The Storage Automation Report

How IT Professionals Are Using and Benefiting from Automation of the Storage Layer

NetApp®

What's in the report?

Conducted through an independent research organization, this report queried more than 250 global IT professionals to gain insight into how they use storage automation to realize a variety of benefits. Respondents varied across job role, industry, and company size.

This report details the drivers behind storage automation, what tools and interfaces IT professionals are using, preferences around storage management plug-ins and software development kits, and the benefits realized by implementing storage automation.

Introduction

Automation continues to echo throughout the information technology industry because of its ability to reduce complexity, improve efficiency, and nurture innovation. The worldwide data center automation software market grew 13.7% in 2015 to total $2.3 billion[1] and is continuing to foster growth among enterprises and service providers. The State of Automation report[2] dives into which tools IT professionals are using for automation today, and it looks at trends for streamlining business in the future.

As the cloud continues to improve accessibility across entire organizations, cloud teams are expected to see the biggest increase ever in infrastructure spending over the next year.[3] And as spending on storage infrastructure continues to grow to support the growth of cloud services, automation is essential to keep up with the pace of the entire industry. Because on-premises private clouds grow at the fastest rate, automating the infrastructure behind them allows greater agility and scalability across organizations. Automation enables flexibility for organizations to continue to shift and stay ahead of the demands of the ever-changing market.

"Cloud is not only yet another delivery model supporting existing storage workloads — it is an essential enabler for development and proliferation of a broad range of new applications and services."

- Natalya Yezhkova, Research Director, Storage Systems[4]

The demand for innovative storage architectures will continue to develop with the demand for local, agile cloud services. For industries born in the cloud like software-as-a- service (SaaS) companies, storage infrastructure has always been invisible to the end user. Behind the scenes, infrastructure can cause major growing pains for a scaling enterprise. The right programmable, scalable infrastructure is critical to the success of your business. This report delivers insights for your growing infrastructure, helping you to improve your business through automation trends and tools.

This report highlights responses from SaaS-like companies. Computer software companies had the highest response rate among responding industries (35% of all respondents). These providers and their customers have no tolerance for slow, unavailable, or unresponsive solutions, or solutions that lack the most innovative and up-to-date features. To remain competitive, SaaS companies take advantage of automation tools to continue their agile business development, testing, and deployment. In addition to a high adoption rate of auto-mation tools, SaaS companies are also more likely to seek out DevOps practices to deliver faster development practices alongside their operational counterparts.

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1 IDC. Worldwide Datacenter Automation Software Market Shares, 2016: Year of Suite Success.
   Available at https://www.idc.com/getdoc.jsp?containerId=US41372217. June 2016.

2 The report was published at the beginning of calendar year 2017, during NetApp's 2017 fiscal year. For consistency, "this year" and 2017 refer to data collected at the end of 2016.
   "Last year" refers to the Storage Automation report published in calendar year 2015.

3 TVID: 9C4-3E2-E28

4 IDC. Worldwide Storage for Public and Private Cloud Forecast, 2016-2020.
   Available at https://www.idc.com/getdoc.jsp?containerId=US42059416. December 2015.
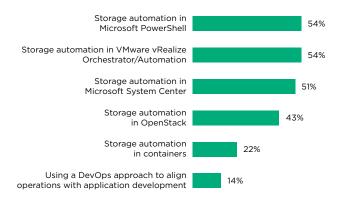
KEY FINDING | VMware vRealize continues to be a prominent tool for storage automation, with Microsoft PowerShell usage drastically increasing among respondents.

Respondents were asked which technologies they currently use to implement storage automation. VMware vRealize remained one of the most popular automation initiatives: 42% of respondents indicated usage in 2015 — a number that grew to 54% of survey respondents. Microsoft PowerShell saw the largest increase in usage: 54% of respondents indicated usage, up from just 15% of respondents in 2015. This jump and continued growth with PowerShell is likely due to its support on more operating systems and containers. This figure is also consistent with IDC research findings, suggesting that Windows represents a majority of the automation market. Automation initiatives also increased significantly for Microsoft System Center (51% of respondents) and for OpenStack (43%).

