ARIS SERVER INSTALLATION GUIDE - LINUX

ARIS 10

October 2026

This document applies to ARIS Version 10 and to all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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1. Installation

This chapter describes the single node installation of an ARIS server using the Windows setup program. For further information, read the relevant documents on the ARIS Documentation website or download them from ARIS Download Center.

To install ARIS server on Linux systems, the ARIS agent must be provided first. The required files are available in the installation folder **<ARIS_Installation_and_Documentation-<version>>\Linux setup** that you can download from the ARIS Download Center (login required). After you have copied and installed the files, you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

If you run an ARIS server Windows setup remotely, the following components are installed:

- **ARIS Cloud Controller (ACC)**
- **ARIS agent**
- **ARIS server***
- **Viewer** *
- **Designer** *: The functionalities **workflows**, **Share model**, **Change request** and **Approve model** are available using an ARIS server license. For full ARIS Process Governance functionality, you need to purchase and import an ARIS Process Governance license.
- **ARIS download client**: Authorized users can start ARIS download clients within their browsers. All necessary files are downloaded from the ARIS server to a local directory. Users do not need a local ARIS client installation.
- The **default** tenant for all user data.
- The **master** infrastructure tenant.
- **ARIS Risk and Compliance** (optionally): The installation procedure is described in the ARIS Risk and Compliance Installation Guide (see ARIS installation package).
- **Dashboards** (optionally)*

*The functional range depends on the server license that you have purchased (see **ARIS Product Feature Matrix**). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

You can install ARIS server along with ARIS Risk and Compliance on one machine. The ARIS Risk and Compliance installation procedure is described in the **ARIS Risk and Compliance Installation Guide**. For advanced installations, it is strongly recommended that you request an installation service from ARIS Professional Services. This is of particular importance when you intend to install ARIS across several computers/VMs (distributed installation). A scenario this specific requires in-depth knowledge of the technical infrastructure and environment. This information cannot be included in the product documentation and must be obtained through specialized training. Contact your ARIS representative for more information.

Setup activities are logged in the files **%temp%\ARIS_install_log** and **%temp%\aris_install_full.log**.

Remote installation

To install ARIS server on Linux systems, the ARIS agent must be provided first. The required files are available in the installation folder **<ARIS_Installation_and_Documentation-<version>>\Linux setup** that you can download from the ARIS Download Center (login required). After you have copied and installed the files,

you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

2. General prerequisites

For each setup procedure described in this document, the following general prerequisites must be met. Additional prerequisites are listed in related procedure descriptions.

- You have downloaded the ARIS installation package to access the ***.rpm** files (see: **Linux setups\Linux_<system>\ARIS_Agent**, as well as **Linux setups\Linux\ARIS_Admin and ARIS_Scriptrunner**) included in **<ARIS_Installation_and_Documentation-<version>>**.

  To download the package, you need access to the ARIS Download Center where a login is required.
- Make sure that the hard and software requirements are met. For information about hardware and software requirements, refer to the ARIS system requirements on the ARIS Documentation website.
- In the Linux operating system port **14000** must be open.
- In the Windows operating system ports **13131-13140** must be open to give access to the setup repository server.
- Ensure that the virtual memory available on your Linux operating system is set to [36] **262144 [36]**.
- Make sure that the **FONTCONFIG** Linux package is installed on the Linux operating system together with all required fonts. Otherwise, fonts are not visible in ARIS and unreadable text is displayed.
- On Red Hat Linux 10 and higher, make sure the **libxcrypt-compat** package is installed. This is a requirement for installing the **aris10-cloud-agent**.
- Read the ARIS Release Notes for last-minute information not included in this document.
- If virus scanners are active on application servers used by ARIS, the performance of Java-based ARIS software is seriously reduced by on-access scanning. By automatically removing suspicious files mandatory for ARIS operations, quarantining can lead to malfunctions or a complete failure of ARIS. We therefore strongly recommend that you exclude the ARIS installation directory from on-access scanning to prevent performance impact. Scan the directory on a regular basis using a schedule. The scan should run outside of typical working hours. As some virus scanners detect false-positives, we recommend that you limit the scan to executable files only, for example, ***.exe** and ***.jar**. Known cases of false-positives are, for example, **Windows Defender Antivirus** blocking ***.pos** files (**elastic** runnable) or **Trellix** slowing down report execution and failing ARIS setups. Make sure that the overnight scan does not quarantine suspicious files immediately so that further inspection can be performed by ARIS Global Support. If you scan network traffic, this can also result in performance problems with ARIS. To prevent this, exclude the IP addresses of the ARIS server nodes or the ARIS processes from these network scans.
- If you want to import the ARIS license file during the setup procedure, make sure to have the zip file saved on this computer. Otherwise, you must import licenses after the installation (see Manage licenses).
- If you use SELinux, make sure that the defined security settings are met. If the setup fails, modify the SELinux settings or turn it off. Please follow the instructions in the SELinux User's and Administrator's Guide, as well as the documentation provided by the manufacturer.

3. Setup scenarios

This chapter describes the installation processes of ARIS products using different database management systems on Linux operating systems. By default, these installations will create an unprivileged and locked user **aris10** which uses **/home/ARIS10** to install ARIS itself. If you want to use different settings, make sure to change them before installing the first rpm file [8].

From ARIS 10.0.12.0, ARIS Risk and Compliance and ARIS server use the same external database management system if configured. When you update your ARIS server, ARIS Risk and Compliance still uses the database connection as configured for ARIS Risk and Compliance. If you want ARIS server and ARIS Risk and Compliance to use the same connection, you must first update ARIS server. Then configure the database connection manually, as described in the **ARIS Risk and Compliance Installation Guide**.

If you currently run ARIS in version 10.0.18 or lower, you must update to version 10.0.21 first and then update to ARIS in the current version. The direct update to the current version is blocked in server setup, the agent setup, and via ACC **update** command. The ARIS Risk and Compliance installation procedure is described in the **ARIS Risk and Compliance Installation and Upgrade Help**. Documents are available in the **Documents** folder. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

Before installing an ARIS server on a Linux operating system, you must provide the ARIS agent to your Linux Red Hat or SUSE system. To allow customizing activities additionally provide the command-line tools **ARIS Server Administrator** and **ARIS Scriptrunner**. Use the ***.rpm** files for Red Hat or SUSE systems.

After you have copied and installed the files, you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

All required **rpm** files are available in the downloaded <ARIS_Installation_and_Documentation-<version>>**Linux setup** folder. You find all setup programs within the **Windows setups\ARIS_Server** folder. Copy the whole content to a directory of your choice. This will make available all documents needed to setup ARIS as well as the database scripts. These scripts are needed to setup your external database management system for the use of ARIS. If you only copy a single ARIS setup, make sure to copy the content of the folder containing the **setup.exe** file as well as the **Setup_Data** folder.

<ARIS_Installation_and_Documentation-<version>>

Get an overview of the content of the downloaded installation directory:

Folder	Content
Add-ons	Required files needed to connect third-party tools, for example, Microsoft SQL server, Oracle databases or SAP tools.
Content	The **Content** folder contains ARIS databases, method filters and templates, the system database and queries, report scripts and macros that can be imported.
Documents	The **Documents** folder contains all required documents and guides (pdf) in different languages. Legal information documents are available in English. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
Linux setups	Contains all required files to be executed on a Linux operating system.
Linux <system>	Required files to install the ARIS agent and several tools for administration on SUSE and RedHat Linux systems.
ARIS_Admin	Provides ARIS Server Administrator on a Linux system (see ARIS Server Administrator Command-line Tool.pdf).

ARIS_Agent	Provides the ARIS agent. After the ARIS agent is provided, you can install an ARIS server remotely from a Windows machine.
ARIS_Scriptrunner	Provides ARIS Scriptrunner on a Linux system (see ARIS Architect online help).
Windows setups	All required setup programs to be run on Windows machines. Files required for Linux installations are available in the **Linux setups** folder.
ARIS_Agent	Installs the ARIS agent. The ARIS agent will be installed on all Windows machines that will have an ARIS server. It provides basic components, for example, ARIS Cloud Controller (ACC) and handles internal communication processes. If you are about to install an ARIS server remotely, please make sure to first install the ARIS agent locally on that machine.
ARIS_Client	Installs an ARIS client.
ARIS_Server	Installs ARIS. This setup will install **ARIS agent**, **ARIS server** comprises of 100% of **ARIS**, **standard database system (optional)**, **ARIS Viewer**, **ARIS Designer** and **ARIS download clients**. It provides the **default** tenant for all user data. The functionalities **ARIS workflows**, **Share model**, **Change request** and **Approve model** are available using an ARIS server license. For full ARIS Process Governance functionality, you need to purchase and import an ARIS Process Governance license. ARIS Risk and Compliance server can be installed optionally. The ARIS Risk and Compliance server installation procedure is described in the ARIS Risk and Compliance Installation Guide (see installation package). You can optionally install ARIS Aware. ARIS Aware provides dashboards. This setup can be run on Windows operating systems using the standard database system, your Microsoft SQL Server or your Oracle database. You can also install it on a Linux operating system.
Setup_Data	Folder content is needed for all setups. If you only copy one ARIS server setup, please make sure to copy the content of the folder containing the **setup.exe** file as well as the **Setup_Data** folder.

Installing ARIS server

- Using the standard database
- Using a Microsoft SQL Server® (mixed mode)
- Using a Microsoft SQL Server® (Windows authentication)
- Using an Oracle® database

3.1. Change default installation directory or default user

By default, the executed **rpm** files will create an unprivileged and locked user **aris10** which uses **/home/ARIS10** to install ARIS itself. If you want to use different settings, make sure to change them before installing the first **rpm** file.

To change the directory, you must set the environment variable **TARGETDIR** to the desired directory, for example:

export TARGETDIR=/mnt/largedisk

To change the user under which ARIS will run, you must set the environment variable **user** (lower case is mandatory), for example:

export user=TheOtherUser

Ensure to set the environment variables in the same user context as the package manager call that uses the environment variables.

Code Example

sudo -s

```
export TARGETDIR=/mnt/largedisk
export user=TheOtherUser
rpm install aris10-cloud-agent-<number>-1.x86_64.rpm
```

3.2. Installing ARIS server using the standard database

Before installing an ARIS server on a Linux operating system, you must provide the ARIS agent to your Linux Red Hat or SUSE system. To allow customizing activities additionally provide the command-line tools **ARIS Server Administrator** and **ARIS Scriptrunner**. Use the ***.rpm** files for Red Hat or SUSE systems.

