Automation Engine 21

Pre-Install IT Requirements and FAQs

ESKO✳

Contents

1. Introduction

This document describes the information needed to prepare and facilitate the installation of an Automation Engine. It also answers typical IT related questions.

General system requirements for the involved computers can be found on *this page*.

> **Note:** This document mentions components and features that are commercially optional.

> **Note:** The term 'CP' is often used as abbreviation for 'Commercial Print' (page workflows).

There are two sections in this document :

1. Technical details of an Automation Engine setup.
2. Guidelines and good practices in setting up an Automation Engine environment.

2. Technical Details

2.1. Automation Engine in its environment

2.1.1. Components Glossary

Component	Description
Automation Engine Master server	Main server where all clients are connecting to. This server manages the Jobs, tasks and other databases. This server also executes the actual server tasks. This master server is set up on premises or at a hosting data center and so available as an AE SaaS.
Automation Engine Assistant server	Assistant server that can execute tasks to take away load from the Master server.
Application server	Component serving the Automation Engine page workflow tools (the Pilot modes for commercial print). It is also used by some tools in the Layout module. Note: Since AE v20, the AE Viewer no longer uses this server but uses its own Viewer server.
Database server	Server where the databases are located. Typically this component is found on the Automation Engine Master server.
Client	A client workstation is connecting to the Automation Engine Master server via the Pilot or Shuttle application or via a browser client. Editors can also connect to the server (Esko editors or Adobe Illustrator).
Imaging Engine	Esko RIP component built into Automation Engine (commercial option). Offers tasks to generate digital files for proofs and/or plates.
FlexRip	Separate Esko RIP product that the Automation Engine Master connects to. FlexRip/FlexProof was the predecessor of Imaging Engine.
WebCenter	Esko's online collaboration tool.
File server	Where the actual graphics data is. Automation Engine can work with all files in data shares that you configured to be Automation Engine 'Containers'.

Mail server	Your mail server that can be used by Automation Engine to send out e-mails.
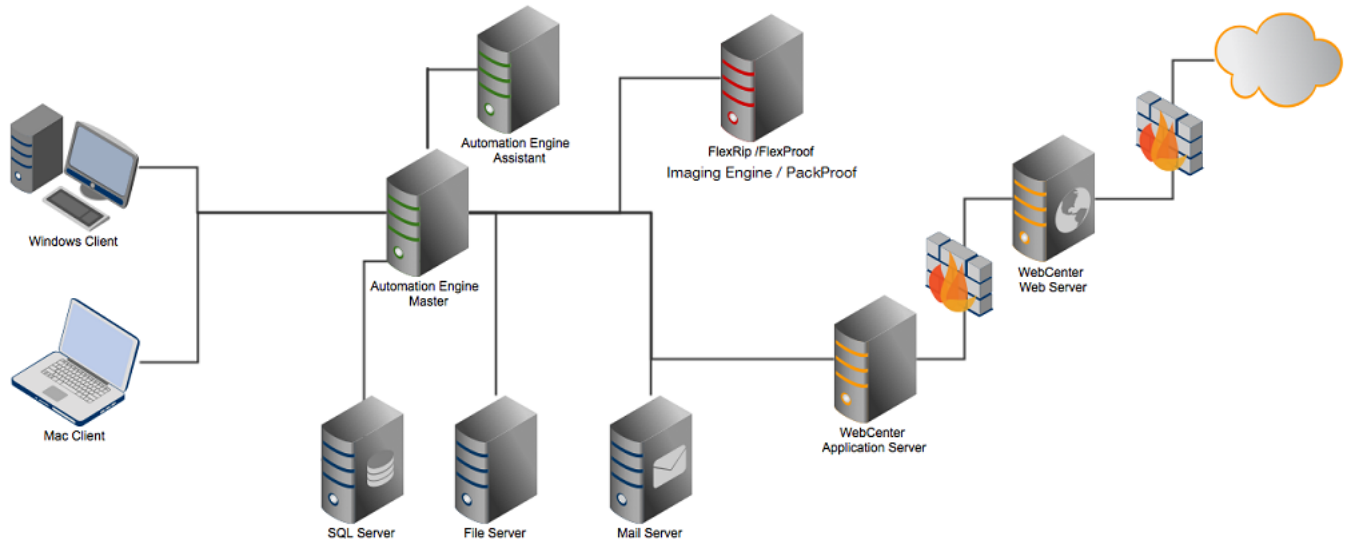
2.2. Automation Engine installation

2.2.1. Automation Engine System Account

Automation Engine needs a **System Account** user to run its service and to connect to other network components.

The Automation Engine **System Account** must meet following requirements on the Automation Engine Master server computer:

- should be a member of the group **Administrators**
- should have the right "**Log on as Batch**"
- should have the right "**Log on as Service**".

A first installation of Automation Engine creates a local user **BGSYSTEM** on the Automation Engine Master according to these requirements. This user then serves as the Automation Engine **System Account**.

