

UCS Desktop Virtualization Services

Manual for administrators

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1 Introduction and architecture

Generally speaking, the **desktop** is understood in IT as the working environment displayed to a user via her screen that she can operate with a mouse, keyboard and other devices as necessary.

Desktop virtualization is a technology whereby this working environment is not provided directly by a PC, notebook or terminal server, but instead is operated on a **virtual machine**. A virtual machine is a special program which creates a standardised and configurable environment (the actual virtual machine) for an operating system with all the programs which run on it. This environment behaves like a real, physical computer from the perspective of the operating system running on it.

Virtualization software is used to operate a number of virtual machines on one computer completely independently of each other. The virtual machines are separate from each other, making it impossible for example to influence one machine from another machine, even if they are operated on the same physical host.

Desktop virtualization thus makes it possible to run many working environments (desktop instances) for many users completely independently of each other on a single computer. Each user has his own exclusive desktop at his disposal.

Contrary to the use of terminal servers, which can also be used to provide desktops centrally, desktop virtualization does not require several users to share a server operating system, but rather each user can continue to work with his desktop operating system just like on a PC. This avoids a range of disadvantages associated with the use of terminal servers, in particular in terms of licence costs, administrative efforts and user acceptance. It is also generally possible to employ software which is not terminal server-compatible directly with UCS DVS.

UCS Desktop Virtualization Services (hereinafter called DVS) is a solution based on Univention Corporate Server (UCS) for the operation of virtualized Microsoft Windows and Linux desktops.

Existing desktops can be virtualized and integrated in UCS DVS. Newly created, virtualized user desktops can either be installed manually or created using a **DVS template**, which is set up by the administrator. DVS templates are created from a prototypically installed system and prepared for personalisation for individual users by means of scripts. On Microsoft Windows systems this is performed via **Sysprep**; on UCD systems by equivalent system scripts (in the following also designated as Sysprep).

Microsoft Windows XP, Microsoft Windows 7 and KDE desktops with Univention Corporate Desktop are supported as operating systems of the virtualized systems.

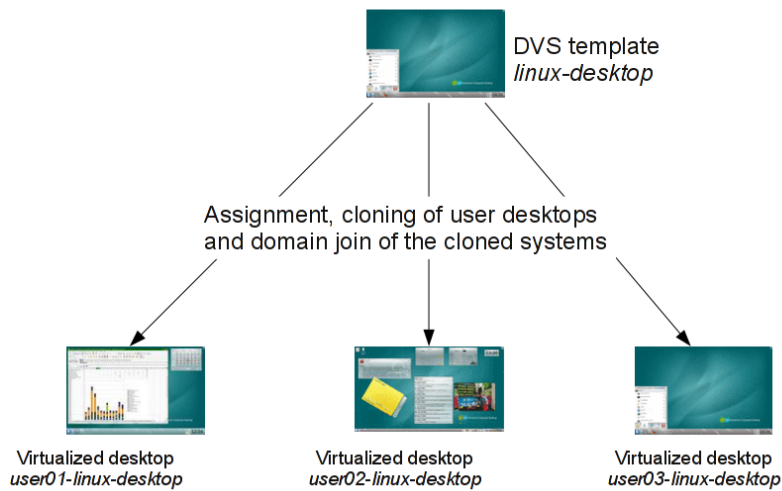


Figure 1.1: Generating the virtualized desktops from a template

The assignment of a template to a user is integrated in the user administration. For example, if a new user is created, it is possible to assign a desktop to him immediately. In addition, administration can be performed via the Univention Management Console. When assigning a template, a copy of the template is created. This copy is then personalised to the user via Sysprep and the system joins the domain automatically (see Figure 1.1). From a technical perspective, not the complete virtual machine is copied, but only the difference from the original status via copy-on-write.

The user desktops are virtualized on virtualization servers with the KVM technology. These systems are referred to as **DVS nodes**. The administration of the virtual machines is integrated in the Univention Virtual Machine Manager (UVMM). If more than one DVS node is employed, there is the possibility of automatically distributing the individual desktops over several servers to guarantee uniform resource utilisation.

The use of more than one DVS node requires all image files for the virtualized desktops to be stored in a commonly accessible shared folder! The setup of this share is described in Chapter 2.2.4.

The virtual machines can either be accessed via thin clients, i.e., computers without hard drives, or a native DVS client, which can be started on Microsoft Windows and Linux workstations. The use of thin clients for deploying DVS is recommended.

The DVS clients create a connection to the virtualized desktop, accept user inputs and display the graphic output of the virtualized desktop system. Connections to Microsoft Windows systems are performed via

the **Remote Desktop Protocol (RDP)**; to UCD desktops via **x2go**. Sound output from the virtualized desktops is relayed to the DVS client. Additionally, peripherals connected to the thin client such as printers or USB mass storage devices are available in the virtual machine.

Thin clients are operated with **UCS Thin Client Services**. Session parameters can be configured per user in Univention Directory Manager.

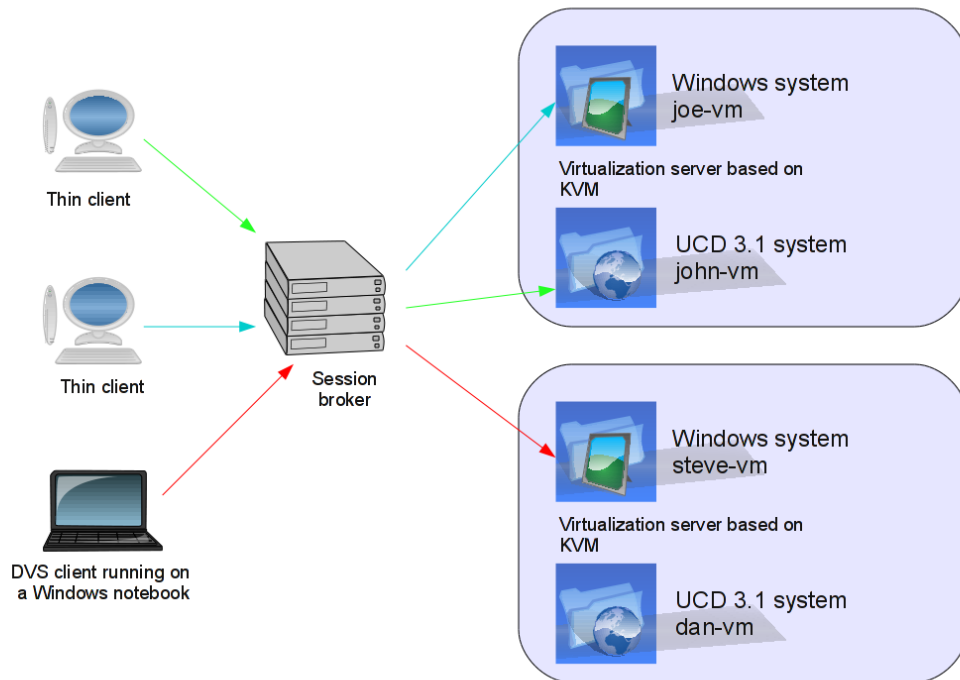


Figure 1.2: Accessing virtualized systems

Localisation of the virtual machines during DVS logon is performed via a central component: the **session broker**. All the session data are stored in a database in the session broker (see Figure 1.2).

Access to DVS can alternatively also be performed from Windows workstations via a self-contained DVS access program. This does not provide the conceptual advantages of thin clients, but does, however, allow gradual migration of a DVS environment from native Windows installations to thin clients.

This manual expands on the manuals for Univention Corporate Server [1], Univention Corporate Desktop [2] and UCS Thin Client Services [3].

2 Installation

In addition to the accessing clients (thin clients or native DVS client installations), a UCS Desktop Virtualization Services installation is comprised of a number of components:

- The **management system** stores the domain data in the LDAP directory, e.g., the user and host accounts. The only writeable copy is stored on the domain controller master and is setup as part of the standard UCS installation.
- **DVS nodes** are virtualization servers based on KVM, on which the virtualized desktops are operated. It is possible to operate as many DVS nodes as required.
- The **session broker** registers the logged-in users and indicates the assigned desktop.
- **Thin client servers** provide thin clients with their boot image (either via PXE or locally on Compact-Flash memory). The use of a thin client server is optional, but recommended. Several thin client servers can be operated.