Due to the increased buzz around containers, this report looks closely at their impact in the market. Containers served as an automation tool for 22% of respondents. Overall, there is an increase in implemented initiatives and processes to increase storage automation for IT professionals.

While computer software companies are automating their storage needs with PowerShell (57% of respondents), they also heavily use OpenStack (56%) for automating across their organizations. This industry, which includes many SaaS and SaaS-like companies, is most heavily using a DevOps approach to align operations with application development (21%)[5] for increased automation.

Which of the following initiatives and processes are you currently implementing?

Initiative	Percentage
Storage automation in Microsoft PowerShell	54%
Storage automation in VMware vRealize Orchestrator/Automation	54%
Storage automation in Microsoft System Center	51%
Storage automation in OpenStack	43%
Storage automation in containers	22%
Using a DevOps approach to align operations with application development	14%

TVID: 34C-807-240

KEY FINDING | Storage automation in Microsoft System Center, PowerShell, and VMware are the most popular initiatives considered for implementation in the next year. However, consideration of storage automation in containers is likely to see the most growth.
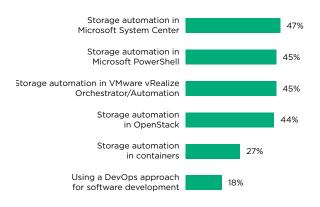
While the majority of IT professionals continue to consider storage automation in Microsoft System Center (47%), PowerShell (45%), VMware vRealize (45%), and OpenStack (44%) for the next year, consideration for both containers and using a DevOps approach has also increased, showing a willingness to move beyond current implementations.

Containers are turning the most heads, with 22% of respondents currently implementing containers and another 27% considering implementation within the next year. The benefits of containers often derive from their speed and lightweight nature; many more containers can be put onto a server than onto a traditional VM. Containers are "shareable" and can be used on a variety of public and private cloud deployments, accelerating dev and test by quickly packaging applications along with their dependencies. Their shared, lightweight nature makes automation even more efficient, especially in fast-paced cloud and as-a-service business models.

Consideration for automation via DevOps tools continues to grow. Although only 14% of IT professionals currently implement a DevOps approach, 18% are considering it for the next year. Companies embracing and implementing DevOps are able to fulfill continuous customer demand and deliver new solutions at even faster speeds. DevOps tools appear to be converging with traditional operations orchestration and provisioning solutions and thus are most likely influencing containers usage numbers as well as open-source orchestration tools.

OpenStack usage is also expected to continue to increase. With 43% of respondents now using OpenStack for automation and 44% considering it for next year, OpenStack usage is likely to continue as a key to automating the next-generation data center. And 53% of IT professionals currently implementing storage automation via VMware vRealize Orchestrator say they're considering OpenStack for the next year,[6] indicating that OpenStack will have no problem maintaining its "disruptor" status.

Which of the following initiatives and processes are you considering implementing in the next year?

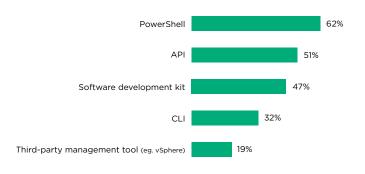| Initiative	%
Storage automation in Microsoft System Center	47%
Storage automation in Microsoft PowerShell	45%
Storage automation in VMware vRealize Orchestrator/Automation	45%
Storage automation in OpenStack	44%
Storage automation in containers	27%
Using a DevOps approach for software development	18%

TVID: 062-BOA-ABB

KEY FINDING | IT professionals are increasingly choosing PowerShell tools for storage automation.

IT professionals prefer PowerShell for storage automation overall (62% of respondents). This reflects a large shift from last year's preference for storage automation through third-party management tools. PowerShell's maturity in the market and ability to automate across platforms make it a popular language for storage automation. Its ease of use and consistent experience for automation also make it a popular choice. VMware users and Microsoft users alike prefer PowerShell in their respective current use segments.[7] OpenStack users still prefer API control (70%) for automation,[8] where interface integrations use APIs, and scripting is less of an operational tool. Among those already deploying containers, PowerShell is also the preferred interface.[9]

Computer software companies report similar use in the overall segment, but API use remains highest for storage automation (57%).[10] By using existing APIs and SDKs, developers don't have to wait on operations teams for storage to be reconfigured. This more streamlined, automated approach builds on the DevOps mentality and empowers developers to build their own environments through virtual machines, containers, and so on.