For IT security reasons, you may want to change this user. Learn how to do this with the dedicated tool in the *System Account page in the Server Admin web page*.

2.2.2. Services

An installation of Automation Engine will install these services:

Service name	Service running under	Purpose
BGMD	Automation Engine System Account	Automation Engine's main service
EG STATION INFORMATION SERVICE	Local System User	System info collection service
AEWebApp	Automation Engine System Account	Web server for the Server Admin web pages and client updates
FLEXlm License Manager	Local System User	License manager
FLEXnet licensing service	Local System User	License manager
EGNKLS	Local System User	Esko NetKey License Server. Used as GlobalVision License server for the GlobalVision "Inspect" tasks.
MSSQLSERVER	Network Service	Default database server
MSSQLServerADHelper	Network Service	SQL Server Active Directory Helper
SQLWriter	Network Service	SQL Server VSS Writer
SQLBrowser	Network Service	SQL Server Browser
EGTunnelServer	Automation Engine System Account	Web server for remote access to Automation Engine

2.2.3. Shares

These shares are created during the installation of Automation Engine:

Sharename	Purpose	Access
AutomationEngineImgFolder	Temporary folder for image data	server only
AutomationEngineLogging	Automation Engine log files	server only
AutomationEngineTmpFolder	Temporary folder for Automation Engine tasks	server only
bg_data_cms_v010	Central resources – Color management data	server and clients
bg_data_custom_v010	Central resources – Automation Engine presets	server and clients
bg_data_dgc_v010	Central resources – Dot gain curves	server and clients
bg_data_fonts_v040	Central resources – Fonts data	server and clients
bg_data_ipldata_v010	Central resources – CIP3/ Inkplanner presets	server and clients

bg_data_marks_v010	Central resources – SmartMarks sets	server and clients
bg_data_screens_v020	Central resource – Screens for Imaging Engine	server and Imaging Engine RIPs.
bg_data_system_v010	Central resources – License configuration	server and clients
DeskPackContainer	Container for temporary DeskPack iles	server and clients
ExampleJobContainer	Default data container created at first install	server and clients
FastRipTask	FlexRip temporary folder	server and clients
Impose	FastImpose templates, marks and defaults	server and clients
PitStop	Enfocus PitStop templates and configuration data	server and clients

Note: The access right of these shares is set to **Read/Write for 'Everyone'**.

Note: In case you would like to restrict permissions on these shares, be aware that these permissions affect the access by desktop applications like PackEdge, ArtPro Action List Editor, Curve Pilot, FlexRip, etc. Note that they do not affect access to the Pilot. The Windows users *used to start up* these desktop applications, as well as the Windows users *used to mount* shares needed for Mac applications, must have read and write access to those shares.

Additionally, the *Automation Engine system account* must have read and write access to these shares as well.

2.2.4. Installation Folder

Automation Engine is by default installed on the root drive in a folder called `Esko`.

Automation Engine can not be installed in the **Program Files** or **Program Files (x86)** folder.

Every Automation Engine installation will create and use a temporary folder in the Esko folder (BG_TMP).

Tip: It is good practice to defer that folder to a drive other than the system drive. Learn more in the *Installation Guide*.

2.3. Network Details

2.3.1. Network Configuration

Automation Engine requires TCP and IPv4 to work.

Note: IPv6 is not supported.

You need to configure DNS correctly. Links to other networks should be configured using host names, not IP addresses.

If a DNS and/or proxy server is used, make sure all components in the environment (Automation Engine server(s), Automation Engine client, Proxy Server) are able to do an `nslookup on hostname` of all other components.

Caution: After installation of the Automation Engine software, the host name of that server can not be changed.

2.3.2. Ports

These are the ports used by Automation Engine and the client software:

TCP :

- 8000-9000 for BGMD and the Automation Engine servers
- 5182 for ShuttleServer, unless configured otherwise
- 4401 for the Automation Engine JDF Server (service port)
- 1433 for the SQL server (default installation)
- 27100 and a dynamic port for Station Information Service
- 1098 RMI port for the Automation Engine Application Server
- 1099 the JNDI Naming Service for the Automation Engine Application Server
- 4444 the RMI Object for the Automation Engine Application Server
- 4445 the Transaction Manager for the Automation Engine Application Server
- 5544 the Automation Engine CDID server that communicates with a CDI's DFS application
- 10002 the GlobalVision License server (learn more *here*)
- 27000 for the License Manager service
- 4420 for JMF communication with Imaging Engine.

