



Process Expert for AVEVA™ System Platform

Infrastructure Virtualization

Application Note

EIO0000004214.00

03/2021



Legal Information

The Schneider Electric brand and any trademarks of Schneider Electric SE and its subsidiaries referred to in this guide are the property of Schneider Electric SE or its subsidiaries. All other brands may be trademarks of their respective owners.

This guide and its content are protected under applicable copyright laws and furnished for informational use only. No part of this guide may be reproduced or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), for any purpose, without the prior written permission of Schneider Electric.

Schneider Electric does not grant any right or license for commercial use of the guide or its content, except for a non-exclusive and personal license to consult it on an "as is" basis. Schneider Electric products and equipment should be installed, operated, serviced, and maintained only by qualified personnel.

As standards, specifications, and designs change from time to time, information contained in this guide may be subject to change without notice.

To the extent permitted by applicable law, no responsibility or liability is assumed by Schneider Electric and its subsidiaries for any errors or omissions in the informational content of this material or consequences arising out of or resulting from the use of the information contained herein.

Table of Contents

Safety Information.....	5
About the Book.....	6
Selecting the Appropriate Virtualization Environment.....	8
Selecting the Appropriate Virtualization Tool	8
Virtualization by Using VMware ESXi	9
Overview	9
Prerequisites and Software Requirements	9
Hardware Requirements and VM Configuration for Small Applications	10
Hardware Requirements and VM Configuration for Medium/Large Applications	11
Recommendation for Virtualized Supervision.....	13
Recommended Virtualized Architectures	14
Installing and Configuring the Software	16
Configuring Schneider Electric Licensing Software	19
Virtualization by Using VMware Workstation Player.....	22
Overview	22
Prerequisites and Software Requirements	22
Hardware Requirements and VM Configuration for Small Applications	23
Hardware Requirements and VM Configuration for Medium/Large Applications	24
Recommendation for Virtualized Supervision.....	26
Recommended Virtualized Engineering Architectures	27
Installing and Configuring the Software	29
Configuring Schneider Electric Licensing Software	30

Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

Document Scope

This document describes the system requirements to use EcoStruxure Process Expert for AVEVA System Platform in a virtualized environment. It recommends various architectures for engineering and/or operation and outlines how to implement them.

It is written for users who are familiar with EcoStruxure Process Expert for AVEVA System Platform and the principles of software virtualization.

This document does not describe how to use EcoStruxure Process Expert for AVEVA System Platform or the virtualization tools.

Validity Note

This document is valid for EcoStruxure Process Expert for AVEVA System Platform 2020 R2 or later. It supersedes any previous version.

Related Documents

Title of documentation	Reference number
EcoStruxure™ Process Expert for AVEVA System Platform Installation and Configuration Guide	EIO0000004208 (eng)
EcoStruxure™ Process Expert for AVEVA System Platform Licensing Guide	EIO0000004209 (eng)
EcoStruxure™ Process Expert for AVEVA System Platform Control Participant Services User Guide	EIO0000004210 (eng)

You can download these technical publications at app.schneider-electric.com/ecostruxure-hybrid-dcs, *Document Downloads* section.

Registration required.

EcoStruxure Process Expert Support Portal

Visit app.schneider-electric.com/ecostruxure-hybrid-dcs for support, software updates, and latest information on EcoStruxure Process Expert for AVEVA System Platform.

Registration required.

Trademarks

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

VMware, VMware ESXi, VMware Tools, VMware vSphere, and VMware Workstation Player are either registered trademarks or trademarks of VMware Inc. in the United States and/or other countries.

AVEVA, Orchestra, and InTouch are trademarks or registered trademarks of AVEVA Group plc in the United States and/or other countries.

Product Related Information

The examples in this manual are given for information only.

▲ WARNING

UNINTENDED EQUIPMENT OPERATION

Adapt examples that are given in this manual to the specific functions and requirements of your industrial application before you implement them.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

▲ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines. ¹
- Test each implementation of a system for proper operation before placing it into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

¹ For additional information, refer to NEMA ICS 1.1 (latest edition), *Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control* and to NEMA ICS 7.1 (latest edition), *Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems* or their equivalent governing your particular location.

Selecting the Appropriate Virtualization Environment

Selecting the Appropriate Virtualization Tool

Intended Use

You can use EcoStruxure Process Expert for AVEVA System Platform with the following VMware® virtualization tools. Select the one that is appropriate for your specific application and refer to the corresponding chapter.

For more information on the tools, visit www.vmware.com.

Virtualization tool	Target applications	Main benefits of virtualization
VMware ESXi™, page 9 Type-1 (bare metal) hypervisor (Recommended)	Use on dedicated virtualization servers. System integrators: <ul style="list-style-type: none"> • Adding EcoStruxure Process Expert for AVEVA System Platform to other already virtualized software that is used for projects. • Running different versions of the software used by customer base. • Developing complete projects that customers will run in virtualized environments. Endusers: <ul style="list-style-type: none"> • Virtualization of control room software in industrial environments. • Running large applications. 	<ul style="list-style-type: none"> • Improved performance over type-2 hypervisor. • Suitable for industrial applications. • Optimized hardware usage. • Scalability. • Facilitates recovery in case of disaster situation.
VMware Workstation Player™, page 22 Type-2 hypervisor	Use on desktop or laptop workstations. <ul style="list-style-type: none"> • Training • Demonstrations 	<ul style="list-style-type: none"> • Portability on a laptop. • Reduced setup time (mounting of virtual disk).

Disclaimer

For each virtualization tool, tests have been performed by using a host computer that meets the minimum hardware requirements described in the corresponding chapter.

Using hardware, software, and/or settings other than those described may result in a non-working EcoStruxure Process Expert for AVEVA System Platform infrastructure.

Virtualization by Using VMware ESXi

Overview

Virtualization Tool

Virtualization is performed by using VMware ESXi. It is an enterprise type-1 bare metal hypervisor. The virtualization software does not install on a Windows® operating system (OS) but directly on dedicated server hardware. The hypervisor lets you create one or more virtual machines by using the ESXi management console.

Benefits and Drawbacks of Virtualization

The main benefit of using EcoStruxure Process Expert for AVEVA System Platform in a virtualized environment is the capability to provide a fully functional engineering and runtime environment inside a virtual machine that can be used in industrial applications. Virtualization lets you optimize the usage of your hardware, is cost effective, scalable, and facilitates recovery in case of disaster situations.

It also allows using different versions of the software on the same host computer without conflicts. Each version is installed in a separate virtual machine.

Performance Considerations

Using EcoStruxure Process Expert for AVEVA System Platform in a virtual environment is demanding in terms of computing resources.

Compared to a traditional installation on physical hardware, you may experience an increase in the time it takes to complete a typical system engineering lifecycle of up to 35%. This measurement was obtained with [medium and large applications, page 9](#), which contain Control projects with 400 sections. In each section, the facets of 5 instances are assigned.

Using virtualization on a host computer that does not meet minimum hardware requirements renders the software unusable in an industrial environment.