The following describes the installation of all the components on one server (sufficient for smaller environments or tests) and the set-up in a distributed environment.

2.1 Installing a single server environment

UCS DVS can only be installed on systems upgraded to UCS 2.4-2! The following command can be used to perform an update:

```
univention-updater net --update to 2.4-2
```

The **univention-dvs** package can be used to set up all the packages necessary for DVS on a master domain controller server:

```
univention-config-registry set repository/online/component/dvs=yes \  
    repository/online/component/dvs/version=current  
univention-upgrade  
univention-install univention-dvs
```

If thin clients are to be used, the following steps are also necessary:

```
univention-config-registry set repository/online/component/tcs=yes  
univention-install univention-thin-client-schema  
univention-install univention-thin-client  
univention-install univention-thin-client-dvs  
univention-run-join-scripts
```

The system is ready for operation with UCS DVS after a restart.

2 Installation

2.2 Installing a distributed environment

UCS DVS can only be installed on systems upgraded to UCS 2.4-2! The following command can be used to perform an update:

```
univention-updater net --update to 2.4-2
```

2.2.1 Installing the UCS management system integration packages

The ***univention-dvs-schema*** package must be installed on the master domain controller. It includes the LDAP schema extensions required for DVS and integrates in the user and computer administration of the Univention Directory Manager:

```
univention-config-registry set repository/online/component/dvs=yes \  
    repository/online/component/dvs/version=current  
univention-upgrade  
univention-install univention-dvs-schema  
univention-run-join-scripts
```

If thin clients are to be used, the following steps are also necessary:

```
univention-config-registry set repository/online/component/tcs=yes  
univention-upgrade  
univention-install univention-thin-client-schema  
univention-run-join-scripts
```

The installation of further DVS components can only be started once the schema installation on the domain controller master has been completed and the system been restarted.

2.2.2 Installing the session broker

The session broker can be installed on a system in the DVS domain with the ***univention-dvs-sessionbroker*** package (the installation can only be performed on domain controllers (master, backup and slave)):

```
univention-config-registry set repository/online/component/dvs=yes \  
    repository/online/component/dvs/version=current  
univention-upgrade  
univention-install univention-dvs-sessionbroker  
univention-run-join-scripts
```

For advanced requirements (e.g., a high availability scenario), operation of more than one session broker is also supported. In this case, database replication for the session database must additionally be set up. This is documented in Univention Wiki under [\[4\]](#).

If Univention Corporate Desktop is also to be virtualized in a UCS DVS environment, an additional package needs to be installed on the system:

```
univention-install univention-dvs-sysprep-ucd
```

2.2.3 Installing a virtualization server (DVS node)

A DVS node is based from a technical perspective on the Univention Virtual Machine Manager and can only be installed on systems with CPUs which provide hardware support for virtualization.

This can be determined by searching in `/proc/cpuinfo` for ***vmx*** or ***svm***.

```
grep -Eo '(vmx|svm)' /proc/cpuinfo
```

A DVS node can be installed on all domain controller servers (master, backup and slave) or member servers with the ***univention-dvs-node*** package:

```
univention-config-registry set repository/online/component/dvs=yes \
    repository/online/component/dvs/version=current
univention-upgrade
univention-install univention-dvs-node
univention-run-join-scripts
```

2.2.4 Installing DVS nodes

In a distributed environment (if more than one DVS node is used or if a DVS node is used and the session broker is operated on another system), it is essential that all the image files of the virtualized desktop are stored in a file share which can be accessed simultaneously. This share can either be provided by an existing storage system / SAN or also be realised by a share on a UCS system. This is documented in Univention Wiki under [4].

2.2.5 Installing a thin client server

In addition, the components for UCS Thin Client Services and DVS need to be integrated via the repository:

```
univention-config-registry set repository/online/component/dvs=yes \
    repository/online/component/dvs/version=current \
    repository/online/component/tcs=yes
```

The thin client server can then be installed with the following command:

```
univention-upgrade
univention-install univention-thin-client
univention-run-join-scripts
```

The DVS thin client packages can then be installed:

```
univention-install univention-thin-client-dvs
```

2 Installation

3 Creation and management of DVS templates

The templates for user desktops are created in two steps. Firstly a virtual machine (hereinafter called **template system**) is installed in the Univention Virtual Machine Manager and then a **DVS template** created from this machine via a UMC module.

Alternatively, there is also the possibility of creating virtualized desktops directly from existing images without the use of DVS templates. This is described in the Chapter 4.3.

As some operations can take some time when working with a DVS template, it is recommended to increase the timeout of the Univention Management Console with the Univention Configuration Registry variable `umc/web/timeout`, e.g., to **3600** for an hour.

3.1 Installing a virtual machine as a template

UCS DVS supports virtual desktops based on Microsoft Windows XP SP3 (32 bit), Microsoft Windows 7 (32 bit and 64 bit) and UCD 3.1 (32 or 64 bit).

A UCS domain name server should be specified in the standard DHCP policy. The reason for this is that the preparation of the template systems with Sysprep needs to resolve the domain and host names. The resolution is performed via DNS service records, which are not present if an external DNS server is used. In addition, the standard gateway should be set via a DHCP policy.

3.1.1 Installing a Microsoft Windows template system

The virtual machine is installed like a standard system with the Microsoft Windows installation routine via the Univention Virtual Machine Manager. Operation of the UVMM is described in Chapter 6 of the UCS manual [1].

Attention:

It is essential that the IP configuration is performed via DHCP.

Attention:

Incoming RDP connections must be allowed in the firewall configuration, otherwise the DVS login will fail.

For Microsoft Windows 7, both rules for **Remote Desktop (TCP in)** must be activated in the Windows firewall settings under **Advanced settings -> Inbound Rules** in the control panel.

For Microsoft Windows XP, **Remote Desktop** must be activated in the Windows firewall settings under **Exceptions** in the control panel.

The performance of virtualized Windows systems can be considerably increased by the installation of the virtIO drivers. The use of the drivers is thus recommended. The setup is documented under [5].



3 Creation and management of DVS templates

If Microsoft Windows 7 is installed and an advanced Sysprep configuration (see Chapter 3.3) should be performed, the ISO image of the Windows Automated Installation Kit should be downloaded and mounted in the Univention Virtual Machine Manager as a CDROM drive. ¹

Apart from this, no other special steps must be taken into account during the installation of the template systems. Following the basic installation, any other installation can be installed which will be used on the user desktops.

Prior to the conversion into a DVS template, the template system must be shutdown.

3.1.2 Installing a Univention Corporate Desktop template system

The virtual machine is installed like a standard system with the Univention Installer via the Univention Virtual Machine Manager. Operation of the UVMM is described in Chapter 6 of the UCS manual [1].

Attention:

It is essential that the IP configuration is performed via DHCP.

The template system should not join the UCS domain - this could cause irritations. It is sufficient to integrate the machine with the system role **IP managed client** in the DHCP management.

Apart from this, no other special steps must be taken into account during the installation of the template systems. Following the basic installation, any other installation can be installed which will be used on the user desktops.

Prior to the conversion into a DVS template, the template system must be shutdown.

3.2 Creating a DVS template for Microsoft Windows XP

The template is created on the system on which the session broker is running using the Univention Management Console's **DVS templates** module.

If there is no template yet, **Create new template** can be used to create one. Firstly, a **Name of the template** must be entered, e.g., **Office desktop** and confirmed with **Next**.

In the following dialogue box, the **Virtual instance** is selected which should be used as the DVS template. If the **For creating the template create and use a copy of this instance** option is selected, the preparation of the DVS template will be performed on a copy of the virtual machine. This can take several minutes depending on the size of the template as hard drive images of several GB in size are copied. If no copy is used, the virtual machine is no longer available for direct access following the creation of a template. **Next** must now be clicked again.

