Micro Focus Security ArcSight Connectors

SmartConnector for Oracle SYSDBA Audit Multiple Folder

Configuration Guide

June, 2018

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Warranty

Restricted Rights Legend

Trademark Notices

Revision History

Date	Description
10/17/2017	Added encryption parameters to Global Parameters.
11/30/2016	Updated installation procedure for setting preferred IP address mode.
11/17/2015	Added information to Troubleshooting section.
02/16/2015	Updated platform support statement.
03/31/2014	Added support for Oracle Database version 12cR1.
08/15/2012	Updated parsers to map STATUS, RETURNCODE to Outcome and Reason; removed incorrect Severity mapping
06/30/2012	Clarified that connector is not installable on Windows operating systems.

SmartConnector for Oracle SYSDBA Audit Multiple Folder

This guide provides information for installing the SmartConnector for Oracle SYSDBA Audit Multiple Folder and configuring the device for event collection. Event collection from Windows platforms is not supported. Oracle Database versions 8i, 9i, 10g, 11g, 11gr2, and 12cR1 are supported.

Because the Oracle database does not allow the destination for audit file output to be configured in Windows (this output is sent to the Windows Event Log), this SmartConnector is not supported for installation on Windows operating systems. Use the SmartConnector for Microsoft Windows Event Log - Unified to collect Oracle Audit events from Windows systems.

This SmartConnectors also logs SYSDBA login/logout behavior; the SmartConnector for Oracle Audit DB does not.

Product Overview

For complete information about Oracle database auditing, see "Configuring Auditing" in the *Oracle Database Security Guide* for your database version.

Oracle Auditing

There are two general types of auditing supported by ArcSight SmartConnectors:

- Standard auditing
- Administrator auditing

Standard Auditing

Use standard auditing for SQL statements, privileges, schemas, objects, and network and multi-tier activity. Standard audit records are written to either of the following locations:

SYS.AUD$ system table
You can view the contents of this table by querying the DBA_AUDIT_TRAIL data dictionary view, or the DBA_COMMON_AUDIT_TRAIL view.

Operating System files
The AUDIT_TRAIL initialization parameter controls how standard audit trail records are written.

Administrator Auditing

On UNIX systems, you can monitor the activities of system administrators (user SYS, and users connecting with the SYSDBA or SYSOPER privilege) by using the Syslog Audit Trail, in addition to the Operating System Audit Trail. Syslog is another destination audit trail, similar to operating system files, XML format files, and database tables.

To control how administrator audit files are written, set the following initialization parameters:

AUDIT_SYS_OPERATIONS parameter
Enables or disables administrator auditing. Setting it to TRUE records system administrator activities in the operating system file that contains the audit trail.

AUDIT_SYSLOG_LEVEL parameter
When the AUDIT_TRAIL parameter is set to OS, writes SYS and standard operating system audit records to the system audit log using the `syslog` utility.

Activities Always Audited

Regardless of whether database auditing is enabled, Oracle Database *always* audits certain database-related operations and writes them to the operating system audit file. The operating system audit file captures the complete archived messages for these types of activities. This includes the following operations:

- **Administrative privilege connections to the database instance.**
  An audit record is generated that lists the operating system user connecting to Oracle Database as SYSOPER or SYSDBA. This provides for accountability of users with administrative privileges.

- **Database startup.**
  An audit record is generated that lists the operating system user starting the instance, the user terminal identifier, and the date-and-time stamp. This data is stored in the Operating System Audit Trail because the Database Audit Trail is not available until after the startup has successfully completed.

- **Database shutdown.**
  An audit record is generated that lists the operating system user shutting down the instance, the user terminal identifier, and the date-and-time stamp. You can set the location of this file by using the AUDIT_FILE_DEST initialization parameter.

