

Dynamic Data Center

Guidance for Hosting Providers

© 2009 Microsoft Corporation. All rights reserved. The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication and is subject to change at any time without notice to you. This document and its contents are provided AS IS without warranty of any kind, and should not be interpreted as an offer or commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT.

Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

Microsoft, Active Directory, Hyper-V, Silverlight, SQL Server, Windows, Windows Powershell, and Windows Server are trademarks of the Microsoft group of companies.

All other trademarks are property of their respective owners.

The descriptions of other companies’ products in this document, if any, are provided only as a convenience to you. Any such references should not be considered an endorsement or support by Microsoft. Microsoft cannot guarantee their accuracy, and the products may change over time. Also, the descriptions are intended as brief highlights to aid understanding, rather than as thorough coverage. For authoritative descriptions of these products, please consult their respective manufacturers.

Microsoft will not knowingly provide advice that conflicts with local, regional, or international laws; however, it is your responsibility to confirm that your implementation of any advice is in accordance with all applicable laws.

1. Introduction

A Dynamic Data Center (DDC) is a combination of automation, control, and resource management software with a well-defined topology of servers, storage, and networking hardware. The concepts of DDCs have existed for several years, and the industry has made tremendous progress in terms of automating and managing the data centers. The availability of the Hyper-V™ hypervisor in Windows Server® 2008 and the System Center Server Management Suite Enterprise has made creating a Dynamic Data Center an achievable goal.

The convergence of Advanced Virtualized Processor technology from Intel and AMD, combined with Windows Server 2008, has made virtualization a mainstream technology that is affordable by a broader market. This explosive growth, if not planned properly, could cause management problems that result in customer satisfaction issues and drive the costs higher.

Because of the diversity of application usages that customers will have for a DDC, it is impossible to define a single, general-purpose configuration that fits all needs. Therefore, Microsoft provides a set of guidelines and basic building blocks based on its product offerings that will help the hosting providers create a Dynamic Data Center.

The Dynamic Data Center will consist of the following resources:

* **Servers:** Servers in the DDC may vary in characteristics. For the most part, we envision the servers to be virtualized (guest) environments; however, these virtual machines still must run on physical servers (known as hosts). The hosts may include blade servers or standard rack-mounted servers with different amounts of memory, different performance and capacity disks, different number, type, and speed of processors, and so on. In a DDC, the provisioning of physical and virtual servers is automated using workflows with minimal human intervention.
* **Network:** Network equipment may consist of IP-based load balancers, layer‑2 network switches, and firewalls. Physical networking switches and other equipment must be managed along with virtual switches that are created between different virtual servers and physical hosts.
* **Storage:** Storage equipment for DDCs will most likely be based on a storage area network (SAN) device or any other iSCSI device. In certain low-end configurations, where high-availability is not a requirement, the DDCs may also use local storage.
* **Management Appliances:** Managing the DDC requires a management fabric that, for the most part, automates the day-to-day operations. The management tools must address the different “abilities” that are expected of the DDC. Microsoft® System Center solutions for data center management enable data center managers to optimize resources, improve the visibility of IT assets and issues, and meet service levels, all while decreasing costs.

In a Dynamic Data Center, all resources, such as servers, networks, and storage, are provisioned and allocated using automated workflows with minimal human intervention. The monitoring of these resources is performed by management appliances continuously. The monitoring appliances can provide rule-based actions to deal with exceptions or generate alerts to attract operator attention.

1. Services of a Dynamic Data Center

A hosting provider expects the previously mentioned resources in a Dynamic Data Center to work seamlessly and provide the following services:

* Provisioning:
	+ Automated provisioning of servers (virtual and physical)
	+ Management of configuration settings of virtual servers
	+ Provisioning of network switches and creating load-balanced farms of virtual servers
	+ Auto-placement of virtual servers and the best available physical server in the environment
	+ Creation and management of templates that are used to create instances of virtual servers
	+ Creation and management of system images that are used to create instances of physical servers
* Backups and restores:
	+ Backups and restores of individual files and folders within all servers
	+ Backups and restores of entire servers
	+ Backups and restores of computers that are running Microsoft SQL Server®
	+ Ability to roll back changes made in servers
* Monitoring:
	+ Monitoring of status of key services on individual (or collection of) servers
	+ Tracking events and logs being generated on servers
	+ Tracking performance counters to measure and optimize use of systems
	+ Generating notifications based on predefined rules for events or counters
* Configuration management:
	+ Tracking hardware assets and software licenses (and configuration items in environment)
	+ Management of software updates (by customized update schedules)
	+ Defining and using desired configurations for servers
	+ Generating reports of installed software, updates, pending actions, and so on
	+ Installing applications, such as Internet Information Services (IIS), SQL Server, and others, during maintenance windows
* Security:
	+ Server-level security to isolate and contain customers within their own virtual servers and prevent access to other virtual servers running on the same hosts
	+ Network-level security to provide isolation and protection of networks from attacks triggered from within a guest by a malicious user.
* Increasing availability to end customers:
	+ Creation of a clustered environment to host virtual servers (including use of shared storage to support clustered servers)
	+ Ability to gracefully failover a guest server to a new physical server
	+ Ability to upgrade physical servers by forcing a move of guests virtual machines (VMs) to another server
1. DDC Guidance from Microsoft

To make it easier for hosting providers to create Dynamic Data Centers, Microsoft is pleased to provide a set of documents and code samples that will serve as guidelines and best practices. This collateral is made available in the Dynamic Data Center Toolkit for Hosters. The set of documents provided is as follows:

* Bare-metal provisioning of Windows Server 2008 to host virtual environments
* Provisioning a virtual environment (using Hyper-V). This document outlines:
	+ Configurations to deploy a virtual infrastructure based on Windows Server 2008 Hyper-V.
	+ Configuring the Active Directory® service to make it easier to create a multi-tenant environment.
	+ Securing the environment.
	+ Managing the virtual environment using System Center Virtual Machine Manager.
	+ Best practices to configure and use Virtual Machine Manager.
	+ Capacity planning.
* Installing and configuring System Center to manage your virtual environment
* Leveraging System Center Data Protection Manager to back up/restore the virtual environments in a delegated administration model
* Configure System Center Configuration Manager to:
	+ Perform updates on demand.
	+ Track inventory.
	+ Push out standard configurations and software.
* Configure System Center Operations Manager to monitor and alert individual end customers based on policies

In addition to these documents, we are releasing a Microsoft Silverlight™-based test portal for ContosoHosting.com. This portal includes a control panel that enables end customers to:

* Provision and manage Hyper-V–based clients.
* Perform file/folder-level backups and restores.
* Monitor important counters and receive alerts.
* Install updates during a configurable time window.
* Monitor events.

Along with the sample application, we provide the source code for Windows® Communication Foundation (WCF) services and Windows Powershell™ scripts to perform all operations to provision and manage the System Center Server Management Suite Enterprise and Windows Server 2008.

1. Summary

The Dynamic Data Center Toolkit provides comprehensive guidance to manage virtualized data centers. It focuses on using the four key components in System Center Server Management Suite Enterprise ( Configuration Manager, Operations Manager, Data Protection Manager, and Virtual Machine Manager) to create a managed hosting offer by hosting providers. The Dynamic Data Center Toolkit includes a white paper (installation guidance, best practices, and so on) and sample C#-based WCF services to manage the environment.