

Kelverion Automation

VM Provisioning and Management Solution

Deployment Guide

Version 3.1

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1. Overview

Beginning with the power of Windows Server 2012 and System Center 2012, Self-Service Virtual Machine Provision has been placed into the hands of all Microsoft's customers, large or small. A fully automated self-service provision of Virtual Machines from a Service Catalogue is now a reality whatever the size of your IT team.

This deployment guide assumes that Windows 2012 R2 and System Center 2012 R2 or later is in use.

The VM Provisioning and Management Solution enables System Center users to create and manage Virtual Machine instances either on premise or in the public cloud from the Kelverion Automation Portal. Previous versions of this Solution have relied upon System Center Service Manager deployment, which has now been replaced by the Kelverion Automation Portal.

This is a fully adaptable solution which is easily extendable to use your own third party Service Catalogue or Service Request System such as BMC Remedy, ServiceNow, CA Service Desk Manager, HP Service Manager or System Center Service Manager to initiate the process.

The solution is not restricted to Microsoft HyperV and can also provision VMware, Windows Azure or Amazon EC2 VMs or all four simultaneously, or alternatively the Self-Service migration of VMs between hypervisors.

This System Center Orchestrator driven solution delivers a number of fully automated functions including:

- Kelverion Automation Portal Service Catalogue integration
- VM automatically deployed in infrastructure based on portal selections
- Automated Self Service Portal offerings for:
 - Changing VM Resource Allocation
 - VM Maintenance including
 - Resume VM
 - Revert to VM Checkpoint
 - Start VM
 - Stop VM
- VM CI created in the PDS CMDB tables.

The offering can be easily extended to enable heterogeneous system support;

- Use your own third party Service Catalogue or Service Request System
- Create VM Configuration Items in your own CMDB
- Self-Service migration of VMs between Hypervisors
- Extend to provision Citrix XenServer VMs

2. Pre-Installation Information

2.1. Kelverion VM Provisioning and Management Package Contents

The VM Provisioning and Management Solution Package contains the following elements:

- Kelverion Persistent Data Store creation script (Microsoft SQL Server)
- Kelverion VM Infrastructure Tables Creation script (Microsoft SQL Server)
- Kelverion Automation Portal Service and Offering Data Export file
- VM Provisioning and Management Solution Runbook Set
- Kelverion VM Provisioning and Management Deployment Guide
- VM Provisioning and Management - Data Manipulation Config.xml
- Automation Portal - Request - Data Manipulation Config.xml
- VM Provisioning and Management - Monitor Unix Registration.xml

2.2. Integration Packs Required

The solutions requires the following Integration Packs:

Microsoft

- System Center 2012 R2 Virtual Machine Manager Integration Pack
- System Center Integration Pack for Windows Azure

Kelverion

- SQL Server Integration Pack
- Data Manipulation Integration Pack
- Network Messaging Integration Pack
- Runbook Management Integration Pack
- Text Manipulation Integration Pack
- Integration Pack for Amazon EC2
- Integration Pack for VMWare vSphere

Before importing any Runbooks please insure these Integration Packs are installed in Orchestrator. If you do not already have Kelverion Integration Packs they can be downloaded for evaluation from our website.

2.3. Kelverion Automation Portal

This version of the solution is designed to be triggered from the Kelverion Automation Portal. The Portal needs to be deployed before the Service and Offerings can be installed. Please see separate documentation for instructions on how to deploy the Kelverion Automation Portal.

2.4. Persistent Data Store

The Persistent Data Store (PDS) is a SQL Server database that is used by this Solution to allow all of the actions that the Runbooks take to be carried out in a robust way. The use of the database at each “step” allows us to design the Runbooks such that each Runbook is simple and can be considered a discrete unit. In programming terms it allows the Runbooks to be modular.