Audit Trails

Standard Audit Trail

In standard auditing, SQL statements, privileges, schema objects, and network activity are audited. Audit the objects in your own schemas using the AUDIT statement. To disable auditing of an object, use the NOAUDIT statement. No additional privileges are needed to perform this task. Users can run AUDIT statements to set auditing options regardless of the AUDIT_TRAIL parameter setting. If auditing has been disabled, the next time it is enabled, Oracle Database will record the auditing activities set by the AUDIT statements.

Note the following:

- To audit objects in another schema, the AUDIT ANY system privilege is required.
- To audit system privileges, the AUDIT SYSTEM privilege is required.
- If the O7_DICTIONARY_ACCESSIBILITY initialization parameter has been set to FALSE (the default), only users who have the SYSDBA privilege can audit objects in the SYS schema.

Operating System Audit Trail

As an alternative to creating standard audit records in the DBA_AUDIT_TRAIL (SYS.AUD$ table), you can create standard audit records in operating system files.

You can direct audit trail records to an operating system audit trail if the operating system makes an audit trail available to Oracle Database. If not, then Oracle Database writes the audit records to a file outside the database. The target directory varies by platform. On most UNIX platforms, it is $ORACLE_BASE/admin/$DB_UNIQUE_NAME/adump, but for other platforms, check the platform documentation to learn the correct target directory.

Use the AUDIT_FILE_DEST initialization parameter to specify an operating system directory into which the audit trail is written, when the AUDIT_TRAIL initialization parameter is set to OS or to XML. You must set AUDIT_FILE_DEST to a valid directory with permissions restricted to the owner of the Oracle software and the DBA group. Mandatory auditing information also goes into that directory, as do audit records for user SYS if the AUDIT_SYS_OPERATIONS initialization parameter is specified. Change AUDIT_FILE_DEST using the following ALTER SYSTEM statement, which enables the new destination to be effective for all subsequent sessions.

```
ALTER SYSTEM SET AUDIT_FILE_DEST = directory_path DEFERRED;
```

If you do not set the AUDIT_FILE_DEST parameter, Oracle Database places the file in the following default locations:

- **Linux and Solaris:** `$ORACLE_BASE/admin/$DB_UNIQUE_NAME/adump`

  For example:

  ```
  /opt/oracle/app/oracle/admin/orcl/adump
  ```

Notes:

- If your operating system supports an audit trail, then its location is operating system-specific. On most UNIX platforms, it is `$ORACLE_BASE/admin/$DB_UNIQUE_NAME/adump`, but for other platforms, check the platform documentation to learn the correct target directory.
- When the `AUDIT_TRAIL` initialization parameter is set to `XML` (or `XML,EXTENDED`), Oracle Database writes audit records to XML-formatted operating system files. The XML-format audit records are written to the directory specified by the `AUDIT_FILE_DEST` parameter on all platforms.

Syslog Audit Trail

A potential security vulnerability for an operating system audit trail is that a privileged user, such as a database administrator, can modify or delete database audit records. To minimize this risk, you can audit the activities of system administrators by creating a Syslog Audit Trail.

Syslog is a standard protocol on UNIX-based systems for logging information from different components of a network. Applications call the syslog function to log information to the syslog daemon, which then determines where to log the information. You can configure syslog to log information to a file name `syslog.conf`, to the console, or to a remote, dedicated log host.

Because applications, such as an Oracle process, use the syslog function to log information to the syslog daemon, a privileged user would not have permissions to the file system where syslog messages are logged. For this reason, audit records stored using a Syslog Audit Trail can be more secure than audit records stored using an Operating System Audit Trail.

In addition to restricting permissions to a file system for a privileged user, for a Syslog Audit Trail to be secure, neither privileged users nor the Oracle process should have `root` access to the system where the audit records are written.

Enable Auditing of Administrative Users

Use the AUDIT_SYS_OPERATIONS initialization parameter to specify whether all users connecting as SYSDBA or SYSOPER are to be audited. For example, the following setting specifies that SYS is to be audited:

```
AUDIT_SYS_OPERATIONS = TRUE
```

The default value, FALSE, disables SYS auditing.

