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OpenStack Monitoring

The emerging opportunities for service providers and how CA Unified Infrastructure Management can help

ca technologies

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Executive Summary

Today, your customers are in the midst of a massive paradigm shift, undertaking digital business transformation so they can compete more effectively in their dynamic markets. As they seek out technologies that can help accelerate their digital transformation, IT decision makers are increasingly gravitating toward OpenStack software. This paper offers a detailed look at the drivers that are prompting the adoption of OpenStack—and the challenges that enterprise IT teams are likely to confront when they start leveraging this software. The paper then introduces CA Unified Infrastructure Management (CA UIM) and shows how the solution enables service providers to deliver managed monitoring service offerings that address their customers' emerging requirements.

Cloud Management Infrastructures: A Key Element of Digital Transformation

The digital transformation imperative

"Quite simply, organizations that leverage cloud infrastructures are better equipped to pursue digital transformation initiatives and boost their competitive position."

To compete and win in the application economy, it's critical for enterprises to pursue digital business transformation. Only those organizations that become truly digital businesses will be able to operate with the speed, agility and efficiency that emerging markets will demand.

Digital transformation requires innovation across the spectrum of how digital services are developed, supported and delivered. As a result, businesses are adopting a wide range of new technologies and approaches. The following sections highlight one technology framework that will be increasingly vital in supporting digital business transformation: cloud infrastructures.

Why cloud infrastructures are so vital to digital transformation

Over the decades, enterprise IT environments have continued to evolve and expand. While the specifics vary according to each organization, common themes have emerged.

Each element and service within the environment has typically been individually procured, deployed, configured and integrated. Ultimately, a complex ecosystem with disparate platforms, versions, vendors, support mechanisms and more has emerged. Given this complexity, administrators struggle to handle ongoing efforts like patches and upgrades—which can take weeks—given the interdependencies that have to be accounted for. IT teams contend with spiraling costs. Ultimately, the infrastructure impedes the business in harnessing new technologies and approaches and in delivering new innovations to market. In recent years, cloud infrastructures were introduced to enable organizations to address the challenges associated with legacy environments and approaches. By offering virtualized cloud infrastructures that enable computing to be delivered as a service, cloud infrastructures provide a wide range of benefits.

These infrastructures offer significant advantages in efficiency, elasticity and agility, enabling faster support of new services. Quite simply, organizations that leverage cloud infrastructures are better equipped to pursue digital transformation initiatives and boost their competitive position.

"OpenStack delivers a number of operational advantages, enabling organizations to improve scalability and agility while reducing costs."

OpenStack: A Strategic Enabler of Digital Business Transformation

In recent years, OpenStack has emerged as one of the leading alternatives for creating cloud environments. OpenStack software enables organizations to instantly deploy virtual machines and other resources required to manage and operate a cloud environment. OpenStack software can control large pools of computing, storage and networking resources across a data center, and enable administrators to manage these resources through a dashboard or API. The software enables users to provision resources through web interfaces.

OpenStack software

OpenStack represents a collection of open source software components that allow users to develop and manage a cloud infrastructure in a data center. The software is delivered through various "projects", discrete sets of code that are used for computing, object storage, services like identity management, networking and more.

OpenStack offers flexible implementation capabilities, supporting deployments in public and private clouds as well as hybrid models that span enterprise and public cloud data centers. OpenStack also features standardized, API-driven access to all components in the ecosystem. These APIs have become the standard for enterprise infrastructure-as-a-service (IaaS) implementations, and 97 percent of community members surveyed said "standardizing on the same open platform and APIs that power a global network of public and private clouds" was one of their top five considerations in choosing OpenStack.[1]

OpenStack advantages

OpenStack delivers a number of operational advantages, enabling organizations to improve scalability and agility while reducing costs. The platform makes horizontal scaling easy, which means organizations can efficiently serve more users as needed, simply by spinning up more instances. Through the platform's operational efficiency, businesses can realize enhanced agility, and significantly accelerate innovation and time to market. OpenStack's open source delivery enables virtually unlimited potential for customization, and it offers potential cost savings over commercial offerings.

