ESG SHOWCASE

Dell CloudIQ: AIOps for Intelligent IT Infrastructure Insights

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ABSTRACT: As IT continuously scales and becomes increasingly distributed and multi-cloud, machine learning is playing an essential role helping IT managers to keep pace. CloudIQ AIOps application, from Dell Technologies, is changing the infrastructure management game, leveraging machine learning and related intelligence to provide actionable insights and integrated automation across its broad IT portfolio. CloudIQ simplifies and accelerates IT operations and helps often-overworked IT staff to keep their entire IT environment running properly. If you use Dell Technologies products, you should also be leveraging CloudIQ.

Overview

As businesses become more digital, demands on IT increase in scale, diversity, and complexity. For organizations to keep pace, IT *itself* must therefore become more productive—with technology becoming smarter to augment scarce personnel. IT organizations need to pursue this proactive approach. They must seek out tools that provide them with better insight. Consider the 2022 data center modernization investment priorities of IT managers surveyed by ESG:[1]

- 32% say they will be investing in leveraging AIOps.

- 21% say they will be investing in more remote monitoring/management technology to manage their data center infrastructure.

- 21% say they will be investing in more data center automation tools, which can help with systems management tasks such as anomalous resource utilization detection, proactive failure alerts, or automatic policy management.

The future lies in the use of machine learning technology combined with detailed telemetry data to give smart people the insights they need to do more, along with integrated automation to expedite IT operations, accelerate issue identification and diagnosis, and support organizations' AIOps objectives for their infrastructures. What if a tool like that were included with the infrastructure that you are already using—a tool that is able to span multiple technologies to provide a more complete vision? *CloudIQ is designed to be that kind of tool.*

With the Rise of IT Complexity, Digital Businesses Must Expect More

Nearly half (46%) of IT managers surveyed by ESG said IT is more complex now compared with two years ago, with 35% of those organizations identifying higher data volumes as a top driver of the complexity increase.[2] More data translates into more infrastructure, more applications, and more demands on IT from users.

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[1] Source: ESG Research Report, *2022 Technology Spending Intentions Survey*, November 2021. All ESG research references and charts in this showcase have been taken from this research report, unless otherwise noted.
[2] Source: ESG Survey Results, *2022 Technology Spending Intentions Survey*, November 2021.

