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1. Introduction

This document describes the necessary information needed to facilitate the setting up of an Automation Engine Installation. General system requirements can be found on [http://www.esko.com/en/SystemRequirements/Automation%20Engine/](http://www.esko.com/en/SystemRequirements/Automation%20Engine/)

**Note:** This document includes certain optional components and features.

There are two sections in this document:

1. Technical details of an Automation Engine Installation
2. Technical Details

2.1 Automation Engine in its environment

2.1.1 Overview

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation Engine Master server</td>
<td>Main controller where all clients are connecting to. This server manages the jobs and tasks database. This server also executes the actual server tasks.</td>
</tr>
<tr>
<td>Automation Engine Assistant server</td>
<td>Assistant server that can execute tasks to take away load from the master server.</td>
</tr>
<tr>
<td>Application server</td>
<td>Component serving the Automation Engine Viewer and CP tools. Typically this component is found on the Automation Engine Master server</td>
</tr>
<tr>
<td>Database server</td>
<td>Server where the databases are located. Typically this component is found on the Automation Engine Master server</td>
</tr>
<tr>
<td>Client</td>
<td>A client workstation is connecting to the Automation Engine Master server via Pilot or Shuttle. Editors can also connect to the server (ArtPro, PackEdge, Illustrator).</td>
</tr>
<tr>
<td>FlexRip</td>
<td>RIP to generate proofs and/or plates. The Automation Engine Master typically connects to one or more RIP devices.</td>
</tr>
<tr>
<td>WebCenter</td>
<td>Online collaboration tool.</td>
</tr>
<tr>
<td>Fileserver</td>
<td>Where the actual data is, files are stored in containers.</td>
</tr>
<tr>
<td>Mail server</td>
<td>A mail server can be used to let Automation Engine send out e-mails.</td>
</tr>
</tbody>
</table>
2.2 Automation Engine installation

2.2.1 Automation Engine System User

Automation Engine needs a system user to run its service and connect to other network components. The Automation Engine System User account must meet following requirements on the Automation Engine server:

- should be a member of the Administrators group
- should have the Logon as Batch right
- should have the Logon as Service right

A default installation of Automation Engine creates a local user BGSYSTEM on the Automation Engine master according to these requirements and will serve as the Automation Engine System User.

2.2.2 Services

A default installation of Automation Engine will have following services installed:

<table>
<thead>
<tr>
<th>Service name</th>
<th>Service running under</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGMD</td>
<td>Automation Engine System User</td>
<td>Automation Engine’s main service</td>
</tr>
<tr>
<td>EG APPLICATION SERVER (*)</td>
<td>Automation Engine System User</td>
<td>Application server service for Viewer and CP Layout tools</td>
</tr>
<tr>
<td>EG STATION INFORMATION SERVICE</td>
<td>Local System User</td>
<td>System info collection service</td>
</tr>
<tr>
<td>EGWEBSRV</td>
<td>Automation Engine System User</td>
<td>Webserver for server admin and client updates</td>
</tr>
<tr>
<td>FLEXlm License Manager</td>
<td>Local System User</td>
<td>License manager</td>
</tr>
<tr>
<td>FLEXnet licensing service</td>
<td>Local System User</td>
<td>License manager</td>
</tr>
<tr>
<td>MSSQLSERVER</td>
<td>Network Service</td>
<td>Default database server</td>
</tr>
</tbody>
</table>
Automation Engine

<table>
<thead>
<tr>
<th>Service Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSQL$EG_APPSRV_JBOSS (*)</td>
<td>Network Service</td>
<td>Default database server for the application server</td>
</tr>
<tr>
<td>MSSQLServerADHelper</td>
<td>Network Service</td>
<td>SQL Server Active Directory Helper</td>
</tr>
<tr>
<td>SQLWriter</td>
<td>Network Service</td>
<td>SQL Server VSS Writer</td>
</tr>
<tr>
<td>SQLBrowser</td>
<td>Network Service</td>
<td>SQL Server Browser</td>
</tr>
</tbody>
</table>

(*) Installed optionally on systems having Viewer and/or CP Layout Tools.