In your environment there may be a number of constraints that control the creation of a new database. For example the location of the log and data files, the recovery options that should be used, and the collation of the server. These requirements are typically specified by the DBA responsible for your database server. These options do not affect the Runbooks so please use the appropriate options for your environment.

Location

Typically the PDS is created on the same database instance as is used for the Orchestrator database. There is no specific requirement that this must be the case. In environments where there is very high load you may find that creating the PDS on a different database instance advantageous.

Database version

The Runbooks provided, have been tested against SQL 2012 with the latest patches and updates applied. You may need to modify the SQL Script to get it to operate in your environment or to install it on older versions of SQL Server.

Collation

The Runbooks have all been developed on systems using **Case Insensitive** collations, the specific collation setting used for your environment must be case insensitive other than that though the setting can be chosen as appropriate for your environment.

Sizing

The minimum recommended size of the PDS is 1GB.

The amount of space required will depend on the two following factors:

- Number of requests processed
- Housekeeping frequency

3. PDS Creation

Each Kerverion Automation Solution uses a set of common tables within the PDS Database and a set of tables specific to itself.

As part of each solution package you are provided with a SQL script which will generate the PDS database tables required for the solution. When the SQL scripts are executed they check for the existence of each table they required in the PDS database. If this is a new installation they will create both the Common Tables and their Solution Specific database tables. If you are already using a Kerverion Automation Solution then the script will detect that some of the tables this solution requires already exist and the script skips these table creation steps and creates only the tables which do not exist in your installation.

The VM Provisioning and Management Solution additionally deploys tables to support a CMDB function. This is used to contain information (CI's) about the configuration of the virtual machine environment as well as information on the Virtual Machines themselves. These additional tables are stored in the PDS_LIVE database and accessed in the same way as other tables in the PDS.

3.1. PDS Creation Steps

1. Create a New Database on your SQL Server called PDS_Live or connect to your existing PDS_LIVE database
2. Then execute the SQL Script provided within the PDS_Live database you created.
3. Once the PDS_Live database is created you must ensure the Orchestrator Runbook Server Service Account has as a minimum Read and Write Access permissions to the PDS_Live database.

3.2. Additional CMDB Tables

Once the PDS has been set up then the CMDB tables can be loaded using the separate SQL installation script. Note these tables will need to be populated with the relevant CI data before the Solution can be consumed.

If a previous version of the VM Provisioning and Management Solution has been deployed that used System Center Service Manager, the data can be extracted directly and imported using a simple disposable Runbook for each of the tables.

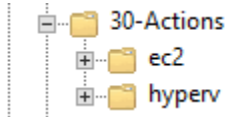
3.2.1. VMProvisioning.Portal_VM_Infrastructure

This table contains information on the virtual machine hosting providers, or infrastructure, and the path to the relevant Runbook in the VM Provisioning and Management Solution.

Example Data:

InfrastructureName	InfrastructureRunbookPath	ObjectStatus	DisplayName
Microsoft HyperV	hyperv	Active	Microsoft HyperV
VMware vSphere	vSphere	Active	VMware vSphere
Microsoft Azure	Azure	Active	Microsoft Azure
Amazon EC2	ec2	Active	Amazon EC2

Note: The 'InfrastructureRunbookPath' property is used to identify the appropriate runbook to be executed for this particular infrastructure type. And must match exactly the folder name within Orchestrator. These names are case sensitive.



3.2.2. VMProvisioning.Portal_VM_Infrastructure_Instances

This table contains information on the standard instance types of virtual machines that can be deployed. This information includes number of CPUs and Memory etc. and matches it to the hosting infrastructure.

Example Data:

CPUs	MemoryGB	InstanceName	HddSizeGB	OsName	InstanceId	ObjectStatus	DisplayName
2	8	t2.Large	NULL	NULL	NULL	Active	Amazon EC2
1	2	t2.small	NULL	NULL	NULL	Active	Amazon EC2
1	1	vSphere.micro	10	NULL	NULL	Active	VMware vSphere
0.5	0.8	Azure.ExtraSmall	any	Any	ExtraSmall	Active	Microsoft Azure
1	3.5	D1	30	NULL	12345	Active	Microsoft Azure
1	2	Small	40	NULL	NULL	Active	Microsoft HyperV

NOTE: it is important that the 'InstanceName' exactly matches the names available in your target infrastructure.