Licensing Mechanism

The licensing software, [page 19](#) that is used in the architectures described in this chapter is installed in a virtual environment.

Yet, if required, you can install the Floating License Manager on a physical license server.

Prerequisites and Software Requirements

Overview

Before starting with the installation, refer to the following documentation:

- *EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide* for the guest operating system requirements and other system requirements.
- VMware ESXi help for additional software and hardware requirements.

Prerequisites

The following are prerequisites to the virtualization of the software.

For the host computer	The following need to be enabled in the BIOS: <ul style="list-style-type: none"> • VT-x or AMD-V. • The NX/XD bit.
For EcoStruxure Process Expert for AVEVA System Platform	You possess the necessary licenses for the software components that you will be using (for example, the system server, the engineering client).

CPU Selection

The CPU specifications described in this chapter are generic and a specific model is indicated only as an example.

Software Requirements

Component	Requirement
Virtualization software	VMware ESXi 6.5 or later (Standard edition or higher). The use of the latest compatible version of VMware Tools™ is recommended.
EcoStruxure Process Expert for AVEVA System Platform configuration	Default configuration.

Application Size

The hardware requirements described in this manual depend on the size of the application.

The size of an application is defined by the total number of instances that it contains.

Application size	Number of instances
Small	Up to 1,000
Medium	Less than 3,000
Large	From 3,000 to 10,000

Hardware Requirements and VM Configuration for Small Applications

Overview

This topic describes the hardware requirements for the host computer and the resources to be allocated to the ESXi VM for small applications, page 9.

The type of architecture that is considered for this size of application is the all-in-one engineering architecture, page 14 where EcoStruxure Process Expert for AVEVA System Platform is installed inside one ESXi VM.

All-In-One Architecture – Host Computer Hardware Requirements

Component	Requirements
CPU	<ul style="list-style-type: none"> Min. CPU mark: 10,000 Min. base frequency: 2.6 GHz Min. turbo frequency: 3.6 GHz Number of CPUs (sockets): 1 (typically, more CPUs provide better performance) Cores: 12 / logical processors (threads): 24 Min. cache size: 20 MB Min. bus speed: 8 GT/s For example, Intel® Xeon® Gold 6126 processor.
RAM	DDR4, 2600 MHz min. 8 GB of RAM need to remain available for the host computer to function properly once the required amount has been allocated to the VM.
Hard drive	SSD, SATA 6 Gbps Ensure that at least 30% of the hard drive of the host computer (a minimum of 10 GB) remain free once you have allocated the necessary disk size to the ESXi VM. RAID 10 configuration.

All-In-One Architecture – Resource Allocation to ESXi VM

The table describes the hardware resources of the host computer that need to be allocated to the ESXi VM.

Component	Resource allocation requirement
CPU	16 vCores (1 socket)
RAM	24 GB
Disk	128 GB thick provisioned, lazily zeroed (fixed size).

Hardware Requirements and VM Configuration for Medium/Large Applications

Overview

This topic describes the hardware requirements for the host computer and the resources to be allocated to ESXi VMs for medium and large applications, page 9.

The following types of engineering architectures are considered for these sizes of applications:

- All-in-one architecture, page 14: EcoStruxure Process Expert for AVEVA System Platform is installed inside one ESXi VM.
- Distributed architecture, page 14: The system server and the remote engineering client are installed in separate ESXi VMs running on the same host computer.

All-In-One Architecture – Host Computer Hardware Requirements

Component	Requirements
CPU	<ul style="list-style-type: none"> Min. CPU mark: 10,000 Min. base frequency: 2.6 GHz Min. turbo frequency: 3.6 GHz Number of CPUs (sockets): 1 (typically, more CPUs provide better performance) Cores: 16 / logical processors (threads): 32 Min. cache size: 20 MB Min. bus speed: 8 GT/s For example, Intel® Xeon® Gold 6126 processor.
RAM	DDR4, 2600 MHz min. 8 GB of RAM need to remain available for the host computer to function properly once the required amount has been allocated to the VM.
Hard drive	SSD, SATA 6 Gbps Ensure that at least 30% of the hard drive of the host computer (a minimum of 10 GB) remain free once you have allocated the necessary disk size to the ESXi VM. RAID 10 configuration.

All-In-One Architecture – Resource Allocation to ESXi Virtual Machine

The table describes the hardware resources of the host computer that need to be allocated to the ESXi VM.

Component	Resource allocation requirement
CPU	Minimum: 20 vCores (2 sockets) Recommended: 28 vCores (2 sockets)
RAM	Minimum: 32 GB Recommended: 40 GB
Disk	512 GB thick provisioned, lazily zeroed (fixed size).

Distributed Architecture – Host Computer Hardware Requirements

The requirements are valid for a distributed EcoStruxure Process Expert for AVEVA System Platform engineering architecture with one remote client connecting to the system server.

If you want to use several remote clients, each one installed in a separate ESXi VM, the hardware requirements of the host computer need to be increased by multiples of the resources that are allocated to the client VM.

Component	Requirements
CPU	<ul style="list-style-type: none"> Min. CPU mark: 10,000 Min. base frequency: 2.6 GHz Min. turbo frequency: 3.6 GHz Number of CPUs (sockets): 2 Cores per CPU: 28 / logical processors (threads) per CPU: 56 Min. cache size: 20 MB Min. bus speed: 8 GT/s For example, Intel® Xeon® Gold 6126 processor.
RAM	DDR4, 2600 MHz min. 8 GB of RAM need to remain available for the host computer to function properly once the required amount has been allocated to the VMs.
Hard drive	SSD, SATA 6 Gbps Ensure that at least 30% of the hard drive of the host computer (a minimum of 10 GB) remain free once you have allocated the necessary disk size to the ESXi VMs. RAID 10 configuration.

Distributed Architecture – Resource Allocation to ESXi Virtual Machines

• System Server VM

The table describes the hardware resources of the host computer that need to be allocated to the ESXi VM in which the system server is installed.

Component	Resource allocation requirement
CPU	12 vCores (6 vCores with 2 sockets) The socket-vCore ratio should be defined based on the number of CPUs of the processor.
RAM	Minimum: 16 GB
Disk	256 GB thick provisioned, lazily zeroed (fixed size). (Of which 100 GB are to be used for AVEVA System Platform.)

• Engineering Client VM

The table describes the hardware resources of the host computer that need to be allocated to the ESXi VM in which an engineering client is installed.

Component	Resource allocation requirement
CPU	Minimum: 16 vCores (8 vCores with 2 sockets) Recommended: 28 vCores (14 vCores with 2 sockets) The socket-vCore ratio should be defined based on the number of CPUs of the processor.
RAM	Minimum: 32 GB
Disk	120 GB thick provisioned, lazily zeroed (fixed size).

Recommendation for Virtualized Supervision

Overview

If you also want to use in a virtualized environment the Supervision components, page 15 that are required for the runtime and runtime navigation services, additional resources of the host computer need to be allocated.