HTTP:

- 9000 for the web server port of the browser client workspaces
- 9999 for the Server Admin web pages (egwebapps.exe)
- 9897 for the Server Config web pages
- 18560 for the Automation Engine Viewer
- 8080 for the Automation Engine Application Server

- 4411 for the Automation Engine JDFServer (JMF)
- 4412 for the Automation Engine Frip2JDF Server, which communicates with the DFS/PlatePrep and Grapholas software on CDI's
- 4415 for the Automation Engine Web Service (ElemServer) (unless configured otherwise)
- 44110 for the JMF port of the task Interact using JDF/JMF.
- 44111 for the JMF port of the Devices server.
- 443 for all tunnelserver communication with Automation Engine (used for signing in with Okta and used in a SaaS setup)

Connection with clients:

- The server sometimes relies on ephemeral ports, for example for uploading files in Pilot. These ports are picked randomly between 49152 and 65535.

2.3.3. LAN/WAN Network Performance

Automation Engine client-server connection requires decent network performance. This is also true for the server's access to remote containers and/or devices.

Latency simulations in a lab environment show that:

- With delays below 20ms, client (Pilot) performance or access to remote containers and/or devices is optimal.
- With delays till 50ms, client performance or access to remote containers and/or devices is relatively acceptable.
- With delays around 100ms (and higher), client performance or access to remote containers and/or devices is poor to unacceptable.

Therefore Automation Engine is not suited to run in a WAN environment.

> **Warning:** Using tools such as remote desktop services is in violation with the EULA (End User License Agreement).

> **Note:** Automation Engine is also available as a SaaS solution. Learn more in *NEW - AE SaaS: When your AE is in a Data Center*.

2.4. Database server

Installing Automation Engine also automatically installs an **SQL Express** database engine. However, for scaling and performance reasons, one can choose to use a **Full SQL Server**. Learn more in *Using a Full SQL Server* on page 21.

> **Note:** Since v18.0, SQL 2008 and 2008 R2 are no longer supported. Learn more on the Esko Knowledge Base in *this article about upgrading SQL 2005/2008/2008R2 to a recent supported version*.

2.4.1. Installation Details

Mandatory components:

- SQL Server Database Engine
- Replication and Fulltext components

Mandatory installation parameters:

- Collation settings: Use Windows' defaults (supported from Automation Engine 14.0.1 on)
- Security Mode: SQL
- TCP protocol for the SQL Server service: enabled

> **Note:** These are the installation parameters used to install the default MSSQL Express server:

```
/ACTION=INSTALL
/FEATURES=SQLEngine
/BROWSERSVCSTARTUPTYPE=Automatic
/SQLSVCSTARTUPTYPE=Automatic
/SQLSVCACCOUNT="NT AUTHORITY\SYSTEM"
/SQLSYSADMINACCOUNTS="BUILTIN\ADMINISTRATORS"
/IACCEPTSQLSERVERLICENSETERMS=1
/INSTANCENAME=<instancename> of MSSQLSERVER for unnamed instance
/SECURITYMODE=SQL
/SAPWD=<default password>
/TCPENABLED=1
```

2.4.2. Configuration details

Automation Engine requires 4 databases to run:

- BSJobs
- FastLane_TM
- FastLane
- fasttrack

> **Note:** The terms `BS` and `FastLane` refer to names of old Esko products that Automation Engine's server framework originates from.

To access and modify these databases, Automation Engine needs a user who can:

- Log in to the Database server
- Database roles:

  - db_owner: Members have full access.
  - db_accessadmin: Members can manage Windows groups and SQL Server logins.
  - db_datareader: Members can read all data.
  - db_datawriter: Members can add, delete, or modify data in the tables.
  - db_ddladmin: Members can run dynamic-link library (DLL) statements.
  - db_securityadmin: Members can modify role membership and manage permissions.

• db_backupoperator: Members can back up the database.

2.4.3. Oracle as Database Server for the Application Server component

⚠ **Attention:** From Automation Engine 18 on, this support for Oracle was set to 'Soon Outdated'. This means that, in a next major version, support for this database server will be removed.

An Oracle database server can be used to run the `Automation Engine Application Server`.

Using Oracle will increase performance of the Pilot modes **Pages**, **Proofs** and **Plates**. These modes are only used in a production workflow for books and magazines.

Following database server versions are supported:

• Oracle 10g Standard Edition, Enterprise Edition
• Oracle 11g Standard Edition, Enterprise Edition

⚠ **Caution:** Using Oracle as a database server for `BSJobs`, `FastLane_TM` and `FastLane` is not supported.

2.5. File Server

2.5.1. File Server OS Types

All Esko applications running on Windows OS can use data that is available on network shares. For Automation Engine to perform according to expectations, these shares need to be on NTFS volumes on Windows file servers.

As file server, we recommend to use Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2 or Windows 2016 (preferably the same version as for the Automation Engine server).

As only Windows file servers are supported, Mac OS X or Unix/Linux (CIFS/SMB or NFS) data servers for example are not supported (including many Network Attached Storage units).

2.5.2. Supported Access Protocols

Esko does not support file server access over protocols other than "Windows File Sharing".

2.5.3. File Server Access

The Automation Engine System Account must have read and write access on the shares. Learn more in *Automation Engine System Account* on page 6.

