder: `C:\Program Files (x86)\NetIQ\ChangeGuardianAgent\data\CGW_Repository`
Missing auditing for 'User Account Management', unable to monitor policy	AD: 00000774	Check if AD auditing is configured
Missing auditing for 'Computer Account Management', unable to monitor policy	AD: 00000774	Check if AD auditing is configured

Issue as shown the Dashboard	Error Code	Workaround
Missing auditing for 'Distribution Group Management', unable to monitor policy	AD: 00000774	Check if AD auditing is configured
Missing auditing for 'Security Group Management', unable to monitor policy	AD: 00000774	Check if AD auditing is configured
Missing auditing for 'Authorization Policy Change', unable to monitor policy	AD: 00000774	Check if AD auditing is configured
Missing auditing for 'Authentication Policy Change', unable to monitor policy	AD: 00000774	Check if AD auditing is configured
Missing auditing for 'Directory Service Changes', unable to monitor policy	AD: 00000774 Group Policy: 00001542	Check if AD auditing is configured
Missing auditing for 'Directory Service Access', unable to monitor policy	AD: 00000774 Group Policy: 00001542	Check if AD auditing is configured for both AD and Group Policy
Missing failure auditing for 'User Login Monitoring', unable to monitor logon failure policy	AD: 00000774	Check if AD auditing is configured
Missing success auditing for 'User Login Monitoring', unable to monitor logon success policy	AD: 00000774	Check if AD auditing is configured
Missing failure auditing for 'User Logoff Monitoring', unable to monitor logoff failure policy	AD: 00000774	Check if AD auditing is configured
Missing success auditing for 'User Logoff Monitoring', unable to monitor logoff success policy	AD: 00000774	Check if AD auditing is configured
Failed to read Active Directory object <directory_path>, unable to monitor policy	AD: 00000779 Group Policy: 00001547	Check if AD auditing is configured
Missing auditing flags <\flag_value> in ACE SACL for <directory_path>, unable to monitor policy	AD: 00000776 Group Policy:00001544	Check if AD auditing is configured
Required provider `IQCGW` missing	Change Guardian Agent for Windows: ELQ0006	Check if the registry key of the provider includes the value `IQCGW`
Required provider `IQCG` missing	Change Guardian Agent for Windows: ELQ0006	Check if the system is a domain controller and check if the registry key of the provider includes the value `IQCG`

Issue as shown the Dashboard	Error Code	Workaround
Required provider `CGADProvider` is missing	AD: ELQ0006	Check if the system is a domain controller and check if the registry key of the provider includes the value `CGADProvider`
Required provider `CGSmartProvider` is missing	Change Guardian Event Collector Addon for Windows: ELQ0006	Check if Change Guardian Event Collector Addon for Windows Agent is enabled in Agent Manager before installing Change Guardian Agent for Windows
Required provider `CGAzureADProvider` is missing	Azure AD: ELQ0006	Check if Azure AD monitoring is enabled in Agent Manager before installing Change Guardian Agent for Windows
Required provider `UDetect` is missing	NetApp: ELQ0006	Check if the system is a domain controller and check if the registry key of the provider includes the value `UDetect`
Required provider `IQCDetect` is missing	UNIX: ELQ0006	Check if the system is a domain controller and check if the registry key of the provider includes the value `IQCDetect`

Issues on Security Agent for UNIX

Unable to Connect to Port

Issue: Security Agent for UNIX is not able to connect to port 8094.

Workaround: Check whether the port 8094 is running:

```
netstat -an | grep 8094
```

Unable to Run the Services

Issue: Security Agent for UNIX services are not running.

Workaround:

1. Check if the `detectd` and `auditd` services are running:

   ```
   ps -ef | grep "detect"
   ps -ef | grep "auditd"
   ```

2. (Conditional) If the services are not running, restart the following services:

   2a Restart `vigilentagent` service:

   ```
   ./vigilentagent.rc restart
   ```

   2b Go to the `- /usr/netiq/pssetup` directory and run the following command:

   ```
   ./detectd.rc restart
   ```

   2c Restart `auditd` service:

   ```
   service auditd restart
   ```

Policies Are Not Applied to the Agent

Issue: The policies are not applied to the Security Agent after it is assigned using Policy Editor.

