SIEMENS

SIMATIC

SIMATIC Virtualization as a Service (V1.1 SP1)

Operating Manual

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09/2014

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Legal information

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⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

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indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Preface

Purpose of the manual

This document supports you in commissioning and configuring the virtualization system.

Core content

The following core issues are covered in this document:

- What is SIMATIC Virtualization as a Service?
- Which services are included?
- How is the virtualization system commissioned?
- How is the virtualization system configured?
- How can the virtualization system be extended?
- How does remote log in work on virtual machines (VMs)?
- How is the data backed up?

Required basic knowledge

General knowledge in the area of automation engineering and process control engineering is required to understand this documentation.

Validity

This document is valid for the following components of the "SIMATIC Virtualization as a Service V1.1 SP1" virtualization system:

- SIMATIC PCS 7 V8.0 SP2
- SIMATIC WinCC V7.3
- VMware vSphere 5.1
  - VMware ESXi 5.1 Update 2
  - VMware vSphere Client 5.1 Update 2

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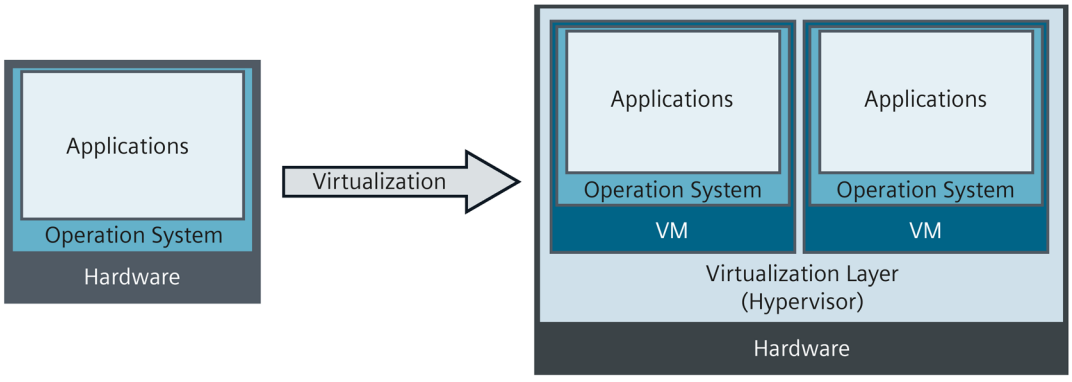
Introduction

1

1.1 Introduction to virtualization

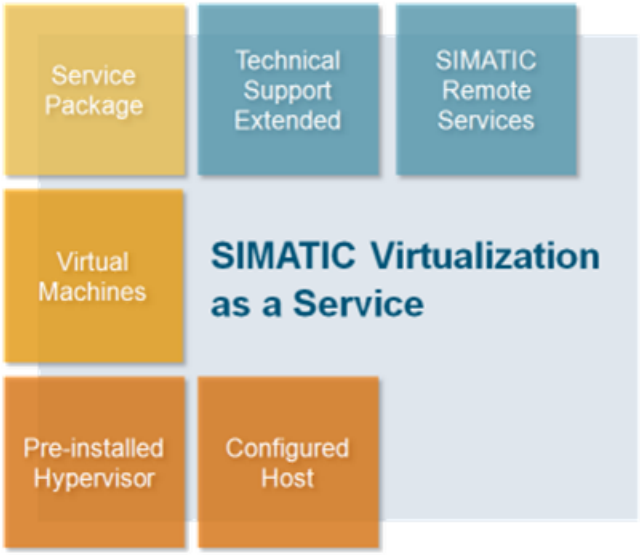
Virtualization is a method of dividing up physical hardware resources on one computer into several logical (virtual) environments.



As a result of the virtualization the operating system and user software on a computer is detached from its hardware and provided in the form of a virtual machine (VM).
A virtual machine refers to software that depicts a real computer and can itself execute applications. Virtual machines have virtual hardware (e.g. graphics card, CPU, memory (RAM), network cards, and hard disks on SCSI or IDE controllers) and standardized virtual device drivers.
Several virtual machines can be implemented separately from each other on a real, physical computer (host system). Isolation prevents conflicts from software dependencies and offers the opportunity to start and stop virtual machines independently of each other. If there is a crash only the relevant virtual machine is affected.
The physical computer (host system) can also be upgraded without affecting or modifying the virtual machines.

1.2 Description

SIMATIC Virtualization as a Service is a pre-configured, ready-to-use virtualization system for implementing efficient automation solutions for SIMATIC systems.



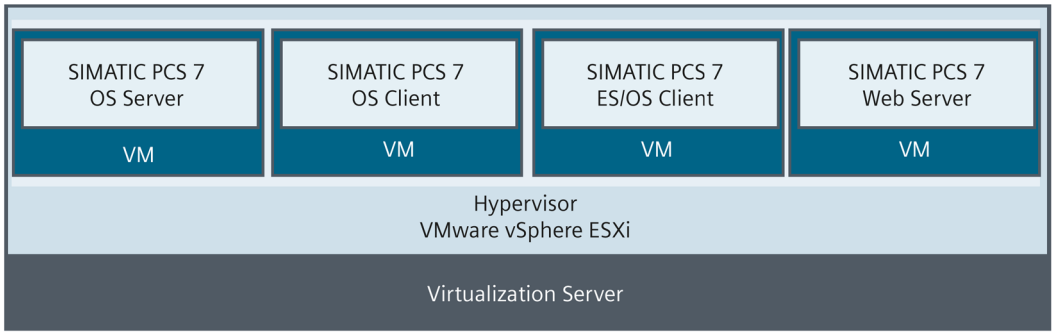
1.2.1 The virtualization system

The virtualization system is comprised of software and hardware components that are ideally matched to each other and thus offer high performance. They include:

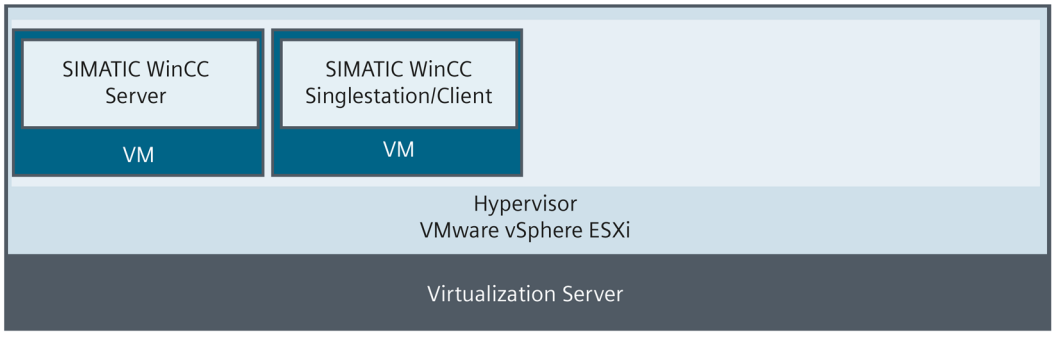
- Hardware
  - Virtualization server
  - Thin client(s)
- Software
  - VMware vSphere ESXi (Hypervisor)
  - VMware vSphere Client
  - Virtual machines with Microsoft Windows Server 2008 as operating system and SIMATIC software (PCS 7, WinnCC)

The virtualization system can be extended easily and efficiently using pre-configured templates and is therefore scalable to various system sizes. A fault-tolerant system can be implemented by connecting an additional virtualization server.

- SIMATIC PCS7



- SIMATIC WinCC



1.2.2 Service

With the purchase of "SIMATIC Virtualization as a Service" the following product groups are supported as part of the "Product service & support" module:

- SIMATIC PCS 7 (V8.0 SP1 and higher)
- SIMATIC WinCC (V7.2 Upd. 5)
- Virtualization hardware (server, thin clients)
- Virtualization software (VMware vSphere)

The support is provided by a contact from Siemens Industry. The service and support package offers advice and support for quickly resolved tasks (up to 2 hrs per case) by telephone, support request, or fax. For requests that last longer than 2 hours Siemens will submit a quotation for "extended support". The number of cases is not limited.

You can send your support requests via the Siemens Industry Online Portal (https://support.automation.siemens.com).

1.3 Function principle

A hypervisor is installed on a high-performance server (HP Proliant DL380P GEN8) as an additional software layer that manages the hardware resources and is dynamically distributed across the virtual machines.

The central management, configuration, and maintenance of the virtual machines and the virtualization server is undertaken via a management console and using the "VMware vSphere Client" software. You can use the following hardware as a management console:

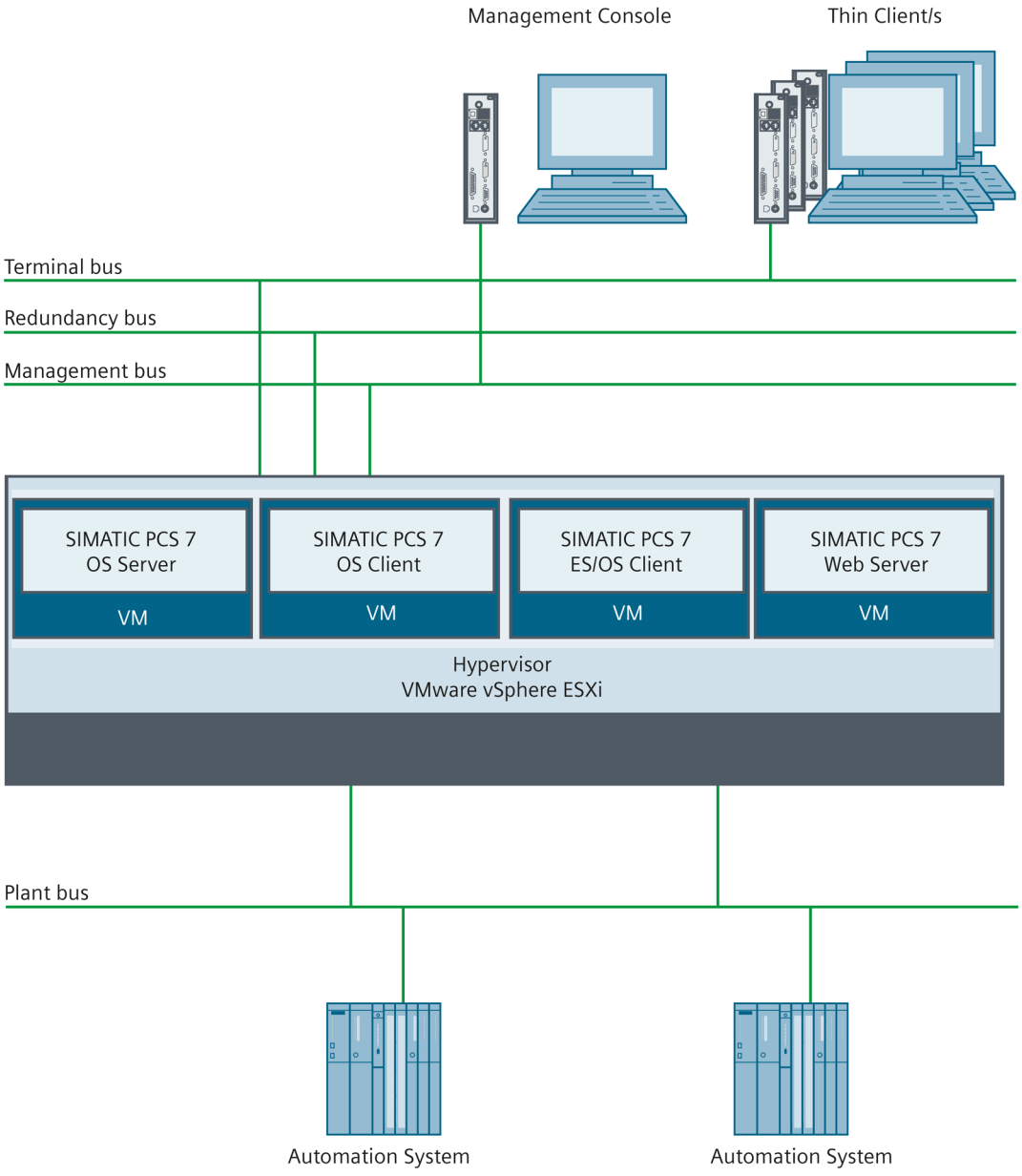
- Thin Client with Windows operating system
  In this case the thin client must be connected with the management bus.
- Any computer that meets the requirements for the "VMware vSphere Client" software.
  For additional information refer to (http://kb.vmware.com).

The virtual machines are equipped with SIMATIC PCS 7 or SIMATIC WinCC installations and pre-configured depending on the automation task (e.g. PCS 7 ES/client, WinCC server). The access to the virtual machines is provided via the "VMware vSphere Client" software or a remote connection. The remote access by RDP is only permitted for virtual clients and takes place via the thin client.

The communication between the virtual machines takes place via the communication buses (management, terminal, redundancy buses) planned for this purpose.

The communication between the virtual machines and the available automation systems takes place via the plant bus.

The figure below shows an example of the communication buses of the virtualization system:



A highly available configuration can be realized via a second virtualization server. The virtual redundant servers require the redundancy bus for the synchronization.

1.4 Advantages

SIMATIC Virtualization as a Service offers the following advantages:

- Solution from a single source
  - Life cycle services from a single source for all supplied hardware and software components
  - Perfectly matched software and hardware components
  - Quick and safe integration of the system using pre-finished, configured, and tested components
- Reduction in costs
  - Reduction in life cycle costs by increasing energy efficiency
  - Reduction in investment and operating costs
  - Savings through the use of energy-saving and low-cost thin clients for operating and observing the process
- Higher performance
  - Optimal use and utilization of the hardware resources supplied
- Increased flexibility and system availability
  - Cost-effective and quick expansion of system components using ready-to-run templates
  - Simple transfer of a virtual machine to a new hardware environment
  - Lower cost for system modernization
- Reduction in time required for maintenance and support
  - Reduction in the administrative costs by merging several systems onto one virtualization server
  - Reduced maintenance costs and times using centralized administration
- Increasing security
  - More security using remote access with centralized rights management and reduced attack options for thin clients
  - Simple system management and extended support in cooperation with SIMATIC remote services

1.5 Scope of delivery

1.5.1 Hardware and software components

The system components supplied may vary:

- Selected host system
- Number of thin clients ordered
- Number and type of ordered virtual machines

Detailed information on the scope of delivery is included in the delivery note.

Hardware

The following variants of hardware components may be supplied:

Name	Host system/configuration	Number	Comment
HP ProLiant DL380p Gen8 8 (Technical data and hardware configuration depending on ordered host system)	6Cx1P HP Host: • HP DL380p Gen8 Intel Xeon E5-2630 V2 (2.6GHz/6-core/DDR3-1600) FIO kit • 24 GB (3x8GB) 2Rx4 PC3L-12800R-11 kit • 1.2TB 6G SAS 15K (2.5inch) SC ENT HDD RAID 5 • 1x Ethernet 1GB 4-port 331T • 1x Ethernet 1GB 4-port 331FLR FIO • 2x 460W Power Supply kit • iLo Advanced incl. 3yr TS U1-Svr Lic	1	Virtualization server
	8Cx1P HP Host: • HP DL380p Gen8 Intel Xeon E5-2650 V2 (2.6GHz/8-core/DDR3-1866) FIO kit • 32 GB (4x8GB) 1Rx4 PC4-14900R-13 kit • 1.5TB 6G SAS 15K (2.5inch) SC ENT HDD RAID 5 • 1x Ethernet 1GB 4-port 331T • 1x Ethernet 1GB 4-port 331FLR FIO • 2x 460 Power Supply kit • iLo Advanced incl. 3yr TS U1-Svr Lic		

Name	Host system/configuration	Number	Comment
	6Cx2P HP Host: • HP DL380p Gen8 Intel Xeon E5-2630 V2 (2x 2.6GHz/6-core/DDR3-1600) FIO kit • 48 GB (6x8GB) 2Rx4 PC3L-12800R-11 kit • 1.8TB 6G SAS 15K (2.5inch) SC ENT HDD RAID 5 • 1x Ethernet 1GB 4-port 331T • 1x Ethernet 1GB 4-port 331FLR FIO • 2x 460 Power Supply kit • iLo Advanced incl. 3yr TS U1-Svr Lic		
	8Cx2P HP Host • HP DL380p Gen8 Intel Xeon E5-2650 V2 (2x 2.6GHz/8-core/DDR3-1866) FIO kit • 64 GB (8x8GB) 1Rx4 PC3-14900R-13 kit • 4.8TB 6G SAS 15K (2.5inch) SC ENT HDD RAID 5 • 1x Ethernet 1GB 4-port 331T • 1x Ethernet 1GB 4-port 331FLR FIO • 2x 750W Power Supply kit • iLo Advanced incl. 3yr TS U1-Svr Lic		
HP Txx Flexible Thin Client	HP Txx Flexible ThinClient operating system: Windows Embedded 7	1	Thin client incl. operating system licenses
	HP Txx Flexible ThinClient operating system: Linux Thin Pro	optional	

VMware Software

The following VMware software is supplied:

Name	Host system	Number	Comment
VMware vSphere 5.1 Standard for 1 Processor	6Cx1P HP Host, 8Cx1P HP Host	1	VMware Hypervisor incl. licenses
	6Cx2P HP Host, 8Cx2P HP Host	2	

Virtual machines

The following variants of virtual machines may be supplied:

Virtual machines with SIMATIC PCS 7 software:

- SIMATIC PCS 7 V8.x ES/OS client

Name	Number	Comment
Microsoft Windows Server 2008 R2 SP1 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC PCS 7 V8.x ES/OS client	1	Software without licenses

- SIMATIC PCS 7 V8x OS server

Name	Number	Comment
Microsoft Windows Server 2008 R2 SP1 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC PCS 7 V8x OS server	1	Software without licenses

- SIMATIC PCS 7 V8x OS client

Name	Number	Comment
Microsoft Windows Server 2008 R2 SP1 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC PCS 7 V8x OS client	1	Software without licenses

- SIMATIC PCS 7 V8x Web server

Name	Number	Comment
Microsoft Windows Server 2008 R2 SP1 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC PCS 7 V8x Web server	1	Software without licenses

Virtual machines with SIMATIC WinCC software:

- SIMATIC WinCC server

Name	Number	Comment
Microsoft Windows Server 2008 R2 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC WinCC server V7.x	1	Software without licenses

- SIMATIC WinCC single station/client

Name	Number	Comment
Microsoft Windows Server 2008 R2 SP1 Standard x64 Embedded System	1	Operating system incl. licenses
SIMATIC WinCC single station/client V7.x	1	Software without licenses

Data backup hardware

The following data backup hardware is supplied:

Name	Number
USB hard disk, 500 GB memory	1

The USB hard disk contains the following data:

Data	Description
Licenses & agreements	• VMware software license key • SIMATIC Virtualization as a Service - Service agreement
Product documentation	• "SIMATIC Virtualization as a Service" manual • "SIMATIC Virtualization as a Service - Quick Install Guide" manual
Backup of host system configuration	• Hypervisor (VMware vSphere ESXi) • Networks
Open Source Code	• Thin client • VMware
Open Source software report	• PDF
Backup of virtual machines	Backing up the delivery status of the ordered virtual machines as OVF files
Backup of MAC addresses of supplied virtual machines	List of MAC addresses of ordered virtual machines

1.5.2 Services

A service agreement for at least 2 years is supplied as standard. You can find detailed information on the services it includes in the supplied service agreement.

Commissioning

2

2.1 Preparation

2.1.1 Unpack and check delivery unit

Please particularly note the following points when unpacking:

- We recommend that you do not throw away the original packaging. Store this for any new transport.
- Store the documents provided. They are required for initial commissioning and are part of the product.
- Check the packaging and contents for visible transport damage.
- Ensure that the delivery is complete (see section "Items Supplied").
- If you find transport damage or discrepancies please inform your sales contact.

Note

Observe the manufacturer safety instructions

Also observe the device-specific information and safety instructions from the manufacturer.

Note

Management Console

The packaging of the thin client that can be used as management console is labeled accordingly.

2.1.2 Assemble devices

You will find information and safety instructions for assembling the devices supplied in the manufacturer's product documentation:

- HP Support Center (http://h20565.www2.hp.com/portal/site/hpsc)

2.1.3 Additional components required

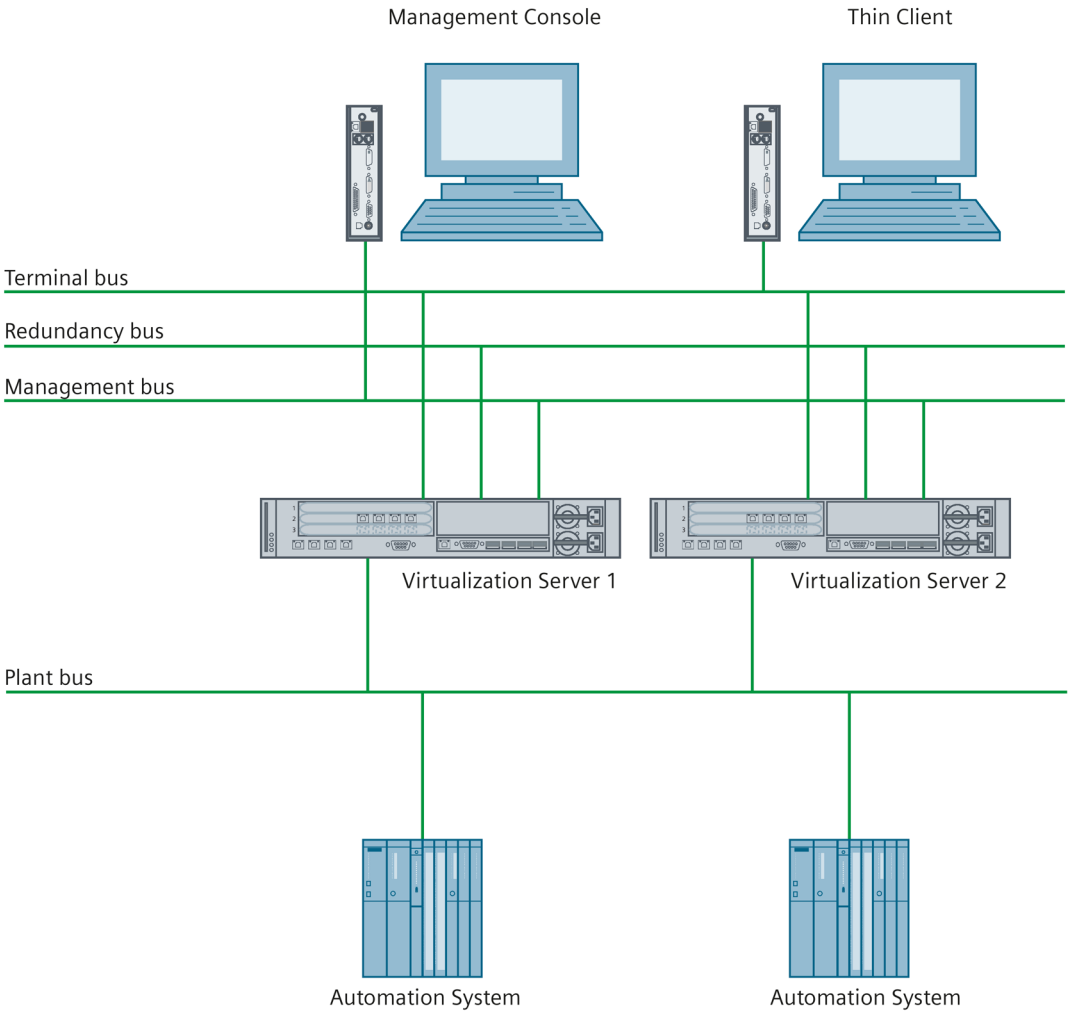
To commission the virtualization system, in addition to the delivery unit, the following components are required:

- Hardware
  - Optional: PC for use as a management console. Any PC that meets the requirements for the "VMware vSphere Client" software can be used as a management console. For additional information refer to http://kb.vmware.com. Alternatively the supplied thin client can be used as the management console if it is equipped with a Windows operating system.
  - Optional: Switches depending on system configuration; you can find information on the switches for the SCALANCE product range at http://www.automation.siemens.com
  - Monitor for operating the virtualization server and thin client. Note the manufacturer's information.
- Software
  The SIMATIC components pre-installed on the virtual machines must be licensed. The scope and type of the required licenses depend on the options and the number of virtual machines. Information on licensing is available at:
  - SIMATIC PCS 7 (www.siemens.com/simatic-pcs7)
  - SIMATIC WinCC (www.siemens.com/wincc)

2.2 Connecting the hardware components

2.2.1 Overview of the hardware components

The following figure shows the hardware components schematically and their network connections:

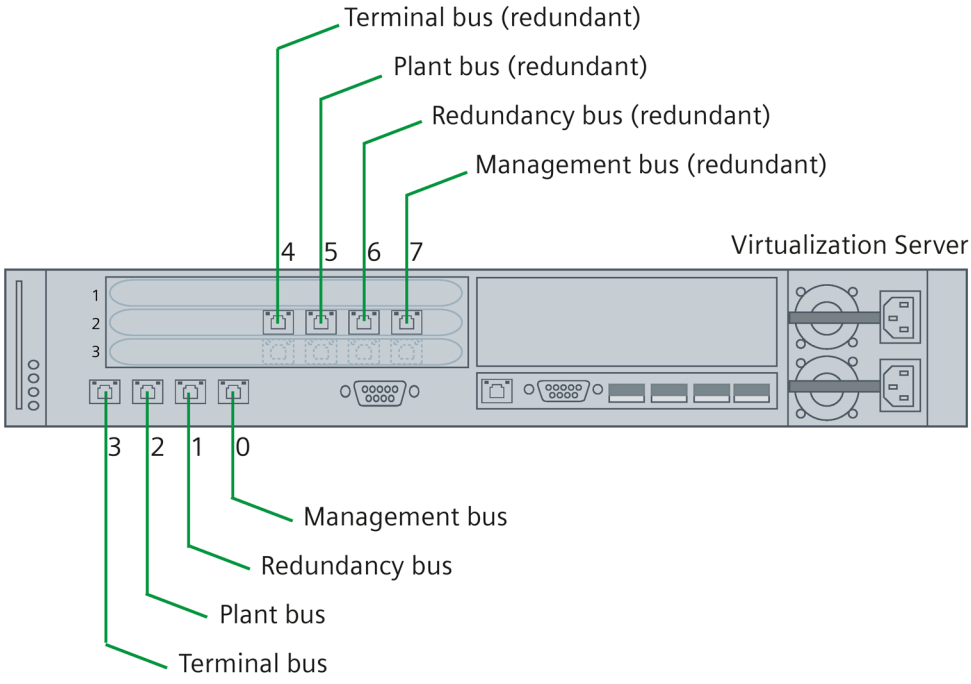


2.2.2 Description of the network connections

The virtualization server has 8 ports. Each port is assigned to one of the following bus systems:

- Terminal bus
- Plant bus
- Redundancy bus
- Management bus

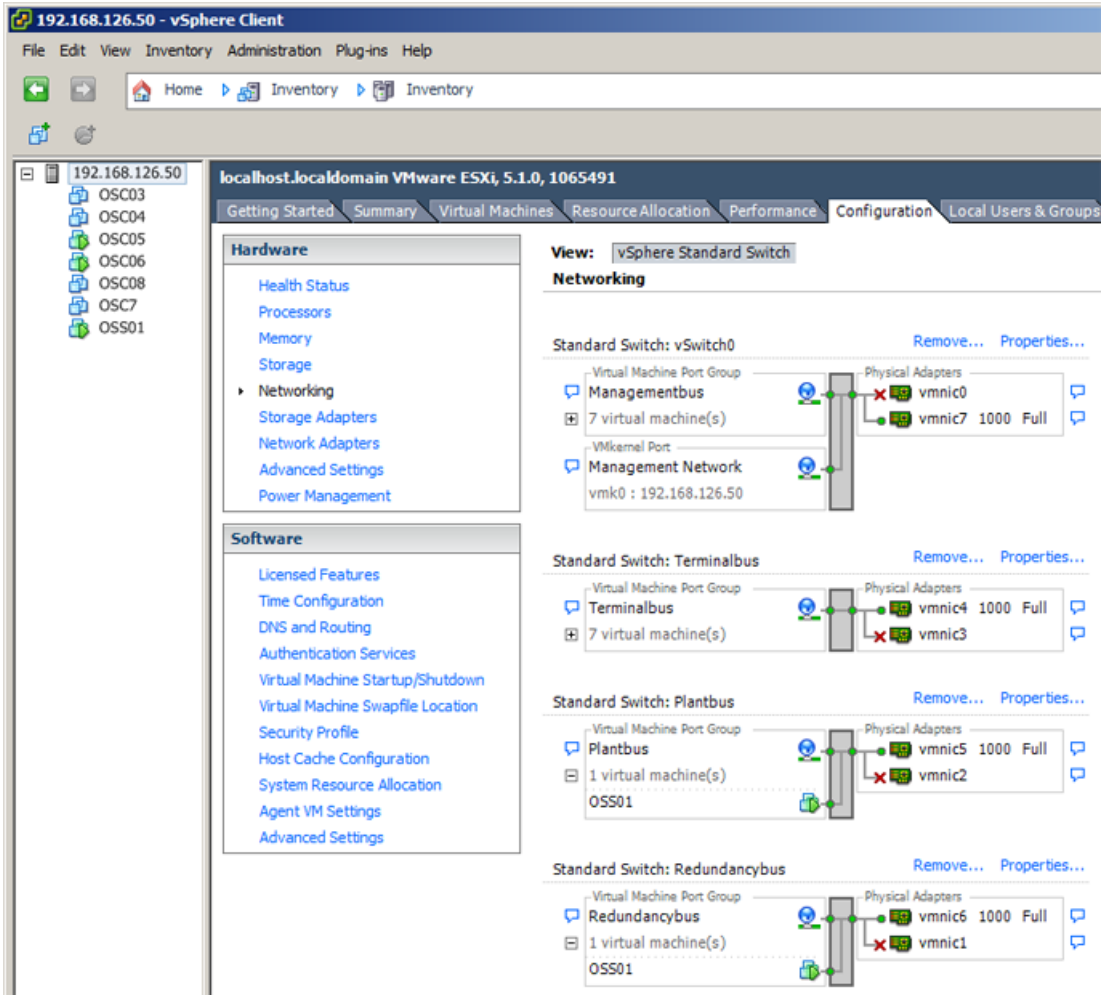
The following figure shows the assignment of the bus systems to the ports on the virtualization server:



Note

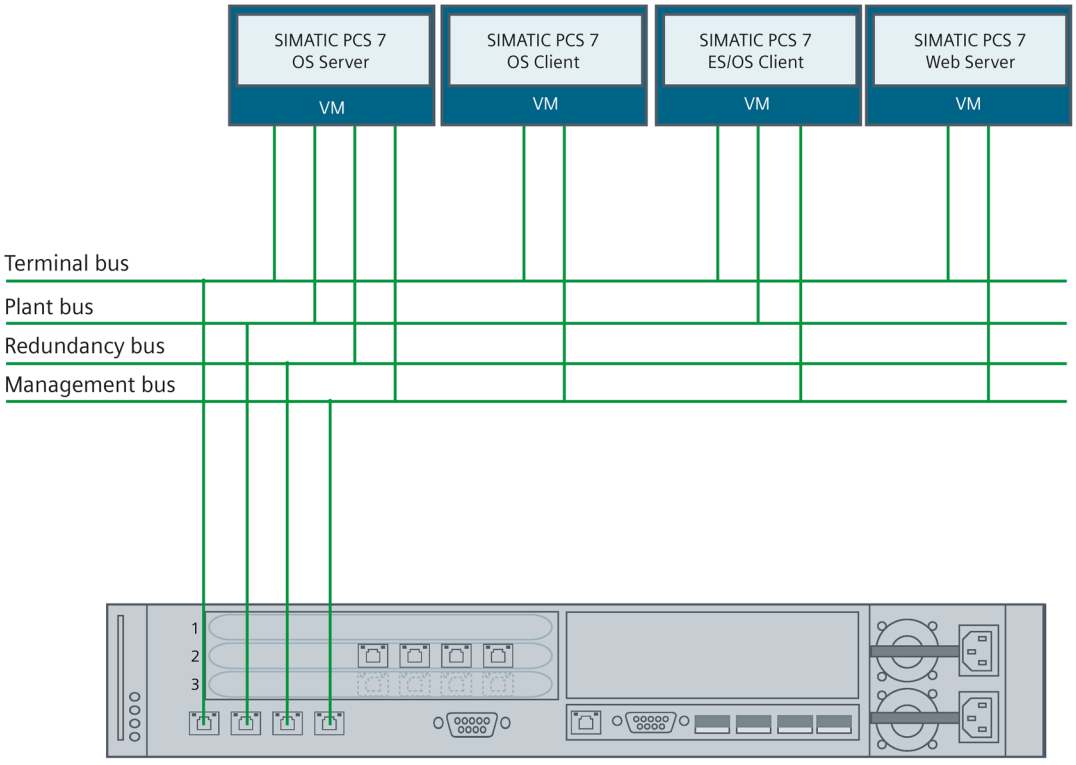
The redundancy bus is required if an additional virtualization server is used to set up a redundant SIMATIC server pair. With a simple system configuration with one virtualization server, the redundancy bus is not required.

The assignment of the bus systems to the ports on the virtualization server is displayed in the "Configuration" tab in the "VMware vSphere Client" software:

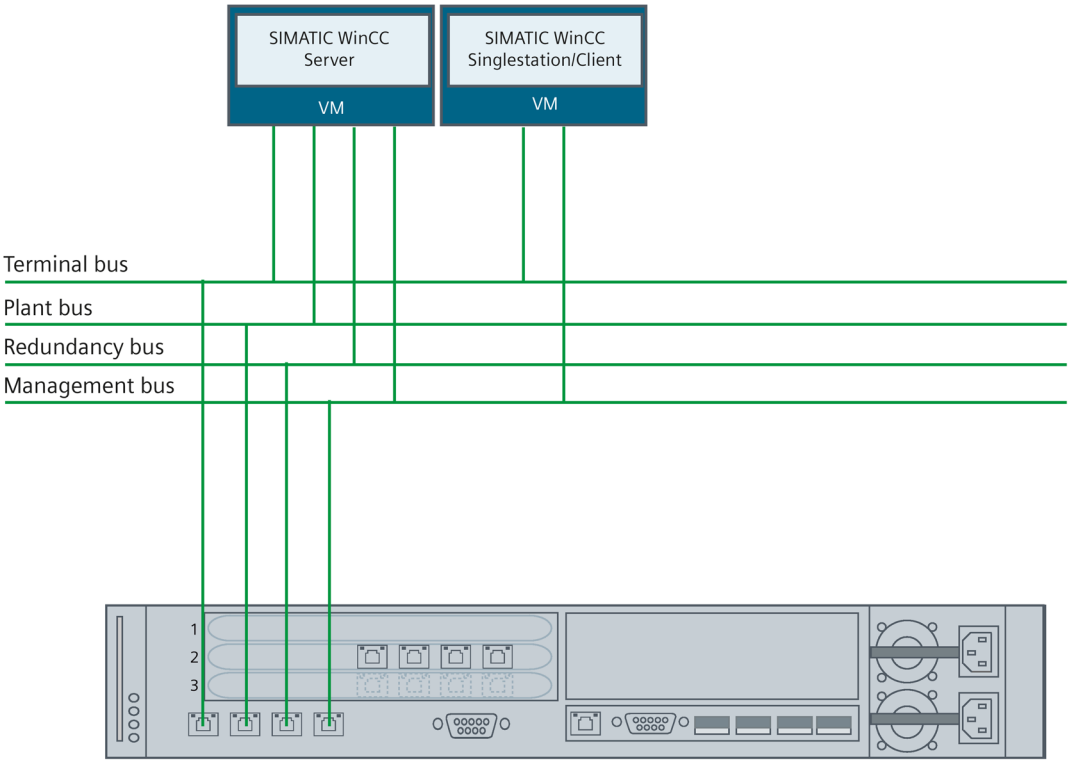


The virtual machines use virtual network cards. The network connections are configured as follows:

- SIMATIC PCS 7



- SIMATIC WinCC



Information on the configuration of the network connections of the virtual machines can be found in section "Setting the network connections (Page 49)".

2.2.3 Connect the virtualization server and management console

Introduction

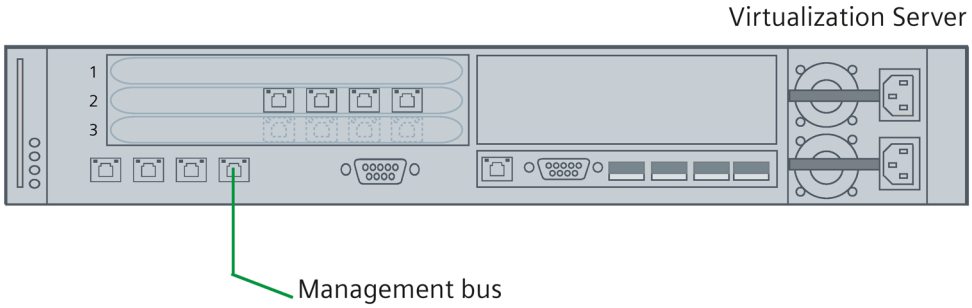
The virtualization server and management console are linked via the management bus. You can connect the following hardware as a management console:

- The supplied management console with pre-installed Vmware vSphere Client software
- A computer that meets the requirements for the "VMware vSphere Client" software.

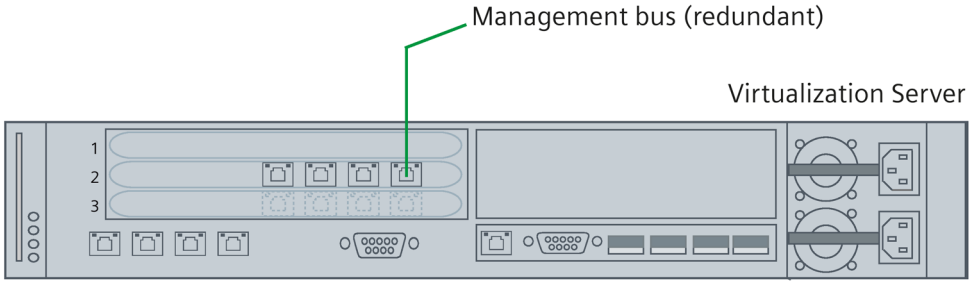
Procedure

To connect the virtualization server and management console, follow these steps:

1. Insert the bus connection plug on the network cable into the following port on the virtualization server:



2. Connect the virtualization server and management console via the relevant interface on the management console.
3. If you want the management bus to be redundant connect a second network cable to the following port on the virtualization server and connect it (e.g. via a switch) to the management bus.



2.2.4 Connecting the thin client

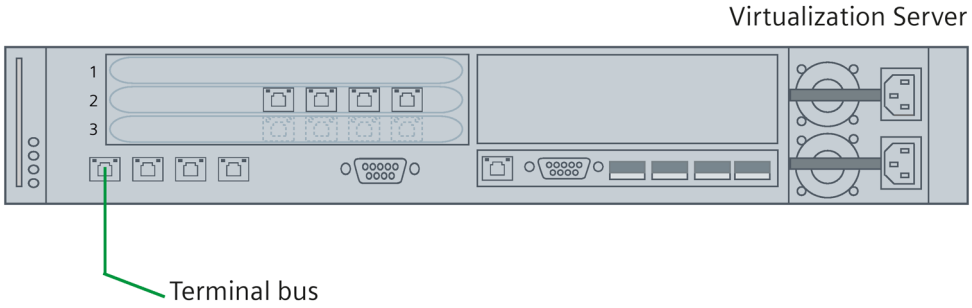
Introduction

If the thin client is used exclusively for operator control and monitoring (PCS 7 OS client or WinCC client), it is connected with the virtualization server via the terminal bus. In contrast when being used as the management console the thin client must be connected with the management bus.

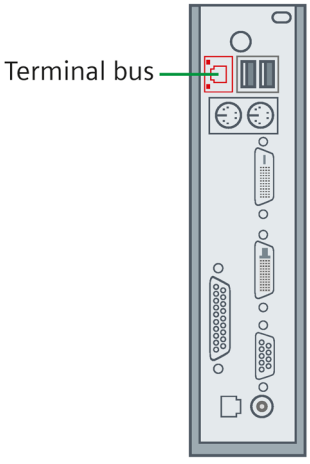
Procedure

To connect the thin client supplied, follow these steps:

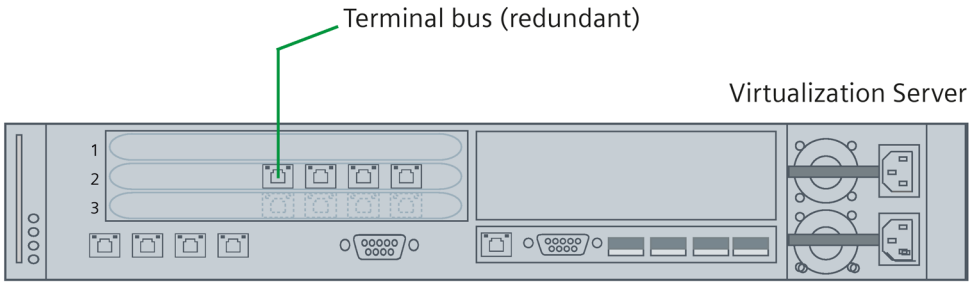
1. Insert the bus connection plug on the network cable into the following port on the virtualization server:



2. Connect the virtualization server and thin client with the terminal bus. Use the following interface on the thin client to do so:



3. If you want the terminal bus to be redundant connect a second network cable to the following port on the virtualization server and connect it (e.g. via a switch) to the terminal bus:



2.2.5 Connection of automation systems

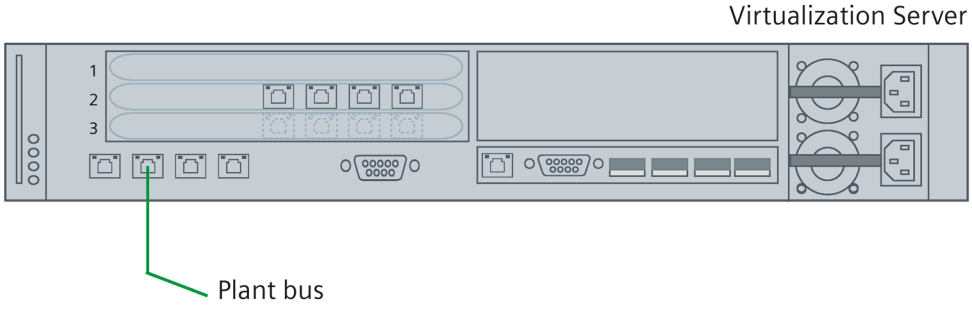
Introduction

Automation systems are connected with the virtualization server via the plant bus.

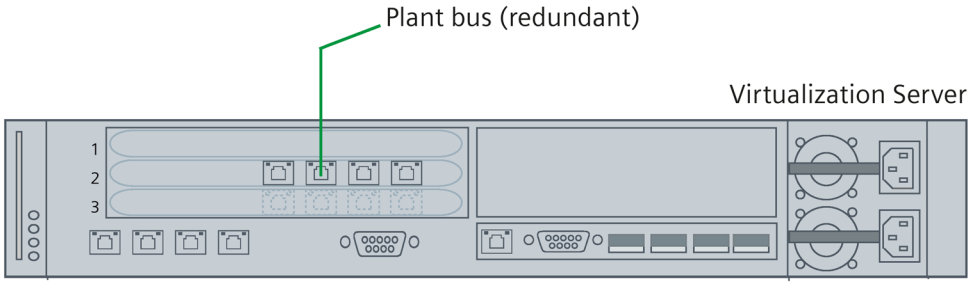
Procedure

To connect an automation system, follow these steps:

1. Insert the bus connection plug on the network cable into the following port on the virtualization server:



2. Connect the automation system.
   Observe the information and safety instructions on the relevant automation system in the documentation. You can find information on the Siemens automation systems at https://support.automation.siemens.com.
3. If you want the plant bus to be redundant connect a second network cable to the following port on the virtualization server and connect it (e.g. via a switch) to the plant bus.



2.2.6 Connecting a second virtualization server for redundant virtual OS servers/WinCC servers

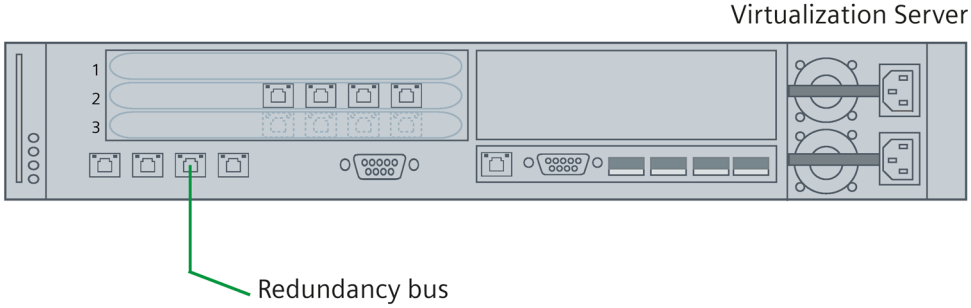
Introduction

When operating a redundant OS/WinCC server pair that is distributed over two virtualization servers, the redundancy bus must be connected.

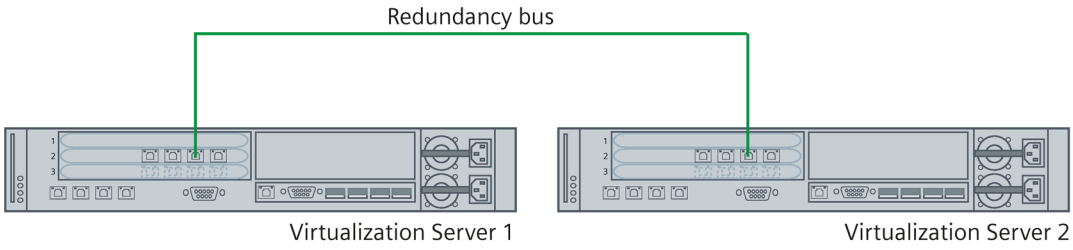
Procedure

To connect a virtualization server to the redundancy bus, follow these steps:

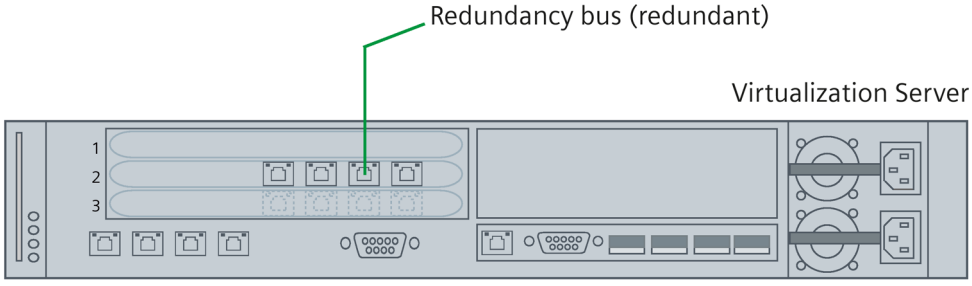
1. Insert the bus connection plug on the network cable into the following port on the virtualization server:



2. Connect the virtualization server with the network cable on the redundancy bus.



3. If you want the redundancy bus to be double, connect a second network cable to the following port on the virtualization server and connect it (e.g. via a switch) to the redundancy bus:



2.3 Configuring the virtualization server

Introduction

The virtualization server is supplied with a password and a pre-configured IP address. The password and IP address must be modified for each user. The data set on the virtualization server must be noted and treated in confidence. It is required for additional configuration steps.

Note

Also observe the device-specific information and safety instructions from the manufacturer:

- HP Support Center (http://h20565.www2.hp.com/portal/site/hpsc)

Requirements

The following requirements must be met:

- The virtualization server is assembled and commissioned according to the manufacturer's regulations.
- A monitor and keyboard are connected on the virtualization server.

Procedure

Follow these steps to configure the virtualization server:

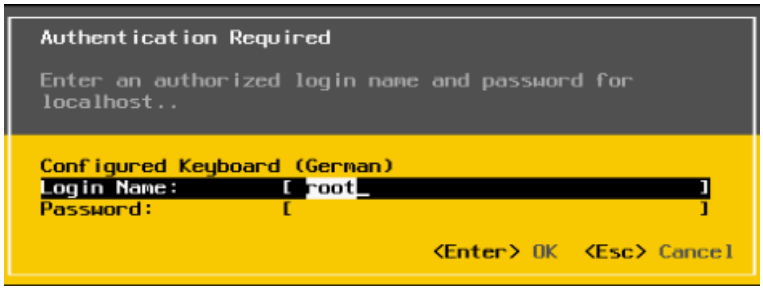
1. Switch the virtualization server on via the mains/standby switch.

   The server's start-up application is displayed.

2. Press the F2 button.

   The dialog for logging in to the virtualization server is opened.

3. Enter the following logon data:
   - Login Name: root
   - Password: Siemens1234

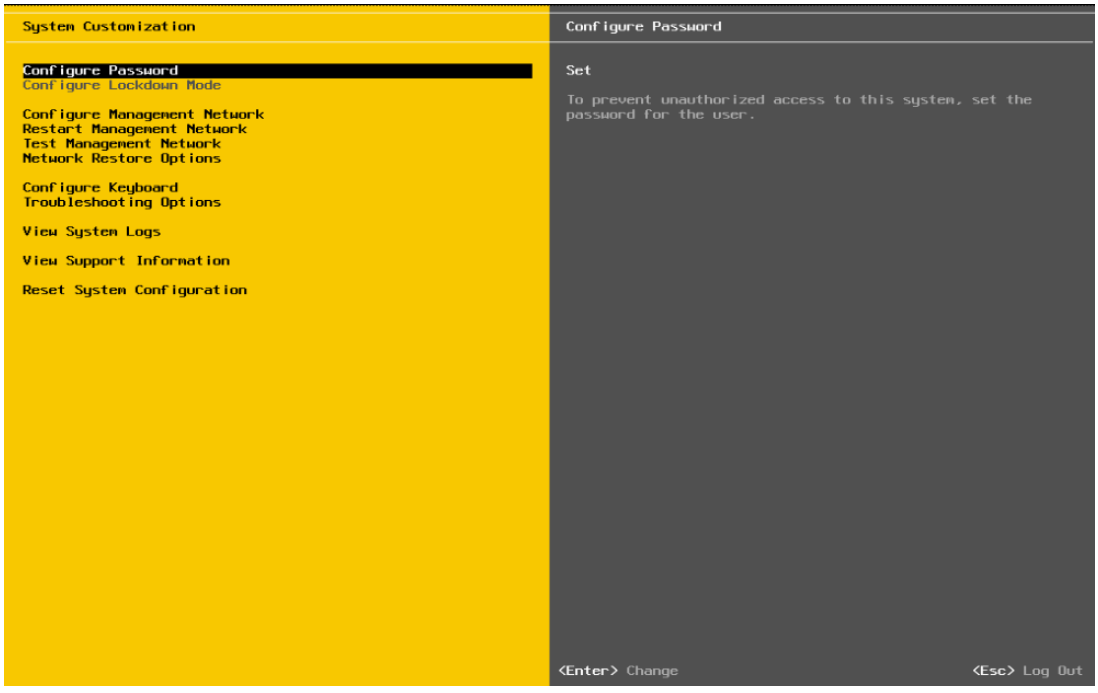


4. Press Enter.
   The options for modifying the system characteristics of the virtualization server are displayed.

5. Navigate to the "Configure password" entry and press Enter.

Note

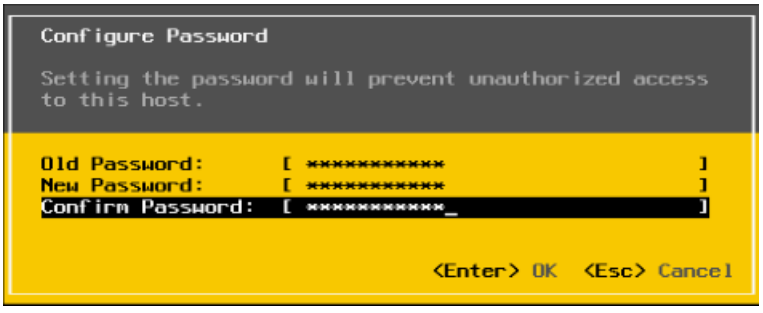
Use the <Arrow down> and <Arrow up> buttons to navigate between the individual entries.



The password change dialog opens.

6. Enter the default password "Siemens1234" for the virtualization server in the "Old Password" line.

7. Enter a new password for the virtualization server into the "New Password" and "Confirm Password" lines.



8. Press Enter to save the change.

Note

Using the "Esc" button you can reject the changes and leave the dialog.

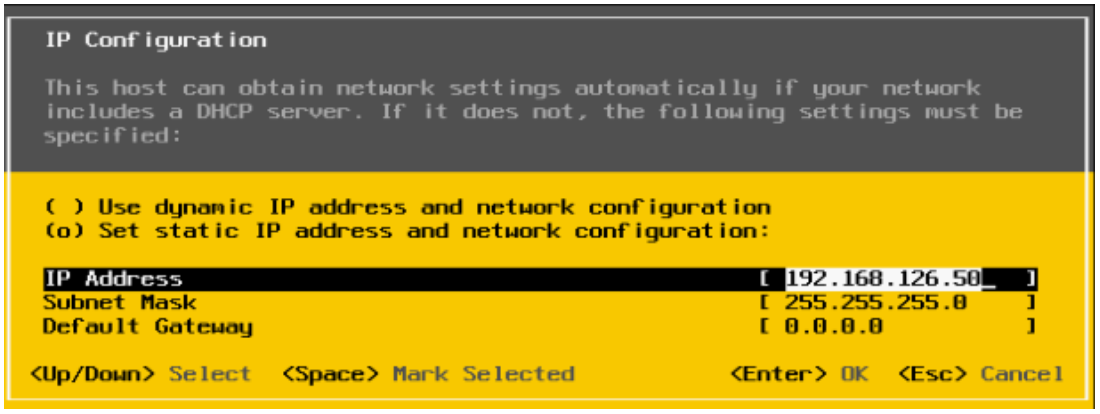
9. Navigate to the "Configure Management Network" entry and press Enter.

   The options to change the network settings are displayed.

