

Implementing Private Cloud Storage and Virtualization using Windows Server 2012

Windows Server 2012 R2

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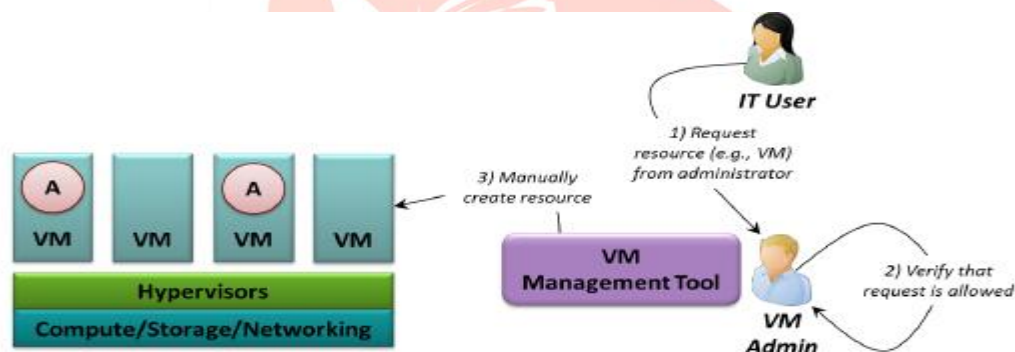
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Abstract - The benefits of the cloud are clear. You get added flexibility and easy access to additional resources. Virtualization is the best place to start, giving you improved utilization of the resources you have today. With the built-in virtualization capabilities of Windows Server, you'll get best-in-class features and performance. When you add the capabilities of System Center, you can build cloud elasticity and scalability into the datacenter using automation, resource pooling, and dynamic provisioning.

Index Terms - Cloud computing, hypervisor, virtualization, data center.

I. INTRODUCTION

What is a Private Cloud? What exactly is a private cloud? And how is it different from traditional virtualization? Both questions have straightforward answers. In a traditional virtualized environment, like those in most enterprises today, getting new resources requires human intervention. For example, if a developer needs a new VM, what happens commonly looks something like the process shown in Figure.



In traditional virtualization, and IT user requests resources from a person, then waits for a verification process to complete.

What Is Server Virtualization?

Server virtualization:

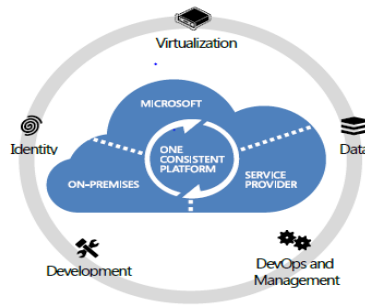
- You can create and run multiple computer operating systems on a single physical computer
- Host servers share resources with all the virtual machines

Virtualization challenges:

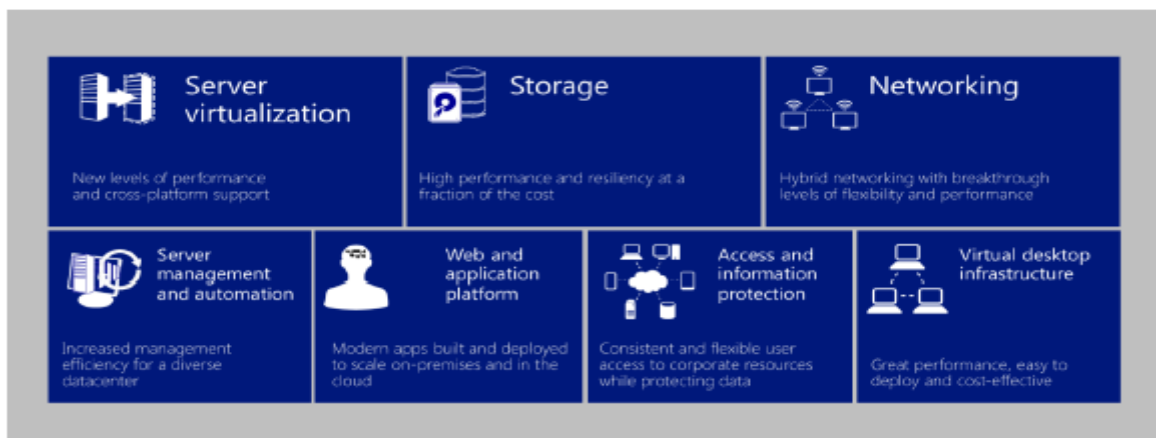
- Limited number of compute resources

Server virtualization features:

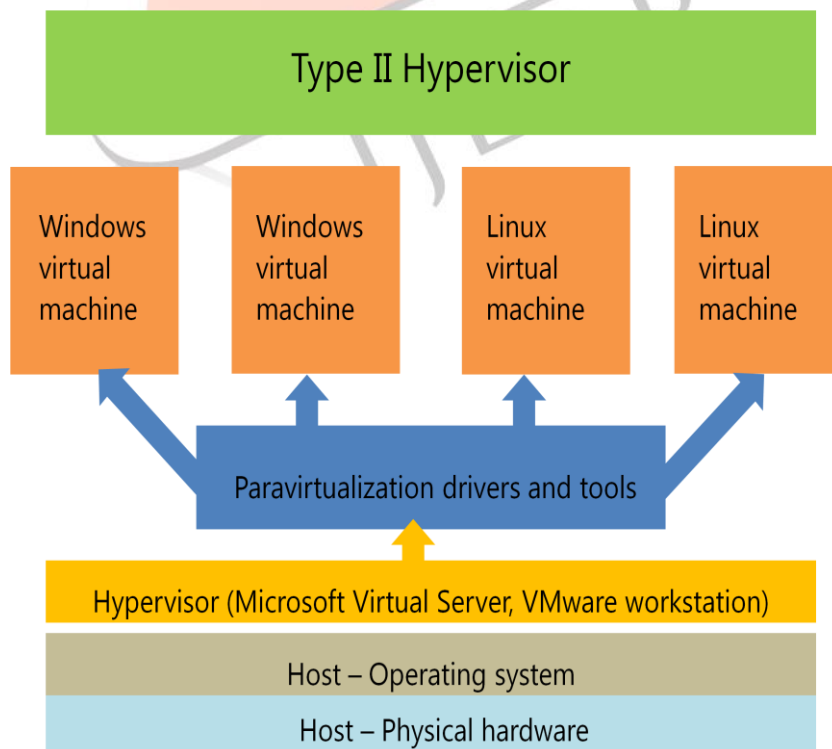
- Hyper-V server virtualization feature allow full utilization of physical resource and provide advanced technology to make a more robust, available and dynamic server computing environment.



Windows Server Hyper-V is a sophisticated and feature-rich virtualization platform that has helped organizations of all sizes realize considerable cost savings and operational efficiencies. With Windows Server 2012 R2, server virtualization with Hyper-V is pulling ahead of the competition with industry leading size and scale, making Hyper-V the platform of choice for you to run your mission critical workloads. Using Windows Server 2012 R2, you can take advantage of new hardware technology, while still utilizing the servers you already have. This way you can virtualized today, and be ready for the future.

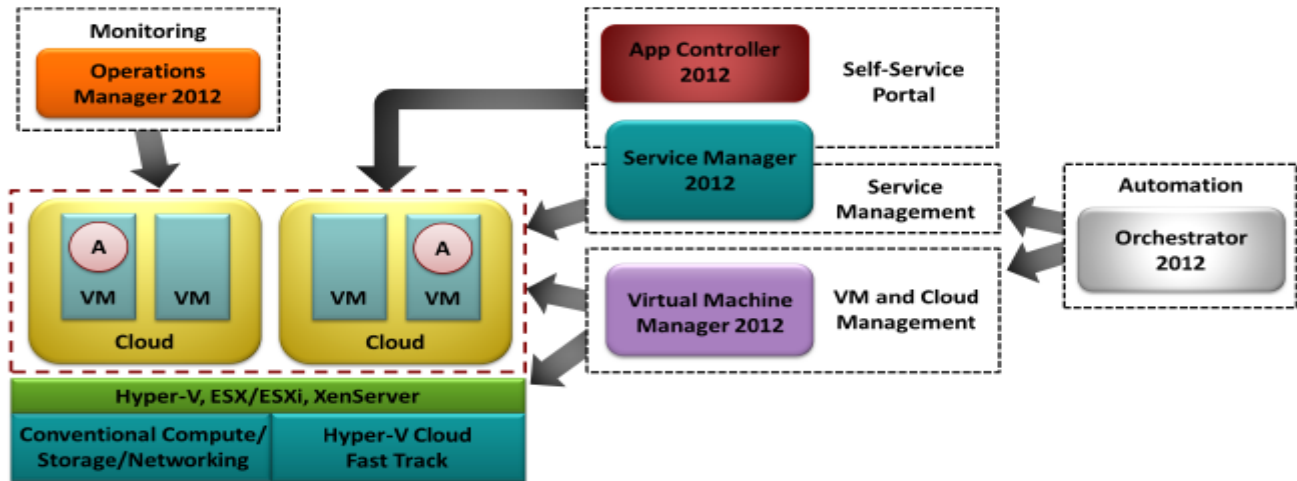


Whether you are looking to expand VM mobility, increase VM availability, handle multi-tenant environments, gain bigger scale, or gain more flexibility, Windows Server 2012 R2 with Hyper-V gives you the platform and tools you need to increase business agility with confidence.