All audit records for SYS are written to the operating system file that contains the audit trail, and not to SYS.AUD$ (also viewable as DBA_AUDIT_TRAIL).

For Solaris, if the AUDIT_FILE_DEST parameter is not specified, the default location is `$ORACLE_HOME/rdbms/audit`.

For other operating systems, see their audit trail documentation.

All SYS-issued SQL statements are audited indiscriminately and regardless of the setting of the AUDIT_TRAIL initialization parameter.

Consider the following SYS session:

```
CONNECT / AS SYSDBA;
ALTER SYSTEM FLUSH SHARED_POOL;
UPDATE salary SET base=1000 WHERE name='myname';
```

When SYS auditing is enabled, both the ALTER SYSTEM and UPDATE statements are displayed in the operating system audit file as follows:

```
Thu Jan 24 12:58:00 2002
ACTION: 'CONNECT'
DATABASE USER: '/'
OSPRIV: SYSDBA
CLIENT USER: jeff
CLIENT TERMINAL: pts/2
STATUS: 0

Thu Jan 24 12:58:00 2002
ACTION: 'alter system flush shared_pool'
DATABASE USER: ''
OSPRIV: SYSDBA
CLIENT USER: jeff
CLIENT TERMINAL: pts/2
STATUS: 0

Thu Jan 24 12:58:00 2002
ACTION: 'update salary set base=1000 where name='myname''
DATABASE USER: ''
OSPRIV: SYSDBA
CLIENT USER: jeff
CLIENT TERMINAL: pts/2
STATUS: 0
```

Batch versus Realtime Mode

Batch mode is for situations when external scripts are used to copy the SYSDBA audit log files from their original location into a folder monitored by the connector. In batch mode, the files are processed and, when the processing is complete, they are renamed.

In realtime mode, the connector checks for the Oracle process IDs for the live SYSDBA sessions to determine whether some SYSDBA audit files need to be processed continuously as long as the sessions are open. The other files are processed and renamed. To determine the process IDs for the live sessions. the connector uses an operating system command for local instances and a database query for remote instances.

Log retrieval is done remotely via file sharing (either CIFS or NFS). When configuring in remote mode, the folder in which Oracle logs are stored must be shared in the server and mounted on the remote server from which logs are retrieved.

Install the SmartConnector

The following sections provide instructions for installing and configuring your selected SmartConnector.

Use OS user **oracle** to install the SmartConnector for correct file permissions to be established.

Connector Appliance/ArcSight Management Center supports mounting for Network File System (NFS) and CIFS (Windows) shares. When you install this connector on one of these devices, establish a CIFS mount on the device before adding the connector. Provide this share name during connector configuration. For more information, see **Remote File Systems** in the Connector Appliance or ArcSight Management Center Administrator's Guide.

Prepare to Install Connector

Before you install any SmartConnectors, make sure that the ArcSight products with which the connectors will communicate have already been installed correctly (such as ArcSight ESM or ArcSight Logger).

For complete product information, read the *Administrator's Guide* as well as the *Installation and Configuration* guide for your ArcSight product before installing a new SmartConnector. If you are adding a connector to the ArcSight Management Center, see the *ArcSight Management Center Administrator's Guide* for instructions, and start the installation procedure at "Set Global Parameters (optional)" or "Select Connector and Add Parameter Information."

Before installing the SmartConnector, be sure the following are available:

- Local access to the machine where the SmartConnector is to be installed
- Administrator passwords

