Implementation and User Guide

Version 7.4

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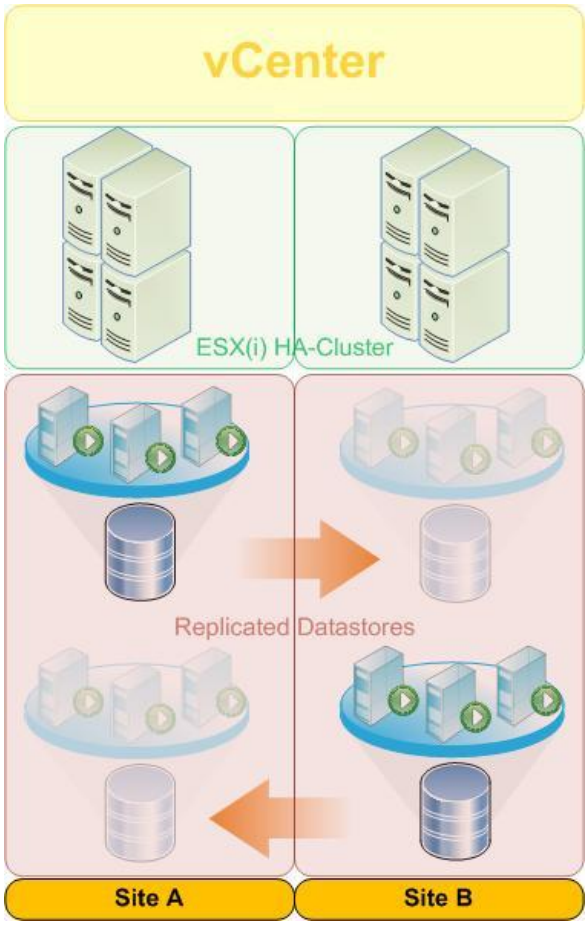
1. Overview

1.1. Description



vfailover provides an automated failover and failback mechanism for virtualized data centers in VMware environments. Mirrored data stores and raw device mappings can be switched between sites either in planned or disaster scenarios. Due to its broad range of supported VMware high availability cluster configurations it can be easily integrated in existing environments. vfailover closes the gap between storage and application administration by combining deep VMware knowledge with years of storage array experience.

vfailover is a solution designed for minimizing downtime in cases of disaster or planned maintenance operations in a VMware HA-Cluster environment running in two datacenters. There is no need to reconfigure the virtual environment before initiating failovers.

Failover/Failback tasks are fully automated and initiated the same way.

Replication may be configured bidirectional.

vfailover works on data store / RAW device mapping basis. That means single, multiple or all mirrored Datastores can be switched between datacenters in one task with one click (command). vfailover is a script based solution running on vCenter Server or a system which has network connection to vCenter Server. There slightly different requirements depending on the supported storage platforms.

vfailover works in environments with one or two vCenter servers.

vCenter is an essential component. It has to be assured that it's available or can be recovered easily at the remaining site in case of a disaster. With this solution and storage vendors remote replication technologies it is possible to protect important virtual machines by mirroring the underlying data stores.

1.2. Environment

- vCenter Server: Central Management Server for the virtual infrastructure.
- ESX(i) Servers: Hosts with VMware ESX or ESXi Hypervisor, configured into VMware High Availability Clusters.
- HDS Storage Array: HDS enterprise or modular storage arrays with Truecopy replication setup for datastores.
- PowerCLI: VMware scripting interface for virtual infrastructure.
- vfailover: Script environment, managing automated failover between sites in the virtual environment.

1.3. Integration

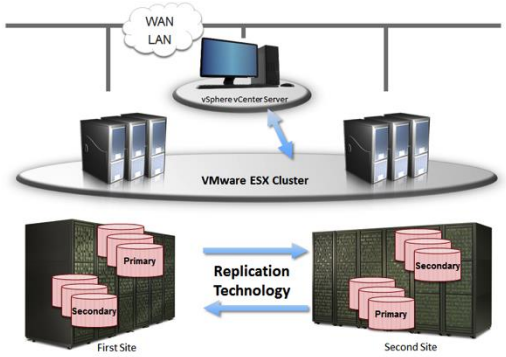
- Identify datastores which should be protected between sites
- Setup Truecopy replication for datastores which shall be protected
- Provide access to Truecopy secondary volumes to all ESX(i) hosts in the VMware high availability cluster(s)
- Install Hitachi Raid Manager software and VMware PowerCLI at the vCenter Server(s) or a dedicated management host which remains available in case of disaster and has network access to vCenter server
- Present Hitachi Command Devices to either vCenter server(s) or dedicated management host for vfailover
- Setup vfailover parameters - Storage-, vCenter- and Site-setup
- Run vfailover configuration
- Initiate failover test with non-production datastore

2. System Requirements

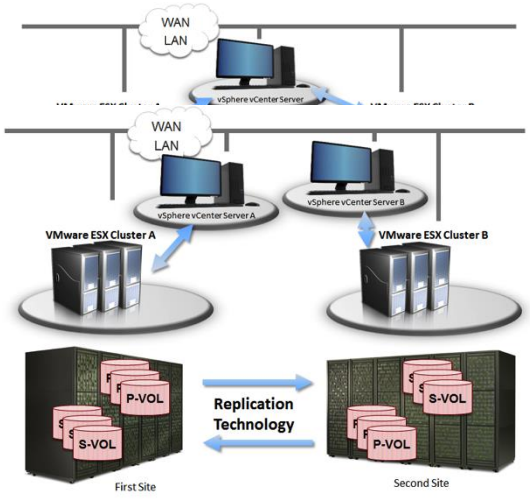
2.1. VMware Environment

vfailover supports 3 different types of VMware vSphere ™ data center configurations

- One VMware vSphere ™ HA cluster with one vCenter server



- Two VMware vSphere ™ HA clusters with one vCenter server



- Two VMware vSphere ™ HA clusters with two vCenter servers

vCenter server is the core component in the VMware virtual infrastructure. It is essential that it is available or can be easily restored to running state in case of a site failure. There are several ways (best practice) to achieve this:

- Two virtual center configuration, one at each datacenter

  In this setup no extra tasks are necessary to make vCenter accessible on both sites. vfailover can be integrated on each vCenter server.

- Cold Standby vCenter server

  vCenter server is setup as virtual machine in the virtual environment. Scheduled clones of the vCenter VM to a datastore located at the other datacenter ensures that vCenter server is ready to be booted at the remaining datacenter in case of disaster. The datastore where the VM-Clone resides should be available to all ESX(i) hosts in the second datacenter. Then the administrator can decide where to register and startup the "backup vCenter server". Clones should be created on a regular basis (once a day) to make sure vCenter configuration is current. The schedule depends on the configuration changes or monitoring needs for the environment. Two separate vfailover management hosts, one at each site, have to be used in this configuration, because it is not possible to establish clones from virtual machines with raw device mapping.

- Any other method making vCenter server available

  There are other methods, several third-party products and VMware vCenter Heartbeat to replicate vCenter server to a secondary site and make it available in a disaster scenario. As long as vfailover runs on its own management servers there should be no impact to vfailover operations. Because of disaster recovery is a complex topic each individual solution should be verified by a consultant before starting a vfailover implementation.

2.2. VMware Software Requirements

The following VMware software versions are supported:

- VMware vSphere ™ vCenter 4.0, 4.1, 5.0, 5.1, 5.5, 6.0, 6.5
- ESX, ESXi 4.0, 4.1, 5.0, 5.1, 5.5, 6.0, 6.5
- PowerCLI 4.0, 4.1, 5.0, 5.1, 5.5, 6.0, 6.5

2.3. Hitachi Data Systems Storage Arrays

The following HDS storage systems are supported:

- Hitachi Thunder 9570V / 9580V
- Hitachi AMS 200 / 500 / 1000
- Hitachi AMS 2100 / 2300 / 2500
- Hitachi TagmaStore Universal Storage Platform 100 / 600 / 1100
- Hitachi TagmaStore Network Storage Controller 55
- Hitachi Universal Storage Platform V / VM
- Hitachi Virtual Storage Platform (IP- and FC based Command Device support) / G1x00 / Gx00
- Hitachi Unified Platform VM
- Hitachi Unified Storage 100 Family (HUS 110, HUS 130, HUS 150)

2.4. Hitachi Data Systems Software Requirements

The following HDS software products are required:

- Recent Storage Array Controller Firmware/Software
- Hitachi Truecopy synchronous replication
- Hitachi Command Control Interface 01-32-03/01 (HUS and AMS) and above, 01-32-03/06 (USP, USP-V, VSP/G1000, HUS VM) and above

2.5. vfailover Management Server

If running vfailover on the vCenter server, vSphere compatibility matrix has to be checked:

http://www.vmware.com/resources/compatibility/search.php

The following operating systems and additional software is supported by vfailover:

- Windows 2003 Server R2
- Windows 2008 Server, Windows 2008 Server R2, Windows 2012 Server, Windows 2012 R2 Server
- Windows Powershell 4.0

3. Implementation

3.1. Installation and Preparation

3.1.1. *One vCenter server with two dedicated vfailover management Hosts*

- Preparation of two virtual machines (Software requirements described in chapter 2)
- Installation of Windows Powershell software and/or update to v4 http://www.microsoft.com/en-us/download/details.aspx?id=40855
- Installation of PowerCLI software
- Download PowerCLI from VMware website and install as described in the installation Guide http://communities.vmware.com/community/vmtn/vsphere/automationtools/powercli
- Installation of VMware vSphere Client
- Installing Hitachi Command Control Interface
- Presenting of at least one Command Device per Hitachi Storage Array as raw device mapping to the virtual machines
- Copying vfailover Delivery Kit to "C:\Program Files\vfailover"

3.1.2. *Two vCenter Servers*

The same steps as described in chapter 3.1.1. apply to this configuration. There is no need to prepare dedicated virtual machines for vfailover, although it would be possible.

3.1.3. *Different vCenter Setup*

Any other vCenter server configurations must be verified before starting the installation. vfailover can be integrated in various scenarios, but some may require additional effort.

3.2. vfailover Configuration

3.2.1. *Permissions*

To make vfailover working permissions on the vCenter server and on the management hosts are needed.

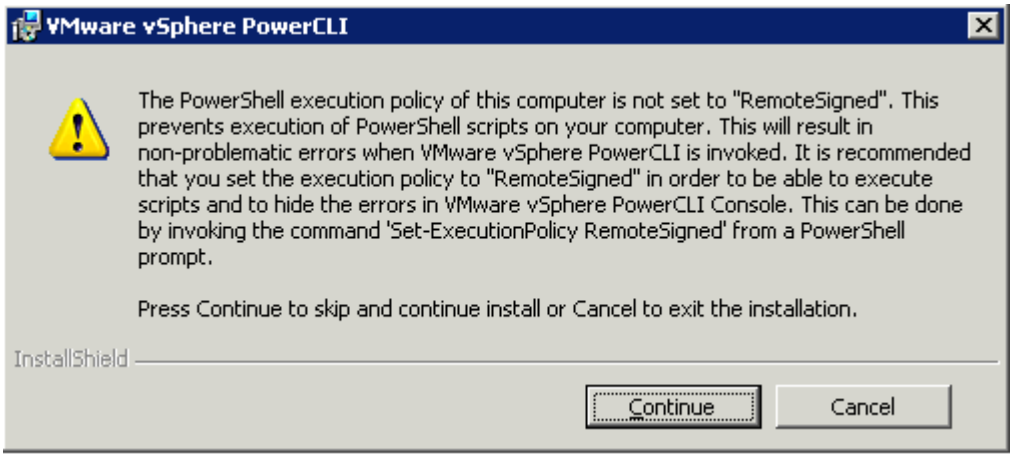
For the installation and operation of vfailover local administrator rights are required either on the dedicated management hosts or on the vCenter servers.

Additionally, vfailover can only be executed with a user account that has the “datacenter administrator” role assigned.

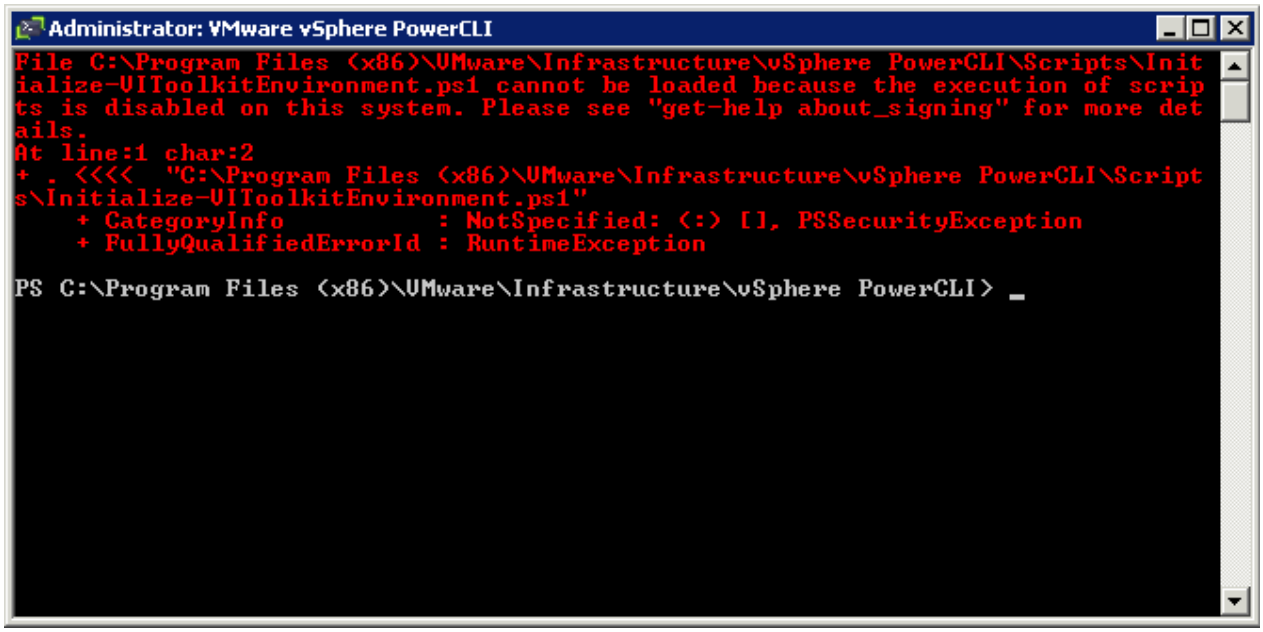
3.2.2. *VMware PowerCLI Configuration*

vfailover is a scripting solution based on Windows Powershell and VMware PowerCLI extension. It can only be executed in a Windows Powershell Environment.

To allow scripts to be executed from within the shell the execution policy has to be set. You may also get a warning during the installation of PowerCLI. This warning can be ignored and the installation continued.



Setting the execution policy can be done after the first run of the PowerCLI Console. An error message similar to the screenshot will occur.



