

# Virtualization: Build an IT Lab for Virtual Machines

*Do you have a demand for testing hardware to support new projects and updates? A virtual test lab could fit the bill.*

## Thomas Vater and Andreas Rynes

Are you frustrated because your IT staffers are constantly demanding hardware for testing—hardware that you don't have in your budget? Then you're dealing with a problem that's probably as old as IT itself.

Everybody talks about virtualization for datacenters, but what about virtualization for IT labs and development environments? Virtualization provides a significant degree of efficiency, flexibility and cost savings. It also reduces the friction between IT professionals and business unit leaders when the subject is additional funding for dedicated lab or development infrastructure.

Previously, your IT staff only had a couple of options for dealing with these tasks. They could use their own work desktops or laptops, or allocate budget money to buy hardware to support their testing and development needs. Both of these methods are inefficient in terms of use of budget and time.

Hardware is often purchased when there's plenty of unused hardware still available. This is expensive and time-consuming for everyone involved. Another disadvantage is that you can't move or transfer hardware or the tools and applications running on a particular desktop or laptop, so there's limited flexibility with that approach.

Another possibility for establishing a testing or development platform is to use laptop hardware with Virtual Server or Hyper-V installed. This is more flexible for moving the lab around to customers, but has many disadvantages as well:

- Installation and provisioning new virtual machines (VMs) wastes a lot of productive time
- Most installation source files need to be locally available
- Running multiple VMs on a laptop requires a significant amount of memory—you can't recreate certain scenarios
- Disk drives don't deliver high performance and create a bottleneck
- Disk space for VMs and installation sources is limited
- Extensive backup scenarios
- Little flexibility in creating different networks

You need a highly flexible, centralized lab infrastructure that everyone can use with the least amount of administrative effort. You don't want to require staff dedicated to running the lab environment. Any virtual infrastructure has to include all needed components for self-service, without the need for technical or organizational routine tasks.

## The Virtual Solution

One of the more effective virtual solutions for developing and maintaining a virtual lab setting is built around a central infrastructure of Hyper-V hosts grouped by Microsoft System Center Virtual Machine Manager (VMM) and running VMM Self Service Portal 2.0 on top. This is what we used to set up our virtual test lab. The technologies include:

- Windows Server 2008 R2 Hyper-V
- VMM 2008 R2
- VMM Self-Service Portal 2.0
- SQL Server 2008 R2
- Windows Server Update Services (WSUS)
- Forefront Threat Management Gateway (TMG) 2010

Two Hyper-V hosts have a minimum of two physical network adapters each (see **Figure 1**). One network adapter is connected to the corporate network. A second adapter serves the internal IT lab network, which is isolated from the production network. Both hosts are members of a VMM host group.