Note: All the services and processes of Automation Engine run as 32 bit.

### 2.2.3 Shares

These shares are created during the installation of Automation Engine:

<table>
<thead>
<tr>
<th>Sharename</th>
<th>Purpose</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationEnginelmgFolder</td>
<td>Temporary folder for image data</td>
<td>server only</td>
</tr>
<tr>
<td>AutomationEngineLogging</td>
<td>Automation Engine log files</td>
<td>server only</td>
</tr>
<tr>
<td>AutomationEngineTmpFolder</td>
<td>Temporary folder for Automation engine</td>
<td>server only</td>
</tr>
<tr>
<td>bg_data_cms_v010</td>
<td>Central resources - Color management data</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_custom_v010</td>
<td>Central resources - Automation Engine presets</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_dgc_v010</td>
<td>Central resources - Dot gain curves</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_fonts_v040</td>
<td>Central resources - Fonts data</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_ipldata_v010</td>
<td>Central resources - CIP3/Inkplanner presets</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_marks_v010</td>
<td>Central resources - SmartMarks sets</td>
<td>server and clients</td>
</tr>
<tr>
<td>bg_data_system_v010</td>
<td>Central resources - License configuration</td>
<td>server and clients</td>
</tr>
<tr>
<td>DeskPackContainer</td>
<td>DeskPack temporary folder</td>
<td>server and clients</td>
</tr>
<tr>
<td>EG_APPSRV_BINDEPLOY</td>
<td>Application server configuration folder</td>
<td>server only</td>
</tr>
<tr>
<td>EG_APPSRV_CONFIGURATION</td>
<td>Application server configuration folder</td>
<td>server only</td>
</tr>
<tr>
<td>EG_APPSRV_DEPLOY</td>
<td>Application server configuration folder</td>
<td>server only</td>
</tr>
<tr>
<td>ExampleJobContainer</td>
<td>Default job container</td>
<td>server and clients</td>
</tr>
<tr>
<td>FastRipTask</td>
<td>FlexRip temporary folder</td>
<td>server and clients</td>
</tr>
<tr>
<td>Impose</td>
<td>FastImpose templates, marks and defaults</td>
<td>server and clients</td>
</tr>
<tr>
<td>PitStop</td>
<td>Pitstop templates and configuration data</td>
<td>server and clients</td>
</tr>
</tbody>
</table>
2.2.4 Installation Folder

Automation Engine is installed in a folder *Esko* on the root drive by default. Automation Engine cannot 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*) by default.

Tip: It is good practice to defer that folder to a drive other than the system drive.

2.3 Network Details

2.3.1 Network Configuration

Automation Engine relies on TCP and IPv4 to work.

Note: IPv6 is unsupported.

You need to configure DNS correctly. Links to other network should be configured using hostnames, not IP addresses.

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

Note: After installation of the Automation Engine software, the hostname of that server cannot be changed.

2.3.2 Ports

Ports used by Automation Engine and the client software are listed here.

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 EG Application server
- 1099 JNDI Naming Service for the EG Application server
• 4444 RMI Object for the EG Application server
• 4445 Transaction Manager for the EG Application server
• 27000 for the License Manager service

HTTP:
• 80 + 9999 for Tomcat/ServerAdmin (egwebsrv.exe)
• 8080 for EG Application Server
• 4411 for the Automation Engine JDFServer Â (JMF)
• 4412 for the Automation Engine Frip2JDF Server : process incoming feedback (JMF) from DFS
• 4415 for the Automation Engine ElemServer (experimental)

Connection with clients:
• The server sometimes relies on ephemeral ports, e.g. for uploading files in Pilot. These ports are generally picked randomly between 49152 and 65535.

2.3.3 LAN/WAN Network Performance

Latency simulations in a lab environment show that:
• With delays below 20ms client (Automation Engine Pilot) performance is optimal
• With delays till 50ms client performance is relatively acceptable
• With delays around 100ms (and higher) client performance is poor to unacceptable

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

Note: Using tools such as remote desktop services is in violation with the EULA.