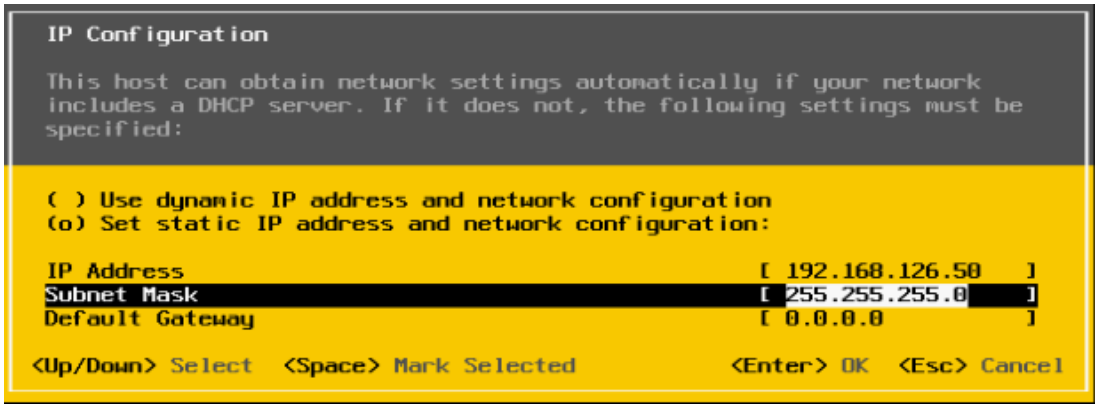
10. Navigate to the "IP Configuration" entry and press Enter.

    The dialog to modify the IP address is opened.

11.Enter the desired IP address.



12.Enter the desired subnet mask.



13.Press Enter to save the change.

A summary of the settings is shown under the "IP Configuration" entry.

14.Press the <Esc> button to reach the initial dialog.

15.Press <Esc> again to log off from the system.

2.4 Configuration of the management console

2.4.1 Configuration of the supplied thin client as management console

Introduction

The packaging of the thin client that can be used as management console is labeled accordingly.

The thin client comes pre-installed with a Windows operating system and the "VMware VSphere Client" software.

Note

Thin clients with the HP ThinPro operating system cannot be used as management consoles.

You set an IP address for the network connection during configuration of the thin client.

Procedure

To configure the thin client (Windows operating system), follow these steps:

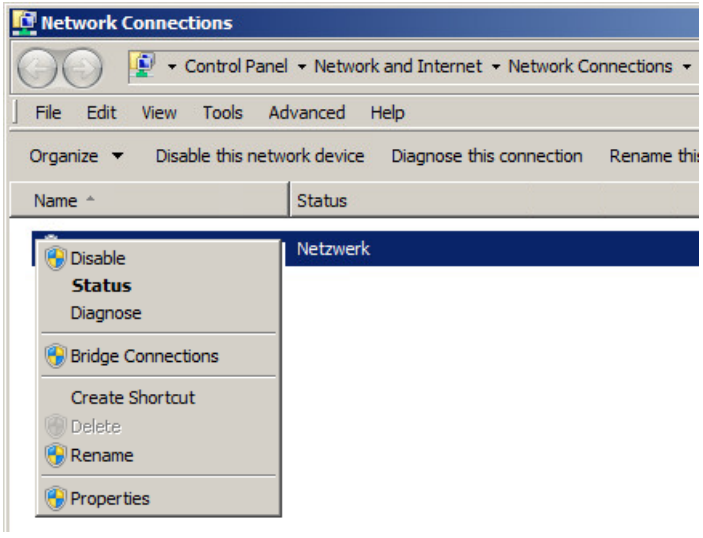
1. Switch on the thin client.

   The thin client is started in the restricted user mode. To configure the thin client, you must switch to the administrator mode.

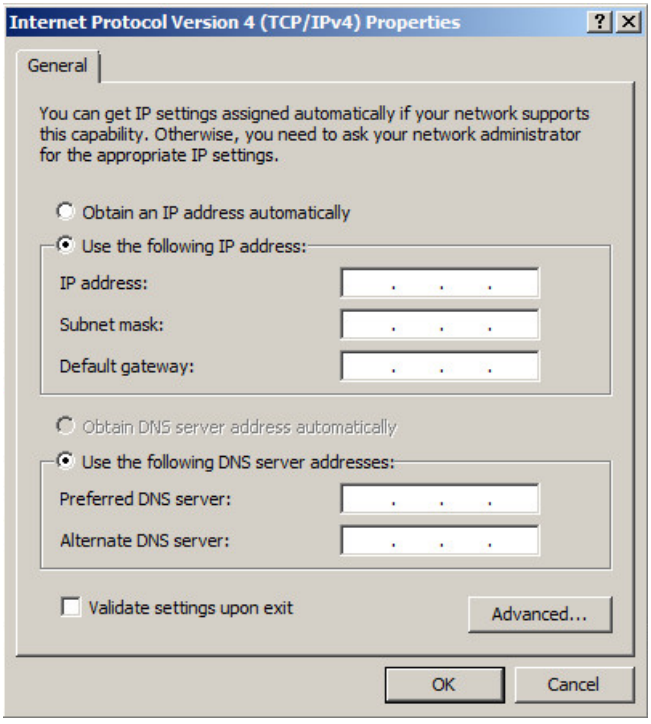
2. Log on to the thin client as administrator. To do so, use the following logon data:
   - User name: Administrator
   - Password: Administrator

3. Open the network connections via "Start > Control Panel > Network and Internet > Network Connections".

4. Select the displayed network connection and open the "Properties" dialog with the shortcut menu.

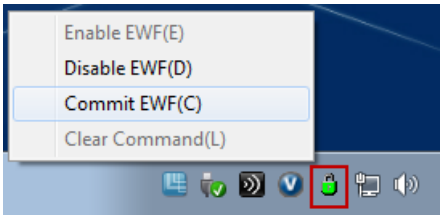


5. Select the "Internet Protocol Version 4 (TCP/IPv4)" element and click the "Properties" button.
6. Activate the "Use the following IP address" option and enter the desired IP address.



7. Click "OK".

8. To save the configuration settings, right click on the "lock" icon in the Windows task bar and select the "Commit EWF(C)" command:



NOTICE
Saving the settings If you do not explicitly save the configuration settings, these are lost when the thin client starts next.

9. Switch to the thin client's user mode.
   The default logon data are:
   - User name: User
   - Password: User

2.4.2 Configuration of a computer as management console

Introduction

You set an IP address for the network connection during configuration of a computer as management console and install the "VMware vSphere Client" software. You configure and manage the virtual machines that are pre-installed with the SIMATIC software and available on the virtualization server using the "VMware vSphere Client" software.

Requirements

The following requirements must be met:

- A computer that meets the minimum requirements of the "VMware vSphere Client" software.
- The installation application for the "VMware vSphere Client" software is available.

  You can find the installation application at https://my.vmware.com.

Setting the network connection

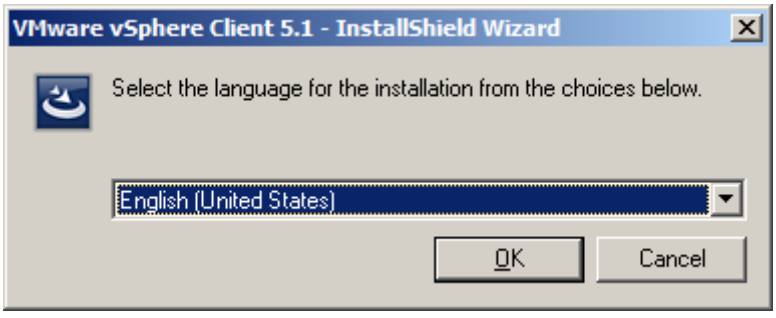
To set the network connection, follow these steps:

1. Switch on the computer.
2. Log on as administrator.
3. Open the network connections via "Start > Control Panel > Network and Internet > Network Connections".
4. Select the displayed network connection and open the "Properties" dialog with the shortcut menu.
5. Select the "Internet Protocol Version 4 (TCP/IPv4)" element and click the "Properties" button.
6. Activate the "Use the following IP address" option and enter the desired IP address.
7. Confirm the changes with "OK".

Installing the "VMware vSphere Client" software

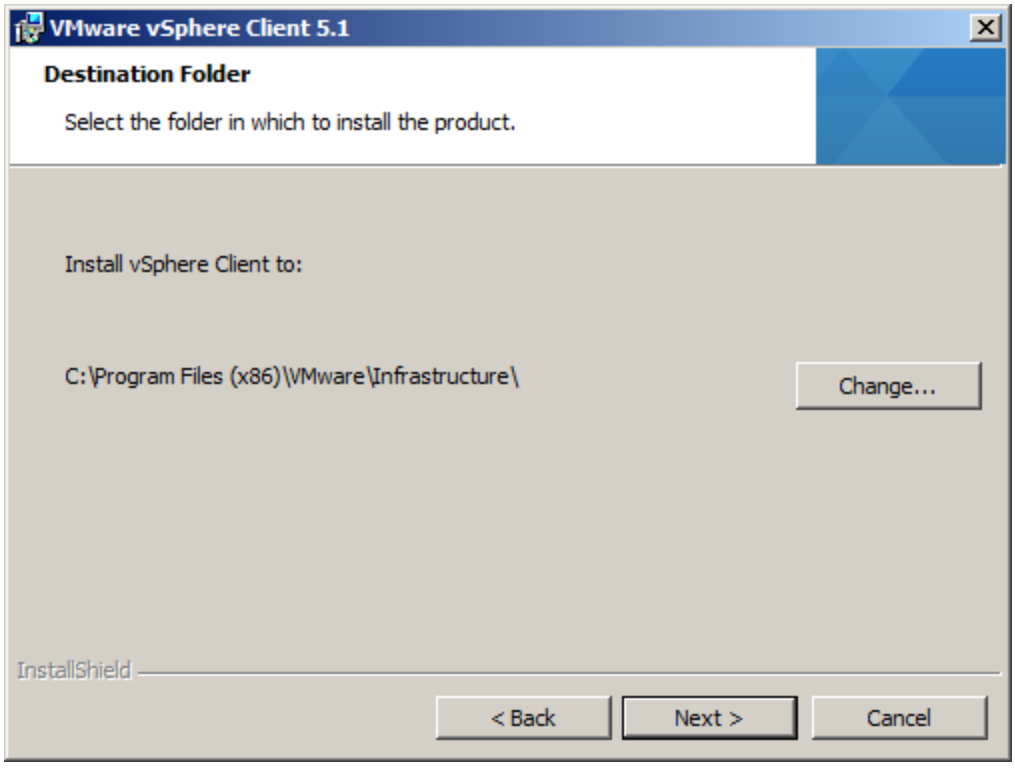
To install the "VMware vSphere Client" software, follow these steps:

1. Start the management console.
2. Start the installation application of the "VMware vSphere Client" software.
3. Select the desired installation language.

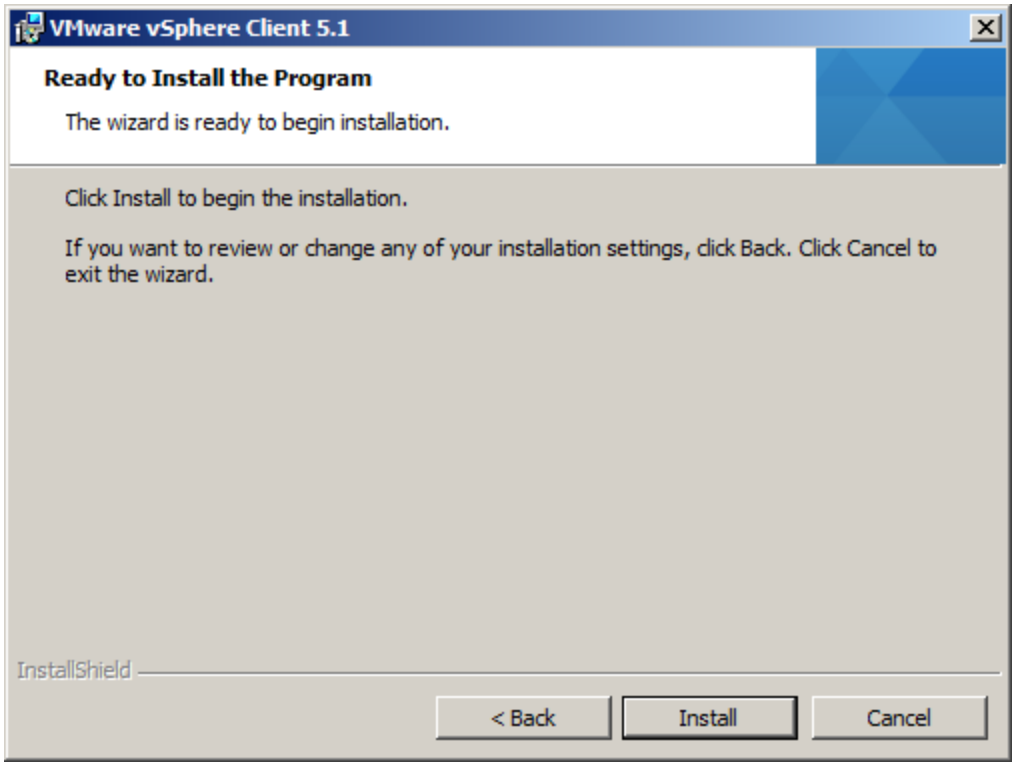


4. Click "Next" in the first dialog.
5. Note the patent agreements and click "Next".
6. Agree to the license agreement and click "Next".

7. Enter the installation path and click "Next".



8. Click the "Install" button.



The installation is started. The successful implementation of the installation is confirmed by a notification.

9. Click "Finish" to complete the installation.

2.5 Thin client configuration

2.5.1 Thin clients with Windows operating system

Set an IP address for the network connection and change the energy saving mode, if necessary, during configuration of a thin client with Windows operating system that is used for operator control and monitoring of the virtual clients (PCS 0S clients, WinCC clients). The configuration steps are described in the section "Configuration of the supplied thin client as management console (Page 33)".

2.5.2 Thin clients with HP ThinPro operating system

Introduction

When commissioning the thin client for the first time, the "HP Easy Tools" wizard is started automatically. Use this wizard to configure the thin client to your requirements.

The network connection must also be set during configuration of the thin client.

Requirements

The following requirements must be met:

- The thin client is assembled and commissioned according to the manufacturer's regulations.
- The thin client is connected with the terminal bus.
- A monitor, keyboard, and mouse are connected to the thin client.

Procedure

To configure the thin client, follow these steps:

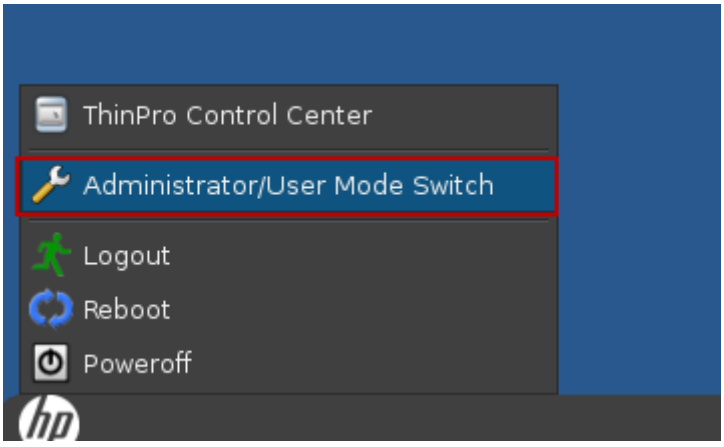
1. Switch on the thin client.

   The configuration wizard starts.

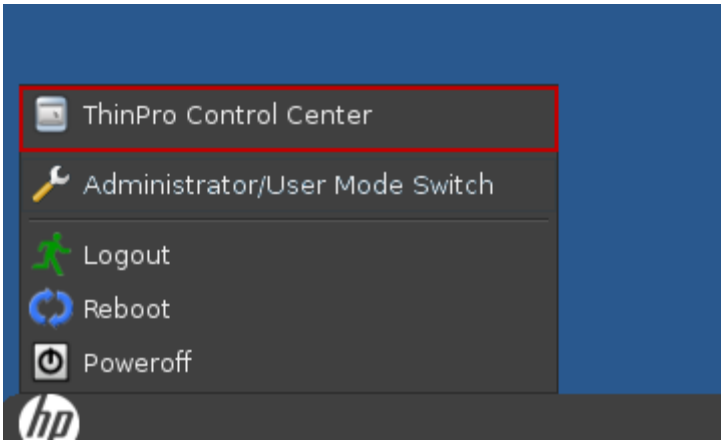
2. Select a language for executing the wizard.
3. In the left navigation area click on the "Easy Config" button.
4. Use the "Next" button to navigate to the individual configuration options and make the desired settings.

   Detailed information on the configuration options can be found in the manufacturer's "HP Easy Tools" (http://h20000.www2.hp.com) administrator manual.
5. Click “Exit” in the "Thank You" section to complete the configuration of the thin client.

6. Switch on the administrator mode for the thin client. To do so, use the following logon data:
   - User name: Administrator
   - Password: Administrator



7. Open the "ThinPro Control Center" application.



   The application dialog opens.
8. Click on "Control Panel" in the left navigation area of the dialog.
9. Click on the network and set an IP address.
10. Confirm your changes with "OK".
11. Open the ThinPro Control Center.
12. Switch to the thin client's user mode.
    The default logon data are:
    - User name: User
    - Password: User

Configuration of the virtual machines 3

3.1 Start the "VMware vSphere Client" application

Introduction

In this section, you will learn how to start the "VMware vSphere Client" application and how to access the virtual machines that are available on the virtualization server.

Requirements

The following requirements must be met:

- The virtualization server and management console are operational.
- The password and IP address for the virtualization server have been set and are available.

  See section "Configuring the virtualization server (Page 28)".
- The server and management console are linked via the management bus.
- The "VMware vSphere Client" application is installed on the management console.

Procedure

To start a virtual machine, follow these steps:

1. Start the management console.
2. Double-click the desktop icon for the "VMware vSphere Client" software or select "Start > All Programs > VMware > VMware vSphere Client".

3. Enter the log in data for the virtualization server.

   (See the section "Configuring the virtualization server (Page 28)".

   The "VMware vSphere Client" application is opened. The virtual machines available on the virtualization server are displayed in the left-hand navigation area.

3.2 Start the virtual machines

Introduction

When you start one of the virtual machines for the first time after commissioning an installation setup executes automatically. The setup installs SIMATIC software depending on the automation task of the virtual machine (e.g. PCS 7 OS server, WinCC client). The setup must be executed for each virtual machine.

Requirements

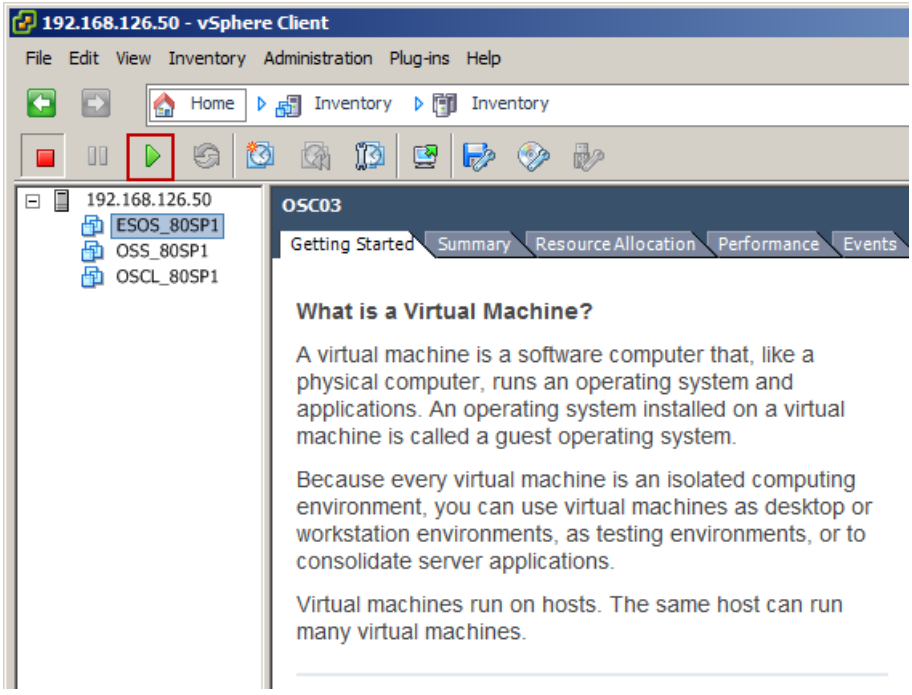
The following requirements must be met:

- The "VMware vSphere Client" application is started on the management console.
- The connection to the virtualization server is established and the available virtual machines are displayed in the left-hand navigation area of the "VMware vSphere Client" application.

Procedure for SIMATIC PCS 7

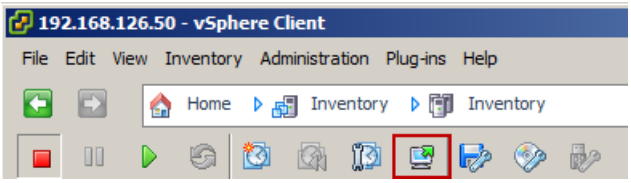
To start a virtual machine and execute installation setup, follow these steps:

1. Select the virtual machine and click the "Power On" button.



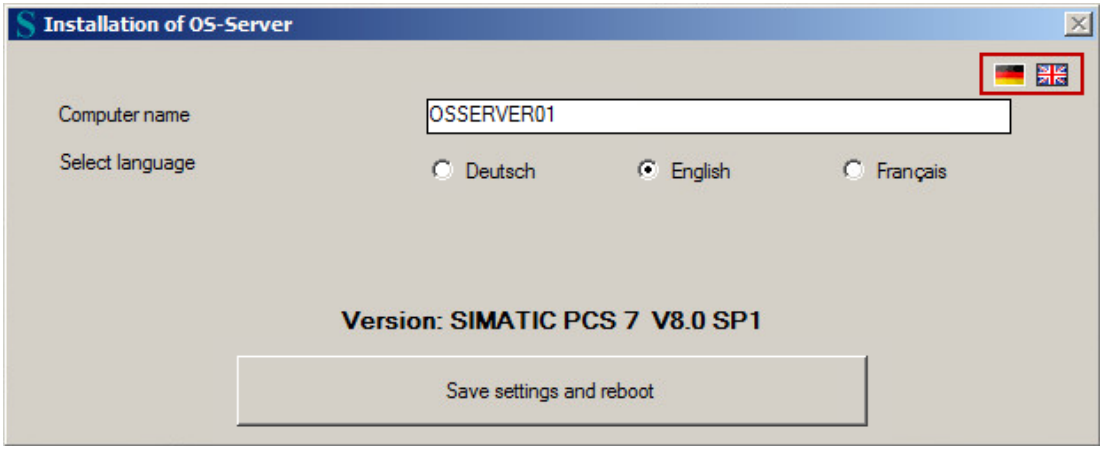
The virtual machine starts.

2. Click the "Launch Virtual Machine Console" button to open the virtual machine in a separate window.



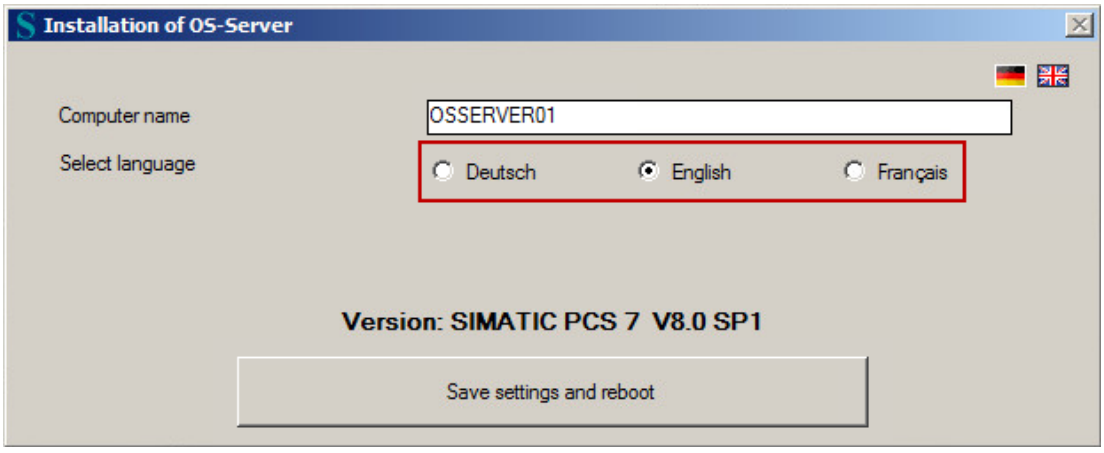
The virtual machine is displayed. The installation setup opens.

3. Select the language for the installation setup.



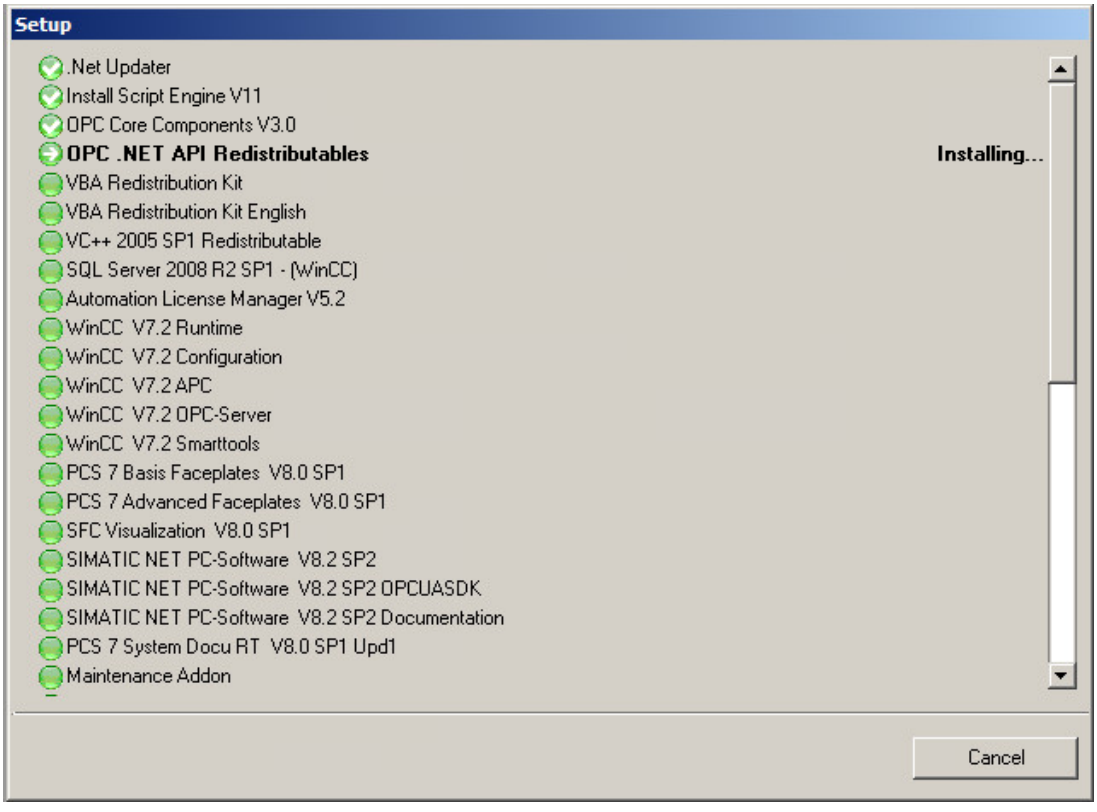
4. Enter the computer name for the virtual machine in the "Computer name" field.

5. Select the desired language to install SIMATIC PCS 7.



6. Click the "Save settings and reboot" button.

   The virtual machine restarts. After the restart the installation of the SIMATIC PCS 7 components is started automatically.



7. Wait until the installation process is complete.

   After the installation the computer restarts automatically.

8. Repeat steps 1 to 7 for each virtual machine.

Note

You can also install other SIMATIC PCS 7 components on the virtual machines. The complete installation package is available on the data drive of the virtualization server.