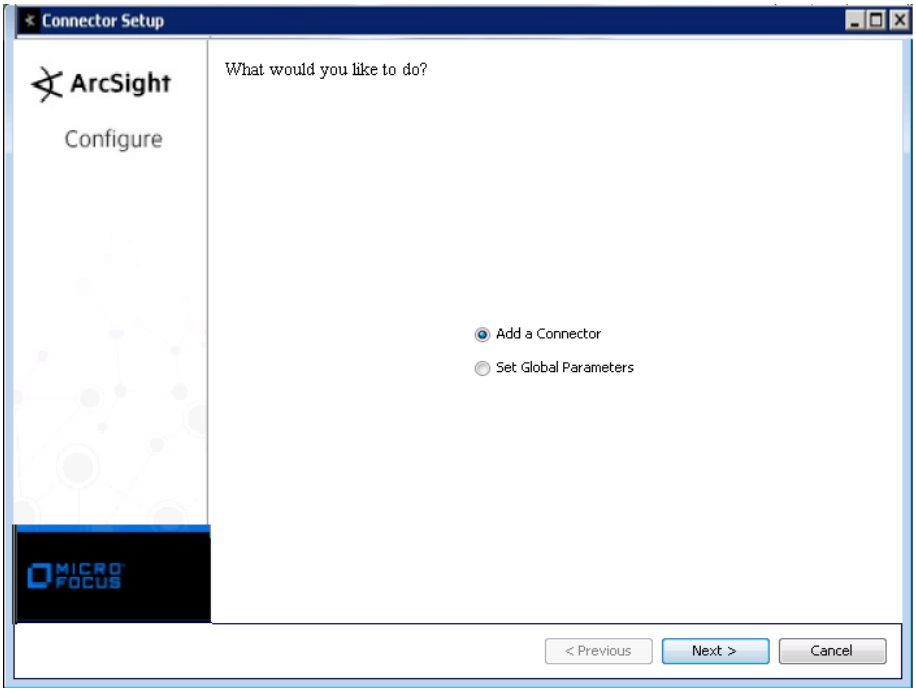
Install Core Software

Unless specified otherwise at the beginning of this guide, this SmartConnector can be installed on all ArcSight supported platforms; for the complete list, see the *SmartConnector Product and Platform Support* document, available from the Micro Focus SSO and Protect 724 sites.

1. Download the SmartConnector executable for your operating system from the Micro Focus SSO site.
2. Start the SmartConnector installation and configuration wizard by running the executable.

   Follow the wizard through the following folder selection tasks and installation of the core connector software:

   Introduction
   Choose Install Folder
   Choose Shortcut Folder
   Pre-Installation Summary
   Installing...
3. When the installation of SmartConnector core component software is finished, the following window is displayed:



Set Global Parameters (optional)

If you choose to perform any of the operations shown in the following table, do so before adding your connector. You can set the following parameters:

Parameter	Setting
FIPS mode	Select 'Enabled' to enable FIPS compliant mode. To enable FIPS Suite B Mode, see the SmartConnector User Guide under "Modifying Connector Parameters" for instructions. Initially, this value is set to 'Disabled'.
Remote Management	Select 'Enabled' to enable remote management from ArcSight Management Center. When queried by the remote management device, the values you specify here for enabling remote management and the port number will be used. Initially, this value is set to 'Disabled'.
Remote Management Listener Port	The remote management device will listen to the port specified in this field. The default port number is 9001.
Preferred IP Version	When both IPv4 and IPv6 IP addresses are available for the local host (the machine on which the connector is installed), you can choose which version is preferred. Otherwise, you will see only one selection. The initial setting is IPv4.

The following parameters should be configured only if you are using Micro Focus SecureData solutions to provide encryption. See the *Micro Focus SecureData Architecture Guide* for more information.