After you have copied and installed the files, you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

In **RedHat** and **SUSE** systems ***.rpm** files will perform these actions automatically:

- **/etc/sysctl.conf**

```
 kernel.shmmax:
if "kernel.shmmax < 629145600" then "kernel.shmmax = 629145600"
max_file_max:
if "max_file_max < 200000” then "fs.file-max = 200000"
```

- **/etc/security/limits.d/40-aris.conf**

```
 $max_file_max = "ulimit -n"
If "$max_file_max > 2^20" then max_file_max = 2^20
aris10 soft nofile $max_file_max
aris10 hard nofile $max_file_max
aris10 soft nproc 12204
aris10 hard nproc 12204
```

- **/etc/pam.d/su**

```
 session required pam_limits.so
```

Prerequisites

Make sure that the general prerequisites are met [6].

Procedure

1. Copy the file **aris10-cloud-agent-<number>-1.x86_64.rpm** or **aris10-cloud-agent-SLES-<number>-1.x86_64.rpm** from the ARIS installation package to the hard drive of your Linux system.

   This file provides the ARIS agent. The ARIS agent is needed to perform a remote server installation.
2. Optionally copy the files for installing ARIS Server Administrator and ARIS Scriptrunner. These files are not mandatory for ARIS server to be installed.
3. Depending on the files you have copied and the type of the Linux system enter the relevant command to install the files. By default, these installations will create an unprivileged and locked user **aris10** which uses **/home/ARIS10** to install ARIS itself. If you want to use different settings, make sure to change them before installing the first rpm file [8].

   rpm –i aris10-cloud-agent-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your Red Hat system.

   rpm –i aris10-cloud-agent-SLES-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your SUSE system.

   rpm –i aris10adm-<number>-1.x86_64 and **rpm –i aris10-scriptrunner-<number>-1.x86_64**

   These commands optionally install the administrator tools **ARIS Server Administrator** and **ARIS Scriptrunner**.
4. Perform the ARIS server installation from a machine running a Microsoft Windows operating system (see ARIS installation package\Windows setups\ARIS_Server).
5. Start the **setup.exe** file as an administrator.
6. Select the **Perform installation on a remote server** option and enter the name of your Linux system.
7. Select ARIS server to be installed.
8. Select **Use dashboards** to make dashboards available. This will activate the **dashboarding** runnable. If you do not select this option, the runnable will be installed but not activated.
9. Select ARIS Risk and Compliance if you want to install this program as well. The ARIS Risk and Compliance installation procedure is described in the **ARIS Risk and Compliance Installation and Upgrade Help**. Documents are available in the **Documents** folder. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
10. Select the installation directory if required.
11. Only if you need to specify an external proxy server IP address for incoming requests enter the proxy server computer name or IP.
12. Change the ARIS agent user credentials to prevent unauthorized access to your ARIS system. Make sure to store the credentials in a save place. If you forget the credentials, you can no longer update the system or modify the configuration.
13. If you change the credentials, you will be further on prompted to enter that password you've chosen whenever you start/stop the ARIS server or access your ARIS installation using ARIS Cloud Controller.
14. If the ports **1080** or **1443** are already in use, specify the port numbers to be used. If you change the default port numbers users must add **:<this port number>** to the URL (see below).
15. To force secure connections (**HTTPS**), uncheck **HTTP port**. If you do so, make sure to make a valid TLS server certificate [27] available.

16. Select the suitable system settings option. You need to take the RAM required and the number of users who will be accessing the ARIS server into account. For a productive system it is recommended to select the **Medium** or **Large** option.

    The Demo scenario option is recommended for demonstration purposes (laptop) only.

    Warning
    If the hardware does not fit the system requirements, a warning is prompted. In this case do not proceed the setup. Otherwise, ARIS might not work reliably.

17. To import the ARIS license file, enable **Import now**, click **Select file...**, and navigate to the license archive file. Otherwise, licenses must be imported after the installation.

    Make sure this file contains the required ARIS server license. The functional range depends on the server license that you have purchased (see **ARIS Product Feature Matrix**). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

18. Select the **Standard** database system.
19. Enter the SMTP mail processing parameters of an existing account.

    Warning
    If you don't, ARIS will not send any notifications, due to the missing mailing functionality.

    But you can configure SMTP mail processing [38] at any later point of time. Some parameters can also be managed using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

20. Activate **Use TLS/SSL encryption** to prevent password sniffing.
21. Only if your mail server requires SMTP authentication, select the option **SMTP authentication** and enter the user credentials.

    Warning
    If you enter these parameters but your mail server does not require SMTP authentication, the connection will be rejected.

22. If you are about to use a proxy server, enter all proxy processing parameters. You can also enter them later, using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

    You can specify a URL to be used for validating the proxy server settings.

23. Select the start option:

    Select **Start automatically** if you want to have the server started up with every restart of your operating system.

    Select **Start manually** if you want to start/stop the server on the active computer manually.

24. Start the installation process. If you have changed the ARIS agent's default user credentials during this procedure, you will be prompted for that password you have chosen.

The installation process takes some time. You can change settings entered during the setup process. Use the **reconfigure** ACC command to change settings, such as ports. After the ARIS server installation has completed, you must check the installation and configure the system [25].

To ensure optimum performance when you are using ARIS with the standard database system, we recommend that you regularly shrink the database. This prevents that the used disk space constantly increases. To do so, execute the **vacuumdb.exe** file (<ARIS installation directory>\server\bin\agentLocalRepo\.unpacked\<build number>_PostgreSQL-run-prod-<ARIS version>-windows64-runnable.zip\postgresql\bin). For detailed information, read the instructions provided by the manufacturer.

To uninstall ARIS from a Red Hat or a SUSE system enter, for example, **rpm –e aris10-cloud-agent**.

3.3. Installing ARIS server using a Microsoft SQL Server

Before installing an ARIS server on a Linux operating system, you must provide the ARIS agent to your Linux Red Hat or SUSE system. To allow customizing activities additionally provide the command-line tools **ARIS Server Administrator** and **ARIS Scriptrunner**. Use the ***.rpm** files for Red Hat or SUSE systems.

After you have copied and installed the files, you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

In **RedHat** and **SUSE** systems ***.rpm** files will perform these actions automatically:

- **/etc/sysctl.conf**

```
 kernel.shmmax:
if "kernel.shmmax < 629145600" then "kernel.shmmax = 629145600"
max_file_max:
if "max_file_max < 200000” then "fs.file-max = 200000"
```

- **/etc/security/limits.d/40-aris.conf**

```
 $max_file_max = "ulimit -n"
If "$max_file_max > 2^20" then max_file_max = 2^20
aris10 soft nofile $max_file_max
aris10 hard nofile $max_file_max
aris10 soft nproc 12204
aris10 hard nproc 12204
```

- **/etc/pam.d/su**

```
 session required pam_limits.so
```

Prerequisites

- Make sure that the general prerequisites are met [6].
- An operating Microsoft SQL Server database. If you have not yet installed the Microsoft SQL Server, follow the instructions in the Microsoft installation program, as well as the documentation provided by the manufacturer. The external database management system is not included in this package. If you need help in setting up ARIS using your external database system, please contact ARIS. Note that this service is not subject to the standard software maintenance agreement and that these changes can only be performed if you requested and agreed on them.

- Ensure that **Latin1_General_CI_AI** sorting is selected for the COLLATE statement.
- The **SQL Server and Windows authentication mode** (mixed mode) option is selected (Microsoft SQL Console > **Security** tab).
- You must know the port number, the database name of the new database instance if it was not configured as a default instance, and also the user name and the password of the application user.
- You have downloaded the latest supported version (see **ARIS System Requirements**) of the Microsoft SQL Server JDBC driver from the Microsoft Download Center to a directory of your choice.
- SQL scripts and all additional files. All scripts and files are located on the installation medium (Add-ons\DatabaseScripts\Design&ConnectServer\mssql) or they can be downloaded from the ARIS Download Center.

Procedure

1. Copy the file **aris10-cloud-agent-<number>-1.x86_64.rpm** or **aris10-cloud-agent-SLES-<number>-1.x86_64.rpm** from the ARIS installation package to the hard drive of your Linux system.

   This file provides the ARIS agent. The ARIS agent is needed to perform a remote server installation.
2. Optionally copy the files for installing ARIS Server Administrator and ARIS Scriptrunner. These files are not mandatory for ARIS server to be installed.
3. Depending on the files you have copied and the type of the Linux system enter the relevant command to install the files. By default, these installations will create an unprivileged and locked user **aris10** which uses **/home/ARIS10** to install ARIS itself. If you want to use different settings, make sure to change them before installing the first rpm file [8].

   rpm –i aris10-cloud-agent-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your Red Hat system.

   rpm –i aris10-cloud-agent-SLES-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your SUSE system.

   rpm –i aris10adm-<number>-1.x86_64 and **rpm –i aris10-scriptrunner-<number>-1.x86_64**

   These commands optionally install the administrator tools **ARIS Server Administrator** and **ARIS Scriptrunner**.

4. Your database administrator must adjust the settings that are used by all database scripts. These scripts must be executed by the database administrator to set up the database as required.

   Edit the **envset.bat** file to specify the connection data of the Microsoft SQL server instance. It's a good idea to write down the credentials. They must be entered later during the ARIS setup process.

   To specify the connection data of the Microsoft SQL instance, modify the highlighted parameters and refer to the comments:

```
REM
REM You may edit this section for customizing purposes.
REM
REM This script is intended to be executed on the Microsoft SQL server
machine, therefore the default value is 'localhost'
REM If the MSSQL_SAG_FILEGROUP_FILE_DIR directory exists on the Microsoft
SQL server machine, you can run the script remotely. When executed locally,
the script creates this mandatory directory.
REM If you use a default instance, an instance name is not required.
REM If you use named instances, enter a backslash '\' followed by the
instance name.
SET MSSQL_SAG_MSSQL_SERVER_NAME=localhost
REM This script is configured for the use of Windows authentication by
default.
REM Windows authentication uses the user account running this script and
does not require user credentials to be specified in this script.
REM If you want to use user/password authentication instead, uncomment the
following lines and modify the settings for use by the SQL Server command
line tool (sqlcmd).
REM SET SQLCMDUSER=sa
REM SET SQLCMDPASSWORD=manager
REM name of database that will be created by the script.
SET MSSQL_SAG_DATABASE_NAME=ARIS10DB
REM folder in which the database files should be stored.
SET MSSQL_SAG_FILEGROUP_FILE_DIR=F:\msqldata\ARIS10DB
REM credentials of the login that is used by the application.
SET MSSQL_SAG_APP_USER=ARIS10
REM If using % character in your password: Write %% to yield a single %
character.
SET MSSQL_SAG_APP_PWD=*ARIS!1dm9n#
REM schema names for the default and master tenants
SET MSSQL_SAG_TENANT_DEFAULT=ARIS_DEFAULT
SET MSSQL_SAG_TENANT_MASTER=ARIS_MASTER
REM
REM The rest of the script must not be modified.
```

5. Execute the **inst.bat** file. This will create the database including the two mandatory tenants and the application user. The application user (APP_USER) is the Microsoft SQL user connecting ARIS and the Microsoft SQL database. The default user name is **ARIS10**. But you may have changed that name in the **envset.bat** earlier. Two schemes are mandatory. One for the **master** tenant and one for the **default** tenant. Write down the tenant names. These names must be entered later during the ARIS server setup process.