Workaround: To verify whether the policies are applied to the agent after they are assigned in Policy Editor, check if the `<rule>.xml` file is created in the computer in the following directory:

```
/usr/netiq/vsau/etc/detectd.d/groups/<platformauditobject>/rules/
```

Events are not Generated After Configuring Security Agent for UNIX

Issue: Security Agent for UNIX fails to send events to the Change Guardian Server if the locale setting is incorrect. (`Bug 1102111`)

Workaround: Ensure that the following is set:

1. The path is set at the operating system: `SET_PERL_LIBPATH=1; ./etc/vsaunix.cfg`
2. The locale variables are added to the `/etc/profile` file:
   - `export LC_CTYPE=en_US.UTF-8`
   - `export LC_ALL=en_US.UTF-8`

Cannot Browse User While Creating Policies

Issue: User Browse option does not work while creating policies using Policy Editor.

Workaround: To enable browsing for UNIX data sources while creating a policy, the computer where you install the Policy Editor must have a Change Guardian Agent for Windows. If you do not install an agent on the machine running Policy Editor, you must manually enter the data source paths while creating a policy.

To enter the data source paths:

1. (Conditional) If your operating system is 32-bit, in the registry `\HKLM\Software\NetIQ\ChangeGuardianAgent\repositoryEnabled` set the `repositoryEnabled` flag to 1.
2. (Conditional) If your operating system is 64-bit, in the registry `\HKLM\SOFTWARE\Wow6432Node\NetIQ\ChangeGuardianAgent\repositoryEnabled` set the `repositoryEnabled` flag to 1.
3. Restart the Change Guardian Agent for Windows.

Collecting Agent Logs

You can use Agent Manger to collect logs from Security Agent for UNIX. You must install the agent using Agent Manager to be able to collect the agent logs.

You cannot set debug levels to agent log collection. The logs are collected based on whatever debug level is set in the agent.

To collect agent logs:

1. In Agent Manager, select the agent under **All Assets**.
2. Click **Manage Installation > Collect Agent Logs > Start Log Collection**.
3. In the **Completed Tasks** tab, click **Download Agent Logs**.

NOTE: You can download a log only once. For an agent, you can download the log that you collected last. The previously collected logs are overwritten every time you click **Collect Agent Logs** for that agent.

Issues Related to Upgrade

Deploying Alert Rules Fail

Issue: Deploying an alert rule fails when you create, modify, or delete an alert rule after an upgrade. Although Deployment Status shows Success, the Alert Rule Deployment Status window displays an error that deployment has failed.

Workaround:

To resolve the issue:

1. Comment the IP address 127.0.0.2 in the `/etc/hosts` file.
2. Restart the Change Guardian server:

   ```
   /opt/netiq/cg/scripts/cg_services.sh restart
   ```

Change Guardian Configuration Fails after Appliance Installation Completes

Issue: After appliance installation, configuration of Change Guardian might fail to complete with the following error message:

```
Change Guardian configuration has failed. Check /var/opt/novell/sentinel/
log/config_cg_onboot.log.
```

In such a case Agent Manager and `javos` services might fail to start.

Workaround: Reconfigure Change Guardian.

To reconfigure Change Guardian:

1. Verify if Change Guardian service (8443) is running using the command:

   ```
   netstat -an | grep "8443" | grep "LISTEN"
   ```

2. (Conditional) If Change Guardian service (8443) is not running, start Change Guardian service (8443):

   ```
   /opt/netiq/cg/scripts/cg_services.sh start
   ```

3. Reconfigure Change Guardian:

   ```
   /opt/novell/sentinel/setup/configure.sh
   ```

Cleaning Up Data From PostgreSQL When Migration Fails

Issue: Database migration to PostgreSQL fails

Workaround: Delete the data that was partially moved to the PostgreSQL database.

To clear PostgreSQL:

1. Ensure that the PostgreSQL database is running.
2. Log in to the Change Guardian server as `root` and switch to `novell` user.
3. Go to the location where you have extracted the Change Guardian installer or the migration utility.
4. Delete the migrated data:

   ```
   ./db_migration_failure_cleanup.sh
   ```

5. (Conditional) If you are performing a traditional upgrading, upgrade Change Guardian.
6. (Conditional) If you are upgrading an appliance, run the appliance configuration utility.

Exception After Changing Keystore Password with Specific Special Characters

Issue: When you upgrade Change Guardian to 5.1 or later and change the keystore database password with specific special characters, the following exception are displayed: `Failed to initialize Communicator (Defect 172329)`

Workaround: None.

Error Message “timedatectl command is not found” is Displayed During an Upgrade

Issue: While upgrading from Change Guardian 5.2 to 6.1 on RHEL 6.10, you might receive an error message: “timedatectl command is not found”.

Workaround: You can ignore this error message. RHEL 6.1 does not support the `timedatectl` command.