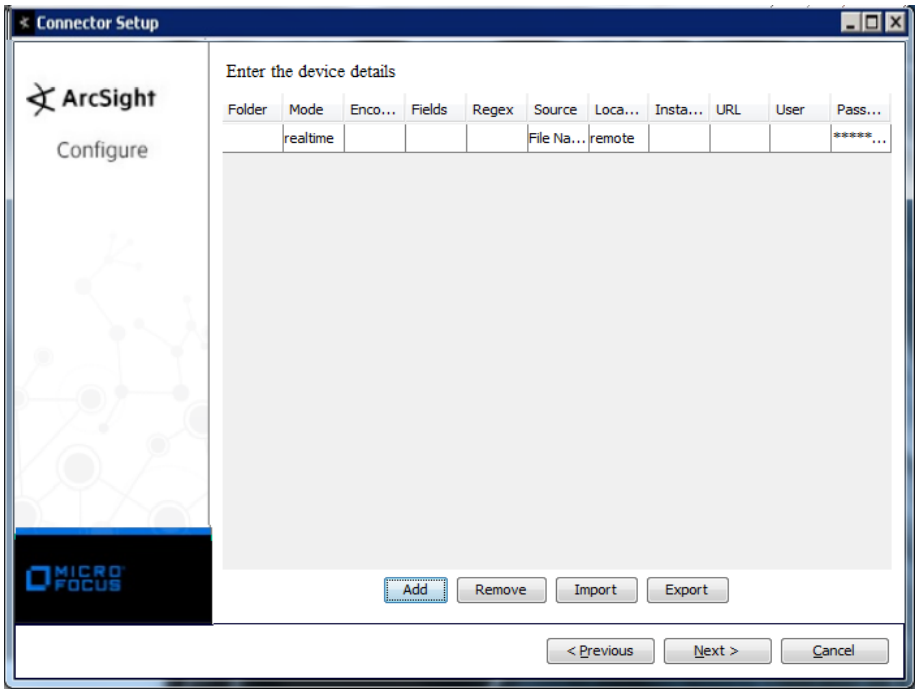
Parameter	Setting
Format Preserving Encryption	Data leaving the connector machine to a specified destination can be encrypted by selecting 'Enabled' to encrypt the fields identified in 'Event Fields to Encrypt' before forwarding events. If encryption is enabled, it cannot be disabled. Changing any of the encryption parameters again will require a fresh installation of the connector.
Format Preserving Policy URL	Enter the URL where the Micro Focus SecureData Server is installed.
Proxy Server (https)	Enter the proxy host for https connection if any proxy is enabled for this machine.

Parameter	Setting
Proxy Port	Enter the proxy port for https connection if any proxy is enabled for this machine.
Format Preserving Identity	The Micro Focus SecureData client software allows client applications to protect and access data based on key names. This key name is referred to as the identity. Enter the user identity configured for Micro Focus SecureData.
Format Preserving Secret	Enter the secret configured for Micro Focus SecureData to use for encryption.
Event Fields to Encrypt	Recommended fields for encryption are listed; delete any fields you do not want encrypted and add any string or numeric fields you want encrypted. Encrypting more fields can affect performance, with 20 fields being the maximum recommended. Also, because encryption changes the value, rules or categorization could also be affected. Once encryption is enabled, the list of event fields cannot be edited.

After making your selections, click **Next**. A summary screen is displayed. Review the summary of your selections and click **Next**. Click **Continue** to return to proceed with "Add a Connector" window. Continue the installation procedure with "Select Connector and Add Parameter Information."

Select Connector and Add Parameter Information

1. Select **Add a Connector** and click **Next**. If applicable, you can enable FIPS mode and enable remote management later in the wizard after SmartConnector configuration.
2. Select **Oracle SYSDBA Audit Multiple Folder** and click **Next**.
3. Enter the required SmartConnector parameters to configure the SmartConnector, then click **Next**.