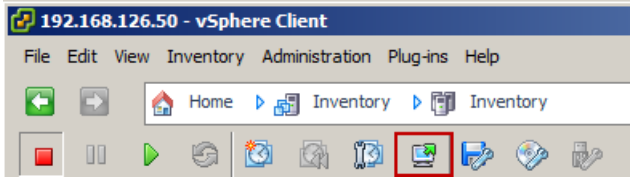
Procedure for SIMATIC WinCC

To start a virtual machine and execute installation setup, follow these steps:

1. Select the virtual machine and click the "Power On" button.

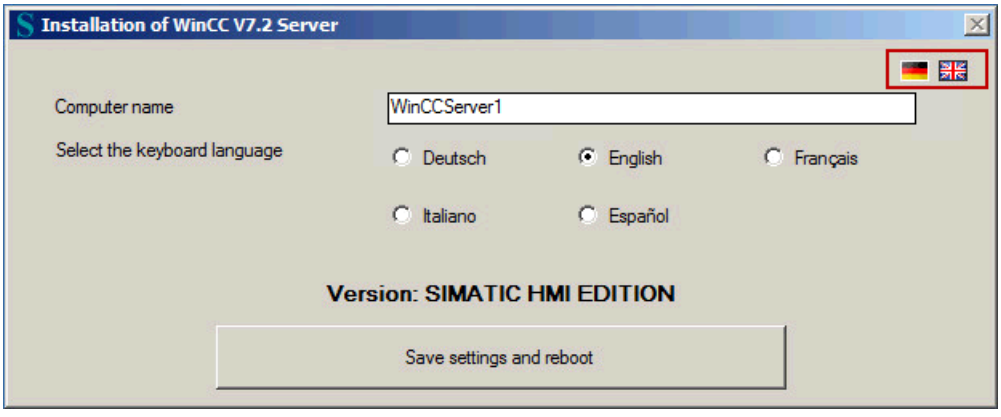
   The virtual machine starts.

2. Click the "Launch Virtual Machine Console" button to open the virtual machine in a separate window.



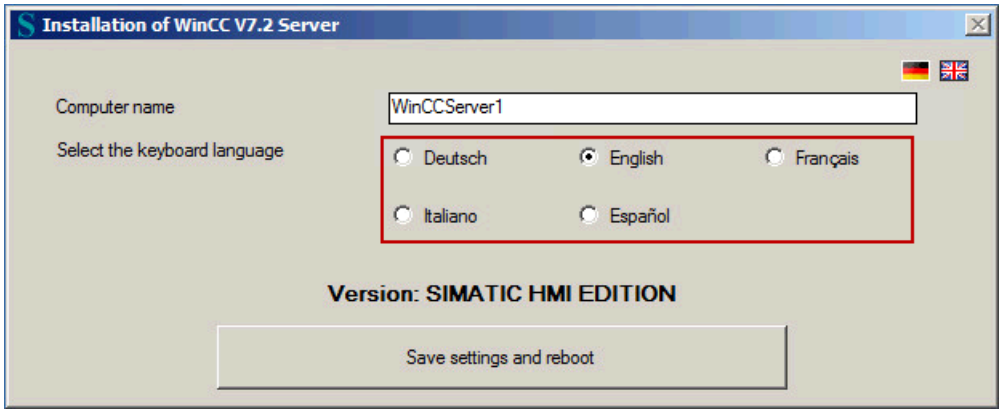
   The virtual machine is displayed. The installation setup opens.

3. Select the language for the installation setup.

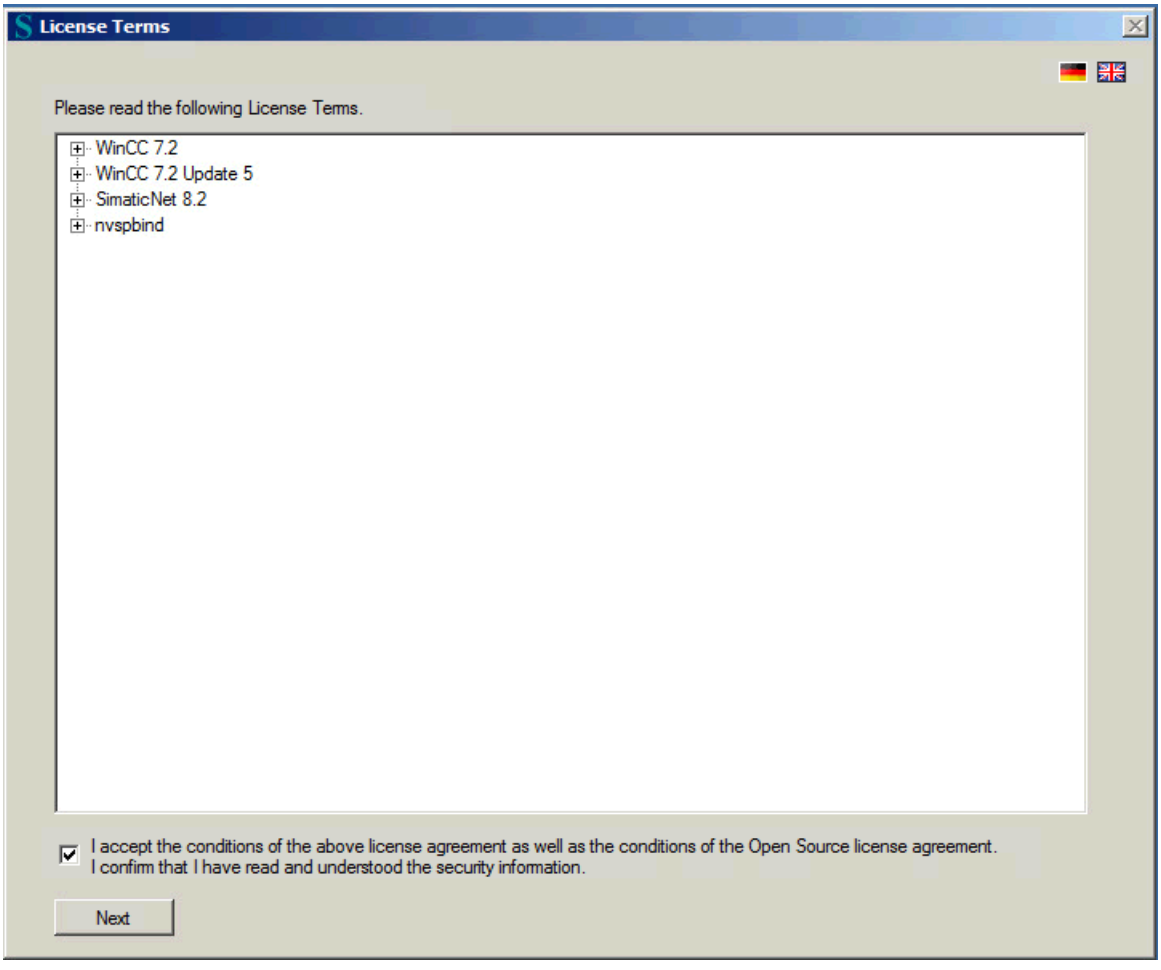


4. Enter the computer name for the virtual machine in the "Computer name" field.

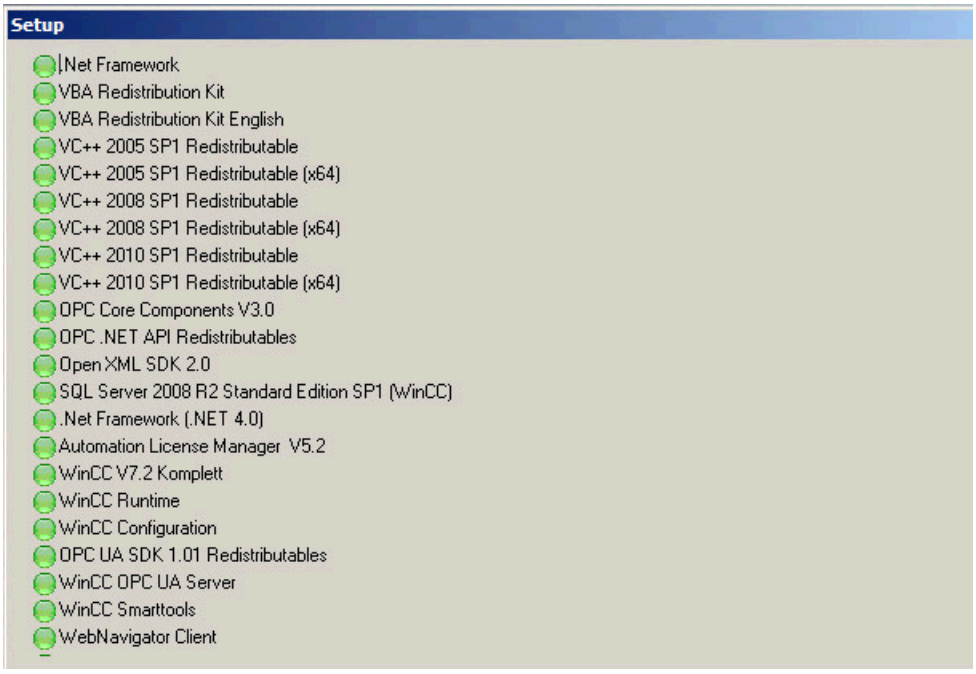
5. Select the desired language to install SIMATIC WinCC.



6. Click the "Save settings and reboot" button.
7. Agree to the license agreement by selecting the check box and click "Next".



The virtual machine restarts. After the restart the installation of SIMATIC WinCC is started automatically.



8. Wait until the installation process is complete.

   After the installation the computer restarts automatically.

9. Repeat steps 1 to 7 for each virtual machine.

Note

You can also install other SIMATIC WinCC components on the virtual machines. The complete installation package is available on the data drive of the virtualization server.

3.3 Setting the network connections

Introduction

Depending on the automation task the individual virtual machines have the following network connections:

- SIMATIC PCS 7

	PCS 7 ES/OS-Client	PCS 7 OS-Server	PCS 7 OS-Client	PCS 7 Web Server
Management bus	x	x	x	x
Terminal bus	x	x	x	x
Redundancy bus	-	x	-	-
Plant bus	x	x	-	-

- SIMATIC WinCC

	WinCC Server	WinCC single station/client
Management bus	x	x
Terminal bus	x	x
Redundancy bus	x	-
Plant bus	x	-

So that the communication between the individual virtual machines can be implemented an IP address must be set for each network connection. The configuration of the network connections must be implemented individually for each virtual machine and network connection.

Requirements

The following requirements must be met:

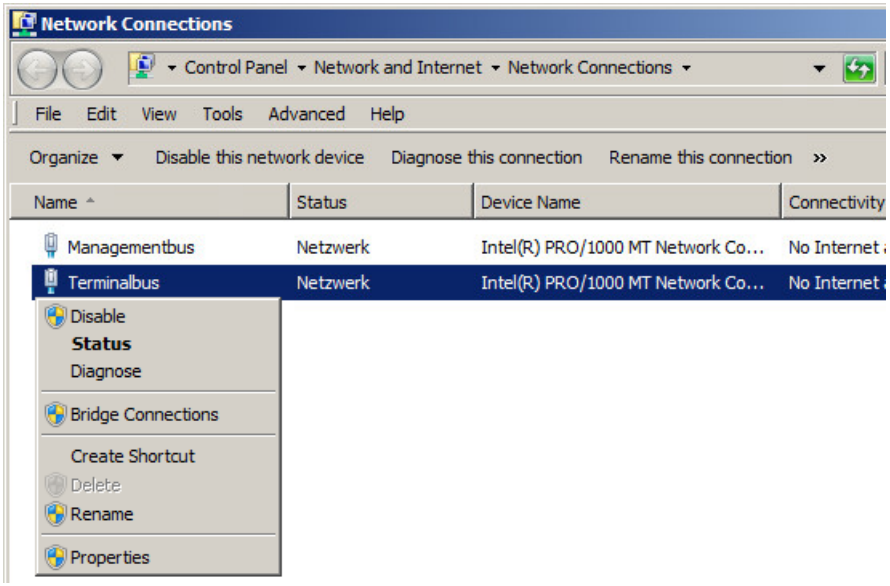
- The "VMware vSphere Client" application is started on the management console.
- The installation of the SIMATIC software was conducted without errors on all virtual machines (see section "Start the virtual machines (Page 43)").

Procedure

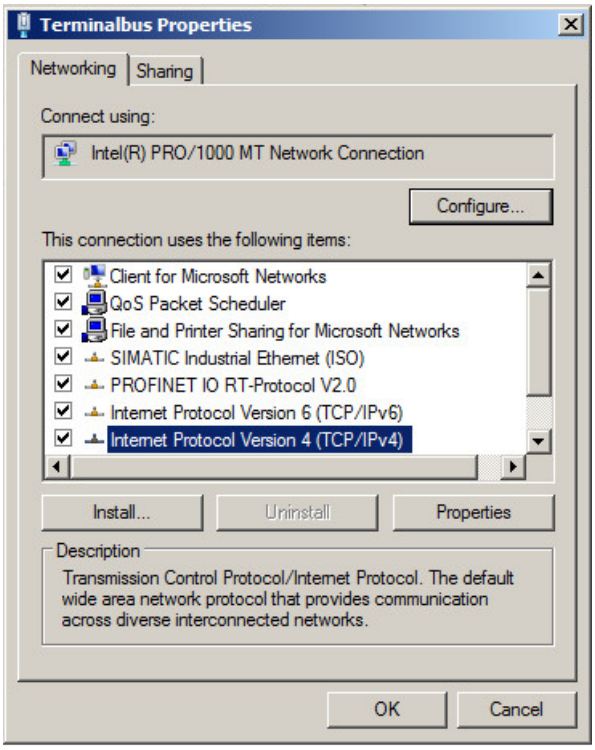
To set the network connections, follow these steps:

1. Start the virtual machine.
2. Open the network connections via "Start > Control Panel > Network and Internet > Network Connections".

3. Select one of the network connections (e.g. terminal bus) and open the "Properties" dialog via the context menu.



4. Select the "Internet Protocol Version 4 (TCP/IPv4)" element and click the "Properties" button.

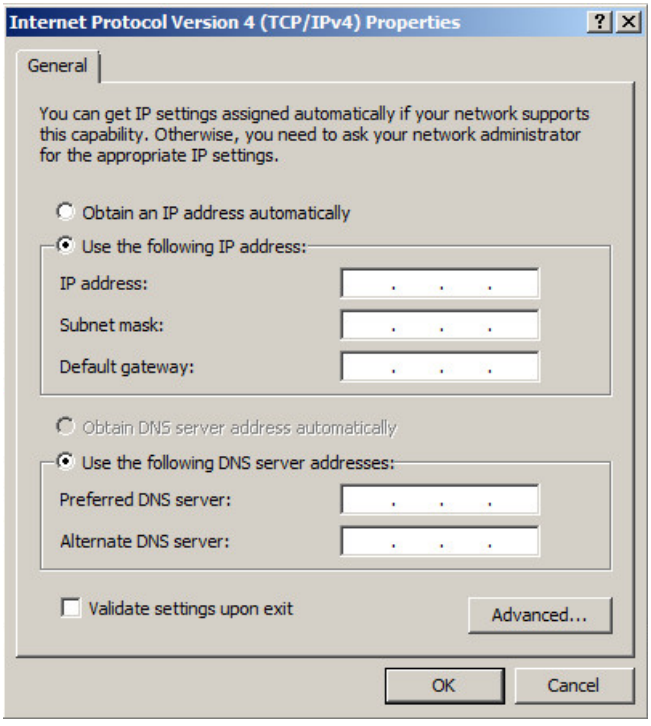


5. Activate the "Use the following IP address" option and enter the desired IP address.

Note

Assign the IP addresses corresponding to your plant configuration. Select the same number range, e.g.:

- 192.168.1.11
- 192.168.1.12
- 192.168.1.13
- 192.168.1.14



6. Confirm the changes with "OK".
7. Repeat steps 3 to 6 for each network connection for the virtual machine currently open.
8. Configure the network connections of all available virtual machines as per Steps 1 to 7.

3.4 Using SOFTNET-IE

Introduction

The "SOFTNET-IE S7 REDCONNECT VM V8.2" software offers the option of realizing a highly available connection to an automation system in the virtual environment. The "SOFTNET-IE S7 REDCONNECT VM V8.2" software is part of the "SIMATIC NET V8.2" software package. You can find information on the installation in the "PG/PC - Industrial Ethernet / PROFIBUS SIMATIC NET PC Software V8.2" (http://support.automation.siemens.com/WW/view/en/61630923) manual.

Requirements

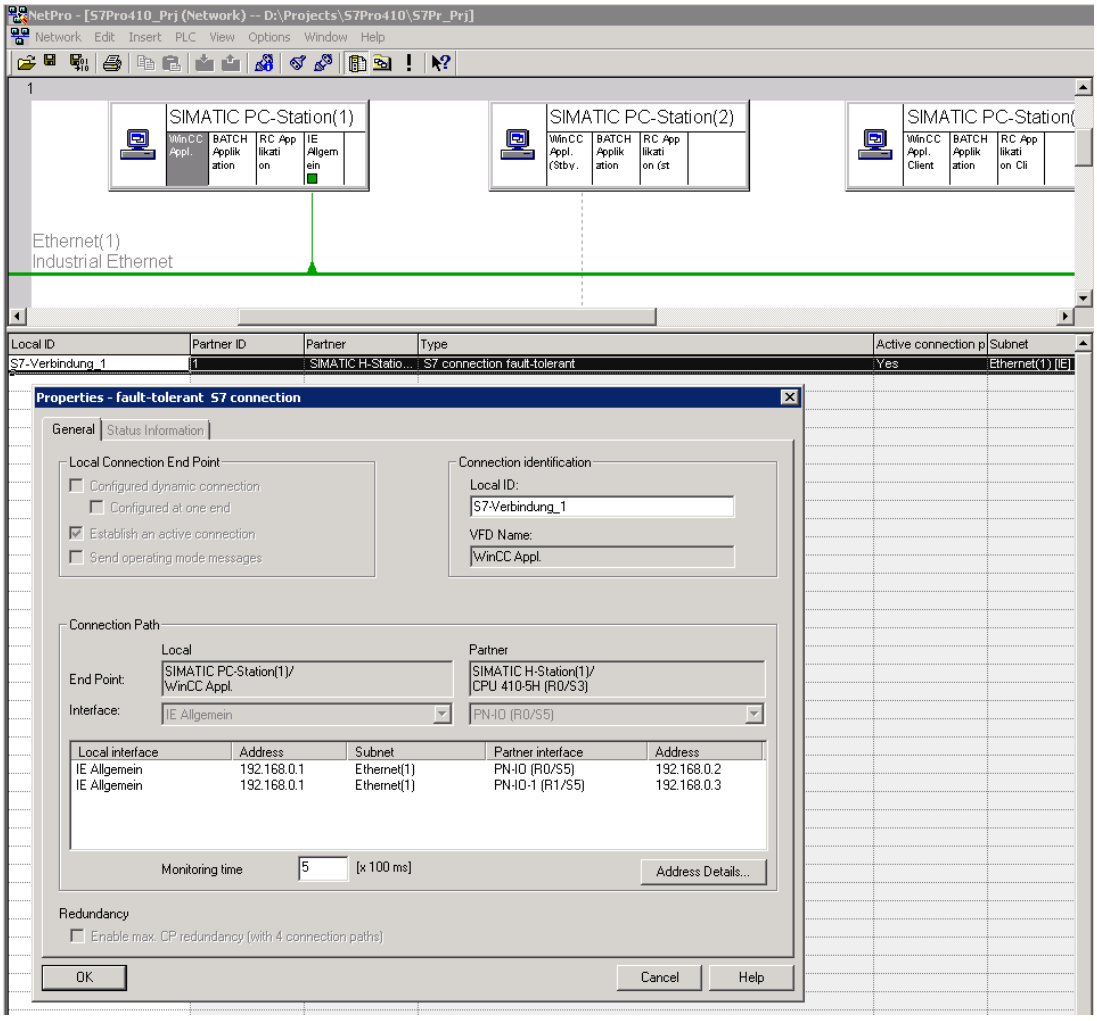
The following requirements must be met:

- The license package for highly available connections (MLFB: 6GK1704-0HB08-2AA0) is available. One license package per virtual machine is required.
- Fault-tolerant CPU firmware version is V6.0 or higher
- The use of the virtual "E1000" network card has been approved for OS-AS communication on the plant bus (SOFTNET-IE S7) for virtual machines.

Configuration in SIMATIC PCS 7

Configuring the highly available connection takes place in SIMATIC PCS 7 with the "NetPro" engineering tool. You can find detailed information about configuration in the "PCS 7 Engineering System" (www.siemens.de/pcs7-dokumentation) manual.

"IE General" must be set as the communication interface for configuring the highly available connection in the virtual environment. The following figure shows a sample configuration:



Configuration in SIMATIC WinCC

The fault-tolerant connection is configured with the "NetPro" engineering tool in SIMATIC WinCC. Detailed information on configuration is available in the manual. Detailed information on configuration is available in the manual "WinCC: Communication (http://support.automation.siemens.com/WW/view/en/73568736)".

3.5 Activating the automatic start of the virtual machines

Introduction

The virtual machines can be set such that they are executed automatically after the system starts.

Requirements

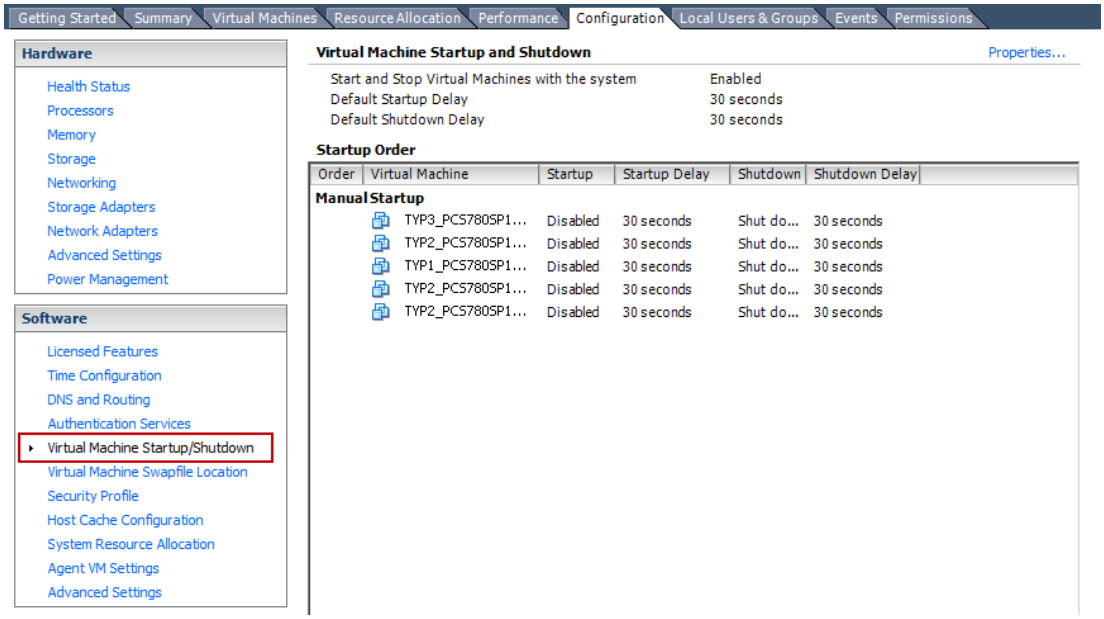
The following requirements must be met:

- The "VMware vSphere Client" application is started on the management console.
- The connection to the virtualization server is established and the available virtual machines are displayed in the left-hand navigation area of the "VMware vSphere Client" application.

Procedure

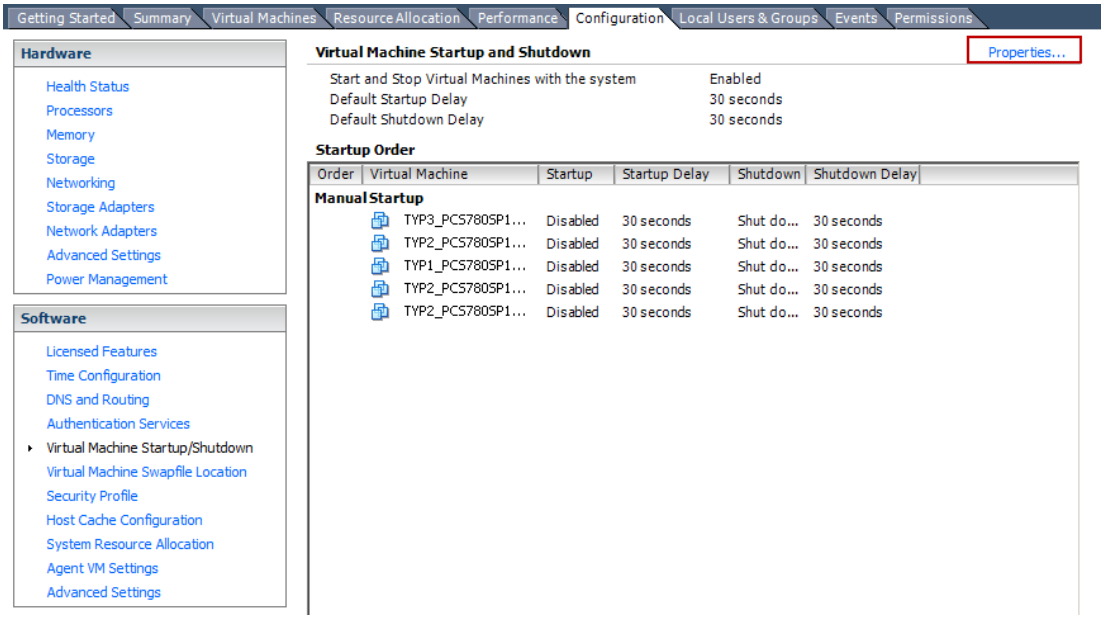
To activate the automatic execution of a virtual machine, follow these steps:

1. Click the "Configuration" tab on the "VMware vSphere Client" application.
2. In the "Software" area click on "Virtual Machine Startup/Shutdown".



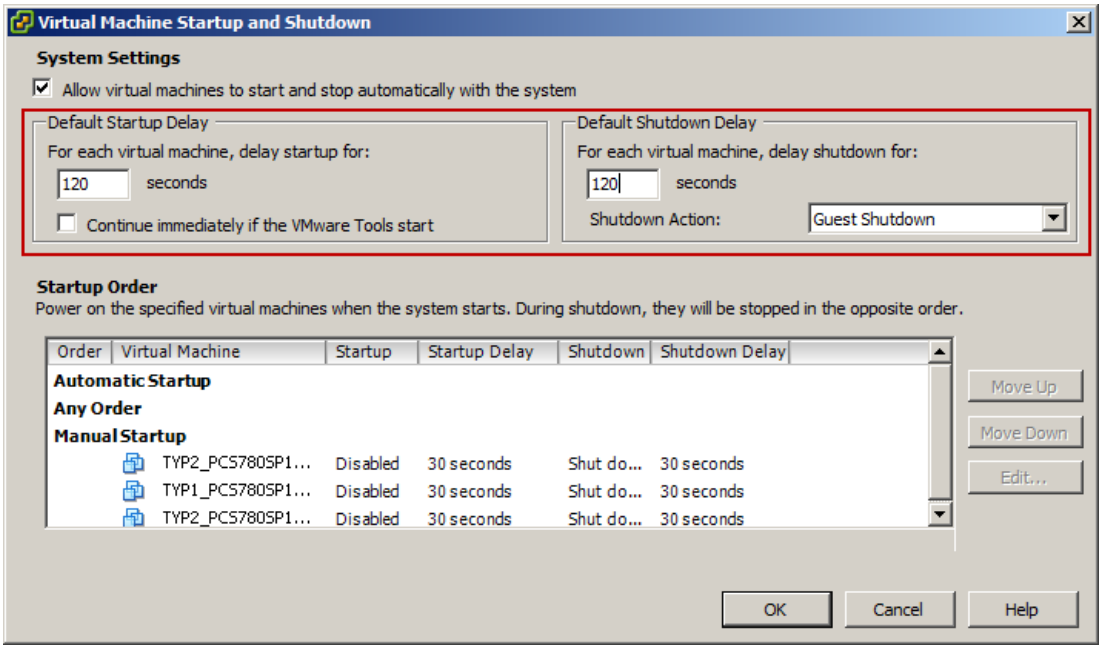
The available virtual machines are displayed in the "Startup order" area.