2.6. Mail Server

Automation Engine can send e-mail to communicate with your colleagues or customers, but also with Esko Support, to report and document any problems.

Supported protocols are :

- smtp
- smtps (secure)

You can set up your corporate mail server or any Google Servers to be used by the Automation Engine to send e-mails. For setting up a Google Server, you need a Google mail account. You can configure Automation Engine to use a secure connection to smtp.gmail.com on port 465 using that account.

Learn more on configuring the use of an e-mail server in *E-Mail Configuration*.

2.7. Users and Groups

2.7.1. Old and New User Model - Before and Since v20

BEFORE v20. The OLD User Model

Before v20, users created by Automation Engine were always Windows users on the Automation Engine server computer. You could use a tool in Automation Engine to add them, but they were actually created on the Windows OS of the server.

- **Local Windows user**. This is a user whose user name and encrypted password are stored on the computer itself.

- **Domain Windows user**. This is a user whose user name and password are stored on a domain controller rather than the computer the user is logging in to. Your IT staff manually had to add those domain users to the Windows groups BGUSERS or BGADMIN.

As security requirements became more important, Automation Engine had to step away from this model.

Learn more on the page *Migrating from the Old User Model to the New one* on page 14.

SINCE v20. The NEW User Model

As introduced in the page about *Authentication and Authorization*, user accounts that you can sign in with to Automation Engine 20 and later can come from several *Identity Providers* (IdPs).

Creating users using an Automation Engine tool no longer creates Windows users.

Since v20, Automation Engine accounts can be provided:

- by Automation Engine itself: These are called **Internal** users.

- by the Windows user subsystem: These Windows users exist after an upgrade (corresponding to both local and domain Windows users from the old user model), or can get created when a domain Windows user signs in for the first time.
- by an external IdP:

    - **LDAP**.

        > ⚠️ **Attention:** In v20.0, the support for LDAP users is still in pre-release.

        Only Microsoft Active Directory on a Windows Domain Controller is supported as an external IdP.

        When LDAP support goes mainstream, Automation Engine setups with Windows domain users will obviously be guided to use this type of provider.
- The support for more providers is in progress.

Configuration of the User Model in Automation Engine

You can disable specific identity providers and configure the ones you want.

This is done in a special version of the Server Admin web page that only runs locally on the AE server computer itself.

Learn more in the chapter on AE Server management, in *The AE Server CONFIG web page*.

2.7.2. Migrating from the Old User Model to the New one

Automatic Migration to the New User Model during an Upgrade to v20

When upgrading an Automation Engine to version 20.0 or higher,

- All existing Automation Engine users, both local and domain Windows users, are converted to the new user model and categorized as users of the provider 'Windows'. See the column **Provider** in the Users view.
- You can use these migrated users in v20, but, in a next major version, Automation Engine will no longer support users of the provider Windows.

    > ⚠️ **Attention:** We strongly advise to prepare to further migrate users from the legacy provider Windows to the modern Internal or LDAP provider. Learn about the dedicated tool to *migrate users*.

- The migrated users keep all their attributes, including its e-mail, Access Rights, Views, Smart Views, Favorites, etc.
- The migrated users can sign in with their same user name and password.
- The former user properties Name and Domain are now combined into the single new User Name property in which the former name and domain are separated by the @ sign.

    - New AE users with provider Windows that map to local Windows users (on the AE master server) will always have a user name that ends in "@<server>", with <server> being the host name of the AE master.
    - As before, when a user's domain is not the local host, he needs to add the domain name to his user name, for example `george23@bigcompany.com`.
- The upgrade also migrates the two predefined Windows user groups BGADMIN and BGUSERS to the v20 concept of groups, where they still contain the same users.

    - Members of the group BGADMIN are, as before v20, granted the right to administer the server.

- The upgrade also creates as many new AE roles as there were custom groups as you could see in the Pilot of the older version (**Setup views** > **Users view** > **tab Groups**). Their names and predefined Access Rights are kept, as these new AE roles serve the same purpose as the old custom groups. The imported AE users that previously belonged to such an old custom group, are now attributed the corresponding new AE role.

- Automation Engine continues to need a **System Account** user to start and run the main server software (the service BGMD) and to enable connectivity to other network components. This account (by default the user BGSYSTEM) still needs to be a Windows user, for example to grant client users the access to 'Explore' Containers (access to data shares). Learn more in *Automation Engine System Account* on page 6.

When, on v20, Restoring a Backup from an Older Version

- All users in the backup (these are all users that at least once actively logged on to the older version server where the backup is taken from) are 'imported' at restore time into the new user model of AE 20.0 as new AE users with provider Windows.
- The behavior after restoring is identical to how it was before v20. For example, only the user related information about Favorites is restored, which implies that not all functionality that in one way or another relates to users and/or relates to information about them will behave as on the system the backup was taken from).
- The behavior about local or domain Windows users after the restoring is the same as after an upgrade to v20 (see above).