Given the massive scale of modern IT environments and the diverse breadth of technologies in use, solving any problem has simply become more complex and more time-consuming. That complexity comes with a cost. Activities take longer than they should, and too many personnel are being consumed by day-to-day maintenance activities.
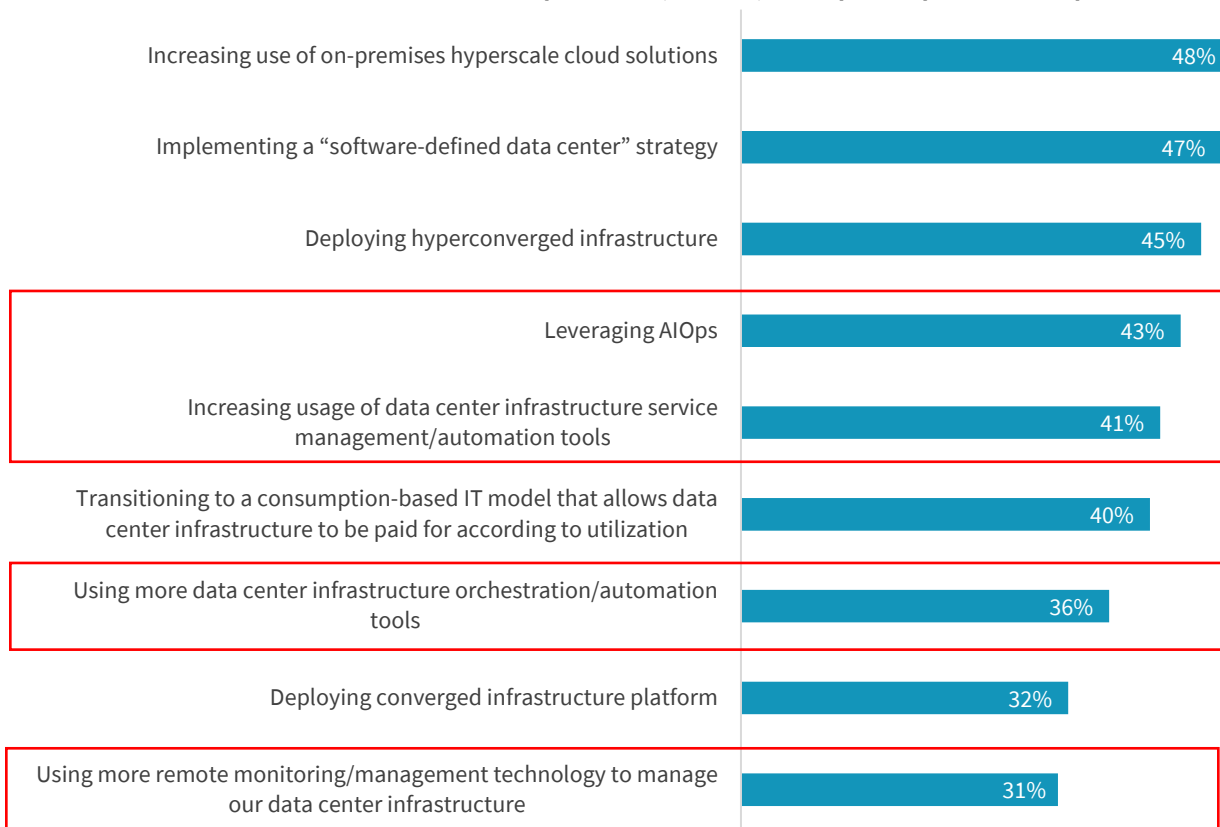
Orchestration and Automation Deficiencies Drive Demand for AI/ML

Although automation tools help, they don't provide a complete answer. Consider the 37% of senior IT decision makers who reported experiencing problematic shortages of expertise in the area of IT orchestration and automation. As a result, the integration of artificial intelligence (AI) and machine learning (ML) into IT management and operations software is becoming essential. In a separate survey of IT decision makers in organizations that employ, plan to employ, or are interested in deploying an observability practice, ESG found that 76% agree that the introduction of more automation or tools with integrated machine learning would deliver a meaningful improvement in business operations.[3]

As part of a separate research study, ESG solicited the opinions of 372 IT decision makers responsible for evaluating, purchasing, managing, and building application infrastructure. Nearly half (46%) of respondents plan to invest in technologies that provide a cloud-like experience on-premises as part of their organization's strategy for their on-premises data center environments over next three years. ESG went on to ask those respondents to further identify what they meant by a cloud-like experience (see Figure 1).[4]

Figure 1. Approaches to Create a Cloud-like Experience in the Data Center

What technologies or approaches are key to helping your organization create a cloud-like experience in its data centers? (Percent of respondents, N=172, multiple responses accepted)

Increasing use of on-premises hyperscale cloud solutions	48%
Implementing a "software-defined data center" strategy	47%
Deploying hyperconverged infrastructure	45%
Leveraging AIOps	43%
Increasing usage of data center infrastructure service management/automation tools	41%
Transitioning to a consumption-based IT model that allows data center infrastructure to be paid for according to utilization	40%
Using more data center infrastructure orchestration/automation tools	36%
Deploying converged infrastructure platform	32%
Using more remote monitoring/management technology to manage our data center infrastructure	31%

Source: ESG, a division of TechTarget, Inc.

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[3] Source: ESG Survey Results, *Distributed Cloud Series: Observability Trends*, May 2022.
[4] Source: ESG Survey Results, *Distributed Cloud Series: Application Infrastructure Modernization Trends*, March 2022.

The results in Figure 1 call out multiple technologies that IT leaders expect to leverage to improve their IT automation capabilities and operations efficiency, including leveraging AIOps (43%), increasing usage of management/automation tools for data center services (41%), increasing usage of orchestration/automation tools (36%), and increasing usage of remote infrastructure management tools (31%). As IT organizations seek to modernize their data center environments with a cloud-like experience and accelerate IT operations, the integration of AI and automation is poised to play a massive role in achieving those objectives.