6. If you need additional tenants, you must create additional schemes for each new tenant. If you are going to create additional tenants for ARIS10 to migrate data from ARIS 9.8.7 or later, make sure to use identical names in both ARIS versions.

   Run the script **create_schema_for_tenant.bat** and pass the schema name as parameter, for example:

   create_schema_for_tenant.bat <schema name for additional tenant>

   If the schema already exists it will be dropped and recreated automatically. If you do not use the scripts, you can also set up the database and create an empty schema for each tenant manually.

   If you use an external database management system and you have created empty schemes for additional tenants, you must assign additional tenants [32] to these schemes after the ARIS server setup is completed. The **default** tenant and the **master** tenant were assigned automatically.
7. Perform the ARIS server installation from a machine running a Microsoft Windows operating system (see ARIS installation package\Windows setups\ARIS_Server).
8. Start the **setup.exe** file as an administrator.
9. Select the **Perform installation on a remote server** option and enter the name of your Linux system.
10. Select ARIS server to be installed.
11. Select **Use dashboards** to make dashboards available. This will activate the **dashboarding** runnable. If you do not select this option, the runnable will be installed but not activated.
12. Select ARIS Risk and Compliance if you want to install this program as well. The ARIS Risk and Compliance installation procedure is described in the **ARIS Risk and Compliance Installation and Upgrade Help**. Documents are available in the **Documents** folder. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
13. Select the installation directory if required.
14. Only if you need to specify an external proxy server IP address for incoming requests enter the proxy server computer name or IP.
15. Change the ARIS agent user credentials to prevent unauthorized access to your ARIS system. Make sure to store the credentials in a save place. If you forget the credentials, you can no longer update the system or modify the configuration.

    If you change the credentials, you will be further on prompted to enter that password you've chosen whenever you start/stop the ARIS server or access your ARIS installation using ARIS Cloud Controller.
16. If the ports **1080** or **1443** are already in use, specify the port numbers to be used. If you change the default port numbers users must add **:<this port number>** to the URL (see below).
17. To force secure connections (**HTTPS**), uncheck **HTTP port**. If you do so, make sure to make a valid TLS server certificate [27] available.
18. Select the suitable system settings option. You need to take the RAM required and the number of users who will be accessing the ARIS server into account. For a productive system it is recommended to select the **Medium** or **Large** option.

    The Demo scenario option is recommended for demonstration purposes (laptop) only.

    Warning
    If the hardware does not fit the system requirements, a warning is prompted. In this case do not proceed the setup. Otherwise, ARIS might not work reliably.
19. To import the ARIS license file, enable **Import now**, click **Select file...**, and navigate to the license archive file. Otherwise, licenses must be imported after the installation.

    Make sure this file contains the required ARIS server license. The functional range depends on the server license that you have purchased (see **ARIS Product Feature Matrix**). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
20. Select **MSSQL**.

21. Select the required JDBC driver for the Microsoft SQL database management system.
22. Enter the connection parameters used in the **envset.bat** file and exactly the values used by the **Microsoft SQL server**.

    The values shown are the default values used in the **envset.bat** file and the default parameters used when setting up the Microsoft SQL server.

    - **Server**: Fully qualified name or IP address of the Microsoft SQL server. The default parameter used in the **envset.bat** file is **localhost**. The default name works only if you run that script from the machine were the Microsoft SQL server is installed.
    - **Port**: Port addressing the SQL server instance running over TCP. The default port number used in the **envset.bat** file is **1433**.
    - **Database name**: Name of the database that was created by the **envset.bat** script. The default value is **ARIS10DB**.
    - **Application user**: Login user name that is used by the application. The default value used in the from **envset.bat** file is **ARIS10**.
    - **Password**: The application user's password. The default value used in the from **envset.bat** file is ***ARIS!1dm9n#**.
    - **Default schema**: Schema name for the **default** tenant and user name for that schema's owner. The default value used in the from **envset.bat** file is **ARIS_DEFAULT**.
    - **Master scheme**: Schema name for the **master** tenant and user name for that schema's owner. The default value used in the from **envset.bat** file is **ARIS_MASTER**.
23. Enter the SMTP mail processing parameters of an existing account.

> **Warning**
> If you don't, ARIS will not send any notifications, due to the missing mailing functionality.

But you can configure SMTP mail processing [38] at any later point of time. Some parameters can also be managed using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

24. Activate **Use TLS/SSL encryption** to prevent password sniffing.
25. Only if your mail server requires SMTP authentication, select the option **SMTP authentication** and enter the user credentials.

> **Warning**
> If you enter these parameters but your mail server does not require SMTP authentication, the connection will be rejected.

26. If you are about to use a proxy server, enter all proxy processing parameters. You can also enter them later, using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

    You can specify a URL to be used for validating the proxy server settings.
27. Select the start option:

    Select **Start automatically** if you want to have the server started up with every restart of your operating system.

    Select **Start manually** if you want to start/stop the server on the active computer manually.
28. Start the installation process. If you have changed the ARIS agent's default user credentials during this procedure, you will be prompted for that password you have chosen.

The installation process takes some time. You can change settings entered during the setup process. Use the **reconfigure** ACC command to change settings, such as ports. After the ARIS server installation has completed, you must check the installation and configure the system [25].

To uninstall ARIS from a Red Hat or a SUSE system enter, for example, **rpm –e aris10-cloud-agent**.

3.4. Installing ARIS server using an Oracle database

Before installing an ARIS server on a Linux operating system, you must provide the ARIS agent to your Linux Red Hat or SUSE system. To allow customizing activities additionally provide the command-line tools **ARIS Server Administrator** and **ARIS Scriptrunner**. Use the ***.rpm** files for Red Hat or SUSE systems.

After you have copied and installed the files, you must start the remote installation from a Windows system. If you do not want to run the setup remotely from a Windows machine, you must execute all required steps manually using ARIS Cloud Controller. For more information on manual setup, refer to the **ARIS Distributed Installation Cookbook**.

In **RedHat** and **SUSE** systems ***.rpm** files will perform these actions automatically:

- **/etc/sysctl.conf**

```
 kernel.shmmax:
if "kernel.shmmax < 629145600" then "kernel.shmmax = 629145600"
max_file_max:
if "max_file_max < 200000” then "fs.file-max = 200000"
```

- **/etc/security/limits.d/40-aris.conf**

```
 $max_file_max = "ulimit -n"
If "$max_file_max > 2^20" then max_file_max = 2^20
aris10 soft nofile $max_file_max
aris10 hard nofile $max_file_max
aris10 soft nproc 12204
aris10 hard nproc 12204
```

- **/etc/pam.d/su**

```
 session required pam_limits.so
```

Prerequisites

- Make sure that the general prerequisites are met [6].
- An operating Oracle database management system. If you have not yet installed the Oracle database management system, please follow the instructions in the Oracle installation program, as well as the documentation provided by the manufacturer. The external database management system is not included in this package. If you need help in setting up ARIS using your external database system, please contact ARIS. Note that this service is not subject to the standard software maintenance agreement and that these changes can only be performed if you requested and agreed on them.
- Ensure that **SQL*PLUS** is available. Therefore, an ORACLE client or an ORACL server must be installed on the machine where the scripts are run.

- Use of the database character set **AL32UTF8** is mandatory.
- You must know the port number, the database/service name of the new database instance and also the credentials, for example, the user name and the password of the application user.
- You have downloaded the latest supported version (see **ARIS System Requirements**) of the Oracle JDBC driver from the Oracle website to a directory of your choice.
- SQL scripts and all additional files. All scripts and files are located on the installation medium (Add-ons\DatabaseScripts\Design&ConnectServer\oracle) or they can be downloaded from the ARIS Download Center.

Procedure

1. Copy the file **aris10-cloud-agent-<number>-1.x86_64.rpm** or **aris10-cloud-agent-SLES-<number>-1.x86_64.rpm** from the ARIS installation package to the hard drive of your Linux system.

   This file provides the ARIS agent. The ARIS agent is needed to perform a remote server installation.
2. Optionally copy the files for installing ARIS Server Administrator and ARIS Scriptrunner. These files are not mandatory for ARIS server to be installed.
3. Depending on the files you have copied and the type of the Linux system enter the relevant command to install the files. By default, these installations will create an unprivileged and locked user **aris10** which uses **/home/ARIS10** to install ARIS itself. If you want to use different settings, make sure to change them before installing the first rpm file [8].

   rpm –i aris10-cloud-agent-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your Red Hat system.

   rpm –i aris10-cloud-agent-SLES-<number>-1.x86_64.rpm

   This command installs the ARIS agent to your SUSE system.

   rpm –i aris10adm-<number>-1.x86_64 and **rpm –i aris10-scriptrunner-<number>-1.x86_64**

   These commands optionally install the administrator tools **ARIS Server Administrator** and **ARIS Scriptrunner**.
4. Your database administrator must adjust the settings that are used by all database scripts. These scripts must be executed by the database administrator to set up the database as required.

   Edit the file

   envset.bat to specify the connection data of the Oracle instance. It's a good idea to write down values and credentials. They must be entered later during the ARIS server setup process.
5. Edit the **envset.bat** file and adjust the following lines replacing the **highlighted** parameters with the settings appropriate for your environment:

   REM The path to where sqlplus.exe can be found.

   SET CIP_ORA_BIN_PATH=**<enter the path>**

   REM hostname, port and service name

   SET TARGET_HOST=**localhost**

   SET TARGET_PORT=**1521**

   SET TARGET_SERVICE_NAME=**ARIS**
6. Edit the following lines to change the **highlighted** credentials of the application user:

   REM credentials of the user that is used by the application.

   SET CIP_APP_USER=**ARIS10**

   SET CIP_APP_PWD=***ARIS!1dm9n#**

   REM password of the tenant schemas.

   SET CIP_TENANT_SCHEMA_PWD=***ARIS!1dm9n#yy**

7. With the next two lines you specify the DBA user you intend to use to create the application user and this DBA user's password:

   REM credentials of the Oracle user that will be used to create the application schema.