Applying Updates on Change Guardian Appliance Fails With an Error Message

Issue: When you restart the Change Guardian services during an appliance update, the following error messages might be displayed:

```
Exception in thread "main" java.lang.NoSuchMethodError:
org.apache.http.impl.client.HttpClientBuilder.setSSLHostnameVerifier(Ljava
x/net/ssl/HostnameVerifier;)Lorg/apache/http/impl/client/
HttpClientBuilder;
  at
esecurity.ccs.comp.event.visualization.ESRestUtil.<init>(ESRestUtil.java:1
12)
  at
esecurity.ccs.comp.event.visualization.ESRestUtil.getInstance(ESRestUtil.j
ava:121)
  at
esecurity.ccs.comp.event.visualization.ESRestUtil.main(ESRestUtil.java:136
)
```

Workaround: Perform the following steps:

1. Switch to the directory `/<installation-path>/opt/novell/sentinel/bin/`
2. Open the `elasticsearch.sh` file.
3. Change `LIB_LOCATION="${ESEC_HOME}/lib/*:. "` to `LIB_LOCATION="${ESEC_HOME}/lib/ccsapp*.jar "`.
4. Open the following files and perform step 3:
   - `create_kibana_index_pattern.sh`
   - `elasticsearch_index_template.sh`
   - `elasticsearchRestClient.sh`

- `load_kibana_data.sh`
- `reSyncAlert.sh`

Issues on Federated Servers

If you have enabled data federation in your environment, review the following issues:

Permission Denied

After doing a distributed search, check the extended status page to view the search status. If the search is not successful, check the following possible causes:

- The data source server administrator might have disabled data federation on the data source server. To enable data federation on the data source server, see Step 3 in "Allowing Access to an Authorized Requestor Server" on page 137.
- The data source server administrator might have disabled the authorized requestor server for data federation. Ensure that the authorized requestor server is enabled in the data source server. For more information, see "Allowing Access to an Authorized Requestor Server" on page 137.
- The role that you used to connect might not have the `Search Data Targets` permission.

Connection Down

- Network issues in your organization.
- Change Guardian servers or Change Guardian services might be down.
- Connection might have time-out.
- The IP address or the port number of the data source server has changed, but the authorized requestor configuration might not be updated.

Unable to View Raw Data

The Proxy group that is assigned to the authorized requestor might not have the `view all events` permission to view the raw data.

Problems While Adding Data Source

The authorized requestor server and the data source server might not be communicating with each other. Ensure that the firewall and NAT are set up properly to allow communication in both directions. Ping both ways to test.

Some Events Are Only Visible from the Local System

You might not be able to view the events from the data source servers for one of the following reasons:

- The trial license might have expired. You must purchase an enterprise license to reactivate this feature to view events from the data source servers.
- The user who has logged in to the authorized requestor has one set of permissions on the local data, such as view all data, view system events, security filter settings, and the search proxy group has another set of permissions, possibly more restrictive. Therefore, certain types of data, such as raw data, system events, and PCI events, might be returned only from the local system and not the data source server.

Cannot Run Reports on the Data Source Servers

The trial license might have expired. You must purchase an enterprise license to reactivate this feature to run reports from the data source servers.

Different Users Get Different Results

Different users might have different security filters or other permissions and therefore get different results from a distributed search.

Cannot Set the Administrator Role as the Search Proxy Role

This is by design, for security reasons. Because the data viewing rights for the administrator are unrestricted, it is not desirable to allow the administrator role to be the search proxy role.

Error Logs

You can also determine the cause of a search failure by examining the log file on the authorized requestor server. The default location for the log file is `/var/opt/novell/Change Guardian/log`. For example, you might see one of the following messages:

```
Invalid console host name 10.0.0.1

Error sending target request to console host 10.0.0.1

Error getting certificate for console host 10.0.0.1

Authentication credentials in request to opt-in to console 10.0.0.2 were rejected

Request to opt-in to console 10.0.0.2 was not authorized
```