The DVS template is then prepared for the individualisation with Sysprep. To do so, the **Start instance for sysprep** option must be selected. If it is not activated, there is no individualisation of the virtualized desktop machine the first time a login is performed! The Sysprep scripts (Windows 7, Windows XP and Univention Corporate Desktop) are selected under **Operating system**.

Copying the virtual machine can take some time.

¹<http://www.microsoft.com/downloads/de-de/details.aspx?FamilyID=696dd665-9f76-4177-a811-39c26d3b3b34>

Then a dialogue box opens in which a connection to the template instance can be created via **Direct access (VNC)**.

A share is set up on the system on which the session broker is installed which can be accessed via Windows Explorer. This requires an account which is a member of the **Domain Admins** group, i.e., the **Administrator** in the default setting.

The **Windows XP SP3** subdirectory includes two batch files, which prepare the DVS template.

The basic configuration for the Sysprep procedure is stored in the `sysprep.inf` file. Prior to use, the Sysprep configuration must be adapted to local settings such as the Microsoft Windows licence key.

There are two possibilities for starting the Sysprep procedure: **UCS-DVS-Sysprep-non-interactive** reads the configuration out of the `sysprep.inf` and then shuts the system down automatically. **UCS-DVS-Sysprep-interactive** starts the interactive Sysprep editor (Setup Manager).

3.2.1 Non-interactive configuration

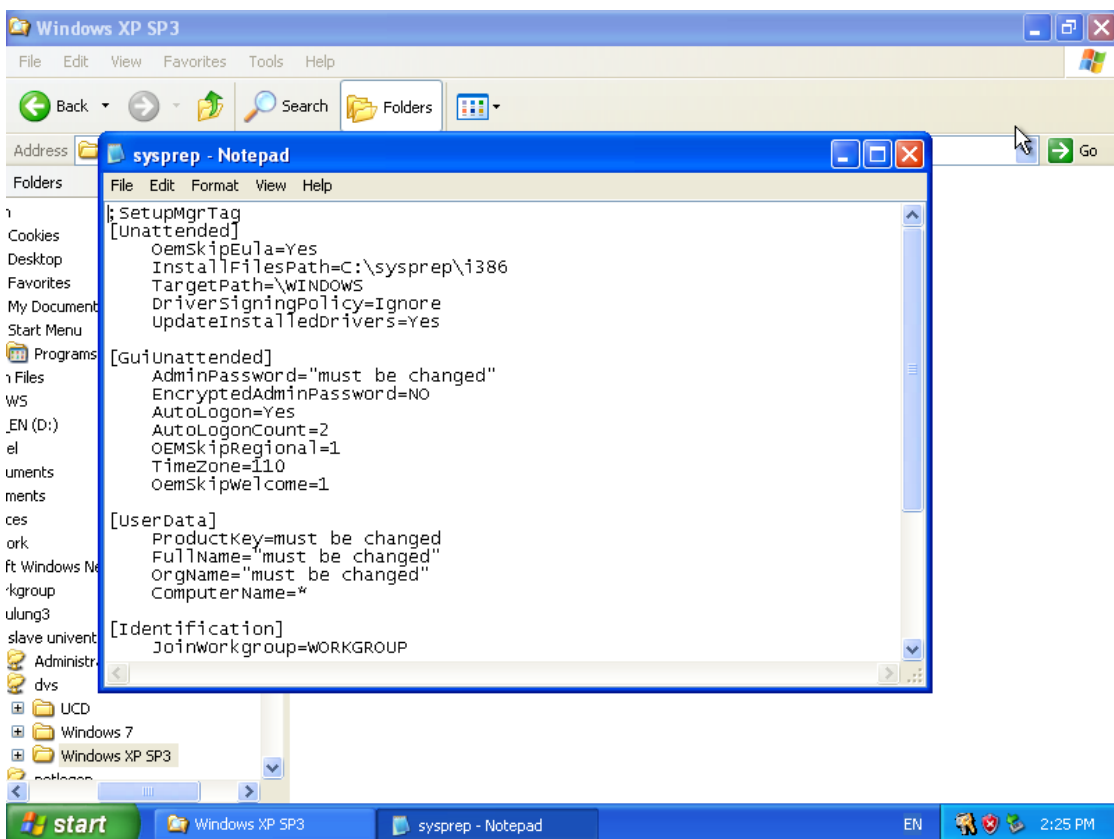


Figure 3.1: Non-interactive Sysprep configuration for Microsoft Windows XP

The following steps must be performed with an Administrator account during the non-interactive configuration:

3 Creation and management of DVS templates

- Editing the `sysprep.inf` file (see Figure 3.1).
- The following values must be changed (from **must be changed** to the actual value):
 - AdminPassword (the password for the local administrator account)
 - ProductKey (the licence key)
 - FullName (the person's name associated with licence)
 - OrgName (the organisation's name associated with the licence)
- Further adjustments can be performed. A description of the different settings can be found at <http://support.microsoft.com/kb/302577>. The settings for **AutoLogon** and **AutoLogonCount** must not be changed.
- Opening the batch file `UCS-DVS-Sysprep-non-interactive`. The warning about a potentially dangerous type of file can be skipped with **Run**. The preparation of the system can take a few minutes. The system is then directly shut down.

Now one must return to the UMC wizard and select **Next**.

In the following dialogue box, it can be selected whether copy-on-write should be used for the generation of the user desktops from the template:

- If the option is activated, only the deviation from the template system is saved per user desktop. This saves a large amount of memory space. If the template image is no longer available, all the virtual machines which are "dependent" on it can no longer be used. Accidental deletion is detected in Univention Virtual Machine Manager and prevented. Copy-on-write is activated in the basic setting.
- If the option is not activated, an independent copy is created for each virtualized user desktop.

Clicking on **Finish** completes the creation of the template. It now appears in the module's overview list and can be assigned to users (see Chapter 5).

3.2.2 Interactive configuration

The following steps must be performed with an Administrator account during the interactive configuration:

- Opening the batch file `UCS-DVS-Sysprep-interactive`. The warning about a potentially dangerous type of file can be skipped with **Run**.
- Select **Next** directly in the **Welcome to Setup Manager** window.
- Select **Modify existing** under **New or Existing Answer File** and select the `sysprep.inf` with **Browse**.
- The **Type of setup** should be selected as **Sysprep setup** (see Figure 3.2).

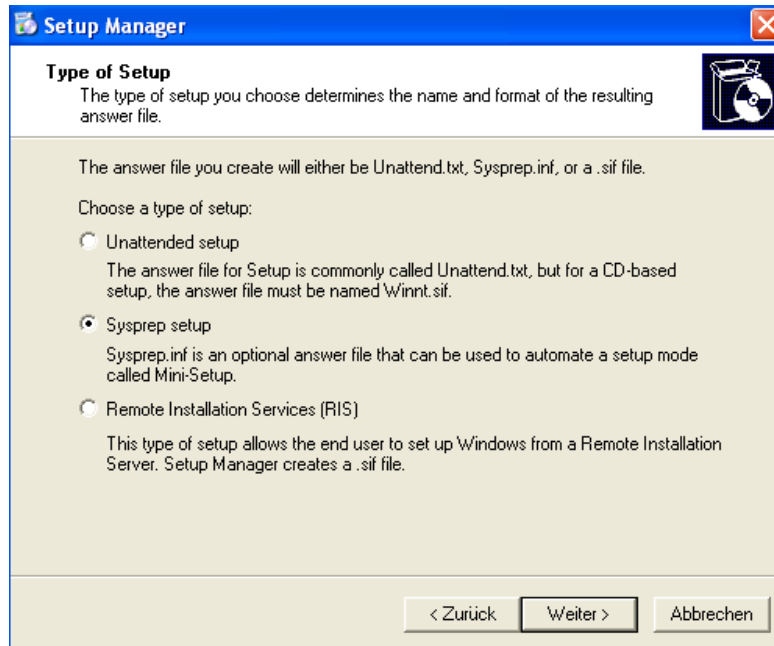


Figure 3.2: Selection of the Sysprep setup type on Windows XP

- **Windows XP Professional** must be selected under **Product**.
- For the licence conditions to be accepted automatically, **Yes, fully automate the installation** must be selected in the **License Agreement**.
- The name and company of the Windows licence holder must be entered under **General Settings -> Name and Organisation**.
- The Microsoft Windows licence key must be entered under **General Settings -> Product Key**.

