White Paper

Enhancing IT Management with Infrastructure Analytics

Data Insights and Control for Your Hybrid Cloud

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1 Introduction

Why Infrastructure Analytics?

Modern IT infrastructures consist of hybrid cloud architectures that span the traditional on-premises data center to hyperscaler cloud services providers. IT infrastructures are growing more complex; heterogeneous physical and virtual servers, multiprotocol networks and storage systems, and off-premises public clouds are difficult to monitor and manage. Traditional management tools for this infrastructure are based on horizontal domains, performed through vendor-specific element managers by distinct technology teams. Technology services delivered to the customer, however, are not domain specific. These services depend on the coordination of physical and logical configurations across technology domains to deliver access to information.

To support their customers, IT organizations need enhanced tools to understand how the disparate infrastructure and cloud elements support key applications and services. Aligning operational tooling with the “customer” consumption enables IT organizations to deliver more reliable, more effective services, at a lower overall cost. Benefit areas for infrastructure analytics include configuration management, monitoring and alerting, chargeback, capacity management, and performance management.

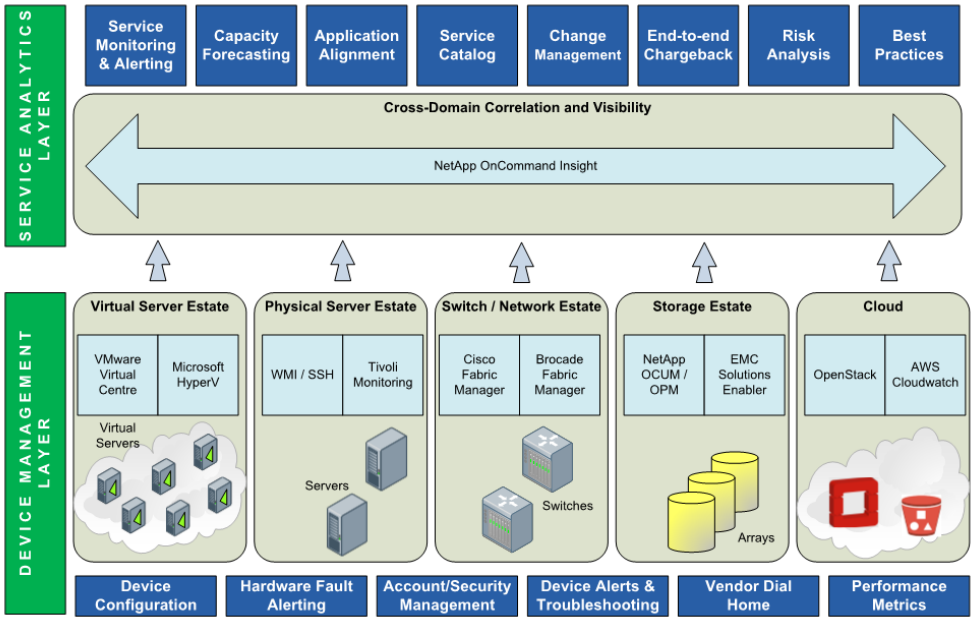
NetApp OnCommand Insight

NetApp® OnCommand® Insight management software provides real-time, multivendor, multiprotocol service-level views and analytics of agile and traditional IT. The software enables organizations to analyze on-premises and cloud infrastructure in terms of the end-to-end services delivered, thereby improving operational effectiveness and reducing costs.

The software is completely agentless, which means low deployment and administration costs and rapid time to value after deployment. OnCommand Insight provides actionable operational analyses to VM, network, and storage teams. Integration with business service delivery platforms allows it to pull storage into the IT service delivery chain.

OnCommand Insight functions as a configuration management system for infrastructure. It sits above the device management layer, pulling information from the physical and virtual server estate, the storage network, and the storage systems themselves (Figure 1). This information is then analyzed and correlated into *service paths*, which represent the end-to-end data access between a host or virtual host and a volume.

Figure 1) Service management and device management layers.



2 Enhancing Infrastructure Management

This section describes specific areas where OnCommand Insight improves operational effectiveness for IT organizations.

Configuration Management

Improved configuration management can drive down costs through more effective asset management, as well as improve service quality through standardization and change and impact analysis.

Discovery and Asset Management

Most organizations struggle to maintain up-to-date asset and configuration information for their storage infrastructure. Often the data is stored in Excel spreadsheets and updated manually, resulting in out-of-date and incomplete information, as well as the operational costs associated with the work hours dedicated to the task.

