Virtualization MANagement (VMAN)

DMTF Standards for Virtualization Management
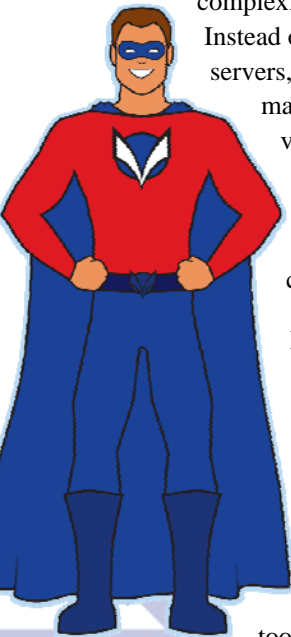
Introduction

Virtualization has become a key technology deployed by an increasing number of Information Technology (IT) organizations worldwide. System virtualization has quickly gained popularity because of its potential to reduce IT costs.

Virtualization allows IT managers to increase the use of their existing physical resources and even reduce the number of systems deployed and managed. This consolidation helps reduce hardware management requirements, mitigates power and cooling needs, and thus lowers IT costs overall.

However, while system virtualization can reduce the cost of owning and maintaining physical hardware, some of the savings are offset by the added systems management complexity introduced by virtualization. Instead of managing numerous physical servers, administrators are managing many virtual computer systems (i.e. virtual machines) consolidated onto fewer physical servers. The management complexity shifts from hardware to virtual computer systems.

Moreover, deploying virtualization solutions typically means the addition of management tools to the existing environment.

Introducing new management tools requires administrator training and further increases complexity and cost.

This increase is even larger for IT organizations that deploy virtualization solutions from multiple vendors.

DMTF Standards for Management of Virtualization Systems

The Distributed Management Task Force (DMTF) has introduced management standards to address the complexity of managing a virtualized environment. DMTF is the leading industry organization developing standards for systems management and promoting interoperability of solutions using these standards. The following diagram (**Figure 1**) outlines the software lifecycle. DMTF VMAN Open Virtualization Format standard addresses the packaging/distribution and deployment/ installation aspects while System Virtualization Management standards target the management stage of a virtualized system lifecycle.
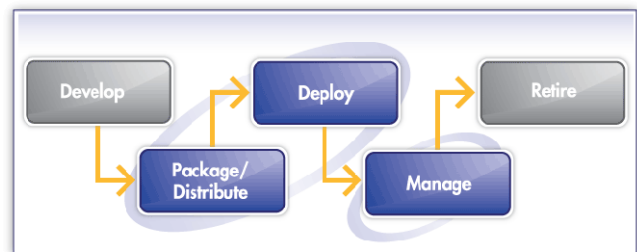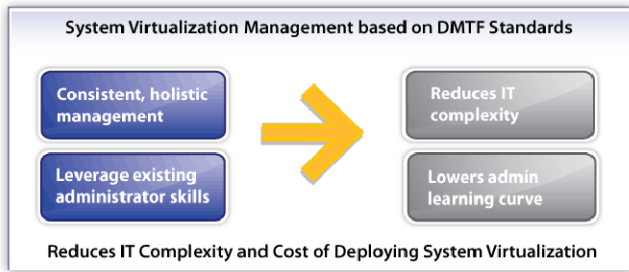

Figure 1. A virtual computer system lifecycle

Open Virtualization Format (OVF)

OVF is a DMTF standard for *packaging* and *distributing* virtual appliances. A *Virtual Appliance* is a pre-built software solution, comprised of one or more Virtual Machines that are packaged, maintained, updated and managed as a unit. OVF enables portability and simplifies *installation* and *deployment* of virtual appliances across multiple virtualization platforms (See **Figure 1**). For more information about OVF, please refer to the **OVF Technical Note (**www.dmtf.org/vman**)**.

System Virtualization Management

Standards developed by DMTF for system virtualization management define a consistent way for *managing* any virtualized environment (i.e. virtual machines manager and associated virtual machines). The standards allow all vendors to easily develop interoperable management solutions that lower management complexity and cost, especially in a heterogeneous, multi-vendor environment. For example, by supporting these management standards, virtual machines and their deployments can be managed in the same fashion, independent of vendors. The entire virtualized environment could be managed from a single management console.

DMTF standards for managing virtualized systems extend the existing standards for managing servers called SMASH (Systems Management Architecture for Server Hardware) and the underlying DMTF management data model called CIM (Common Information Model). Due to this, vendors can develop management features that are consistent for both physical and virtual systems. Administrators can then easily leverage their familiarity with server management to manage virtual systems. This lowers the administrator's learning curve when introducing new virtualization technologies, reduces complexity, and thus lowers IT costs of adopting virtualization.

Elements of System Virtualization and Management

The basic elements of a system virtualization environment are shown in **Figure 2.** The resources that make up the virtualization environment are typically provided by one or more host computer systems. A virtualization layer (typically firmware or software, but sometimes hardware) manages the lifecycle of a virtual computer system.

The virtual computer system is composed of virtual resources allocated or assigned to it from the host computer system. A virtual computer system may be active and running an operating system and applications with a full complement of virtual devices defined and allocated.