How likely would you be to use the following interfaces and tools for your storage automation?

Interface/Tool	Percentage
PowerShell	62%
API	51%
Software development kit	47%
CLI	32%
Third-party management tool (eg. vSphere)	19%

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7 TVID: C75-937-41B; TVID: 28A-2F1-DAD
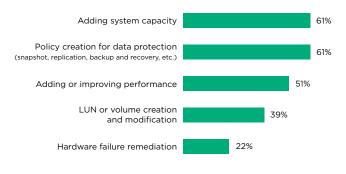
8 TVID: EB0-249-ED3

9 TVID: 532-0CC-E3E

10 TVID: D4F-23D-E96

KEY FINDING | IT professionals are already automating the addition of system capacity and policy creation for data protection.

IT professionals are looking to automate a number of storage tasks. Across the pool of respondents, IT professionals are currently automating or planning to automate adding system capacity (61%) and policy creation for data protection (61%) within the year. OpenStack and PowerShell users have been more likely to prioritize automating adding system capacity over automating creating policies for data protection,[11] while VMware users are more likely to prioritize automating policy creation for data protection via snapshot, replication, or backup and recovery.[12] Although the top choice of storage automation is strong for both adding capacity and protecting data, the top priority for the different platforms may reflect the varying strengths, mindsets, and capabilities of open-source versus legacy platforms.

Computer software companies are more likely to automate policy creation for data protection (64%).[13] By automating as many storage tasks as possible, including the automation of building and protecting new data environments, these companies are validating their DevOps mentality.

How likely would you be to use the following interfaces and tools for your storage automation?

Adding system capacity	61%
Policy creation for data protection (snapshot, replication, backup and recovery, etc.)	61%
Adding or improving performance	51%
LUN or volume creation and modification	39%
Hardware failure remediation	22%

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11 TVID: 099-995-069, TVID: 2C2-E9E-DC0

12 TVID: 24E-4D7-A40

13 TVID: 3A1-690-7EA

KEY FINDING | Increasing employee productivity is the top driver behind storage automation.

Of the many drivers behind an organization's deployment of storage automation, easing complexities for employee productivity was most common (61%), followed by easing complexities involved with provisioning and deploying storage (55%). Compared
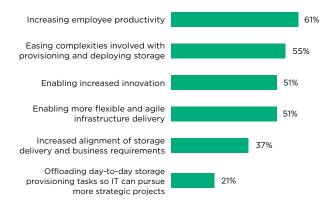
with previous findings, easing complexities remained relatively important, dropping only slightly from the most important driver to the second most important driver, proving its lasting relevance in automating storage. With the adoption of simpler platforms, priorities for automation continue to shift.

Employee productivity as a driver increased dramatically in the same time frame, increasing to 61% of respondents. Enabling increasing innovation also took a leap in importance (51%). Both of these changes show the increased importance of the employee to responding organizations.

Computer software companies strengthened these top drivers for automating — 63% of computer software respondents led with automation for increased employee productivity, followed by 57% of these companies automating to ease complexities involved with provisioning and deploying storage.[14] In an SaaS environment, freeing employee time from hardware management is critical for developing a leaner, better software product that is competitive in the marketplace. Additional time allows a more feature-rich experience for the end user, thereby helping the SaaS company retain and grow revenue with existing customers.

IT professionals currently deploying OpenStack have similar needs for storage automation. Even more so, this subset wants to increase employee productivity (73%) and ease complexities involved with provisioning and storage (72%).[15] This large focus across platform users and industries to increase employee productivity aligns well with the increased interest in DevOps. Applying DevOps principles accelerates time to value, improves quality, and increases productivity for the business.

What are the top drivers behind your organization's deployment of storage automation?