3.2.3. VMProvisioning.Portal_VM_Infrastructure_Networking

This table contains information on the Virtual Networks that the virtual machines can be attached to. This information is matched to the hosting infrastructure and region.

Example Data:

Infrastructure	RegionZone	NetworkName	NetworkID	NetworkACLs	ObjectStatus	DisplayName
Microsoft Azure	Central US	Central US	1234	NULL	Active	Microsoft Azure
VMware vSphere	DC_01	Test	123456	NULL	Active	VMware vSphere
Amazon EC2	us-east-1b	subnet-7ab7973c	subnet-7ab7973c	sg-6026eb05, sg-f7975b92	Active	Amazon EC2 - DOMAIN
Microsoft Azure	East US2	Lab	123456	NULL	Active	Microsoft Azure - Lab
Microsoft HyperV	Test Lab	Lab Domain	123456	NULL	Active	Microsoft HyperV - Lab Domain

It is important to ensure that the Network properties are correctly configured to match your environment as the values selected are used within the runbooks to

configure the newly deployed virtual machine. Incorrect configuration of these values typically lead to virtual machine deployment failures, or machines that have invalid network configuration.

3.2.4. VMProvisioning.Portal_VM_Infrastructure_Regions

This table contains data on the Hosting Provider's Regions and Zones. Note the employment of multiple Zones is only for very large organisations and this solution will require extending to make use of more than one Zone per Region.

Example Data:

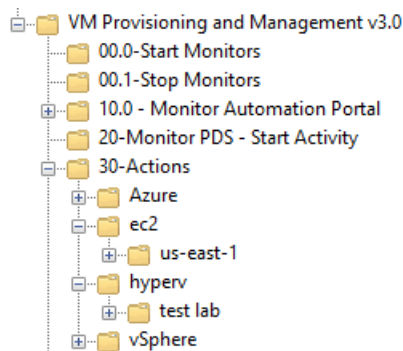
Infrastructure	Region	RegionRunbookPath	RegionZone1	ObjectStatus	DisplayName
Microsoft HyperV	Test Lab	test lab	test lab	Active	Microsoft HyperV Test Lab
VMware vSphere	DC_01	TestLab	Test VMs	Active	VMware VSphere TestLab
Amazon EC2	US-EAST-1	us-east-1	us-east-1b	Active	Amazon EC2 US-EAST-1
Microsoft Azure	East US2	east-us2	East US2	Active	Microsoft Azure - East US2
Microsoft Azure	Central US	Central US	safs	Active	Microsoft Azure - Central US

If you examine the runbook folder structure beneath \VM Provisioning and Management v(n)\30-Actions, you can see that beneath each Virtualisation Infrastructure type there is a folder to match region that will be targeted.

This CI Class is also used to separate out Development VM infrastructure from Production VM infrastructure in on premise situations.

In the case of the Azure configuration we need to specify the storage account that is associated with this Regional Information. This is done by setting the value for the Region Zone 1. In the example data below the storage account name is "safs".

NOTE: The "Region Runbook Path" property of the CI must match exactly the name of the folder in Orchestrator, this property is case sensitive.



3.2.5. VMProvisioning.Portal_VM_Infrastructure_Templates

This table contains information on the templates that are used to create the base image. This data is typically generated by the Infrastructure providers and updated periodically. It is recommended that a method of synchronising this data is created

to ensure that future virtual machines are created from up-to-date and available templates.

