E-BOOK

The Secret to Workload Placement and Performance Monitoring for Hybrid Clouds

How to make informed decisions *before* moving your applications to the cloud

NetApp

1 On Your Premises or in the Cloud?
2 Performance Management and Analytics
3 Policy Management
4 Resource Management
5 Next Steps

1. On Your Premises or in the Cloud?

Transitioning from an on-premises environment to a cloud environment presents IT teams with new challenges. For example, although cloud compute and network services are interchangeable and transient, application data is unique and not easily moved. The best time to make the cloud/no-cloud decision is *before* an application is hosted (or re-hosted). However, without an ability to analyze the various aspects of performance, policies, and resource management, applications are often placed on an improper infrastructure platform. This can lead to unintended consequences, including higher costs and additional administration requirements.

To make informed workload placement decisions requires new analytic tools. A new breed of *infrastructure analytics* can provide insights to guide decision-making for when to host an application using on-premises IT resources and when public cloud resources are a better fit.

"The cloud has helped businesses improve costs in customer acquisition and customer service, reach new markets, push out new products, and minimize procurement and supply chain costs. However, without cost optimization, they could be overspending by more than 70%."

—Gartner, Three Moves for CIOs to Lower Business Costs With Cloud, Ron Blair, 24 March 2017

For example, as shown in Figure 1, NetApp® OnCommand Insight infrastructure analytics software can collect and display service level performance metrics so you can view performance over a period of days, weeks, or months.

1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

The service levels, based on IOPS or IO Density, are user-defined and can be changed on-the-fly. Performance filters are provided to parse data by either application or volume. Most importantly, NetApp OnCommand Insight is agentless and therefore location independent. This means that ***all*** infrastructure data is analyzed, whether it resides in the cloud or on-premises.

Figure 1: Service Level Performance Dashboard

Infrastructure analytics are a departure from the storage resource management (SRM) tools of the past. SRM tools essentially provided a spreadsheet of raw data—dozens of columns and thousands of rows of it—but they delivered little in the way of actual decision-making ability. In contrast, infrastructure analytics turns all that raw data into information that can be used to make informed decisions, thereby increasing the level of control maintained over the entire environment.

1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

2. Performance Management and Analytics

Service level performance is just one aspect of performance management. NetApp OnCommand Insight provides over 50 data analytic points specific to performance utilization and resource availability across the entire infrastructure stack. By correlating performance and capacity trends to identify potential issues, IT can mitigate the problems resulting from improperly provisioned applications.

NetApp OnCommand Insight automatically discovers and reports on the memory, CPU, throughput, I/O, response time, and class-of-service characteristics of all the elements in your data infrastructure. These reports can be rolled up to demonstrate how well the infrastructure is meeting the performance goals set forth by your various internal customers and your customer-facing business services. Performance accountability reporting is also automated, displaying the performance of service paths to each tenant, business unit, application, project, or server. This enables the IT organization to identify customers or areas of the business that drive up infrastructure costs through unforeseen resource usage.

For instance, as shown in Figure 2, an edge performance dashboard can be used to identify workload characteristics on the edges—your highest and lowest performing applications.This dashboard displays the top 10 and bottom 10 applications based on average and peak performance. Applications are listed by name, peak IOPS, peak throughput, and peak response time. By having this information at hand, IT organizations can quickly determine if any workloads have been provisioned on an incorrect platform. This example of compiled data, presented swiftly and visually, represents the backbone of infrastructure analytics. IT personnel are no longer required to sift through reams of raw data to arrive at a conclusion.