3. Click on "Properties".



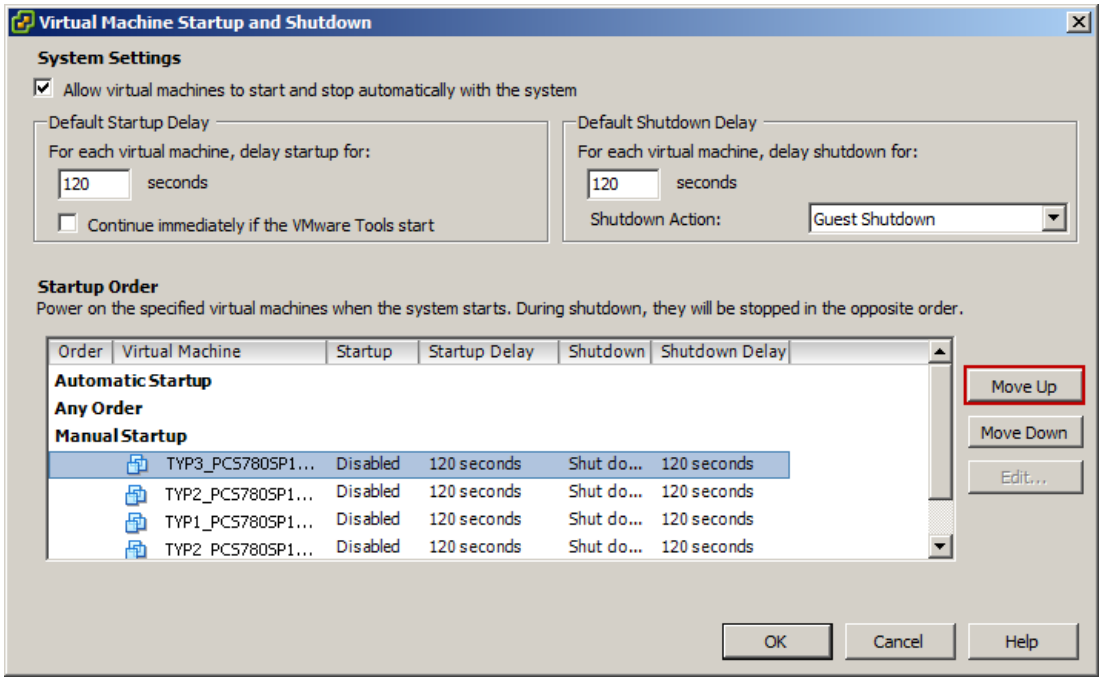
The "Virtual Machine Startup and Shutdown" dialog is opened.

4. Activate the "Allow virtual machines to start and stop automatically with the system" option box.
5. Set the delay for starting and stopping the virtual machines.

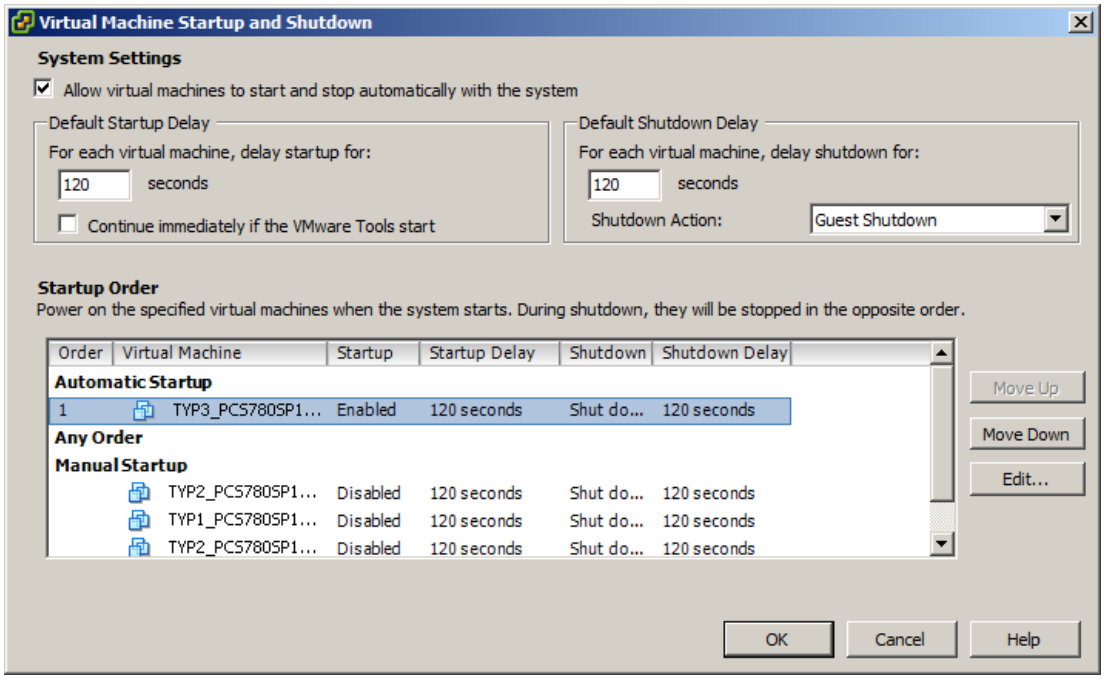


6. In the "Manual Startup" area select the virtual machine for which you want to activate the automatic start.

7. Move the virtual machine to the "Automatic Startup" area using the "Move Up" button.



The virtual machine is positioned in the "Automatic Startup" area.



8. Repeat steps 4 and 5 for all virtual machines for which you want to activate the automatic start. You can change the start order using the "Move Up" and "Move Down" buttons.
9. Click "OK" to save the changes.

3.6 Licensing the SIMATIC software

For licensing the SIMATIC components that are installed on the virtual machines, the licenses must be transferred from a license USB stick to the virtual machines so that these are available for the SIMATIC License Manager (ALM). To do so, execute the following steps:

- Configuration of the connections between a license USB stick and the virtual machines
- Transfer the licenses using the SIMATIC License Manager (ALM)

3.6.1 Connecting USB devices

Introduction

To transfer the license to a virtual machine the use of USB devices must be configured for each virtual machine.

Requirements

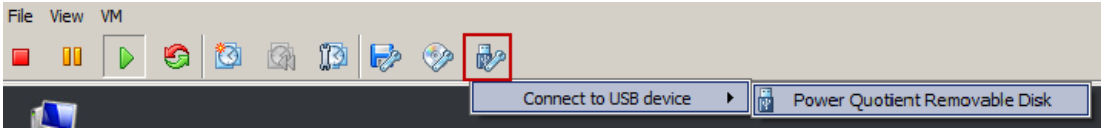
The following requirements must be met:

- The "VMware vSphere Client" application is started on the management console.
- The license USB stick for licensing the SIMATIC components is connected to the management console.

Procedure

To connect a USB device with a virtual machine, follow these steps:

1. Start the virtual machine.
2. Click on the USB icon in the toolbar of the virtual machine and select the "Connect to USB device" command.



3. Select the USB device that contains the necessary SIMATIC licenses.
4. Repeat steps 1 to 3 for all available virtual machines.

3.6.2 Transfer the SIMATIC licenses

Introduction

The transfer of SIMATIC licenses from a license USB stick to a drive on a virtual machine takes place with the aid of the SIMATIC Automation License Manager (ALM). The SIMATIC Automation License Manager is pre-installed on all virtual machines.

Requirement

The following requirements must be met:

- The "VMware vSphere Client" application is started on the management console.
- The license USB stick for licensing the SIMATIC components is connected to the management console.
- The connection to USB devices is configured on the virtual machines

  (See section "Connecting USB devices (Page 57)")

Procedure

To transfer the licenses to the drive, follow these steps:

1. Start one of the virtual machines.
2. Start the SIMATIC Automation License Manager via the following desktop icon:

   The SIMATIC Automation License Manager is opened.
3. Transfer all required licenses to the drive on the virtual machine.

   Information on transferring licenses is found in the "SIMATIC Automation License Manager" (http://support.automation.siemens.com/WW/view/en/56956174) manual.
4. Repeat steps 1 to 3 for all available virtual machines.

3.7 Creating and managing PCS 7 projects

Projecting and configuring PCS 7 projects is conducted in the same way as for traditional systems. You will find detailed information on this in the following documentation "SIMATIC PCS 7 Manual Collection" (www.siemens.de/pcs7-dokumentation).

3.8 Creating and managing WinCC projects

WinCC projects are configured in the same way as traditional systems. Detailed information on this subject is available in "WinCC: Working with WinCC (http://support.automation.siemens.com/WW/view/en/73506085)".

Access to the virtual machines

4

4.1 Access to virtual PCS 7 OS/WinCC servers, PCS 7 ES and PCS 7 web server

Introduction

The access to the following virtual machines is provided via the "VMware vSphere Client" software:

- SIMATIC PCS 7
  - PCS 7 ES
  - PCS 7 OS Server and
  - PCS 7 Web Server
- SIMATIC WinCC
  - WinCC Server

Access using RDP is not permitted.

Requirements

The following requirements must be met:

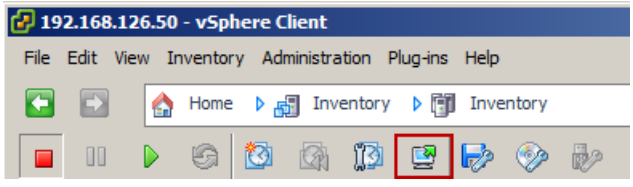
- The virtual machines are configured.
  (See section "Configuration of the virtual machines (Page 41)".)
- The virtual machine that you want to access is activated.
- The "VMware vSphere Client" software is started.

Procedure

To access a virtual machine, follow these steps:

1. Select the virtual machine that you want to access.

2. Click the "Launch Virtual Machine Console" button to display the virtual machine.



The virtual machine is shown in a separate window.

4.2 Access to virtual PCS 7 OS/WinCC clients

You have the following options for accessing virtual PCS 7 OS/WinCC clients:

- Access via the "VMware vSphere Client" software
  Access is provided from the thin client (Windows operating system) or the management console and is recommended for configuring, maintaining, and managing the virtual PCS 7 OS clients. The procedure is the same as in section "Access to virtual PCS 7 OS/WinCC servers, PCS 7 ES and PCS 7 web server (Page 61)".
- Access via an RDP connection
  Access is from the thin client and is recommended for operator control and monitoring of the virtual clients.

4.2.1 Creating a remote desktop connection (RDP)

Introduction

You create and configure an RDP connection on the thin client for remote access to a virtual client.

Requirements

The following requirements must be met:

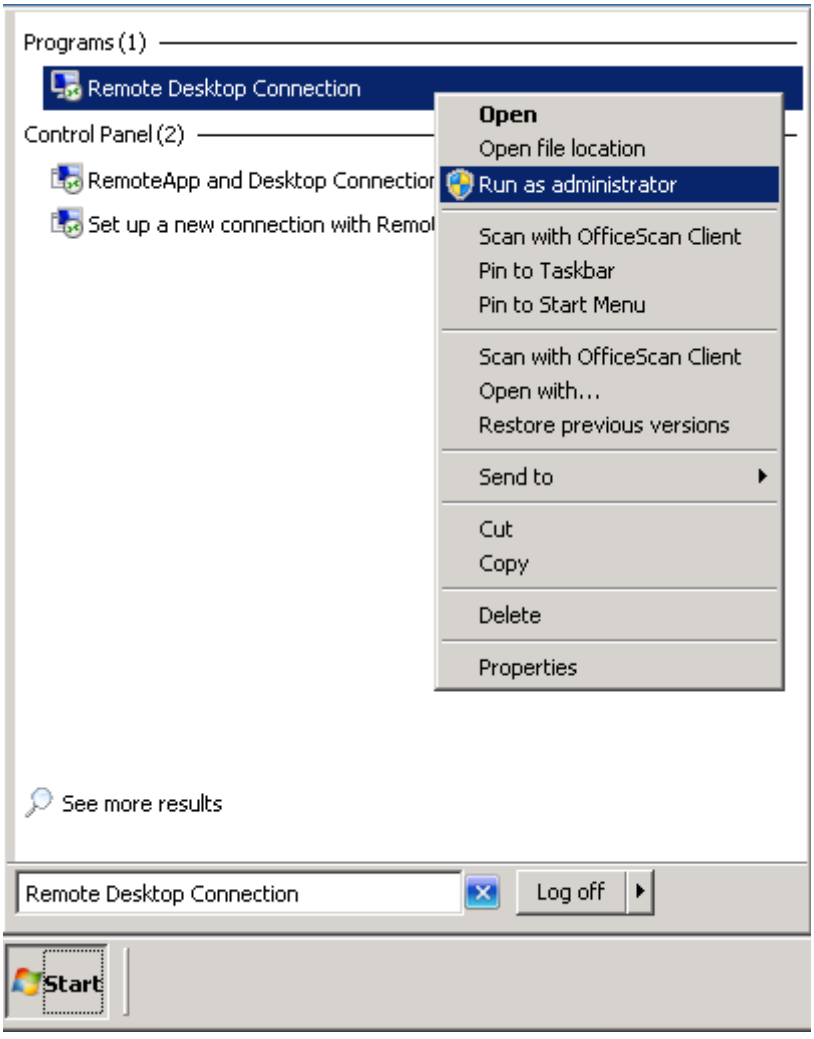
- The virtual client that you want to access is configured and activated.

  (See section "Configuration of the virtual machines (Page 41)".)
- The thin client is switched on.

Procedure (Windows operating system)

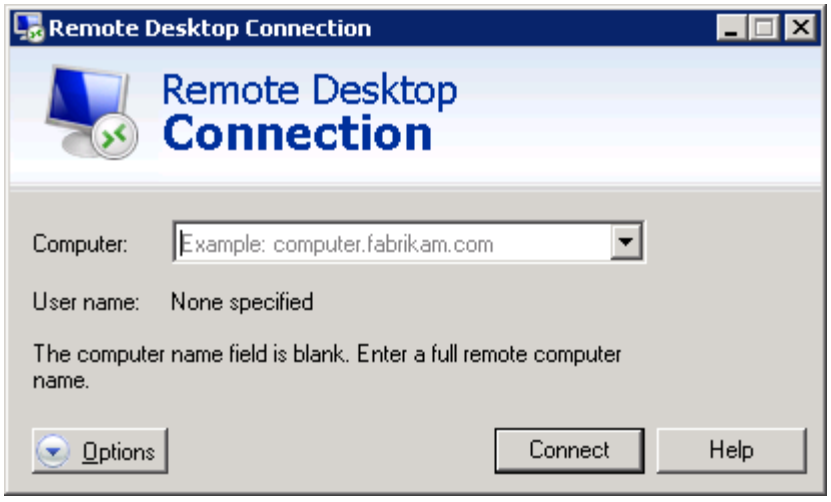
In order to set up remote access to a virtual client, follow these steps:

1. Enter the search term "Remote Desktop Connection" in the search field in the Windows start menu.
2. Execute the "Remote Desktop Connection" application as administrator.

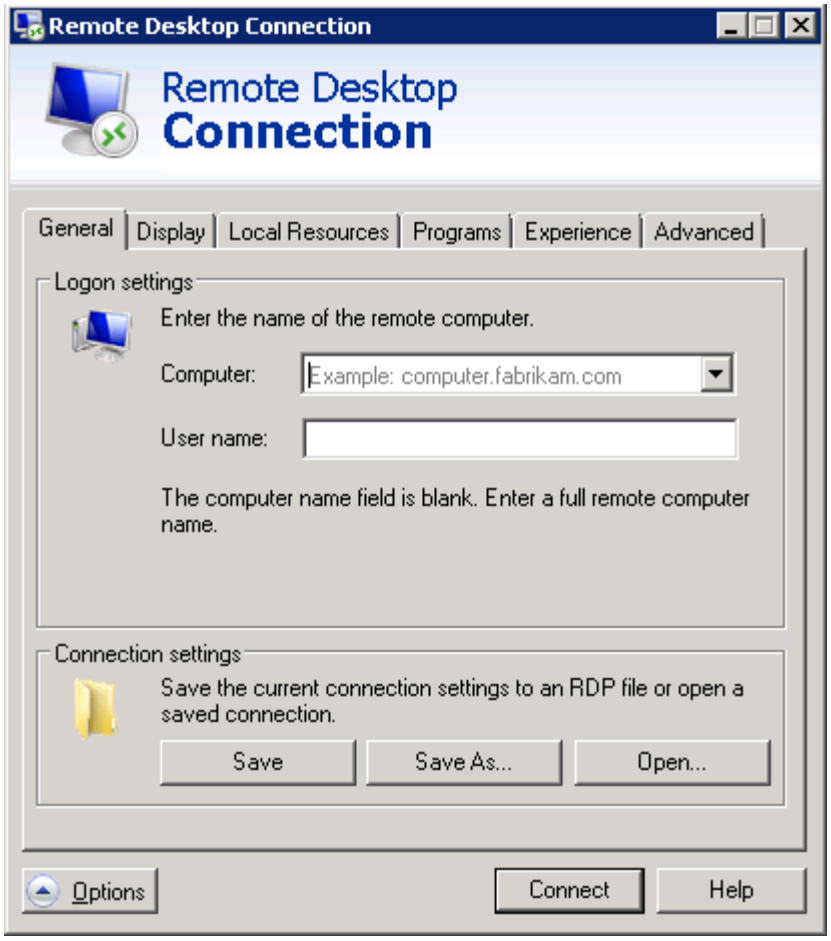


The application dialog opens.

3. Click the "Options" button.



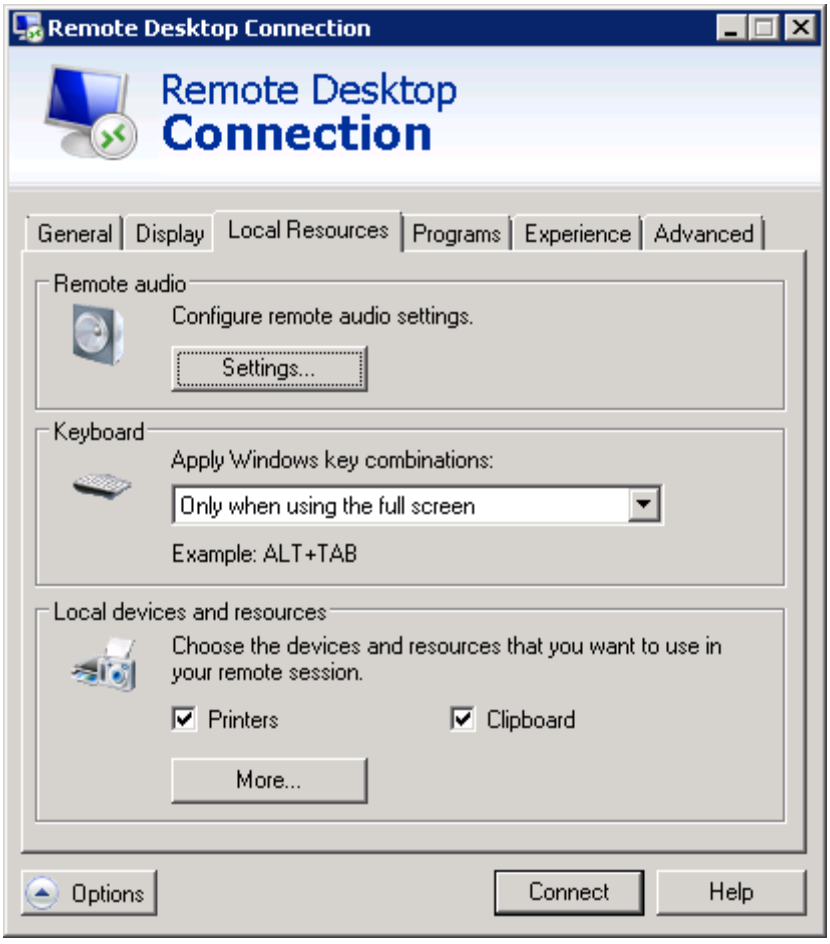
4. Enter the following network data for the connection:
   - Computer: <IP address of the virtual OS client> : <Port:3389> (e.g. 192.168.126.131:3389)
   - User name: User name for logging in to the client



5. Click the "Save As" button and save the connection.

   Ensure that the access to the connection is possible for all desired users after quitting the administrator mode.

6. Select the "Display" tab and set the display properties for the connection.
7. Select the "Local Resources" tab and set the desired settings for playing the acoustic signals.

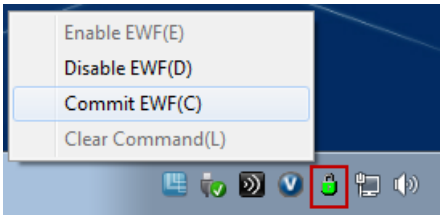


Note

Via the "Settings" button in the "Remote audio" area you can set the device on which the acoustic signals are played for messages and alarms from the PCS 7/WinCC notification system.

8. Activate the desired options under the "Programs", "Experience", and "Advanced" tab.
9. Click the "Connect" button to establish the connection to the client.

10. To save the settings right click on the "lock" icon in the Windows task bar and select the "Commit EWF(C)" command:



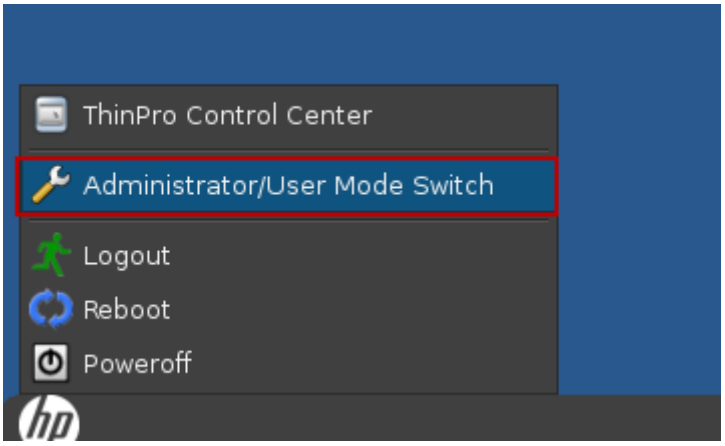
NOTICE
If you do not explicitly save the configuration settings, these are lost when the thin client starts next.

11. Switch to the thin client's user mode.

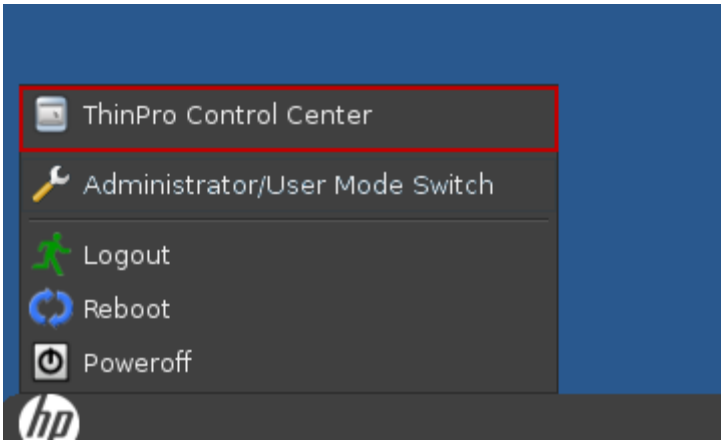
Procedure (HP ThinPro operating system)

In order to set up remote access to a virtual client, follow these steps:

1. Switch on the administrator mode for the thin client.

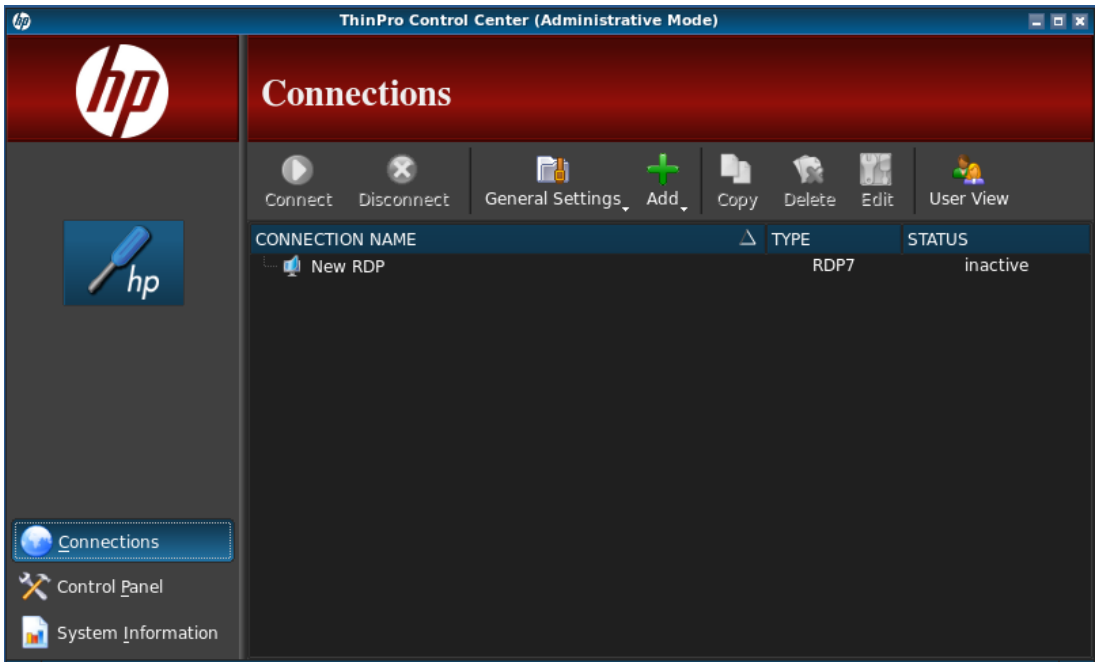


2. Open the "ThinPro Control Center" application.

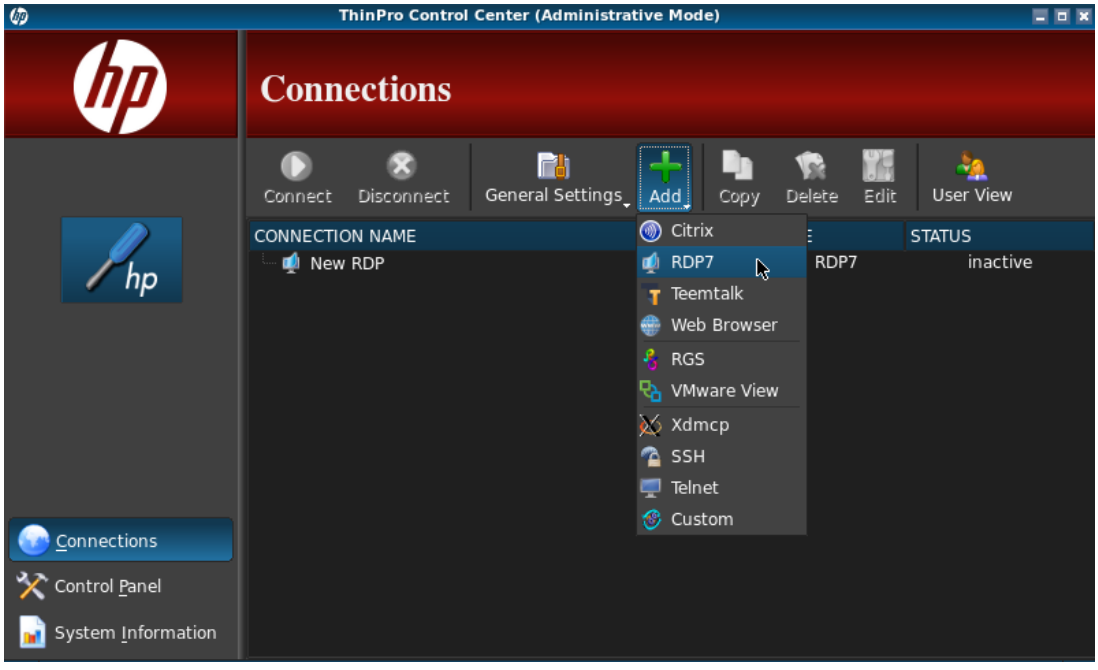


The application dialog opens.

