Automate IT Infrastructure for Speed, Security, and Efficiency
How the Dell EMC Systems Management Portfolio Fits the Bill

ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper
Written by Torsten Volk
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IT Transformation Starts with Automation
The role of the traditional IT department is changing. Modern IT departments encourage staff to develop basic programming skills to achieve a better understanding of what an application requires from its infrastructure to run in an efficient manner. While IT administrators will not and should never become true app developers, the ability to understand and apply basic coding practices is the foundation for automating on-premise IT infrastructure in a manner that is as simple to consume as public cloud resources.

Automation is the Key to a Competitive Private Cloud
Today, over one-third of enterprises are using four or more different public clouds. The general expectation is that this number will increase, since business units cannot wait for data center resources to be provisioned and developers are now used for comprehensive public cloud APIs. However, EMA research shows that in 2018, the demand for private cloud is almost twice as high as public cloud demand. Enterprises place IT transformation projects on hold due to their belief that approximately half of their data sources cannot be moved or even connected to applications in the public cloud. Therefore, enterprises should explore how to provide similar speed, agility, APIs, scalability, and cost through a new generation of highly automated, on-premise server infrastructure. This can transform the physical data center into the private portion of the corporate hybrid cloud.

Automation is the Precondition for Successful DevOps
EMA research shows that 62 percent of enterprises are dissatisfied with the quality, speed, and cost of their application releases. The report found that “automation is critical to facilitate a much faster release schedule that simultaneously absorbs less operator time and increases release quality by minimizing the potential for human error.” Therefore, it’s surprising to see a low level of automation adoption for on-premise server management tasks like deployment/provisioning, firmware and driver updates, hardware troubleshooting and resolution, and server decommissioning. Automating these simple tasks can free up time for busy IT staff to focus on more strategic projects, including IT transformation initiatives.

In this analyst paper, Enterprise Management Associates (EMA) provides tips for corporate IT automation to provide a viable alternative to public cloud. EMA research shows that after indicating a strong preference for public clouds in previous years, enterprises are now planning to invest into private cloud infrastructure at a higher speed. In the final section, EMA examines ways that Dell EMC PowerEdge servers, managed with iDRAC and OpenManage systems management software, can help accelerate IT infrastructure automation, which is a quick and easy way to increase adoption for on-premise server management tasks.
### DON'T TRY TO BE GOOGLE OR FACEBOOK

Hyperscale companies, such as Google and Facebook, were built from the ground up on cloud-native application architecture with most capabilities, like high availability, load balancing, auto scaling, disaster recovery, security, and compliance, which traditional data center infrastructure is expected to provide. Enterprises cannot transform their IT department into a hyperscale cloud, since there are hundreds or even thousands of traditional applications that still rely on the legacy infrastructure capabilities. While these applications will not run within a hyperscale environment, they can still significantly benefit from infrastructure automation. A modern server platform can provide lifecycle management for a mix of these traditional apps and cloud-native services.

Mixed workloads will dominate for the foreseeable future.

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### STRIVE FOR SPEED, AGILITY, AND SCALABILITY

Corporate IT can no longer justify a three- to four-week gap between "code complete" and "code in production." Today, users expect new features on a daily or weekly basis, making it difficult to run through the mostly manual (and at best, script-driven) process of standing up the required staging and production environments for each code change. The optimal server platform comes with a built-in policy and automation engine that enables administrators to gradually move out of the critical path of continuous software deployment and into a role that is responsible for creating and optimizing automated workflows.

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### UTILIZE PROGRAMMABLE INFRASTRUCTURE

Programmable infrastructure, or "infrastructure as code," provides comprehensive APIs for software developers to provision, configure, monitor, and manage infrastructure within the boundaries defined by IT administrators. Administrators are responsible for creating the policy and configuration that ensure safe, compliant, and cost-effective resource consumption. The role of IT administrators is changing from "provisioning, managing, and upgrading servers" to "ensuring the availability of APIs and the configuration of centralized policies." This new breed of IT administrators continuously improves their programming skills to be able to optimize how to best enable software to request and consume these server resources via API.

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### USE AUTOMATION TOOLS

Programmable infrastructure can be managed through automation tools, such as Chef, Puppet, Ansible, or Salt. For example, when a developer creates a new Chef cookbook to stand up a Kubernetes cluster or train an AI model, the cookbook can automatically provision and configure the required infrastructure by making API calls to the server platform. In the case of training an AI model, the cookbook would request a server profile that deploys only server hardware with GPUs. Only if there are no GPU servers available would the cookbook request a different server profile for automatic provisioning.