The virtual computer system may also be inactive with no software running and only a subset of the virtual devices actually allocated. A key administrator responsibility in this environment is managing the operational lifecycle of these virtual systems.
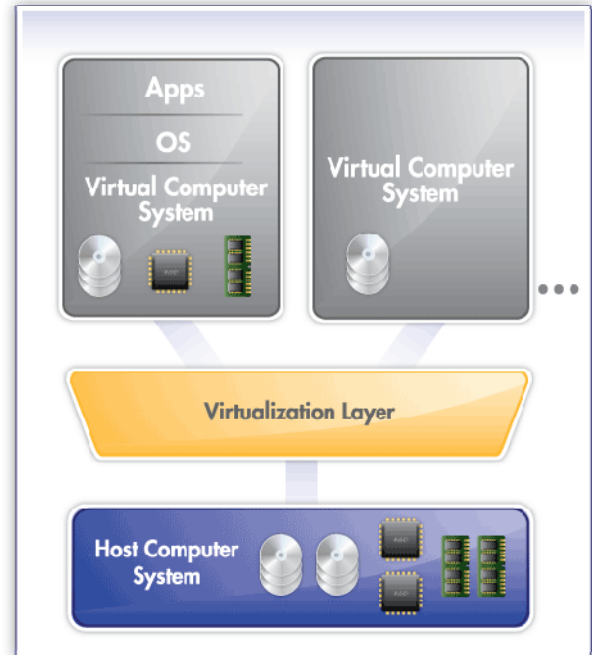

Figure 2. Elements of Virtualized System Management

Resources of the virtual computer system may have different properties or qualities than those of the underlying physical resources. For example, virtual resources may have different capacities or qualities of service for performance or reliability than those of their underlying physical resources. Managing relationships between virtual and physical resources adds complexity to administration tasks in a virtualized environment.

Using DMTF Standards for Managing Virtualized Environment

Managing a virtualized environment combines familiar administration tasks, such as managing physical systems and resources, with new tasks introduced by virtualization itself. DMTF standards for managing virtualization system strive to simplify these tasks by providing standard, consistent ways of discovering, configuring, managing and monitoring virtual computer systems and their underlying physical resources.

Discovery and Inventory

To effectively manage an IT environment, administrators need an accurate view of the systems, components and other

managed targets deployed. This includes not only identifying information about each target, but also configuration, asset, and other inventory information. Ideally, such information is automatically discovered by the administrator's management tools or console, rather than being manually entered and maintained.

DMTF standards for virtualization management define consistent mechanisms for discovering virtual machines deployed and their attributes. Moreover, the DMTF SMASH suite of specifications for server management also supports discovery of physical systems and attributes. When combined, vendors are enabled to implement solutions that can automatically provide a holistic view of the administrator's virtual and physical environment.

Ongoing Lifecycle Management

In an operational environment, virtual systems are not static entities. Their configurations may change to meet new demands. They may be enabled, disabled or suspended at different points in time. Managing the operational lifecycle of a deployment of virtual systems is an ongoing and potentially time-consuming administrator task.

DMTF standards for system virtualization management cover various aspects related to the control and management of the operational lifecycle of a virtual system. The implementation of these standards enable consistent management of the complete lifecycle of a virtual computer system including the creation, modification, enabling, disabling, suspending, creating snapshots, as well as monitoring a virtual computer system for these changes.

Monitoring and Diagnostics

Another critical operational task is monitoring of both virtual and physical resources. Monitoring includes the detection and tracking of changes to the environment, configuration, as well as monitoring of health and performance. In a virtualized environment, monitoring the health of deployed systems can be complex as administrators need to monitor both virtual and physical resources. Moreover, if a problem occurs, the diagnostics process will need to include a correlation between virtual resources and the physical ones on which they rely.

DMTF standards for both virtual system and server management provide consistent ways for monitoring the health of computing resources. In addition, the standards also support a mapping between virtual and physical resources, which allows vendors to develop management capabilities that can monitor and diagnose issues easier across both the virtual and physical IT environment. This

further simplifies the tasks of the administrator responsible for managing a deployment of virtualized systems.

Evolving the Standard for Managing System Virtualization

DMTF continues to work on expanding and improving industry standards for system virtualization management. The DMTF VMAN (Virtualization Management) Initiative and the associated Work Groups and forums drive the related efforts. The technical efforts are primarily driven by the System Virtualization, Partitioning and Clustering (SVPC) Work Group.

The existing DMTF standards for System Virtualization Management are summarized in *CIM System Virtualization Model. Whitepaper* [DSP2013_1.0.0] (www.dmtf.org/vman)

Conclusion

As more and more IT organizations deploy virtualization solutions, they find that the technology brings many benefits but also trade-offs due to the increased complexity of managing such an environment. Added management complexity means higher overall IT administration costs.

DMTF standards for system virtualization management helps vendors develop management solutions that reduce complexity and thus mitigate management complexity and costs for a virtualized environment, especially for heterogeneous deployments.

More Information

For more information about DMTF and details about its published standards, visit www.dmtf.org.

About DMTF

With more than 4,000 active participants representing 44 countries and nearly 200 organizations, the Distributed Management Task Force, Inc. (DMTF) is the industry organization leading the development, adoption and promotion of interoperable management standards and Initiatives. DMTF management technologies are critical to enabling management interoperability among multi-vendor systems, tools, and solutions within the enterprise. By deploying solutions that support DMTF standards, IT managers can choose to deploy a mix of systems and solutions that best meet their users' needs, while reducing management complexity and total cost of ownership. Information about the DMTF technologies and activities can be found at www.dmtf.org.