Migrating Users Yourself to another Provider

The *Users* view offers a dedicated tool to manually migrate users.

Learn more in *Migrating Users* on page 15.

2.7.3. Migrating Users

Migrating Windows users to Internal or LDAP users

- In the Users view, select one or more users from the provider Windows.

    When selecting multiple Windows users, they must all belong to the same domain. The domain of a user is the part of the user name after the (last) "@" character.

    > **Attention:** Users that were not visible in the Users View at the moment of selection will not be taken into the selection. An example: If you have 200 Windows users belonging to the same domain, you should not select all of them and migrate all 200 in one go. Only the users visible in the view at the time of selection will belong to the selection (maximum +- 50).

- Right-click your selection and choose **Migrate Users...**
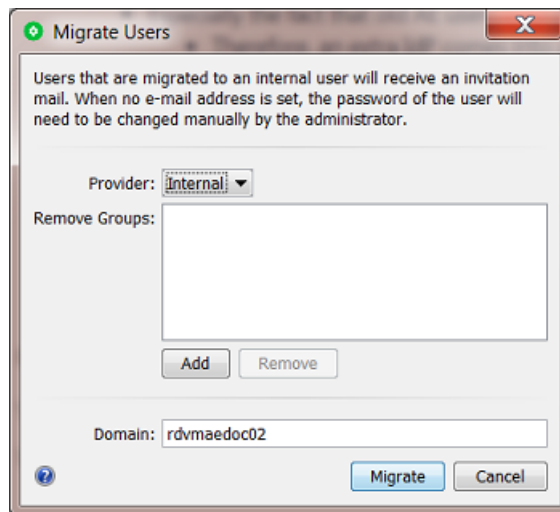
- **Provider**: Select the new provider:

  - **Internal**:

    - Windows user passwords cannot just be taken over. That is why users that are migrated to an internal user will receive an e-mail that invites them to choose a new password. When no e-mail address was set, the password of the user will need to be changed manually by the administrator.
    - All other user related properties are kept (Full Name, E-mail Address, Description).
    - Note that migrating a user will not remove that local Windows user at the Windows OS level, nor will it remove it from the BGUSERS or BGADMIN local Windows group it belongs to. Still it will not be possible anymore to use this local Windows user's credentials to gain access to Automation Engine.

  - **LDAP**:

    Important: In v20.0, the support for LDAP accounts is still in pre-release.

- **Remove Groups**: When migrating users, it is possible to select some groups from which the selected users should be removed.

  This could be the moment to remove them from the old groups BGUSERS and BGADMIN that were migrated during the upgrade to v20.

- **Domain**: Leave this field empty to strip of the domain name from the user name. Or type in a new domain name for that user. Be aware of these consequences:

  - When migrating to the **Internal** provider:

    - **Leaving the domain part as it was** will always require the full name to be used at sign in time (whereas, before migrating the user, the name without the domain part may have been sufficient).

      The benefit however is that this choice ensures that all user related info is kept (settings for Views, Access Rights, Red Alerts as well as Preferences and Favorites) and user related behavior remains identical (for example user presets in Access Points, To-dos, Tickets, SmartName resolving, Notification e-mails).

- **Clearing the domain part** makes it easier at sign-in time, but comes with the limitation that only the user related info about Favorites can be kept. This choice may also influence the user related behavior.

- **Changing the domain part** into another domain name is possible, but probably does not make much sense. It also comes with the same consequences as clearing the domain part.

- When migrating to the **LDAP** provider:

  - **Leaving the domain part** as it was keeps all user related info (settings for Views, Access Rights, Red Alerts as well as Preferences and Favorites) and user related behavior remains identical (for example user presets in Access Points, To-dos, Tickets, SmartName resolving, Notification e-mails).

  - **Changing the domain part** into another domain name could make sense if that is required to map the (domain) Windows provider identities to LDAP provider ones. This however comes with the limitation that only the user related info about Favorites can be kept. Also, the user related behavior may be influenced by this choice as well.

  - **Clearing the domain part** makes no sense.

- Click **Migrate**. A dialog will provide feedback.

2.7.4. FAQs about the User Model

- **Q: Does Automation Engine support Single Sign-On?**

  - A: The Automation Engine client software does not yet offer any implementation for *Single Sign-On* (SSO).

- **Q: What if the password of the only Admin user can't be found?**

  - A:

  1. When you have access to that user's mailbox, try the "Forgot password?" tool to set a new password.
  2. When you can't use this tool, contact Esko Support.

     > ⚠️ **Attention:** For security reasons, user information is kept out of Automation Engine's SQL databases.

- **Q: What happens when I restore a backup that contains pre-v20 users?**

  - A: For example: you have a new installation of v20 and restore a backup onto it that was made of a v18.1.

    The v18.1 users in that backup will be added to the new v20 as they were: They will appear in the Users view, with provider Windows.

    So basically the result is the same as if you would have upgraded on that server from v18.1 to v20.