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### STRIVE FOR SPEED, AGILITY, AND SCALABILITY

Centralize Operational Intelligence, Compliance Reporting, and Enforcement

When administrators attempt server configuration changes, the server platform needs to evaluate these changes for compliance and track each change in a comprehensive audit report. It is critical to prevent pockets of automation, where multiple different server management tools are used and no central audit report is created. Administrators need to be able to set centralized compliance policies that can be applied to the entire organization, specific business units, user groups, or individual use cases. Centralized policy management is the basis for comprehensive organization-wide compliance reporting.

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### ENABLE EASY EXPERIMENTATION

Make it easy to rapidly experiment with new technologies and validate the resulting solutions with customers. To enable unrestricted experimentation, corporate IT needs to be able to rapidly reconfigure or cloud resources with the right mix of cloud infrastructure. For example, enterprises typically spend significant amounts of funding to reserve ad hoc server instances on a public cloud to train AI models. However, in a well-automated data center business, users can temporarily use excess capacities for this without incurring additional cost.

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### KEEP IT SIMPLE

Server management software needs to allow administrators to translate their formerly manual steps of provisioning, configuring, and managing infrastructure into policy-driven automated workflows. When the next line of business request rolls around, the administrator can either trigger the automated provisioning of infrastructure templates or IT can give developers access to these templates through a self-service portal and API calls. Whenever developers provision new environments from these templates, the policy engine needs to automatically add the freshly provisioned infrastructure to all the applicable policy, reporting, and lifecycle management automation groups.

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**EMA'S TIPS FOR IT AUTOMATION**

- **Use Automation Tools**: Programmable infrastructure can be managed through automation tools, such as Chef, Puppet, Ansible, or Salt. For example, when a developer creates a new Chef cookbook to stand up a Kubernetes cluster or train an AI model, the cookbook can automatically provision and configure the required infrastructure by making API calls to the server platform. In the case of training an AI model, the cookbook would request a server profile that deploys only server hardware with GPUs. Only if there are no GPU servers available would the cookbook request a different server profile for automatic provisioning.

- **Centralize Operational Intelligence, Compliance Reporting, and Enforcement**: When administrators attempt server configuration changes, the server platform needs to evaluate these changes for compliance and track each change in a comprehensive audit report. It is critical to prevent pockets of automation, where multiple different server management tools are used and no central audit report is created. Administrators need to be able to set centralized compliance policies that can be applied to the entire organization, specific business units, user groups, or individual use cases. Centralized policy management is the basis for comprehensive organization-wide compliance reporting.

- **Enable Easy Experimentation**: Make it easy to rapidly experiment with new technologies and validate the resulting solutions with customers. To enable unrestricted experimentation, corporate IT needs to be able to rapidly reconfigure server hardware, sometimes in a temporary manner. For example, enterprises typically spend significant amounts of funding to reserve ad hoc server instances on a public cloud to train AI models. However, in a well-automated data center business, users can temporarily use excess capacities for this without incurring additional cost.

- **Adopt Redfish**: Hypervisors, clouds, and container platforms need easy access to servers in order to operate efficiently, reliably, and in a scalable manner. The Redfish standard defines RESTful API access across participating infrastructure vendors, to all critical configuration items via human-readable JSON schema. Redfish is gradually replacing the only machine-readable IPMI standard. Redfish RESTful APIs enable any software to browse the resource tree to look up configuration and health parameters, and to issue remote commands to servers, enclosures, and the entire rack. For example, Redfish can enable configuration management software, such as Ansible, Chef, Puppet, or Salt to provision, monitor, scale, and manage a mixed environment of Redfish-compliant servers.
## TEN REQUIREMENTS FOR MODERN SERVER INFRASTRUCTURE