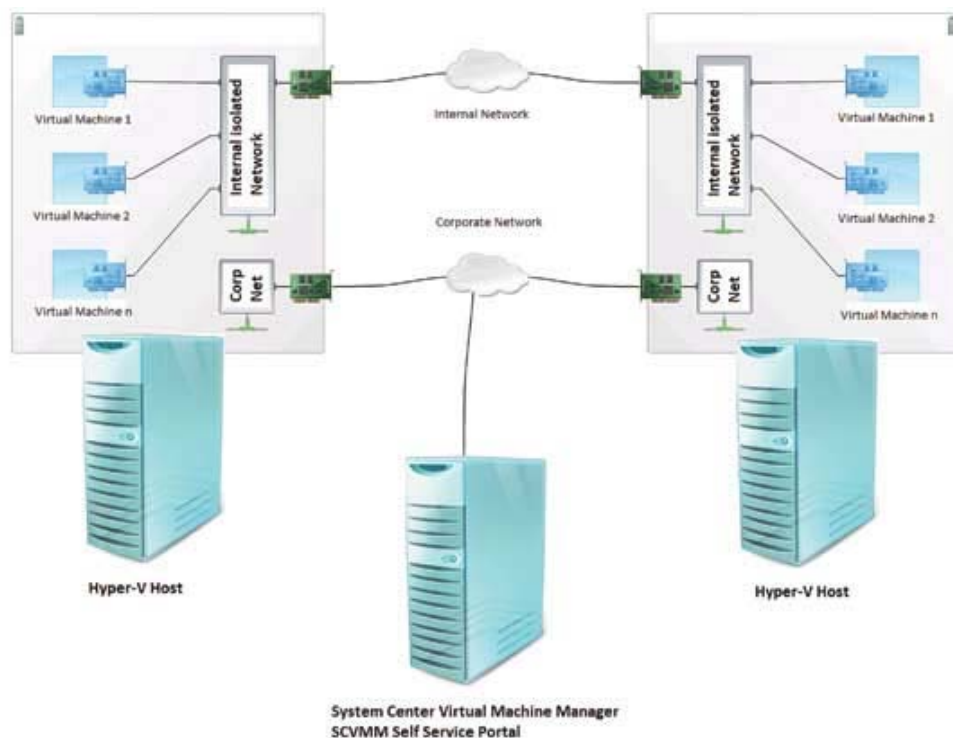


Figure 1 **The physical base infrastructure of a virtual lab environment.**

A third physical machine (that doesn't even have to be that powerful) runs VMM and SQL Server 2008 R2, and hosts the Web server for the VMM Self Service Portal.

Inside the virtual IT lab, we built a minimum core infrastructure. This consists of an Active Directory Domain Services (AD DS) domain controller (DC) that also acts as the WSUS server for the internal environment. There's also a virtual SQL Server 2008 R2 two-node cluster and a VM acting as Forefront TMG 2010.

This virtual base infrastructure is convenient for someone who needs to create new VMs and wants them to join an existing domain without worrying about Windows Updates, installing Active Directory or installing SQL Server. It receives Windows Updates via the virtual WSUS server. There's a domain policy in the virtual domain that configures all domain-joined machines to use this WSUS server automatically. The Forefront TMG 2010 server provides access to the Internet from the isolated internal network via the corporate network.

There's a lengthy but straightforward list of initial tasks required to set up the lab:

- Setup of central hosts with Windows Server 2008 R2 Hyper-V
- Install Windows Server 2008 R2
- Check the Hyper-V Getting Started Guide
- Set up VMM server with Windows Server 2008 R2, SQL Server 2008 R2, VMM 2008 R2 and VMM Self-Service Portal 2.0 (including the dashboard functionality)
- Instal the VMM server
- Check the VMM 2008 R2 Self-Service Portal 2.0
- Configure a Host Group in VMM and join your central Hyper-V hosts
- Configure at least one virtual network—this is bound to the second network adapter of the hosts

There are some other preparation steps as well. You'll have to prepare Sysprepped images for each type of VM you want to provide your users in the VMM Library (this is initially the most time-consuming part of the solution). Microsoft provides images for Windows XP, Windows Vista, Windows 7, Windows Server 2003, Windows Server 2008 and Windows Server 2008 R2.

There are different ways to do this step: One is to set up a VM with the base OS and run Sysprep from the VMM console. This basically prepares the image with Sysprep and moves it as a template to your VMM installation library. If you need to do a manual Sysprep within your VM, you can manually add the Sysprepped images as VM Templates to the VMM library.

You'll also need to predefine hardware profiles for the VMs and configure them to use the virtual network. This is separate from the corporate network. You can also add additional software shares (for installing additional software on the VMs) to the library. You can allow access for your users with their corporate user accounts to these library parts, so these items are available in the Self Service

Portal.

Configure a basic structure for the Self Service Portal in the form of a business unit, infrastructure, service and service roles. Here you have the flexibility to create a structure that's the most useful one for your requirements.

The hierarchy in our solution looks like this:

- Business Unit: Services AT
- Infrastructure 1: ATSERVICES-Infrastructure
- Service 1: Services LAB
- Service Role 1: LABService
- Infrastructure 2: Sales-Infrastructure
- Service 1: Sales Service
- Service Role 2: Sales Role

This is just a simple setup for a basic separation of two different environments. One environment is for Microsoft services employees to create testing scenarios. The other is for Microsoft salespeople to create product demonstrations.

There are a variety of optional steps you can take to add additional features, depending on your needs:

- Configure a certificate for the Self Service Portal Web site to provide SSL communication
- Set up a virtual DC and create a default Windows domain for the internal environment
- Create user accounts so they can join machines to the domain
- Install the Dynamic Host Configuration Protocol (DHCP) server on the virtual DC, which makes it convenient for every new preconfigured VM to request an IP address
- Install and configure WSUS on the virtual DC
- Configure a domain-wide Group Policy Object (GPO) that configures each domain-joined machine to use the internal WSUS server and configure the Windows Update parameters
- Install Forefront TMG 2010 to provide Internet access from within the VMs on the separated network using the Firewall Client for Internet Security and Acceleration (ISA)
- Provide network shares that are accessible from the corporate network and from the internal virtual network if users have to transfer data between the two environments
- Associate costs and limits in the Self Service Portal to create guidelines for your users and force diligent infrastructure usage

This is only a sample configuration, done according to one organization's requirements. You need to identify and address *your* needs and the capabilities of *your* underlying virtualization hardware.