   REM Note that this user must be endowed with DBA privileges such as user SYSTEM.

   SET CIP_INSTALL_USER=**system**

   SET CIP_INSTALL_PWD=**manager**

8. If your data tablespace name is different from **ARISDATA** respectively **TEMP** for temp tablespace, you will also need to modify these highlighted parameters accordingly:

   REM tablespace name of the tablespace in which the data of the application schema should be stored.

   SET CIP_TS_DATA=**ARISDATA**

   REM name of the temporary tablespace.

   SET CIP_TS_TEMP=**TEMP**

9. Save the **envset.bat** file. So you can use it for future update setups again.
10. Run the script **cip_create_app_user.bat**.

    This will create the application user. The application user (CIP_APP_USER) is the Oracle user connecting ARIS and the Oracle database. The default user name is **ARIS10**. But you may have changed that name in the **envset.bat** earlier.

11. Create an empty schema for each tenant. Two schemes are mandatory. One for the **master** tenant and one for the **default** tenant. The names, for example, **aris_master** and **aris_default** can be modified. Write down the tenant names. These names must be entered later during the ARIS server setup process. If you need additional tenants, you must create additional schemes.

    To create the schema objects, run these commands for each schema name **aris_master**, **aris_default** and additional tenants.

    Run the script **cip_create_schema_for_tenant.bat** and pass the schema name as parameter, for example:

    cip_create_schema_for_tenant.bat **aris_master** (mandatory)

    cip_create_schema_for_tenant.bat **aris_default** (mandatory)

    cip_create_schema_for_tenant.bat **<oracle schema name for additional tenant>** (optional)

    If you are going to create additional tenants for ARIS10 to migrate data from ARIS 9.8.7 or later, make sure to use identical names in both ARIS versions. If the schema already exists it will be dropped and recreated.

    If you use an external database management system and you have created empty schemes for additional tenants, you must assign additional tenants [32] to these schemes after the ARIS server setup is completed. The **default** tenant and the **master** tenant were assigned automatically.

12. Perform the ARIS server installation from a machine running a Microsoft Windows operating system (see ARIS installation package\Windows setups\ARIS_Server).
13. Start the **setup.exe** file as an administrator.
14. Select the **Perform installation on a remote server** option and enter the name of your Linux system.
15. Select ARIS server to be installed.
16. Select **Use dashboards** to make dashboards available. This will activate the **dashboarding** runnable. If you do not select this option, the runnable will be installed but not activated.
17. Select ARIS Risk and Compliance if you want to install this program as well. The ARIS Risk and Compliance installation procedure is described in the **ARIS Risk and Compliance Installation and Upgrade Help**. Documents are available in the **Documents** folder. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
18. Select the installation directory if required.
19. Only if you need to specify an external proxy server IP address for incoming requests enter the proxy server computer name or IP.

20. Change the ARIS agent user credentials to prevent unauthorized access to your ARIS system. Make sure to store the credentials in a save place. If you forget the credentials, you can no longer update the system or modify the configuration.

    If you change the credentials, you will be further on prompted to enter that password you've chosen whenever you start/stop the ARIS server or access your ARIS installation using ARIS Cloud Controller.
21. If the ports **1080** or **1443** are already in use, specify the port numbers to be used. If you change the default port numbers users must add **:<this port number>** to the URL (see below).
22. To force secure connections (**HTTPS**), uncheck **HTTP port**. If you do so, make sure to make a valid TLS server certificate [27] available.
23. Select the suitable system settings option. You need to take the RAM required and the number of users who will be accessing the ARIS server into account. For a productive system it is recommended to select the **Medium** or **Large** option.

    The Demo scenario option is recommended for demonstration purposes (laptop) only.

    Warning
    If the hardware does not fit the system requirements, a warning is prompted. In this case do not proceed the setup. Otherwise, ARIS might not work reliably.
24. To import the ARIS license file, enable **Import now**, click **Select file...**, and navigate to the license archive file. Otherwise, licenses must be imported after the installation.

    Make sure this file contains the required ARIS server license. The functional range depends on the server license that you have purchased (see **ARIS Product Feature Matrix**). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.
25. Select **Oracle**.
26. Select the required JDBC driver for the Oracle database management system.

27. Enter the connection parameters used in the **envset.bat** file and exactly the values used by the Oracle server.

    The values shown are the default values used in the **envset.bat** file and the default parameters used when setting up the Oracle server.

    Enter exactly the values used by the Oracle server, for example, **database name**. Use the **default** schema's name and the **master** schema's name that have been created earlier.

    - **Server**: Fully qualified name or IP address of the Oracle server.
    - **Port**: Specify the port number addressing the Oracle server instance running over TCP. The corresponding line in the **envset.bat** file is **SET TARGET_PORT=1521**.
    - **Database/Service name**: Specify the Oracle SID or Oracle service name. The corresponding line in the **envset.bat** file is **SET TARGET_SERVICE_NAME=ARIS**.
    - **Application user**: Login user name that is used by the application. The corresponding line in the **envset.bat** file is **SET CIP_APP_USER=ARIS10**.
    - **Password**: The application user's password. The corresponding line in the **envset.bat** file is **SET CIP_APP_PWD=*ARIS!1dm9n#**. Enter the schema names exactly in the way they have been created earlier.
    - **Master schema**: Schema name for the **master** tenant and user name for that schema's owner. Enter exactly the name used when you have created the schema, for example, **aris_master** (see step **Create an empty schema for each tenant**).
    - **Default schema**: Schema name for the **default** tenant and user name for that schema's owner. Enter exactly the name used when you have created the schema, for example, **aris_default** (see step **Create an empty schema for each tenant**).

      If you want to use an Oracle cluster you must change the connection URL as required: **syntax**: **jdbc:oracle:thin:@<ORACLE_SERVER>:<ORACLE_PORT>:<ORACLE_SID>**. After the setup process is completed you need to update the external service [33].

28. Enter the SMTP mail processing parameters of an existing account.

    Warning
    If you don't, ARIS will not send any notifications, due to the missing mailing functionality.

    But you can configure SMTP mail processing [38] at any later point of time. Some parameters can also be managed using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

29. Activate **Use TLS/SSL encryption** to prevent password sniffing.
30. Only if your mail server requires SMTP authentication, select the option **SMTP authentication** and enter the user credentials.

    Warning
    If you enter these parameters but your mail server does not require SMTP authentication, the connection will be rejected.

31. If you are about to use a proxy server, enter all proxy processing parameters. You can also enter them later, using the ARIS Administration of this server. Please refer to the online help of ARIS Administration.

    You can specify a URL to be used for validating the proxy server settings.

32. Select the start option:

    Select **Start automatically** if you want to have the server started up with every restart of your operating system.

    Select **Start manually** if you want to start/stop the server on the active computer manually.

33. Start the installation process. If you have changed the ARIS agent's default user credentials during this procedure, you will be prompted for that password you have chosen.

The installation process takes some time. You can change settings entered during the setup process. Use the **reconfigure** ACC command to change settings, such as ports. After the ARIS server installation has completed, you must check the installation and configure the system [25].

To ensure optimum performance when you are using ARIS with an Oracle database, we recommend that you recalculate the database statistics regularly.

To uninstall ARIS from a Red Hat or a SUSE system enter, for example, **rpm –e aris10-cloud-agent**.

Update installations are available. Components will be stopped. After the system has been updated all components will be started automatically.

3.5. How to start ARIS Cloud Controller (ACC)

ACC is a command-line tool for administrating and configuring an ARIS installation. ACC communicates with the ARIS agents on all nodes. You can use ACC in multiple modes (see Technical Help: ARIS Cloud Controller Command-Line Tool). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

> **Warning**
> ACC commands will majorly impact your system. They require profound knowledge of the technical ARIS infrastructure and environment. This knowledge can be acquired only by attending related training courses. These are provided by ARIS Academy. According to the standard software maintenance agreement, we cannot guarantee proper functioning if you use ACC commands without this knowledge or without our services.

ARIS Cloud Controller (ACC) can be used in three modes:

Interactive mode (default)

ACC runs with an interactive shell, allowing you to manually issue commands.

Batch mode

Batch mode is activated by specifying a command file with the **-f** command line parameter (see ACC command line parameters below). ACC will execute the commands in the file in the given sequence and exit after execution or if one of the commands fails.

A command file line starting with **#** will be interpreted as a comment line and ignored by ACC.

Command mode

You can directly pass a single command to ACC as a command line parameter. The command will be executed and ACC will exit.

When passing commands directly as a command line parameter, you must be careful when escaping strings in your command, for example, double-quote-delimited parameters. The operating system command shell will eliminate the double quotes, leaving your string parameter un-escaped. Therefore, make sure to escape the quote characters and special characters.

Examples

If you issue the command in command mode, for example:

```
    set remote.repository.url="http://something.com/repo"
```

you must enter:

```
    acc.bat -h localhost -u <user name> -pwd <remoteAccessPassword> set
remote.repository.url=\"https://something.com/repo\"
```

If you enter:

```
    acc.bat -h localhost -u <user name> -pwd <remoteAccessPassword> set
remote.repository.url="https://something.com/repo"
```

ACC will return an error message, for example:

```
    line 1:52 mismatched character '<EOF>' expecting '\n'
    Invalid or erroneous command "set     remote.repository.url=https://
something.com/repo ": line 1:30 extraneous i    nput ':' expecting EOF
    Use "help" to display a list of available commands.
```

This also affects passwords and names containing special characters. If you try to back up your tenants with the following command, make sure to escape the quote characters and the special character **&** used in the password **User&12345**.

If your user name or password includes any special character, add a backslash (****) before the character for ACC to process the special character as a string. If your password contains an ampersand (**&**), add a backslash before the ampersand.

```
    ./acc.bat -h localhost -u Clous -pwd g3h31m -p 18011 -c     ../
generated.apptypes.cfg backup tenant default username=\"admin\"
password=\"User\&12345\"
```

To obtain information about the usage of ACC commands, enter **help** or **help <command>**.

Windows operating system

To start ACC under a Windows operating system, click **Start > All Programs > ARIS > Administration > Start ARIS Cloud Controller**. If you changed agent user credentials you must enter the user name and/or the password.

Linux operating system

To start ACC under a Linux operating system, execute the **acc10.sh** shell script. To do so, enter: **su -c acc10.sh aris10**. After the ARIS server installation was completed on a Linux operating system, the **aris10** user is locked and has no password. Command-line tools (**sh** files), such as **ARIS server Administrator** or **ARIS Cloud Controller** can only be started by the **aris10** user related to the ARIS agent.