Dell Technologies CloudIQ and the Intelligent Data Center

To deliver the benefits of AI-enabled operations to its customers, Dell Technologies is taking a multi-faceted approach. The company is well along the implementation of its strategy to integrate AI/ML-based intelligence and automation across its broad portfolio, currently spanning servers, storage, data protection, and networking. It is complementing those innovations with CloudIQ, its AIOps application for IT infrastructure. This application leverages AI/ML to provide proactive monitoring, analytics, and recommendations based on telemetry data from Dell Technologies infrastructure systems. Through APIs, CloudIQ insights can be used to intelligently trigger automation.

An inherent advantage in this approach is that Dell is able to address the complexity of contemporary IT with multiple solutions, each leveraging insights from its own perspective. IT infrastructure environments are increasing complex with a diverse and ever-increasing set of technologies. Given the sheer size of these environments, it is unlikely that any single tool can meet every need. By combining multiple layers of intelligence, both integrated into the system and via a cloud-based automation platform with CloudIQ, Dell is able to break down the IT automation challenge into more manageable pieces,

and then address those pieces with separate but optimized layers of technology.

CloudIQ is included with Dell Technologies ProSupport service contracts for no additional fee. Being cloud-based and hosted by Dell Technologies, CloudIQ doesn't require users to install or maintain it. It is enabled by turning on the standard secure telemetry conduit from the user's equipment to the Dell Technologies secure data center.

CloudIQ users can grant Trusted Advisor access to their Dell Technologies or reseller account teams, enabling them to share their CloudIQ interfaces and provide additional best-practice recommendations, optimization guidance, proactive issue recognition, and further remediation advice. CloudIQ users have reported that the application speeds time-to-resolution 2x to 10x.[5]

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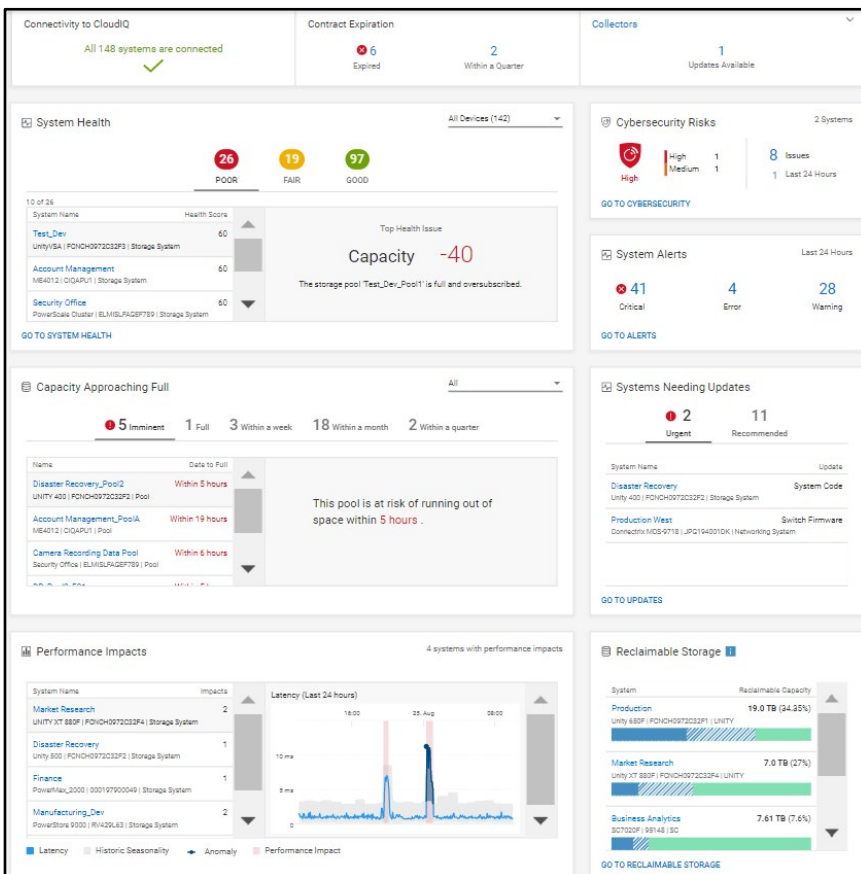
[5] Based on a Dell Technologies survey of CloudIQ users conducted May through June 2021. Actual results may vary.