Powershell scripts can be signed with digital signatures and per default only signed scripts can be executed. Detailed instructions about signing scripts are described in the Windows Powershell documentation.

vfailover can only be executed on dedicated systems where only authorized administrators with the necessary permissions have access to. Therefore, the vfailover script has no digital signature. To allow the execution of an unsigned script it is necessary to set the execution policy within the PowerCLI environment to unrestricted (Run as Administrator if UAC enabled). This can be done with the following commands and has to be confirmed with "Y":

Set-ExecutionPolicy unrestricted

Set-ExecutionPolicy bypass

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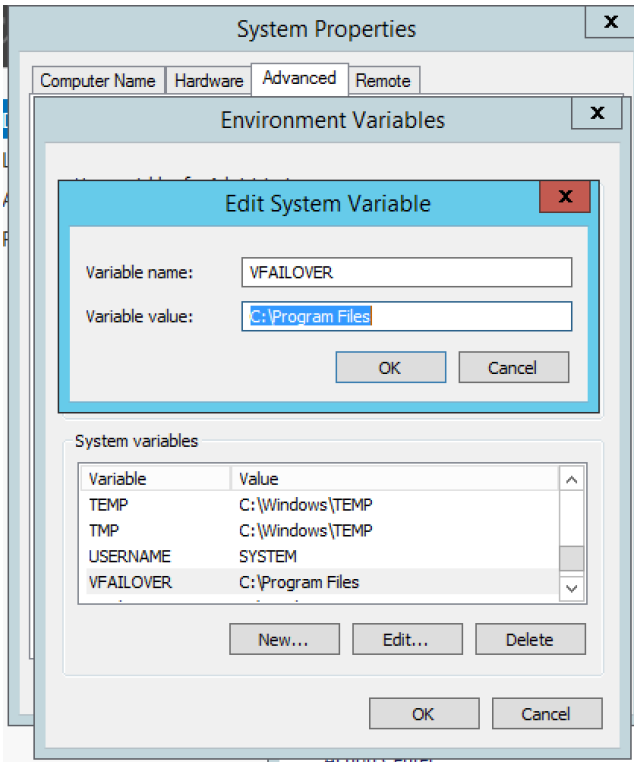
3.2.3. *System Environment Variable*

To allow vfailover to be installed at any place on the vfailover Management Server please add the following System Environment variable to your Management Server:

variable = VFAILOVER
value = <Installation Path of vfailover>

e.g: if vfailover is installed at "C:\Program Files\vfailover" set the system environment variable to VFAILOVER = C:\Program Files (No Hyphens)



3.2.4. *vfailover Cluster Configuration File*

vfailover setup is based on configuration files depending on the vSphere environment. Three different types of vCenter configurations are supported described in chapter 2.1.1.

Configuration is stored in ".properties" files. There are several sections where the operating parameters will be specified. The configuration Files must be created in "conf" subfolder in the vfailover directory (e.g.: "c:\program files\vfailover\conf") on both vfailover management hosts. This will be done at the initial setup of vfailover for the existing environment. Every time an additional VMware HA-Cluster is added, new files must be created. These files will be created by WebGUI (from version 6.6.3), but you can create it manually as well.

- **Global Settings**

HorcmRoot *= Path where Hitachi Command Controller Interface is installed*
Vendor *= Storage Vendor ID {HITACHI | HNAS}*
SetInvisible *= SCSI Hide the S-Vols after Failover {TRUE | FALSE}*
SetInvisibleWithConfig *= SCSI Hide the S-Vols during Config Run(Backup) {TRUE | FALSE}*
HUR *= HUR Mirror Unit Number for Horcm Files*
ExcludeList *= Path to the LDEV Exclude List (RDMs which are not mirrored, One per Line, Decimal)*
CTGNO *= Consistency Group Number which will be covered with this configuration file*
Rescan *= HBA Rescan Option {SERIAL | PARALLEL}*
RemoveVMHostOnFailure *= in case of UNPLANNED Failover choose to remove ESX Hosts with dead objects (data stores and/or virtual machines) from Config {YES | NO}*
ObjectPrefix *= Choose Prefix for virtual machine – and data store name on recovered Site during UNPLANNED failover {e.g.: recovered_by_vfailover_}*
VMsInParallel *= How many VMs should be registered in parallel, default = 50*

- **Log Level**

LogLevel *= Specify Logging {1:Error | 2:Warning | 3:Info | 4:Debug}*

- **Datastores(Datastore Clusters)**

dsCluster *= Datastore Cluster(s) handled by vFailover, comma separated {e.g.: DSCProduction}*
dsIdentifier *= Datastore(s) handled by vFailover, comma separated {vFailover*}*
dsvCenter *= Datastore where the vCenter server is located {e.g.: "san_vCenter"}*

- **Email Settings for Mode Status**

EmailNotification *= Email Notification enabled {NEVER | ONERROR | ALWAYS}*
EmailSmtpServer *= SMTP Server for sending mail*
EmailFrom *= Email sender address vFailover should use*
EmailTo *= Email Recipient(s) address, comma separated*

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- **Virtual Machine Boot Order Control**

WaitOnPing *= vFailover waits on ping before starting next set of VMs {TRUE | FALSE}*
PingTimeOut *= Seconds to wait for ping reply*

- **Site A (Datacenter A) Configuration Settings**

DataCenterA *= Data center Identifier*
vCenterServerA *= vCenter Server Name or IP Address*
ConnectionTypeA *= vCenter Server connection type: http, https*
InstanceA *= Instance Number used by Hitachi Command Control Interface*
PortA *= TCP-Port used by Hitachi Command Controller Interface*
StorageA *= Storage subsystem serial number*
HAClusterA *= vSphere HA Cluster*
SiteA *= ESX(i) hosts in site A, comma separated*

- **Site B (Datacenter B) Configuration Settings**

DataCenterB *= Data center Identifier*
vCenterServerB *= vCenter Server Name or IP Address*
ConnectionTypeB *= vCenter Server connection type: http, https*
InstanceB *= Instance Number used by Hitachi Command Control Interface*
PortB *= TCP-Port used by Hitachi Command Controller Interface*
StorageB *= Storage subsystem serial number*
HAClusterB *= vSphere HA Cluster*
SiteB *= ESX(i) hosts in site A, comma separated*

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Example property file "HDS.properties":

HDS.properties - Notepad

File Edit Format View Help

```
# ----------------------------------------
# global settings
#
# HorcmRoot             : <horcm folder>
# Vendor                : HITACHI | HNAS
# RemoveVMHostOnFailure : YES | NO
# ObjectPrefix          : <custom prefix>
# SetInvisible          : TRUE | FALSE
# SetInvisibleWithConfig: TRUE | FALSE
# Rescan                : SERIAL | PARALLEL
# ExcludeList           : <file with RDM LUN Numbers to exclude on failover>
# ----------------------------------------
HorcmRoot=C:\HORCM\etc
Vendor=HITACHI
SetInvisible=FALSE
SetInvisibleWithConfig=FALSE
Rescan=SERIAL
RemoveVMHostOnFailure=NO
ObjectPrefix=Recovered_by_vFailover_
# ----------------------------------------
# log level
#
# 1 : Error
# 2 : Warning
# 3 : Info
# 4 : Debug
# ----------------------------------------
LogLevel=4
# ----------------------------------------
# datastore(s) or datastore cluster
#
# examples:
# dsCluster=myDSCluster
# dsIdentifier=vfailoverNAS*,nas1*,nas20
# ----------------------------------------
dsCluster=vFailoverDSC
#dsIdentifier=ESX-PROD-VIENNA,ESX-PROD-PRAGUE
# ----------------------------------------------------------
# email settings
#
# vfailover sends result of mode status.
#
# EmailNotification   : NEVER | ONERROR | ALWAYS
# EmailSmtpServer     : <smtp server>
# EmailFrom           : <from email addr.>
# EmailTo             : <to email addr.>, comma separated
# ----------------------------------------------------------
EmailNotification=ALWAYS
EmailSmtpServer=movismxs.movis.local
EmailFrom=praguemgmt@vfailover.com
EmailTo=info@movis.co.at
# ----------------------------------------------------------
# virtual machine boot order control
#
# vfailover waits on ping before starting next set of
# virtual machines.
#
# WAITONPING      : TRUE | FALSE
# PINGTIMEOUT     : <seconds to wait on ping>
# ----------------------------------------------------------
WaitOnPing=TRUE
PingTimeOut=60
# --------------
# --- Site A ---
# --------------
# Data center Identifier
DataCenterA=Vienna
# vSphere vCenter Server Name or IP Address
vCenterServerA=192.168.1.200
# vCenter Server connection type: http, https
ConnectionTypeA=HTTPS
# Instance Number and TCP Port used by Hitachi Command Control Interface
InstanceA=30
PortA=11030
# Storage subsystem serial number
StorageA=7519
# vSphere HA Cluster Name
HAClusterA=MovisCluster
# ESX(i) hosts in site A, comma separated
SiteA=vienna.movis.local


# --------------
# --- Site B ---
```


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With some of these parameters the specific vSphere environment will be defined. Here are configuration examples for the different setups:

- one VMware vSphere ™ HA cluster with one vCenter server

  HAClusterA=*myVMwareCluster*

  HAClusterB=

  vCenterServerA=*myVSphereServer*

  vCenterServerB=

- two VMware vSphere ™ HA cluster with one vCenter server

  HAClusterA=*myVMwareClusterA*

  HAClusterB=*myVMwareClusterB*

  vCenterServerA=*myVSphereServer*

  vCenterServerB=

- two VMware vSphere ™ HA cluster with two vCenter server

  HAClusterA=*myVMwareClusterA*

  HAClusterB=*myVMwareClusterB*

  vCenterServerA=*myVSphereServerA*

  vCenterServerB=*myVSphereServerB*

Configuration files need to be created for each VMware vSphere ™ HA cluster configuration or each consistency group that builds a unique block out of some data stores and / or raw device mappings.

3.2.5. *vfailover Bootorder Configuration*

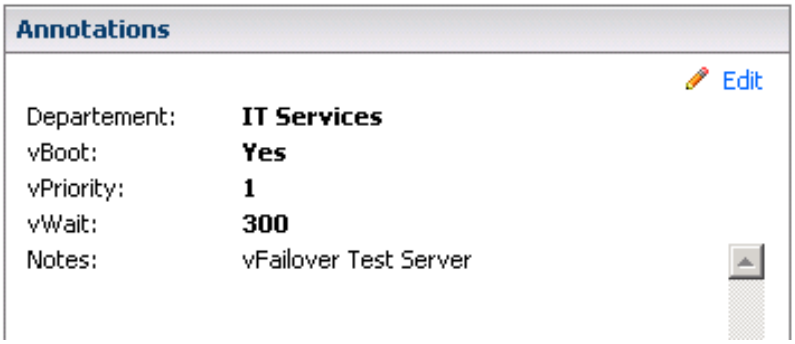
It may be essential to define a specific boot order for the virtual machines to make sure the environment is working correctly after a failover/failback operation. For example Windows Domain Controllers must be the first systems which are up and running because most of the other servers depend on Active Directory Domain services.

Therefore it is necessary to define a boot order for the virtual machine startup process. This will be done by specifying the Custom Attributes for Virtual Machines that have to boot before others (for example Active Directory Domain Controllers, LDAP Servers).

vPriority: Boot Order Priority. Ascending (Lowest number first). VMs with same priority are processed as they come.
(If empty or custom attribute not exists vPriority = 9999)

vWait: Seconds to wait before starting next virtual machine.
(If empty or custom attribute not exists vWait = 60)

vBoot: Start VM or keep VM powered off
(If empty or custom attribute does not exist, VM will be started if it was running before failover or will be kept powered off if it was not turned on before failover)



3.2.6. *vfailover Configuration File Parameter: CTGNO*

vfailover can handle two different types of consistency group usage:

Scenario 1 ("CTGNO" needs not to be defined in configuration file):

- Data store 1 — CTGNO = 2
  - virtual machine 1
    - virtual disk on data store 1 — *CTGNO = 2 (inherited)*
    - raw device 1 — CTGNO = 2
    - raw device 2 — CTGNO = 2
  - virtual machine 2
    - virtual disk on data store 1 — *CTGNO = 2 (inherited)*
    - raw device 3 — CTGNO = 2

Scenario 2 ("CTGNO" needs to be defined):

- Data store 1 — CTGNO = 5
  - virtual machine 1
    - virtual disk on data store 1 — *CTGNO = 5 (inherited)*
    - raw device 1 — CTGNO = 5
  - virtual machine 2
    - virtual disk on data store 1 — *CTGNO = 5 (inherited)*
    - raw device 2 — CTGNO = 5
- Data store 2 — CTGNO = 5
  - virtual machine 1
    - virtual disk on data store 2 — *CTGNO = 5 (inherited)*
  - virtual machine 2
    - virtual disk on data store 2 — *CTGNO = 5 (inherited)*

In scenario 1 there is no need to set the CTGNO parameter as there is only one data store configured in consistency group 2. Typically, you would create one vfailover configuration file per VMware cluster setup.

In scenario 2 there are two different data stores serving the same virtual machines with capacity. In that case it makes sense to define consistency group as the virtual machine might need consistency over all their hard disks in case of a failure. Therefore, you need to configure those two data stores into the same consistency group 5. By specifying "CTGNO=5" within the vfailover configuration file the HORCM instances will be created with only one group instead of a group per data store. You create as much vfailover configuration files for the same VMware cluster as consistency groups exists.

In case of a failover at scenario 1 you can failover data store by data store or all data stores at once.
In case of a failover at scenario 2 you can only failover all data stores together.

4. vfailover Operation

4.1. User Authentication

User Authentication has changed with version 6.6.2 to a more secure method. User Name and password had to be specified during execution of vfailover. Credentials were stored if optional parameter "-StoreCredentials:$true" was used

You must use "-StoreCredentials:$true" parameter the first time you execute an vfailover operation for a specific User. Then you will be asked for Username and password. These credentials will be stored and encrypted. After that you do not need to specify the "-User" or "-password" parameter for this user.

For WebGUI operation you must have a user with stored credentials, otherwise no Login is possible!!!

4.2. Operation Mode "config"

This mode is essential for a working vfailover environment. Every time LUN configuration changes occur in the vCenter clusters, vfailover operation mode "config" must be executed. After a failover/failback the operation mode "config" must be executed too. For a successful configuration all datastores, which should be used with vfailover, must be mirrored between the two sites and mirror state must be "PAIR" from within Storage Navigator (Modular) or Command Control Interface. If mirror state is different operation mode "config" may not be able to detect the exact datastore to LUN mapping and Truecopy configuration.

To keep vfailover configuration up to date a scheduled run of vfailover operation mode "config" at regular basis is recommended. This can be done with the Windows Scheduler or any other task scheduling tool on the host(s) vfailover is installed.

Sample syntax for operation mode "config", before 6.6.2:

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_MainCluster" -User Administrator -Mode config

Sample syntax for operation mode "config", after 6.6.2:

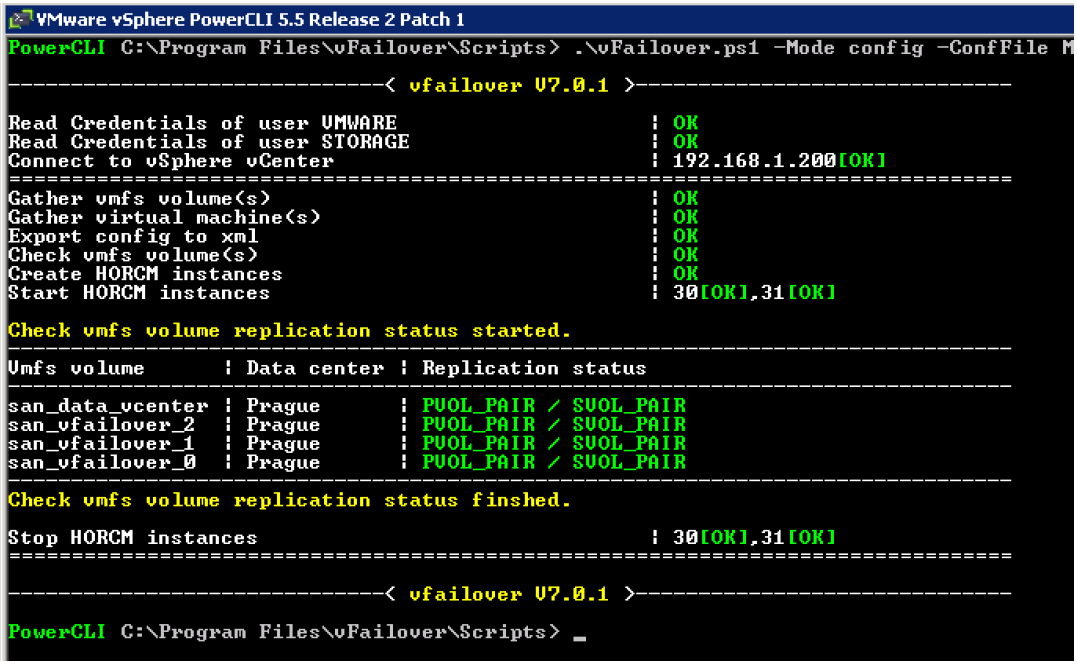
C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_MainCluster" -Mode config –StoreCredentials:$true

You then will be asked for user name and password.