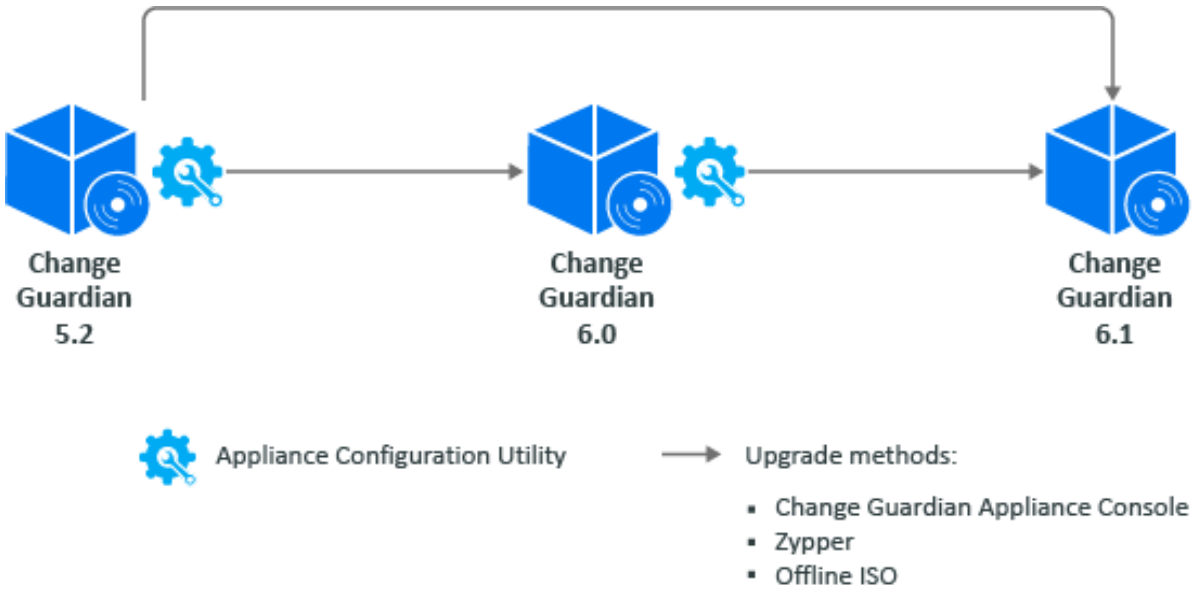
```
Error sending target request to console host 10.0.0.1
```

A Appendices

This chapter provides information about the following sections:

Appliance Upgrading Paths

The following diagram illustrates the upgrade paths available for Change Guardian appliance:



Review the following to understand the upgrade paths:

- Change Guardian 6.1 supports appliance upgrade in ISO and OVF formats.

  You must have applied the channel updates to upgrade from Change Guardian 5.2 or later. The channel now lists the Change Guardian 6.1 updates.
- Upgrade to Change Guardian 5.2 from Change Guardian 5.1 or 5.1.1.
- You can upgrade to a higher version using either of the following methods:
  - Change Guardian Appliance Console
  - Zypper
  - Offline ISO

Uninstalling Change Guardian

Checklist to Uninstall

Use the following checklist to uninstall Change Guardian:

- Uninstall the following components before you uninstall Change Guardian:
  - Change Guardian Agent for Windows and Security Agent for UNIX using Agent Manager
  - Policy Editor
- Complete the tasks after uninstalling to verify that Change Guardian is uninstalled
- Uninstall assets before uninstalling Change Guardian and the components

Task	See
Uninstall the components	"Uninstalling Change Guardian Event Collector Addon for Windows Agent" on page 190
	"Uninstalling Change Guardian Agent for Windows" on page 191
	"Uninstalling Security Agent for UNIX" on page 191
	"Uninstalling Policy Editor" on page 192
Uninstall Change Guardian	"Uninstalling Change Guardian" on page 192
Perform the post-uninstall steps	"Tasks After Uninstalling" on page 192

Uninstalling Change Guardian Event Collector Addon for Windows Agent

To uninstall, open the Change Guardian Event Collector Addon for Windows Agent application.

Uninstalling Change Guardian Agent for Windows

Ensure that you have removed assets using Agent Manager.

You can uninstall the Change Guardian Agent for Windows in the following ways:

- “Uninstalling Remotely” on page 191
- “Uninstalling Manually” on page 191

Uninstalling Remotely

1. Log in as `administrator` to the Change Guardian web console.
2. Click **ADMINISTRATION > Integration > Agent Manager**.
3. Select the assets from which you want to uninstall the agent.
4. Select **Manage Installation > Uninstall Agents**.
5. Click **Start Uninstall**.

Uninstalling Manually

1. Go to **Control Panel > Programs and Features** and search for Change Guardian Agent for Windows.
2. Select the Change Guardian Agent for Windows application, then click **Uninstall**.

Uninstalling Security Agent for UNIX

Prerequisites:

- Reconfigure the agents using Agent Manger to disable the agent
- Remove assets from Agent Manager

Uninstalling Remotely

To uninstall:

1. Select the assets from which you want to uninstall the agent.
2. Select **Manage Installation > Uninstall Agents**.
3. Click **Start Uninstall**.

To verify that you have successful uninstalled, navigate to respective asset. Ensure that the asset is not listed in the assets list.