Example Data:

TemplateName	TemplateDescription	TemplateID	Architecture	Platform	ObjectStatus	Infrastructure
TKLBase	Tum Key Linux Base system	VirtualMachine-vm-200	x64	Tum Key Linux	Active	VMware vSphere
Windows Server 2012 R2 Datacenter	Windows Server 2012 R2 Datacenter	a699494373c04fc0bc8f2bb1389d6106_Windows-Server...	x86_64	Windows	Active	Microsoft Azure
TestVM_T_01	Microsoft Windows Server 2008 R2 (64bit)	VirtualMachine-vm-200	x86_64	Windows	Active	VMware vSphere
TestVM_T_03	Microsoft Windows Server 2008 R2 (64bit)	VirtualMachine-vm-501	x86_64	Windows	Active	VMware vSphere
Windows_Server-2008-R2_SP1-English-64Bit-SQL_2012...	Microsoft Windows Server 2008 R2 SP1 Datacenter ...	ami-00bec816	x86_64	Windows	Active	Amazon EC2
Windows_Server-2016-English-Full-Base-2016.11.09	Microsoft Windows Server 2016 Base AMI provided b...	ami-b06249a7	x86_64	Windows	Active	Amazon EC2
Windows_Server-2008-R2_SP1-English-64Bit-Base-2017...	Microsoft Windows Server 2008 R2 SP1 Datacenter ...	ami-b36b1da5	x86_64	Windows	Active	Amazon EC2
Windows Server 2012 R2	Standard Windows Server 2012 R2 Build	123456	x86_64	Windows	Active	Microsoft HyperV
VT-Win7	Windows 7	VirtualMachine-vm-66	X64	Windows	Active	VMware vSphere
Windows_Server-2012-R2_RTM-English-64Bit-Base-201...	Microsoft Windows Server 2012 R2 RTM 64-bit Local...	ami-271b6d31	x86_64	Windows	Active	Amazon EC2
Windows_Server-2012-R2_RTM-English-64Bit-SQL_201...	Microsoft Windows Server 2012 R2 RTM 64-bit Local...	ami-ad7402bb	x86_64	Windows	Active	Amazon EC2
Windows_Server-2016-English-Full-Base-2017.05.22	Microsoft Windows Server 2016 with Desktop Experie...	ami-f1b5cf7	x86_64	Windows	Active	Amazon EC2

3.2.6. VMProvisioning.Portal_VM_Infrastructure_VmInfo

This table holds information on the Virtual Machines that are being managed by the solution. Each row represents a virtual machine Configuration Item and contains the basic configuration and state information. This table can be extended to contain additional data as required. A method of ensuring data consistency with the upstream system will need to be developed if a separate CMDB is used with this solution.

Example Data:

FQDN	DeploymentType	Infrastructure	Region	Zone	VMTemplateUsed	VMInstanceName	AssetStatus
rc-vs-test030.lab.kelverion.com	Custom	VMware vSphere	DC_01	Test VMs	TKLBase	vSphere.Medium	Running
RC-TEST-0001.lab.kelverion.com	Custom	Microsoft Azure	Central US	safs	Windows Server 2012 R2 Datacenter	Azure.ExtraSmall	Running
RC-VS-TEST033.lab.kelverion.com	Custom	VMware vSphere	DC_01	Test VMs	TKLBase	vSphere.Medium	Running
RC-TEST-0002.lab.kelverion.com	Standard	VMware vSphere	DC_01	Test VMs	TKLBase	vSphere.micro	Running

Two critical fields are required by the solution that may not be populated during a typical data load. They are the 'AssetStatus' and 'DeploymentType' fields.

AssetStatus can be set to 'Running' as a default setting or 'Deleted' if the machine has been retired but not removed from the CMDB. The DeploymentType field needs to be set to either 'Standard' or 'Custom' depending on whether the VM used a predefined InstanceType, such as 't2.small', or whether a completely custom setup was used to build the VM.