II. CREATING A PRIVATE CLOUD WITH SYSTEM CENTER 2012

System Center 2012 allows creating and using private clouds. Customers and partners can use these technologies to offer traditional IaaS services, such as VMs on demand. This technology family also provides more, with support for deploying multi-tier applications, monitoring and updating those applications, and automation services to make all of this more efficient. Figure illustrates the primary technologies used to construct a Microsoft private cloud.



As the figure shows, the Microsoft private cloud supports three different hypervisors: Microsoft Hyper-V, VMware ESX/ESXi, and Citrix XenServer. It also supports conventional compute, storage, and networking hardware along with pre-packaged hardware configurations that conform to the Hyper-V Cloud Fast Track specification. Building on this foundation, System Center 2012 can create a private cloud. The main components used to do this are the following:

System Center Virtual Machine Manager (VMM) 2012, which provides the fundamental services for creating and managing clouds. It also provides the technologies used to deploy and update VMs and applications.

System Center App Controller 2012, a self-service portal for requests made directly to a private cloud created with VMM 2012. (As described later, this portal can also be used with Windows Azure.)

System Center Service Manager 2012, which provides automated IT service management and an associated self-service portal. If an organization wishes to define a process with human approvals for some private cloud scenarios, for example, Service Manager 2012 makes this possible.

System Center Orchestrator 2012, providing a way to automate interactions among other management tools such as VMM 2012 and Service Manager.

System Center Operations Manager 2012, which can monitor VMs, applications, and other aspects of a private cloud, then initiate actions to fix problems it detects.

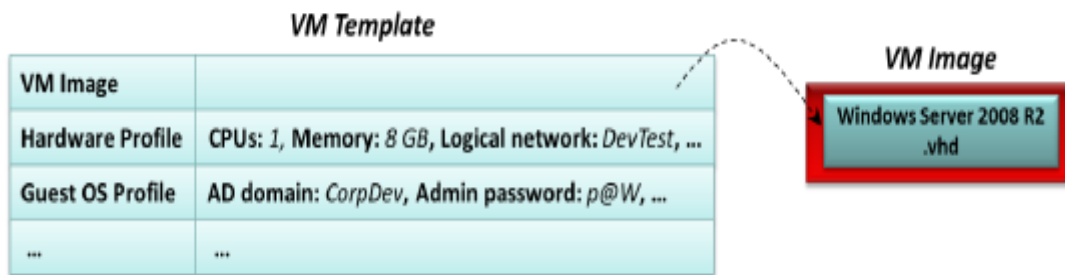
Creating a Cloud

As described earlier, an administrator creates clouds using Virtual Machine Manager 2012. The physical resources a cloud uses can come from either *host groups*, each of which can contain some combination of physical servers running Hyper-V, ESX/ESXi, or XenServer, or *VMware resource pools*, which contain only servers running ESX/ESXi. For each cloud, the administrator can specify its total capacity along with many details: what its VMs can look like (including options for processors, memory, disks, and network interface cards), whether the VMs use HA, and more. The administrator can also create different categories of storage, giving each one a different name. For example, Gold storage might be fast and expensive, while Silver storage is slower but cheaper. An IT user creating a VM in that cloud can then choose the storage option that best meets her needs by specifying just the category's name—she needn't be aware of the underlying details.

The VMM administrator also defines what the cloud's users are allowed to do. Along with per-user quotas, VMM 2012 provides a range of fine-grained options for specifying this. There are separate permissions for authoring a VM template or service template, for example, for starting a VM or application from those templates, and for stopping a VM or service. A VMM administrator can also create delegated administrators who have limited access to specific parts of the physical environment, such as a branch office.

Creating a cloud isn't enough to make it useful, however. It also needs VM templates and service templates that let users create VMs and applications. The next sections take a closer look at these fundamental concepts in the Microsoft private cloud.