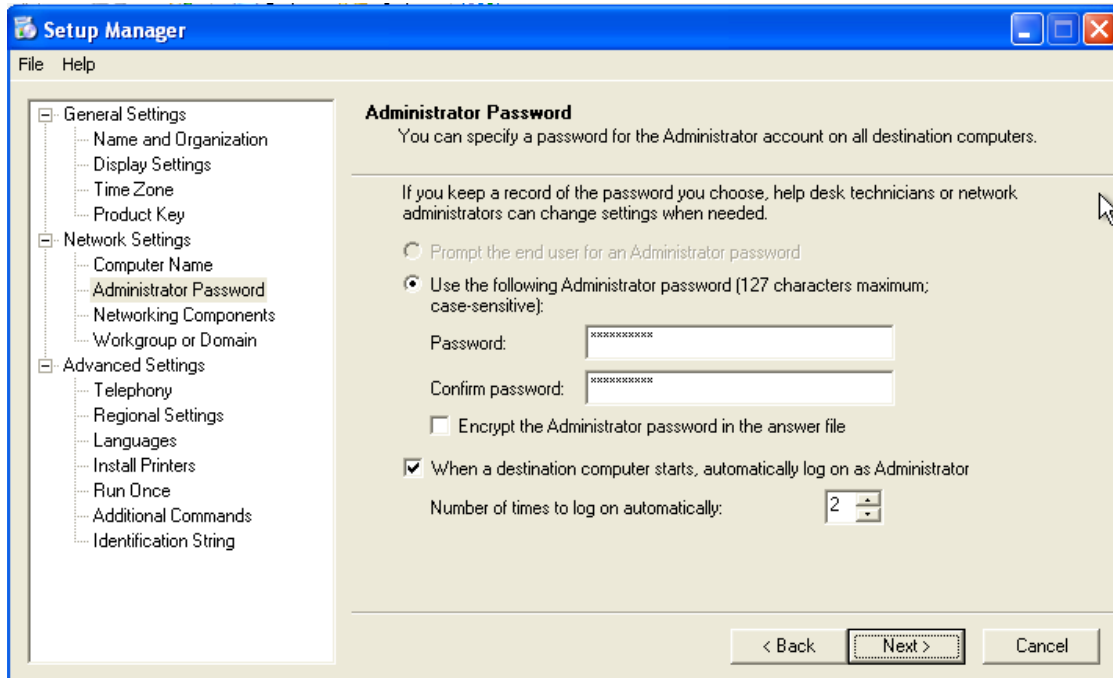


Figure 3.3: Setting the Administrator password on Microsoft Windows XP

- The password of the local Administrator account must be specified under **Network Settings** -> **Administrator Password** (see Figure 3.3). The setting for **When a destination computer starts, automatically log on as Administrator** must not be changed!
- Further adjustments can be performed. A description of the different settings can be found at <http://support.microsoft.com/kb/302577>. The settings for **AutoLogon** and **AutoLogonCount** must not be changed.
- The wizard can then be finished with **Finish** (can be found under **Advanced Settings** -> **Identification String**).



Figure 3.4: Starting the Sysprep process

- The `C:\sysprep\sysprep.inf` default must be confirmed in the final **Setup Manager has cre-**

ated an answer file with the settings you provided. To save the file enter a path and file name dialogue box. If the Sysprep configuration is to be reused later, it should be saved in the DVS share again.

The preparation of the system can take a few minutes.

- The system then shuts down automatically (see Figure 3.4).

Now one must return to the UMC wizard and select **Next**.

In the following dialogue box, it can be selected whether copy-on-write should be used for the generation of the user desktops from the template:

- If the option is activated, only the deviation from the template system is saved per user desktop. This saves a large amount of memory space. If the template image is no longer available, all the virtual machines which are "dependent" on it can no longer be used. Accidental deletion is detected in Univention Virtual Machine Manager and prevented. Copy-on-write is activated in the basic setting.
- If the option is not activated, an independent copy is created for each virtualized user desktop.

Clicking on **Finish** completes the creation of the template. It now appears in the module's overview list and can be assigned to users (see Chapter 5).

3.3 Creating a DVS template for Microsoft Windows 7

The template is created on the system on which the session broker is running using the Univention Management Console's *DVS templates* module.

If there is no template yet, **Create new template** can be used to create one. Firstly, a **Name of the template** must be entered, e.g., *Office desktop* and confirmed with **Next**.

In the following dialogue box, the **Virtual instance** is selected which should be used as the DVS template. If the **For creating the template create and use a copy of this instance** option is selected, the preparation of the DVS template will be performed on a copy of the virtual machine. This can take several minutes depending on the size of the template as hard drive images of several GB in size are copied. If no copy is used, the virtual machine is no longer available for direct access following the creation of a template. **Next** must now be clicked again.

The DVS template is then prepared for the individualisation with Sysprep. To do so, the **Start instance for sysprep** option must be selected. If it is not activated, there is no individualisation of the virtualized desktop machine the first time a login is performed! The Sysprep scripts (Windows 7, Windows XP and Univention Corporate Desktop) are selected under **Operating system**.

Copying the virtual machine can take some time.

Then a dialogue box opens in which a connection to the template instance can be created via **Direct access (VNC)**.

A share is set up on the system on which the session broker is installed which can be accessed via Windows Explorer. This requires an account which is a member of the *Domain Admins* group, i.e., the *Administrator* in the default setting.

3 Creation and management of DVS templates

The **Windows 7** subdirectory includes two batch files, which prepare the DVS template.

The basic configuration for the Sysprep procedure is stored in the `sysprep.<arch>.xml` files. Prior to use, the Sysprep configuration must be adapted to local settings such as the Microsoft Windows licence key.

There are two possibilities for starting the Sysprep procedure: **UCS-DVS-Sysprep-non-interactive** reads the configuration out of the `sysprep.<arch>.xml` and then shuts the system down automatically, **UCS-DVS-Sysprep-interactive** starts the interactive Sysprep editor (Setup Manager).

All the following steps must be performed by the Administrator user! On a newly installed system, the Administrator account is usually deactivated. The tick next to **Account is disabled** in the administrator account must then be removed under **Local Users and Groups** in the computer administration and a password entered.

3.3.1 Non-interactive configuration

The following steps must be performed in the non-interactive configuration:

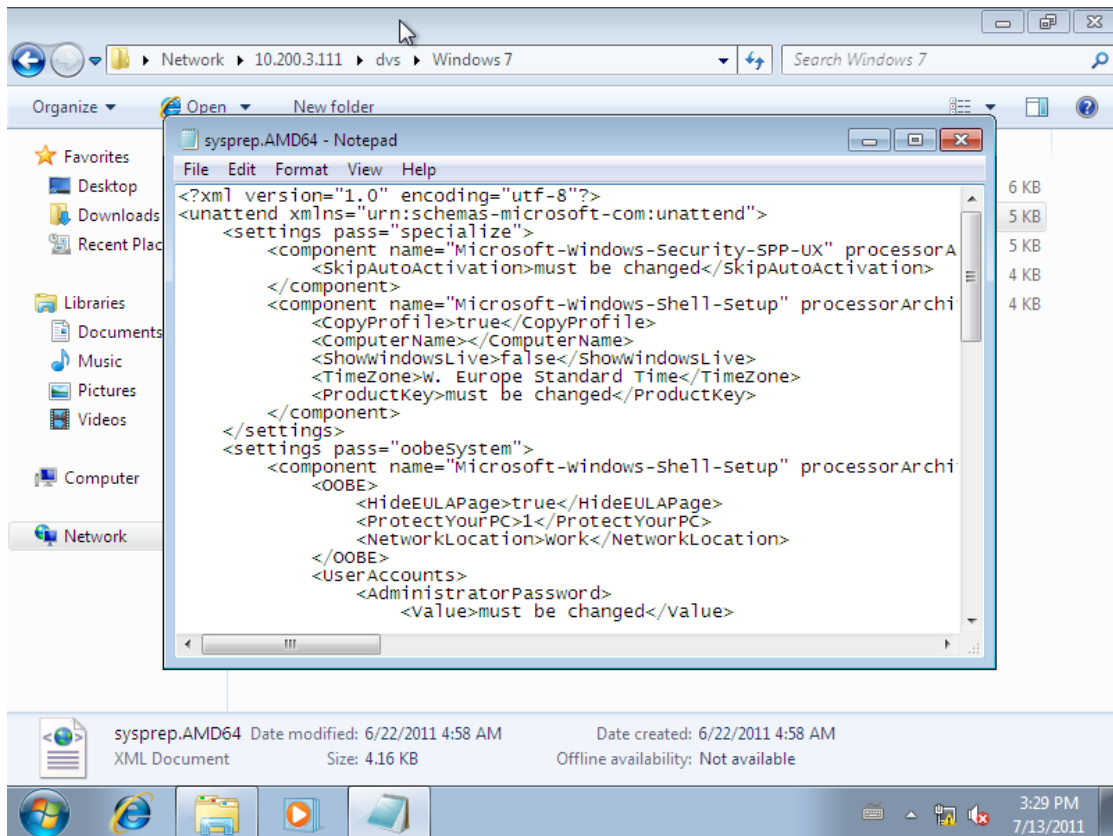


Figure 3.5: Configuring the Windows 7 Sysprep through a XML file

- Editing of the `sysprep.AMD64.xml` file (for Windows 7/64 bit) or `sysprep.x86.xml` file (for Windows 7/32 bit) with any editor (see Figure 3.5).
- The following values must be changed in the XML file (from **must be changed** to the actual value):
 - **SkipAutoActivation**: true
 - **ProductKey**: the licence key
 - **AdministratorPassword**: the password for the administrator account (the additional value **Value** must also be completed) and the **Password** under **AutoLogon** must also be set.
 - **RegisteredOrganization**: the organisation's name associated with the licence
 - **RegisteredOwner**: the user's name associated with the license

Following the editing of the `sysprep.xml`, no **must be changeds** must be found during a search!

- Further adjustments can be performed. A description of the different settings can be found at <http://technet.microsoft.com/en-us/library/ee676646%28WS.10%29.aspx> The settings for **AutoLogon** and **AutoLogonCount** must not be changed.
- Opening the batch file `UCS-DVS-Sysprep-non-interactive`. The warning about a potential dangerous type of file can be skipped with **Run**. The preparation of the system can take a few minutes. The system is then directly shut down.

Now one must return to the UMC wizard and select **Next**.

In the following dialogue box, it can be selected whether copy-on-write should be used for the generation of the user desktops from the template:

- If the option is activated, only the deviation from the template system is saved per user desktop. This saves a large amount of memory space. If the template image is no longer available, all the virtual machines which are "dependent" on it can no longer be used. Accidental deletion is detected in Univention Virtual Machine Manager and prevented. Copy-on-write is activated in the basic setting.
- If the option is not activated, an independent copy is created for each virtualized user desktop.

Clicking on **Finish** completes the creation of the template. It now appears in the module's overview list and can be assigned to users (see Chapter 5).

3.3.2 Interactive configuration

The following steps must be performed during the interactive configuration:

- Opening the batch file `UCS-DVS-Sysprep-interactive`. The warning about a potential dangerous type of file can be skipped with **Run**.
- If the Windows Automated Installation Kit is not yet installed, an error message is given. It must then be downloaded from the address specified and installed. `UCS-DVS-Sysprep-interactive` must then be run again.
- The following settings must be set under **oobeSystem -> Microsoft-Windows-Shell-Setup-neutral** (see Figure 3.6).
 - **AutoLogon -> Password** to the password for the Administrator account

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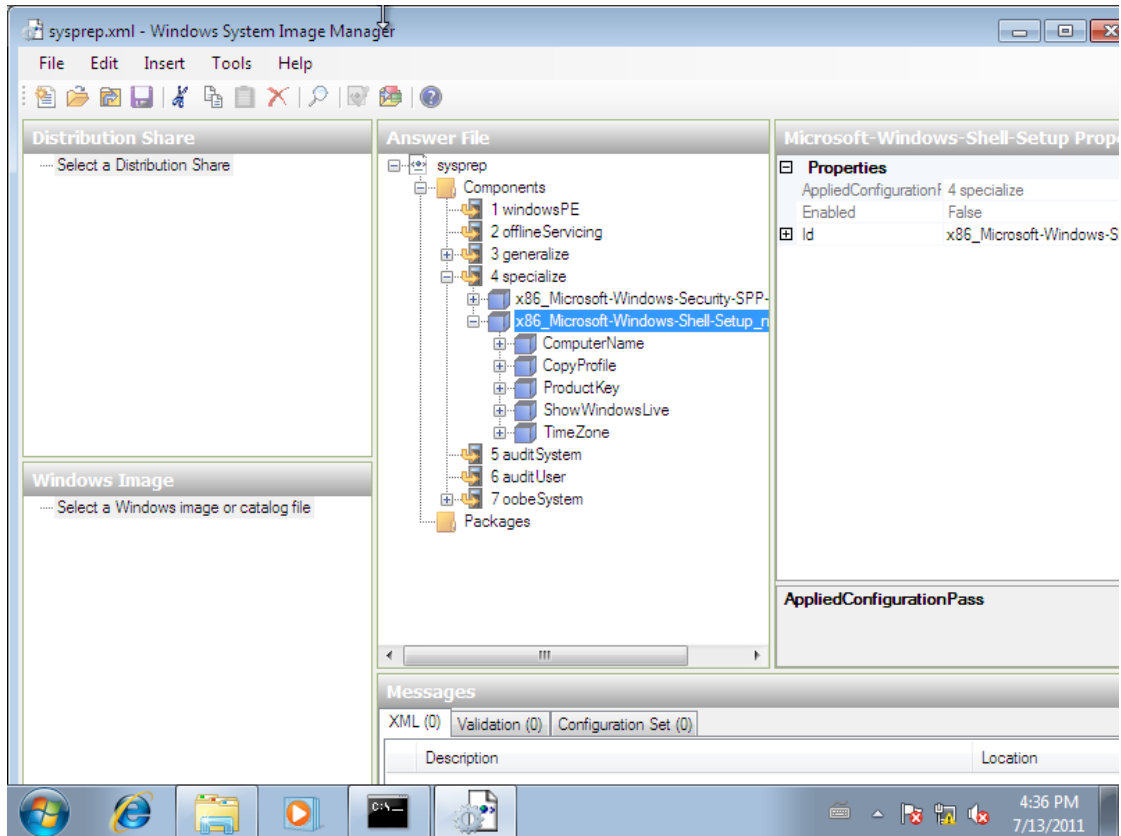


Figure 3.6: Configuring the Windows 7 Sysprep in Windows System Image Manager

- **UserAccounts -> AdministratorPassword** to the password for the Administrator account
- **UserAccounts -> LocalAccounts -> LocalAccount (Administrator) -> Password** to the password for the Administrator account
- **RegisteredOrganization** to the organisation's name associated with the license
- **RegisteredOwner** to the user's name associated with the license
- **SkipAutoActivation** must be set to **true** under **specialize -> Microsoft-Windows-Security-SPP-UX**.
- The Windows licence key must be entered under **ProductKey** under **specialize -> Microsoft-Windows-Shell-Setup-neutral**.
- Further adjustments can be performed. A description of the different settings can be found under <http://technet.microsoft.com/en-us/library/ee676646%28WS.10%29.aspx> and http://www.windowsnetworking.com/articles_tutorials/Deploying-Vista-Part6.html.
The settings for **AutoLogon** and **AutoLogonCount** must not be changed.
- The configuration must then be saved with **File -> Save Answer file** (you can confirm the default path here) and the Windows System Image Manager ended with **File -> Exit**.