- To unlock the **aris10** user, enter: **passwd -u aris10**
- To interactively enter a password, enter: **passwd aris10**
- To start the command-line tools, enter: **su -c acc10.sh aris10** or **su -c arisadm.sh aris10**
- To execute these command-line tools as an ARIS user without **root** privileges, you must enter the password of the **aris10** user.
- To copy files manually into the **ARIS** directory, as the **aris10** user enter the commands: **su aris10** and **sudo aris10**

  As an ARIS user without **root** privileges, you must make sure that the files have the correct ownership (**aris10**).
- To lock the **aris10** user again enter: **passwd -l aris10**

4. Configure ARIS server

After the ARIS server installation was completed on a Linux operating system, the **aris10** user is locked and has no password. Command-line tools (**sh** files), such as **ARIS server Administrator** or **ARIS Cloud Controller** can only be started by the **aris10** user related to the ARIS agent.

- To unlock the **aris10** user, enter: **passwd -u aris10**
- To interactively enter a password, enter: **passwd aris10**
- To start the command-line tools, enter: **su -c acc10.sh aris10** or **su -c arisadm.sh aris10**
- To execute these command-line tools as an ARIS user without **root** privileges, you must enter the password of the **aris10** user.
- To copy files manually into the **ARIS** directory, as the **aris10** user enter the commands: **su aris10** and **sudo aris10**

  As an ARIS user without **root** privileges, you must make sure that the files have the correct ownership (**aris10**).
- To lock the **aris10** user again enter: **passwd -l aris10**

After installation please check the system. To prevent unauthorized access, you must change initial passwords and optionally define security settings for passwords. Depending on the features you want to use in ARIS additional modifications are required.

Procedure

1. Due to the current Tomcat (Ghostcat) vulnerability, block [28] all ports except the load balancer HTTPS port.
2. If you use an external database management system and you have created empty schemes for additional tenants, you must assign additional tenants [32] to these schemes after the ARIS server setup is completed. The **default** tenant and the **master** tenant were assigned automatically.
3. If you use an external load balancer (LB), you must reconfigure ARIS LB [43] to prevent system failure caused by ARIS brute-force protection.
4. Make sure that all fonts are available [39].
5. To check the installation, start ARIS server.

   To do so, start **ARIS Cloud Controller** (**su -c acc10.sh aris10**). If you have changed the ARIS agent's default user credentials during this procedure, you will be prompted for that password you have chosen.

   As the internal ARIS user running all runnables has no root privileges all privileged ports (<1024) cannot be used. To run ARIS under a privileged port you need to redirect the ports [42].
6. Enter **startall**. This process will take a while.

7. Enter **list** to monitor the status of all runnables.
   The state of all runnables represented by their instance IDs is listed. Possible states are:
   - **UNKNOWN**
     The runnable state is not yet known. This state is shown directly after the ARIS agent was started.
   - **STARTING**
     The runnable is starting, but this process is not complete yet.
   - **STARTED**
     The runnable is running.
   - **DEACTIVATED**
     The runnable is not in use. It has been deactivated manually and can be activated if necessary.
     This runnable is deactivated if ARIS server was installed without ARIS Aware.
   - **DOWN**
     This runnable started and crashed. The ARIS agent will attempt to automatically restart the runnable momentarily.
   - **FAILED**
     This runnable has crashed. The ARIS agent has given up trying to restart the runnable.
     If you want more detailed information on health checks, please refer to the **ARIS System Monitoring** guide. If a runnable does not start properly, read the **Basic Troubleshooting**.
8. After all runnables have started, open your browser and enter **localhost** or **https://<IP address or fully-qualified host name>:<load balancer port>/#<tenant name>/adminSettings**. You must enter the port number only if you have changed or redirected the standard port. The login dialog opens.
9. Enter the user name **superuser** and the password **superuser**. This user only has access to the ARIS Administration of the tenant.
10. Click **OK**. ARIS Administration opens.
11. Click **Licenses** and check whether the licenses were properly imported during setup. If you have not imported licenses during setup, do so now. For detailed information on license and user management and security settings refer to the **Manage ARIS** online help chapter.
12. Click **User management**. The list of users is displayed. It contains all default users.
13. Make sure to assign all required license privileges to the **system** user, such as ARIS Architect. Otherwise, the **system** user cannot perform administrative actions, such as running scheduled reports. For detailed information on license and user management and security settings refer to the **Manage ARIS** online help chapter.
14. Change all default passwords and customize the password policy (see **Configure user management**).

> **Warning**
> To prevent unauthorized access to the ARIS system, after installation or data migration, always change the default passwords of all users that are automatically created (**arisservice** user, **guest** user, **system** user, **superuser** user) on all operational tenants, as well as on the infrastructure tenant (master). It is mandatory to provide administrator permissions to different users and/or make sure to not lose the superuser's password. Otherwise, the system will not allow administrator access. If you did not change the ARIS agent user's credentials during the setup process, please at least change the ARIS agent user's password manually.

By default, the **elastic_<s**, **m**, or **l>** runnable (Elasticsearch) uses generic user credentials required for communication with other ARIS runnables. You can check [35] and change [35] the user name and the password if required.

15. Create users or import LDAP users and assign privileges and licenses for the **default** tenant. For detailed information on user management and security settings refer to the **Manage ARIS** online help chapter.

    If you have created additional tenants, users and licenses must be managed for each additional tenant.
16. Create additional system users and superusers for each tenant holding all required administrator permissions. This will allow access to the ARIS system in case of password loss.
17. Optionally customize the password policy. You can define passwords to expire after a period of time, define length or strength of a password or you can force users to change their passwords before first login.
18. If you use functionalities and extension packs as listed, you must customize ARIS accordingly.
    - If you are going to use **ARIS for SAP ® Solutions**, additional requirements must be met. For details, see Technical Help: Connect SAP® systems and Required SAP systems.
    - To make dashboards available, refer to the online help.
19. Click **Logout**.
20. Send the URL **https://<IP address or fully-qualified host name>:<load balancer port>/#<tenant name>/home** to all users.

ARIS server is installed and running.

You can stop ARIS server using the **Stop ARIS server** link in the Windows start menu or enter **stopall** in the **ARIS Cloud Controller** (see **ARIS Cloud Controller (ACC) Command-line Tool**).

4.1. Security advice

Due to the Tomcat (Ghostcat) vulnerability, you are recommended to block [28] access to all **AJP** ports if you use an ARIS version prior to **10.0.12.0**.

4.1.1. Make TLS certificate available for ARIS server

By default, the **loadbalancer** runnable is set to allow both unencrypted HTTP (port 80) and encrypted HTTPS (port 443) access. To use TLS (former SSL), the certificate must fit the load balancer's host name. Otherwise, client connections, in particular web browser connections, will fail due to an invalid certificate.

Obtaining a valid certificate

If you want to use TLS, you need a valid certificate for the server on which the load balancer is running. This certificate must be signed by a certificate authority (CA). Please make sure that the certificate is compatible with the Java version of each ARIS client.

- You can buy a certificate from an official CA. Most clients, in particular browsers, will trust certificates signed by such a CA.
- If your company uses own CA, use a certificate from this CA and add this CA to the trust store of all clients.

Adding a valid certificate to the load balancer

Your certificate must contain two parts:

- The private key used to encrypt information sent back to the client (file extension **.key**).
- The server certificate (file extension **.crt**).

1. Put the ***.key** file and the ***.crt** file into a ZIP archive.
2. Copy this ZIP file to a local directory that can be accessed by ARIS Cloud Controller (ACC).
3. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
4. Stop the **loadbalancer** runnable. Enter, for example: **stop loadbalancer_m**
5. Enter the ACC command **enhance loadbalancer_<s, m**, or **l> with sslCertificate local file "<path to the ZIP file>"**

   Example: **enhance loadbalancer_m with sslCertificate local file "c:\\temp\\lbcert.zip"** .

   If you have blanks or special characters in the path, you must put it in quotes and use a double backslash instead of a single slash. Alternatively, use single forward slashes, for example: **"c:/temp/lbcert.zip"**.
6. Start the **loadbalancer** runnable again. Enter, for example: **start loadbalancer_m**

The SSL certificate is available.

If an ARIS client cannot perform connections to servers using TLS certification, you need to provide an additional certificate (see: **Basic Troubleshooting Guide**).

4.1.2. Safety recommendation: Block AJP ports

The **Apache JServ Protocol** (AJP) is a binary protocol that can proxy incoming requests from a web server to an application server behind the web server. AJP is a highly trusted protocol. It must not be made available to untrusted clients because they could gain access to confidential information or execute code on the application server.

ARIS uses AJP for communication between the **loadbalancer** runnable that bases on Apache HTTPD and ARIS applications that base on Apache Tomcat. The vulnerable Tomcat AJP connector is mandatory and must stay active for ARIS applications.

If you have installed ARIS server according to our recommendations, you can block access to the ports of all runnables except the HTTP and HTTPS ports used by the **loadbalancer** runnable by setting appropriate firewall rules. By default these HTTP and HTTPS ports are **80** and **443** on Windows operating systems and **1080** and **1443** on Linux operating systems.

To prevent unauthorized access, check that the [29] **AJP [29]**
ports of your ARIS installations are only accessible from networks from which users access ARIS [29]. The **show node** ACC command gives an overview of open **AJP** ports. It lists all ports used by ARIS runnables. The **connector.ajp.port** parameter (in former ARIS versions called **CATALINA_AJP_PORT**) identifies **AJP** ports. If any of these ports are accessible from an external network, you must block access immediately by your firewall.

Important: If your ARIS system is a multiple node installation, the **AJP** ports must remain open for data transfer between multiple nodes. These open **AJP** ports do not represent a security gap, because distributed ARIS installations must always be protected by a firewall.

4.1.3. Check open AJP ports (Ghostcat vulnerability)

To prevent unauthorized access,
check that the **AJP** ports of your ARIS installations are only accessible from networks from which users access ARIS [29].

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.