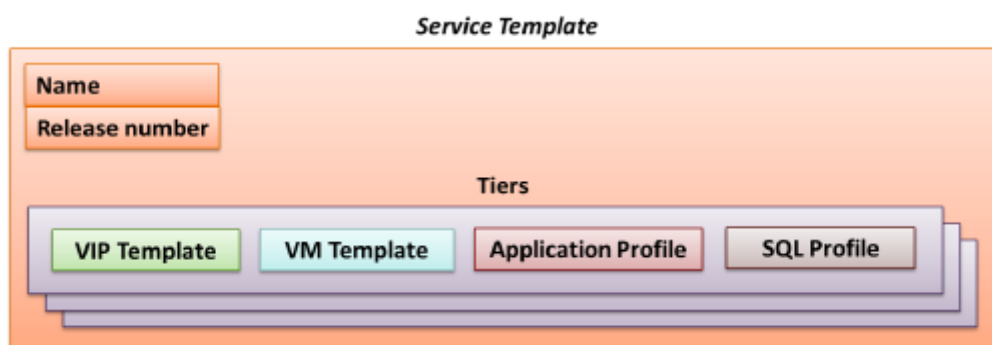
Using VM Templates



As the figure shows, every VM template contains a link to a VM image. This image, such as a .vhd file, contains the guest operating system that will run in this VM, together with any applications or other software that has been installed on the image. Creating a VM requires more than this, however, and so a VM template can contain more. The possibilities include:

A hardware profile that describes the VM itself. For example, a VM template might specify that the VM has 1 CPU, 8 gigabytes of memory, and is attached to a logical network named “DevTest”, as Figure shows.

A guest operating system profile that describes specifics about the OS running in this VM. In the example shown here, for instance, a VM created from this VM template will become part of the Active Directory domain “CorpDev” and have its administrator password set to “p@W”.



Every service template has a name and a release number. It also contains one or more tiers, each describing some part of an application or VM. A tier can contain some combination of four components:

A VIP template, describing the characteristics of a virtual IP address that will be supported by a hardware load balancer connected to this tier. For example, a VIP template might specify that a particular virtual IP address requires support for SSL, sticky sessions, or other options.

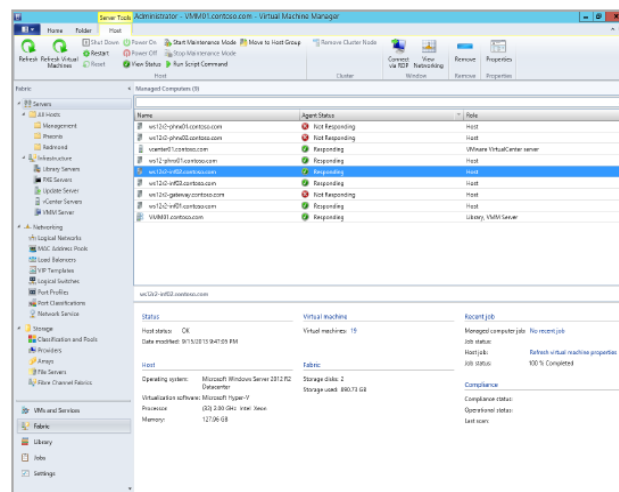
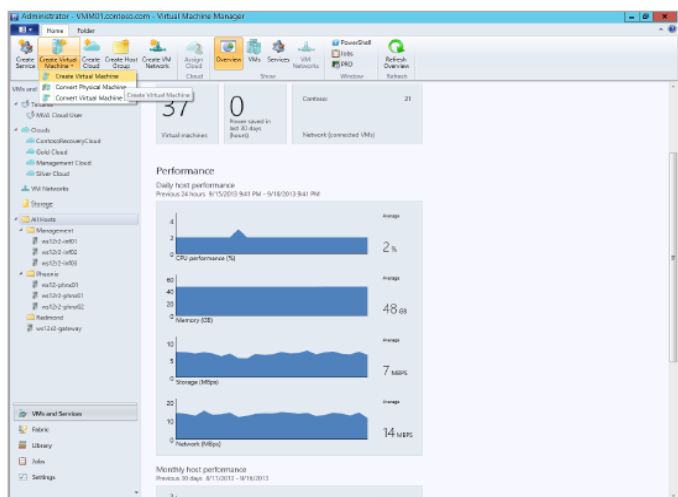
A VM template, describing the kind of VM this tier should use. This is a standard VM template, as just described, and it's the only mandatory component in a tier.

An application profile, referencing the application code this tier runs (if any). This profile can also reference various kinds of scripts, such as scripts that run before and after the tier's application code is installed.

A SQL profile, referencing schema definitions and other information for a SQL Server database.