2.4 Database server

By default, Automation Engine is installed with an SQL Express database engine. However, for scaling and performance reasons (see section 2.1.3), one can choose to use a Full SQL server.

2.4.1 Installation Details

Mandatory components:
• SQL Server Database Engine
• Replication and Fulltext components

Mandatory installation parameters:
• Collation settings: SQL_Latin1_General_CP1_C1_AS
• Security Mode: SQL
• TCP protocol for the SQL Server service: enabled
Note: Installation parameters used to install the default MSSQL Express server:

```
/ACTION=INSTALL
/FEATURES=SQL
/BROWSERSVCSTARTUPTYPE=Automatic
/SQLSVCSTARTUPTYPE=Automatic
/SQLSYSACCOUNT=“NT AUTHORITY\SYSTEM”
/SQLSYSADMINACCOUNTS=“BUILTIN\ADMINISTRATORS”
/SQLCOLLATION=SQL_Latin1_General_CP1_CI_AS
/IACCEPTSQLSERVERLICENSETERMS=1
/INSTANCENAME=<instancename> of MSSQLSERVER for unnamed instance
/SECURITYMODE=SQL
/SAPWD=<default password>
/TCPENABLED=1
```

### 2.4.2 Configuration details

Automation Engine will require 4 databases to run:

- BSJobs
- FastLane_TM
- FastLane
- EG_Appserver_JBOSS

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

- Login 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 Database server for the application server component

An Oracle database server can be used to run the EG_Appserver_JBOSS database of the application server component.

This will increase performance of the pages, proofs and plates module making Oracle only relevant in a books and magazines production workflow. It has no effect on the Viewer performance - also using the application server component.

Following database server versions are supported:

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

Note: using Oracle as a database server for BSJobs, FastLane_TM and FastLane is not supported.
2.5 File Server

2.5.1 Server Types

Automation Engine can use data that is available on network shares. These shares need to be on Windows or Unix/Linux (using SMB) file servers.

**Important:** We recommend to use Windows Server 2003 or Windows Server 2008 as file server.

**Note:**
Due to increasing connectivity issues between Mac OS and Windows Server, Mac OS X (version 10.5.x, 10.6.x, 10.7.x, 10.8.x) data servers are no longer supported.

2.5.2 Supported protocols

Esko does not support fileseserver access over protocols other than SMB/SMB2.

2.5.3 File server access

The Automation Engine system user (see section 1.2.1) must have read and write access on the shares.

2.6 Mail Server

Automation Engine sends mail for communication with Esko CS (reporting problems) and Customers. Supported protocols are:

- smtp
- smtps (secure)

You can setup the Corporate Mail server or the Google servers to be used by the Automation Engine to send 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.
2.7 Users and Groups

2.7.1 Automation Engine Users

Users in Automation Engine map directly to Windows users. The Windows users are organized in two local Windows groups on the Automation Engine master. Regular users are in the BGUSERS group, administrators are in the BGADMIN group.

These Windows users can be local users on the Automation Engine master or Windows domain users. If you create a new user in the Automation Engine user interface, a local Windows user is created for you. If you wish to use domain users, assign these domain users to either the BGUSERS or the BGADMIN local Windows group.

2.7.2 Automation Engine Groups

User groups in Automation Engine itself have no correlation with Windows groups.

2.7.3 Domain Users

Domain users can be used in Automation Engine. This requires that the Automation Engine system user can retrieve user info from the active directory. Read more in Automation Engine System User on page 6

Note: Automation Engine does not offer support for Domain Groups.

2.7.4 Single Sign-On

The Automation Engine client software does not have any single sign-on implementation.

2.8 The Automation Engine Pilot

2.8.1 Java

On Windows, a Java Runtime Environment (JRE version 1.7) is distributed with the pilot. The user does not need to install Java on the client machine.