1 On Your Premises or in the Cloud?

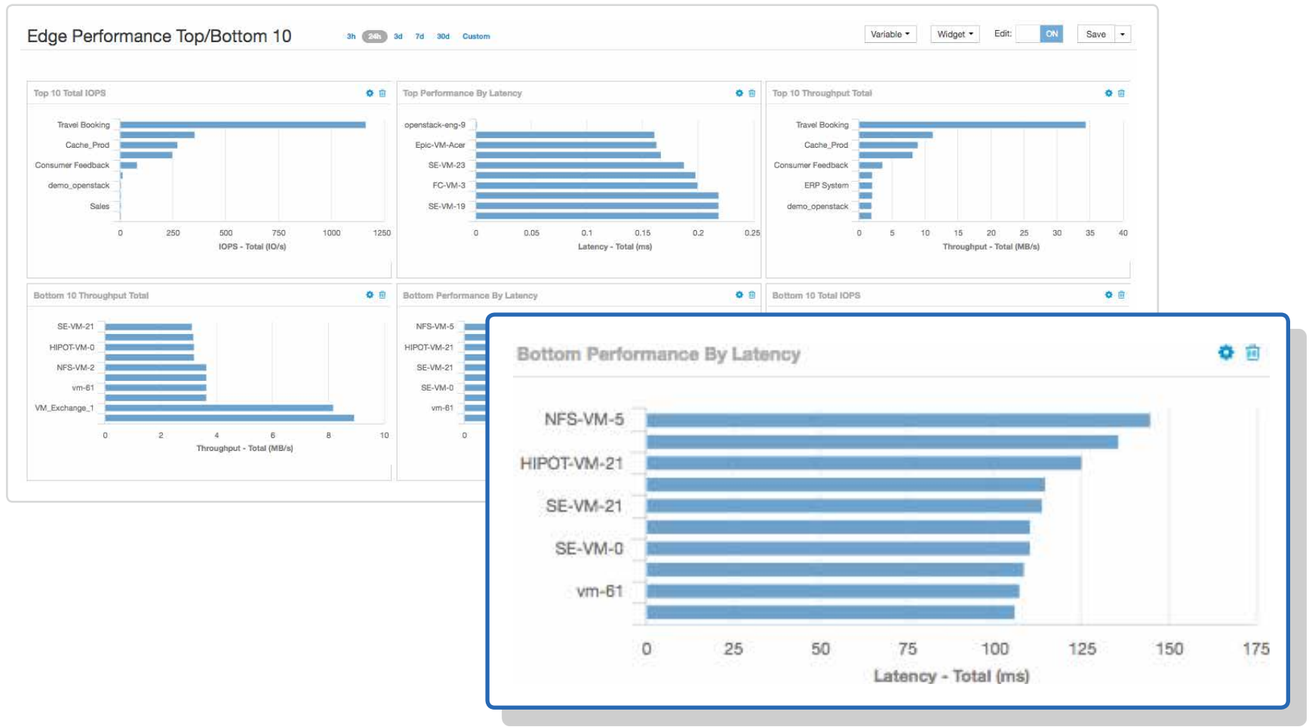
2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

Figure 2: Edge Performance Dashboard



1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

3. Policy Management

Historically, storage monitoring has been performed strictly at the device layer. Individual components could send alerts based on physical component failure, temperature, or state change, but none of these alerts included the context needed to assess the potential impact to business services. Also, the devices did not alert on infrastructure misconfigurations at a higher level, such as redundant path failures. These shortcomings often lead to undiagnosed problems because "nothing looked broken," as well as to latent risks in the infrastructure, both of which elevate the likelihood of outages.

To address these issues, the NetApp OnCommand Insight policy engine enables organizations to create and adhere to standard, repeatable infrastructure architecture and configuration practices. These policies are set against service path attributes and enforced in real time. The organization defines a service catalog, or a desired level of service, and OnCommand Insight makes certain that the "real" infrastructure configuration and performance levels are in compliance with your design goals.

A policy violations dashboard provides intelligent alert notifications based on custom policy thresholds across compute, network, and storage. Capacity, efficiency, virtual machine and array IOPS, and switch port monitoring are among the many items that can be monitored for policy violations. Figure 3 shows how this information can be consolidated onto a single dashboard, including charts that summarize violation types based on the thresholds you define.

