SMASH Simplifies Cross-Platform Server Management

Introduction

A critical factor in measuring IT management success is the ability to control costs in the data center. As IT organizations face increasing complexity and expense associated with operating multiple server platforms across diverse departments, sites and geographies, server management continues to be a central focus. With important initiatives like grid and utility computing underway at many end user organizations, standards that focus on the area of server management are increasingly critical.

In the past, there were no cross-platform standards that addressed the need for administrators to directly manage servers from multiple vendors. This led hardware manufacturers to develop varied tool sets to manage systems via in-band and out-of-band connections for different operating systems and system states. Enterprise server management in most data centers is comprised of a variety of tools and applications used by administrators. In many cases, these tools are specialized and adapted to each individual environment, installation and product. In today's multi-vendor data center, this has resulted in an inefficient array of management commands and tools that differ by provider. This complexity can dramatically increase server management costs.

To address this problem, the Distributed Management Task Force (DMTF) created the Systems Management Architecture for Server Hardware (SMASH) Initiative. The SMASH Initiative includes a suite of specifications that deliver architectural semantics, industry standard protocols and DMTF Management Profiles to unify the management of the data center. The DMTF specifications published as part of this Initiative include: the Web Services for Management (WS-Man) Specification, the Server Management (SM) Command Line Protocol (CLP) Specification, the SM Managed Element Addressing Specification, the SM CLP-to-CIM Mapping Specification, the SMASH Implementation Requirements Specification, and the SMASH Architecture White Paper, as well as over 30 DMTF Management Profiles.

TABLE OF CONTENTS

DMTF's SMASH

Since the DMTF's Server Management Working Group (SMWG) was announced, the group has attracted more than 400 members from over 50 different companies, demonstrating a strong commitment by vendors and users across the industry to collaborate on this effort and deliver vendor-independent, platform-neutral server management. This groundswell of support has resulted in an expanded scope for the DMTF's server management standards, and the outcome is SMASH – a collection of specifications that will enable unprecedented

simplicity for server management across diverse IT environments in the data center and beyond.

SMASH is designed to describe system management interactions independent of the actual implementation, providing a common vocabulary for server management. The SMASH specifications are implementation agnostic, and can be used on a variety of platforms, regardless of server type, topology and framework – spanning the spectrum from small stand-alone servers to large partitionable servers, and encompassing topologies such as blades and racks, as well as unique segments such as industry standard servers, telecommunications and mission critical high-end servers.

Extra emphasis has been placed in the development of the SMASH Specifications to enable "lightweight" implementations that are architecturally consistent. Building on the DMTF's widely implemented Common Information Model (CIM) Schema, the SMASH Specifications enable a full spectrum of server implementations without sacrificing the richness of CIM. Emphasis has been placed on ensuring that these implementations will be interoperable at the protocol level, regardless of CPU architecture, chipset solutions, vendor or operating environment.

SMASH enables simple and intuitive management of heterogeneous servers in the data center independent of machine state, operating system state, server system topology or access method. SMASH facilitates local and remote management of server hardware in both Out-of-Band and Out-of-Service management environments.

In-Band Management operates with the support of *hardware* components that are critical to, and used by, the operating system. Out-of-Band Management operates with hardware resources and components that are independent of the operating system's control. These resources are dedicated to systems management

and allow management of system hardware components independent of their state. In-Service management operates with the support of *software* components that run concurrently and are dependent on the operating system, while Out-of-Service management operates with the support of software components that require the operating environment to be put out-of-service and the system be placed into an alternate management environment. SMASH contains a model to describe these terms (both In-Band and Out-of-Band, as well as In-Service, and Out-of-Service) and to relate them to management today.

SMASH Management Protocols

SMASH specifies both a web services and command line protocols for server management. For programmatic access by management software, such as system management consoles, SMASH specifies the Web Services for Management Protocol (WS-Man). For management by a administrator using command line tools or scripts, SMASH also defines a command line protocol or SMASH CLP.

Independent of these protocols, the profiles that can be implemented for SMASH remain the same, ensuring consistency of server management.

Server Management via WS-Man

SMASH supports the Web Services for Management Protocol (WS-Man), which specifies web services that expose a common set of system management operations such as discovery and manipulation of management resources, subscription to events, and execution of management methods.

