SIMPLIFYING AND AUTOMATING MANAGEMENT ACROSS VIRTUALIZED/CLOUD-BASED INFRASTRUCTURES

EMC IT’s strategy for leveraging enterprise management, automation, and orchestration technologies to discover and manage performance across complex virtual server, storage and cloud environments.

ABSTRACT

This white paper describes EMC IT’s strategic approach for facilitating management and automation across a virtualized, cloud-based infrastructure using various EMC, VMware, and EMC partner tools. It is intended for IT executives, architects, designers, and consultants who are responsible for ensuring that applications and IT services remain secure, compliant, and operating optimally.

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EXECUTIVE SUMMARY

Servers, storage, networks, databases, and applications must seamlessly work together in today’s next-generation cloud data centers to facilitate the delivery of quality on-demand IT services to business units.

A holistic and strategically orchestrated management and automation strategy is required to ensure maximum value is continually derived from those services. However, the challenge lies in the fact that end-to-end management and automation technology is still in early development.

EMC IT is breaking new ground in this area by progressively rolling out EMC®, VMware®, and EMC partner management and automation technology solutions to further streamline operations and maximize the benefits of EMC’s evolving private cloud infrastructure.
INTRODUCTION

Management and automation, in relation to IT service delivery, are core enablers of the cloud model and directly impact the level of operational and business success it can deliver. This is the reason why the field is evolving so quickly. The more visibility and control that can be facilitated end-to-end across the cloud infrastructure, the more significant the cost, operational, and business benefits will be.

This white paper provides an overview of the EMC IT Enterprise Management and Automation Service (EMAS) team’s efforts.

DRIVING NEXT-GENERATION IT MANAGEMENT AND AUTOMATION CAPABILITIES

While the implementation of virtualization and private cloud technology is accelerating the ability to quickly tailor existing and new applications and IT services to growing and changing business needs, it is also necessitating a dramatic change in the way IT infrastructure is now managed and protected.

With a focus on providing more control and awareness, automation and efficiency, reliability, agility, security, and governance into the IT infrastructure, the EMC IT EMAS team is focusing its efforts in the areas depicted in Figure 1.

1. Monitoring/Event Management
2. Automation via Orchestration
3. Performance Management
4. Capacity Management
5. Log Management
6. Federated CMDB
7. Governance Framework for Lifecycle of Tools

Figure 1: Key areas of focus for EMC IT’s next-generation IT Enterprise Management and Automation strategy

To accelerate progress, EMC IT is actively collaborating with VMware and other partners to strengthen existing capabilities and drive next-generation IT enterprise management and automation initiatives forward.
“Because we are completely changing the footprint of the data center—virtualizing everything—we need a better way to manage and monitor the virtual environment. Therefore, the cloud has become the driver for a new generation of management tools.”

Paul DiVittorio, Director, IT Enterprise Systems and Application Hosting Architecture, EMC

MONITORING AND EVENT MANAGEMENT FOR OPTIMAL OPERATIONS

A key goal for the EMC IT EMAS team is the implementation of monitoring and event management capabilities to ensure the health and security of infrastructure elements, especially from the applications and services perspective.

For the most part, today’s server, storage, networking, and other elements don’t automatically come with monitoring and management technology. These capabilities have to be built into each element by implementing software-based management and monitoring agents. However, that is only the beginning. Each element must also be identified and correlated within the infrastructure that is supporting a specific application as well as the services that application helps deliver. In addition, integration between agents isn’t always a given, and often these tools must be adapted so that they can work with one another as a collective whole. This is the goal of EMC IT, and much of it is being facilitated by the EMC IT Operations Intelligence solution (ITOI—formally known as EMC Smarts).

Approaching monitoring and event management in this way enables the EMC IT to roll up all of the elements-related information, stream it into an EMC ITOI dashboard, and quickly pinpoint, for example, that a specific network problem is causing issues to occur in specific applications or services—even across a multi-tenant environment. Action can then be taken to quickly restore service back to end users or remediate a security issue.
Figure 2: This graphic depicts how EMC IT is implementing the Operations Intelligence solution to facilitate strategic monitoring capabilities in the event management space. Instead of focusing only on one technology area, a broader view is taken relative to what the service is actually consuming within that infrastructure. If a problem occurs, the element causing the issue can be quickly identified for faster remediation.