The OnCommand Insight agentless discovery mechanism automatically imports information about all infrastructure assets in the estate, giving accurate and real-time visibility into all the servers, virtual servers, HBAs, switches, and storage arrays. In addition to basic asset discovery and management, OnCommand Insight performs service path correlation to provide visibility into exactly how the storage infrastructure supports key applications and business services. Attributes of the path, such as redundancy, response time, and capacity overcommit, can be used to ascribe a level of service to the end-to-end relationship.

Standardize Infrastructure Deployment Practices

Enforcing standard deployment practices for infrastructure is extremely difficult. Even with organizations that have well-defined infrastructure service catalogs, VMs, storage, and storage networks, provisioning is often done manually, which can result in inconsistent deployment practices between individuals or human error in the deployment. Over time, configuration changes also tend to shift the estate away from standard practices toward a more entropic state.

OnCommand Insight has a policy engine that enables organizations to create and adhere to standard, repeatable infrastructure architecture and configuration practices across the organization. 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 the software makes certain that the “real” infrastructure configuration and performance comply. As an example, many customers set up policies requiring all premium-class VMs to have latencies less than 5ms. Another example would be requiring production SAN-attached servers to have redundant paths to storage.

CMDB Integration

Information technology service management (ITSM) solutions perform a variety of functions, many of which stem from a configuration management database (CMDB) maintained by the ITSM solution. Typically, these CMDBs have a variety of configuration items covering web front ends, applications, databases, and servers, with a server’s storage treated as a component of the server itself. Storage systems themselves may exist as assets in the CMDB, but there is seldom an automated mechanism to link them to servers. The exclusion of storage infrastructure from the traditional ITSM service impact model is often viewed as a “black hole” in these solutions.

Service path information from OnCommand Insight can be imported into a CMDB to extend traditional ITSM use cases to storage, including service impact management, alerting, ticketing, and asset management.

Monitoring, Troubleshooting, and Change Management

Effective monitoring, troubleshooting, and change management enhance the reliability of services delivered by the infrastructure and minimize downtime and costs.

Service Configuration Monitoring and Troubleshooting

For many organizations, storage monitoring is done strictly at the device layer. Individual components can send alerts based on physical component failure, temperature, or state change, but none of these alerts carry a service impact context. Also, devices do not alert on operator error or existing misconfigurations. These shortcomings can lead to operational staff ignoring device-based alerts because “nothing looks broken,” as well as to latent quality risk in the estate, both of which elevate the likelihood of outage.

The OnCommand Insight policy-based monitoring of service paths mitigates the risk of outage by providing a service context for every detected configuration change. For instance, when OnCommand Insight detects that a port on a switch goes offline, it creates an alert based on which server-to-volume relationships violate policy because they now lack redundancy. If nothing is accessing data over the port, then no service event is created.

The policy engine also enables OnCommand Insight to alert based on configuration issues that carry no device-based alert. For instance, if a volume is allocated to one HBA in a server but not the other, the storage array would not generate an alert. However, OnCommand Insight would detect the single-path configuration as a violation of the redundancy policy and generate an alert.

When OnCommand Insight detects a configuration policy violation, the software automatically provides root-cause analysis by linking the violation to the configuration change that created it.

The policy-based monitoring in OnCommand Insight applies to all discovered service paths, so latent quality risks can be identified before they lead to outage.

Service Performance Monitoring and Troubleshooting

OnCommand Insight policy-based monitoring extends into the performance realm, alerting the organization when service performance does not comply with the service-level objectives (SLOs) for the class of service, or tier.

Performance policies are monitored agentlessly and in near real time at the VM, hypervisor, network, and storage layers. These policies can employ thresholds for multiple metrics simultaneously and are typically applied to objects of a service level, rather than to objects on a device. For example, a policy may be violated if a “gold”-class VM sees latency > 10ms *and* IOPS >10; a “silver”-class VM will have a looser policy.

When OnCommand Insight detects a service performance policy violation, the software provides root-cause analysis by automatically correlating performance metrics between infrastructure domains (Figure 2) and identifying “bully” and “victim” resources.

Figure 2) VM latency, automatically correlated to storage volume performance metrics.

“What If” Change Impact and Analysis

For most organizations, a significant percentage of outages can be attributed to planned changes.

In addition to the near-real-time monitoring of infrastructure changes and their effects on services, OnCommand Insight also offers a facility to simulate planned changes ahead of time and assess their impacts. This approach significantly reduces the risk associated with planned changes and can greatly accelerate projects, particularly those with heavy change loads, such as migrations, consolidations, and transformations.

Chargeback or Showback

Effective infrastructure chargeback or showback reporting enables IT organizations to introduce accountability to their customers. IT management can use the information to make better business decisions; for instance, an application that consumes large amounts of infrastructure but generates little revenue might be a candidate for decommissioning. Despite the utility of the chargeback/showback process, many organizations do not deploy this sort of reporting because of the difficulties in implementing it. Reports are often time consuming to create and rely heavily on manual inputs, resulting in high operational costs and inaccuracies in the numbers presented to end-user organizations.