After that you can run any vFailover command without credentials within this user context!

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_MainCluster" -Mode config

In this case the configuration file "vfailover_MainCluster.properties" will be used for the vCenter setup parameters. vfailover database configuration will be done for all Datastores which are specified in the .properties File with the parameter "dsCluster" or "dsIdentifier". If a "*" is specified for the parameter "-dsIdentifier" all datastores will be stored in the vfailover database (settings specified in the .properties File can be overruled if parameter "Datastore" is used in the COMMAND prompt during execution). For the connection to the vCenter server the vCenter user "administrator" will be used. After executing this operation mode, a password prompt appears in the PowerCLI window.



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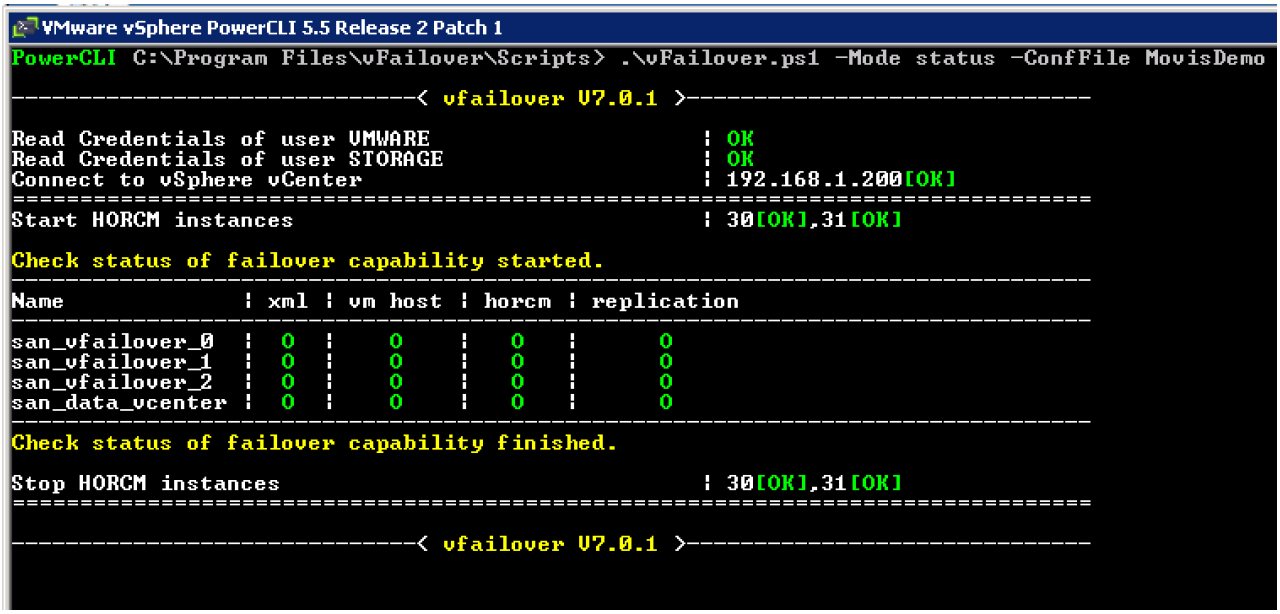
4.3. Operation Mode “status”

Operation mode “status” displays the state of vfailover setup and configuration backup and the according state of the Truecopy mirror. In a working vSphere environment this information can be used for documentation purposes or to check if all Truecopy mirrors are working and in the proper state.

Sample syntax for operation mode “status”(after v6.6.2):

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_MainCluster" -Mode status

Sample output for operation mode “status”:



“xml”: Backup of all Configuration Settings(Cluster, Datastore, VM, …) was successful (0) or not (X)

“vm host”: all VM Hosts(ESXi Servers) specified in “.properties” File are available (0) or not (X)

“horcm”: HORCM Files are available and Instances are running (0) or not (X)

“replication”: Truecopy Replication Status is OK (0) or not OK (X)

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4.4. Operation Mode “planned”

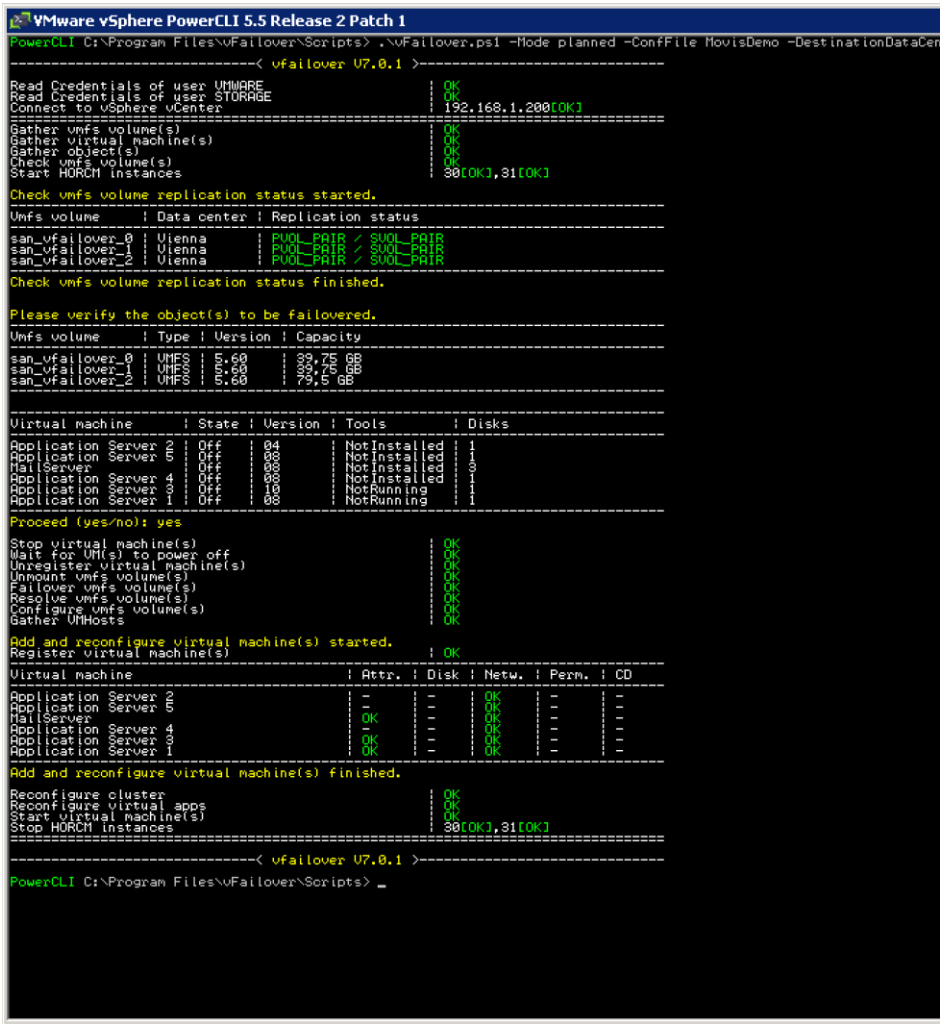
Operation mode “planned” is used for planned switching (failover/failback) operations. It can only be used if the affected vSphere HA-Clusters are fully operational and the Truecopy mirrors are in pair state. This mode is designed for a planned takeover of one or more datastores to the other datacenter. This may be necessary for example, if one of the sites has to be brought down for maintenance work.

Sample syntax for operation mode “planned”(after 6.6.2):

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_movis-ha" -Mode planned –DestinationDatacenter Remote

Sample output for operation mode “planned”:

In this example all datastores containing “san_vf*” in the datastore name will be switched to the datacenter named “Remote” with the vCenter user account “administrator”. After executing the vfailover operation the password for user “administrator” must be entered for a successful connection to vCenter server. Before the takeover will be executed a summary of the affected datastores and virtual machines will be displayed. This must be confirmed by entering “yes” to start the takeover.



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Workflow major steps for a planned failover operation:

- Shutdown/PowerOff virtual machines - all virtual machines where VMware Tools are installed will be shut down properly. If not possible or no VMware Tools are available, they will be powered off. The script will initially wait 5 minutes on the shutdown process. If some of the virtual machines do not shut down within the first 5 minutes user will be asked whether to wait another 5 minutes, to wait forever or to force a power off (Possible User Input: wait5min, forever, poweroff).
- Reconfigure virtual machines for failover – Raw Device Mappings and virtual disks which reside on a different datastore than the main datastore of the virtual machine must be removed from virtual machine configuration for a proper takeover.
- *Attention! If virtual disks reside on different datastores user has to failover all the datastores together in one step.*
- Unregister virtual machines – Virtual Machines will be unregistered from vCenter configuration.
- Unmount data store(s) from all ESX(i) hosts if vSphere Version 5 is installed.
- Swap storage replication (horctakeover) of datastore and RAW Device LUNs at Storage level – Truecopy mirrors volumes will be swapped (P-Vol and S-Vol will be changed).
- Rescan HBAs and VMFS – Rescan of all ESX(i) hosts to refresh vCenter LUN configuration.
- Resignature datastores – Datastores may be recognized as Snapshots at the other site. As the base signature values have changed (other storage subsystem) resignature will be executed to write a new signature onto the datastore. This operation involves another vmfs rescan.
- Rescan HBAs and VMFS – Rescan of all ESX(i) hosts to refresh vCenter LUN configuration.
- Register virtual machines – Virtual Machines will be re-registered in the vCenter.
- Reconfigure virtual machines:
    - Raw Device Mappings and virtual disks will be added back to the Virtual Machine configuration.
    - Move virtual machines into “its” folder
    - Set custom attributes
    - Reconfigure virtual distributed network switch configuration
- Reconfigure cluster to rebuild all the virtual machine settings that have been before failover.
- Power on virtual machines (as defined in bootorder File)

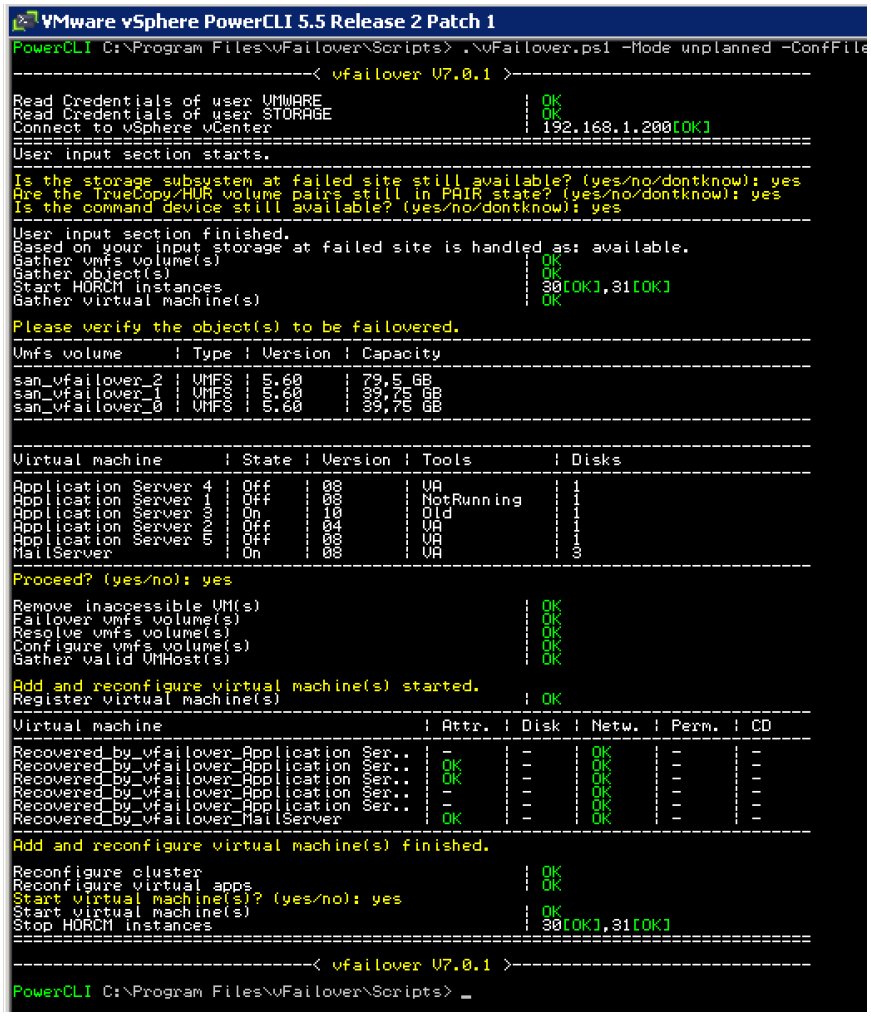
4.5. Operation Mode “unplanned”

Operation mode “unplanned” should only be used in case of a site/ESX(i) host/storage array failure. With this mode failed datastores and virtual machines will be brought online at the remaining site.

Sample syntax for operation mode “unplanned”(after v6.6.2):

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_movis-ha -Mode unplanned –DestinationDatacenter Remote

In this example all datastores containing “san_vf*” in the datastore name will be switched to the datacenter named “Remote” with the vCenter user account “administrator”. After executing the vfailover operation the password for user “administrator” must be entered for a successful connection to vCenter server. Before the takeover will be executed a summary of the affected datastores and virtual machines will be displayed. This must be confirmed by entering “yes” to start the takeover.



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Workflow major steps for an unplanned failover operation:

- Move still running virtual machines – VMs must be moved from VM Hosts that also run virtual machines with failed datastores (Storage Subsystem failure)
- If Parameter "RemoveVMHostOnFailure" is set to "Yes" VM Hosts and/or VM Hosts with failed datastores will be disconnected and removed– VM Hosts with orphaned objects have to be removed from vCenter configuration for proper failover operation. If Parameter "RemoveVMHostOnFailure is set to "No" VM Hosts and VMs will remain in configuration as orphaned objects. Mirrored Datastores and depending VMs will be recovered and get a prefix as defined with the "ObjectPrefix" parameter in the config file. VCenter configuration has to be cleaned up manually (delete orphaned objects) after unplanned failover operation.
- Based on user input storage will be treated as available or not available.
- Available: Swap storage replication (horctakeover) of datastore and RAW Device LUNs at Storage level – Truecopy mirrors volumes will be swapped (Like in planned mode).
- Not available: Make replication volumes read- and writeable on second storage subsystem – Enable write access to LUNs at the remaining datastore, remove write access from primary volumes if still available
- Rescan HBAs and VMFS – Rescan of all ESX(i) hosts to refresh vCenter LUN configuration.
- Resignature datastores – Datastores may be recognized as Snapshots at the other site. As the base signature values have changed (other storage subsystem) resignature will be executed to write a new signature onto the datastore. This operation involves another vmfs rescan.
- Rescan HBAs and VMFS – Rescan of all ESX(i) hosts to refresh vCenter LUN configuration.
- Register virtual machines – Virtual Machines will be re-registered in the vCenter.
- Reconfigure virtual machines:
    - Raw Device Mappings and virtual disks will be added back to the Virtual Machine configuration.
    - Move virtual machines into "its" folder
    - Set custom attributes
    - Reconfigure virtual distributed network switch configuration
- Reconfigure cluster to rebuild all the virtual machine settings that have been before failover.
- User can decide if the script should power on the virtual machines (based on their previous state or as defined in the BootOrder File) or if the virtual machines should stay powered off.

4.6. Operation Mode "repair"

Operation mode "repair" checks all the Virtual Machines in a cluster after an unplanned failover for custom attributes, resource pool association, folder association and dvSwitch configuration. If there are any parameters missing they will be reconfigured.