A TOTAL CUSTOMER IMPACT VIEW PROMOTES BETTER SERVICE

Internal application owners are the customer focal point for the team’s monitoring and event management efforts. To ensure that applications are operating optimally, the team has been developing total customer impact views. This involves identifying common problems, such as the inability to quickly access corporate emails from iPhones and Blackberry devices, and then exploring how various solutions, both EMC and third-party, can be used to better and more cohesively leverage element-layer information to quickly spot and address specific issues as they arise.

EMC IT envisions future capabilities to include direct end-user access to dashboards to view up-to-the-minute status of their applications and services based on a color-coded schematic. For example, if status is shown in red it could mean that a problem has been identified and logged; yellow could be used to notify users that remediation is underway. Green might mean that a particular user is having an isolated problem and that the monitoring team should be notified directly to investigate and address the problem.
**IT ORCHESTRATION AND AUTOMATION**

Recently deployed, IT Orchestration (EMC IT Orchestrator) software will soon provide IT administrators with provisioning and automation capabilities to support Infrastructure as a Service. One of the first areas where the software will be used is to help IT administrators automate the many steps involved in provisioning a virtual machine—from obtaining the next available IP address to the work that must be done on ancillary systems. This behind-the-scenes automation is expected to make it easier to do business with IT and enable IT administrators to facilitate a better end-user experience.

**Support for the EMC Global Command Center**

The EMC Global Command Center (GCC) monitors and manages the company’s global virtual and physical infrastructure across networks, storage systems, servers, and applications around the clock.

As a key customer of the EMC IT EMAS team, the GCC relies on the team’s cohesive strategy in leveraging EMC, VMware, and partner tools to weed through the daily deluge of events and alerts to prioritize those that could impact IT services. With EMC IT EMAS support, EMC GCC has ready access to information about what events have the highest rate of abnormal behavior, allowing for a proactive approach in addressing the most pressing issues first.

**OPTIMIZING PERFORMANCE MANAGEMENT**

Because the environment is always changing in response to business need, ensuring optimal performance across a virtualized and cloud-based infrastructure can be a daunting endeavor.

EMC IT’s approach to monitoring service performance is to leverage EMC, VMware, and other vendors’ element layer tools—such as those to monitor storage, compute, database, and network security performance—and integrate the information generated by them into a cohesive whole using the VMware vCenter™ Operations Management Suite (vc Ops).

To gain better visibility from top to bottom in a complex IT environment, vc Ops is being used to collect and time-stamp performance details in quarter-hour intervals. Patented algorithms within the vc Ops then learn behavior from the information streaming into the tool, and issue early warning alerts when abnormalities are detected.
ELIMINATING THE NOISE—PRIORITIZING WHAT’S IMPORTANT

Unlike the past when information from the different elements could only be viewed on an individual basis, one component at a time, an innovative approach is enabling the EMC IT EMAS team to leverage VMware technology to create a performance manager-of-managers (MOM) that will eventually be used within a centralized command center. This powerful performance management tool is being configured to proactively and holistically detect—down to a granular level—anomalies across a variety of element layer tools.

Currently in use as a “post-mortem” problem management tool—after an outage has occurred, for example—its capability will soon enable the team to monitor across all components in real time and quickly identify any that may be impacting the performance of an application and related services. Because this tool will enable the team to clearly see the severity and constancy of any deviant anomalies, it will further strengthen event management by facilitating a prioritization of efforts necessary to tackle complex performance problems by addressing the most pressing issues first.

CAPACITY MANAGEMENT IN THE CLOUD

Capacity management is not something new to EMC IT. However, now it must be adapted to accommodate the more ambitious requirements of an operationally complex and more fluid IT environment.

Catering to two different internal customers, each with a specific capacity focus, the EMC IT EMAS team is collaborating with both to clarify the specifics on the information that they need. For example, the EMC platform team requires a constant flow of real-time data to ensure that storage and compute resources are available on the data center floor for on-demand consumption. Responsible for “stocking the shelves”, the services group within EMC’s IT Private Cloud Infrastructure Group must be able to predict, often months in advance, what compute and storage resources will be needed to accommodate future capacity requirements across multiple data centers.

Storage and compute resources, once provisioned separately, are now best addressed using a centralized strategy that allows a more accurate, dynamic, and comprehensive approach for handling both immediate and long-term capacity needs related to application and IT service delivery. To that end, the EMAS team is working out ways to deploy and integrate the necessary tools to deliver compute, storage, and eventually network capacity data so that it can be easily and optimally monitored and managed.

A key player in EMC IT’s technology leadership strategy, the EMAS team’s progress in advancing EMC’s management and automation capabilities to support optimal service delivery will soon enable customers to quickly achieve their own successful outcomes in this area. EMC’s ultimate goal for both its own company and those of its customers is to bring greater simplicity, clarity, and control over next-generation environments to fully capitalize on the benefits of virtualization and the cloud.