Parameter	Description
Folder	Path to and name of the folder containing the Oracle SYSDBA audit logs.
Mode	Select the processing mode: 'batch' or 'realtime'. The default mode is 'realtime.' See "Batch vs. Realtime Mode" for more information.
Encoding	Enter the type of character set encoding used in the audit logs. For example, UTF-8 (8-bit UCS transformation format), UTF-16 (16-bit UCS transformation format)... If this field is left empty, the connector assumes the audit logs are in the default encoding determined by the operating system and locale settings.
Fields	What you specify for this parameter is extracted into the fields whose names you specify (the most common field being the ArcSight Device Host Name event field). When specifying more than one value, separate each field by a comma. When you enter values in this field, you also must enter corresponding Regex (regular expression) parameter values in the Regex field.
Regex	When you enter values for the Fields parameter, enter a regular expression (such as 'audit_(.*?)_\d+.AUD') to be used for extracting fields from the Log File Name. Using java simple date format to create date format file names, example log file names could be: audit_ORACLEINST1_20060225.AUD, audit_ORACLEINST2_20060226.AUD To extract Oracle Server instance names (which would be ORACLEINST1 and ORACLEINST2 in the sample file names) into the ArcSight deviceHostName event field, enter the expression 'audit_(.*?)_\d+.AUD'. Parentheses indicate the logical grouping of part of a regular expression. For each event field you specify for the "Event Fields" parameter, specify an equal number of groupings in the regular expression. (See "Regular Expressions" in the ArcSight FlexConnector Developer's Guide for more information about regular expressions.)
Source	Select the source from which fields are to be extracted (File Name or File Path). The following parameters are required for 'realtime' mode; they are used to query the remote Oracle database to determine the current audit files for live Oracle sessions.
Location	Select 'local' or 'remote'. When you select 'local', also fill in the Instance parameter. When you select 'remote', also fill in the URL, User, and Password parameters.
Instance	Enter the database instance in this field when you select 'local' in the Location parameter field.
URL	When you select 'remote' as the Location, enter the URL for the Oracle Database instance being audited in this field (for example, jdbc:oracle:thin:@<hostname>:<port>:<sid>). To connect to a database in an RAC setup, use: jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(SERVICE_NAME=DATABASE_SERVICENAME)))
User	When you select 'remote' as the Location, enter the name of an Oracle SYSDBA database user having access to the sys.v_$process table.
Password	When you select 'remote' as the Location, enter the password for the Oracle SYSDBA user.

You can click the 'Export' button to export the host name data you have entered into the able into a CSV file; you can click the 'Import' button to select a CSV file to import into the table rather than add the data manually. See the "SmartConnector User's Guide" for more information.

Select a Destination

1. The next window asks for the destination type; select a destination and click **Next**. For information about the destinations listed, see the *ArcSight SmartConnector User Guide*.
2. Enter values for the destination. For the ArcSight Manager destination, the values you enter for **User** and **Password** should be the same ArcSight user name and password you created during the ArcSight Manager installation. Click **Next**.
3. Enter a name for the SmartConnector and provide other information identifying the connector's use in your environment. Click **Next**. The connector starts the registration process.

4 If you have selected ArcSight Manager as the destination, the certificate import window for the ArcSight Manager is displayed. Select **Import the certificate to the connector from destination** and click **Next**. (If you select **Do not import the certificate to connector from destination**, the connector installation will end.) The certificate is imported and the **Add connector Summary** window is displayed.

Complete Installation and Configuration

1 Review the **Add Connector Summary** and click **Next**. If the summary is incorrect, click **Previous** to make changes.

2 The wizard now prompts you to choose whether you want to run the SmartConnector as a stand-alone process or as a service. If you choose to run the connector as a stand-alone process, select **Leave as a standalone application**, click **Next**, and continue with step 5.

3 If you chose to run the connector as a service, with **Install as a service** selected, click **Next**. The wizard prompts you to define service parameters. Enter values for **Service Internal Name** and **Service Display Name** and select **Yes** or **No** for **Start the service automatically**. The **Install Service Summary** window is displayed when you click **Next**.

4 Click **Next** on the summary window.

5 To complete the installation, choose **Exit** and Click **Next**.

For instructions about upgrading the connector or modifying parameters, see the *SmartConnector User Guide*.

Run the SmartConnector

SmartConnectors can be installed and run in stand-alone mode, on Windows platforms as a Windows service, or on UNIX platforms as a UNIX daemon, depending upon the platform supported. On Windows platforms, SmartConnectors also can be run using shortcuts and optional Start menu entries.

