

## Solution Brief

# Performance Management with OnCommand Insight

### Key Benefits

Avoid problems and meet service-level expectations.

Define policies and establish best practices.

Manage risks and minimize downtime.

### Challenges of Performance Management and Risk Mitigation

Given that the data center is the heart of an enterprise, data center reliability must be monitored and understood. Executives now pay more attention to what's happening in the data center than they ever have in the past. IT managers and executives are challenged to gain end-to-end visibility into their storage, fabric, and compute infrastructure availability, performance, and usage and identify potential risks to services. When problems do arise, they need to reduce troubleshooting time and return to an operational state as quickly as possible with the least amount of manual intervention, if any.

### Operational Intelligence with OnCommand Insight

NetApp® OnCommand® Insight helps improve end-to-end performance, from the virtual machine (VM) environment to the storage network, down to the disks. It gathers near-real-time metrics for the entire storage service path—VM, fabric, and storage performance data—and maps it to applications, tenants, business units, and projects. OnCommand Insight proactively identifies “greedy” and “degraded” workloads and provides analytics to optimize service levels and to align storage consumers to their proper tier of storage service to avoid resource contention. OnCommand Insight helps users understand the daily patterns that might affect performance. Users can view an application's actual usage metrics across the infrastructure assets and use that information to optimize application performance.

By providing data to monitor service quality, prevent application failures, and improve recovery time, OnCommand Insight helps reduce risk to IT operations. It reduces costs by improving usage and by decreasing the time and effort that troubleshooting requires.

With OnCommand Insight, customers can:

- Detect anomalous behavior based on machine learning.
- Receive event notifications based on policy thresholds that are set across the compute, switch, and storage elements that are being monitored.
- Monitor performance for all hardware and software objects for elements in the storage service path of applications.
- Define, measure, and improve service levels based on performance and capacity
- Conduct workload analysis for on- and off-premises data migrations.
- Identify greedy and degraded resources.

### Identify risks before they become problems

OnCommand Insight anomaly detection is a proactive monitoring approach that uses machine-learning intelligence based on historical information. It can detect emerging performance anomalies far sooner than with traditional thresholds, giving administrators more time to discuss, plan for, and mitigate concerns before application service-level objectives (SLOs) or data center services are affected.

The anomaly detection feature (Figure 1) provides application infrastructure awareness and enables users to proactively identify changes in behavior in the resources that support the application. The anomaly detection engine ingests the performance metrics that OnCommand Insight collects. It identifies anomalies in key performance counters, including IOPS, latency, storage node and pool usage, hypervisor CPU, and deep SAN fabric performance metrics, which often are responsible for slow-drain device contention. Beyond typical threshold alerting, anomaly detection learns the normal operating range for the application workload and highlights when performance changes in behavior are outside the expected levels.

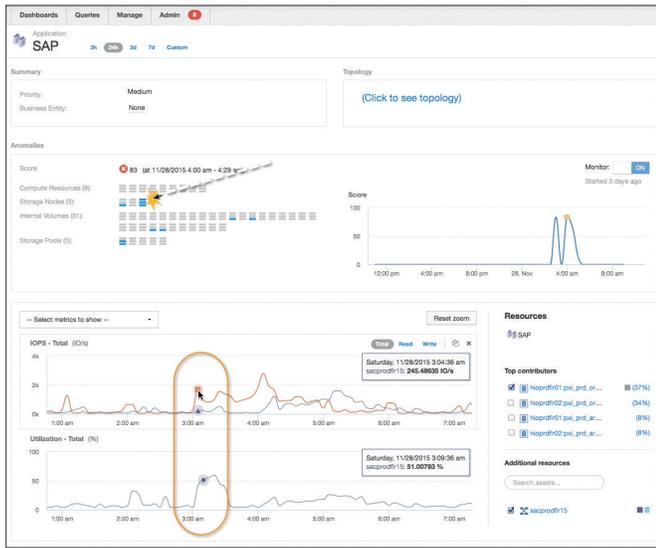


Figure 1) Example of an application landing page with OnCommand Insight anomaly detection.

The latest advances in OnCommand Insight anomaly detection provide a more aggressive and proactive approach to detecting deviating resource behaviors before they become service disruptions or outages.

### Define and establish multipolicy performance thresholds

With OnCommand Insight, users can define multipolicy threshold polices for storage, compute, and fabric objects. This capability means that users can create a threshold by using a combination of metrics, such as IOPS and latency (Figure 2 shows an example). Users can create performance policy thresholds on datastores, disks, hypervisors, internal volumes, ports, storage, storage nodes, storage pools, VMDKs, VMs, and volumes. These objects can be labeled with unique annotations and specific metrics can be set so that boundary values can be used to define SLAs and SLOs.



Figure 2) Example of a multipolicy threshold that uses latency and IOPS.

When the performance of an object breaches predefined thresholds, OnCommand Insight has various methods for alerting the IT staff about the violation. These methods are SNMP, Syslog, and SMTP (e-mailed) alerts. E-mailed alerts allow users to quickly click and launch to the affected resources within OnCommand Insight.