EMC IT Proven:
innovation and success shared

EMC IT is a pioneer in leveraging progressive technology in innovative and collaborative ways to broaden and improve the capabilities of its operations and drive the mission of the company’s business forward. Tested and proven, these solutions and best practices are then shared with EMC’s customers. By drawing upon EMC IT’s experiences and expertise in integrating and using technology in ways that extract its fullest potential, customers are able to accelerate their own virtualization and private cloud initiatives and benefits that follow.
**A FEDERATED CONFIGURATION MANAGEMENT DATABASE (CMDB)**

As part of the Infrastructure Technology Information Library (ITIL) framework, a Configuration Management Database (CMDB) essentially comprises systems of record, which document what components are tied to specific applications and IT services. In a federated CMDB, this information is brought together so that the IT department is always aware of what is in the inventory. Information contained in the CMDB is often used in change management processes to help avoid mis-configurations, which can lead to infrastructure issues and downtime.

![CMDB diagram]

**Figure 4.** The current state of EMC IT’s CMDB

The EMAS team’s efforts in this area are being concentrated on building a service catalog based on a federated CMDB that details all of the different components that are available for EMC IT to use and leverage. Selection will be as simple as filling out an order form and will replace a complex time-consuming process that now sends internal customers in many different directions to track down, procure, and effectively assign/deploy the right components for a specific job.

Today the primary consumer of CMDB data is the change management process, and the CMDB is at the end of the process and thus last to be updated. The future state will have the CMDB at the front of the on-boarding processes and will be the source of data for all other service management processes.

Each resource will be logged into the CMDB so that there is a full accounting of every configuration item—where it is, who is using the service and for what purpose, and the state of operations (e.g. if there have been performance or availability issues and how often they occur, how much capacity is being used, cost details, etc.).

Through these efforts the EMAS team will create a powerful ecosystem that can be leveraged to further its multi-focused strategy to streamline management and improve operations across EMC’s next-generation IT infrastructure.
Because applications can be expensive to buy, implement, and maintain, application rationalization has become a common practice within IT shops. It involves a governance strategy that helps determine which applications used by employees are providing the most value over the course of their lifecycle, and which should be retired and the money better invested elsewhere.

However, less than one percent of the tools that IT practitioners use to help deliver a service are actually captured in the application space—leaving them ungoverned. To effectively manage this subset of applications from the perspective of cost and value across their lifecycle, the EMC Enterprise Tools Advisory Board (ETAB) was formed. ETAB is a cross-functional IT representation from applications, to databases, to security, and acts as a centralized hub for facilitating optimum tool governance and management. Deciding factors are TCO, redundancy, and re-investment of monies by “sun setting” redundant tools.

In operation for the past year, the board has been responsible for culling almost 200 tools down to 100 of the most valuable, with metrics provided on the total cost of ownership for each remaining tool.

Today, when a tool purchase request is made, the ETAB reviews the appeal to determine if there is already something in the portfolio that could provide the required capabilities. In this way, redundancy is minimized and only the best and most cost-effective tools from EMC and other vendors are used.

The ETAB’s efforts in this area are ongoing, and its information is shared both internally and with customers to help them build their tool portfolios and leverage the same cost/value advantages.

**Figure 5.** The future state of EMC’s Federated CMDB
CONCLUSION

Keeping up with today’s agile IT enterprise while helping to ensure reliability, flexibility, security, and governance across all applications and service offerings is a tall order—one that necessitates ongoing efforts in management and automation.

EMC IT’s pervasive management and automation strategy is intended to increase the integration of existing and emerging technologies, bringing them together into an enhanced and cohesive whole within the following framework of core capabilities.

• Monitoring and Event Management
• IT Process Orchestration/Automation
• Performance Management
• Capacity Management
• Federated Configuration Management Database and Service Catalog
• Enterprise Tools Advisory Board: Supporting a Governance Framework for the Lifecycle of Tools

Operating from a holistic perspective, the future reveals a fully operational EMC Global Command Center, equipped with centralized dashboards, capable of monitoring and managing virtual data center components in real time, and supported by IT process orchestration to automate manual and complex IT processes. The end result is an optimized virtual and private cloud-based infrastructure strengthened by management simplicity and service delivery excellence.
REFERENCES

For more information, please visit:

www.EMC.com/EMCITProven

EMC IT’s IT Transformation blog at http://itblog.emc.com/