Driver	%
Increasing employee productivity	61%
Easing complexities involved with provisioning and deploying storage	55%
Enabling increased innovation	51%
Enabling more flexible and agile infrastructure delivery	51%
Increased alignment of storage delivery and business requirements	37%
Offloading day-to-day storage provisioning tasks so IT can pursue more strategic projects	21%

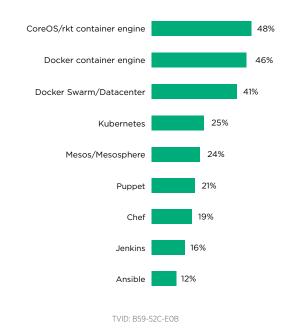TVID: 1CO-DC9-777

14 TVID: 2D4-88B-9E6

15 TVID: E28-E92-AAB

KEY FINDING | Container engines are popular tools currently in use or in consideration for use among IT professionals.

Among the diverse collection of tools currently in use or in consideration for use in the next year, both container engines, CoreOS/rkt (48%) and Docker (46%), garnered the most interest. Containers, which can be seen as an alternative to or a replacement for traditional VMs, are gaining in popularity. This concentrated response to container engines reiterates the growing interest. Among the orchestration tools listed, Docker Swarm/Datacenter held the highest interest for IT professionals, at 41%. The interest in this tool has nearly doubled since last year's automation report. Although the majority of these users are probably using Docker Swarm with the Docker container engine, the spread of interest across other orchestration and developer tools suggests that IT professionals are using, or considering using, more than one tool to automate their storage environments.

OpenStack users have a much stronger preference for the Docker container engine (68%) and Docker Swarm/Datacenter (50%), while VMware and PowerShell users both prefer the CoreOS/rkt container engine (60% and 57%, respectively).[16] Interestingly, the tool with the most interest for both VMware and PowerShell users after container engines was still Docker Swarm/Datacenter. Kubernetes remained a highly popular tool across all platforms, with 27% of respondents who use PowerShell expressing interest, as well as 34% of OpenStack and VMware users. Puppet, Chef, and Ansible continue to have relevance for automating applications and infrastructure, although they are more commonly tied to traditional application frameworks. This usage is likely to increase as container technologies and configuration management tools continue to mature.

SaaS companies are more likely to use container engines than the average IT professional surveyed (TVID: 6C7-98C-C68). Of IT professionals working in the computer software industry, the CoreOS/rkt container engine (56%) is more likely to be used than the Docker container engine (49%). Thus SaaS companies are less likely to use Docker Swarm (38%) and show a more balanced usage across orchestration tools, from 24% using Chef to 27% using Kubernetes.

Which of the following tools are you using currently, or considering in the next year?

Tool	Percentage
CoreOS/rkt container engine	48%
Docker container engine	46%
Docker Swarm/Datacenter	41%
Kubernetes	25%
Mesos/Mesosphere	24%
Puppet	21%
Chef	19%
Jenkins	16%
Ansible	12%

TVID: B59-52C-E0B

16 TVID: CBB-C94-59B, TVID: 37E-A89-3B8, TVID

KEY FINDING | APIs are evenly consumed through consolidation layers and existing tools.
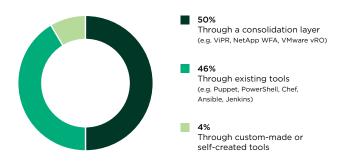
When asked which method they preferred for consuming APIs, respondents were fairly evenly split between consuming through a consolidation layer (50%) and through existing tools (46%).

Current implementers of OpenStack and VMware prefer API consumption through a consolidation layer, with OpenStack users having a stronger preference (69%)[17] over VMware users (57%).[18] IT professionals currently implementing containers prefer to consume APIs through existing tools (55%).[19]

Although there is no doubt about the importance of APIs in automating a storage environment, APIs also improve automation between platforms. From previous findings, IT professionals are using a number of platforms, with interest for others only increasing. APIs benefit automation between these different tools as well. It appears that IT professionals are happy to consume APIs, whether they are accessed through a consolidation layer or through the tools themselves.

Computer service companies may slightly prefer consuming APIs through a consolidation layer, such as ViPR, NetApp® OnCommand® Workforce Automation, or VMware vRO (57%).[20] This means that the API is no longer directly consumed, which may be a result of looking for standardization between systems, platforms, or vendors.

What is your preferred method for consuming storage APIs?