That capability in turn saves them nine hours—the equivalent of a workday—on average per week.[6]

CloudIQ supports a broad mix of Dell servers (PowerEdge), storage (PowerStore, PowerMax, PowerScale, PowerVault, Unity/Unity XT, XtremIO, and SC Series), SAN switching (Connectrix), Ethernet switching (PowerSwitch), data protection (PowerProtect DD and PowerProtect Data Manager), converged and hyperconverged infrastructure (VxBlock, VxRail, and PowerFlex), and infrastructure-as-a-service (APEX Data Storage Services), as well as VMware virtualization, for a consolidated view across the data path, providing a multiplier effect for CloudIQ's value.

State of All Systems at a Glance: Core, Edge, and Cloud

Accessible via standard browsers and mobile devices, CloudIQ features impressively quick and easy monitoring and analytics capabilities for systems at your data centers, disaster recovery sites, and edge locations. CloudIQ also supports

data protection in public clouds based on Dell's virtual data protection software and is expected to support primary storage in public clouds based on Dell's virtual primary storage products. A neatly formatted overview dashboard provides fleetwide summaries of systems' health, capacity, performance, reclaimable storage, and available firmware upgrades. This simplifies troubleshooting, and from there, an admin can easily navigate to


relevant details and prescribed steps for remediation. With a global view, CloudIQ can further simplify multi-site operations by centrally automating systems' firmware updates. CloudIQ supports this for hyperconverged systems today and will support it for other types of systems in the future.

System Health Scores, Notifications, and Reports

CloudIQ compiles the insights about each monitored system into a single health score that is intuitive to understand. It is clickable for granular details and recommendations for remediation based on engineering expertise for each system and specific model. Health scores are based on a set of categories, including components, configuration, capacity,

performance, and data protection. Any change in health issues triggers health notifications sent to users via email and/or the CloudIQ mobile app, depending on the user's preference.
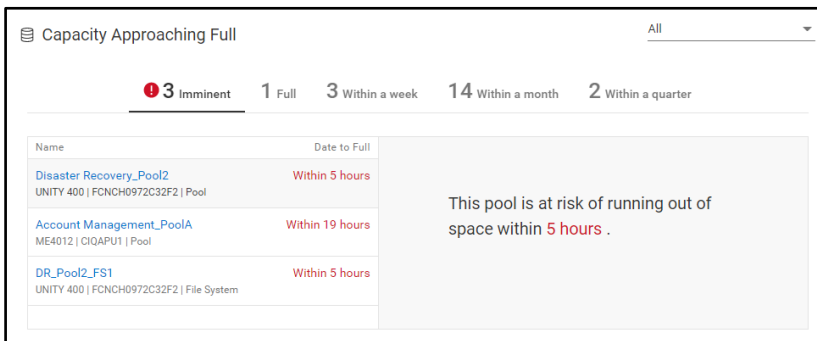
CloudIQ offers the ability to customize reports and optimize communications and collaboration across IT and DevOps teams, executives, and line-of-business stakeholders. Dell has integrated CloudIQ health notifications with Webhook, enabling users

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[6] Based on a Dell Technologies survey of CloudIQ users conducted May through June 2021. Actual results may vary.

to choose to push those notifications to third-party applications of their choice, including ticketing systems such as ServiceNow, or communications platforms such as Slack and Microsoft Teams to offer additional efficiency.