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<td><strong>Infrastructure as Code</strong>: The server management platform needs to abstract all configuration items necessary to describe the exact state of a server. This includes all CIs of the BIOS, NIC, PERC, RAID, power, chassis, and cooling components of the server.</td>
<td>The Dell EMC OpenManage systems management portfolio and iDRAC offer agentless access to all configuration items required to fully define and manage servers.</td>
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<td><strong>Policy Engine</strong>: The policy engine needs to enable the template-driven provisioning of identical servers, straight from the server configuration file. This is the precondition to ultimately make consistent server types available through a self-service catalog or programmatically via API.</td>
<td>OpenManage Enterprise enables the deployment of server templates to compliant infrastructure resources, based on rules defined by IT.</td>
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<td><strong>Day 2 Management</strong>: Once resources are deployed, IT admins need to be able to define ongoing policies for updating BIOS, firmware, drivers, monitoring logs, system health and performance, backup and restore, and the overall scalability of the environment.</td>
<td>The OpenManage Lifecycle Controller can automate regular server management tasks, including firmware upgrades and data protection.</td>
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<td><strong>Integration with Operations Management Platforms and Hypervisors</strong>: Managing servers through the hypervisors eliminates the time, effort, and risk that is typically involved when new server environments are requested. For example, users of Microsoft System Center or VMware vCenter should be able to deploy, monitor, and manage the underlying server resources for virtualized environments, including storage nodes.</td>
<td>The Dell EMC OpenManage systems management portfolio offers supported integrations for the VMware vSphere client and for the Microsoft System Center. This enables IT generalists to deploy, configure, monitor, and scale server and storage nodes straight from within vSphere or System Center.</td>
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<td><strong>Comprehensive API</strong>: The API needs to provide easy access to all system components for deployment, monitoring, events, and management.</td>
<td>The OpenManage Enterprise API provides full access to BIOS, PERC, RAID, OS settings, events, alerts, and policy workflows. This enables customers to leverage standard automation tools, such as Ansible, Chef, Puppet, or Salt, to build up and scale entire application stacks, from the server up.</td>
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<td><strong>Comprehensive Audit Reports:</strong> While IT often is inclined to deviate from the standard manner of provisioning a certain type of server, even a small number of customizations introduces significant risk and cost into the management process. The systems management software needs to track and report on all customizations made to deployed instances of server templates.</td>
<td>Dell EMC OpenManage Enterprise and iDRAC offer agentless access to all configuration items required to fully define and manage servers.</td>
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<td><strong>Build and Deploy Standardized Templates:</strong> Instead of relying on the skills and knowledge of individual server administrators, the optimal server platform needs to offer standardized templates that can be configured within the confines of corporate policy.</td>
<td>OpenManage Enterprise enables new users to easily provision compliant infrastructure based on configuration templates.</td>
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<td><strong>Compliance Enforcement:</strong> Optimal compliance enforcement requires the systems management software to enforce the application of compliance templates, even for highly customized servers.</td>
<td>Provisioning is template-based and records all manual and automatic configurations made to individual hardware in a comprehensive audit history.</td>
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<td><strong>Stateless Management:</strong> Ultimately, server infrastructure needs to become stateless, with the ability to simply replace a failed node's hardware without any required configuration and ideally, without any temporary performance degradation. The systems management software has to reimage the replacement node based on the failed node's configuration file. Ensuring identical configuration between old and new servers guarantees that there is no application impact.</td>
<td>iDRAC and OpenManage Enterprise enable stateless infrastructure management by entirely abstracting the configuration and management layer from the underlying hardware infrastructure. This enables enterprises to simply plug in new server resources that can then be customer provisioned by policy workflows that could be triggered manually, through a self-service portal, or via API.</td>
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<td><strong>Optimize Utilization:</strong> Optimal server utilization requires the ability to provision and compose server infrastructure automatically, based on just-in-time requirements. A bank may want to use the same rack of blade servers that runs their customer terminals during the day, to train machine learning models overnight.</td>
<td>OpenManage Enterprise provides utilization reports that enable administrators to reuse infrastructure during downtime.</td>
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A well-automated local data center can offer similar deployment speed, agility, cost, and even scalability as a public cloud. This is achieved by taking server administrators out of the critical path and turning them into the guardian of automation policies, capacity planning, and compliance and security reporting.

The Dell EMC OpenManage systems management portfolio provides the automation, policy capabilities, and APIs to turn corporate IT into a competitor to public cloud. If used to its full extent, the software can offer business units and DevOps teams a user experience that is very similar to what they are used to from hyperscale clouds, such as AWS, Azure, and Google Cloud.

In addition, server automation is key to modernizing the approximately 50 percent of today’s applications that cannot currently be moved to the public cloud. This unavailability of on-premises infrastructure that can run cloud-native applications is currently stalling many IT transformation plans and could be resolved by adopting server platforms that can easily be consumed by developer code, while at the same time still accommodating traditional application workloads with their “old-fashioned” requirements in terms of high availability, backup, performance, and security.
About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst firm that provides deep insight across the full spectrum of IT and data management technologies. EMA analysts leverage a unique combination of practical experience, insight into industry best practices, and in-depth knowledge of current and planned vendor solutions to help EMA's clients achieve their goals. Learn more about EMA research, analysis, and consulting services for enterprise line of business users, IT professionals, and IT vendors at www.enterprisemanagement.com or blog.enterprisemanagement.com. You can also follow EMA on Twitter, Facebook, or LinkedIn.

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