This is required whether you install the Supervision components in a separate VM or add them to a VM in which the system server is already installed.

Resource Allocation for Virtualized Supervision Architecture

The table indicates the minimum hardware resources of the host computer that need to be allocated to an ESXi VM in which the following components are installed (for details on the software that is required, see the *EcoStruxure™ Process Expert for AVEVA System Platform, Installation and Configuration Guide, Software Architecture*):

- AVEVA System Platform Development Studio.
- InTouch OMI.
- The EcoStruxure Process Expert for AVEVA System Platform operation client.
- AssetLink.
- Modicon Communication Server or OPC UA Server Expert

Small Applications

Component	Resource allocation requirement
CPU	4 vCPUs
RAM	8 GB
Disk	100 GB

Medium/Large Applications

Component	Resource allocation requirement
CPU	<ul style="list-style-type: none"> • Minimum: 8 vCPUs • Recommended: 16 vCPUs
RAM	<ul style="list-style-type: none"> • Minimum: 8 GB • Recommended: 16 GB
Disk	100 GB

Recommended Virtualized Architectures

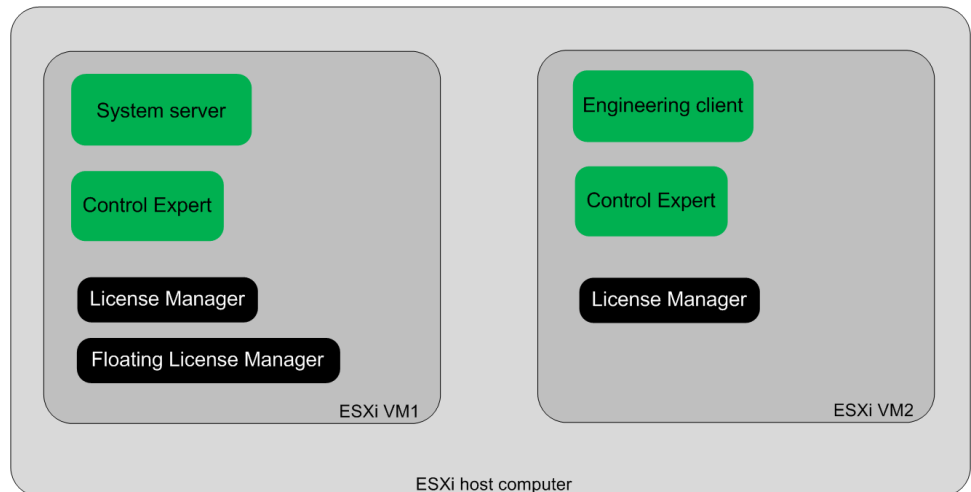
Overview

This topic describes typical EcoStruxure Process Expert for AVEVA System Platform architectures that you can use in an ESXi virtual environment.

Distributed Architecture

Optimal performance is achieved by using an architecture where the system server and the engineering client are virtualized on separate VMs. This way, all software components required for engineering are virtualized.

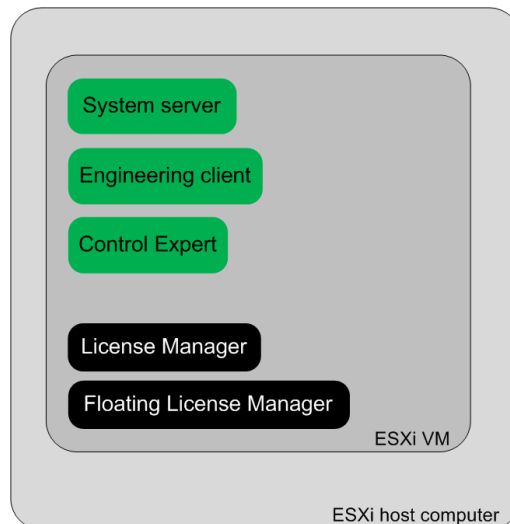
You can virtualize additional engineering clients on separate VMs running on the same or other host computers.



All-In-One Engineering Architecture

Alternatively, you can use an all-in-one engineering architecture where the system server and the engineering client are virtualized on the same VM.

You can still virtualize additional engineering clients in separate VMs if the need arises.

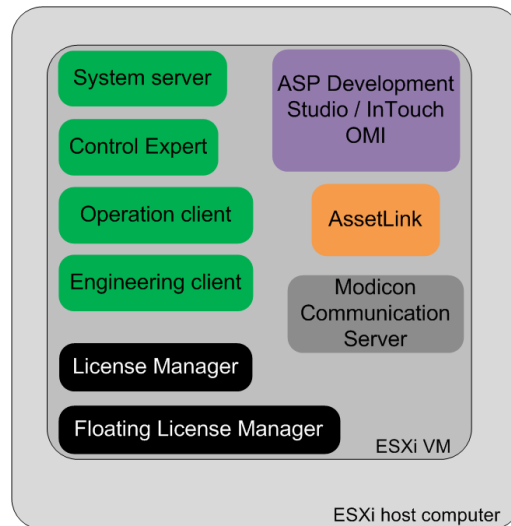


Operation Architecture with Runtime Navigation Services

To use Supervision and runtime navigation services (RTNS) with either virtualized engineering architecture, you can virtualize the Supervision components and the EcoStruxure Process Expert for AVEVA System Platform operation client on the same or a separate VM.

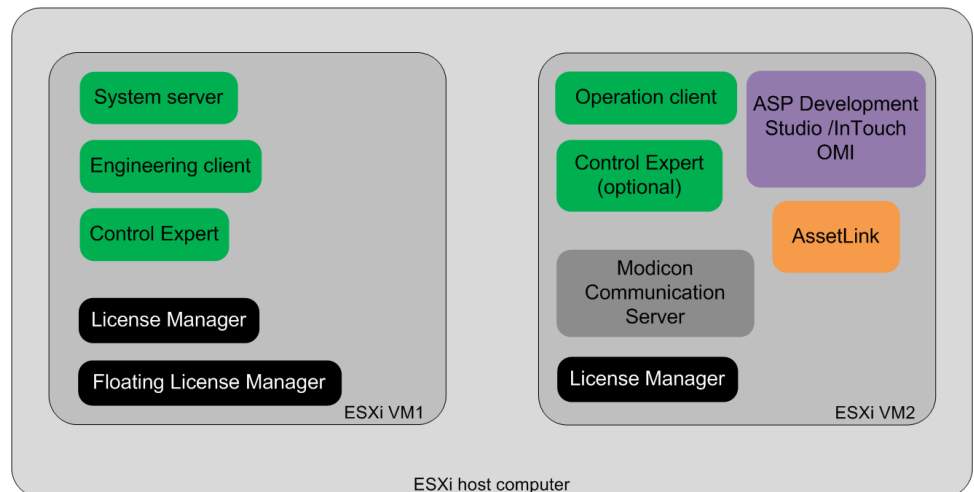
Like in a traditional installation, the operation client needs to communicate with the virtualized system server.

The following figure shows the components of an all-in-one engineering and operation architecture virtualized on one VM.