Intelligent Capacity Tracking, Anomaly Detection, and Forecasting

CloudIQ possesses advanced machine learning capabilities for capacity tracking and prediction. It uses an ML algorithm that leverages a seasonal decomposition model to feed a forecasting algorithm as the foundation of its capacity forecasting. CloudIQ trains this ensemble model across all connected systems to further enhance the algorithm for more reliable capacity utilization forecasting, indicating to IT administrators when systems are reaching full capacity. CloudIQ currently supports capacity forecasting for storage, data protection, network, and hyperconverged systems.
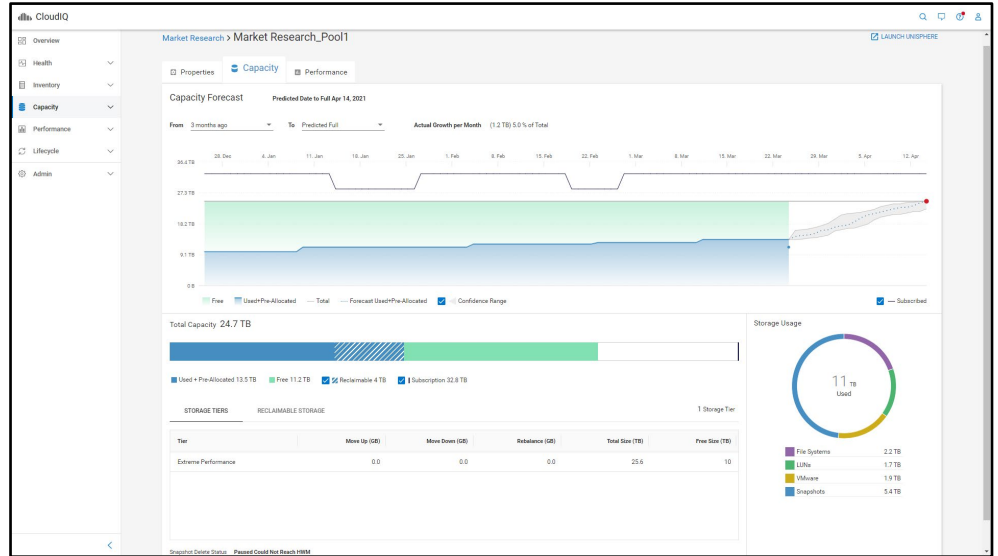
CloudIQ can also identify sudden anomalies in thinly provisioned storage pools' capacity consumption, including spikes that pose a threat of imminently reaching full capacity. This capability helps administrators see that they need to take immediate action to avoid data unavailability due to oversubscription.
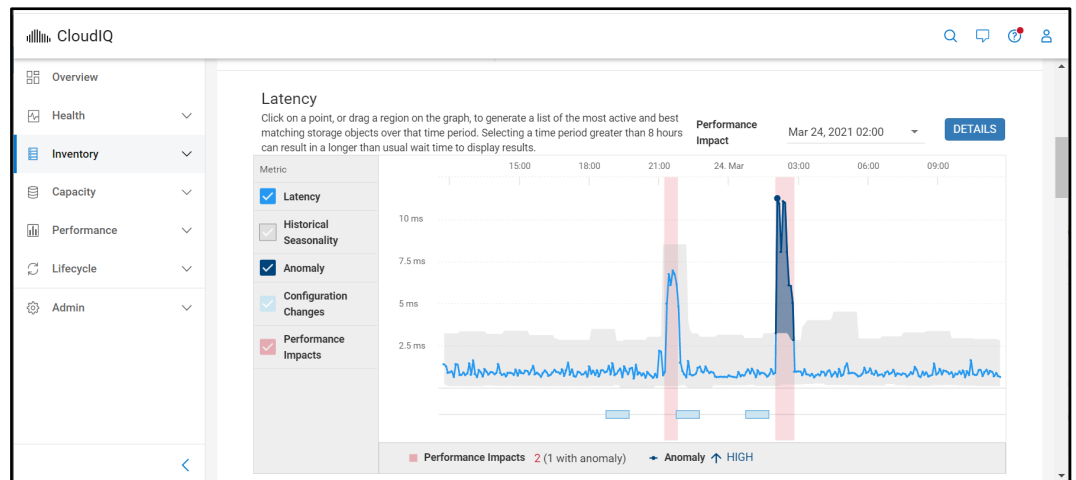
Intelligent Performance Tracking and Anomaly Detection

CloudIQ samples performance telemetry data every five minutes, leverages a machine learning algorithm that learns normal server, storage, and network performance patterns over a given time period, and then indicates whenever a performance metric (an anomaly) falls out of those bounds.