OnCommand Insight offers a flexible platform for infrastructure accountability, through its path correlation capabilities. Chargeback/showback reporting is automated off the back of the discovery, with the software summing the VM, network, and capacity resources of service paths provisioned to each tenant, business unit, application, project, or server. Logic within the data warehouse solves many of the traditional difficulties with chargeback/showback reporting. The data model enables granularity down to the hour for the “power state” of VMs, cluster capacity is not double counted, virtualization platforms are correctly accounted for, and replica capacity can be associated with the business entity accessing the source capacity.

OnCommand Insight discovery and reporting enable organizations to implement extremely flexible, accurate, and automated chargeback/showback processes, with almost no incremental operational cost.

Capacity Management

Improved capacity management can drive down operational and capital costs and improve service quality. The OnCommand Insight data warehouse provides a single system of truth to agentlessly collect and present infrastructure information, reveal usage trends, and easily create and distribute reports.

Capacity Planning

OnCommand Insight records historical infrastructure capacity growth trends and creates future growth forecasts, enabling organizations to accurately identify where and when additional server, network, or storage resources must be allocated and/or purchased. This decision support enables organizations to avoid overprovisioning and to implement just-in-time purchasing, driving down the capital costs associated with infrastructure.

Reclaiming Resources

Over time, some resources in any infrastructure estate become “orphaned”: that is, allocated but not in use. There are various routes that infrastructure takes to become orphaned; typical examples include incomplete decommissioning processes or project cancelation after provisioning has taken place.

OnCommand Insight employs its path analytics to discover orphaned or unused resources. The 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. In a typical organization deploying OnCommand Insight, somewhere between 0.5% and 4% of infrastructure resources in the estate are orphaned. Reclaiming this infrastructure can mean significant capital cost savings. Further capacity for reclaiming can be discovered through performance analysis (identifying active VMs, ports, and volumes that are seeing zero I/O).

Performance Management

Effective performance management of infrastructure services enables organizations to improve the quality of service delivered to the customer, while saving capital and operational costs.

For details about service performance monitoring and troubleshooting, see “Monitoring, Troubleshooting, and Change Management,” earlier in this document.

Infrastructure Optimization

Effective application alignment is one of the key mechanisms for driving down infrastructure costs. Many organizations struggle to implement effective tiering practices due to a lack of performance information, leading to a tendency to allocate a higher class of infrastructure when performance is unknown.

OnCommand Insight offers a wide variety of usable performance information and reports to enable organizations to make informed decisions about application alignment. Using OnCommand Insight performance analytics, many customers can realize enormous capital savings by determining the performance profiles of servers and applications and assigning the appropriate memory, CPU, network, and storage resources to those applications. Over time, this capability significantly drives up the percentage of high-capacity, low-cost storage in the estate; improves the ratio of virtual-to-physical CPU and memory; and increases network utilization rates.

Service Performance Reporting

Many IT organizations are seeking ways to offer and report on infrastructure performance SLOs and I/O consumption. For example, storage SLOs often take the form “*x* IOPS per *y* capacity at *z* response time” for different tiers of capacity. Accurate reporting against these kinds of SLOs is extremely difficult, however, and typically requires different data import processes for different domains and for different vendors within those domains. After performance data has been gathered, manual correlation to the business services or applications used by the end-user organization is generally required. Performance consumption reporting enables IT organizations to identify which business entities are driving up the cost of infrastructure through performance, rather than solely by capacity, means.

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 the infrastructure estate. These reports can be rolled up to demonstrate how successfully the infrastructure is meeting the performance SLOs set forth for the various customers and business services. Performance accountability reporting is also automated off the back of the discovery, with the software plugging the performance metrics for each infrastructure object into its map of end-to-end service paths. The software sums the performance of service paths to each tenant, business unit, application, project, or server, enabling the IT organization to identify customers or areas of the business that drive up infrastructure costs through performance means.

3 Summary

OnCommand Insight provides powerful analytics to enable IT organizations to gain insights, control, monitor, and report on the services provided by the IT infrastructure. The software drives up service quality through standardization and service monitoring, while reducing costs through administrator productivity and more effective utilization of capital assets. Benefit areas include:

- Enhanced administrator productivity and asset discovery through more effective configuration management
- Improved service quality through standard deployment practices and effective service monitoring and alerting
- Reduced capital costs through improved capacity management
- Operational productivity and performance predictability through effective performance management

Learn more about how your organization can use OnCommand Insight to provide optimal service with intelligent operations, business insights, and IT ecosystem integration.

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.