3. Click on "Connections" in the left navigation area of the dialog.

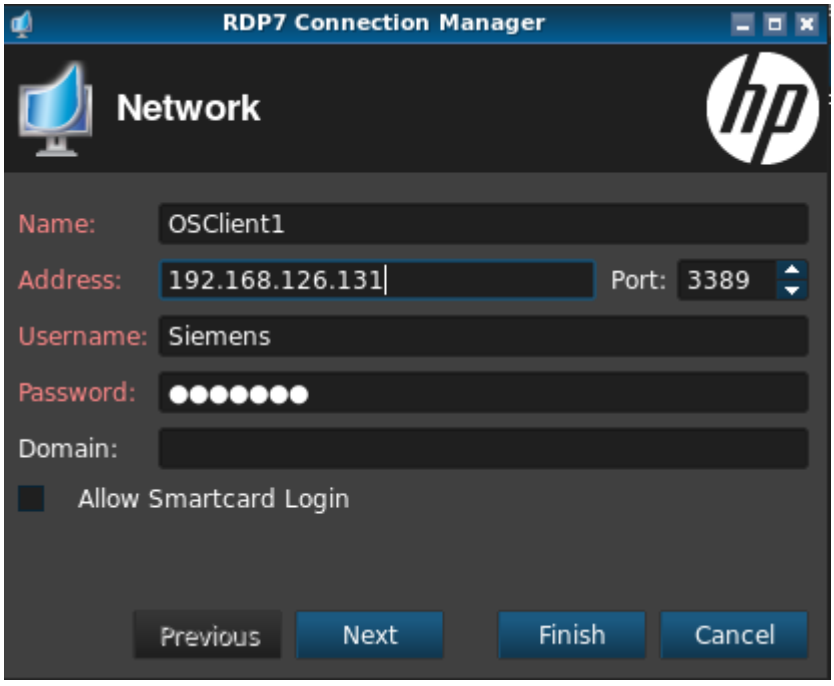


4. Add a new connection.



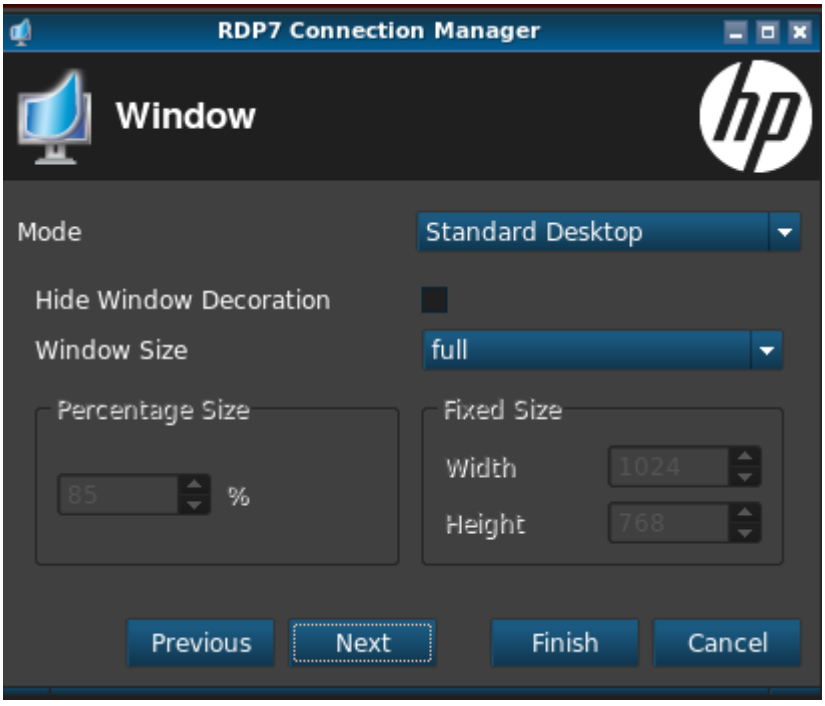
The "RDP7 Connection Manager" dialog is opened.

5. Enter the following network data for the connection:
   - Name: Name of connection, e.g., Client1
   - Address: IP address of the virtual client
   - Port: 3389
   - User name: User name for logging in to the client
   - Password: Password for logging in to the client

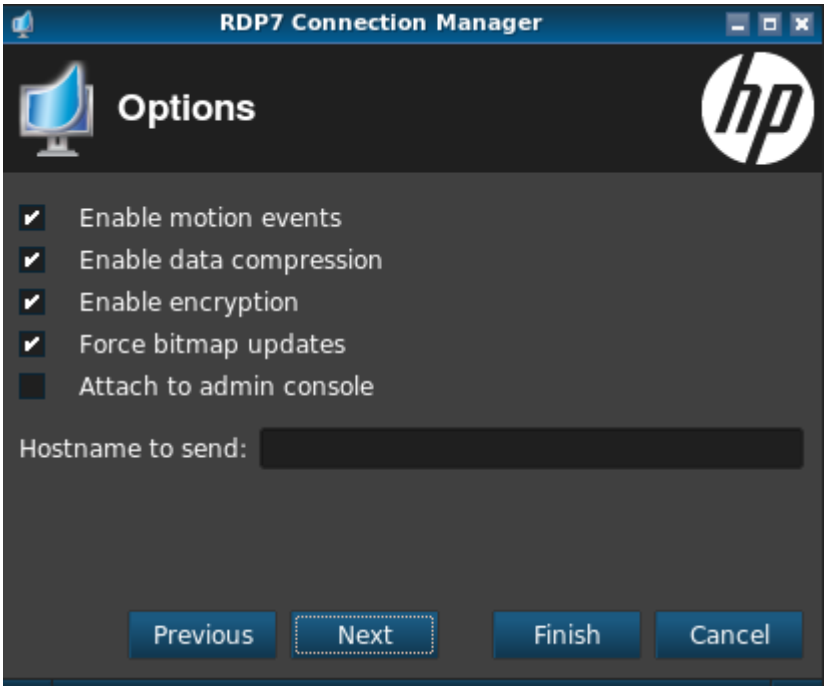


6. Click "Next".

7. Set the desired display properties for the connection and click on the "Next" button.



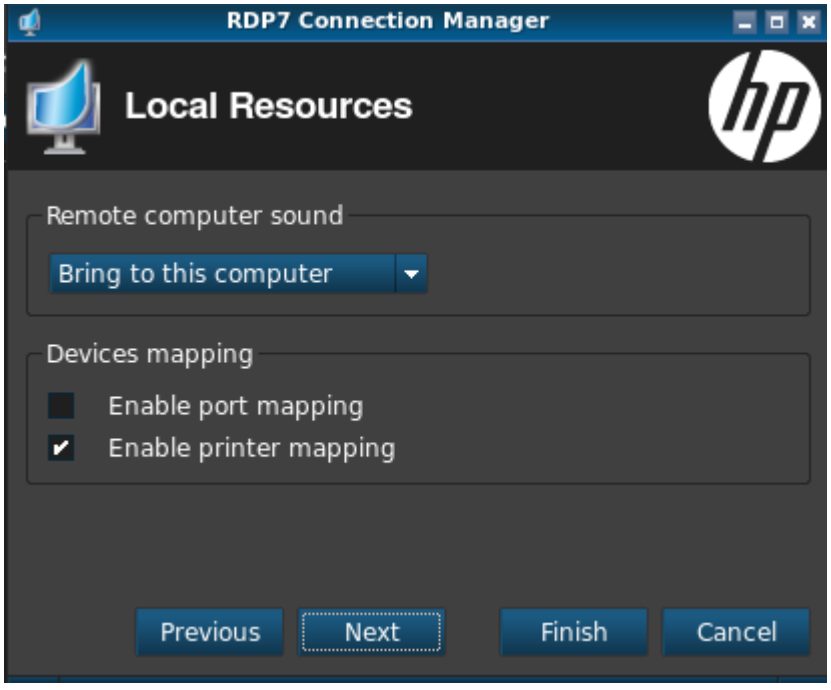
8. Activate the desired options and click "Next".



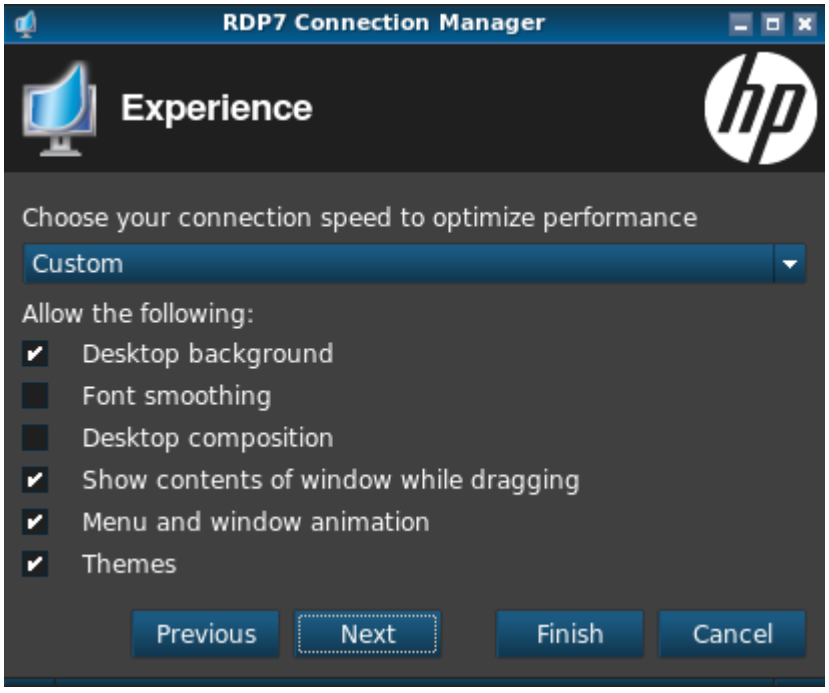
9. Set the desired settings for playing the acoustic signals and click on the "Next" button.

Note

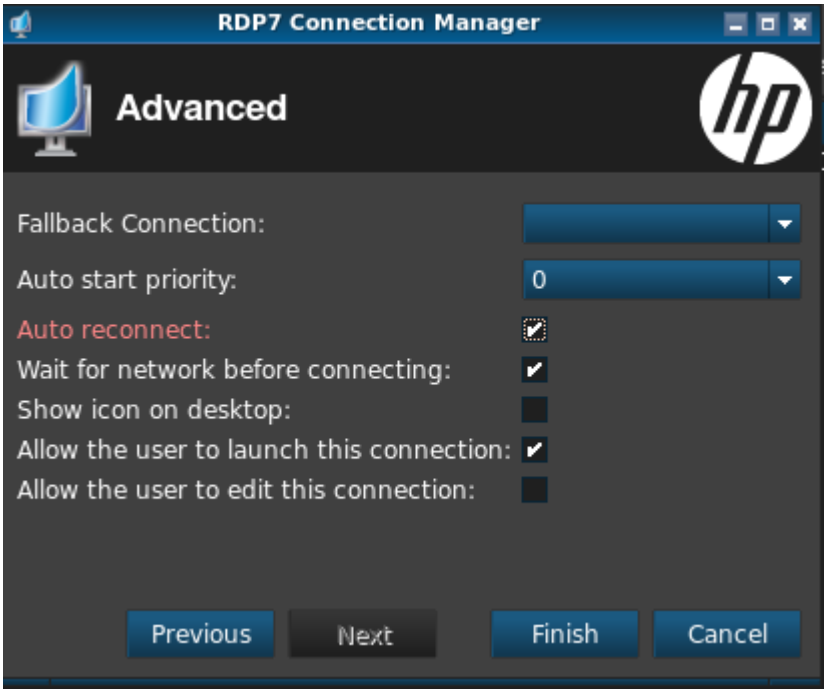
Via the "Remote computer sound" option you can set the device on which the acoustic signals are played for messages and alarms from the PCS 7/WinCC notification system.



10. Set the desired settings for the speed of the connection and user interface.



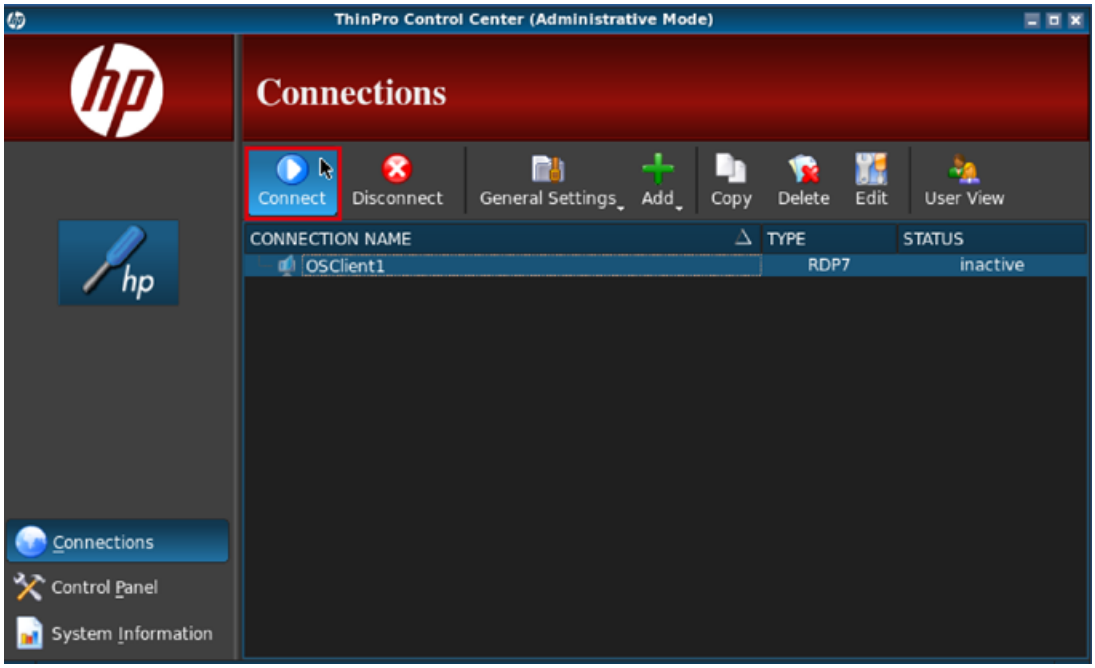
11. Set the desired options for activating and deactivating the connection.



12. Click "Finish" to create the new connection.

    The connection is created and displayed in the "ThinPro Control Center" dialog.

13. Click the connection and click the "Connect" button to establish the connection to the virtual client.



4.2.2 Log off and separate the connection

Introduction

The remote connection is logged off and separated from the relevant virtual machine (e.g. PCS 7 ES, PCS 7 OS client, WinCC client).

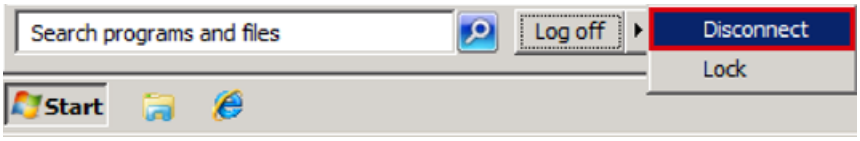
Requirements

- The following requirements must be met:
- The virtual machine is switched on.
- There is a remote connection

Procedure

To disconnect a remote connection, follow these steps:

1. In the start menu of the virtual machine click on "Log off > Disconnect".



Switch off and start the whole system

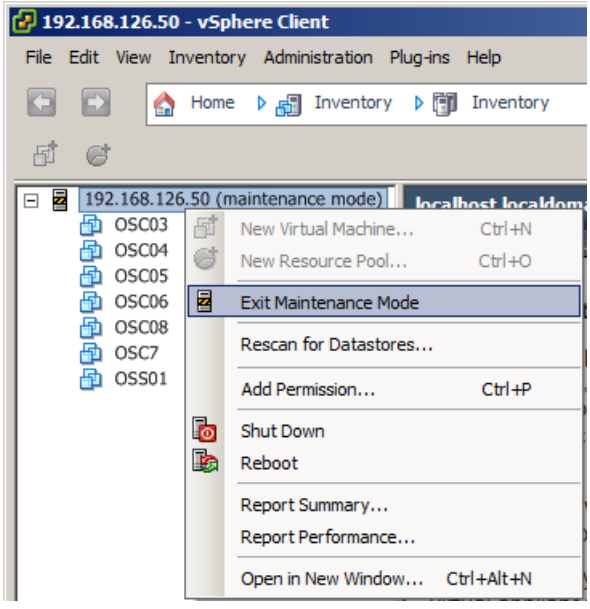
5

5.1 Start the whole virtualization system

After the initial commissioning and configuration, you can start the virtualization system as follows:

1. Switch on the virtualization server. Please note the manufacturer's information and safety instructions.
2. Switch on the thin client. Please note the manufacturer's information and safety instructions.
3. Switch on the management console.
4. Start the "VMware vSphere Client" software on the management console.

   You can find information on this in section "Start the "VMware vSphere Client" application (Page 41)".
5. Close the maintenance mode on the virtualization server if this is activated. Select the virtualization server in the "VMware vSphere Client" software and select the "Exit Maintenance Mode" command in the context menu.



6. Start the desired virtual machines.

   You can find information on this in section "Start the virtual machines (Page 43)".

5.2 Shut down the whole virtualization system

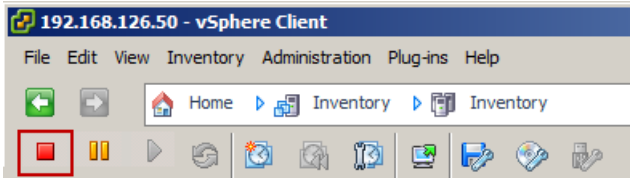
To close the whole virtualization system, follow these steps:

1. Deactivate all SIMATIC projects that are in process operation (runtime).

   You can find information on this in the manual "SIMATIC WinCC: Working with WinCC" (http://support.automation.siemens.com/WW/view/en/73506085).

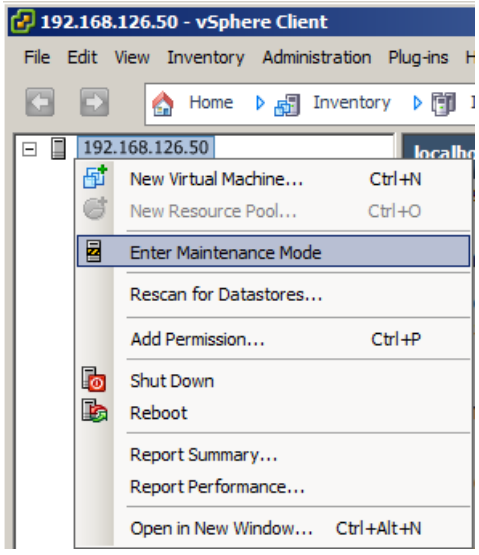
2. Close all virtual machines.

   To do so select the desired virtual machine and click on the "Shut down the guest" button in the "VMware vSphere Client" application toolbar.

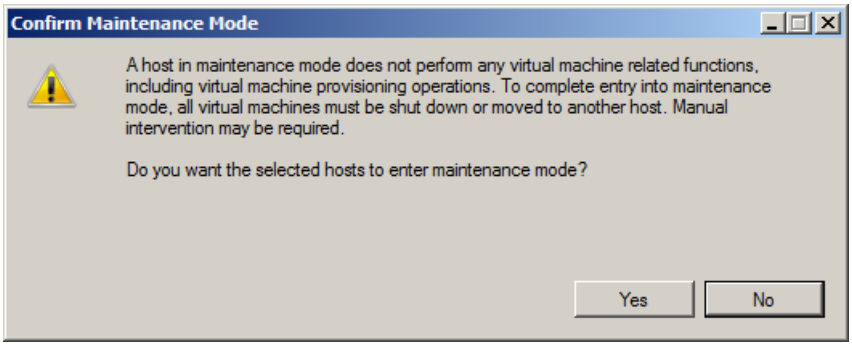


3. End the virtualization server via the "VMware vSphere Client" application.

   – Select the virtualization server and select the "Enter Maintenance Mode" command in the context menu.



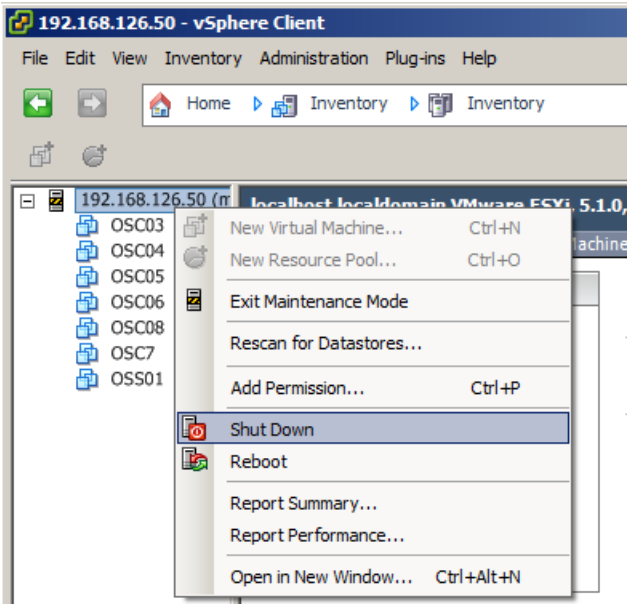
– Confirm the switch to the maintenance mode.



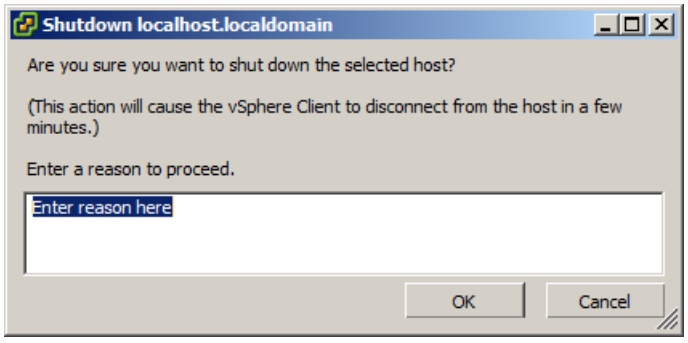
Note

Ensure that the maintenance mode of the virtualization server is not ended automatically when closing down. After restarting the virtualization server, the maintenance mode must be ended manually. Select the virtualization server in the "VMware vSphere Client" software and select the "Exit Maintenance Mode" command in the context menu.

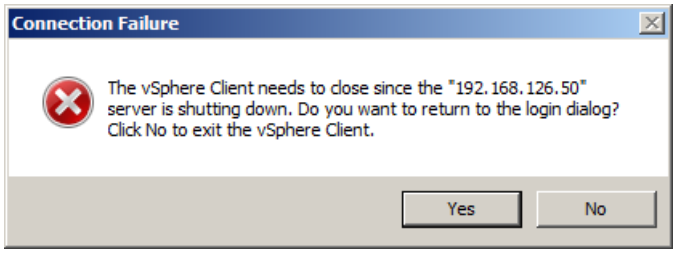
– Select the virtualization server and select the "Shut Down" command in the context menu.



– Enter a reason for closing the virtualization server and click on the "OK" button.



– In the following dialog click on the "No" button to end the "VMware vSphere Client" software.



4. Switch off the management console.
5. Switch off the thin client. Please note the manufacturer's information and safety instructions.

Data backup and restoring the delivery status 6

6.1 Backing up the virtual machines

Introduction

You can back up the working status of a virtual machine by exporting an OVF template. You export the OVF template with the aid of the "VMware vSphere Client" application.

Requirements

The following requirements must be met:

- The "VMware vSphere Client" application is opened.
- The process operation of the SIMATIC projects is ended (runtime is deactivated).
- The virtual machines that you want to back up are switched off.

  You can find information on this in section "Shut down the whole virtualization system (Page 76)".

Procedure

To back up a virtual machine, follow these steps:

1. Select the virtual machine for which you want to back up the working status in the "VMware vSphere Client" application.
2. Select the "File >Export > Export OVF Template" command in the menu bar.

   The "Export OVF Template" dialog box opens.
3. In the "Name" field, type a name for the backup file.
4. In the "Directory" field, enter the desired storage location for the backup file.
5. Select the "Folder of files (OVF)" option in the drop-down list in the "Format" area.
6. In the "Description" field, enter a description for the virtual machine.
7. Click "OK".

   The virtual machine is exported as an OVF file.

6.2 Restoring the delivery status of the virtual machines

To restore the delivery status of the virtual machines do the following:

- Remove existing virtual machines from the hard disk of the virtualization server

NOTICE
Remove the virtual machines Note that when deleting the virtual machines, all data on the virtual machines is irrevocably deleted.

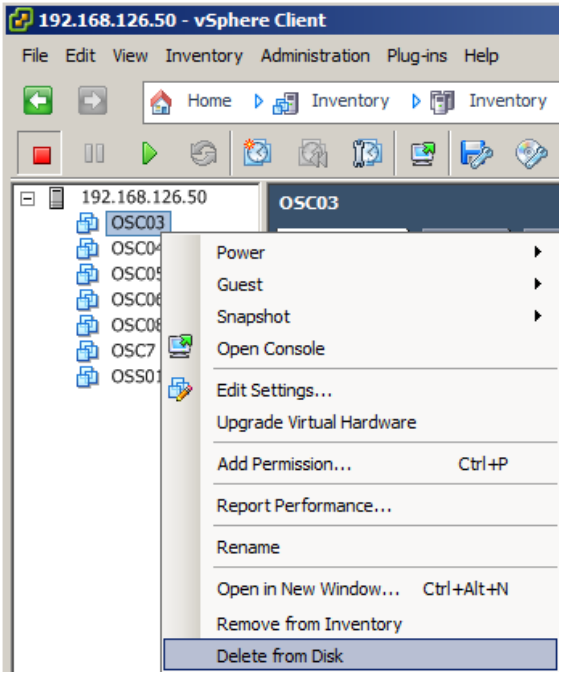
- Restore delivery status of the virtual machines by importing OVF templates.

6.2.1 Remove the virtual machines

Procedure

To delete a virtual machine, follow these steps:

1. Open the "VMware vSphere Client" application.
2. Select the desired virtual machine and the "Delete from Disk" command in the context menu.



The virtual machine is deleted.

6.2.2 Restore delivery status of the virtual machines by importing OVF templates

Requirements

The following requirements must be met:

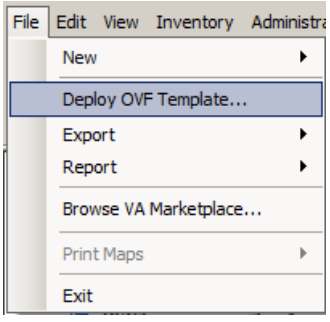
- The "VMware vSphere Client" application is opened.
- The virtual machines that are restored are removed from the hard disk of the virtualization server.
- The USB hard disk supplied with the backup data and the MAC addresses to restore the virtual machines is at hand.