50%
Through a consolidation layer
(e.g. ViPR, NetApp WFA, VMware vRO)

46%
Through existing tools
(e.g. Puppet, PowerShell, Chef, Ansible, Jenkins)

4%
Through custom-made or self-created tools

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17 TVID: E38-EFF-160
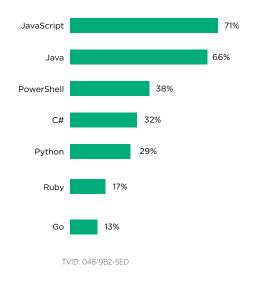18 TVID: 2F0-7E7-2E8
19 TVID: E12-7CB-13C
20 TVID: 136-C2A-CF

KEY FINDING | Java and JavaScript remain the most used languages among respondents.

JavaScript (71%) and Java (66%) are the most popular software development kits and languages used across all platforms. As tools that enable the creation of applications for particular platforms or frameworks, including hardware, SDKs can significantly accelerate the development process.

OpenStack users had a stronger preference for Java (78%), and were most likely to use Python and PowerShell (41%).[21] VMware vRealize users are more likely to prefer JavaScript (76%) and were most likely to use C# (42%).[22] Unsurprisingly, PowerShell users were most likely to take advantage of PowerShell SDKs (50%).[23]

Computer software companies, like those deploying OpenStack, prefer Java SDKs (75%) over JavaScript (70%). The next most popular language for this industry was C# (41%).[24]

Which programming languages and/or Software Development Kits (SDKs) would you be most likely to utilize?

Language	%
JavaScript	71%
Java	66%
PowerShell	38%
C#	32%
Python	29%
Ruby	17%
Go	13%

TVID: 048-9B2-5ED

21 TVID: 9AB-9CC-389

22 TVID: BED-3E4-B9A

23 TVID: A4B-504-54D

24 TVID: 484-1DE-4EC

KEY FINDING | A majority of IT professional complete tasks at least 6 times faster after automating.

The majority of IT professionals are seeing more than sixfold gains in the speed at which they perform a variety of management tasks after automating (nearly 70% of those surveyed reported at least a six- to sevenfold gain after automating). 54% of respondents completed LUN and volume creation and modification 8 to 10 times faster with automation; 75% of respondents completed adding system capacity 6 to 7 times faster with automation.

OpenStack users see greater gains in automation across all tasks, with a majority of tasks seeing eight- to tenfold gains with automation. 65% of OpenStack user respondents saw an eight- to tenfold gain in LUN and volume creation and modification with automation, and 79% saw at least a sixfold gain in the same task.[25]

Similarly, 63% of SaaS-like respondents saw an eight- to tenfold gain in LUN and volume creation and modification with automation, and 79% saw at least a sixfold gain in the same task.[26]

Which programming languages and/or Software Development Kits (SDKs) would you be most likely to utilize?

	Over 10x faster	8x–10x faster	6x–7x faster	4x–5x faster	Up to 4x faster
LUN/volume creation and modification	27%	27%	19%	17%	10%
Policy creation for data protection (snapshot replication backup & recovery, etc.	15%	31%	26%	19%	9%
Adding system capacity	17%	30%	28%	15%	10%
Adding/improving performance	19%	28%	23%	20%	10%
Hardware failure remediation	19%	26%	22%	18%	15%

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25 TVID: 182-7A2-EC6

26 TVID: 07B-B55-39F

Summary

A variety of IT organizations continue to streamline management and improve efficiencies through automation. IT professionals are relatively homogenous in their approaches and hoped-for outcomes around automation, with computer software companies, which are increasingly cloud-based, often having a stronger conviction of the observed trends. Here are three main takeaways around tools and trends related to automation.

- While the market majority uses VMware solutions, IT professionals are increasingly integrating open-source solutions to further their automation efforts. The number of APIs readily available through consolidation layers and existing tools gives the end user more opportunities to integrate platforms. Automation, as it stands today, allows companies to complete tasks 6 times faster.

- Probably due to its maturity in the market and ability to integrate across platforms, PowerShell usage has increased. IT professionals are using automation tools, like PowerShell, to add system capacity and policy creation for data protection.