- The Sysprep procedure now returns to the processing of the batch file and the query appears **Do you want to continue and sysprep your machine?**. This is confirmed with **y**.

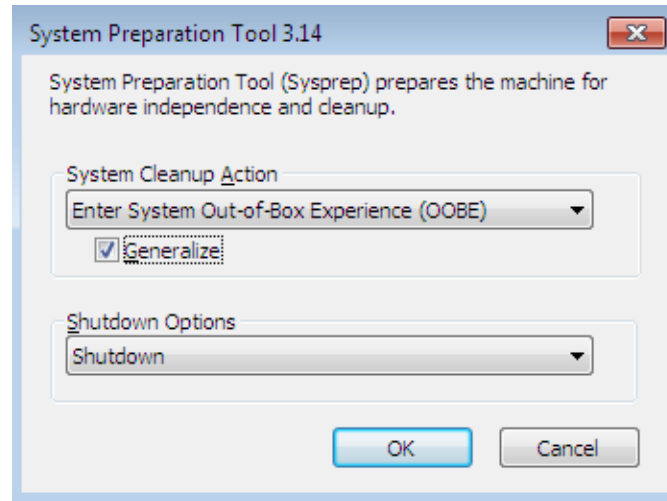


Figure 3.7: Finalisation of the Microsoft Windows 7 Sysprep

- The Windows system preparation program now starts. Then **Enter System Out-of-Box-Experience (OOBE)** and **Generalize** options must be selected here (see Figure 3.7). **Shutdown** should be selected under **Shutdown Options**. Clicking on **OK** prepares the machine and then shuts it down.

Now one must return to the UMC wizard and select **Next**.

In the following dialogue box, it can be selected whether copy-on-write should be used for the generation of the user desktops from the template:

- If the option is activated, only the deviation from the template system is saved per user desktop. This saves a large amount of memory space. If the template image is no longer available, all the virtual machines which are "dependent" on it can no longer be used. Accidental deletion is detected in Univention Virtual Machine Manager and prevented. Copy-on-write is activated in the basic setting.
- If the option is not activated, an independent copy is created for each virtualized user desktop.

Clicking on **Finish** completes the creation of the template. It now appears in the module's overview list and can be assigned to users (see Chapter 5).

3.4 Creating a Windows template without Sysprep

In order to create Windows clones which will later be used as DVS templates, the Windows template image must be copied and prepared specially. The Microsoft tool **Sysprep** is intended for this as standard. It configures the Windows installation in such a way that after the next restart - in other words, once a new DVS desktop is created from the DVS template - a new security identifier (SID) is created. In addition, Sysprep cleans up the user-specific and computer-specific settings and data which do not need to be copied to the target computer.

3 Creation and management of DVS templates

After the Sysprep process, additional DVS-specific settings and configurations are performed on the Windows DVS desktop which guarantee the seamless integration of the system in the UCS domain.

If a different mechanism is used instead of Sysprep for the creation of Windows clones (image procedure), these DVS-specific settings must be integrated manually. In other words the Windows DVS template should have / must get the following settings after the next restart:

- **DHCP** must be activated in the network configuration.
- DVS desktops are automatically assigned a DNS and DHCP entry. The local **Windows hostname** of the DVS desktop must be set on the corresponding DNS entry. The DNS name to which the IP address of the DVS desktop is sent can be determined via the **nslookup** program.
- The DVS desktop must join the **Windows domain** provided by Samba.
- **Remote desktop access** must be activated and the **Domain Users** group of the domain adopted in the local **Remote desktop users** group.
- The **Windows firewall exceptions** for the remote desktop access must be activated (in all network profiles as of Windows 7).

3.5 Creating a DVS template for Univention Corporate Desktop

The template is created on the system on which the session broker is running using the Univention Management Console's **DVS templates** module.

If there is no template yet, **Create new template** can be used to create one. Firstly, a **Name of the template** must be entered, e.g., **Office desktop** and confirmed with **Next**.

In the following dialogue box, the **Virtual instance** is selected which should be used as the DVS template. If the **For creating the template create and use a copy of this instance** option is selected, the preparation of the DVS template will be performed on a copy of the virtual machine. This can take several minutes depending on the size of the template as hard drive images of several GB in size are copied. If no copy is used, the virtual machine is no longer available for direct access following the creation of a template. **Next** must now be clicked again.

The DVS template is then prepared for the individualisation with Sysprep. To do so, the **Start instance for sysprep** option must be selected. If it is not activated, there is no individualisation of the virtualized desktop machine the first time a login is performed! The Sysprep scripts (Windows 7, Windows XP and Univention Corporate Desktop) are selected under **Operating system**.

Copying the virtual machine can take some time.

Then a dialogue box opens in which a connection to the template instance can be created via **Direct access (VNC)**.

The DVS repository component must be integrated on the installed client and the UCD preparation package installed. At this point, the cloned system still has the IP configuration of the template system, which means it is still possible to log on with SSH, for example.

```
univention-config-registry set repository/online/component/dvs=yes
univention-install univention-dvs-sysprep-ucd-boot
```

The localisation of the session broker is performed via a DNS service record. That means that a UCS system has to function as the name server!

Then `univention-dvs-sysprep-ucd` must be run and the user name and password for the access to the DVS share must be entered (typically the Administrator account). Afterwards, the preparation scripts are loaded, the machine modified to use DHCP and an init script set up which joins the system to the UCS domain after the next restart. Following the setting up of the template, the virtual machine can be shut down.

Now one must return to the UMC wizard and select **Next**.

In the following dialogue box, it can be selected whether copy-on-write should be used for the generation of the user desktops from the template:

- If the option is activated, only the deviation from the template system is saved per user desktop. This saves a large amount of memory space. If the template image is no longer available, all the virtual machines which are "dependent" on it can no longer be used. Accidental deletion is detected in Univention Virtual Machine Manager and prevented. Copy-on-write is activated in the basic setting.
- If the option is not activated, an independent copy is created for each virtualized user desktop.

Clicking on **Finish** completes the creation of the template. It now appears in the module's overview list and can be assigned to users (see Chapter 5).

3.6 Managing DVS templates

This module is used to manage Desktop Virtualization templates. New templates can be created or existing templates can be modified.

Template name	Operating system	Creation time	References
Accounting desktop	Windows XP	2011-07-12 14:50:39 (1 hour ago)	0 Modify Delete

[Create new template...](#)

Figure 3.8: Overview of available DVS templates

The start page of the **DVS templates** UMC module displays an overview list of all the existing DVS templates (see Figure 3.8).

References specifies to how many users this template is currently assigned.

The **Modify** option can be used to change the settings of a template at a later date. The display of the **UUID of the template** is for informational purposes only and cannot be changed at a later date.

If the function of a template has changed, the **Name of the template** can also be changed, as can the **Description for the template**.

If a template is no longer required, it can be removed in the overview list. Templates which are still in use cannot be removed.

3 Creation and management of DVS templates

4 Managing virtualized desktops

The UMC module **DVS desktops** is used to manage virtualized desktops. Here you can search for existing desktops and create a desktop from a DVS template.

4.1 Creating a virtualized desktop

The **Create new virtualised desktop** option is used to create a user-specific, virtualized desktop using a DVS template.

Attention: Alternatively, a desktop can also be assigned in the Univention Directory Manager; this is useful if a desktop should be assigned as soon as a user is created, see Chapter 5.1.

Firstly the user must be selected to whom the desktop should be assigned. After clicking on **Next**, a DVS template can be selected (Figure 4.1). The creation and administration of templates is documented in Chapter 3.

Create virtualised desktop

In this step the template for the desktop, the physical server on which the desktop should be running and the choice if these settings should override a previously set default desktop for the user.