4. Automation Portal Service Offering Data Load

The Kolverion Automation Portal should have been installed as part of the pre-requisites, if not then do this before proceeding. The steps described in this section will install the required Service, Offerings and associated configuration into the Automation Portal to present the user with a front end to the VM Provisioning Solution.

The Automation Portal export file for this solution will create all of the required components within the Automation Portal. You will need to update the query configurations to ensure that they point to the SQL Instance and PDS database that you have created and configured in section 3.

Follow the instructions in the Automation Portal Users Guide (P35-P36) to import the file *“VM Provisioning and Management Solution v3.1.export”* which is included in the solution zip file.

Once the Automation Portal configuration has been imported, you **must** update the queries to use the SQL Server instance, and database that is used in your environment, page 39 of the Automation Portal Users guide explains how to edit a query configuration.

4.1. Removing Unwanted Offerings

The solution comes with Offerings for Amazon EC2, Microsoft Azure and HyperV and VMware vSphere. If one or more of these are not deployed in the target environment, then the corresponding Offerings can be removed from the Service. Note, you will need to be in the Automation Portal Admins group to carry out these instructions.

At the top of the Automation Portal is the main toolbar. Click on the link to the ‘Admin’ section, then the ‘Services’ option and then the ‘VM Provisioning and Management’. This will then display a list of the Offerings that are contained in the Service.

For example, if the Amazon EC2 Offerings are not required they can be deleted by clicking on the ‘Actions’ button on the right of the Service Offering and then clicking on ‘Delete’. This step can be repeated on all the Amazon EC2 Offerings in the Service. It is recommended that the associated Runbooks in Orchestrator are not removed.

Service Offerings

New Offering

Add, modify or delete an offering for this service.

Name	Created	Updated	Active	Owner	AD Security Group	Action
Deploy a Standard VM to Amazon EC2	4/11/2017 10:13:38 AM	4/11/2017 12:07:56 PM	True	LAB\mbedford	GG-Automation Portal Users	<div>Actions</div> <div> Edit Delete Move Down </div>
Deploy a Standard VM to Microsoft Azure	4/11/2017 10:54:17 AM	4/11/2017 12:08:24 PM	True	LAB\mbedford	GG-Automation Portal Users	

This action does not actually remove them from the database, it just marks them as deleted. They can be re-published to the Automation Portal by finding the associated record in the 'AutomationPortal' database, 'dbo.Offering' table, and changing the 'Deleted' field from 1 to 0.

5. Solution Configuration

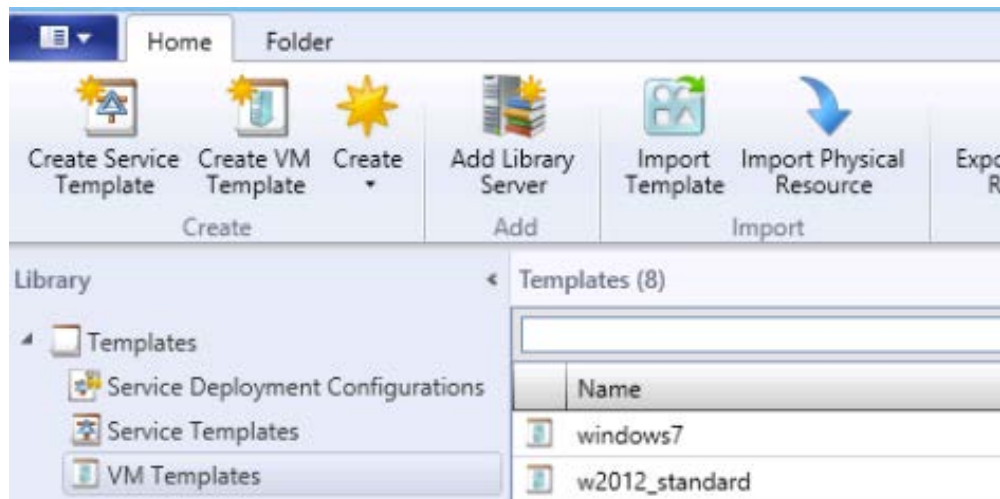
5.1. System Center Orchestrator Configuration