(ASP = AVEVA System Platform)

The following figure shows the components of engineering and operation architecture virtualized on separate VMs.



Installing and Configuring the Software

Installation Procedure

If you are already using ESXi 6.5 or later and have created a VM with an operating system that is suitable for EcoStruxure Process Expert for AVEVA System Platform, you can use it given it is configured appropriately.

The procedure outlines the steps to install ESXi and EcoStruxure Process Expert for AVEVA System Platform.

Step	Action
1	Install ESXi on the host computer.
2	Open the ESXi management console or use the VMware vCenter® console from a remote client, create a VM, and configure it depending on your application size and the type of architecture that you want to use.
3	By using the New Virtual Machine Wizard , install the guest OS of the VM. Refer to the ESXi documentation for the installation of the OS and the VMware Tools™ utility and drivers.
4	Install EcoStruxure Process Expert for AVEVA System Platform in the VM.
5	If you also want to use the AVEVA System Platform components in the virtualized environment, install them. Refer to the <i>EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide, Software Architecture</i> .

Configuring the VM

This topic describes the values that you need to set for various properties of the ESXi VM.

CPU properties (configure **CPU** and **Cores per Socket** based on the requirements that apply to your application and your hardware).

▼ CPU	<input type="text"/> ⓘ
Cores per Socket	<input type="text"/> Sockets:
CPU Hot Plug	<input type="checkbox"/> Enable CPU Hot Add
Reservation	<input type="text"/> MHz
Limit	Unlimited MHz
Shares	Normal 1000
Hardware virtualization	<input checked="" type="checkbox"/> Expose hardware assisted virtualization to the guest OS ⓘ
Performance counters	<input checked="" type="checkbox"/> Enable virtualized CPU performance counters
Scheduling Affinity	Hyperthreading Status: Active Available CPUs: 48 (Logical CPUs) <input type="text" value="0, 2, 4-7"/> ⓘ
CPU/MMU Virtualization	Automatic ⓘ

Memory properties (the **RAM** value is only given as an example).

▼ Memory	
RAM	16384 MB
Reservation	<input type="text"/> MB <input type="checkbox"/> Reserve all guest memory (All locked)
Limit	Unlimited MB
Shares	Normal 1000
Memory Hot Plug	<input type="checkbox"/> Enabled

Disk properties (the disk size is only given as an example).

▼ Hard disk 1	
	100 GB
Maximum Size	274.42 GB
Type	Thick provisioned, lazily zeroed
Disk File	[datastore1] WIN10-ENGG-CLIENT1/WIN10-ENGG-CLIENT1_0.vmdk
Shares	Normal 1000
Limit - IOPs	Unlimited
Virtual Device Node	SCSI controller 0 SCSI (0:0)
Disk mode	Dependent
Sharing	None <small> Disk sharing is only possible with eagerly zeroed, thick provisioned disks.</small>

Network Adapter properties.

▼ Network Adapter 1	
	VM Network
Status	<input checked="" type="checkbox"/> Connect at power on
Adapter Type	E1000e
MAC Address	Automatic 00:0c:29:b1:d8:2e
▶ CD/DVD Drive 1	Datastore ISO file <input checked="" type="checkbox"/> Connect

NOTE: In a distributed architecture, selecting the **VMXNET3** adapter type may improve network performance with remote clients.

Configuring EcoStruxure Process Expert for AVEVA System Platform

The table describes the required configuration of parameters to enable client/server communication.

Virtualized architecture	Setting
All-in-one engineering architecture	No particular configuration is required.
All-in-one engineering and operation architecture	
Remote engineering client (distributed architecture)	In the Engineering Client Configuration Wizard (System Server section) , enter the IP address of the VM that contains the system server. Verify that VMs 1 and 2 can communicate ⁽¹⁾ .
Remote Supervision engineering server and EcoStruxure Process Expert for AVEVA System Platform operation client (distributed architecture)	In the Operation Client Configuration Wizard (System Server section) , enter the IP address of the VM that contains the system server. Verify that VMs 1 and 2 can communicate ⁽¹⁾ .
(1) Keeping the firewall of the Microsoft® Windows® OS in each VM enabled may require user intervention so that some background processes start. If possible, use the ESXi firewall, which you can manage from the vSphere Web Client.	

NOTE: For details, refer to the *EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide*, chapter *Configuring the Software*.

Configuring Schneider Electric Licensing Software

Overview

This topic describes how to configure the Schneider Electric licensing software by using the recommended virtualized engineering architectures as example.

The installation files for the Floating License Manager are available in the installation package of EcoStruxure Process Expert for AVEVA System Platform.

Working Principle

The licensing mechanisms used for virtualization are similar to those used in traditional installations.

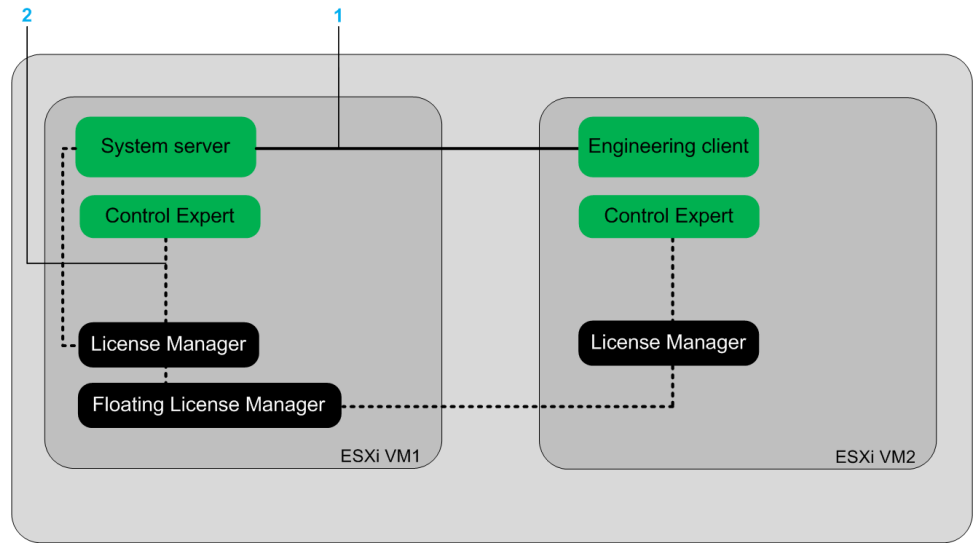
In the License Manager (LM) that is virtualized, enter the IP address of the computer or VM hosting the Floating License Manager (FLM) in which you have activated the necessary EcoStruxure Process Expert for AVEVA System Platform licenses.

Verify that the LM can communicate with the FLM. This requires that the License Server port value that is configured for the FLM and in the LM is the same.

For more information on configuring and using licensing software, refer to the *EcoStruxure Process Expert for AVEVA System Platform Licensing Guide*.