Template
Accounting desktop

Preferred DVS node
*** Automatically determine ***

Default desktop

Cancel Previous Next

Figure 4.1: Assigning a desktop in the UMC module

The virtualized desktops can be operated on several DVS nodes. The distribution of the virtual instances can be determined automatically, alternatively a server can also be assigned directly (see Figure 4.1).

If several virtualized desktops are already assigned to a user, it is possible to define whether this desktop should be the new **Default desktop** (this option is only displayed when a desktop is already assigned to the user).

A summary is then displayed and the assignment can be completed with **Finish**. The following steps are then performed one after another:

4 Managing virtualized desktops

- The virtual machine of the template is cloned and named **user-vm** in the naming scheme, e.g., **john DOE-vm**. At the same time, a new MAC address is assigned to the machine's network interface card.
- A computer object and the corresponding DHCP entry are created in the UCS management system for the newly created machine.
- The new system is started. If the corresponding Sysprep configurations have been installed, the computer name is read out and set using the DHCP entry. Then the machine joins the UCS domain (both on Microsoft Windows and on Univention Corporate Desktop systems).
- The system is then automatically restarted.

4.2 Managing virtualized desktops

The DVS desktops can be listed in the main menu of the module. At the same time it is also possible to display just a subcategory of all systems via a wild card search using different criteria (the name of the assigned user, the name of the DVS template, the name of the DVS nodes and the name of the instance). It is also possible just to display active desktops with **only active desktops**.

Clicking on a desktop name in the overview opens the virtual machine in the Univention Virtual Machine Manager; clicking the name of the virtualization server does the same.

Two statuses are differentiated between; during the Sysprep procedure, the machine is displayed in the **In preparation** status, once completed this is replaced with **Ready**.

Edit can be used to specify a virtualized desktop as the standard desktop at a later point in time (only necessary if a user uses more than one desktop).

Sessions displays an overview of all DVS sessions for a user.

4.3 Assigning a desktop image without using a DVS template

Alongside the standard case - the assignment of the user desktops from a DVS template - there is also the possibility of assigning an existing virtual machine as the DVS user desktop.

This can be used to virtualize an existing desktop installation; an image file for UVMM is created from the existing native installation and the image integrated in the UVMM instances of the domain.

Then the **This computer is a virtual desktop** tick must be activated on the **DVS** tab in the Univention Directory Manager's computer management and a user assignment performed under **User of this virtual desktop**.

4.4 Distributing virtualized desktops among several DVS nodes

If more than one DVS node is in use, there are two possibilities for distributing the virtualized desktops over the individual nodes:

- A static assignment when creating the users in the UMC module or in Univention Directory Manager (see Chapters 4.1 and 5.1).
- Automatic distribution of the load. If **Automatically determine** is selected for the assignment of the DVS templates, the desktops are distributed over the DVS nodes when created. This happens in the following way:
 - Each DVS node has a **Soft limit** and a **Hard limit** of virtualized desktops, which are displayed in the **DVS** tab in the Univention Directory Manager's computer management. As standard these are 10 and 50 desktops and they should be adapted to differently performing systems.
 - Until the soft limit is reached, the newly created desktops are assigned round robin. Only once all DVS nodes have reached their soft limit, further assignments will be performed beyond the soft limit. An example: DVS node A has a soft limit of 10 desktop instances; DVS node B a soft limit of 20. The first 20 assigned users are distributed alternately. For the 21st user, the soft limit for DVS node A is exhausted and the additional users are assigned to node B. As of 30 users, the soft limit for node B is also full. All the additional nodes are now assigned alternately again.
 - When the hard limits are reached, it is not possible to assign any more desktop instances.
 - In the current version of UCS DVS, there is no automatic distribution of the load among the DVS nodes.

The use of more than one DVS node requires the use of a commonly used file share for the image files. This is described in the Chapter 2.2.4.

4.5 Software management of virtualized desktops / Separation of user and system data

Once a virtualized desktop has been cloned from a template, there are two possible procedures for updating the software inventory of the virtualized desktop:

- The software packages are maintained via a **software deployment solution**. The standard mechanisms for software maintenance can be used for Univention Corporate Desktop (documented in the UCS manual [1]). For Microsoft Windows clients, the OPSI4UCS software [6] can be used, which allows a central installation of software and software updates.
- The system updates are performed by a **updating the DVS template** and reassignment to the users. If for example a new software is to be rolled out, the software is installed in one of the template desktops, an updated template generated and then assigned to the users.

Attention:

Updating of the user desktops via updated templates DVS urgently requires the separation of user and system data. During the reassignment of a desktop from a DVS template, the complete virtual machine is regenerated. If this were not the case, each update of a template would overwrite the software inventory of the individual users!

The following modifications must thus be performed:



4 *Managing virtualized desktops*

- The home directories must be stored on a central share. This is described in detail in Chapter 4 of the Univention Corporate Desktop manual [2].
- When using Microsoft Windows clients, roaming profiles must be used. This is already the case in the default setting. Further information can be found in Chapter 8.4.5.4 of the UCS manual [1].

4.6 Automatic suspending of virtualized desktops

In the default setting, the virtualized desktop of a user continues to run after logging off. To reduce the memory consumption, automatic suspending can be activated. This is done by setting the Univention Configuration Registry variable `dvs/session/idle_timeout` on all session broker instances. The timeout is set in seconds.

We recommend setting a timeout of several minutes as this avoids unnecessary pausing of the user's virtualized desktop in the case of a short-term network problems. This also avoids new logins initiated by the user from being thwarted.

5 User-related configuration in the Univention Directory Manager

A user's DVS settings integrate in the normal user administration of the Univention Directory Manager; the **DVS** tab in the user administration and a **DVS policy** policy.

5.1 Settings in the DVS tab

In the **DVS** tab (see Figure 5.1) one can specify which virtualized desktop should be assigned to the user on which DVS node.

The user is assigned a DVS template (see Chapter 3) in the **Create new virtual desktop from this template** field. The assignment of a virtualized desktop is then performed via a Univention Directory listener module. Technically speaking, this is the same as an assignment via the UMC module. Assignment via the UDM policy is useful above all if a virtualized desktop is to be generated directly after creation of a user.

The DVS node on which this desktop should run can be specified using the **Preferred physical server for the new virtual desktop** field. You can either specify a server or use the automatic determination.

If a user uses several desktop instances, **Default virtual desktops of user** can be used to specify the default.

DVS

Preferred physical server for the new virtual desktop
*** Automatically determine ***

Create new virtual desktop from this template

Default virtual desktops of user

Cancel OK

Figure 5.1: Configuration in tab DVS

As soon as a machine is assigned to the user, it is personalised to the user.

5.2 Settings in the DVS policy

The policy (see Figure 5.2) can be used to set defaults for the session.

The **Windows domain for domain logon** is used during the login to Windows desktops.

If the **Access to USB mass storage devices** option is activated, USB mass storage devices connected locally to the thin client are also made available in the virtualized RDP session (see Chapter 6.4).

DVS settings

Select configuration: inherited

Windows domain for domain logon
UNIVENTION

Zugriffseinstellungen für RDP-Sitzungen

Forward audio output Access to connected printers

Access to USB mass storage devices

Zugriffseinstellungen für X2go-Sitzungen

Forward audio output

Cancel OK

Figure 5.2: Configuration through the DVS policy

Printers connected to the thin client locally are available in the RDP session if the **Access to connected printers** option is activated (see Chapter 6.6).

The sound output within the virtualized desktop instance is transmitted to the thin client and output via the speakers if the **Forward audio output** option is activated. The setting applies both to RDP and x2go sessions (see Chapter 6.5).

6 User logins on DVS desktops

The virtualized desktops can be accessed either via **thin clients** - computers without hard drives - or alternatively from native workstations via the **DVS client for Microsoft Windows and Linux**. Thin clients are generally used. The native DVS client is primarily interesting for testing or a gradual migration to thin clients.

Access to Microsoft Windows systems is performed via the remote desktop protocol (RDP) and to Univention Corporate Desktop systems via the x2go protocol.