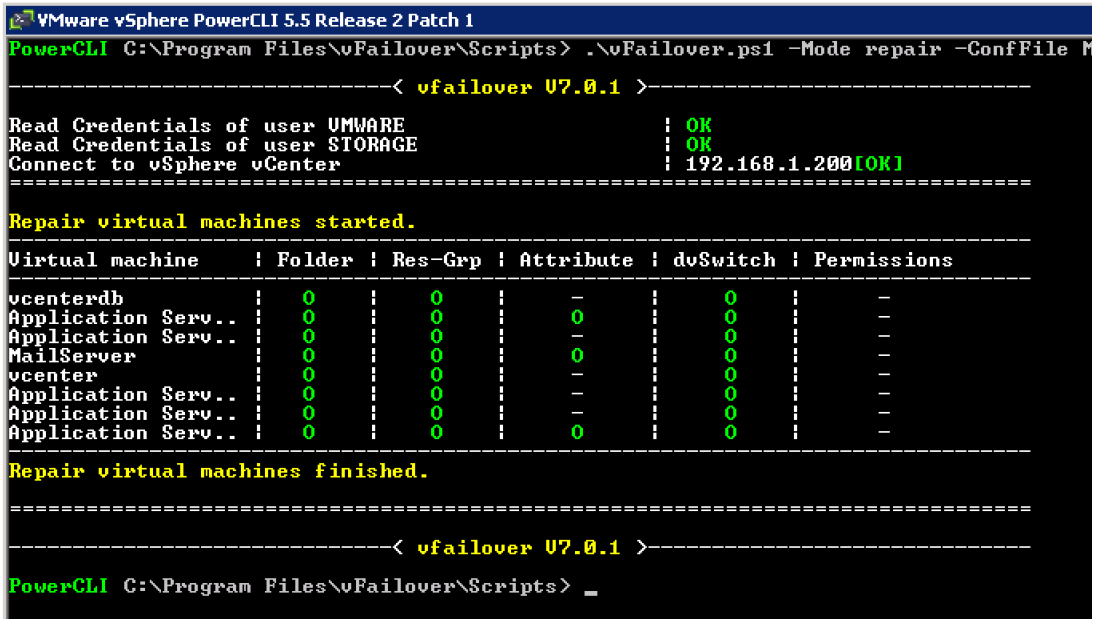
ATTENTION: You must have valid configuration files (Folder ..\vfailover\db) from the point of time before the unplanned failover was done. Do not run the script with mode "config" after an unplanned failover if you want to use the "repair" mode.

Sample syntax for operation mode "repair"(after v6.6.2):

C:\Program Files\vfailover\Scripts\Failover.ps1 -ConfFile "maincluster" -Mode repair

Sample output for operation mode "repair":

Mode "repair" creates a list of all VMs and reconfigures the VM parameters.



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4.7. Operation Mode “vcenter”

Operation Mode “vCenter” can only be used if virtual center server is a virtual machine which resides on a mirrored datastore (Only and all vCenter related VMs should be on that datastore, e.g. server where vCenter db is installed, if not the same machine).

Operation mode “vCenter” can be used in case of a site/ESX(i) host/storage array failure or in case of a planned failover. With this mode failed datastores and virtual machines will be brought online at the remaining site.

In this mode you need to specify a user account which has root permission on one of the remaining ESX(i) hosts. Because in case of no virtual center server is available, switching tasks must be done on one of the ESX(i) hosts.

Sample syntax for operation mode “unplanned”:

C:\Program Files\vfailover\Scripts\vfailover.ps1 -ConfFile "vfailover_Maincluster" -User root -Mode vcenter –DestinationDatacenter Remote -Datastore vcenter

In this example the Datastore called vCenter will be switched to the remaining or remote Datacenter. All other systems won’t be affected. After executing the vfailover operation the password for user “root” must be entered for a successful connection to an ESX(i) server. Before the takeover will be executed you have to choose the ESX(i) host and answer a few questions. Then a summary of the affected datastores and virtual machines will be displayed. This must be confirmed by entering “yes” to start the takeover.

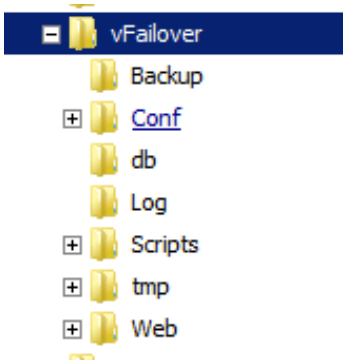
Workflow major steps for an unplanned failover operation:

- Connect to ESX(i) server
- Find out the virtual machine where vCenter server is installed
- Based on user input storage will be treated as available or not available.
- Available: Swap storage replication (horctakeover) of datastore LUNs at Storage level – Truecopy mirrors volumes will be swapped
- Not available: Make replication volumes read- and writeable on second storage subsystem – Enable write access to LUNs at the remaining datastore, remove write access from primary volumes if still available
- Rescan HBAs and VMFS – Rescan ESX(i) host to refresh vCenter LUN configuration.
- Resignature datastore – Datastore may be recognized as Snapshots at the other site. As the base signature values have changed (other storage subsystem) resignature will be executed to write a new signature onto the datastore. This operation involves another vmfs rescan.
- Rescan HBAs and VMFS – Rescan ESX(i) host to refresh vCenter LUN configuration.
- Register virtual machine – Virtual Machine will be registered on ESX(i) host
- User can decide if the script should power on the virtual machine

5. vfailover Framework

vfailover uses a designated Folder structure. This structure is already preconfigured in the vfailover delivery kit and should be copied to "%ProgramFiles%" folder on the vfailover management host(s) or vCenter server(s).

Folder Structure:



- Backup – Folder not actively used by vfailover. Could be used to store xml File exports from “db” folder.
- Conf – vfailover Cluster Configuration files created during initial setup or if new clusters are added
- Db – xml Files with backup of the vCenter configuration. Created during operation mode “config” if parameter “backup” is specified.
- Log – Log file folder for all vfailover operations
- Scripts – vfailover Powershell script folder
- Tmp – Folder for temporary files created during vfailover operations
- Web – Folder for vfailover WebGUI

6. Parameter

Name	Type	Decription
ConfFile	string	Name of configuration file
User	string	User that has the proper privileges to connect to the VMware vCenter Server – Obsolete from v6.5 on, use **StoreCredentials** instead
Mode	string	planned – planned Failover unplanned – unplanned Failover status – Status View config – update vfailover DB repair – Repairs Virtual Machine configuration vcenter – failover mirrored Datastore with vCenter server on it Default: config
Datastore	string	Datastore Identifier(if not specified in .properties file or entries in .properties file should be overruled) Default: * (all)
DestinationDataCenter	string	Is an option when executing with mode “planned” or “unplanned” Data center to which the script should failover the data stores and virtual machines
Backup	boolean	Is an option when executing with mode “config”. Stores information in the db folder of vfailover that allows unplanned failover Default: true
StoreCredentials	boolean	Is a **mandatory** option when using WebGUI!!!!! Executing with all modes. Usage example: vfailover.ps1 -conffile hitachi -mode status -storecredentials:$true --> you will be asked for “vcenter" and “storage” user, credentials will be stored for this user(128bit encryption) After that you can run vfailover without Parameter “-User" vfailover.ps1 -conffile hitachi -mode config/status/planned etc... --> without “-user” With WebGUI you need a User with stored Credentials!!! No other user can modify the credentials, only the user itself!! Default: false

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Name	Type	Decription
MaintenanceMode	boolean	Is an option when executing with mode “planned” If for example all the datastores should be switched from SiteA to SiteB for maintenance reasons and this option is set to “$true”, all the ESX(i) hosts at SiteA will be brought into maintenance mode. Default: false
SilentMode	boolean	Is an option when executing with mode “planned” No interaction with user at all. In case of a failure the script retries each function 5 times before configuring automatic failback. Default: false
ConsoleOutput	string	If a filename is specified for this parameter, the console output will also be piped to the respective file.

RESERVED PARAMETERS:

Name	Type	Decription
SessionId	string	RESERVED FOR WebGUI
PluginRequest	string	RESERVED FOR WebGUI
vCenterRecoveryServer	string	RESERVED FOR vCenter Mode
RecoveryUserPwd	string	RESERVED FOR vCenter Mode

7. vFailover WebGUI

vfailover WebGUI is designed to support the administrators using vfailover in their environments.

If a GUI is preferred, all the modes can be executed through the Web Browser. Even configuration settings can be done there. There is all the Information (Cluster, Host, VMs, Datastores, Disks, …) displayed which is necessary for operating vfailover.

The WebGUI must be installed on both management servers!

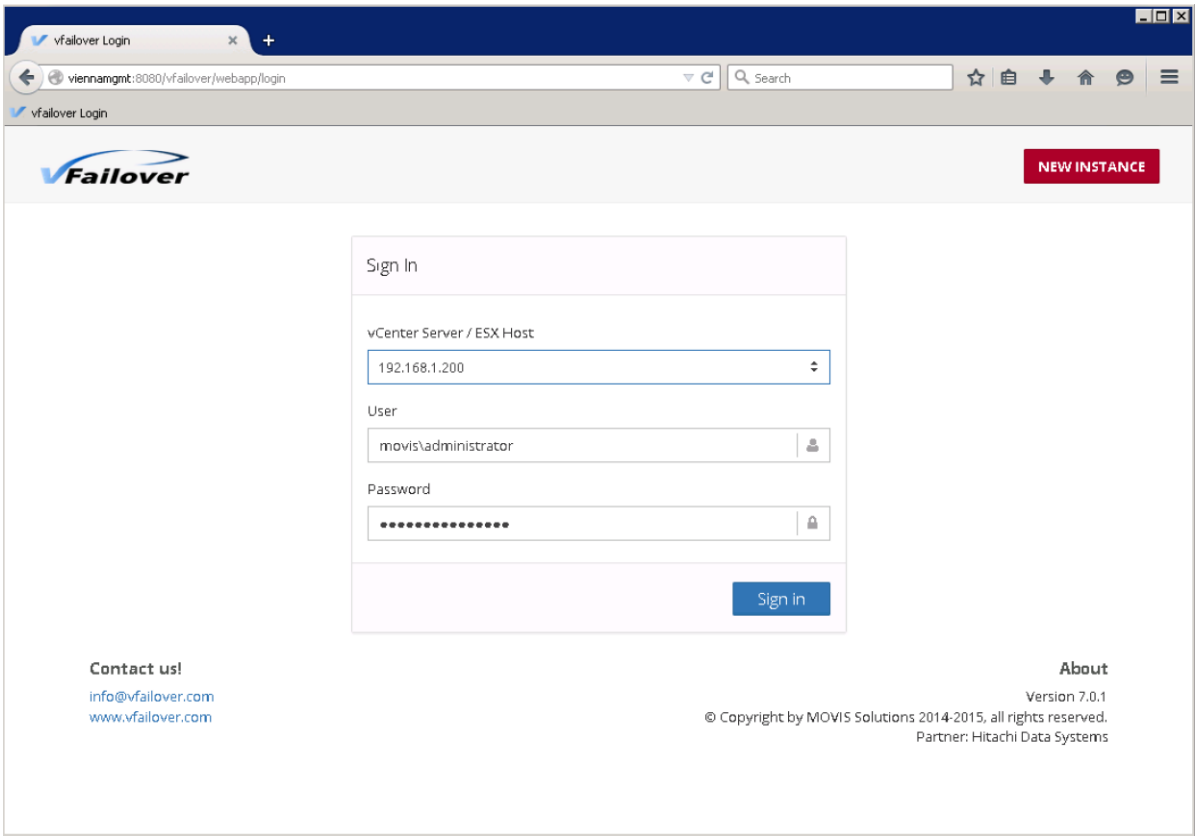
Requirements for the WebGUI (per Management Server):

- Apache Tomcat 7.0.47 for Windows (Install as service: "<vFailover Folder>\web\bin\service.bat install vfailover")
- X64 Java JRE 7 (latest Update)
- Web Browser Firefox (working with others too, but vfailover WebGUI is optimized for Firefox)

7.1. WebGUI Login

7.1.1. *Login*

At the Login Frame the vfailover instance, a valid username and password has to be specified.



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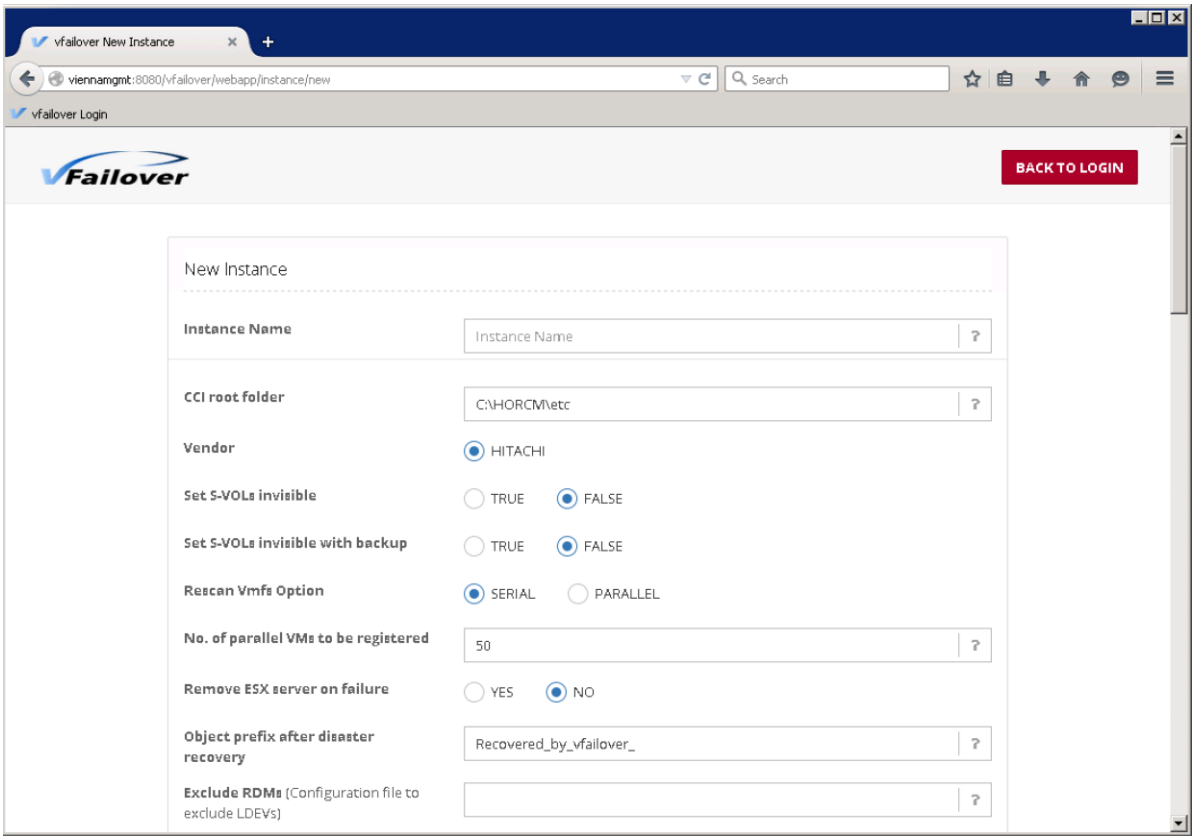
7.1.2. *Instances*

Additionally, a new instance (.properties file) may be created in the login window. An existing instance may be edited after login with button "Edit" at the top. These settings will then be saved to the vfailover "Conf" folder. All necessary parameters are shown in the WebGUI and may be filled out if used.



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7.2. WebGUI Overview

7.2.1. *WebGUI Dashboard*

After logging in an overview about the selected vfailover configuration (MovisDemo) will be displayed. Information about the Last Backup, Clusters, Hosts, … will be shown. Boot Order Settings and VM Status Information are available as well.

In the left Sidebar "Instance Name", "Dashboard", "Action", "Instance", "Task" and "History" can be selected.

Backup and Failover tasks can be started within the "Action" menu.

From the "Instance" selection different views (Clusters, Hosts, Storage Pods, Datastores, Virtual Machines) may be chosen.

Every operation(failover, backup, status) will be started as task and information is displayed in "Task" menu.

"History" shows a task history and links to log files.