Licensing for the Distributed Engineering Architecture

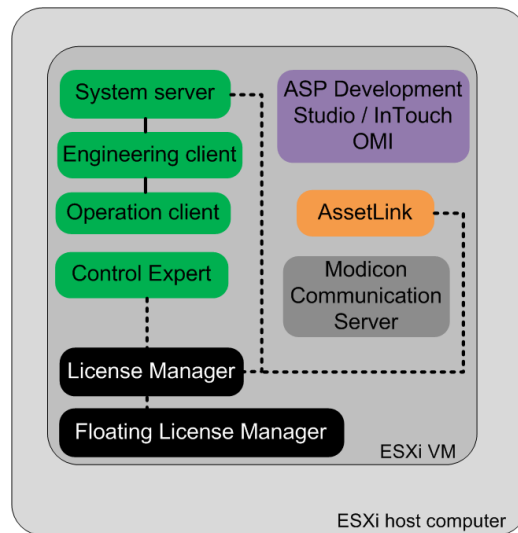
The following figure shows an example where the LM and FLM are installed on VM1 and you can use the default configuration of the licensing software. The LM that is required by Control Expert for the engineering client is installed on VM2. Configure this one with the IP address of VM1. Verify that the two VMs can communicate.



Item	Description
1	Represents client/server connections.
2	Represents connections that are used for license acquisition.

Licensing for the All-In-One Engineering and Operation Architecture

The following figure shows an example where the LM and FLM are installed on the same VM. You can use the default configuration of the licensing software.



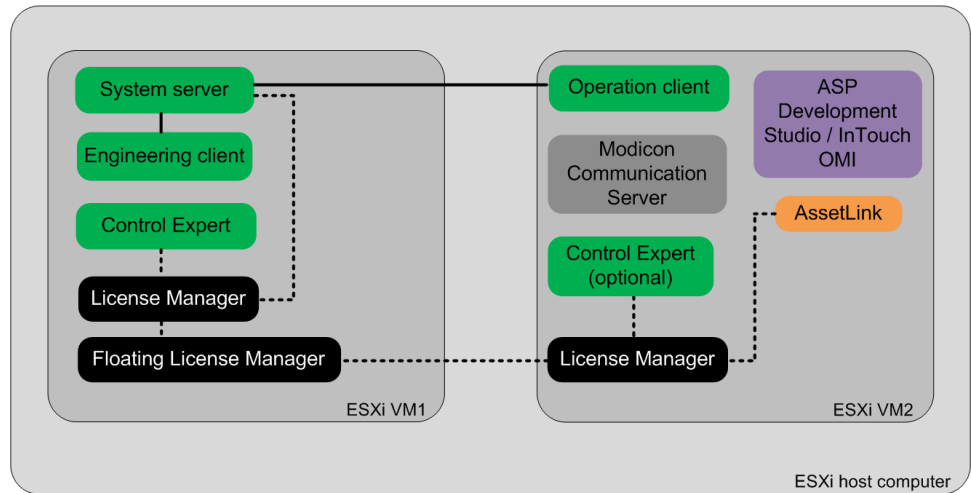
(ASP = AVEVA System Platform)

To use the licenses that have been activated on an FLM that is not virtualized, configure the LM with the IP address of the license server computer, on which the FLM is installed. Verify that it is reachable from the VM.

NOTE: The licensing mechanism of AVEVA System Platform is not described in this application note.

Licensing for the Distributed Architecture With Supervision

The following figure shows an example where the LM and FLM for the EcoStruxure Process Expert for AVEVA System Platform engineering components are installed on VM1 and you can use the default configuration of the licensing software. The LM that is required by Control Expert for the operation client and by AssetLink is installed on VM2. Configure this one with the IP address of VM1. Verify that the two VMs can communicate.



NOTE: The licensing mechanism of AVEVA System Platform is not described in this application note.

Virtualization by Using VMware Workstation Player

Overview

Virtualization Tool

Virtualization is performed by using VMware Workstation Player. It is a desktop application that lets you create, configure, and run virtual machines (VMs) on a host computer equipped with a Windows® operating system.

Benefits and Drawbacks of Virtualization

The main benefit of using EcoStruxure Process Expert for AVEVA System Platform in a virtual environment is the capability to provide a fully functional engineering environment inside a VM. Such a VM can be mounted with a minimum of configuration on suitable computers, which reduces setup time.

It also allows using different versions of the software on the same host computer without conflicts. Each version is installed in a separate VMs.

Yet, using EcoStruxure Process Expert for AVEVA System Platform in a virtual environment is demanding in terms of computing resources because a significant amount of the hardware resources of the host computer (such as processors, RAM, disk space) are reserved and used by the VM. Using a VM on a computer that does not meet minimum hardware requirements has a significant performance impact on both the host computer and the software. As a result, you will not be able to take advantage of the benefits of this solution.

Licensing Mechanism

In the examples described in this chapter, virtualized EcoStruxure Process Expert for AVEVA System Platform components will use licenses that are activated on a Floating License Manager, page 30 that is not virtualized.

Yet, if required, you can also install the Floating License Manager in a virtual environment.

Prerequisites and Software Requirements

Overview

Before starting with the installation, refer to the following documentation:

- *EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide* for the guest operating system requirements and other system requirements.
- VMware Workstation Player help for additional software and hardware requirements.

Prerequisites

The following are prerequisites to the virtualization of the software:

For Workstation Player	VT-x or AMD-V is enabled in the BIOS of the host computer.
For EcoStruxure Process Expert for AVEVA System Platform	You possess the necessary licenses for the software components that you will be using (for example, the system server, the engineering client).

CPU Selection

The CPU specifications described in this chapter are generic and a specific model is indicated only as an example.

Software Requirements

Component	Minimum requirement
Virtualization software	VMware Workstation Player 12.5 or later

Application Size

The hardware requirements described in this manual are grouped by application size.

For simplification, the size of an application is based on the total number of instances and Control projects that contain 400 sections. In each section, the facets of 5 instances are assigned.

Application size	Number of instances
Small	Up to 1,000
Medium	Less than 3,000
Large	More than 3,000

Hardware Requirements and VM Configuration for Small Applications

Overview

This topic describes the hardware requirements for the host computer and the resource allocation of the Workstation Player VM for small applications, page 23.

The type of architecture that is considered for this size of application is the all-in-one engineering architecture, page 27 where EcoStruxure Process Expert for AVEVA System Platform is installed inside one VM.

All-In-One Architecture – Host Computer Hardware Requirements

Component	Requirements
CPU	<ul style="list-style-type: none"> Min. CPU mark: 10,000 Min. base frequency: 2.6 GHz Min. turbo frequency: 3.5 GHz Min. cache size: 8 MB Min. bus speed: 8 GT/s <p>Select a CPU with a number of physical cores and logical processors that is sufficient for your host computer to function correctly (typically, 4 cores) once the required number of logical processors has been allocated to the VM.</p> <p>For example, Intel® Core™ i7-8850H processor.</p>
RAM	Ensure that 8 GB of RAM remain available for your host computer to function correctly once the required amount has been allocated to the VM.
Hard drive	SSD, SATA 6 Gbps
	Ensure that at least 30% of the hard drive of the host computer remains free for your host computer to function correctly once the required disk size has been allocated to the VM.