2. To check ports used by runnables, enter: show node
   The list is displayed. Navigate to the Known used ports section.

```
Port   Runnable       Port                                        Parameter
443    loadbalancer_m HTTPD.ssl.port                              Set
explicitly
1080   loadbalancer_m HTTPD.port                                  Set
explicitly
14200  cloudsearch_m  zookeeper.application.instance.port         Set
explicitly
14201  cloudsearch_m  JAVA-DCSHTTPPORT                            Set
explicitly
14206  cloudsearch_m  JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14220  elastic_m      ELASTICSEARCH.http.port                     Set
explicitly
14226  elastic_m      JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14230* elastic_m      ELASTICSEARCH.transport.tcp.port            Set
explicitly
14240  postgres_m     postgresql.port                             Set
explicitly
14250  cdf_m          connector.http.port                         Set
explicitly
14251  cdf_m          connector.ajp.port                          Set
explicitly
14256  cdf_m          JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14281  zoo_m          clientPort                                  DEFAULT
14296  zoo_m          JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14400  abs_m          connector.http.port                         Set
explicitly
14401  abs_m          connector.ajp.port                          Set
explicitly
14406  abs_m          JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14410  adsadmin_m     connector.http.port                         Set
explicitly
14411  adsadmin_m     connector.ajp.port                          Set
explicitly
14416  adsadmin_m     JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14420  apg_m          connector.http.port                         Set
explicitly
14421  apg_m          connector.ajp.port                          Set
explicitly
14426  apg_m          JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
14430  copernicus_m   connector.http.port                         Set
explicitly
14431  copernicus_m   connector.ajp.port                          Set
explicitly
14436  copernicus_m   JAVA-Dcom.sun.management.jmxremote.port     Set
explicitly
```

```
14440  ecp_m          connector.http.port                          Set
explicitly
14441  ecp_m          connector.ajp.port                           Set
explicitly
14446  ecp_m          JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14450  hds_m          connector.http.port                          Set
explicitly
14451  hds_m          connector.ajp.port                           Set
explicitly
14456  hds_m          JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14460  octopus_m      connector.http.port                          Set
explicitly
14461  octopus_m      connector.ajp.port                           Set
explicitly
14466  octopus_m      JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14470  simulation_m   connector.http.port                          Set
explicitly
14471  simulation_m   connector.ajp.port                           Set
explicitly
14476  simulation_m   JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14480  umcadmin_m     connector.http.port                          Set
explicitly
14481  umcadmin_m     connector.ajp.port                           Set
explicitly
14486  umcadmin_m     JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14490  dashboarding_m connector.http.port                          Set
explicitly
14491  dashboardging_m connector.ajp.port                          Set
explicitly
14496  dashboarding_m JAVA-Dcom.sun.management.jmxremote.port      Set
explicitly
14497  dashboarding_m JAVA-Xrunjdwp\:transport                     Set
explicitly
```

The highlighted connector.ajp.port Port parameter indicates all open AJP ports.

3. If any of these ports are accessible from an external network, you must block access immediately by your firewall.

You have secured the system.

Important: If your ARIS system is a multiple node installation, the AJP ports must remain open for data transfer between multiple nodes. These open AJP ports do not represent a security gap, because distributed ARIS installations must always be protected by a firewall.

4.2. Database connection

This chapter provides information on configuring the ARIS server in order to use an external database management system.

4.2.1. Configure the database connection for additional schemes

Assign tenant to database schema

During the setup process you have created an empty Oracle or Microsoft SQL schema for an additional tenant (see Technical Help: ARIS server Installation - Windows or ARIS server Installation Linux). Read the documents on the ARIS Documentation website or download them from the ARIS Download Center. Additionally created tenants must be assigned to the database schema. Replace values in angle brackets, such as **<tenant name>** with your own values, such as new **tenant1**.

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. To discover the database service ID (<dbserviceID>, such as db000000000), enter:
   list external services
   assign tenant <tenant name> to service <dbserviceID> com.aris.cip.db.schema =<schema name>

   > **Warning**
   > Only use up to 25 lowercase ASCII characters and numbers for tenant names. Names must begin with a character. Special characters, such as the underscore (_), as well as characters in Chinese, Cyrillic, or Arabic, cannot be used.

3. To create a new tenant, enter:
   create tenant <tenant name>

The new tenant is available on ARIS server.

Additional Settings

To enable **validationQuery** for external database connections (Oracle & Microsoft SQL) use the correct validation query for the DBMS.

For Oracle use:

validationQuery="select 1 from dual" and testOnBorrow=true

For Microsoft SQL use:

validationQuery="select 1" and testOnBorrow=true

For better readability, the parameters of the command are shown with line-wraps. For execution you must enter a single-line command.

During registration of external service add parameters, for example, for Oracle:

```
register external service db
url="jdbc:oracle:thin:@<target_host>:<target_port>:<oracle_sid>"
driverClassName="oracle.jdbc.OracleDriver"
username="<cip_app_user>
password="<cip_app_pwd>"
```

```
maxIdle=15
maxActive=100
maxWait=10000
removeAbandoned=false
removeAbandonedTimeout=600
defaultAutoCommit=false
rollbackOnReturn=true
host=<target_host>
port=<target_port>
jmxEnabled=true
validationQuery="select 1 from dual"
testOnBorrow="true"
```

After the external service was already registered, for example, for Oracle:

```
update external service <dbserviceID>
url="jdbc:oracle:thin:@<target_host>:<target_port>:<oracle_sid>"
driverClassName="oracle.jdbc.OracleDriver"
username="<cip_app_user>"
password="<cip_app_pwd>"
maxIdle=15
maxActive=100
maxWait=10000
removeAbandoned=false
removeAbandonedTimeout=600
defaultAutoCommit=false
rollbackOnReturn=true
host=<target_host>
jmxEnabled=true
validationQuery="select 1 from dual"
testOnBorrow="true"
```

Enable validationQuery for external PostGreSQL connection

1. Enter: **stopall**
2. Enter: **reconfigure <postgres_runnable> dbsp.validationQuery="select 1" dbsp.testOnBurrow=true**
3. Enter: **startall**

The database connection is configured.

4.2.2. Update external service (database clusters)

If you have performed an installation using an Oracle or Microsoft SQL database cluster you need to reconfigure the external service after the installation process.

This procedure shows an example for an Oracle database.

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. To connect to an Oracle cluster using a JDBC URL you may use this example:

   update external service <dbserviceID>
   url="jdbc:oracle:thin:@(DESCRIPTION=ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)
   (HOST=<virtual-ip-oracle-cluster>)(PORT =
   <target port>)))(CONNECT_DATA=(SERVICE_NAME=cluster-database-name)))"
   driverClassName="oracle.jdbc.OracleDriver" username="<cip_app_user>"
   password="<new_cip_app_pwd>" maxIdle=15 maxActive=100 maxWait=10000
   removeAbandoned=false removeAbandonedTimeout=600 logAbandoned=true
   defaultAutoCommit=false rollbackOnReturn=true host=<target_host> jmxEnabled=true
   validationQuery="select 1 from dual" testOnBorrow=true

ARIS server can be started using the Oracle cluster.

4.2.3. Encrypt passwords

You can encrypt passwords, such as the **superuser** password. The command line tool **ARIS Server Administrator** is available if you have installed ARIS server or the ARIS Administrator Tools (see Technical Help: ARIS client Installation Guide. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

If you have installed ARIS server, navigate to **< ARIS installation path>\server\bin\work\work_abs_<s, m,** or **l>\tools\arisadm** and run the batch file.

Procedure

1. Start **ARIS Server Administrator**. This command line tool is available, if you have installed ARIS server, or the ARIS Administrator Tools (see Technical Help: ARIS client Installation Guide. Read the documents on the ARIS Documentation website or download them from the ARIS Download Center.

   If you have installed ARIS server, navigate to <**ARIS installation path>\server\bin\work\work_abs_<s, m,** or **l>\tools\arisadm** and run the batch file. Under a Linux operating system, execute the **arisadm.sh** shell script instead. The command prompt opens and ARIS Server Administrator is launched in interactive mode.

   If you accepted the program group suggested by the installation program, click **Start > Programs > ARIS > Administration > ARIS Server Administrator 10**.
2. Establish a connection to the server using the server command:

   syntax: server <server name>:<port number> <tenant> <user name> <password>

   example: server localhost:80 default system manager
3. Enter command: **encrypt <pwd_to_be_encrypted>**

   Example:

   encrypt databaseuser

   encrypted password:{crypted}123456789abcdefg
4. Copy the encrypted password, such as **{crypted}123456789abcdefg** to a text editor file.

You can paste the encrypted password to related fields.

4.3. Elasticsearch

The Document index (Elasticsearch) is a basic component that contains the full-text search index for documents and collaboration data. It also stores users, user groups, licenses, and privileges. By default, the **elastic_<s**, **m**, or **l>** runnable (Elasticsearch) uses generic user credentials required for communication with other ARIS runnables.

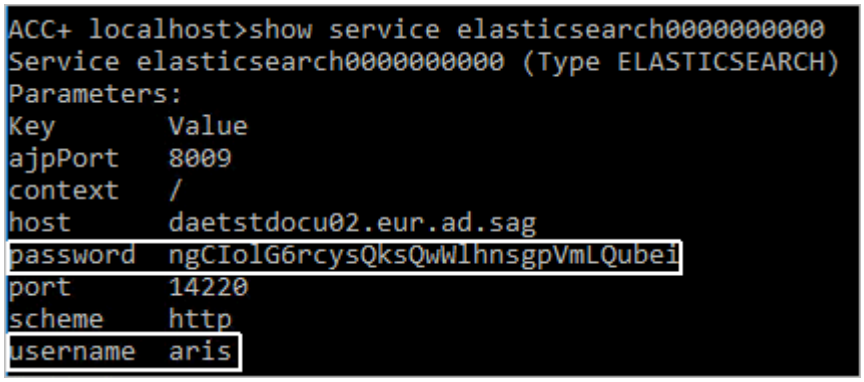
4.3.1. Check user name and password (Elasticsearch)

By default, the **elastic_<s**, **m**, or **l>** runnable (Elasticsearch) uses generic user credentials required for communication with other ARIS runnables. You can check the user name and password in use.

Procedure

1. Navigate to **<ARIS installation path>\server\bin\work\work_elastic_m**, for example, **C:\ARIS10.0\server\bin\work\work_elastic_m**.
2. Open the **instanceId.elasticsearch** file with a text editor.
3. Copy the instance ID, for example:
   elasticsearch0000000000
4. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
5. Once ACC is initialized, enter **show service elastisearch<ID>**, for example:
   show service elasticsearch0000000000

User name and password are displayed.



You can change [35] the user name and the password if required.

4.3.2. Change user name and password (Elasticsearch)

By default, the **elastic_<s**, **m**, or **l>** runnable (Elasticsearch) uses generic user credentials required for communication with other ARIS runnables. You can check [35] and change the user name and the password if required.

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. Once ACC is initialized, enter:
   reconfigure elastic_<s, **m**, or **l> +ELASTICSEARCH.aris.api.user.name="<new user name" +ELASTICSEARCH.aris.api.user.password="<new password>**"
   for example:
   reconfigure elastic_m +ELASTICSEARCH.aris.api.user.name="administrator" +ELASTICSEARCH.aris.api.user.password="Thssmynwpsswrd"
3. Stop the Collaboration runnable **ecp_<s**, **m**, or **l>**. Enter, for example:
   stop ecp_m
4. Restart the Collaboration runnable. Enter, for example:
5. **start ecp_m**

You have changed the user credentials required for the Elasticsearch.