2.7.5. User and Groups in the Old User Model

Windows Users & Windows User Groups

Before v20, users in Automation Engine always mapped to Windows users Automation Engine *master* server computer.

These Windows users were organized in two local Windows groups on that Automation Engine server:

- **BGUSERS**: normal users

- **BGADMIN**: administrator users

> ⚠ **Attention:** Automation Engine user groups do **not** correspond to Windows user groups.

Before v20, in the old user model, there was no tool in the Pilot to create user groups. All had to be done via Windows tools.

Before v20, when you used the tool in the Pilot to create a new user, a local Windows user with the same name was created on the Automation Engine server computer.

Windows Domain Users

You could also add existing Windows "domain users" to become Automation Engine users. This is still valid in the new user model since v20.

If you want to use domain users, your IT staff needs to assign these domain users to either the BGUSERS or the BGADMIN local Windows group.

To use domain users in Automation Engine, this requires that the Automation Engine System Account can retrieve user info from the Active Directory.

Learn more in *Automation Engine System Account* on page 6.

> ⚠ **Caution:** Automation Engine does not offer support for Domain Groups.

The System Account

The Automation Engine **System Account** is a special user that runs the Automation Engine services and connects to other network components.

The default System Account is the user **BGSYSTEM**.

You can change this to another account by using *the System Account page in the Server Admin web page*.

2.8. The Automation Engine Pilot

2.8.1. Java

On Windows and MacOS, a Java Runtime Environment (JRE version 1.8) is distributed with the Pilot client application. You do not need to install Java on the client computer yourself.

2.9. The Automation Engine Web Service

Web server software that Automation Engine web tools are hosted on

Automation Engine tool	is hosted on
Automation Web Services (used by the Web Service Access Points)	Jetty
Automation Engine Server Admin web page	Jetty

FAQs

- **Can we apply a certificate to the Automation Engine Server Admin web page (because out of the box there is no certification assigned at all)?**
  - A: Yes. Learn more on the page *Configuring and Checking the Automation Engine Web Service*.

- **What is Automation Engine's dependency on IIS (Internet Information Services from Microsoft)?**
  - A: None.

3. General Guidelines

3.1. Scalability and Performance (AE server on-premises)

> ⚠️ **Attention:** Most of below information relates to an Automation Engine setup on-premises, and not an AE SaaS setup.

3.1.1. Adding an Automation Engine Assistant

Adding Assistants spreads the task load over more computers.

Per Master server group, independent of the number of Assistants in this group, the maximum of processing channels is 16.

When, even with 16 processing channels, queues keep getting longer and tasks are still not executed fast enough, then you should consider *adding an extra Master server (group)*.

Adding an Assistant to Increase Throughput

Automation Engine comes with a built-in limit on the amount of concurrent tasks (tasks that are processed simultaneously). The number of concurrent tasks that can be processed depends on the licenses purchased . When you evaluate and define the amount of needed concurrent tasks you should take into account the number of processed files and the number of task run on these files over a certain period.

The amount of concurrent tasks needs to be in line with the capacity (RAM/CPU) of the Automation Engine server. More concurrent tasks will increase the load on the system. If the capacity of the Automation Engine server has reached it's limits, it can be increased by adding one or more Assistant servers. One Automation Engine server will then take the role of Master, the other(s) will take the role of Assistant. The Master will monitor its own load and the load of the assistants to decide on which server a task should be executed.

Adding an Assistant for Redundancy

An Automation Engine Assistant is not an out of the box fail safe solution.

However, it could be used in a fail safe scenario. In case the Master breaks down, an Automation Engine server in an Assistant role can be promoted to become the Master server. A full backup package of the Master (Configuration, Resources, Databases) can then be restored on the Assistant to rebuild the initial configuration. Note: the backup package of the Master generated by the scheduled backup procedure of Automation Engine can be automatically copied to the Assistant.

Fail safe solutions based on proper backup tools or on snapshots of virtual images are a valid alternative, and might be seen as a more effective solution.

Adding an Assistant versus Adding an extra Master

When throughput needs to be increased, adding an Assistant is sometimes not the best option. When the production/organization can be split into logical components, it could make sense to add an extra Master.

Also in a group of a Master and his Assistants there is only 1 'CPU queue'. Each time an entry of this queue can be processed (= when a processing channel becomes available), the best suited computer in that group is chosen to execute this task. The best suited computer is the one with the least load on CPU/memory.

> **Tip:** Learn more on Master and Assistant setups in the chapter *Automation Engine Server Management*, in its section on *Server Roles*.

3.1.2. Redirecting Central Resources

Following shares are considered as central resources:

- bg_data_cms_v010
- bg_data_custom_v010
- bg_data_dgc_v010
- bg_data_fonts_v040
- bg_data_ipldata_v010
- bg_data_marks_v010
- bg_data_screens_v020

It is allowed to redirect these resources to a central file server. Valid reasons for doing this are:

- Access: these shares also need to be accessible for other applications/servers than Automation Engine (PackEdge, ArtPro, FlexRip,...)
- Backup strategy: these shares contain critical files such as color profiles, marks, curves etc. Remember that these shares are also included in Automation Engine's scheduled *backup*.