  See the section titled "Scope of delivery (Page 13)" for more information.

Procedure

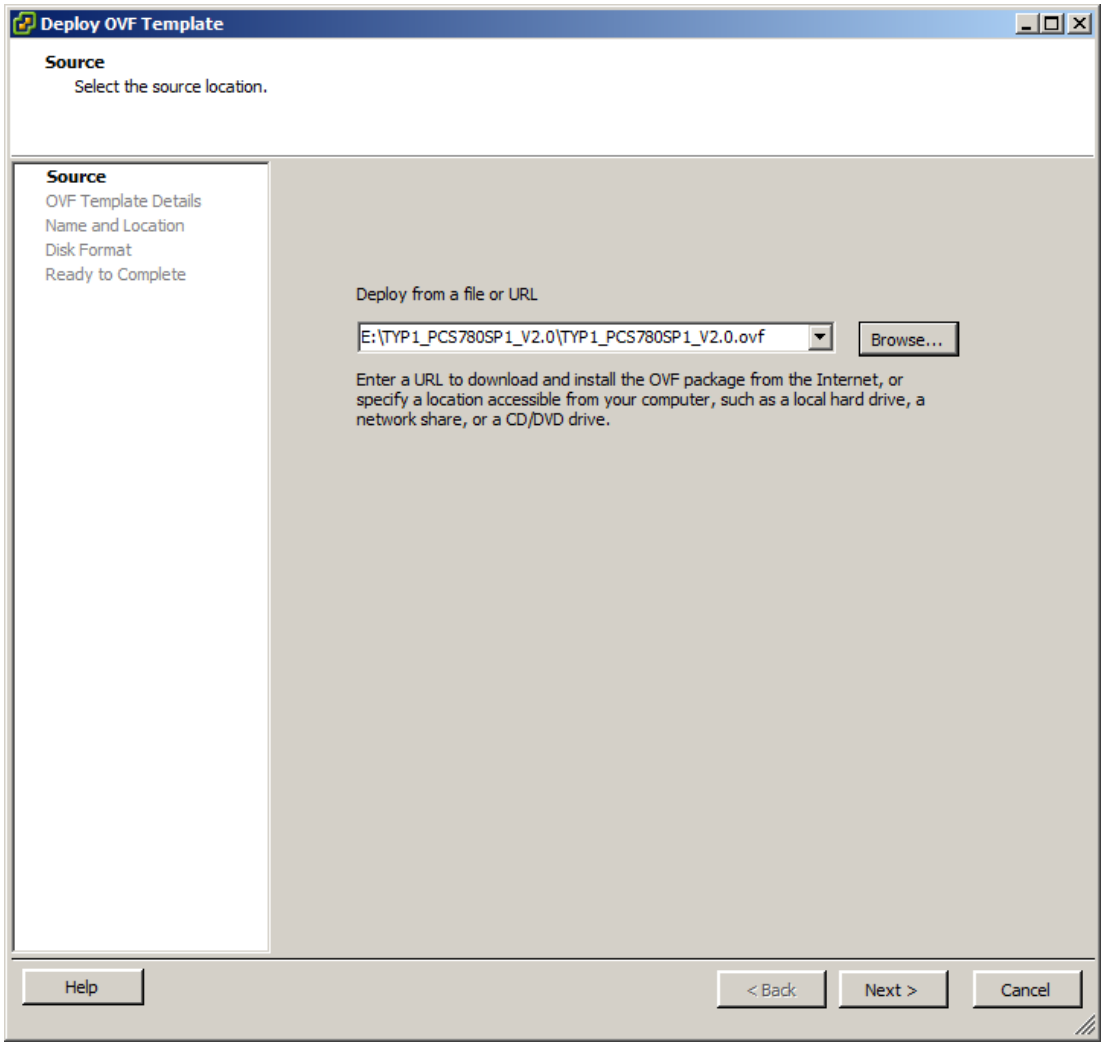
To restore the delivery status of a virtual machine, follow these steps:

1. Connect the supplied USB hard disk to the management console.
2. In the "VMware vSphere Client" application menu bar select the "File > Deploy OVF Template" command.



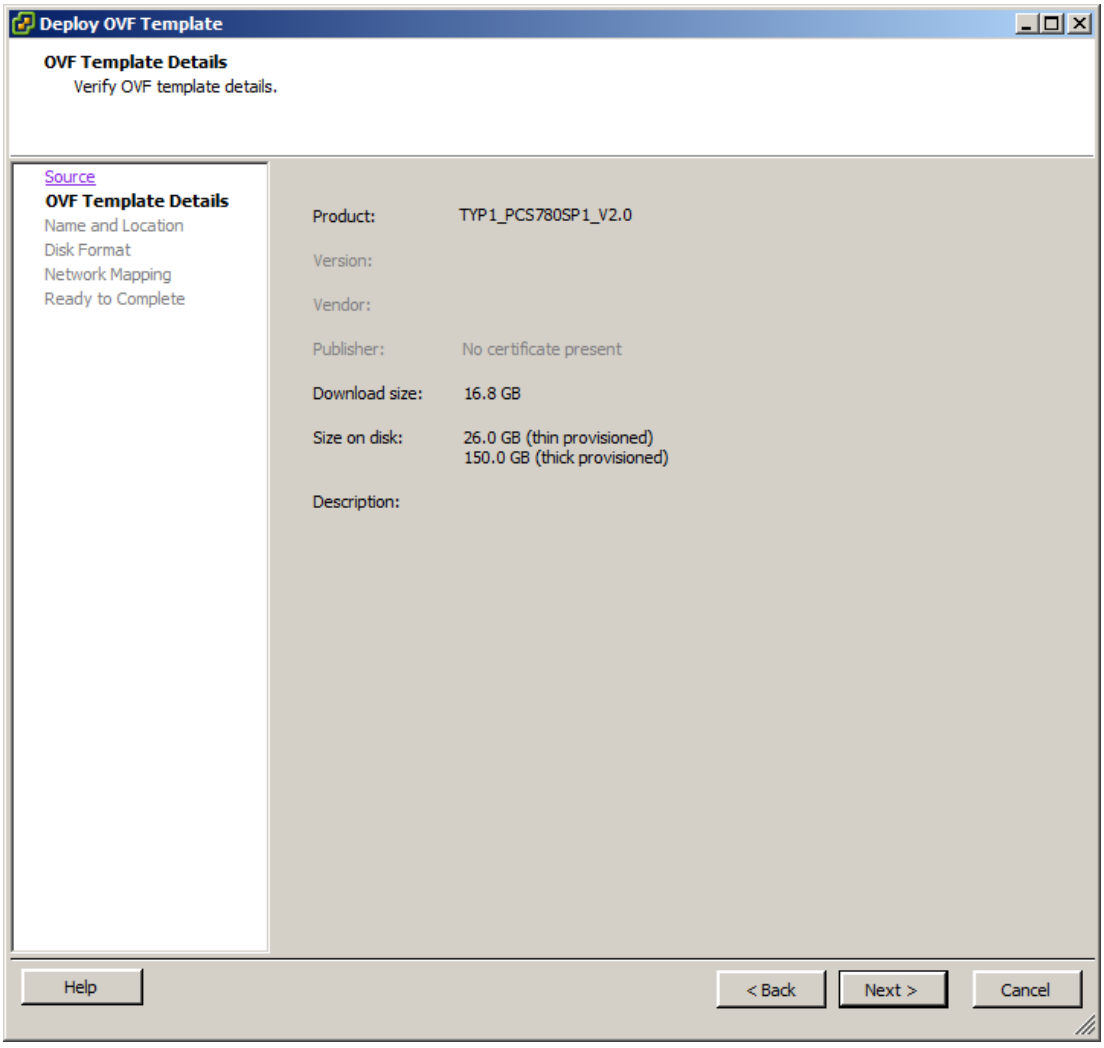
The "Deploy OVF Template" dialog opens.

3. Click the "Browse" button and select the OVF template for the desired virtual machine.

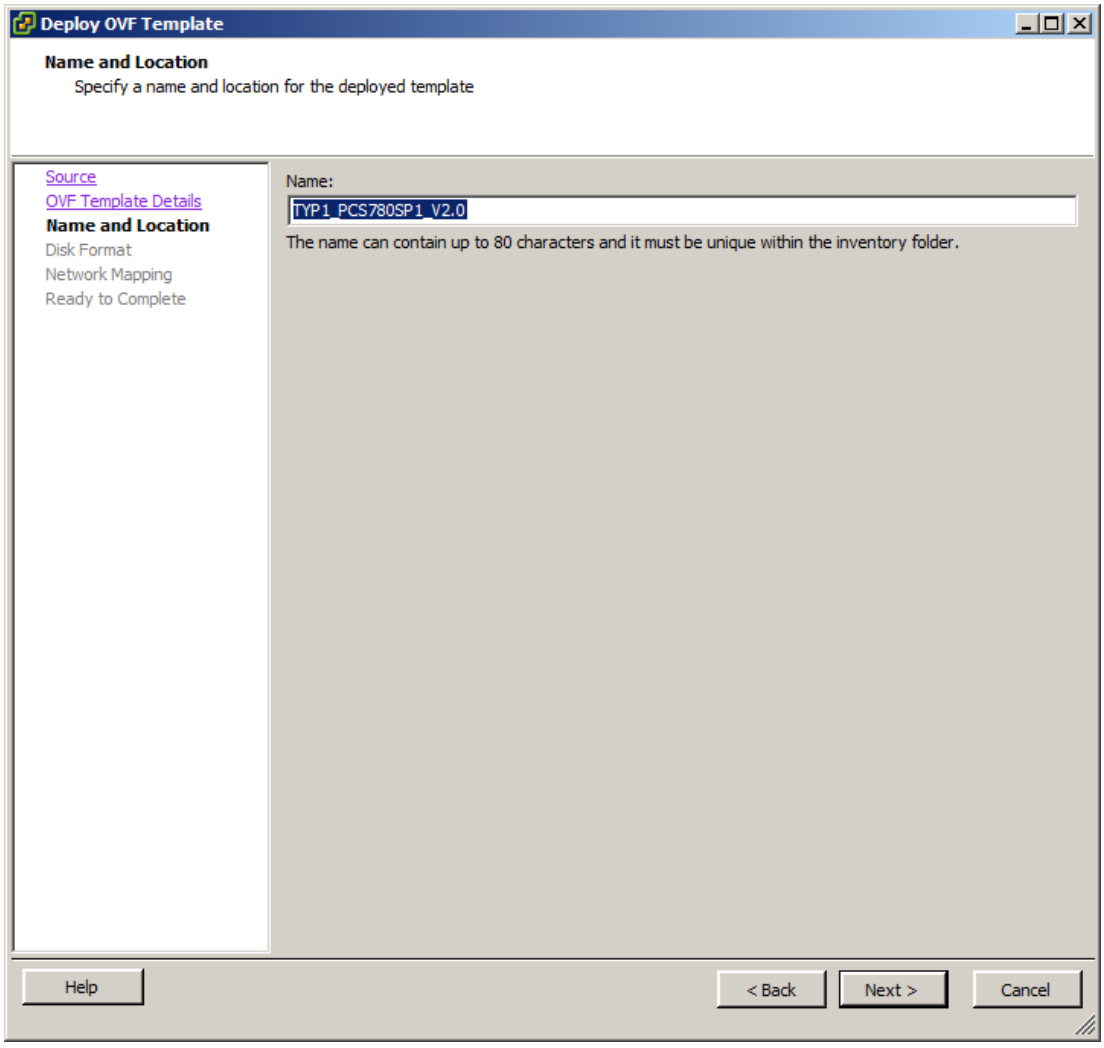


4. Click "Next".

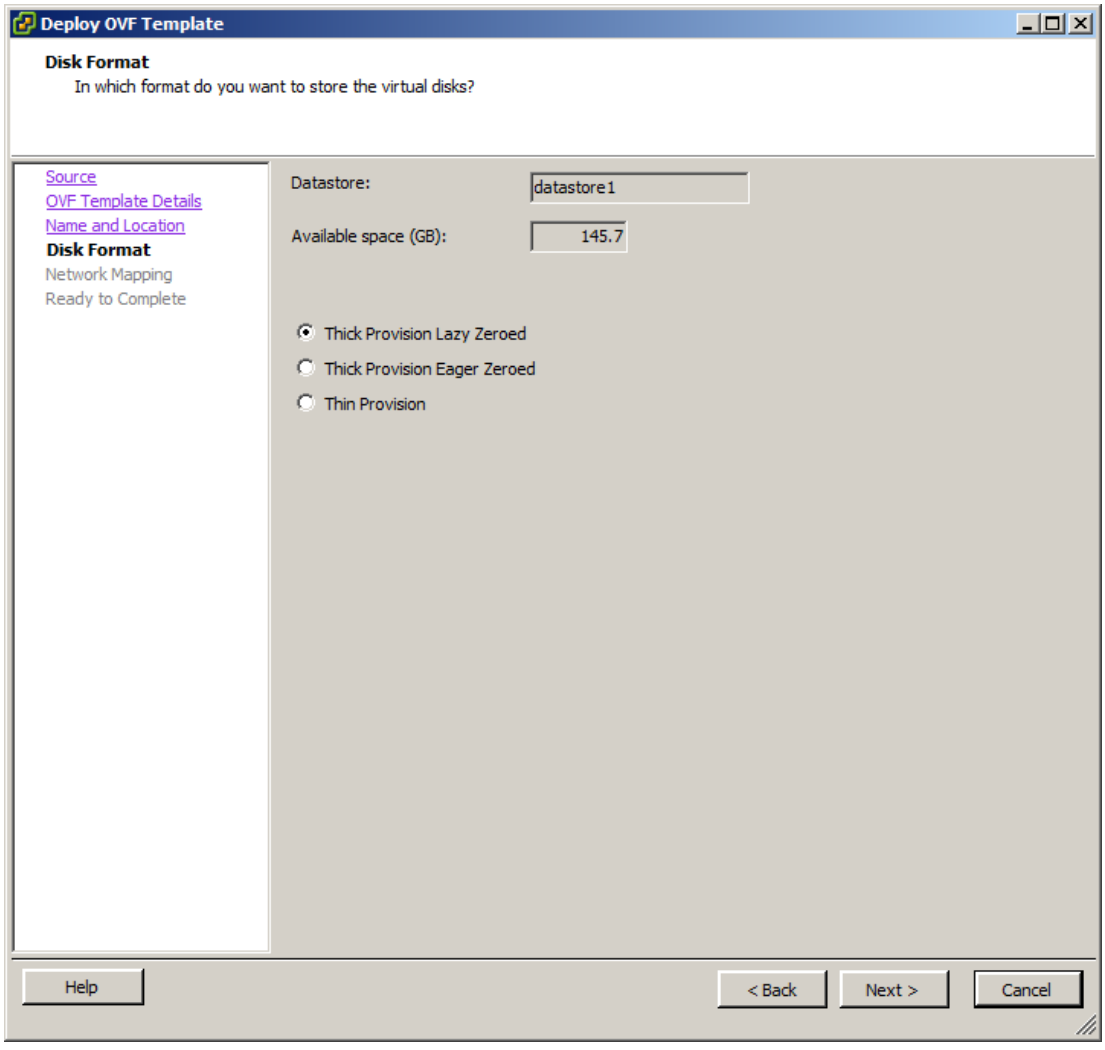
5. Check the properties of the OVF template and click "Next".



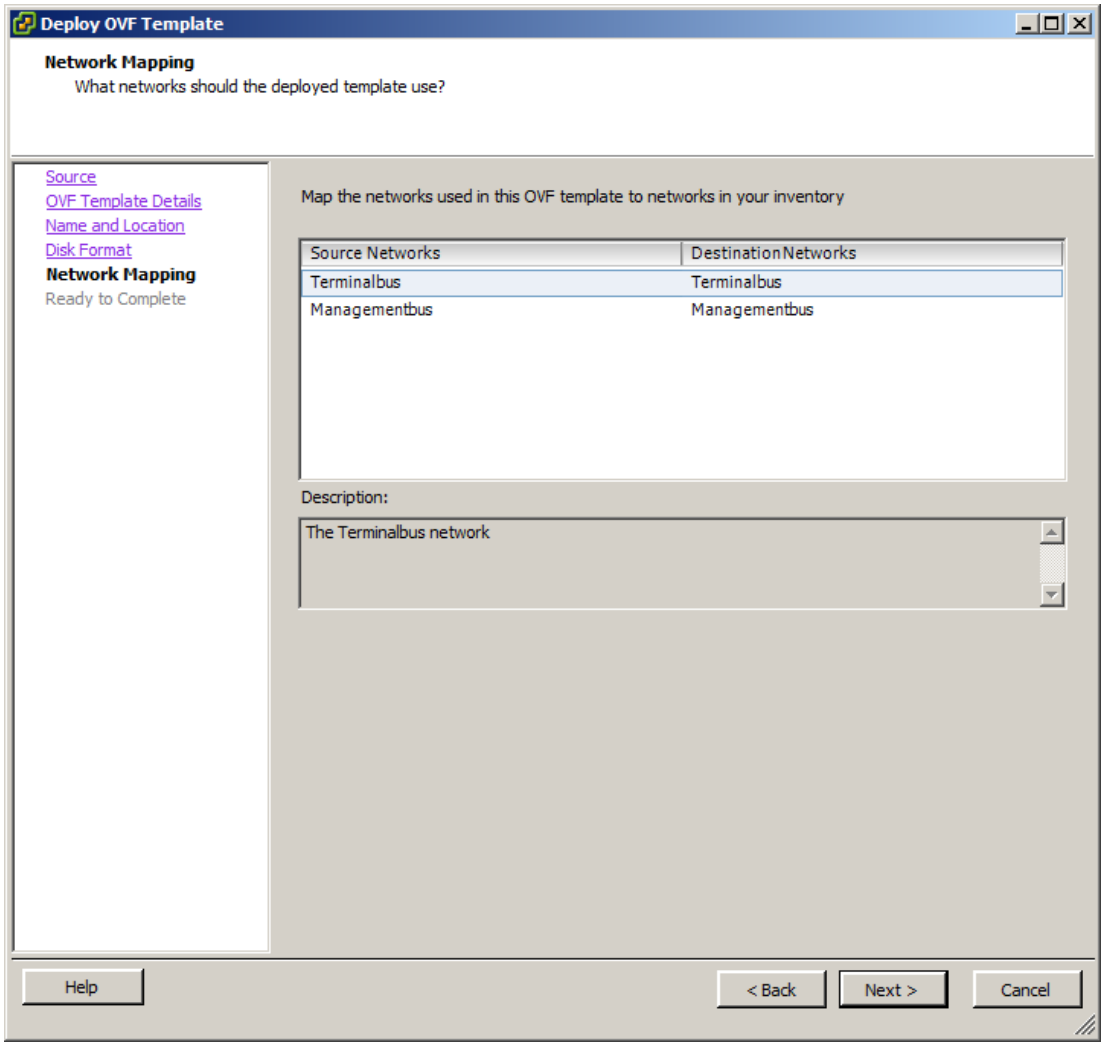
6. Enter a name for the virtual machine and click "Next".



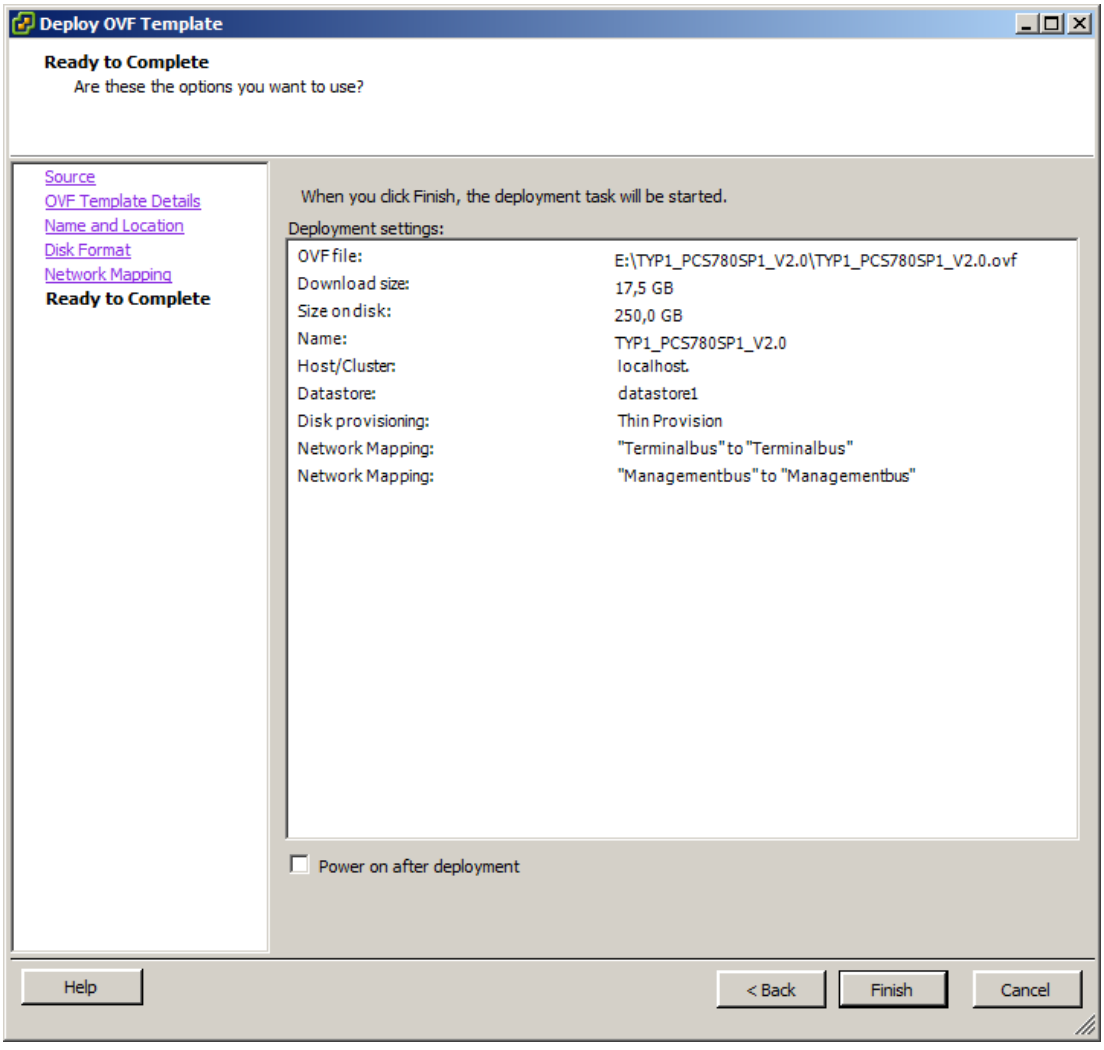
7. Make the settings for the hard disk format and click "Next".



8. Check the network assignment and click "Next".



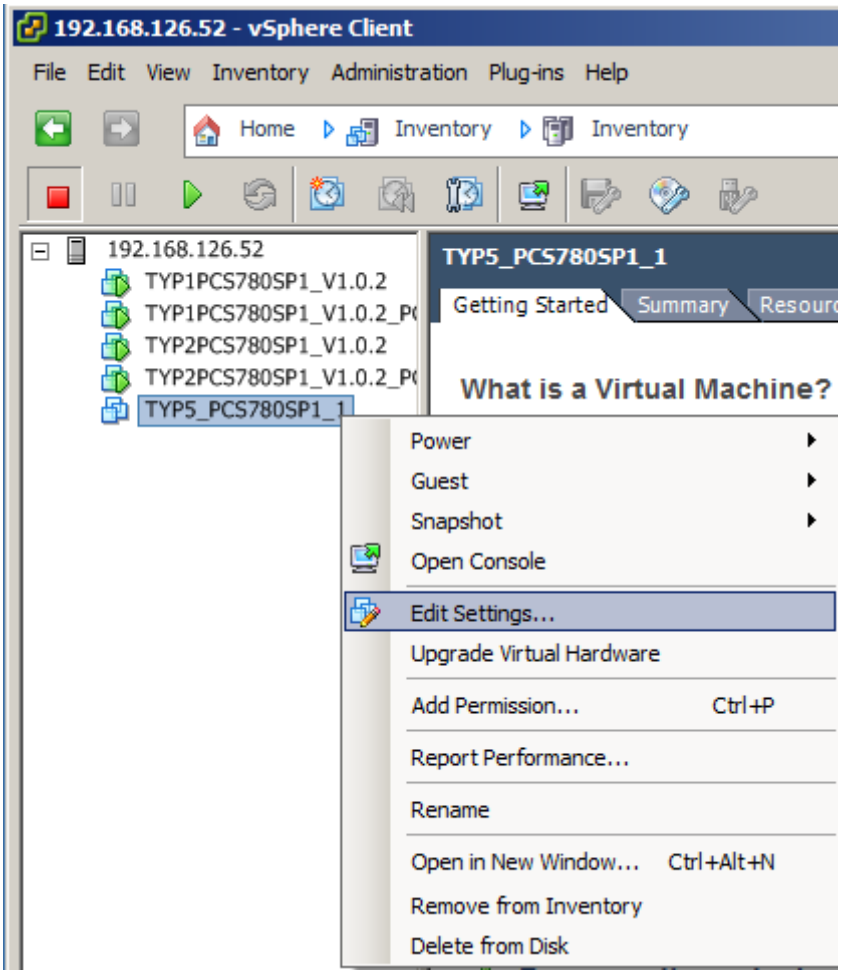
9. Check the import settings and click "Finish".