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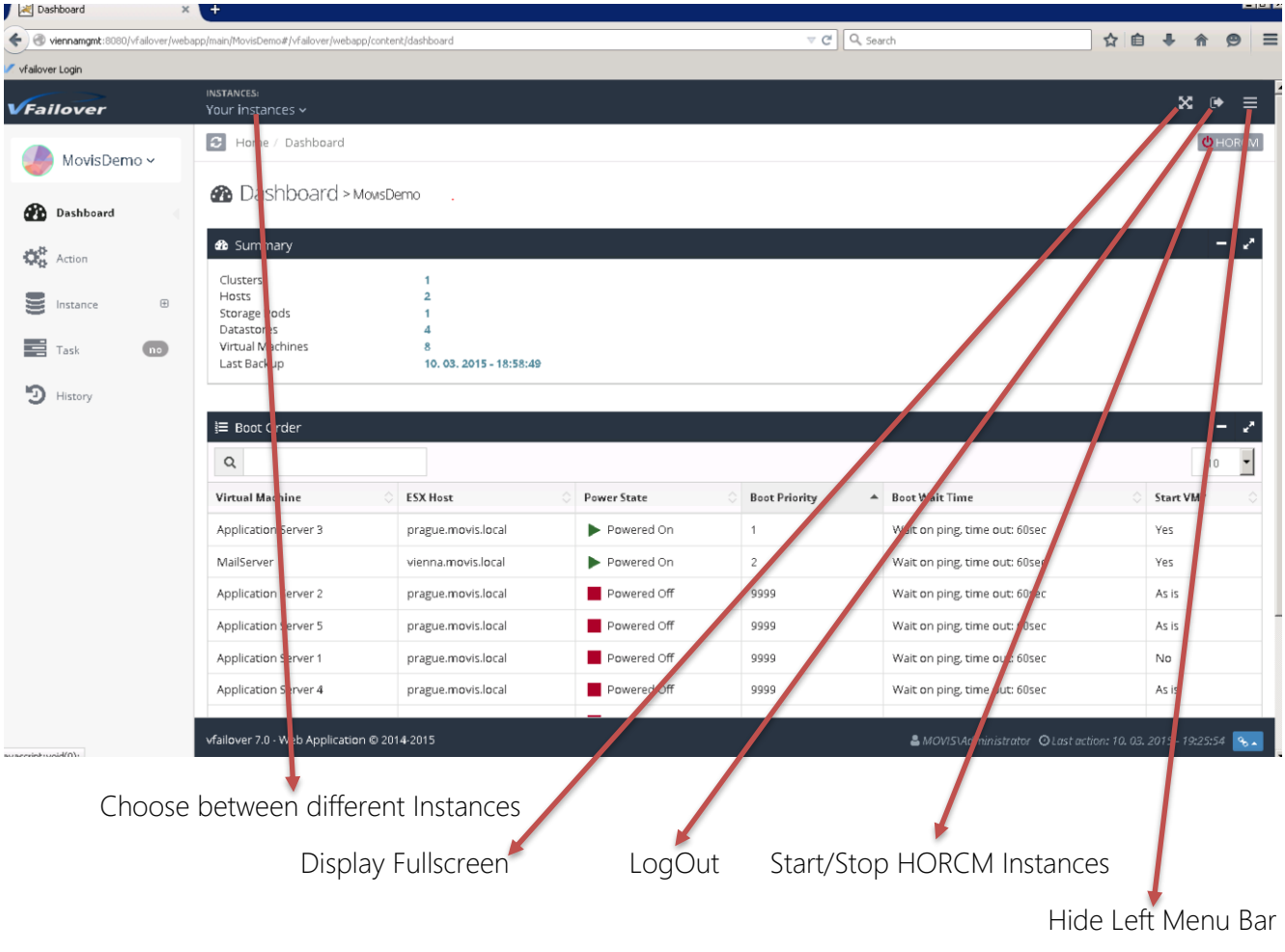
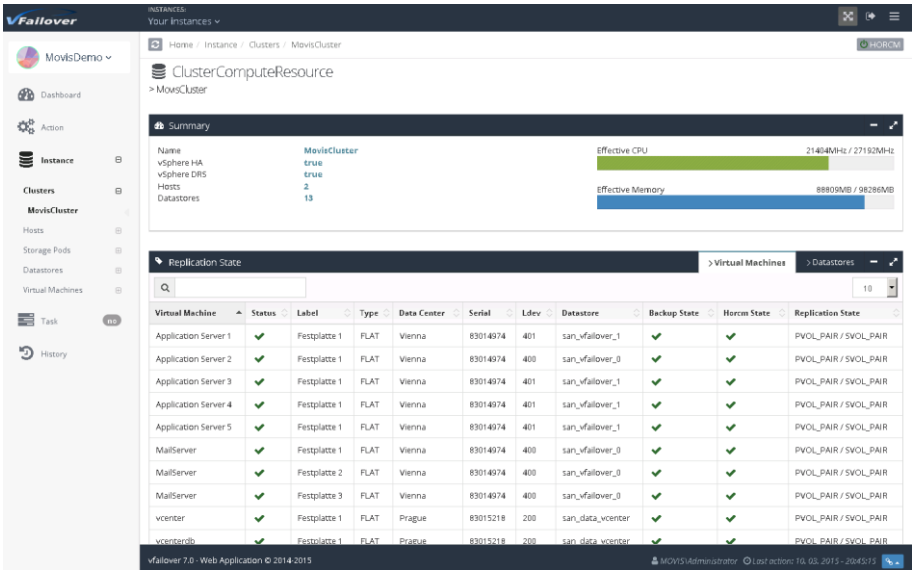
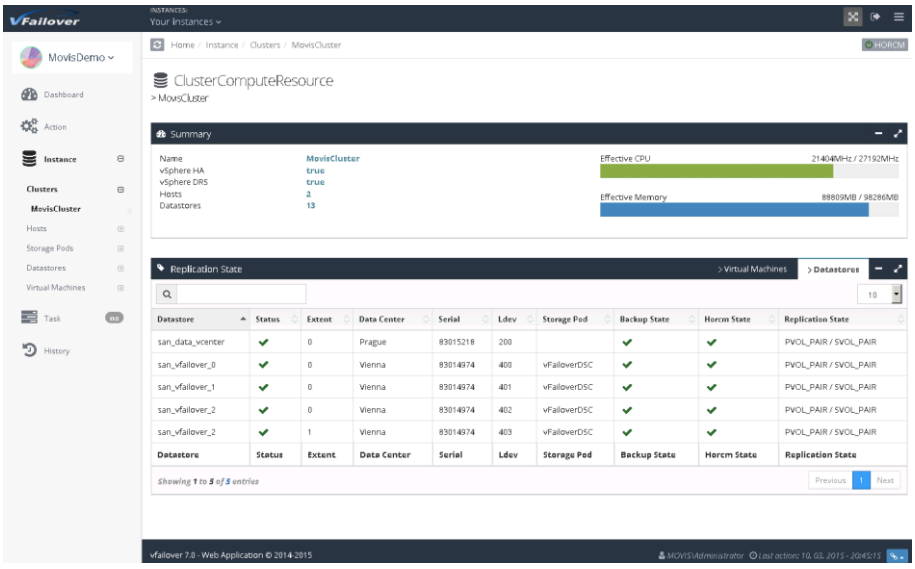


7.2.2. *WebGUI Clusters View*

After the Cluster is chosen, information about Datastore, LDEV and replication information will be shown. If Virtual Machines button will be clicked, information about the virtual machines running within that cluster will be shown.





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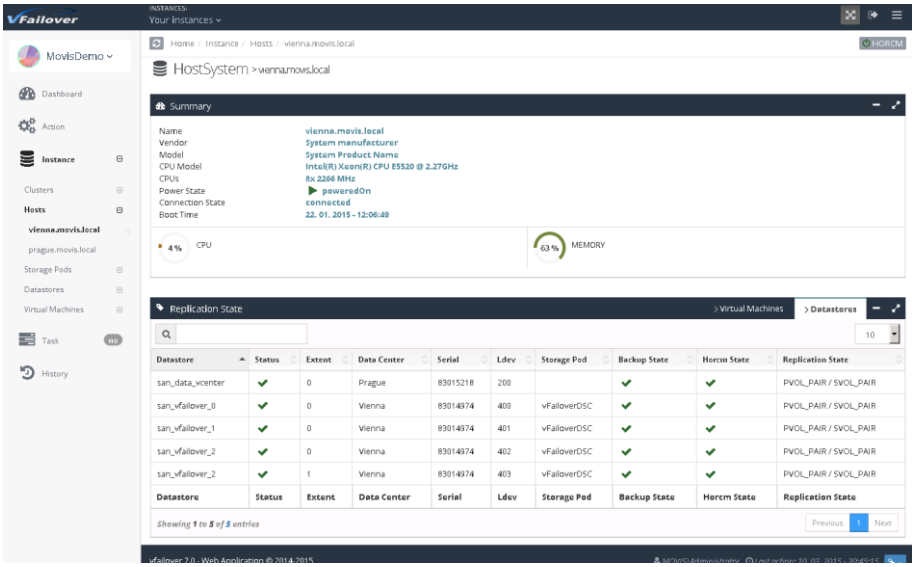
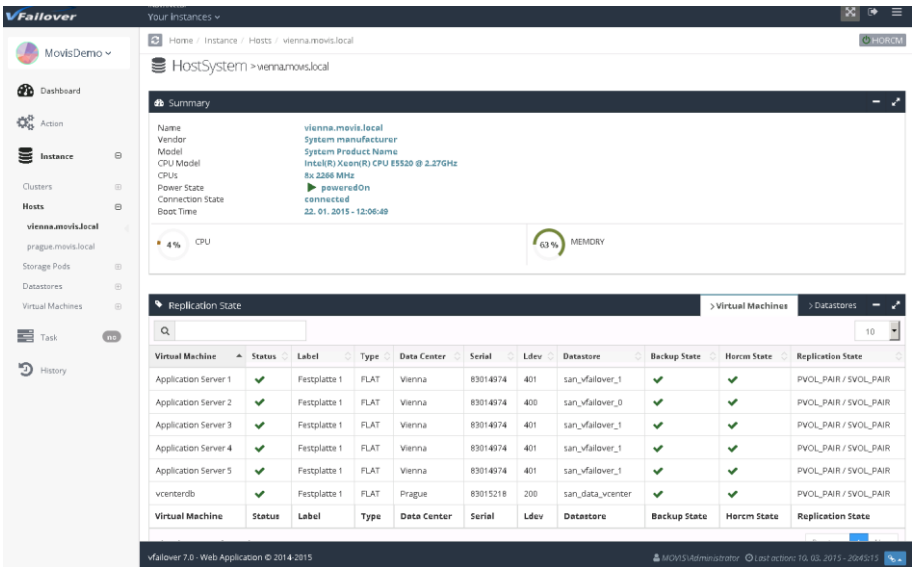
7.2.3. *WebGUI Hosts View*

After one of the VM Hosts(ESXi Server) is chosen, information about Datastore, LDEV and replication information will be shown. If Virtual Machines button will be clicked in the HostSystem Frame, information about the virtual machines running on that host will be shown.





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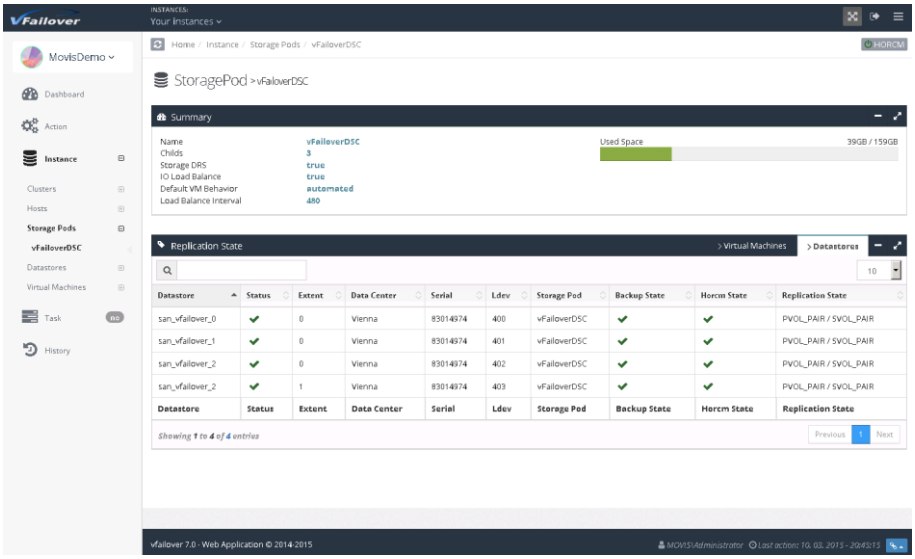
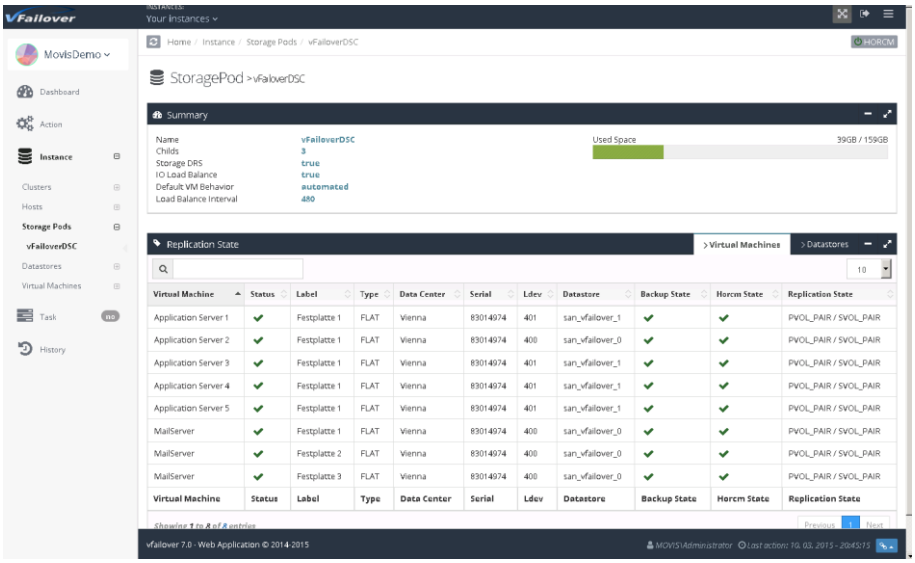
7.2.4. *WebGUI Storage Pods View*

Information about Datastore Clusters(Storage Pods) will be shown there. The member datastores, their extents, LDEV and Replication Status will be shown. If Virtual Machines button will be clicked in the Storage Pod Frame, information about the virtual machines running on that Storage Pod will be shown.