If the connector is installed in stand-alone mode, it must be started manually and is not automatically active when a host is restarted. If installed as a service or daemon, the connector runs automatically when the host is restarted. For information about connectors running as services or daemons, see the *ArcSight SmartConnector User Guide*.

To run all SmartConnectors installed in stand-alone mode on a particular host, open a command window, go to `$ARCSIGHT_HOME\current\bin` and run: `arcsight connectors`

To view the SmartConnector log, read the file `$ARCSIGHT_HOME\current\logs\agent.log`; to stop all SmartConnectors, enter `Ctrl+C` in the command window.

Device Event Mapping to ArcSight Fields

The following section lists the mappings of ArcSight data fields to the device's specific event definitions. See the *ArcSight Console User's Guide* for more information about the ArcSight data fields.

Oracle SYSDBA Audit Header Field Mappings

ArcSight ESM Field	Device-Specific Field
Additional Data	actionDetail
Additional Data	COMMENT_TEXT
Additional Data	LOGOFF_DEAD
Additional Data	LOGOFF_LREAD
Additional Data	LOGOFF_LWRITE
Additional Data	LOGOFF_PREAD
Additional Data	OBJ_CREATOR
Additional Data	SESSIONCPU
Additional Data	SES_TID
Additional Data	STATEMENT
Additional Data	USERHOST
Destination Host Name	Node name
Destination Process Name	Unix process pid
Destination User Name	One of (DATABASE USER, USERID)
Destination User Privileges	One of (PRIVILEGE, PRIV$USED)
Device Action	ACTION
Device Custom Floating Point 1	SESSIONID
Device Custom Number 1	STATUS
Device Custom Number 2	DBID
Device Custom Number 3	ENTRYID
Device Custom String 1	Oracle Home
Device Custom String 2	Log File
Device Custom String 3	Instance Name
Device Custom String 4	One of (OS Type | SES$LABEL)
Device Custom String 5	One of (OS Version | SES$ACTIONS)
Device Custom String 6	One of (Terminal | CLIENT TERMINAL)
Device Event Class Id	One of (ACTION, both (ACTION, RETURNCODE))
Device Host Name	Image
Device Process Name	Image
Device Product	'ORACLESYSDBA'
Device Receipt Time	timestamp
Device Vendor	'ORACLE'
Device Version	version
File Name	OBJ$NAME
Name	ACTION
Reason	One of (STATUS | RETURNCODE)

ArcSight ESM Field	Device-Specific Field
Source Address	Source address
Source Host Name	One of (TERMINAL, CLIENT TERMINAL)
Source Service Name	CLIENT TERMINAL
Source User Name	One of (CLIENT USER, OS$USERID)

Troubleshooting

Why are portions of the raw event truncated?

Different UNIX operating systems implement the syslog() call in different ways. This results in Oracle audit records to be written in different formats. For raw audit events from Oracle with ACTION fields, the connector can parse only the first message into an ArcSight event. The truncated portions of the raw event will be missing.

Why use the OS user oracle to install this SmartConnector?

Only the Oracle user has permission to read the Oracle SYSDBA audit log file that is generated. If the Oracle user does the installation, you need not manually modify permissions.

Why do SmartConnector event files disappear after they are processed?

The SmartConnector for Oracle SYSDBA Audit moves processed event files to the backup folder, under the audit folder (by default, the folder name is **arcsight**) to keep the folder clean and to ensure that IDs are not duplicated. Because Oracle SYSDBA audit log naming is based upon the data obtained, a duplicate ID is possible over a long period of time, which would cause duplicate events to be sent to the ArcSight ESM Manager. Note that once the files are moved to the backup directory, the contents of the backup folder are no longer needed by the SmartConnector.

How is it possible to get an ora err code using the shutdown command, but still the status field is 0?

This behavior can be described as an Oracle bug. The status field does not always reflect the level. But if a remote login fails, you will get code 1017 in this field, which may be interesting to investigate.