OnCommand Insight performance thresholding features include:

- Predefined violation dashboards
- A violation widget for custom dashboards
- The ability to search for violations

### Quickly troubleshoot performance issues

When a performance problem does arise, OnCommand Insight makes it significantly easier to identify and correct it. It allows users to pinpoint specifics in organized views that target problem areas within the data center. Users can query the data that is collected by OnCommand Insight to find information to help rapidly troubleshoot problems. Data can be displayed in a dashboard that is tailored to align with the user's business process and can be easily shared with stakeholders. The OnCommand Insight Visual Query Language is an intuitive search in real time to convert operational questions into actionable insights. It enhances the user's ability to troubleshoot and investigate risks and incidents. Queries can be saved and searched by widgets, annotations, and more.

The OnCommand Insight violations dashboard (Figure 3) helps users prioritize efforts based on the number of events, the duration, and the time of day. Examples of various alerting types include latency, IOPS, usage, severity, business unit, and even associated application.

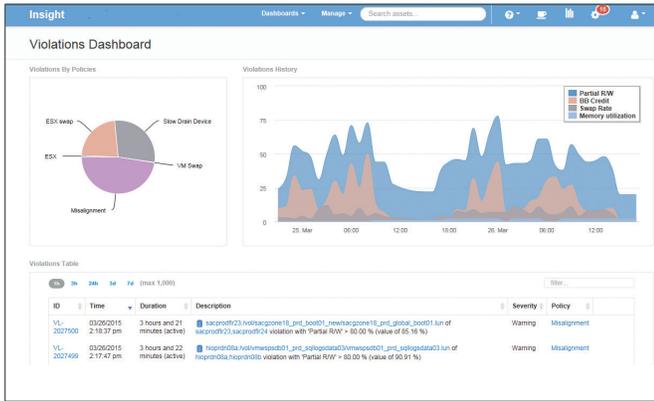


Figure 3) Example of the OnCommand Insight violations dashboard.

Users can quickly analyze key metrics such as CPU, memory, and I/O load for both servers and VMs. They can identify congested hosts and storage network ports. And they can examine application I/O performance and determine whether one application is having a performance impact on another.

OnCommand Insight includes innovative features for analyzing virtual environments. If a VM is running slowly, users can see whether that slowdown is a trend over time or a one-time spike. Users can see whether underlying datastores are overloaded and analyze contention between resources in the storage service path. They can quickly determine whether a particular VM, datastore, or storage volume is bogging down workload performance.

### Assign appropriate storage service levels based on performance

With OnCommand Insight, end users can define service levels and tiers. Tiers can be based on vendor, array model and family, storage pool, and storage volumes. Customers also can define flexible service levels based on a combination of performance metrics from multiple objects in the storage service path. An example of combined metrics that are used in production in NetApp IT and in other large organizations is I/O density per terabyte.

When users define and configure a tier in OnCommand Insight, it automatically applies that tier structure to any storage, volume, and storage pools that match that configuration. When new storage is installed and configured, if the storage matches the criteria for a tier, the tier is automatically applied to the new storage in OnCommand Insight. Customers can use these analytics to make decisions about appropriate asset allocation based on service levels. To provide evidence on the progress of tiering initiatives, OnCommand Insight also reports on the usage ratios of the service levels and tiers over time.

### Perform workload analysis for migrations

OnCommand Insight establishes the baseline service-level performance. This baseline helps customers compare actual SLAs with expected SLAs. It also allows IT administrators to correctly size the environment and to make informed decisions about which workloads are good candidates for hosting in an off-premises or cloud data center.

OnCommand Insight can analyze application workloads and suggest which platform is the most cost-effective (including hybrid cloud) for that data and workload. Users can then plan a more efficient IT infrastructure, improving the use of current assets and helping to plan migrations.

### Use case example: Identify greedy and degraded resources

Application workloads in the enterprise are hosted in a shared environment. When a workload, such as a volume, increases its usage of a cluster component to the point that the component cannot meet the demand of other workloads, the component is in contention. The workload whose activity is overusing a component is *greedy*. The other workloads that share those components and whose performance is affected are *degraded*.

When OnCommand Insight detects an incident, it identifies all the workloads and shared infrastructure components that are involved. It identifies the greedy workloads that caused the incident, the cluster component that is in contention, and the degraded workloads whose performance has decreased because of the increased activity of greedy workloads.

OnCommand Insight correlation analytics help identify greedy and degraded resources for a specified service path. An analysis is performed while viewing each object, greatly reducing the time that is necessary to troubleshoot root-cause symptoms.

### Summary

OnCommand Insight provides operational intelligence, business insight, and IT ecosystem integrations within complex enterprise IT environments. With a centralized location for all performance data, IT teams can identify and correct traffic-flow problems, get optimal performance from all their resources, and reduce or eliminate expensive slowdowns and outages. OnCommand Insight reports and dashboards allow IT teams to respond more quickly to business and mission needs by managing capacity and performance and by detecting risks to IT applications and services.

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