Using a set of advanced machine-learning and time-series correlation algorithms and integrated visualization, CloudIQ helps administrators more quickly conduct performance troubleshooting—giving them a deeply informed understanding of performance deviations that have recently occurred, plus detailed insights on potential resource contention. A performance impact will be identified, in storage for example, when there is high latency and a corresponding drop in IOPs and/or bandwidth. This helps administrators differentiate between non-impacting spikes and spikes that have demonstrable performance impacts and require remediation. Performance tracking and anomaly detection for other

technologies differ accordingly: servers (e.g., CPU, memory, IOPs, and thermal and power metrics); IP networks (e.g., bandwidth, CPU, and memory); and storage area network (e.g., utilization, errors, and congestion).

CloudIQ also provides storage area network congestion-spreading analysis and recommendations and will be enhanced to provide performance analytics for IP network fabrics. Recent advances also include proactive optic failure prediction for storge area networks to further ensure that data and application performance remain predictable and at optimal

levels. Additional predictive performance analytics for various classes of infrastructure are also expected.
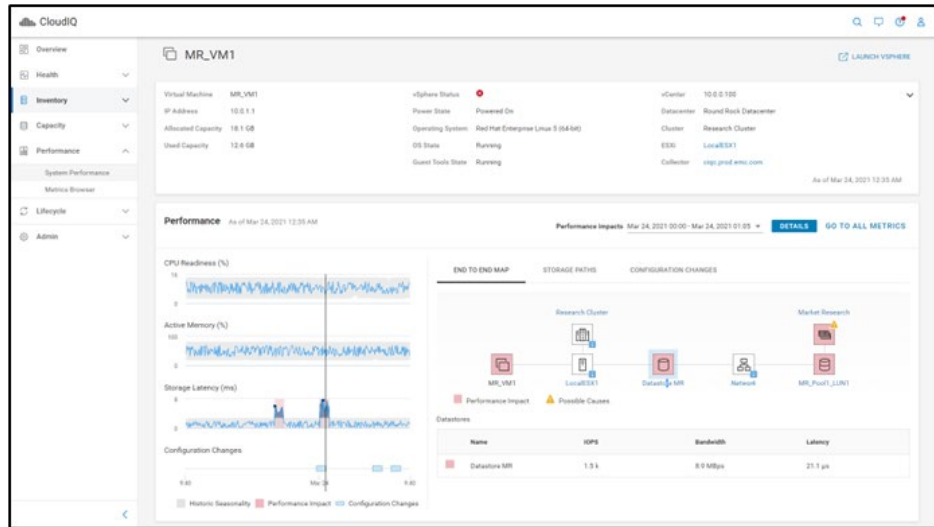
Virtual Machine Awareness and Workload Contention Analysis

CloudIQ offers integration with VMware to understand relationships between individual virtual machines and the supporting infrastructure for broader perspectives on performance and workload contention. By understanding these relationships, CloudIQ can isolate issues such as performance latency spikes causing workload contention, and then highlight the specific component(s) in the data path that are the likely root cause. An end-to-end map shows each virtual machine, server, network, storage system, and specific objects (e.g., storage volumes). To further speed troubleshooting, key performance indicators for latency, IOPs, and bandwidth are also shown in the end-to-end map along with CPU and memory KPIs and configuration changes. Given the complexity of today's infrastructure environments, this ability to automatically identify the probable root cause of issues will significantly reduce the impact on personnel, freeing IT staff to focus on more value-add projects.

Recent CloudIQ advances include vCenter Server-like views of virtual machines and their underlying physical resources for a familiar VMware administration experience. CloudIQ currently views virtualization for hyperconverged infrastructure, storage systems, and storage as-a-service and is expected to provide it for servers in the future.