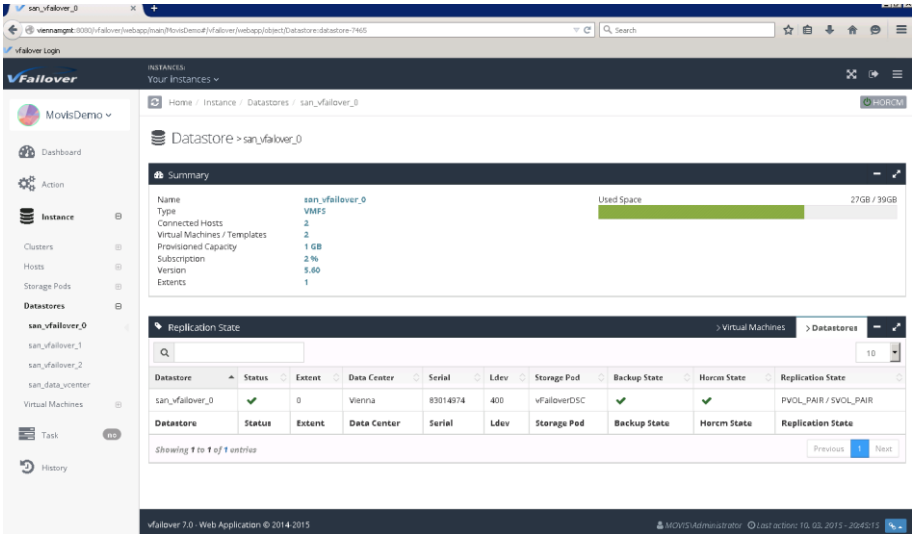


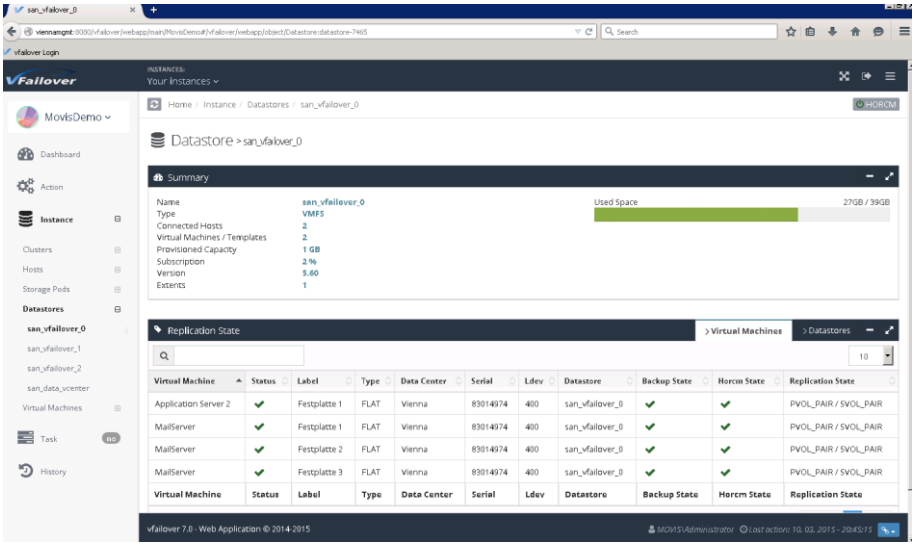


Information about Replication State will only be shown if the HORCM Instances are started by pressing "HORCM" button in the top right corner of the GUI. When the instance is started the "Power" icon ( ) of the button will be colored green, if not it will be shown in red color. If HORCM instances will be started manually in WebGUI, they should be stopped manually as well!! Otherwise there may be problems if vfailover is used with WebGUI and Command Line in parallel (HORCM instances still running in background, no HORCM operation is possible due to different user context...)

7.2.5. *WebGUI Datastores View*

Information about Datastores will be shown there. The extents, StoragePods, LDEV and Replication Status will be shown. If Virtual Machines button will be clicked in the Datastore Frame, information about the virtual machines running on that datastore will be shown.





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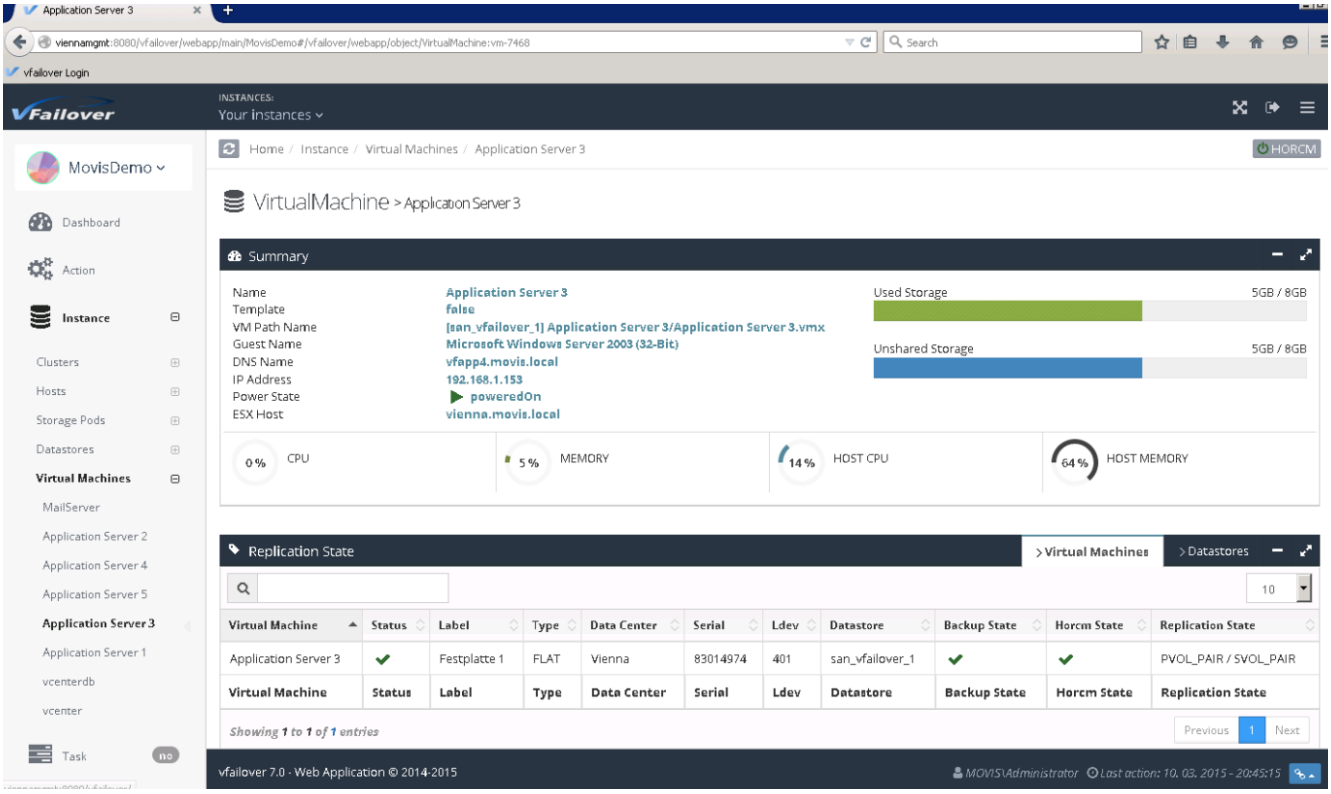
7.2.6. *WebGUI Virtual Machines View*

Information about Virtual Machines will be shown there. This information will be fetched from vCenter Server. You can see utilization of disk space, memory and cpu.

The replication state is displayed and if there is an actual backup.

In the "Datastores" menu more detailed information from the underlying datastore will be displayed.



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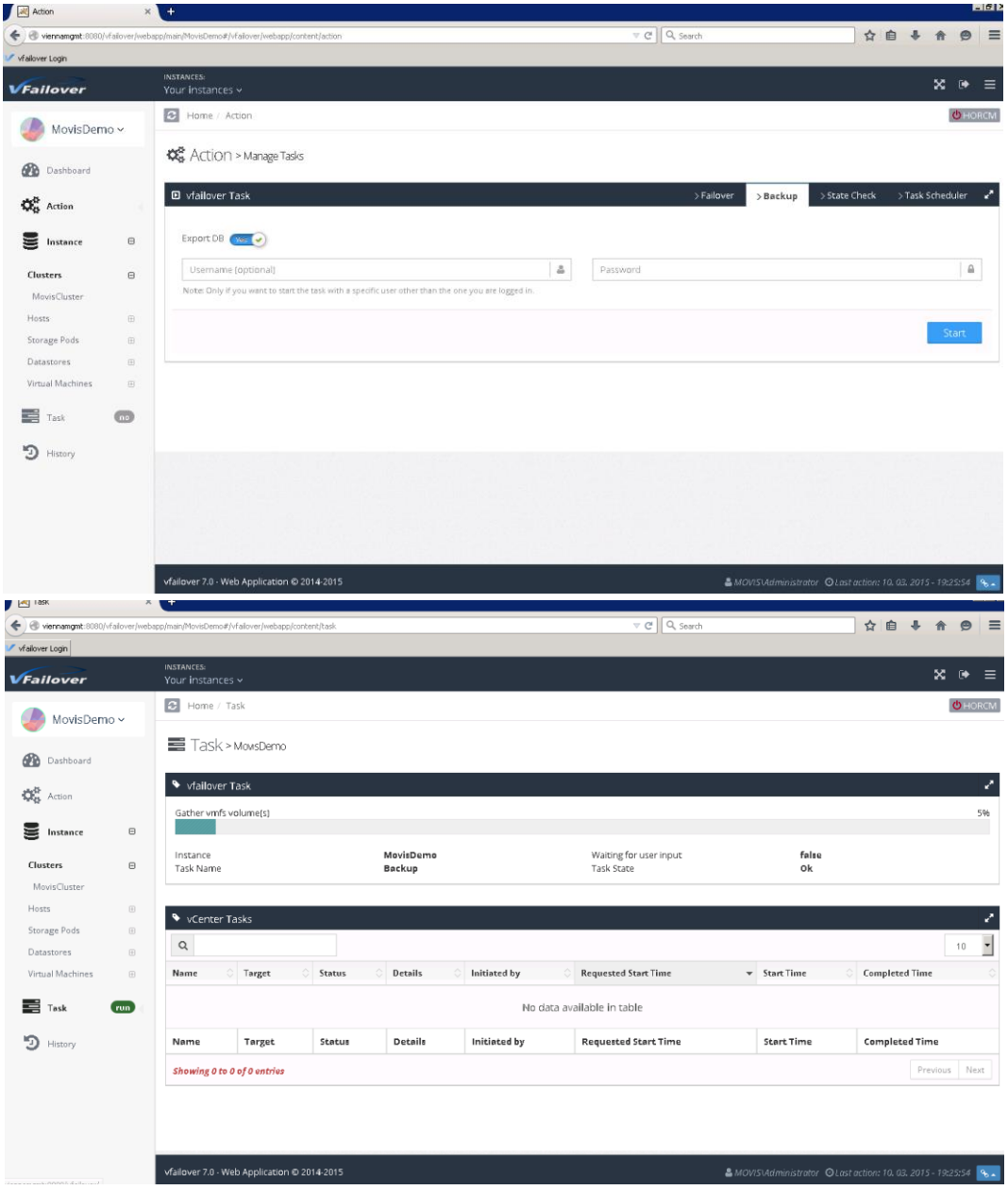
7.3. WebGUI Actions

7.3.1. *WebGUI Backup*

WebGUI Backup means that a configuration run of vfailover will be initiated, to get all the actual configuration information. With "Start", Backup (=config run) may be initiated immediately.

Additionally, a scheduled task ("Task Scheduler" Menu) can be created in the Windows Task Scheduler for the configuration run. Then it will be assured that configuration information will be updated in a regular basis. These scheduled Tasks can only be created but have to be deleted manually from within the Windows Task Scheduler!!



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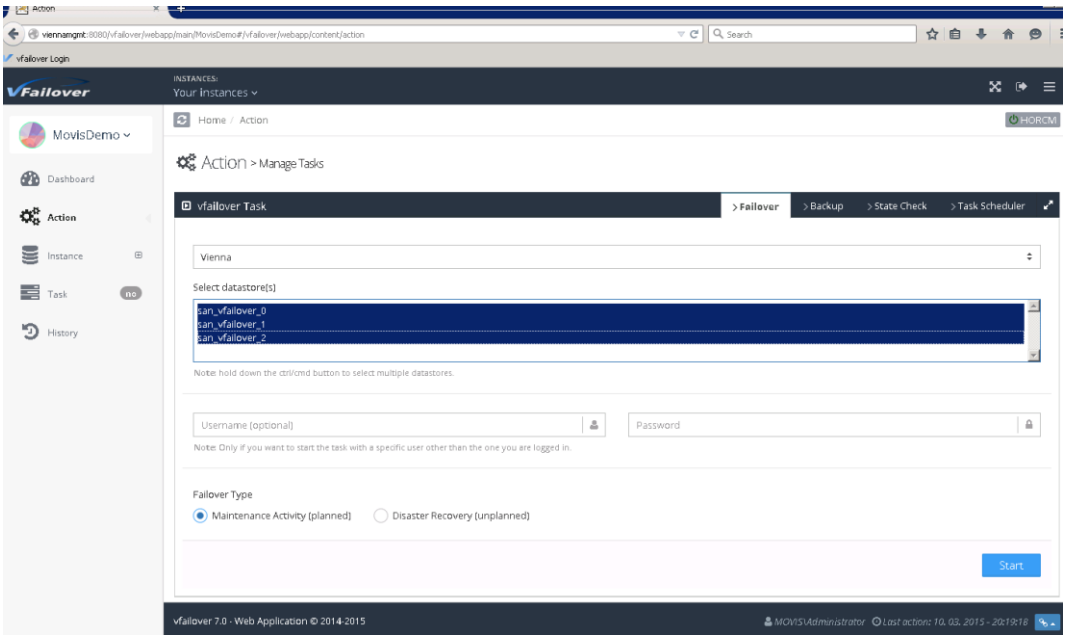
7.3.2. *WebGUI Planned Failover*

Planned Failover can be initiated through the WebGUI. Either an "Maintenance Activity (planned)" or an "Disaster Recovery (Unplanned)" can be initiated.

First select the Datacenter and the active datastores are shown which may be switched to the other datacenter. All datastores which are selected will be switched to the other site after "Start" button is pressed.



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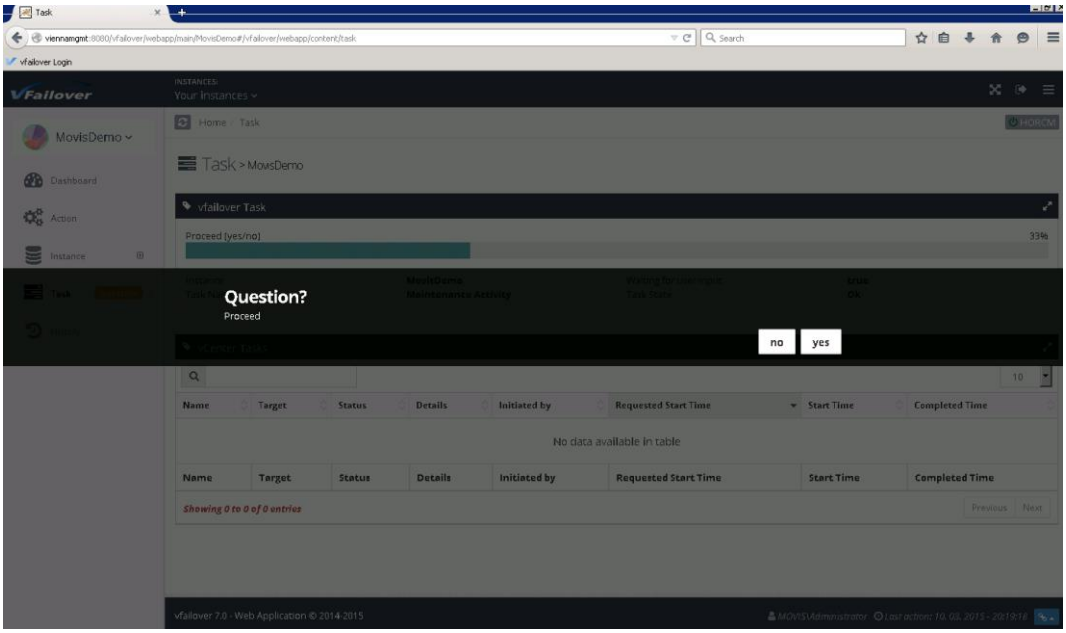
After vfailover initialization has finished, the failover task must be confirmed by pressing the “yes” button.

If Browser will be accidentally closed, it can be started again and the ongoing task status will be displayed!