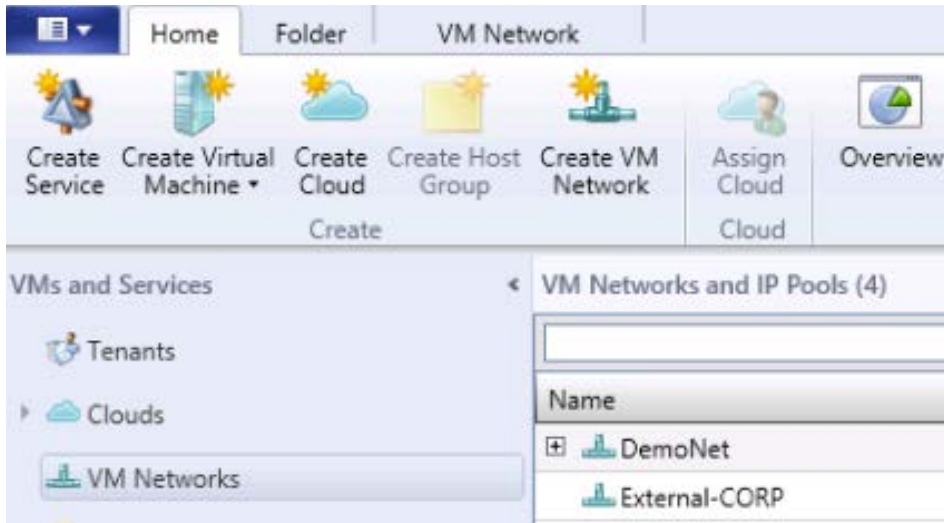
To use the Solution you have to do a series of simple configuration steps to make the Runbooks operate in your environment. These configuration settings are made from the Orchestrator Options menu for each of the products listed below.

- Keverion SQL Server IP
- Keverion Data Manipulation IP
- Keverion Network Messaging IP
- Keverion Runbook Management IP
- Microsoft System Center Virtual Machine Manager IP
- Microsoft Azure IP
- Keverion Amazon EC2 IP
- Keverion VMWare vSphere IP

5.2. System Center Virtual Machine Manager Dependencies

In order for the VM Provisioning and Management solution to operate successfully, it is assumed that VMM has suitable VM templates and VM Networks available.





For example, this will be necessary when 'Deploying a VM from template'. This request offering will display the VM Templates and VM Networks available for selection.

6. Installing Temporary License of Kerverion Integration Packs

To run the solution you will need a full or evaluation licence key for Kerverion Integration Packs.

The licence files need to be copied into a folder called C:\Program Files (x86)\Kerverion Automation\Licenses. If this folder does not already exist on your system please first create the folder C:\Program Files (x86)\Kerverion Automation\Licenses and then copy the attached files into it.

The license key is regularly updated as it includes a specific license end date after which the product will no longer work. If you have a license or date format error on trying to run this product please contact info@kerverion.com detailing date of download and error details.

To purchase a license please contact your Kerverion representative, reseller or email info@kerverion.com

7. Upgrade Warning

The runbooks provided in this VM Provisioning and Management Solution are provided for installation in a clean Orchestrator environment. If you have deployed any previous versions of this Automation Solution then installing this version will overwrite any changes you have made to the currently deployed Runbooks.

You can either delete your existing Runbook deployment and then install this new Automation Solution set or manually upgrade your existing deployment.

The installation of the Kelverion Automation Portal data assumes that there are no other Services with the same names already installed in the Portal. The import process will warn you if there are any conflicts before importing the data. In the event of conflicts you should rename the conflicting items before import to ensure that duplicate service and/or offering names are created.

8. Notes

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