- Containers are increasing in consideration and usage across organizations. These companies are looking to continue to increase storage automation to improve employee productivity through solutions like SDKs. A DevOps approach, most readily embraced by SaaS companies, improves employee productivity and also the delivery of continually improved products to the marketplace.

As storage automation continues to evolve through new tools, employees and organizations alike will reap the benefits of a more agile business to develop and improve with the constantly adapting marketplace. Adoption of automation tools and practices will continue to enable more seamless delivery of information and resources for an ever-increasing, on-demand world.

Simplify and Automate with NetApp Cloud Infrastructure

In large storage deployments, automation is the key to operational efficiency. By automating complex storage management tasks, orchestrating workflows, and delivering deep management integration, you can efficiently satisfy your service delivery needs and focus on driving your business forward. Whether you build your own management frameworks or use an off-the-shelf management stack, NetApp cloud infrastructure makes automating storage management easy and straightforward, regardless of your desired workload.

DevOps

DevOps has emerged as a framework for implementing both cultural and technological change in organizations that are challenged to address dynamic consumer and internal demands. IT must now deliver on a wider range of capabilities and manage data both on premises and off to meet the growing needs of the business and developers. NetApp accelerates success in DevOps journeys by providing highly automated products and solutions that can integrate seamlessly into an organization's value stream while not sacrificing scalability and resiliency. NetApp integrations support application development environments to improve the developer experience, increase collaboration, and address the diverse data needs of your business, your developers, and your operations teams.

OpenStack Private Cloud

Across a wide spectrum of industries, OpenStack powers public, private, and hybrid clouds for a variety of applications. Cloud administrators require the ability to easily provision, manage, and operate compute, storage, and networking economically at scale. Infrastructure automation via standard tools and APIs is a key technical feature that enables cloud-level scalability. Predictability for multitenant workloads is another important requirement, and quality of service features make it possible to deliver against stringent customer SLAs. As an original and continuing member of the OpenStack Foundation, NetApp is a leader in developing and supporting OpenStack cloud infrastructure and has employed past project technical leads for Cinder for block storage and Manila for file storage.

Private Cloud

Today's digital workplace needs to deliver more applications and data across multiple platforms, faster than ever before, to keep up with business demands for rapid deployment. To meet this demand, organizations are looking to deliver private cloud through a platform that automates the delivery and ongoing management of the infrastructure for apps and virtual machines by using a service model approach. To build a private cloud, the IT team needs to modernize their infrastructure by virtualizing compute, storage, network, and security with a software-defined approach. This approach allows them to automate the delivery and ongoing management of the virtualized infrastructure, enabling end users to consume it as a service.

End-User Compute

Most users have experienced virtual desktop infrastructure (VDI) as the first step in the journey to a true end-user computing (EUC) environment. EUC is about bringing the full digital workspace to life for an organization, managing the security and compliance of the platforms, apps, and devices that users rely on. To deliver the full spectrum of desktops and applications that users need to perform their jobs, the EUC environment brings everything into a single operating environment. You can deliver predictable performance for all the desktops, databases, and applications in your end-user computing environment with a highly flexible and efficient architecture that is simple to deploy and manage with NetApp HCI. Easily meet the rapidly changing needs of your EUC environment and accelerate your business outcomes.

Containers

Containers are emerging as a tool of choice for improving an organization's agility, reducing costs, and enhancing system performance. Through NetApp's native container plug-in, Trident, container storage provisioning, orchestration, and volume management are automated to deliver dynamic storage persistence for Docker, Kubernetes, and OpenShift. With Trident, users enable self-service functionality, resulting in fewer handoffs, improved infrastructure usage, and greater flexibility – meaning that resources can do what you need them to do, when you need them. NetApp delivers the flexibility to manage, move, and consume data across storage pools, allowing your data to go where your applications live.

About NetApp

NetApp is the data authority for hybrid cloud. We empower customers to simplify and integrate data management across cloud and on-premises environments to accelerate digital transformation. Together with our partners, we provide a full range of hybrid cloud data services to help global organizations unleash the full potential of their data to expand customer touchpoints, foster greater innovation, and optimize their operations. For more information, visit www.netapp.com. #DataDriven