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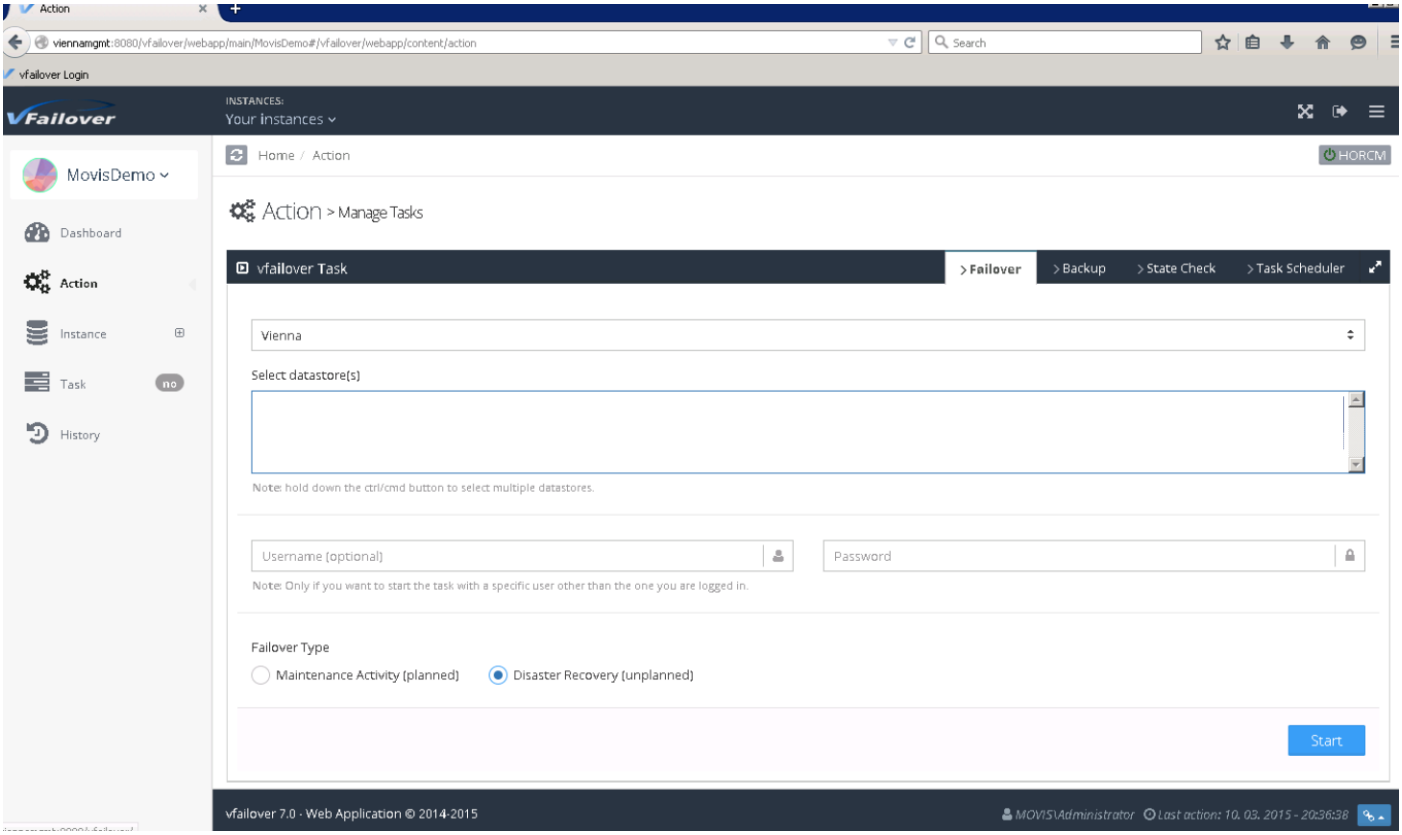
7.3.3. *WebGUI UnPlanned Failover*

Unplanned Failover can be initiated through the WebGUI. Select “Disaster Recovery (Unplanned)”.

Datacenter which is down MUST be selected, no datastores will be displayed in two vCenter server configuration (in one vCenter configuration datastores will be shown, but none has to be selected and all will be switched). All datastores which were active in failed datacenter (stored from last backup run in “db” subfolder) will be taken to available datacenter. Start Button must be pressed.



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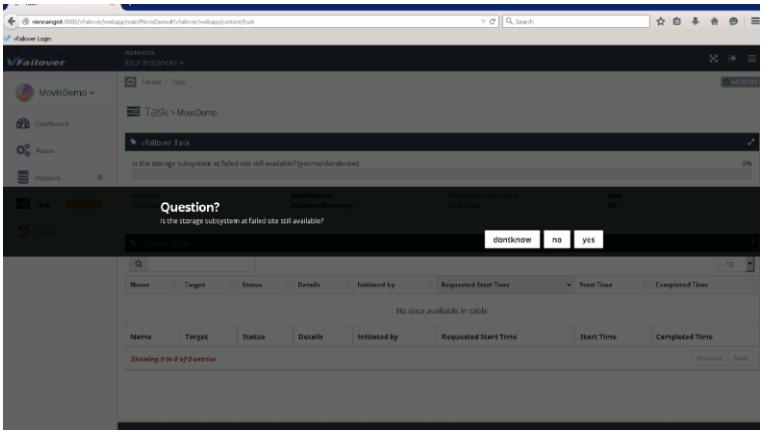
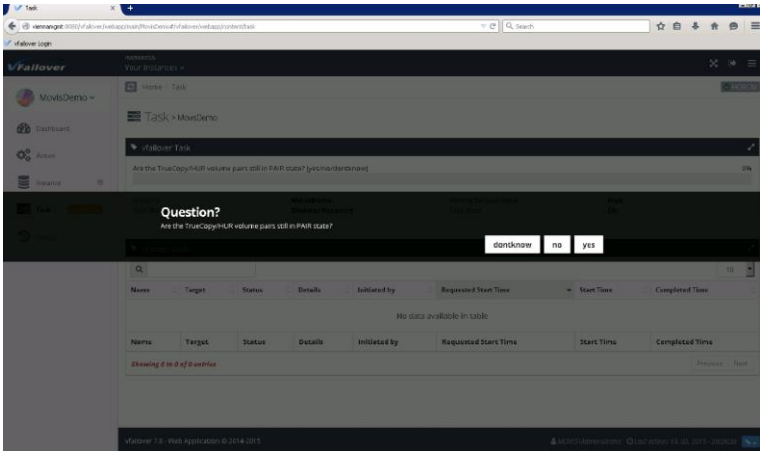
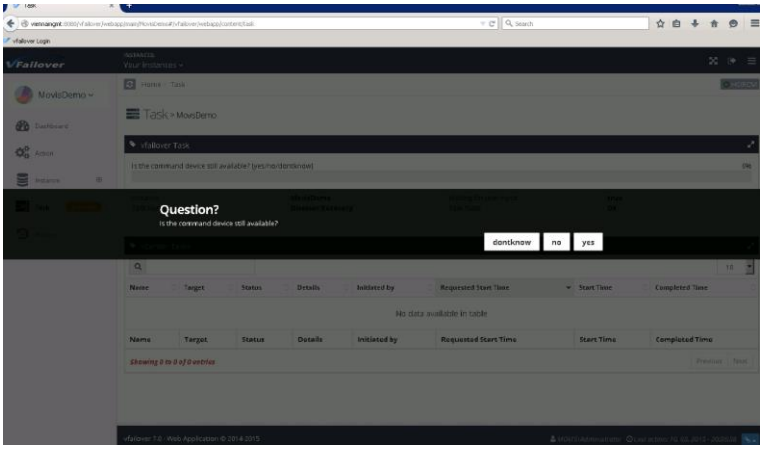
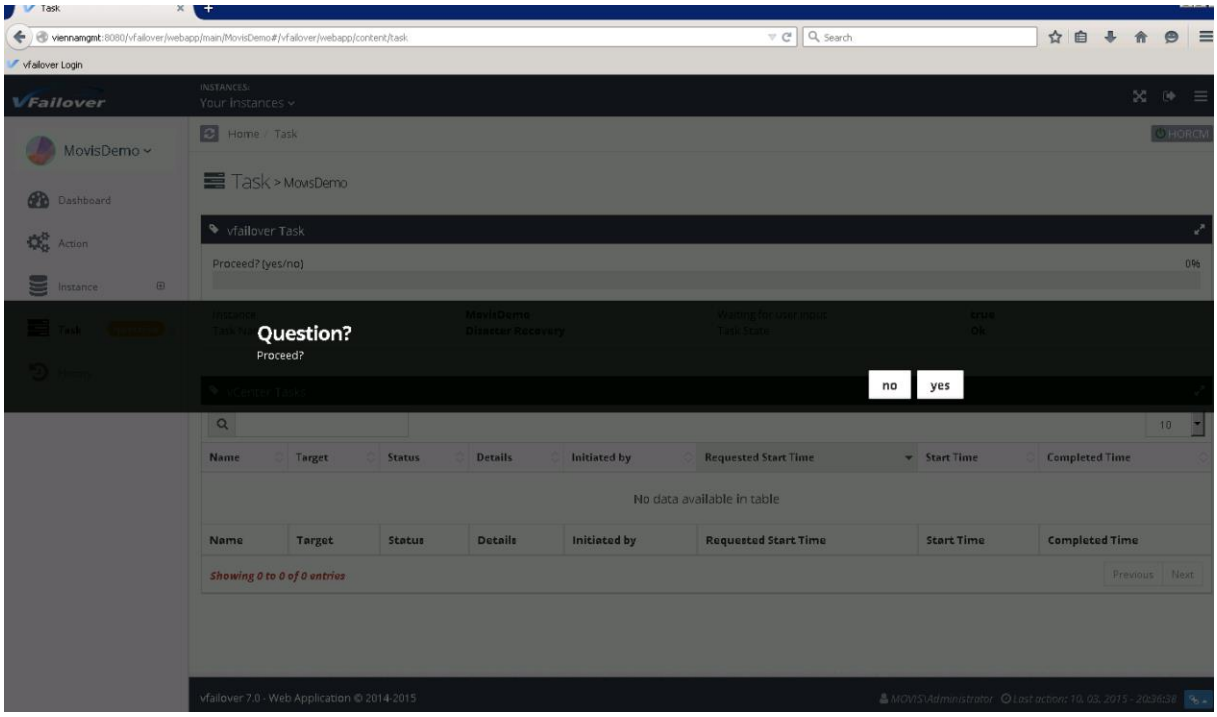
After vfailover initialization has finished, some questions must be answered. Depending on the failed components. Please follow the questions on screen and answer them correctly with (yes/no/dontknow).



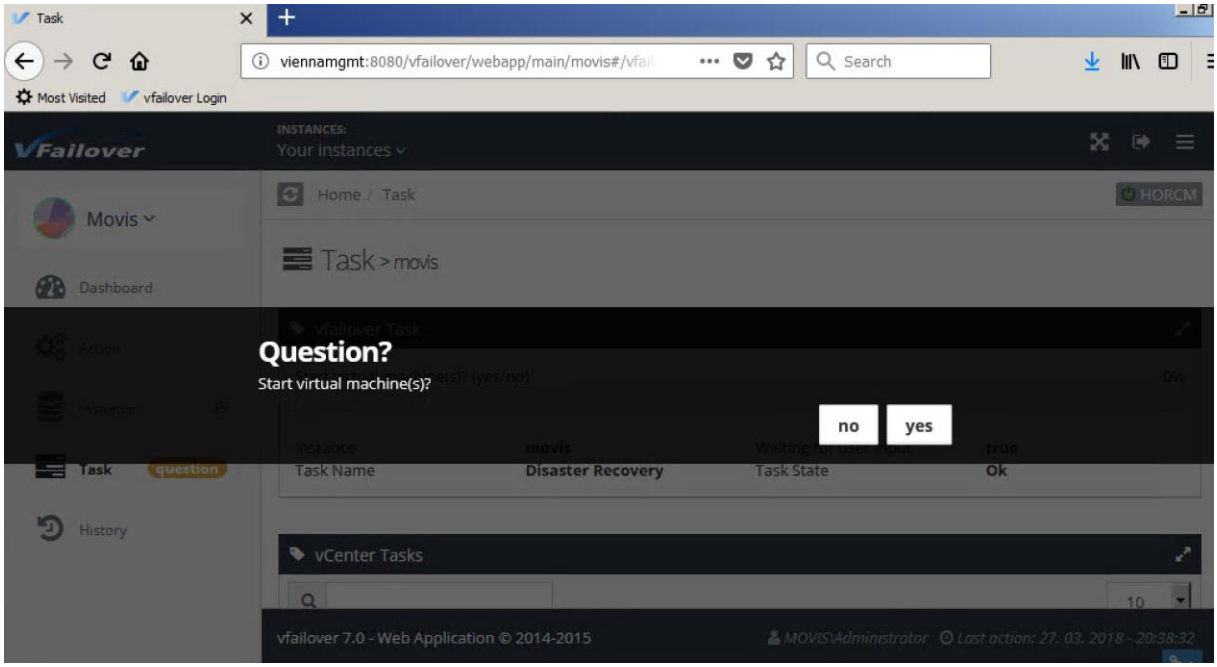




Then type yes again to proceed and initiate the failover!!!



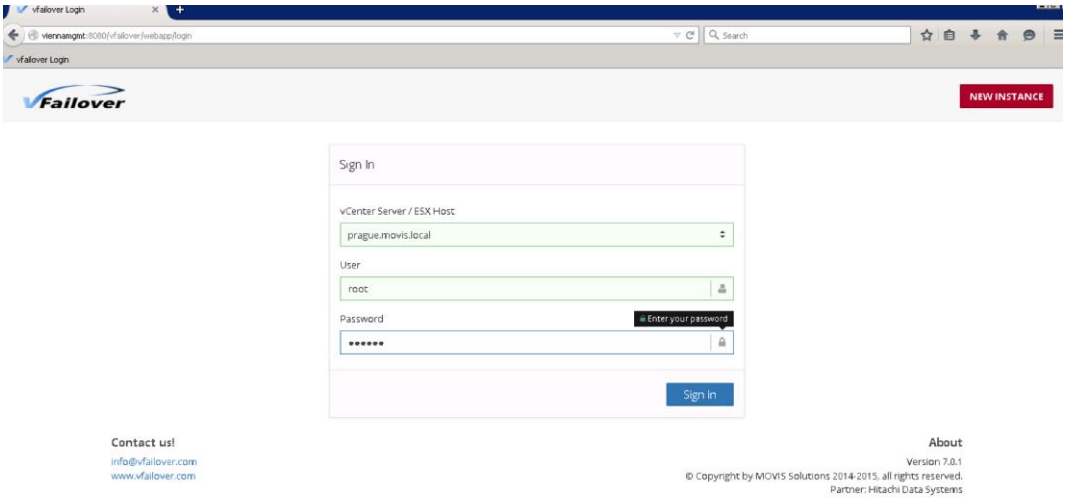
Finally, vfailover will as if virtual machines should be started or not. If "no" will be selected the startup process has to be done manually.



7.3.4. *WebGUI Recover vCenter*

On the Login page login to one of the ESXi hosts on the remaining site which is still running and has access to the datastore mirror(S-Vol) where vCenter server is stored. Make sure that you have root permissions to the ESXi host.

That is used for bringing a vCenter Server and all the VMs at the same datastore online on the remaining site after an unplanned outage!! This is possible if the vCenter Server and its database server are on the same datastore which is mirrored with Truecopy or HUR!!!



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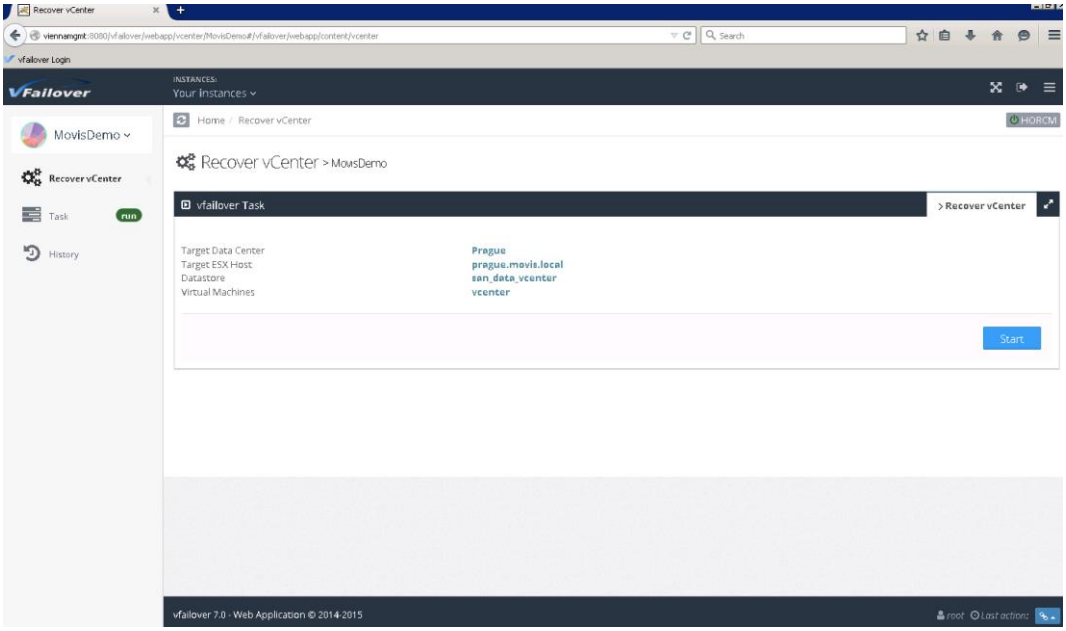
Press Start to recover vCenter server.