On MAC, a Java Runtime Environment 1.6 is required. However, Apple does not allow Esko to distribute this version, so the installation of Java has to happen separately from the Automation Engine client. The installation of Java should start automatically when the Java Runtime Environment
is needed by the Automation Engine client installer. This automatic installation is currently provided by Apple and could change in the future.
3. General Guidelines

3.1 Scalability and Performance

3.1.1 Adding an Assistant to an Automation Engine Configuration

3.1.1.1 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. Evaluating and defining the amount of concurrent tasks needed should take into account the number of files processed 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 its limits, it can be increased by adding one or more Assistant servers. One Automation Engine server will 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.

3.1.1.2 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 a 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 effectual solution.

3.1.1.3 Adding an Assistant versus Adding an extra Master

When throughput needs to be increased, adding an assistant is not necessarily the best option. If the production/organization can be split into logical components, then it could make sense to add an extra master.

One master-assistant(s) combination has one main processing queue.

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

Automation Engine allows to redirect these resources to a central file server. Valid reasons for redirecting these resources are:

• Access: these shares need to accessed from other applications/servers than Automation Engine (PackEdge, ArtPro, FlexRip,...)
• Backup strategy: these shares contain critical files such as color profiles, marks, curves,... Note: these shares are 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 SQLServer

#### 3.1.3.1 Express edition versus Full SQLServer

A default installation of Automation Engine will have its databases running on a SQL 2005 Express database engine. The Express edition comes with following limitations:

• 1 CPU
• 1 GB of RAM
• 4 GB database size (each database can use up to 4 GB) - 10 GB as of SQL Express 2008R2

In case of high production volumes, these limited resources can cause performance issues.

#### 3.1.3.2 Local versus remote SQLServer

Esko recommends having the database server(s) locally on the Automation Engine master (to avoid extra network traffic). However, when a full SQLServer is required (see limitations SQL Express Edition) the licensing model of SQLServer needs to be taken into account:

• Per CPU: high cost if high number of CPU
• Per Client: high cost if high number of end users (end users = amount of users connecting via Pilot, Shuttle, Hotfolders. NOT just BGMD)

In the cases where a full SQL server is needed, typically both CPU and number of end users on the Automation Engine server will be high. Therefore a dedicated server with for example 2 CPU’s can be a more cost efficient alternative.

### 3.1.4 Example Configurations

An Automation Engine setup is scalable and modular. How to setup depends on the load the server needs to carry and the fail safe requirements.
3.1.4.1 Small size configuration
This includes:

- One Master Server: setup as Automation Engine master. The role of this server is managing jobs and tasks as well as processing tasks.
- One File Server: this stores the data processed by the Automation Engine.

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

3.1.4.2 Medium Size Configuration
This includes:

- One Master Server: setup 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: this stores the data processed by the Automation Engine.

3.1.4.3 Large configuration
This includes:

- One Master Server: setup 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: stores the data processed by the Automation Engine
- 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.

3.1.4.4 Very Large configuration
This includes two separate server groups are created consisting of one master server and two assistant servers. Both server groups are completely independent units.

- Two Master Servers: setup as Automation Engine master. The role of this server is managing jobs and tasks as well as processing tasks.
- Four Assistant Servers: configured as an Automation Engine Assistant. This server will only process tasks.
- One File Server: stores the data processed by the Automation Engine

One server per group is setup 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 SQL Server 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

| Note: Running the Automation Engine client software via Remote Desktop Services is in violation with the EULA. |

3.4 Sharing the Automation Engine server with other applications

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 Sharing the Automation Engine Server with other Esko Applications

1. WebCenter: Automation Engine and WebCenter cannot be installed on the same server. Both applications will malfunction if installed on the same server.
2. FlexRip: FlexRip can be installed on the same server as Automation Engine. However, Esko advises to have these components on different servers.
3. PackEdge / Plato / i-cut Layout: Editors such as PackEdge / Plato / i-cut Layout typically found on a client station, can be installed on the same server as Automation Engine (e.g. for template building purposes). However, Esko does not recommend to use the server as a client workstation.

3.4.2 Virus scanners and Firewalls

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