4.3.3. Disable authentication for Elasticsearch

You can switch off the authentication for the Elasticsearch.

> **Warning**
> Disabling authentication is not recommended and must be considered carefully. It bears a potentially risk to data security.

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. Once ACC is initialized, enter: **reconfigure elastic_<s**, **m**, or **l> +ELASTICSEARCH.aris.api.deactivate.authentication="true"**
   for example: **reconfigure elastic_m +ELASTICSEARCH.aris.api.deactivate.authentication="true"**

You have disabled the authentication for the Elasticsearch.

4.4. How to check the virtual memory setting

From ARIS 10 SR4, the **elastic** runnable (elastic search) requires more virtual memory on your Linux operating system in order to prevent indices from causing out-of-memory exceptions. On the machine where the **elastic** runnable is installed, check which value the **vm.max_map_count** system parameter is currently set to.

For this, use the **sysctl vm.max_map_count** command. If the value is lower than **262144**, change it to **262144**.

To change the value for this session only, use the following command (root access permissions required):

sudo sysctl -w vm.max_map_count=262144

This command changes the value for the current session only. After a reboot, this change is undone.

To change the value persistently, add this line to the **sysctl.conf** configuration file that is available in the ARIS installation directory on your machine:

vm.max_map_count=262144

4.5. Mailing

This chapter provides information on configuring automatic mailing.

4.5.1. Configure ARIS agent mail server connection

If only the ARIS agent is installed but no ARIS server you can activate automatic mailing in order to receive technical information from the ARIS agent. This will inform administrators, for example, about performance problems concerning the ARIS agent.

1. Start ARIS Cloud Controller (ACC) [22] on the machine where the ARIS agent is installed.
2. Enter the following lines one after the other.
   Example:
   set mail.notification.enabled=true
   set mail.smtp.host=mailserver.us
   set mail.smtp.port=25
   set mail.smtp.username=<user name>
   set mail.smtp.password=<password>
   set mail.recipients=aris.administrator1@company.com
   set mail.recipients.cc=aris.administrator2@company.com
   set mail.sender.address=<COMPUTERNAME>@us.co

The ARIS agent mail server connection is set.

Mail notification can be configured by the following parameters:

Parameter	Description
mail.notification.enabled (default: **false**)	**true** enables automatic mailing.
mail.smtp.host	Qualified hostname or IP of the mail server.
mail.smtp.port (common: **25**)	Port of the mail server.
mail.smtp.username	User name on the mail server. If this parameter is set, the applications will implicitly enable SMTP authentication. There is **NO** dedicated parameter to explicitly enable SMTP authentication.
mail.smtp.password	Mail server password for the specified user.
mail.sender.address	Sender's e-mail address.
mail.sender.name	Sender's name.

Parameter	Description
mail.recipients	Recipient's e-mail address. This parameter is multivalued, specify several recipients separated with commas, for example: **set mail.recipients = "a@abc.com","b@abc.com"**
mail.recipients.cc	Recipient's e-mail address (**C**arbon **C**opy(CC)). This parameter is multivalued (see **mail.recipients**)
mail.on.system.events	Defining events triggering e-mail notification. This parameter is multivalued, specify several event types separated by comma, for example: **set mail.on.system.events = MACHINE_STATE_CPU_LOAD_HIGH, MACHINE_STATE_** Possible values: ▪ MACHINE_STATE_LOW_DISK_SPACE_PERCENT ▪ MACHINE_STATE_OK_DISK_SPACE_PERCENT ▪ MACHINE_STATE_LOW_DISK_SPACE ▪ MACHINE_STATE_OK_DISK_SPACE ▪ MACHINE_STATE_CPU_LOAD_HIGH ▪ MACHINE_STATE_CPU_LOAD_OK ▪ MACHINE_STATE_MEMORY_USAGE_HIGH ▪ MACHINE_STATE_MEMORY_USAGE_OK
mail.on.state.change (default: **FAILED**)	Defining events triggering e-mail notification if a runnable is in the state **FAILED**.
mail.on.runnable.monitoring.events	Defining events triggering e-mail notification. This parameter is multivalued (see **mail.on.system.events**). Possible values: ▪ RUNNABLE_MONITORING_HIGH_THRESHOLD_EXCEEDED ▪ RUNNABLE_MONITORING_LOW_THRESHOLD_EXCEEDED

4.5.2. Configure SMTP mail server connection

If you did not enter the SMTP server connection parameters during the setup process of a previous ARIS version you need to register your SMTP server manually.

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. Enter, for example:
   register external service smtp host="YourMailServerAddressWithDomain" port=25
3. Check that setting entering:
   list external services

SMTP mail server configuration is set.

You can modify SMTP configuration parameters using the **update external service** command.

Parameter	Type	Default value	Description
Host host	String		Qualified hostname or IP of the SMTP server.

Parameter	Type	Default value	Description
Port port	Integer	25	Port of the SMTP server.
User name username	String		User name on the SMTP server. If this parameter is set, the applications will implicitly enable SMTP authentication. There is **NO** dedicated parameter to explicitly enable SMTP authentication.
Password password	String		Password for the user on the SMTP server.
Sender address sender.address	String		Sender's e-mail address.
TLS use.tls	Boolean	false	Specifies if SMTP server is TLS enabled.
TLS mode tls.mode	String	STARTTLS	Specifies the method used to secure the connection. Accepted values are **STARTTLS** and **SSL**. STARTTLS upgrades an initially non-secure connection to an encrypted one without requiring a dedicated port for secure communication, whereas SSL immediately establishes a secured connection on a dedicated port.

4.6. Make fonts available

Fonts define how text attribute values are displayed, such as names or descriptions in models, tables, output files, print outs and PDF outputs. These fonts are related to languages used in ARIS. The fonts used are taken from different sources, such as the operating system (OS), the JRE used and the system database of the tenant.

Since ARIS version 10.0.6, **Azul Zulu** JRE is used as an internally used JRE. This JRE provides no fonts anymore.

Make sure that all the fonts needed are available on the operating system of the machine were by ARIS server is installed or in the related tenant.

- To make fonts available server wide, use the tools and procedures related to the operating system in use.
  If you add fonts to the operating system or delete fonts, you must restart ARIS server so that the changes take effect.
- To make fonts available tenant wide, you must add the missing fonts to the system database of each tenant. You can add fonts using ARIS Architect or ARIS.
  Adding fonts to the system database has the advantages that font sets are update-prove and there is no need restarting ARIS server to make changes available.

4.6.1. Manage fonts in ARIS

If you have the **Admin** license and **Configuration administration** function privilege, you can manage the fonts that are available for data evaluation and model graphic generation on this tenant.

You must add any missing fonts that you use in scripts and models, but that are not provided by the operating system of ARIS server. If the used fonts are missing, unreadable content might be displayed. The missing fonts are not rendered correctly in output files, or when you paste a copied model to another application. This can occur, for example, in Japanese, if the default attribute font **MS UI Gothic** is missing. In this case, add at least the **msgothic.ttc** font file.

If ARIS server is installed on a Linux operating system, usually no Windows® standard fonts are available. To prevent unreadable content or incorrect line breaks, make sure to add all used fonts from your Windows® operating system.

To manage the fonts used by evaluation scripts, click **Application launcher > Administration > Configuration > Evaluation** and select **Fonts**. You can import one or more fonts used by evaluation scripts to prevent unreadable content when related fonts are not provided by the operating system of the ARIS server.

1. Make sure that no font is selected.
2. Click **Import**.
3. Browse to one or more font files, such as **msgothic.ttc**, and click **Open**. Use **Ctrl+click** to select multiple files.

The fonts are imported.

To delete fonts that are no longer used by evaluation scripts, select the relevant font, then click **Delete**.

4.6.2. Add fonts in ARIS Architect

Fonts define how text attribute values are displayed, such as names or descriptions in models, tables, output files, print outs and PDF outputs. These fonts are related to languages used in ARIS. The fonts used are taken from different sources, such as the operating system (OS), the JRE used and the system database of the tenant.

When ARIS server is installed on a Windows® operating system, all fonts saved in the **Fonts** folder of the operating system are available for report and model graphic generation. Linux operating systems usually provide a smaller set of fonts.

If you use additional fonts in report scripts or in models, you must add the missing fonts to the system database of this tenant. If a used font is missing, unreadable content appears in report output files or incorrect line breaks show up in model graphics. This can occur, for example, in Japanese, if the default attribute font **MS UI Gothic** is missing. In this case, add at least the **msgothic.ttc** font file.

> **Warning**
> If ARIS server is installed on a Linux operating system, usually no Windows® standard fonts are available. To prevent unreadable content or incorrect line breaks, make sure to add all used fonts from your Windows® operating system to the system database of the tenant.

Prerequisite

- You are the script administrator for this tenant.
- You have access to the required font file (*.**ttf** or *.**ttc**).

Procedure

1. In ARIS Architect, click **ARIS > Administration**.
2. Click **Navigation** in the bar panel if the **Navigation** bar is not activated yet.
3. In the navigation tree, click the folder **Evaluations > Fonts**. All additional fonts available in the system database of this tenant are listed. If no fonts are displayed, only the fonts of the Windows® operating system are in use. These fonts are not displayed here.

4. Click **Add font**. The dialog for file selection opens.
5. Navigate to the required **ttf** or **ttc** file.

   If you want to add fonts, such as the **msgothic.ttc** font file from your **Windows/Fonts** folder, you must first copy them to a different folder. The **Windows/Fonts** folder cannot be used as source folder because the Windows® operating system does not allow direct access.
6. Select the font files and click **Open**.

The fonts are added to the system database of this tenant. They are available for reports and model graphic generation.

If you want to delete a font, move the mouse pointer to the required font, right-click, and click **Delete**.

4.7. Make online help available (optional)

From **Service Release 28** and higher, documents and online help are no longer installed. If your company does not allow access to the ARIS Documentation Website, you can provide this content using an internal Web server with SSL configuration and redirecting ARIS.

Prerequisites

- You have access to a Web server with SSL configuration.
- You have downloaded the zipped help file from the ARIS Download Center, for example **ARIS_Installation_and_Documentation_<version>.zip**, and unzipped it to the **Root** directory of your Web server.