1 On Your Premises or in the Cloud?

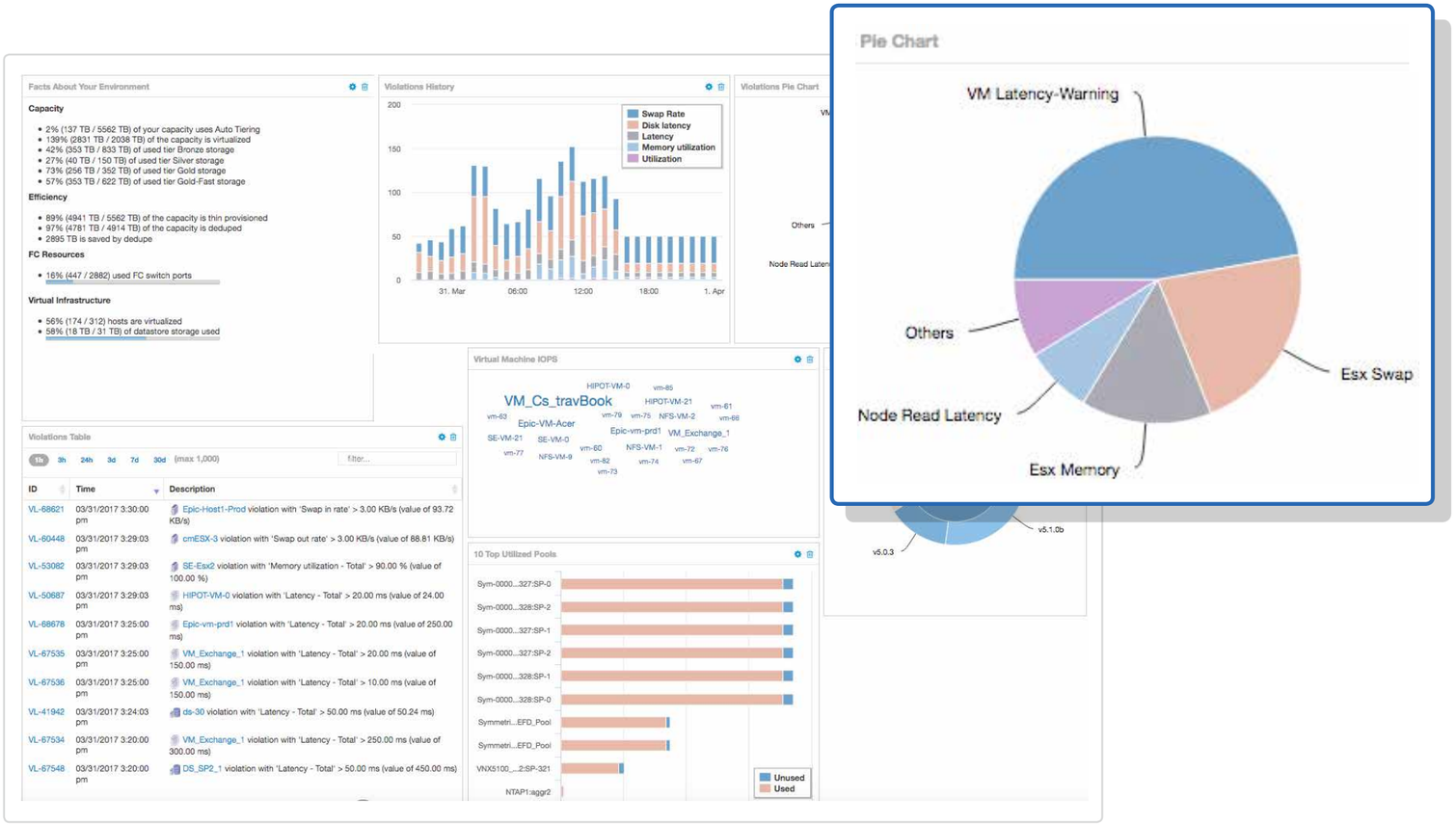
2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

Figure 3: Policy Violations Dashboard



1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

4. Resource Management

It is advised to conduct an application workflow analysis before migrating applications to the cloud. Two important, but often overlooked, items in this workflow analysis include orphaned resource detection and anomaly reporting.

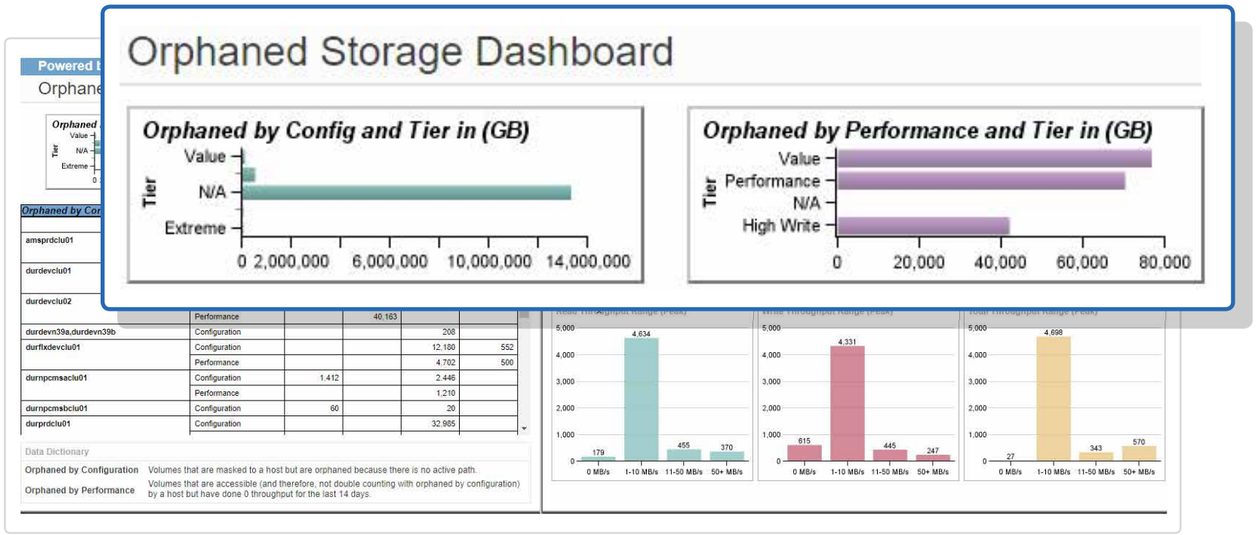
Over time, some resources in any infrastructure become "orphaned": that is, allocated but not in use. The infrastructure can take various routes to become orphaned; typical examples include incomplete decommissioning processes or project cancelation after provisioning has taken place.