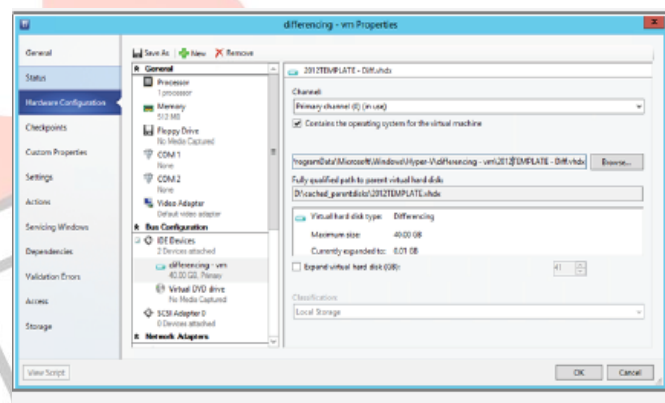
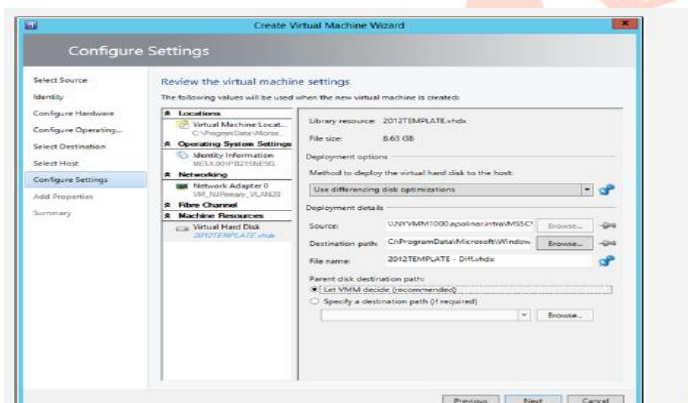
Let's now look at a few examples of Virtual Machine Manager at work. Figure shows the Virtual Machine Manager console with the VMs And Services workspace selected at the bottom left. This workspace is used to deploy and manage virtual machines, virtual networks, clouds, and tenants. In this screen shot, the administrator is reviewing the performance of the hosts to ensure that there is enough capacity to create a new virtual machine.

Figure shows the Virtual Machine Manager console with the Fabric workspace selected. This workspace is used to manage all the infrastructure servers, hosts, costs, networking, and storage components in your environment. In this screen shot, the administrator is reviewing the utilization and health of a Windows Server 2012 R2 Hyper-V host.

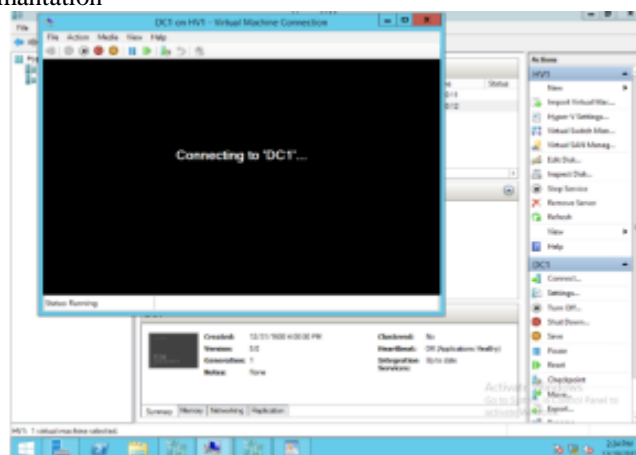
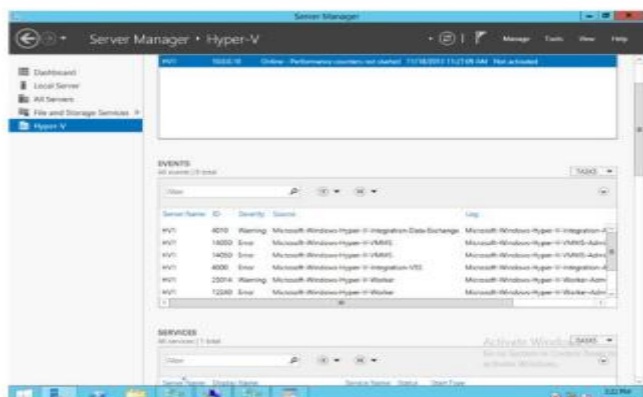


When deploying a virtual machine, you can now use differencing-disk optimizations for deployment. This capability uses the cached parent disk on the Hyper-V host:

Once the virtual machine has been deployed, the properties of the virtual machine will reflect the parent disk as well as the differencing disk:



Hyper V Implementation



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