

Virtualization Technical Note

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Reducing the Cost and Complexity of Managing a Virtualized Environment

DMTF Standards for System Virtualization Management

Introduction

Virtualization has become a key technology deployed by an increasing number of IT (information technology) organizations worldwide. System virtualization has quickly gained popularity because of its potential to reduce IT costs, a goal for all data center managers.

Virtualization allows IT managers to optimize utilization of existing physical resources and even reduce the number of systems deployed and managed. The 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 may be offset by the added systems management complexity introduced by virtualization. Instead of managing numerous physical servers, administrators are managing many virtual machines consolidated onto fewer servers. The management complexity has just shifted from hardware to virtual systems.

Moreover, deploying virtualization solutions typically means adding more management tools, which requires administrator training and further increases complexity and cost. This increase may very well be even larger for IT organizations that deploy virtualization solutions from multiple vendors.

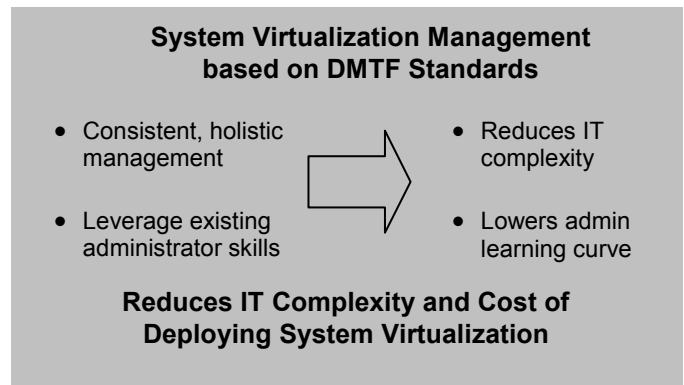
Fortunately, the Distributed Management Task Force (DMTF) has introduced standards designed to simplify the

challenge of managing virtualized environments while reducing costs.

DMTF Standards for System Virtualization Management

To address the complexity of managing virtualized environments, DMTF has introduced standards to define a consistent way for managing any virtualized environment. DMTF is the leading industry organization developing standards for systems management and promoting interoperability of solutions using these standards.

DMTF 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 systems and deployments can be managed in the same fashion, independent of vendor. In this case, the entire virtualized environment could be managed holistically from a single management console.



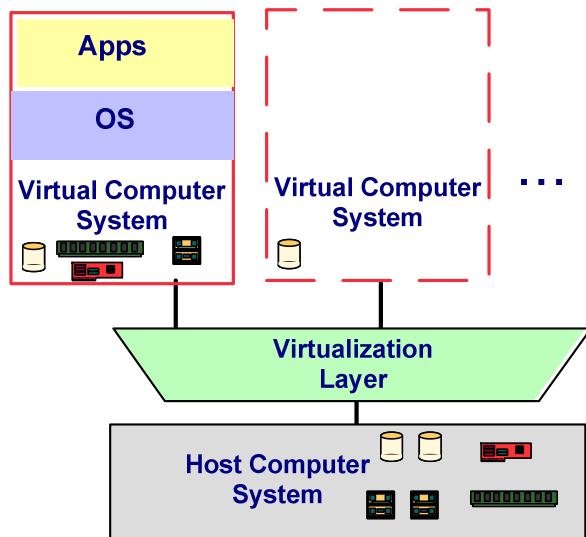
DMTF standards for managing system virtualization are built on and extend the existing standards for managing servers called SMASH (Systems Management Architecture for Server Hardware) and on the DMTF management data model called CIM (Common Information Model). By building on the SMASH standard for server management and its underlying CIM modeling, 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 managing virtualized systems. This lowers an 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 virtualized system are shown below. 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 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.



In system virtualization, a host computer system provides the resources that compose virtual computer systems and their constituent virtual devices. Resources of the virtual

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 System Virtualization Management

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 system virtualization strive to simplify these tasks by providing standard, consistent ways of discovering, configuring, managing and monitoring virtualized systems and their underlying physical resources.

Discovery and Inventory

To effectively manage a data center or 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 determining 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 systems deployed and their attributes. Moreover, the DMTF SMASH standard for server management also supports discovery of physical systems and attributes. Using these DMTF tools, vendors are able to implement solutions that can automatically provide administrators with a holistic view of their virtual and physical environments.

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. Virtual systems may be moved amongst host systems for load balancing or resource usage optimization. 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 in regards to the control and management of the operational lifecycle of a virtual machine. The implementation of these standards enable consistent management of the complete lifecycle of a virtual computer system including creation, modification, enabling, disabling, suspending, and taking snapshots, as well as monitoring a virtual computer for these changes.

Monitoring and Diagnostics

Another critical operational task is monitoring of both virtual and physical resources. Monitoring can include the detection and tracked 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 because 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 they rely on.

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 System Virtualization, Partitioning and Clustering Work Group is the driver of these efforts.

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.