Figure 4 shows a dashboard that employs path analytics to discover orphaned or unused resources. The OnCommand Insight software looks for powered-off VMs, as well as switch ports and volumes that are allocated but are not participating in an end-to-end service path.

Reclaiming this infrastructure can free-up resources and lead to significant cost savings.

In addition, workflow analysis should include anomaly trend reporting. NetApp OnCommand Insight proactively detects application anomalies based on machine learning. Anomaly detection targets an application infrastructure, looking for

Figure 4: Orphaned Resource Dashboard



1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

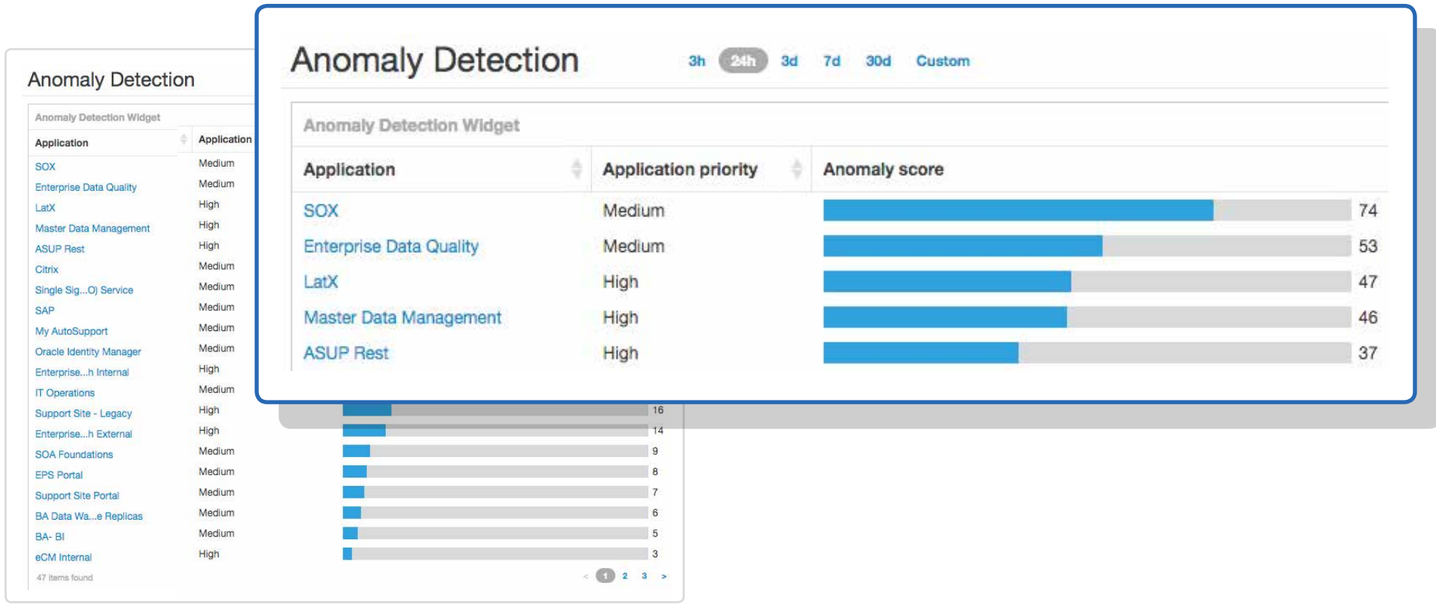
4 Resource Management

5 Next Steps

changes in processing patterns and behaviors. Anomaly results are updated twice per hour and are available on a dashboard as shown in Figure 5.

An understanding of anomalies is important when considering application cloud migration. For example, an administrator might see a consistent daily processing pattern. During the early morning, the workloads IOPS are very low, then later increase during business hours and further subside in the evening. However, early in the evening on October 9th a sudden large spike occurs. By understanding and anticipating application anomalies, better decisions can be made as to whether a given application is suitable for the cloud or not.

Figure 5: Anomaly Detection Dashboard



1 On Your Premises or in the Cloud?

2 Performance Management and Analytics

3 Policy Management

4 Resource Management

5 Next Steps

5. Next Steps

When considering the migration of applications to a hybrid cloud model, it's important to have the tools that allow you to make informed decisions. NetApp OnCommand Insight is an infrastructure analytics tool that provides you a deep understanding of where you should deploy applications across your hybrid cloud environment.

"A single data management tier across on-premise and multiple clouds is critical to making hybrid cloud and multicloud environments effective and creating a powerful foundation for digital transformation (DX) success."

—IDC Executive Brief, sponsored by NetApp, *Managing Your Data in a Hybrid and Multicloud World is Critical to Digital Success*, Doc # EMEA43153917, September 2017

Get started with an online, hands-on demonstration.

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