The graphic output of the virtual machine is displayed on the accessing client and the user inputs are transmitted to the virtual machine. Audio output from the virtual machine is relayed to the sound card / loudspeaker of the accessing system.

In addition, when using RDP, peripherals connected to the thin client such as printers or USB mass storage devices can be made available on the virtualized desktop.

Localisation of the virtual machines during logon on the thin client is performed via a central component: the **session broker**. All the session data is stored in a Postgres database.

6.1 Logins from thin clients

The management and setup of thin clients is not part of this manual. It is explained in detail in the manual for UCS Thin Client Services [3].

During the login on the thin client, the **DVS** session is selected in the **Session** selection field (see Figure 6.1). This session can also be configured statically via a user policy. The necessary steps are described in Chapter 4.2 in the manual for UCS Thin Client Services [3].

The virtualized desktop assigned to the user will be started automatically.

The DVS session broker client started from the DVS session automatically determines the operating system of the target desktop and transparently selects either x2go (for Univention Corporate Desktop) or RDP (for Microsoft Windows XP/7) as the access protocol.

6.2 Logins using the native Windows client

The native DVS Windows client is provided via a CIFS share and can thus be directly installed from Windows clients. To provide the share, the **univention-windows-share** and **univention-dvs-windows-client** packages must be installed on any UCS server. Then the command `univention-run-join-scripts` must be run.

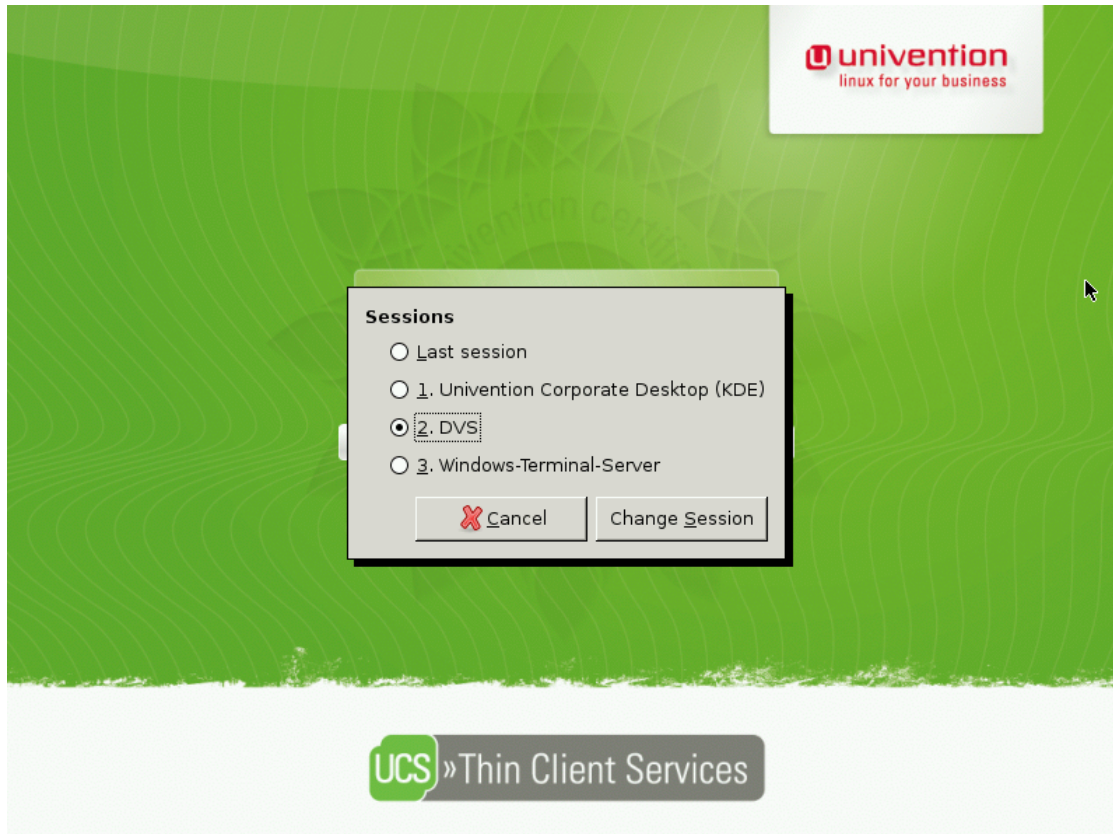


Figure 6.1: Selecting the DVS session during thin client login

The **Univention** file share includes a subdirectory called `Installer->Python2.7`. This includes a version of Python for Windows and some Python modules. They must be set up before the DVS client for Windows can be used:

- Double click on the `python-2.7` MSI package to install Python 2.7. The standard settings for the installer can simply be confirmed.
- Double click on `pywin32-214.win32-py2.7.exe` to install pywin, a compilation of Python bindings for functions of the Windows API. The standard settings for the installer can be simply confirmed.
- `pydns-2.3.0.zip` must be unzipped and then a prompt started with `cmd.exe. setup.py install` starts the installation of the Python-DNS module.
- PyQT provides the QT-GUI library with Python integration. The standard settings for the installer can be simply confirmed.

Once the requisite libraries have been installed, the DVS client for Microsoft Windows can be started under `DVS-Client->UniventionDVsession.pyw`.

In the basic setting, the Windows client can only access RDP instances. If you also wish to create connections to Linux desktops, the x2go client for Microsoft Windows must be additionally installed. It is available

for download at <http://prdownload.berlios.de/x2go/x2goclient-3.01-2-setup.exe>.

The accessing system must use a UCS system as a name server as the session broker is localised via a DNS service record.

6.3 Logins using the native Linux client

The native Linux client can be installed with the **univention-dvs-sessionbroker-client** package. The connection can then be created with `univention-dvs-sessionbroker-client`. A complete overview of the parameters is output with the **-h** option:

```
univention-dvs-sessionbroker-client -h
```

x2go and RDP sessions can be created with the Linux client.

The accessing system should use a UCS system as a name server as the session broker is localised via a DNS service record. Alternatively, the **-s** parameter of the session broker can be specified directly.

6.4 Accessing USB mass storage

Three prerequisites must be fulfilled to allow a user to access a USB stick (or other mass storage device) connected to the thin client from his Microsoft Windows desktop.

- In the Univention Directory Manager's computer management, the **Activate access to client devices** tick must be activated for the thin client in the **Client devices** tab/policy.
- A Univention Configuration Registry policy must be used to set the Univention Configuration Registry variable `thinclient/usbdevice/local` to **yes**. (How to set Univention Configuration Registry variables is documented in Chapter 3.2 of the manual for UCS Thin Client Services).
- The **Access to USB mass storage devices** option must be activated for the accessing user in the **DVS policy** (see Chapter 5.2).

Access to USB mass storage devices is not supported when x2go is used.

6.5 Audio redirection (x2go und RDP)

If thin clients are used, the sound support must be activated for the thin client. This is best performed via policies and can thus also be globally activated:

- In the Univention Directory Manager's computer management, the **Sound enabled** tick must be activated for the thin client in the **Sound settings** tab/policy.
- A Univention Configuration Registry policy must be used to set the Univention Configuration Registry variable `thinclient/sound/daemon` to **pulseaudio**. (How to set Univention Configuration Registry variables is documented in Chapter 3.2 of the manual for UCS Thin Client Services).

In addition, the sound support must be activated user-specifically via the **DVS policy**. This is described in the Chapter 5.2 and can also be set globally via a policy.

Then the audio output of the virtualized desktop is transmitted to the thin client via Pulseaudio.

6.6 Access to locally connected printers

Printing is typically performed via central print servers in most environments. For special cases it can also be practical to connect a printer to a thin client directly.

For this, the **Access to connected printers** option must be activated for the accessing user in the **DVS policy** (see Chapter 5.2).

In addition, the **univention-thin-client-cups** package must also be installed on the thin client server accessed by the thin client. It installs a local print server on the thin client and mounts a USB printer (`/dev/usb/lp0`) and a parallel port printer (`/dev/lp0`) directly.

Access to locally connected printers is not supported when x2go is used.

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