After that the datastore will be brought online on the remaining site, the vCenter server will be brought online. As soon as vCenter is up and running an unplanned failover operation, for all the other protected VMs in the environment, can be started.

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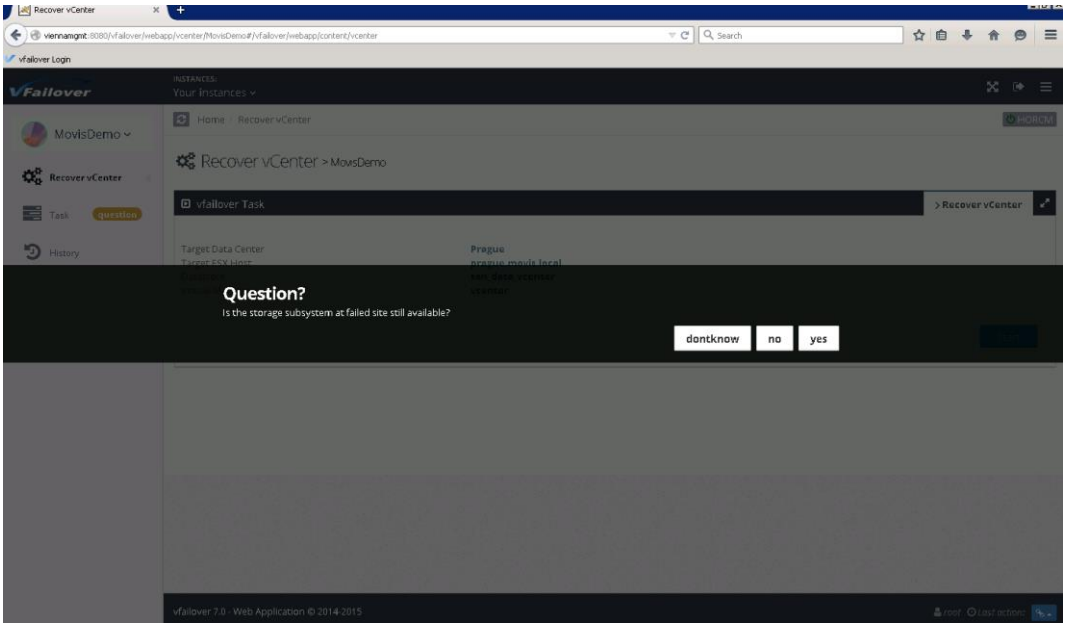
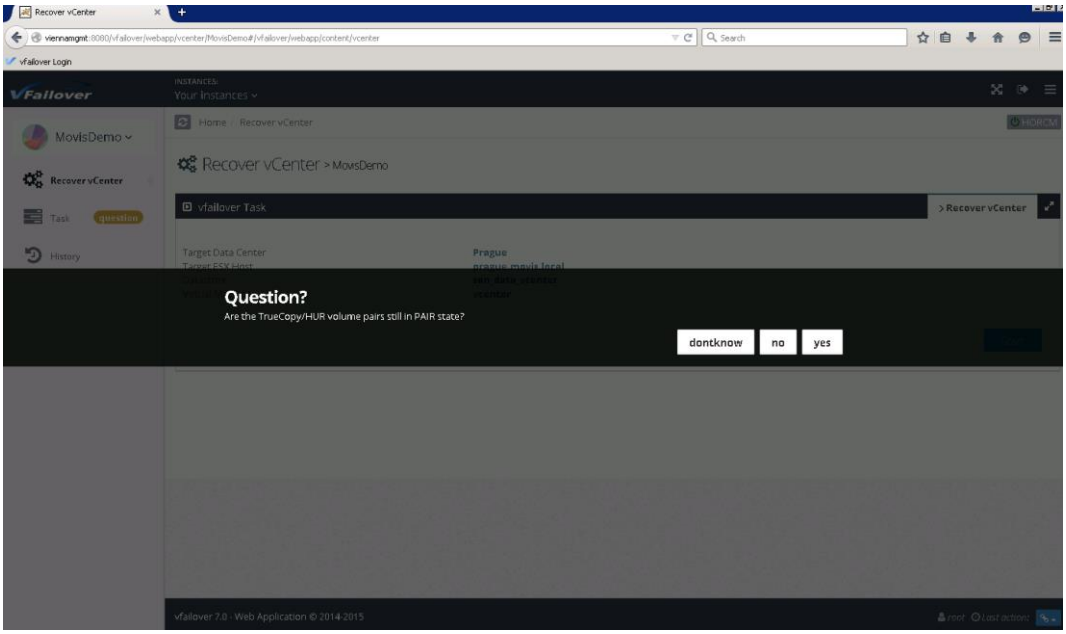
For the failover/recovery of vCenter server some questions have to answered.





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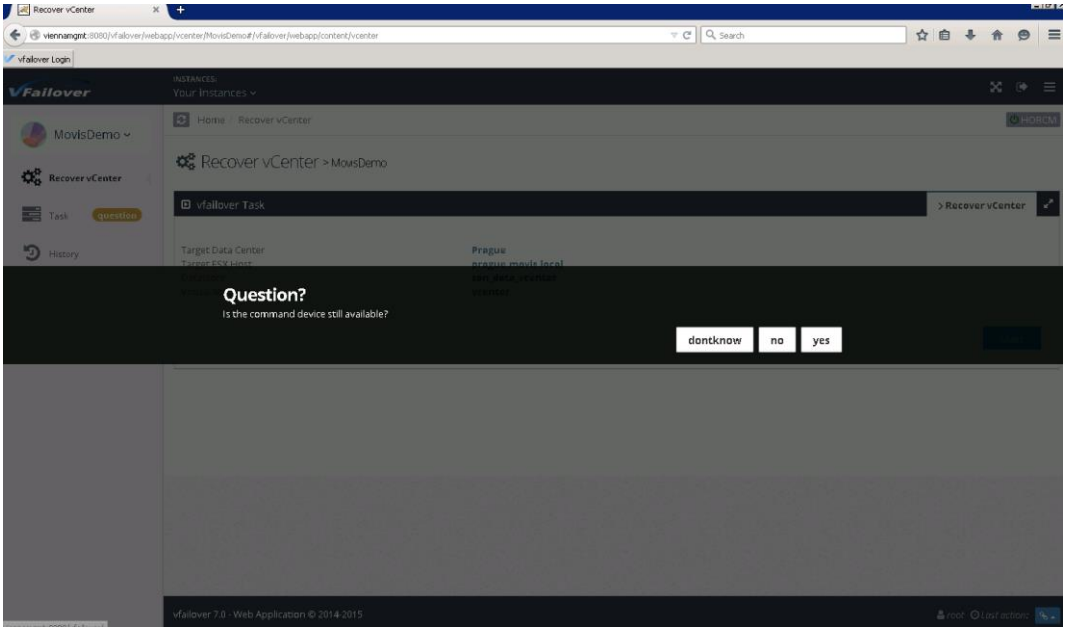

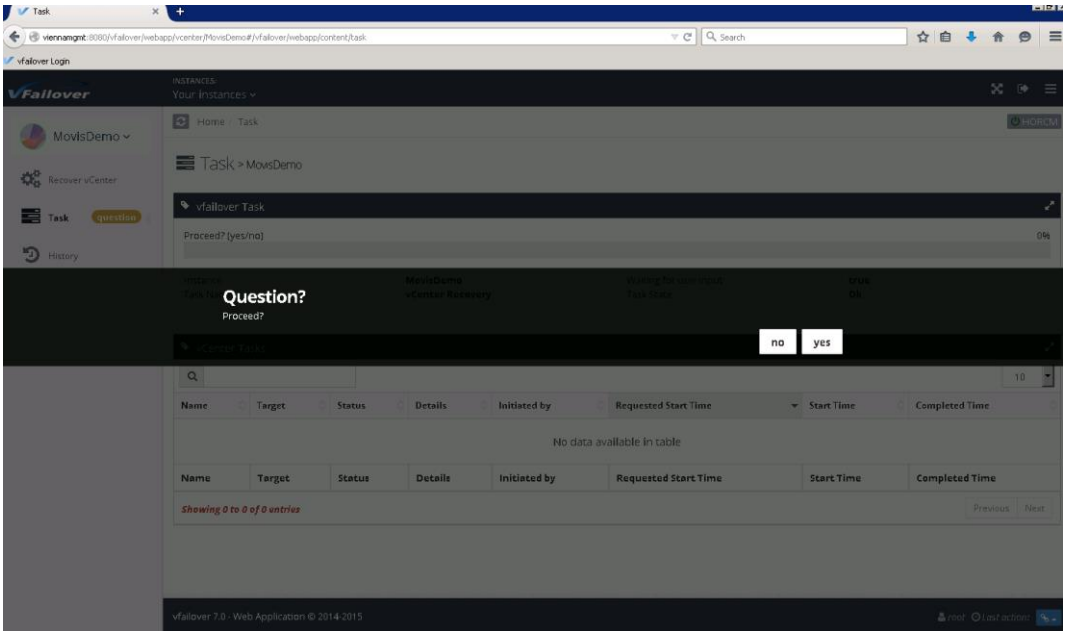

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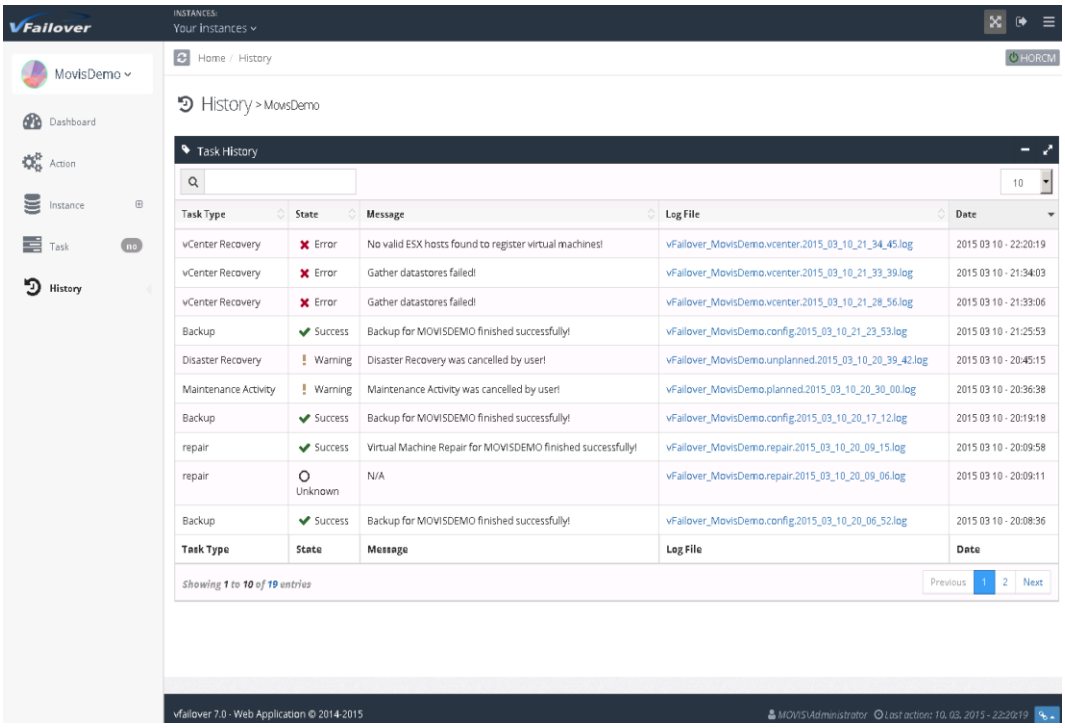
7.3.5. *WebGUI History*

History shows task list and link to logfiles for troubleshooting.



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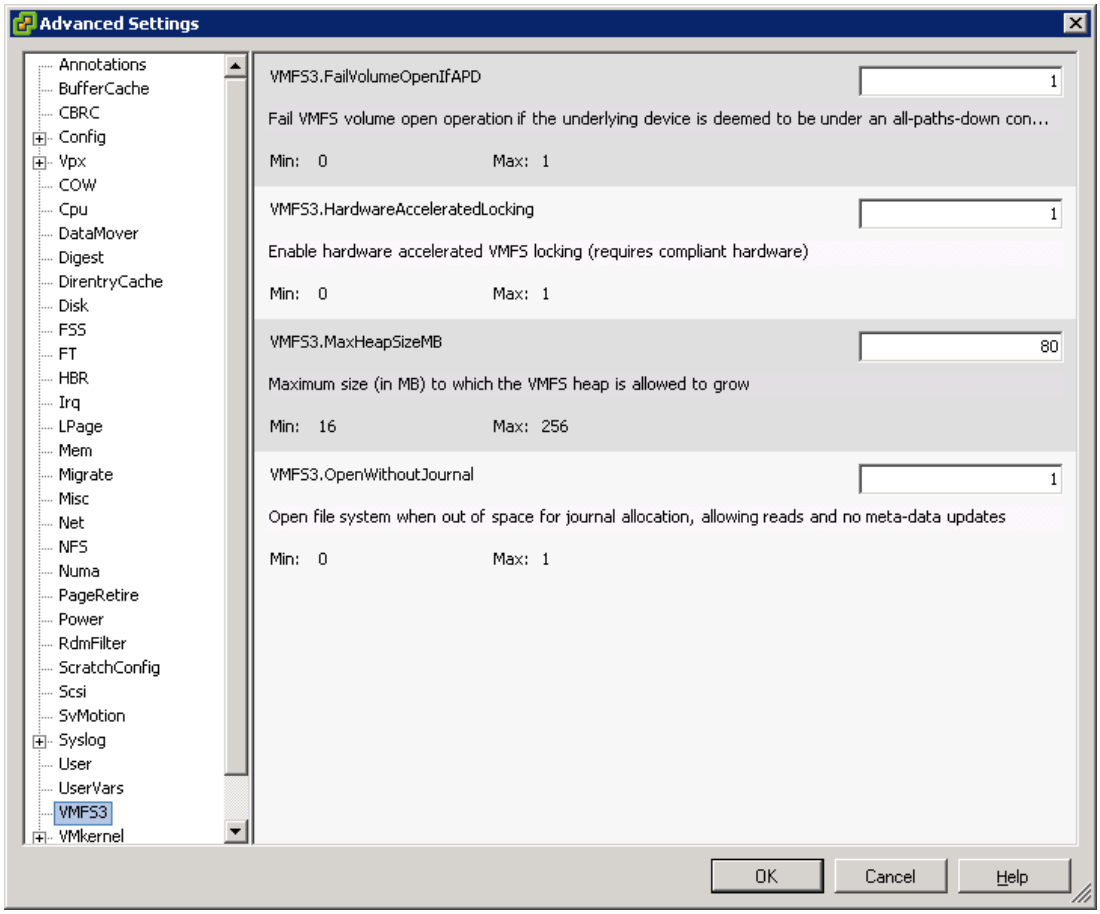
8. vSphere Settings

From vSphere 5 environments on, an additional parameter is MANDATORY.

If access to Storage is lost in VMware this scenario is called APD(All Path Down). In this case the VM Hosts (ESXi Server) try to get the paths back online again. This may result in a condition where all affected ESX Hosts (even on remaining site) and VMs will get unresponsive, which in some circumstances causes the whole virtual environment to fail!!!!

To avoid this behavior a parameter must be changed on the ESX Hosts. This parameter tells the ESX Hosts to fail unresponsive LUNs when all paths are gone (Storage outage).

Value for "VMFS3.FailVolumeOpenIfAPD" must be set to 1:



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