> **Note:** Esko recommends keeping the resources on the Automation Engine server to avoid extra network traffic.

3.1.3. Using a Full SQL Server

Express edition versus Full SQL Server

Automation Engine requires a working DBMS (Database Management System) for its proper operation and "persistent storage".

Microsoft's SQL Server Express Edition is delivered and installed together with Automation Engine. Automation Engine is configured to work with this SQL Server as default DBMS in this out-of-the-box setup. The installation creates new and empty databases and users.

The SQL Server Express Edition software has these limitations :

- Database sizes are limited to 10 GB.
- The service named `SQLServer` will only use 1 CPU and will restrict its memory usage to 1 GB.

In many cases, the SQL Server Express Edition will be sufficient. However, from a certain load or performance expectation onwards, it is highly recommended to upgrade your Express edition to a "full" SQL Server.

The next pages give recommendations as to when the DBMS for an Automation Engine installation should be upgraded from an Express Edition to a full SQL Server.

Database Size Limitations

SQL Server Express Edition, which is delivered along with Automation Engine, has a size limitation of 10 GB per database. However, you can scale up to a full version of SQL Server to increase the size limit to the disk size.

Given that Automation Engine has three main databases (or four, depending on the configuration), consider the following points:

- **Jobs database**: Automation Engine does not function as an archiving system. To keep the Jobs database size under the limits, we recommend:

    - only keep a Job online for it's lifetime. The *concept of a Job* is temporary by nature. Jobs, after a while, are done. If you have many re-prints of products, then consider using the Products tool as well (which does use the same database as Jobs).

    - archiving unused Jobs and Products.

    Note: Theoretical limits regarding the number of Jobs and Products exceed the practical Express Edition server demands (<50.000 Jobs / <250.000 Products) considerably.

- **Task Monitor database**: To keep the size of the Task Monitor database under limits, we recommend:

    - setting up adequate **Task Clean Up rules**. Clean up can be removing them of it can be moving them to a separate task-archive: the **Task History database**.

    Note: The theoretical limit on the number of tasks in the Task Monitor in terms of size (>100.000 tasks) is overruled by what the Express Edition server can handle in terms of performance (<100.000 tasks).

- **Task History database**: When you do not want to delete the past tasks, we recommend to regularly (automatically) archive them into the *Task History* database, this to keep the **Task Monitor database** database size under limits.

- **fasttrack database**: used for the page workflows' Pages, Plates and Proofs View . The SQL Express Edition is not supported to be used for the Pages, Plates and Proofs Views.

Learn more in:

- *Performance Considerations* on page 23.
- *Recommendations* on page 23.

Performance Considerations

The Automation Engine server performance depends on the performance of the used DBMS. This may be noticeable when searching a Job in the Pilot (for example while filtering), when monitoring tasks (while filtering or scrolling), when executing tasks (while persisting their state, progress, ticket, ...) etc.

The number of tasks ran per day and the average number of connected operators (using a Pilot or Shuttle) determines the load put on the Automation Engine server and its DBMS. In addition, the setup of the DBMS and the environment in which it is running will also have an important effect on performance :

• The SQL Server software can be installed on the same computer as the Automation Engine software or on another computer.
• If the SQL Server is installed on another computer, then the network is involved. Under-performing network components may seriously influence DBMS performance. Other software running on that computer may influence performance as well.
• If the SQL Server is installed on the same computer as the Automation Engine (Master or Assistant), that may have an impact on the amount of memory and CPU resources available to Automation Engine.
• An SQL Server can be set up to run 1 instance (unnamed or the default), or even multiple (named) instances. In case of an Express Edition, each instance then has its own limitations (as described above), independent of the others.
• Each Automation Engine database may be configured independently of the others (to potentially point to different SQL Server instances on potentially different computers).

Issues with database performance can be noticed in the following situations (but are not limited to):

• a decline in average response time as experienced by users of the Pilot.
• a decline in average time between the moment of submitting a task and the moment the submitted task starts processing.

Recommendations

We recommend upgrading the SQL Server Express Edition to a full SQL Server in one or more of the following conditions:

• when more than 30.000 tasks are processed per day. This typically corresponds to 1.000 Jobs or files per day.
• when more than 100.000 processed tasks are constantly present in the Task Monitor (assuming that cleanup rules are set up adequately).
• when more than 20 active Pilots are connected simultaneously.
• when Automation Engine is licensed and configured to run more than 7 concurrent tasks.
• when the database size limitation risks to be exceeded.
• when you use the functionality of the Pages, Proofs and Plates views (in page imposition workflows).
• when there is a continuous load on the Automation Engine server (when production runs 24 hours per day).