All-In-One Architecture – VM Configuration

The table describes the amount of hardware resources of the host computer that need to be allocated to the Workstation Player VM.

Component	Resource allocation requirement
Disk size	128 GB Select to store the virtual disk as a single file (recommended).
Memory	12 GB
Processors	6 logical processors Select Virtualize Intel VT-x/EPT or AMD-V/RVI (Virtualization engine section) .
Network adapter	Select Bridged (Network connection section) . The VM is configured with its own IP address.

Hardware Requirements and VM Configuration for Medium/Large Applications

Overview

This topic describes the hardware requirements for the host computer and the resource allocation of Workstation Player VMs for medium and large applications, page 23.

The following types of engineering architectures are considered for these sizes of applications:

- All-in-one architecture, page 27: EcoStruxure Process Expert for AVEVA System Platform is installed inside one VM.
- Distributed architecture, page 27: The system server and the remote engineering client are installed in separate VMs running on the same host computer.

All-In-One Architecture – Host Computer Hardware Requirements

Component	Requirements
CPU	<ul style="list-style-type: none"> • Min. CPU mark: 10,000 • Min. base frequency: 2.6 GHz • Min. turbo frequency: 3.5 GHz • Min. cache size: 8 MB • Min. bus speed: 8 GT/s <p>Select a CPU that has enough physical cores and logical processors remaining for your host computer to function correctly (typically, 4 cores) once the required number of logical processors has been allocated to the VM.</p> <p>For example, Intel® Xeon® E7-8891 processor.</p>
RAM	Ensure that 8 GB of RAM remain available for your host computer to function correctly once the required amount has been allocated to the VM.
Hard drive	SSD, SATA 6 Gbps Ensure that at least 30% of the hard drive of the host computer remains free for your host computer to function correctly once the required disk size has been allocated to the VM.

All-In-One Architecture – VM Configuration

The table describes the amount of hardware resources of the host computer that need to be allocated to the Workstation Player VM.

Component	Resource allocation requirement
Disk size	512 GB Select to store the virtual disk as a single file (recommended).
Memory	Minimum: 18 GB
Processors	<ul style="list-style-type: none"> Minimum: 6 logical processors Recommended: 8 logical processors Select Virtualize Intel VT-x/EPT or AMD-V/RVI (Virtualization engine section) .
Network adapter	Select Bridged (Network connection section) . The VM is configured with its own IP address.

Distributed Architecture – Host Computer Hardware Requirements

The requirements are valid for a Distributed, page 27 EcoStruxure Process Expert for AVEVA System Platform engineering architecture.

Component	Requirements
CPU	<ul style="list-style-type: none"> Min. CPU mark: 10,000 Min. base frequency: 2.6 GHz Min. turbo frequency: 3.5 GHz Min. cache size: 8 MB Min. bus speed: 8 GT/s Select a CPU that has enough physical cores and logical processors remaining for your host computer to function correctly (typically, 4 cores) once the required number of logical processors has been allocated to the VM. For example, Intel® Xeon® Gold 6126 processor for the recommended settings.
RAM	Ensure that 8 GB of RAM remain available for your host computer to function correctly once the required amount has been allocated to the VM.
Hard drive	SSD, SATA 6 Gbps Ensure that at least 30% of the hard drive of the host computer remains free for your host computer to function correctly once the required disk size has been allocated to the VM.

Distributed Architecture – VM Configuration

System Server VM (Host Computer 1)

The table describes the amount of hardware resources of the host computer that need to be allocated to the Workstation Player VM in which the system server is installed.

Component	Resource allocation requirement
Disk size	256 GB Select to store the virtual disk as a single file (recommended).
Memory	Minimum: 12 GB
Processors	<ul style="list-style-type: none"> Minimum: 4 logical processors Recommended: 8 logical processors Select Virtualize Intel VT-x/EPT or AMD-V/RVI (Virtualization engine section) .
Network adapter	Select Bridged (Network connection section) . The VM is configured with its own IP address.

Engineering Client VM (Host Computer 2)

The table describes the amount of hardware resources of the host computer that need to be allocated to the Workstation Player VM in which the engineering client is installed.

Component	Resource allocation requirement
Disk size	120 GB Select to store the virtual disk as a single file (recommended).
Memory	Minimum: 16 GB
Processors	<ul style="list-style-type: none"> Minimum: 4 logical processors Recommended: 8 logical processors Select Virtualize Intel VT-x/EPT or AMD-V/RVI (Virtualization engine section).
Network adapter	Select Bridged (Network connection section). The VM is configured with its own IP address.

NOTE: If you want to use several remote clients, each one installed in a separate Workstation Player VM, the hardware requirements of the host computer need to be increased by multiples of the resources that are allocated to the engineering client VM.

Recommendation for Virtualized Supervision

Overview

If you want to use in a virtualized environment the Supervision components, page 28 that are required for the runtime and runtime navigation services, the hardware requirements for the host computer increase by the figures shown in the table below.

It applies whether you install the Supervision components in a separate VM or add them to a VM in which the system server is already installed.

Resource Allocation for Virtualized Supervision Architecture

The table indicates the minimum amount of hardware resources of the host computer that need to be allocated to the Workstation Player VM in which the following components are installed:

- AVEVA System Platform Development Studio.
- InTouch OMI.
- The EcoStruxure Process Expert for AVEVA System Platform operation client.
- AssetLink.
- Modicon Communication Server or OPC UA Server Expert.

Small Applications

Component	Resource allocation requirement
CPU	4 vCPUs
Memory	4 GB
Disk	100 GB

Medium/Large Applications

Component	Resource allocation requirement
CPU	<ul style="list-style-type: none"> Minimum: 8 vCPUs Recommended: 16 vCPUs
Memory	<ul style="list-style-type: none"> Minimum: 8 GB Recommended: 16 GB
Disk	100 GB

Recommended Virtualized Engineering Architectures

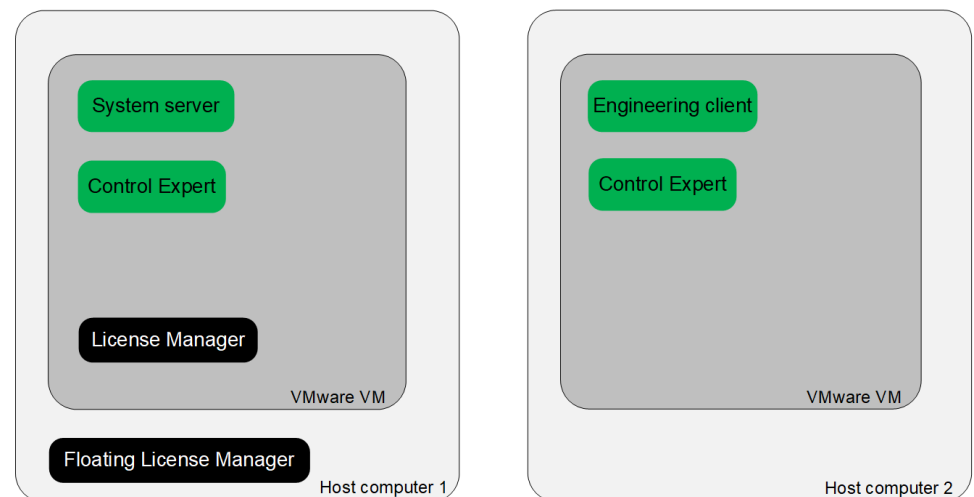
Overview

This topic describes typical EcoStruxure Process Expert for AVEVA System Platform architectures that you can use in a virtual environment.