## Virtual Visuals

The images in **Figures 2, 3,4** and **5** should give you an impression of how the solution looks in real life.

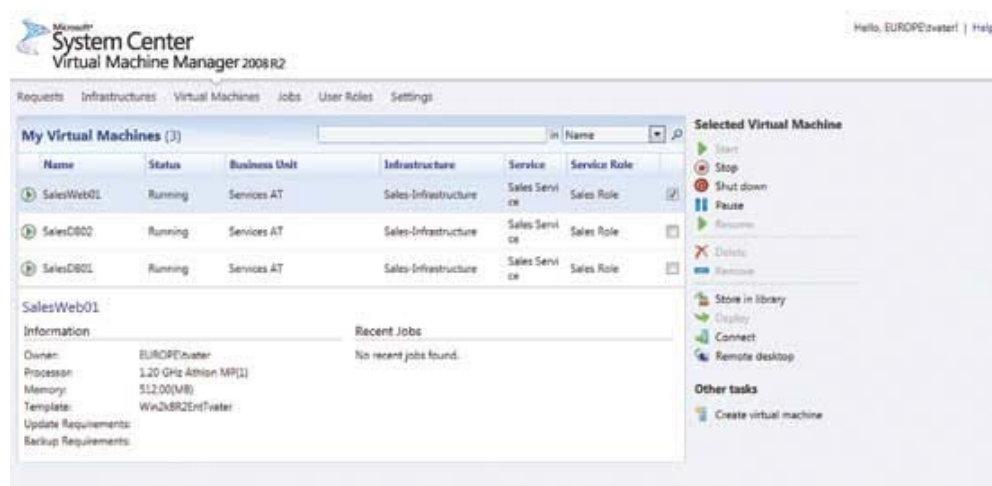


Figure 2 A sample console view of the Self Service Portal with several VMs.

Microsoft  
System Center  
Virtual Machine Manager 2008 R2

Hello, EUROPEstateIT | Help

Requests | Infrastructures | Virtual Machines | Jobs | User Roles | Settings

### Create Virtual Machine

Join Infrastructure

Information

Business Unit: Services AT

Infrastructure: Contoso ITLab

Service: Contoso ITLab

Service Role: Contoso ITLab Service

Information

Name virtual machines: ☒ With a single name and sequential number ☐ Individually

Number of virtual machines to create: 3

Computer Name: Contoso-DC Index suffix start: 01

When you create more than one virtual machine and you use index suffixes, the index suffix will be appended to the name you specify here. For example, if you create four virtual machines with the name WebServer and the index suffix 001, the final names would be WebServer001, WebServer002, WebServer003, and WebServer004.

Template

Apply this virtual machine template: Windows Server 2008 R2 Enterprise [View properties](#)

Network

Select one or more networks for these virtual machines to use:

Select	Network Name	Hyper-V Network Name	Static Network	Domain Joined	Connected to VLAN	VLAN ID	Static MAC Address
<input checked="" type="checkbox"/>	ContosoVLAN1	ContosoVLAN1	No	No	Yes	1	<input checked="" type="checkbox"/>

Figure 3 The standard form for creating a new VM with the VMM Self Service Portal.

Microsoft  
System Center  
Virtual Machine Manager 2008 R2

Hello, EUROPEstateIT | Help

Requests | Infrastructures | Virtual Machines | Jobs | User Roles | Settings

### My Infrastructures (2)

Filter by Business Unit: All Business Units

Name	Virtual Machines	Provisioned	Business Unit	Contact
Contoso ITLab	0	21.03.2011 12:46:58	Services AT	ITLab@contoso.com
Sales Infrastructure	1	18.03.2011 11:17:18	Services AT	ITLab@contoso.com

Services & Service Roles

Service: Contoso ITLab  
Service Role: Contoso ITLab Service

Virtual Machine Templates

Name	Cost	
Windows Server 2003 R2 x86	10.00	
Windows 7 Ultimate x64	5.00	
Windows Server 2008 R2 Enterprise	30.00	

Information

Infrastructure Name: Contoso ITLab Attached File

Decommission (expected): 04.01.2013

Memory Capacity (reserved): 250.00 GB

Storage Capacity (reserved): 2,000.00 GB

[Get information](#)

Selected Infrastructure

- Create virtual machine
- Create change request

Selected Business Unit

- Edit properties

Other Tasks

- Create infrastructure request

Figure 4 A sample overview of configured infrastructures.