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. Enter the path to your internal Web server on which the documents and the online help are provided:

   help.url="<URL to your Web server>"

   Syntax: "https://<server>:<port number>"

   The default path is: **help.url="https://docs.aris.com/"**
3. To reconfigure the **abs**, **copernicus**, and **arcm** runnables using the **help.url** of your Web server, enter the following on all nodes:

   reconfigure abs_<s, **m**, or **l> help.url="<URL to your Web server>"**

   reconfigure copernicus_<s, **m**, or **l> help.url="<URL to your Web server>"**

   reconfigure arcm_<s, **m**, or **l> help.url="<URL to your Web server>"**
4. To specify the version of the content to be used, enter the following for each runnable on all nodes:

   reconfigure <runnable> help.version="10.2026.4.0"

   Example

   reconfigure abs help.version="10.2025.10"

The help is redirected to your internal Web server.

After an update setup, the help on your internal Web server will keep the current version until you have downloaded the corresponding zipped help file from the ARIS Download Center and updated your Web server.

4.8. Redirect ports

When installing ARIS on a Linux operating system, for security reasons, all ARIS components (runnables) are running under a user account that has no root privileges. Such NON-root users, cannot use privileged ports. Privileged ports are all ports <1024. This restriction in particular affects the **loadbalancer** runnable, through which each ARIS client accesses the application through **HTTP** and **HTTPS** protocol. The standard ports for these two protocols are **80** and **443**, respectively, but due to the restriction, the **loadbalancer** runnable will by default use ports **1080** and **1443**, respectively.

To allow users to access ARIS through the default ports of the respective protocol, a port redirect can be performed.

Procedure

1. To redirect ports, use the basic syntax of the **iptables** command:

   iptables -t nat -A PREROUTING -i <network interface> -p tcp --dport <port number to redirect> -j REDIRECT --to-ports <port number>

   Replace **<network interface>** with the name of the network interface through which each ARIS client accesses the ARIS server. You can use the **ip addr** command to get an overview of all network interfaces and their associated IP addresses.

   Replace **<port number to redirect>** with the port on which ARIS should be made accessible to clients. Usually this is the default port of the respective protocol: port **80** for HTTP and port **443** for HTTPS.

   Replace **<port number>** with the physical port used by the **loadbalancer** runnable, that is: port **1080** for HTTP and port **1443** for HTTPS, unless the load balancer port configuration was changed.

   This example redirects port **80** to port **1080** to allow HTTP access over the standard port for the network interface **enp0s8**:

   iptables -t nat -A PREROUTING -i enp0s8 -p tcp --dport 80 -j REDIRECT --to-ports 1080

   This example redirects port **443** to port **1443** to allow HTTPS access over the standard port, here for a network interface named **eth0**:

   iptables -t nat -A PREROUTING -i eth0 -p tcp --dport 443 -j REDIRECT --to-ports 1443

   Start ARIS Cloud Controller (ACC) [22] and establish a connection.

2. Run a **reconfigure** command on the **loadbalancer** runnable.

   To make the **loadbalancer** runnable know through which ports users are now accessing it, you need to run an ACC **reconfigure** command with the following syntax:

   reconfigure loadbalancer_<SIZING>
   HTTPD.zookeeper.application.instance.http.port=<externalHttpPort>
   HTTPD.zookeeper.application.instance.port=<externalHttpsPort>

   Replace **<SIZING>** with the sizing you used to install ARIS server, such as **s**, **m**, or **l**.

   Replace **<externalHttpPort>** with the port from which you redirect to the physical HTTP port of the **loadbalance**r runnable (usually port **80**).

   Replace **<externalHttpsPort>** with the port from which you redirect to the physical HTTPS port of the **loadbalance**r runnable (usually port **443**).

   This example tells the **loadbalancer** runnable in an **m** size installation that users are now accessing through the redirected ports **80** and **443**:

   reconfigure loadbalancer_m HTTPD.zookeeper.application.instance.http.port=80
   HTTPD.zookeeper.application.instance.port=443

ARIS users access ARIS using the redirected ports.

If runnables do not start up properly, resolve possible port conflicts.

4.9. Redirect HTTPS port

To make ARIS accessible under a privileged port on a Linux system, a user with root privileges has redirect the ports [42], for example, the HTTP port **80** or the HTTPS port **443**.

If you have forced the **loadbalancer** runnable to use HTTPS using an ACC command, such as:

reconfigure loadbalancer_m +HTTPD.EnforceHTTPS="true"

connections cannot be established. This is because users are forwarded to **https://<server name>:1443/** instead of **https://<server name>**.

You must redirect the HTTPS port to **443**.

Procedure

1. Start ARIS Cloud Controller (ACC) [22] and establish a connection.
2. Enter:
   reconfigure loadbalancer_m HTTPD.redirect.https.port=":443"
   You must enter a colon followed by the port number.

Users are forwarded correctly.

4.10. Use external load balancer

If you use an external load balancer (LB), you must reconfigure ARIS LB [43] to prevent system failure caused by ARIS brute-force protection.

When you put an HTTP-based application server behind an external load balancer (LB), the HTTP application will only see the IP address of the LB as **apparent client IP**. Likewise, when TLS is terminated at the external LB, the HTTP server will see that it is accessed via HTTP, as it has no way of knowing that the actual clients had been using HTTPS up to the external LB.

For various reasons listed below, it is important for the HTTP application to know the true clients' IP addresses, the true protocol used from the client's perspective, and the TCP port used:

- If the ARIS LB does not know the true client IP, it cannot log it in its access log - the access log will only show the IP of the external LB all the time. This might not be a problem until you try to find out which client did a bad request.
- ARIS has a mechanism to limit the number of failed logon attempts, so that an attacker cannot brute-force passwords. This mechanism logs the number of attempts individually for each client IP. If the attacker at 1.2.3.4 tries to brute force his way into the system he will be slowed down after a few failed attempts. This will not affect other users accessing the system from other IPs. But if the application only sees the IP of the external LB, failed logon attempts all seem to come from the same IP. This makes the brute-force protection become active much earlier because all failed attempts, even if it is not an attack but just a typo, are counted for the same IP - that of the external LB.
- in some situations ARIS server needs to create a link to itself and send that to the client. For example, when Process Governance processes are sending notification mails that contain links to a certain resource in the application, these links should use the host name, protocol and port that the actual end users are using to access the application. Not the host name, protocol and port that the external LB is using to communicate with ARIS. A similar mechanism is going on with the download client **download mechanism**.

Because of this, it is necessary that ARIS in some way gets information about:

- The true IP address of the client.
- The protocol the client originally used to access the application.
- The port used.
- The host name used.

With an external LB in front and without additional mechanisms, all this information would be lost if you did not use the **X-Forwarded-* header** mechanism. Slightly simplified it work like this:

- **X-Forwarded-For** contains the original client IP address.
- **X-Forwarded-Port** contains the port that the client originally used.
- **X-Forwarded-Proto** contains the protocol (HTTPS or HTTP) that the client originally used.
- **X-Forwarded-Host** contains the original host name that the client used.

There is also a more recent header specified (**Forwarded header**), which puts all this information into a single header, but the concept is the same.

To make all the functionality above work properly, an external LB has to add the **X-Forwarded-* headers** or the **Forwarded header** to the request, putting in the true client information.

However, if ARIS would simply accept these headers from anywhere, an attacker could create requests that already contain these headers. For example, using the **X-Forwarded-For** header, he could circumvent the login attempt limitation. He could use a physical IP address, but change the IP in the **X-Forwarded-For** header for each attempt. For this and similar reasons, ARIS LB will by default not accept any of the **X-Forwared-*** headers from anyone. They will simply be removed from the request before passing it on to the actual application micro services.

Using the **HTTPD.X-Forwarded-For.trusted.proxy.regex** parameter, you can specify a regular expression. Any client IP that matches this regex will be considered trustworthy, and only from those the ARIS LB will accept the **X-Forwarded-*** headers.

Note that while this parameter name suggests that it is only relevant for the X-Forwarded-For it is now used for all of these headers - we merely decided to keep the parameter name for compatibility.

Therefore, in any scenario where clients do not directly access ARIS LB, but go through external LBs, you must declare the IPs of your external LBs as trustworthy to ARIS LBs. Therefore, reconfigure each ARIS LB. And if your external LB is using more than one IP address to access ARIS, you must change the regex so that all of these IP addresses match. The regex syntax used is that of the perl-compatible regular expressions library (PCRE) https://www.pcre.org/. The only caveat is that if you need to use a backslash in your regex (like to escape the "." in the above proposal), it has to be replaced by four backslashes.

Example 1.

If the IP of your external LB is **198.20.212.156** and you are using two ARIS LBs, enter the following ARIS Cloud Controller (ACC) commands:

on n1 reconfigure loadbalancer_l HTTPD.X-Forwarded-For.trusted.proxy.regex="198\\\\.20\\\\.212\\\\.156"

on n2 reconfigure loadbalancer_l HTTPD.X-Forwarded-For.trusted.proxy.regex="198\\\\.20\\\\.212\\\\.156"

5. Support and legal information

This section provides you with some general information regarding product support and legal aspects.

5.1. Documentation scope

The information provided describes the settings and features as they were at the time of publishing. Since documentation and software are subject to different production cycles, the description of settings and features may differ from actual settings and features. Information about discrepancies is provided in the Release Notes that accompany the product. Please read the Release Notes and take the information into account when installing, setting up, and using the product.

If you want to install technical and/or business system functions without using the consulting services provided by SAG ARIS GmbH, you require extensive knowledge of the system to be installed, its intended purpose, the target systems, and their various dependencies. Due to the number of platforms and interdependent hardware and software configurations, we can describe only specific installations. It is not possible to document all settings and dependencies.

When you combine various technologies, please observe the manufacturers' instructions, particularly announcements concerning releases on their Internet pages. We cannot guarantee proper functioning and installation of approved third-party systems and do not support them. Always follow the instructions provided in the installation manuals of the relevant manufacturers. If you experience difficulties, please contact the relevant manufacturer.

If you need help installing third-party systems, contact your local ARIS sales organization. Please note that this type of manufacturer-specific or customer-specific customization is not covered by the standard ARIS software maintenance agreement and can be performed only on special request and agreement.

5.2. Support

Product support

We provide support for ARIS products to all customers with a valid support contract.

Information on product version availability and support, as well as sustained support dates, is available at ARIS Community.

Contact our Global Support services at ARIS Community to raise and update support incidents, or post ideas and feature requests.

Community

Register with ARIS Community to download products, updates and fixes, find expert information, and interact with other users.

Documentation

For information on how to use and activate products and for other technical support questions, visit the ARIS Documentation website.

If you want to give feedback on any documentation topic, write to documentation@aris.com.

5.3. Legal notices

This document applies to ARIS Version 10 and to all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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