Distributed Architecture

Optimal performance is achieved by using an architecture where the system server and the engineering client are virtualized on separate host computers. All software components required for engineering are virtualized.

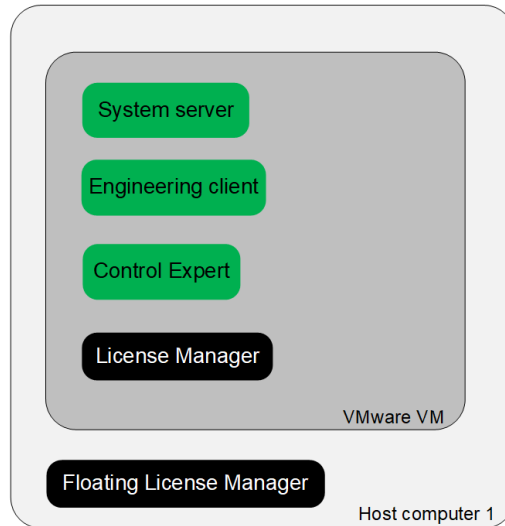
You can virtualize additional engineering clients on other remote computers.



All-In-One Engineering Architecture

Alternatively, you can use an all-in-one engineering architecture where the system server and the engineering client are virtualized on one host computer.

You can virtualize additional engineering clients on other remote computers.



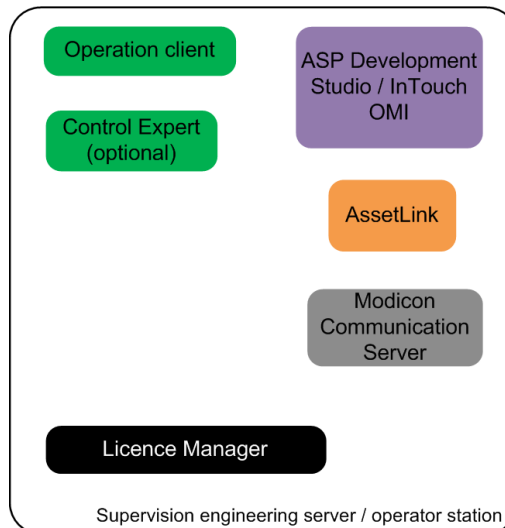
Using Supervision and Runtime Navigation Services

To use Supervision and runtime navigation services with either virtualized engineering architecture, you can install the Supervision components and the EcoStruxure Process Expert for AVEVA System Platform operation client on a remote computer.

This installation can also be virtualized, on the same host computer or a remote one.

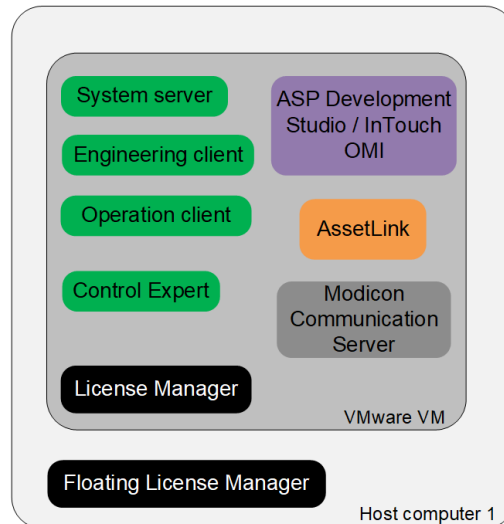
Like in a traditional installation, the operation client needs to be able to communicate with the system server, which is installed on the VM.

The following figure shows the required Supervision components installed on a physical computer.



(ASP = AVEVA System Platform)

The following figure shows the required Supervision components virtualized on the same host computer as the engineering components.



Installing and Configuring the Software

Installation Procedure

If you are not yet using Workstation Player, you need to create a new VM. If you are, you may be able to use an existing VM if it has an operating system that is suited for EcoStruxure Process Expert for AVEVA System Platform and is configured appropriately.

The procedure outlines the installation of Workstation Player and EcoStruxure Process Expert for AVEVA System Platform.

Step	Action
1	Install Workstation Player on the host computer.
2	Start Workstation Player, create one or more new VMs, and configure them depending on your application size and the type or architecture that you want to use.
3	By using the New Virtual Machine Wizard , install the guest operating system of the VM.
4	Install EcoStruxure Process Expert for AVEVA System Platform in the VM. NOTE: Unselect the Floating License Manager check box in the Machine Role dialog box during installation. This installs only the License Manager .
5	If you also want to use the operation server and its control client in a virtual environment, install the necessary components. Refer to the <i>EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide</i> for details.

Configuring EcoStruxure Process Expert for AVEVA System Platform

The table describes the required configuration of parameters to enable client/server communication.

Virtualized architecture	Setting
All-in-one engineering architecture	No particular configuration is required.
All-in-one architecture with Supervision	
Remote engineering client (distributed architecture)	In the Engineering Client Configuration Wizard (System Server section) , enter the IP address of the VM that contains the system server. Verify that the VMs in host computers 1 and 2 can communicate.
Remote EcoStruxure Process Expert for AVEVA System Platform operation client (distributed architecture)	In the Operation Client Configuration Wizard (System Server section) , enter the IP address of the VM that contains the system server. Verify that the VM in host computer 1 and the Operation computer can communicate.

NOTE: For details, refer to the *EcoStruxure Process Expert for AVEVA System Platform Installation and Configuration Guide*, chapter *Configuring the Software*.

Configuring Schneider Electric Licensing Software

Overview

This topic describes how to configure the Schneider Electric licensing software by using the recommended virtualized engineering architectures as example.

The installation files for the Floating License Manager are available in the installation package of EcoStruxure Process Expert for AVEVA System Platform.

Working Principle

The licensing mechanisms used for virtualization are similar to those used in traditional installations.