Extension to Public Cloud
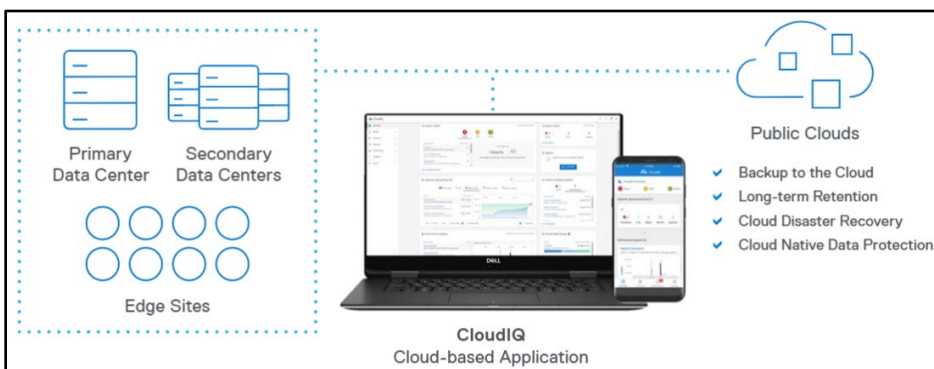
With the proliferation of hybrid cloud deployments, IT needs a way to normalize monitoring and problem solving across private and public cloud environments to reduce complexity. CloudIQ's first step in this direction leverages its integration with Dell Technologies' PowerProtect DD series, DDVE, and Data Manager data protection products, which enable tiering of on-premises VMs, file systems, workloads, and applications to public clouds, as well as in-cloud data protection for cloud-native assets. CloudIQ shows its power to simplify operations by monitoring on-premises and cloud data protection assets along with associated on-premises primary storage assets. Keeping pace with Dell's expansive multi-cloud strategy, CloudIQ will support future Dell storage services based in the public cloud.

Cybersecurity Monitoring

Leveraging telemetry data, CloudIQ automatically assesses the infrastructure environment for violations of users' security configuration policy, notifying users of misconfigurations and recommending actions. As a result, administrators receive an immediate, clear view of the security risk profile focusing on hardening the infrastructure configurations. Security configuration recommendations are based on NIST 800-53 r5 and NIST 800 – 209 standards, as well as Dell Technologies best practices.
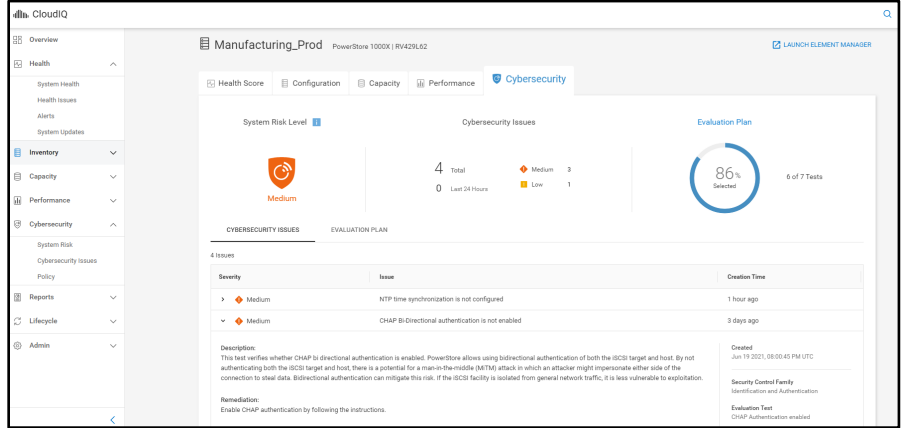
This level of automation frees administrators from having to manually check individual configurations to ensure that they continue to align to the company's policy. Without this level of automation, maintaining effective levels of security can be a daunting challenge as IT infrastructure scales and evolves. Recent CloudIQ advances include ransomware detection as well as security advisories about newly discovered threats (e.g., malware) and recommendations for addressing the threats (e.g., firmware upgrades or security patches).