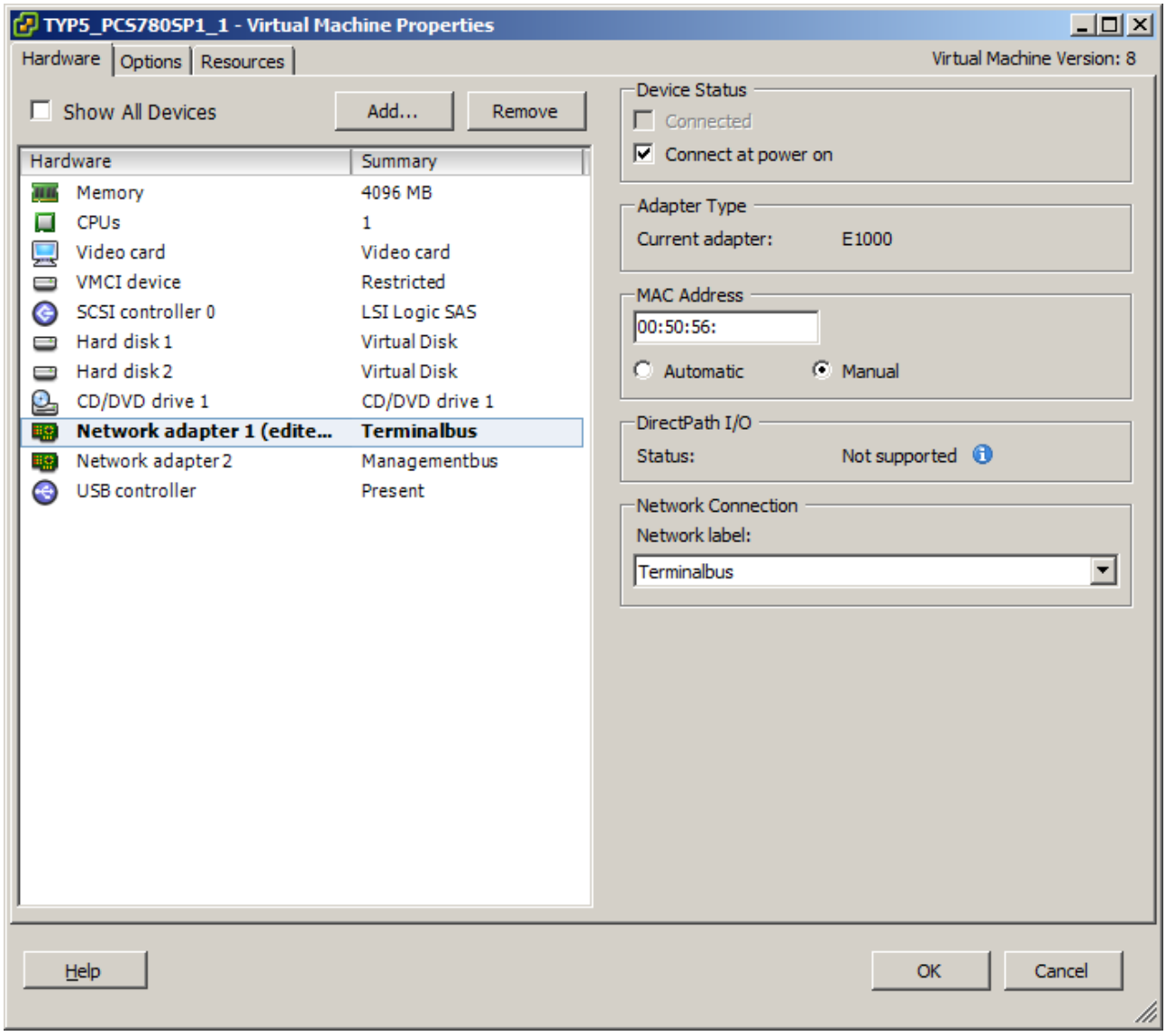
The OVF template for the selected virtual machine is imported.

The successful execution is confirmed by a message.

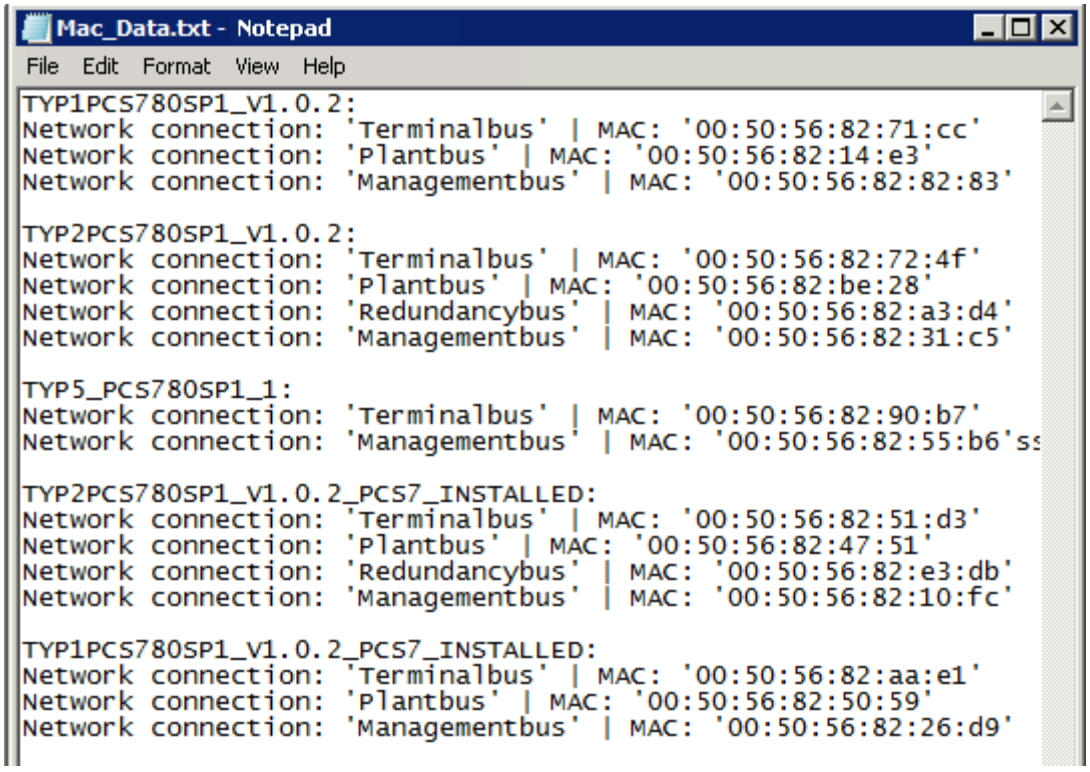
10. Select the imported virtual machine in the "VMware vSphere Client" application and select the "Edit settings" command in the shortcut menu.



11. Select the "Network adapter" property in the "Hardware" tab.
12. Activate the "Manual" option in the "MAC address" area of the dialog.



13. Enter the MAC address of the virtual machine. The MAC addresses are listed on the supplied USB hard disk (see section "Scope of delivery (Page 13)").



6.3 Restoring the delivery status of the virtualization server

To restore the delivery status of the virtualization server do the following:

- Installation of the "VMware vSphere ESXi" software on the virtualization server

NOTICE
New installation of the virtualization server Please note that on installation of the "VMware vSphere ESXi" software, all data and settings on the virtualization server are irrevocably deleted.

- Setting the IP address and network adapter of the virtualization server
- Import additional configuration data

6.3.1 Installing the "VMware vSphere ESXi" software

Introduction

By installing the "VMware vSphere ESXi" software all data on the virtualization server is deleted and a new hypervisor is installed (see section "Function principle (Page 10)").

Requirements

The following requirements must be met:

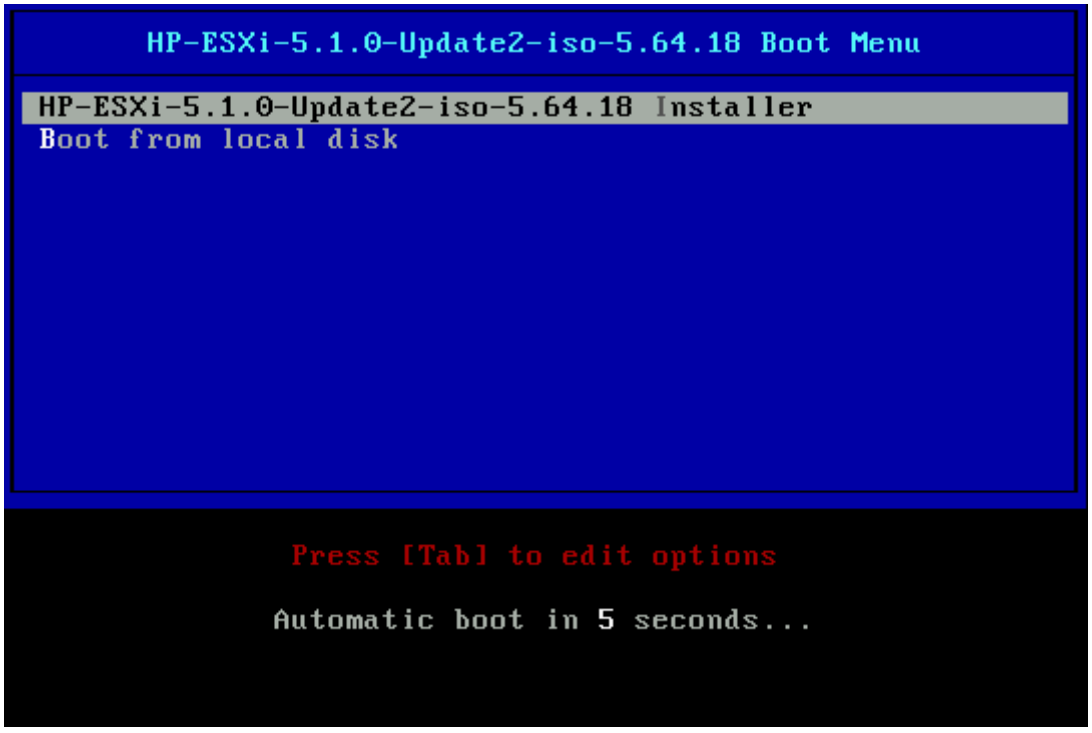
- The virtualization server is assembled and commissioned according to the manufacturer's regulations.
- A monitor, keyboard, and mouse are connected to the virtualization server.
- The supplied CD with the installation of the "VMware vSphere ESXi" software is available (see section "Scope of delivery (Page 13)").

Procedure

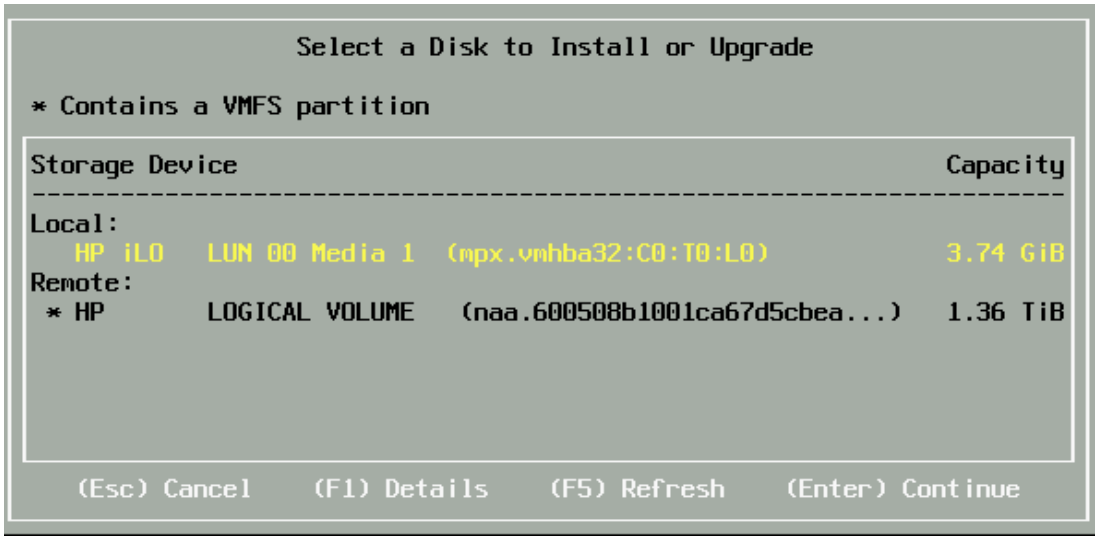
To install the "VMware vSphere ESXi" software and set the virtualization server, follow these steps:

1. Switch the virtualization server on via the mains/standby switch. The server's start-up application is displayed.
2. Insert the installation CD for the "VMware vSphere ESXi" software into the CD drive of the virtualization server.
3. Open the boot menu via the F11 button

4. Make the setting to start from the CD device.



5. Select the target drive for installing the SD memory card for the virtualization server and press Enter.



6. Select a keyboard type.
7. Enter a password for access to the virtualization server.

Note

The data set on the virtualization server must be noted and treated in confidence. It is required for additional configuration steps.

8. Press Enter to start the installation.
9. After completing the installation remove the installation CD from the CD drive of the virtualization server.
10. Press Enter to restart the virtualization server.

6.3.2 Configuration of the IP address and network adapter

Introduction

After installing the "VMware vSphere ESXi" software you set the IP address and network adapter of the virtualization server.

Requirement

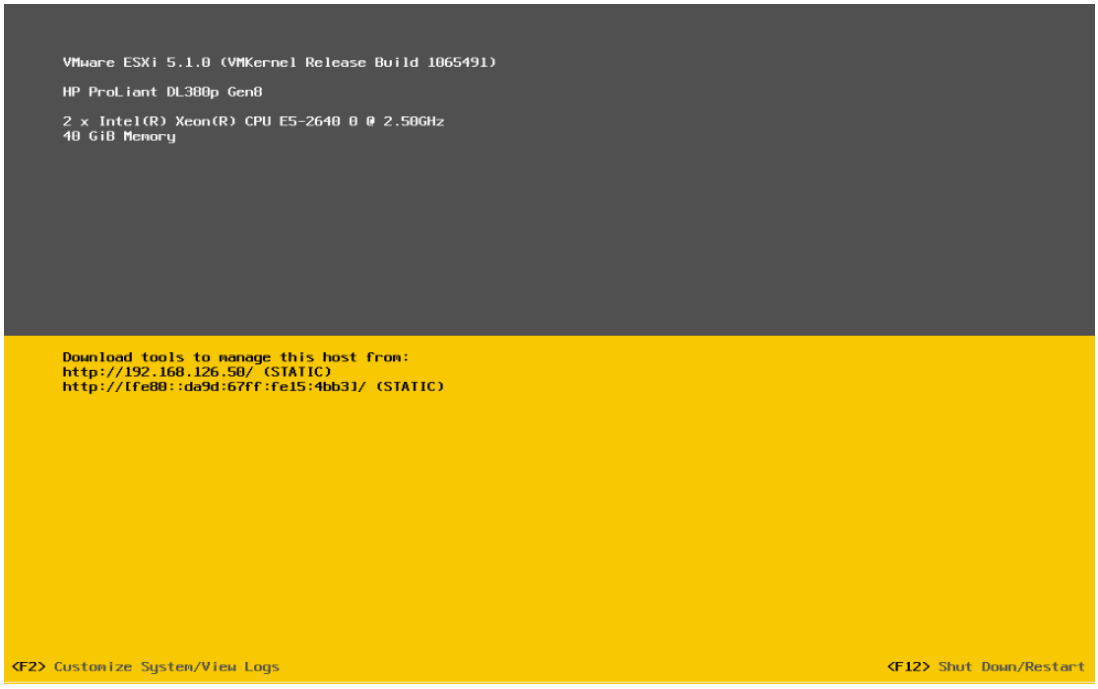
The following requirements must be met:

- The virtualization server is assembled and commissioned according to the manufacturer's regulations.
- The "VMware vSphere ESXi" software is installed.

Procedure

Proceed as follows to configure the virtualization server:

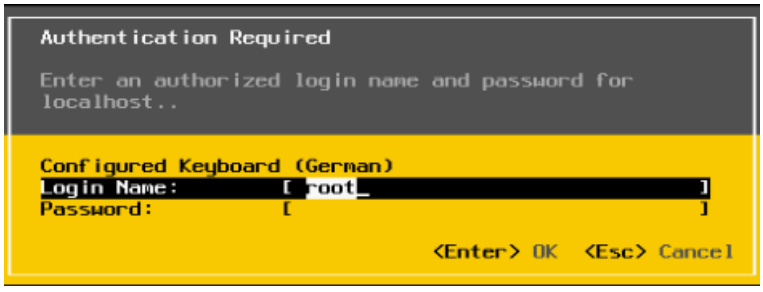
1. Switch the virtualization server on via the mains/standby switch. The server's start-up application is displayed.



2. Press the F2 button.

   The dialog for logging in to the virtualization server is opened.

3. Enter the following logon data:
   - Login Name: root
   - Password: See section "Installing the "VMware vSphere ESXi" software (Page 91)".



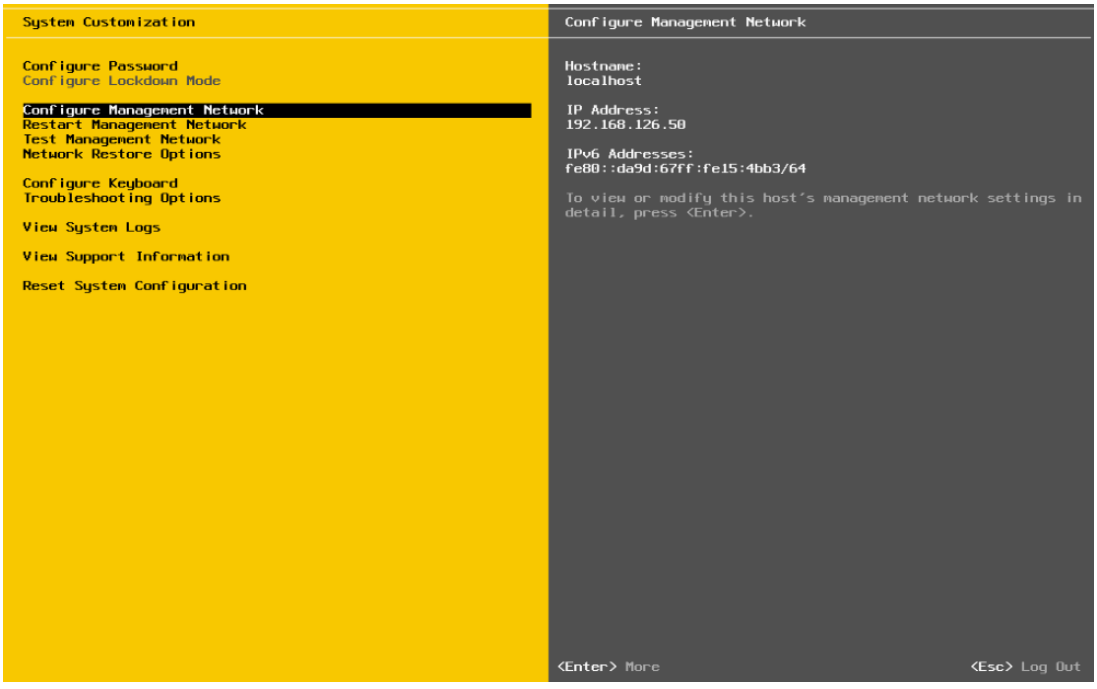
4. Press Enter.

   The options for configuring the system properties of the virtualization server are displayed.

5. Navigate to the "Configure Management Network" entry and press Enter.

Note

Use the <Arrow down> and <Arrow up> buttons to navigate between the individual entries.

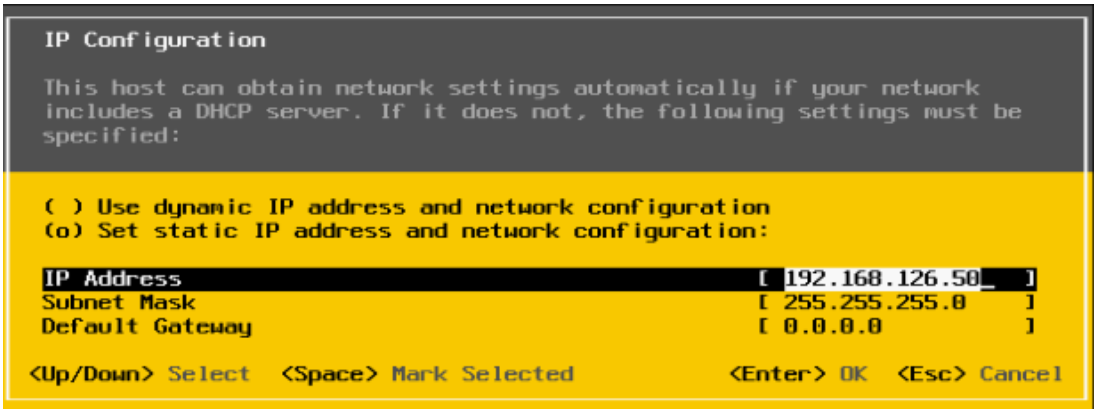


The options to change the network settings are displayed.

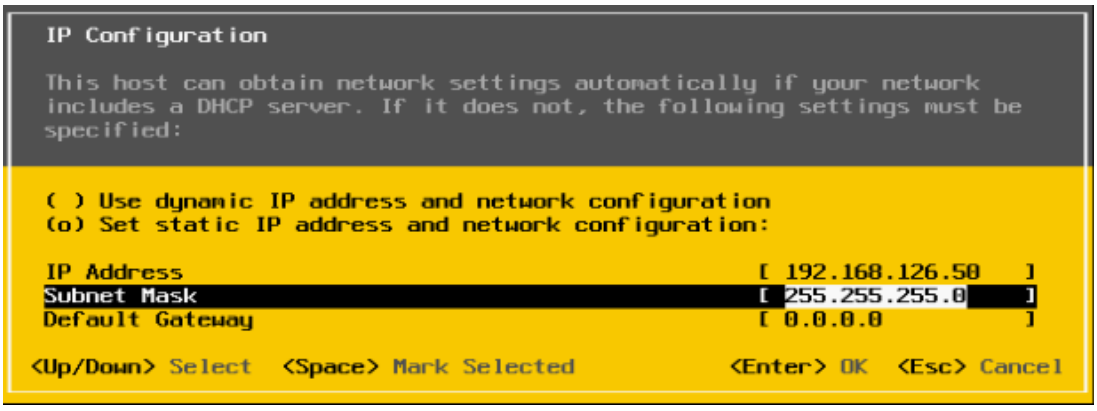
6. Navigate to the "IP Configuration" entry and press Enter.

The dialog to modify the IP address is opened.

7. Enter the desired IP address.



8. Enter the desired subnet mask.



9. Press Enter to save the change.

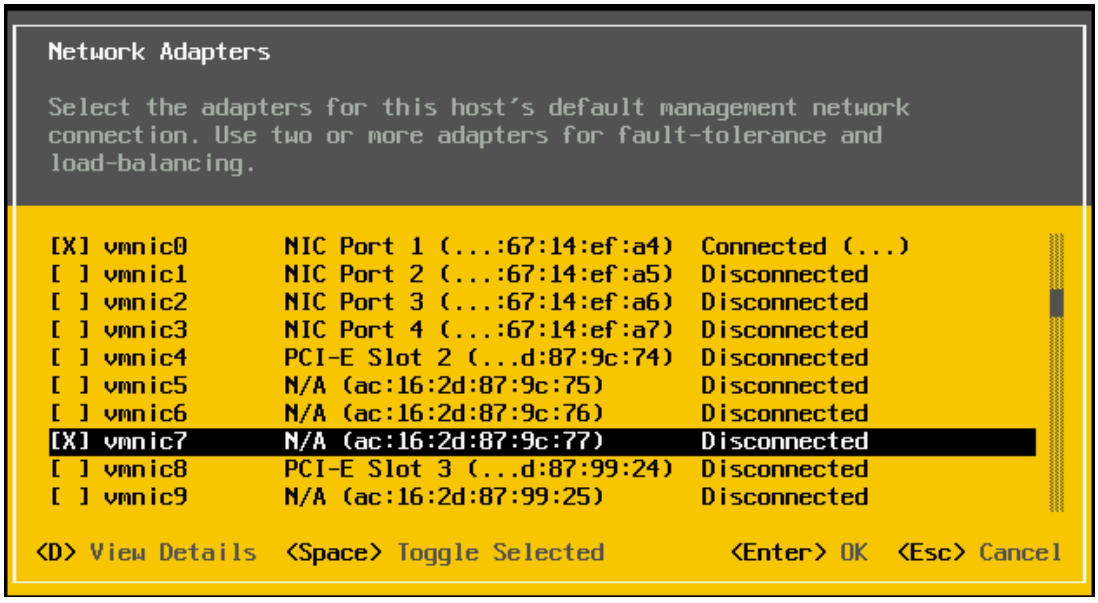
Note

Using the "Esc" button you can reject the changes and leave the dialog.

A summary of the settings is shown under the "IP Configuration" entry.

10. Press the <Esc> button to reach the "Configure Management Network" initial dialog.
11. Navigate to the "Network Adapters" entry and press Enter.

12.Select the "vmnic0" and "vmnic7" interfaces.



13.Press Enter to save the settings.

14.Press the <Esc> button to reach the "System Customization" dialog.

15.Press the <Esc> button to activate the configuration.

6.3.3 Import additional configuration data

Introduction

On the supplied USB hard disk you will find additional configuration data (incl. licenses, network settings) that you can transfer to the virtualization server with the aid of the "VMware vSphere Command-Line Interface" software.

Requirements

- The following requirements must be met:
- The instructions described in the sections "Installing the "VMware vSphere ESXi" software (Page 91)" and "Configuration of the IP address and network adapter (Page 93)" have been executed.
- The supplied USB hard disk is available.
- The installation application of the "VMware vSphere Command-Line Interface 5.1" software is available.

  You can find the installation application at http://www.vmware.com/support/developer/vcli/.

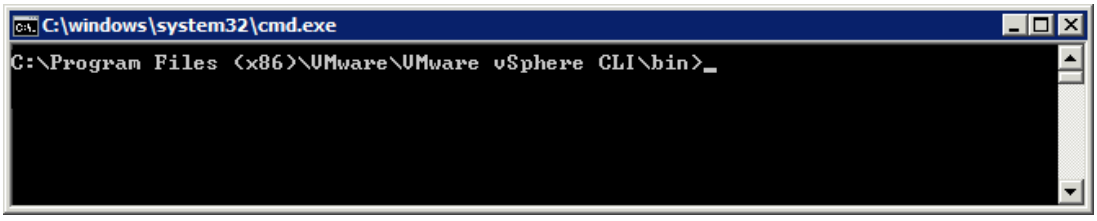
Procedure

In order to transfer the configuration data on the supplied USB hard disk to the virtualization server, proceed as follows:

1. Install the "VMware vSphere Command-Line Interface 5.1" software on the management console.

   Additional information on this is provided in the manufacturer's documentation (http://www.vmware.com/support/developer/vcli/).

2. Connect the supplied USB hard disk to the management console.
3. Open the Windows command line.
4. Enter the path to the installation folder for the "VMware vSphere Command-Line Interface V5.1" software.

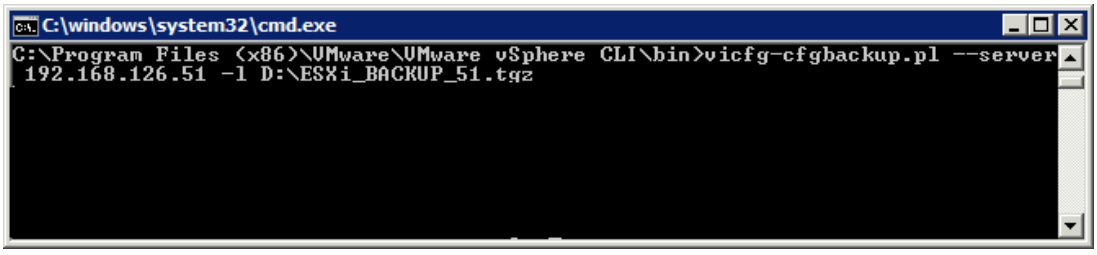


5. Enter the following command:

   ```
   vicfg-cfgbackup --server <server_ip> -l <device> :\ <backup>.tgz
   ```

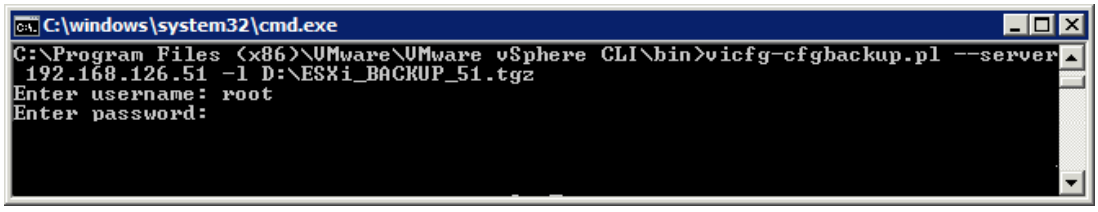
   – <server_ip>: IP address of the virtualization server (see section "Configuration of the IP address and network adapter (Page 93)")

   – <device>: Drive for the supplied USB hard disk



6. Press Enter.

7. Enter the following data:
   - User name: root
   - Password: Password for the virtualization server (see section "Installing the "VMware vSphere ESXi" software (Page 91)").



8. Press Enter.

   The configuration data is transferred to the virtualization server.

9. Restart the virtualization server.