When upgrading to a full SQL Server, special attention must go to provide sufficiently powerful hardware. When the SQL Server is installed on a dedicated computer, we recommend:

• SQL Server 2012, 2014, 2016 or 2017 Standard Edition

- a powerful machine (4-8 CPU)
- 64-bit OS (Windows Server 2012, 2012 R2 or 2016)
- with at least 16 GB RAM (preferably 32 GB)
- with a high performance network card.

Note: While SQL Server Express Edition is expected to be adequate, problems due to database hiccups can happen (for example when peak load happens frequently, which might cause some of the numbers mentioned above to be surpassed temporarily, but not on average). In such cases, we recommend consulting Esko Support and switching to a full SQL server.

Local versus Remote SQL Server

Especially when you choose to work with a Full SQL Server, Esko recommends to not have this database server(s) installed on the Automation Engine Master server but on a separate computer. This is often done in case of large IT setups or to comply with specific internal IT requirements.

Attention: Using a remote SQL Server does means that there is a large amount of (extra) network traffic between that database server and the Automation Engine server software. This setup therefore requires a very reliable and fast network.

Note: It may be easier to increase the power of your Automation Engine server computer than to increase the speed of your network.

Note: Depending on the chosen licensing model of your SQL Server, the amount of CPUs of the computer that you install it on may have a significant impact on its cost. This may so also influence where you install it.

3.1.4. Example Configurations

An Automation Engine setup is modular and scalable. This setup depends on the load that your server needs to carry and on the fail safe requirements.

Small Size Configuration

This includes:

- One Master Server: set up as Automation Engine Master. The role of this server is managing Jobs and tasks as well as processing tasks.
- One File Server: the computer that stores the data that Automation Engine can access and process.

Note: Esko recommends to have a dedicated file server in every case, even for small size configurations.

Medium Size Configuration

This includes:

- One Master Server: set up as Automation Engine Master. The role of this server is managing Jobs and tasks as well as processing tasks.

- One Assistant Server: configured as an Automation Engine Assistant. This server will only process tasks.
- One File Server: the computer that stores the data that Automation Engine can access and process.

Large Configuration

This includes:

- One Master Server: set up as Automation Engine Master. The role of this server is managing Jobs and tasks as well as processing tasks.
- One Assistant Server: configured as an Automation Engine Assistant. This server will only process tasks.
- One File Server: the computer that stores the data that Automation Engine can access and process.
- One Viewing Assistant: configured to handle the Viewing sessions of all the clients.
- One Database Server: the Master server connects to a dedicated database server.

Very Large configuration

This includes two separate server groups consisting of one Master server and two Assistant servers. Both server groups are completely independent units.

- Two Master Servers: both set up as Automation Engine Master. The role of these servers is managing (each their own) Jobs and tasks as well as processing (their own) tasks.
- Four Assistant Servers: configured as an Automation Engine Assistant. These servers will only process tasks.
- One File Server: the computer that stores the data that Automation Engine can access and process.

Per group, one server is set up as Automation Engine Master. The role of this server is reduced to only managing Jobs and tasks. The server has a relatively low amount of CPU and RAM. This server runs a full SQLServer database engine.

Two servers are configured as Assistant. Their role is to process tasks. These servers have a high amount of CPU and RAM.

The data processed by both server groups is stored on the file server.

3.2. Snapshots/Cloning

Taking a snapshot or cloning for fail safe purposes can be done under the condition that no licenses are activated on the server itself. When failing to do so, after restoring a snapshot of a virtual server or restoring a backup clone, the licenses will be broken.

This can be overcome by:

- temporarily deactivating the licenses before creating a snapshot or a clone.
- installing the licenses on a computer other than the Automation Engine server.

3.3. Remote Desktop Services

⚠️ **Warning:** Running the Automation Engine client software via Remote Desktop Services is in violation with the EULA (End User License Agreement).

3.4. Installing Other Applications on the Automation Engine server computer

Automation Engine requires a dedicated server to run on. Installing other software might influence the functioning of Automation Engine and therefore is **strongly discouraged**.

3.4.1. Installing other Esko Applications on the Automation Engine server

1. **WebCenter**: Automation Engine and WebCenter can not be installed on the same server. Both applications will malfunction if installed on the same server.
2. **Imaging Engine**: Imaging Engine can be installed on the same server as Automation Engine. For performance reasons, Esko advises to have RIP components on different servers. The same is also valid for the legacy product FlexRip.
3. **ArtPro+ and Esko classic editors (ArtPro PackEdge, Plato, i-cut Layout)**: Esko editors are typically installed on a client station but can be installed on the same server as Automation Engine (for example to build templates). However, Esko does not recommend to use the server as a client workstation.

3.4.2. Virus Scanners and Firewalls

Make sure that virus scanners and firewalls (including OS firewalls) do not interfere with the Automation Engine software (blocking temp files, processes).