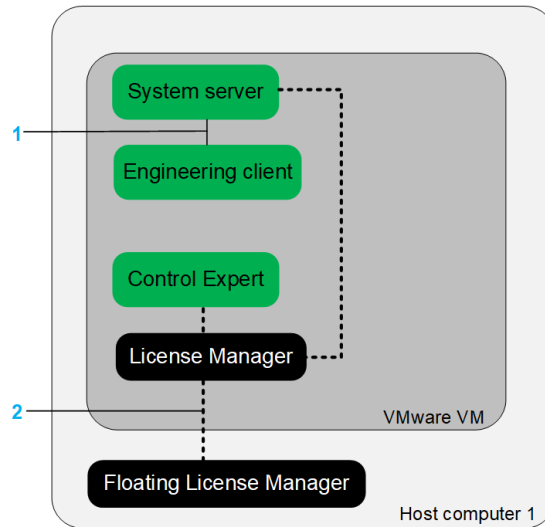
In the License Manager (LM) that is virtualized, enter the IP address of the computer or VM hosting the Floating License Manager (FLM) in which you have activated the necessary EcoStruxure Process Expert for AVEVA System Platform licenses.

Verify that the LM can communicate with the FLM. This requires that the License Server port value that is configured for the FLM and in the LM is the same.

For more information on configuring and using licensing software, refer to the *EcoStruxure Process Expert for AVEVA System Platform Licensing Guide*.

Licensing for the All-In-One Engineering Architecture

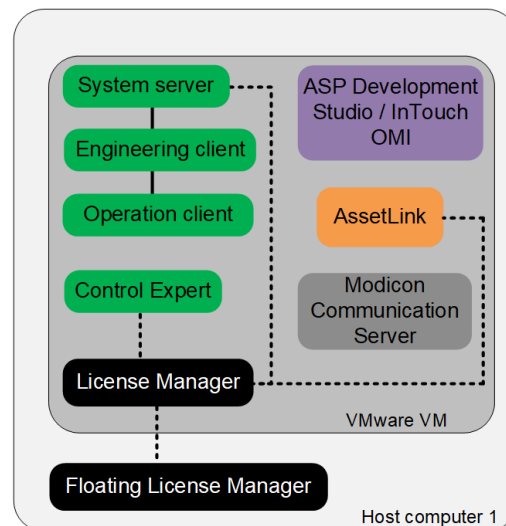
The following figure shows an example where the FLM is installed on Host computer 1 (not virtualized). The LM is configured with the IP address of Host computer 1.



Item	Description
1	Represents client/server connections.
2	Represents connections that are used for license acquisition.

Licensing for the All-In-One Architecture With Supervision

The following figure shows an example where the FLM is installed on Host computer 1 (not virtualized). The LM is configured with the IP address of Host computer 1.



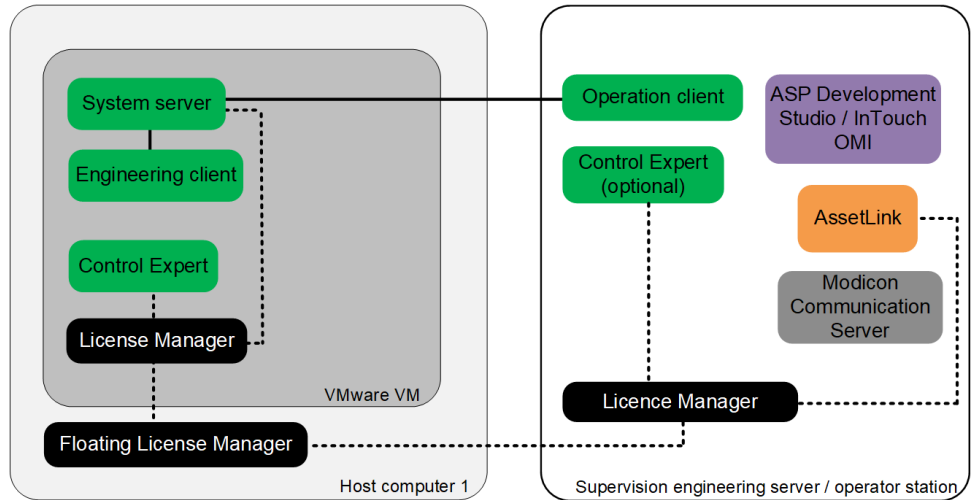
(ASP = AVEVA System Platform)

NOTE: The licensing mechanism of AVEVA System Platform is not described in this application note.

Licensing for the Distributed Architecture With Remote Supervision

The following figure shows an example where the FLM is installed on Host computer 1 (not virtualized).

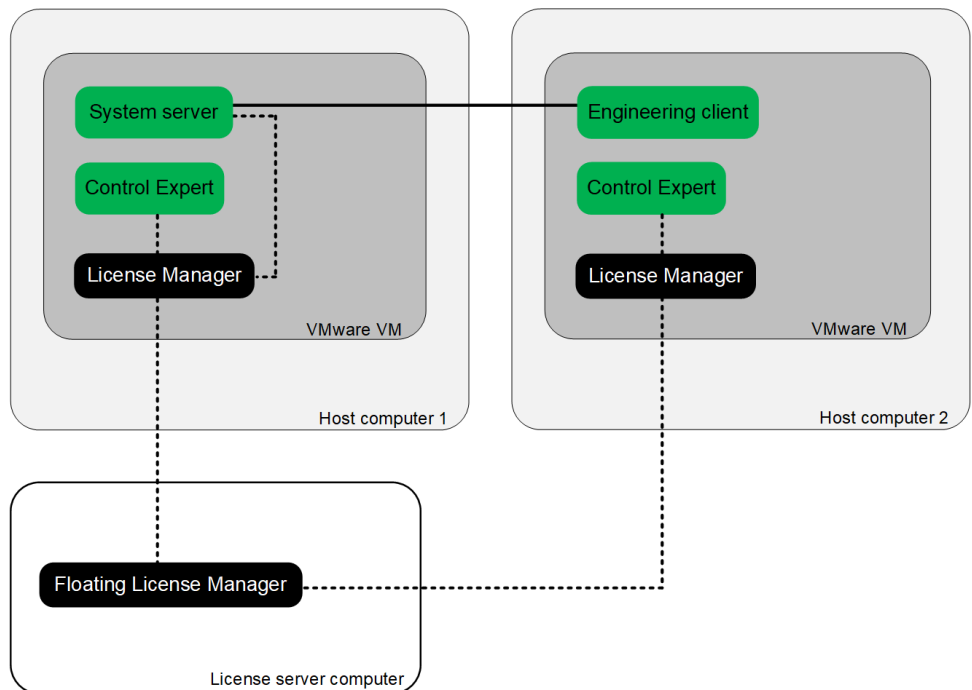
- The LM for the EcoStruxure Process Expert for AVEVA System Platform engineering components is installed on the VM. configure it with the IP address of Host computer 1.
- The LM that is required by Control Expert for the operation client and by AssetLink is installed on a remote computer. Configure this LM also with the IP address of Host computer 1.



NOTE: The licensing mechanism of AVEVA System Platform is not described in this application note.

Licensing With Remote Floating Licensing Manager

The following figure shows an example where licenses have been activated on an FLM that is installed on a remote license server computer. Both LMs are configured with the IP address of the license server computer. Verify the both VMs can communicate with the license server.



Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison
France

+ 33 (0) 1 41 29 70 00

www.se.com

As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

© 2021 – Schneider Electric. All rights reserved.

EIO0000004214.00