API Integrations for Automated Workflow

Achieving the most effective and efficient IT operations requires human and machine intelligence working in concert to expedite and automate activities. Dell Technologies' strategy is to integrate CloudIQ with third-party tools to augment an organization's automation and AIOps strategy.
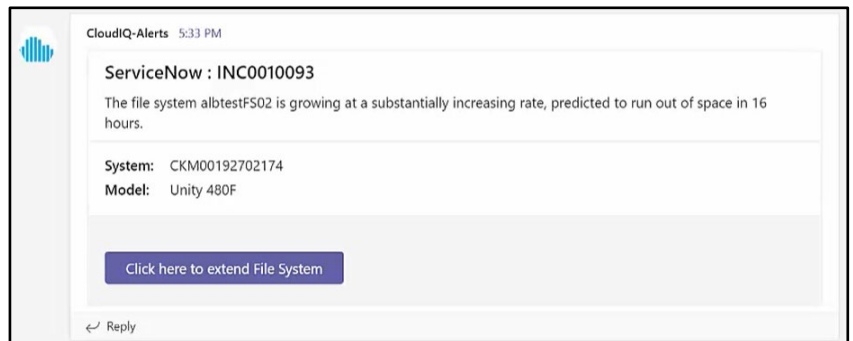
When CloudIQ detects a new risk or a change in health status, it can forward information and initiate workflows, such as service ticketing and escalation, to third-party IT service management and enterprise notification systems including ServiceNow, Slack, or Microsoft Teams by using standard Webhook API or REST API calls. This capability allows the right insights, recommendations, and automation options to get to the right people (such as DevOps teams) as quickly as possible. By expediting collaboration between machine intelligence and human intelligence, CloudIQ can dramatically simplify and accelerate operations for Dell Technologies Infrastructure.

CloudIQ Simplifies IT Infrastructure

The capabilities of CloudIQ are advanced enough to translate into a clear set of real-world, business-level benefits. With the help of CloudIQ, IT can:

- **Get a single consolidated view of systems across the core (data center), edge, and cloud**, including health, alerts and comparisons of systems' key performance indicators to assist with infrastructure-related planning.

- **Accelerate time to resolution of systems' health issues** by receiving notifications with recommendations for resolution.

- **Quickly and easily determine system risk** when demands exceed system capacity or performance.

- **Ensure that hosts always have high-availability access** to resources.

- **Quickly isolate performance impacts**, performance anomalies, and resource contentions.

- **Automatically identify the highest-performing objects and the top consumers of resources**, ensuring they align with business priorities.

- **Find reclaimable storage** that might be unassigned or inactive, such as storage connected to powered-off virtual machines, freeing up capacity.

- **Create customizable reports** to improve collaboration and engagement among IT personnel, line-of business stakeholders, and executive teams.

- **Automatically identify when system updates are recommended** to ensure product robustness and compliance with best practices.

- **Examine findings that are presented to them securely on their mobile devices** or via email, focused on the most relevant information, such as changes that have occurred, without needing to log into the system.

- **Improve cybersecurity protection** through automated configuration assessments and notifications of vulnerability.

- **Attain greater infrastructure insights in an economical way**, as CloudIQ is included in standard infrastructure systems support contracts.

The Bigger Truth

Businesses' demands for IT services will only increase with application environments becoming more diverse and IT infrastructure growing larger and more disaggregated. In the wake of these transformations, tasks that were once simple now take too long and consume too many precious personnel resources—resources that are already scarce and becoming scarcer given the high demand for technical talent.

IT organizations need tools such as Dell Technologies CloudIQ that leverage machine learning and other advanced techniques to collect and consolidate insights from a wide breath of technologies, and then offer recommendations, including automation, while plugging seamlessly into the business's AIOps initiatives.

CloudIQ saves precious time. It frees crucial personnel resources for higher-value tasks. It accelerates operations. If you use Dell Technologies infrastructure products, you should also be leveraging CloudIQ.

For more information, visit DellTechnologies.com/CloudIQ.

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