WS-Man supports the common transport protocols HTTP and HTTPS. These protocols are widely supported in a data center environment, as they are protocols used by web servers and other web services. This simplifies the deployment of management tools based on the SMASH standard into a data center and reduces complexity.

Combined with the underlying DMTF CIM technology and defined management profiles, SMASH delivers a consistent programmatic interface for heterogeneous server management. Management software developers can use the SMASH standard support heterogeneous server management in their management frameworks, tools and consoles. This simplifies heterogeneous server management for data center administrators by making it possible to manage their various server systems from a single management tool.

The Server Management (SM) CLP

The SM CLP is a command/response protocol, transmitted and received over a text message-based transport protocol. The SM CLP input syntax defines a set of text-based commands, which include verbs and options that operate on command targets and properties described by the CIM schema. The SM CLP output syntax is also explicitly defined, with selectable formats, and options include free-form text, keyword=value, and CLPXML.

Once a session is established and authenticated, the SM CLP interaction is initiated by the User (either a human or a script), using text message protocols (the SM CLP specification contains mappings for Secure Shell v2 and Telnet, but other transports are possible). In this simple session, the user navigates a directory-like hierarchy of command targets.

The transport session is established to the CLP Protocol Endpoint, which represents the communication endpoint on which the CLP Service receives incoming connection requests. The SM CLP provides the mechanisms necessary to enable, disable and configure the Protocol Endpoints and the SM CLP Service.

In the example in Figure 1, an administrator needs to see information about the target server and initiates the SM CLP interaction with the command "show" (step 1). The text command message is transmitted from the User over the transport protocol to the CLP Service (2).
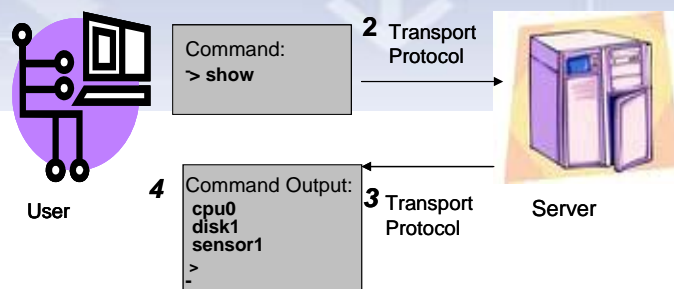

Fig. 1

The command output is transmitted from the CLP Service via the Transport Protocol (3). The user receives the command output (4), which in this example shows the valid server targets (CPU, disk and sensor) that are available targets for SM CLP management commands.

The User is the terminus of one end of the connection; the CLP Service implementation is the other. CLP Service implementations manage the sessions that occur over the transport, while the transport protocol manages the authentication of the session and enables encryption (if any).

Thus, SM CLP enables data center administrators to securely manage their heterogeneous server environments using a command line protocol and a common set of commands. The SM CLP also enables the development of common scripts to increase data center automation, which can help to significantly reduce management costs.

Additional SMASH Capabilities

In addition to providing both Web Services and Command Line Protocols, SMASH includes Management Profiles spanning the spectrum of stand alone servers, modular systems (blades), racks, system hardware components etc., addressing both the enterprise and telecommunications server environments. The profiles are designed to simplify managing system boot, power, storage, firmware update, system configuration and hardware product assets by defining a standardized data model representation for management to be commonly used across implementations.

Closing Remarks

Support in SMASH for a programmatic interface via WS-Man allows management software developers to support heterogeneous server management in their management tools. Server administrators will then no longer need to juggle a disparate set of proprietary tools to manage to manage their multi-vendor environments. Administrators instead can lower complexity and cost by managing their datacenter environments from a single management tool or console.

The SM CLP's human-oriented interface provides a standard command set for controlling hardware in heterogeneous environments, reducing management complexity and costs in the data center. With SMASH, systems offered by different vendors will be represented in standard ways. With SM CLP users can perform common operations on a management station or a client – such as system power on and off, system log display, boot order configuration and text-based remote console – using the same commands across disparate vendor platforms.

SMASH is widely implemented, with support in products from the industry's leading vendors.

IT organizations should take advantage of SMASH to address the common problems of server management and usher in a new era of simplified management in the heterogeneous data center.

Recommended Reading

DMTF's SMASH Standard http://www.dmtf.org/smash

DMTF's CIM Standard: www.dmtf.org/cim

Acknowledgements