Uninstalling Manually

To uninstall the Agent locally, go to the installation directory, then run the following command as a root user:

```
./uninstall.sh
```

Verifying Uninstall

Verify that you have successfully uninstalled, by performing the following:

- Check if all the components are uninstalled

  Run `vi` command on `/etc/vsaunix.cfg` configuration file to check if the agent for parameter is n
- Check that none of the services are running by navigating to the `/usr/sbin` folder
- Check if the folder structure is deleted
- Check if assets that are uninstalled are not listed in the assets list

Uninstalling Policy Editor

To uninstall:

1. Click **Asset Groups > *Agent_Name* > Remove**.
2. Go to **Control Panel > Programs and Features** and search for Change Guardian Policy Editor.
3. Select the Change Guardian Policy Editor application, then click **Uninstall**.

Uninstalling Change Guardian

1. Log in to the Change Guardian server as root.
2. Access the following directory: `/opt/novell/sentinel/setup/`
3. Run the following command: `./uninstall–changeguardian`
4. When prompted to reconfirm that you want to proceed with the uninstall, press **y**.

Tasks After Uninstalling

After you uninstall Change Guardian server:

- Reboot the computer to clear the cache files
- To ensure that the services are not running, run the following commands:

  ```
  ps -ef | grep novell
  ps -ef | grep Sentinel
  ps -ef | grep java
  ps -ef | grep javos
  ```

  NOTE: If the services are still running, reinstalling the Change Guardian server will fail with errors or exceptions. Rebooting the machine terminates any services that are running from the previous installation.
- Ensure that there are no files or system settings remaining from the previous installation

Expanding Disk Space in Hyper-V Virtual Machine

Prerequisite: Ensure that the current disk has the required space to expand by running the `fdisk -l` command at the Change Guardian appliance prompt.

NOTE: You can expand the partition if there are less than four primary partitions. However, if there are four primary partitions, add a new virtual disk to the virtual machine and expand the logical volume.

To expand the disk space:

1. Expand the disk space:
   - **1a** Log in to the Hyper-V server and power off the virtual machine where you installed Change Guardian appliance.
   - **1b** Right-click the virtual machine and click **Settings**.
   - **1c** Under **IDE Controller**, click **Hard Drive**.
   - **1d** Select **Virtual hard disk**, and click **Edit**.

     The Edit Virtual Hard Disk Wizard opens.
   - **1e** In Locate Virtual Hard Disk, click **Next**.
   - **1f** In Choose Action, Click **Expand > Next**.
   - **1g** In Configure Disk, specify the disk size, and click **Next > Finish**.
   - **1h** Turn the machine on.
2. Verify that the disk space has increased by running the following at the appliance prompt:

   `fdisk -l`
3. Create a partition:
   - **3a** Run the disk partitioning utility:

     `fdisk <partition_name>`

     For example, fdisk `/dev/sda`.
   - **3b** To create a new partition, specify ‘n’.
   - **3c** To create a primary partition, specify ‘p’.
   - **3d** Specify the desired partition number.
   - **3e** When prompted for the first and last sectors, press Enter.
4. Change the partition type:
   - **4a** To change the partition type, specify ‘t’.
   - **4b** Specify the partition number you had mentioned.
   - **4c** Specify the Hex code as 8e.
5. To write the partition to the disk, specify ‘w’.
6. Scan for the newly created partition:

   `partprobe -s`

   The new partition number is listed in the output.
7. Verify that the partition is created:

```
fdisk -l
```

The details of the new partition and logical volumes are displayed. For example, the new partition is /dev/sda3. Make a note of the logical volume path to use in a later step. For example the path is /dev/mapper/systemVG-LVvar_opt.

8 Expand the logical volume with the new partition:

8a Create a physical volume by replacing newly created partition:

```
pvcreate <partition_name>
```

For example, the command is: `pvcreate /dev/sda3`

8b Find out the volume group name:

```
vgdisplay
```

For example, the volume group is displayed as `VG Name  volume_group1`.

8c Expand the volume group:

```
vgextend <volume_group_name> <partition_name>
```

For example, the command is `vgextend volume_group1 /dev/sda3`.

8d Check the newly added physical volume and the usable space:

```
pvscan
```

8e Expand the logical volume:

```
lvextend <logical_volume_path> <partition_name>
```

For example, the command is `lvextend /dev/mapper/systemVG-LVvar_opt /dev/sda3`.

8f To use the newly created space, resize the file system to the logical volume:

```
resize2fs <logical_volume_path>
```

For example, the command is `resize2fs /dev/mapper/systemVG-LVvar_opt`.

8g Display the total space and available space on the file system:

```
df -h
```