Microsoft System Center Virtual Machine Manager 2008 R2

Hello, EUROPE\water | Help

Requests | Infrastructures | Virtual Machines | Jobs | User Roles | Settings

**My Requests (18)** Filter by Business Unit: All Business Units

ID	Opened	Modified	Business Unit	Type	Priority	Requested By	Status
CR19	21.03.2011 12:56:01	21.03.2011 12:56:54	Services AT	Change Request	Low	EUROPE\water	Approved
CR17	21.03.2011 12:53:11	21.03.2011 12:53:41	Services AT	Change Request	Low	EUROPE\water	Approved
IR16	21.03.2011 12:40:12	21.03.2011 12:40:39	Services AT	InfrastructureService	Low	EUROPE\water	Approved
CR15	21.03.2011 12:38:17	21.03.2011 12:38:26	Services AT	Change Request	Low	EUROPE\water	Approved
CR14	21.03.2011 12:26:38	21.03.2011 12:26:51	Services AT	Change Request	Low	EUROPE\water	Approved
CR4	21.03.2011 12:20:43	21.03.2011 12:21:19	Contoso	Onboarding	Low	EUROPE\water	Approved
CR12	21.03.2011 12:15:38	21.03.2011 12:16:32	Services AT	Change Request	High	EUROPE\water	NotApplicable
IR11	21.03.2011 11:52:08	21.03.2011 12:14:37	Services AT	InfrastructureService	Medium	EUROPE\water	Approved
CR10	18.03.2011 11:09:25	18.03.2011 11:09:25	Services AT	Change Request	Low	EUROPE\water	NotApplicable
IR8	17.03.2011 23:01:16	18.03.2011 11:17:18	Services AT	InfrastructureService	High	EUROPE\water	Approved

1 2

**IR8**

This request has been approved.

Services & Service Roles: Virtual Machine Templates

Service: Sales Service: Win2kSR25en\water

Service Role: Sales Role

Information

Approval Comments: OK Approved Justification: Sales environment

Infrastructure Name: Sales-Infrastructure Additional Information:

Decommission (expected): 18.03.2013 Attached File:

Memory Capacity (forecast): 500.00 GB

Storage Capacity (forecast): 500.00 GB

**Selected Request**

Approve  
Reject  
Delete  
Reactivate request

**Other Tasks**

Create infrastructure request  
Register business unit

Figure 5 A sample overview of requests submitted through the Self Service Portal.

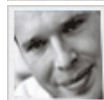
Using this solution to maintain a testing and development lab helps us with a lot of tasks. It also aids in decreasing the budget spent for hardware, as we use available hardware much more efficiently.

One of the really cool facts about our implementation is that we can access it from anywhere. We use the Direct Access Infrastructure of the Microsoft corporate network without needing a VPN connection.

We're now working on extending this "basic private cloud" to the "premium version." Microsoft Consulting Services has built a solution called "Datacenter Services Solution," which provides extended workflows and the highest level of automated provisioning (utilizing System Center "Opalis," System Center Configuration Manager, System Center VMM, System Center Operations Manager and a customizable Web portal). It also uses multinode clustering, and automated host patching provides high availability.



**Thomas Vater** joined Microsoft nearly 10 years ago and works as a senior consultant, focusing on infrastructure technologies for virtualization, identity and security. He holds a Microsoft Certified Master for Windows Server 2008 R2, Directory.



**Andreas Rynes** began his IT career at Microsoft as a software development consultant for .NET, SQL Server and BizTalk projects. He's currently a solution architect responsible for datacenters and virtualization, where he focuses on Infrastructure as a Service and System Center projects.

## Related Content

- [System Center Virtual Machine Manager 2012: VMM Gets Major Upgrade](#)
- [Cloud Computing: Achieving Control in the Hybrid Cloud](#)
- [Virtualization: Hyper-V and High Availability](#)