OpenStack is also enabling organizations to deliver an enhanced experience to users. For example, with OpenStack an IT team can provide users with self-service web interfaces for requesting, provisioning and accessing services. Perhaps most importantly, OpenStack gives organizations an improved ability to support digital transformation initiatives. A look at the applications and services that OpenStack users are running provides a vivid illustration of this capability. Following are the breakdowns of top five applications and services running on OpenStack implementations:

- **Software development workloads** (63 percent). In particular, OpenStack is proving indispensable in enabling DevOps within many enterprises. For example, by using OpenStack, Comcast development teams across the country can now create, deploy and scale new applications in weeks, rather than the months it used to take.[2]
- **Infrastructure services, such as public or private clouds** (49 percent). Many enterprise IT teams leverage OpenStack to deliver "IaaS"-like cloud services to internal business units.

1 OpenStack, "OpenStack User Survey: A snapshot of OpenStack users' attitudes and deployments", April 2016, URL: https://www.openstack.org/assets/survey/April-2016-User-Survey-Report.pdf
2 Comcast, "Comcast and OpenStack: Engineering from Cloud to Couch", URL: http://corporate.comcast.com/comcast-voices/comcast-and-openstack-engineering-from-cloud-to-couch

"Between 2013 and 2016, the percentage of customers that had OpenStack in production grew from 32 to 65 percent."

- **Web services/ecommerce** (38 percent). Walmart is one example of an organization using OpenStack. The retailer has built one of the largest OpenStack deployments, and is using the platform to power its e-commerce activities.[3]
- **Network function virtualization** (NFV) (29 percent). OpenStack in many ways has become the de facto standard for telecom companies looking to establish agile, cost effective NFV environments. According to one report, 85.8 percent of telecom respondents consider OpenStack essential or important to success.[4]
- **Big data** (27 percent). Many organizations are using the scale and elasticity of OpenStack to manage big data workloads. For example, Cray's most recent supercomputer, which was designed specifically for big data analytics, was built on OpenStack.[5]

OpenStack growth, momentum

In the past few years, the adoption of OpenStack software has continued to expand, and become an increasingly integral foundation of production deployments. Between 2013 and 2016, the percentage of customers that had OpenStack in production grew from 32 to 65 percent.[6]

OpenStack's use has been particularly prominent in the arena of private cloud implementations. Forrester analysts have claimed, "OpenStack has been established as a compatibility standard for the private cloud market."[7]

Customers and community

Today, OpenStack software is relied upon to support significant services in companies like BMW, CERN, Comcast, eBay and Wal-Mart. Companies run customer-facing apps that support millions of simultaneous users. However, OpenStack software hasn't solely been the choice of large enterprises. The organizations running OpenStack vary in size: 23 percent of users have 1000-9999 employees, 15 percent have 10,000-99999 and 16 percent employ 100,000 or more.[8] An increasingly large community of OpenStack contributors and users has also emerged. In total, more than 585 companies have supported OpenStack in some way. The OpenStack Foundation counts almost 40,000 people who are actively engaged in the community.

Customer Challenges: Managing Service Levels in OpenStack Environments

Once deployed, OpenStack platforms represent critical elements of the IT infrastructure. If these platforms encounter downtime or performance issues, it can have an immediate and significant impact on customer-facing services, workplace productivity and company revenues. Consequently, establishing effective, continuous monitoring of OpenStack implementations is critical. IT staff members need to constantly monitor the OpenStack environment so they can identify bottlenecks and fix issues. To be effective,

3 OpenStack, "Walmart Presents Takeaway Lessons from Building an E-Commerce Platform with OpenStack," URL: https://www.openstack.org/summit/vancouver-2015/summit-videos/presentation/walmart-presents-takeaway-lessons-from-building-an-e-commerce-platform-with-openstack
4 OpenStack, "OpenStack Foundation Report: Accelerating NFV Delivery with OpenStack," URL: https://www.openstack.org/telecoms-and-nfv/
5 TechCrunch, "Cray's latest supercomputer runs OpenStack and open source big data tools," Ron Miller, May 24, 2016 by URL: https://techcrunch.com/2016/05/24/crays-latest-supercomputer-runs-openstack-and-open-source-big-data-tools/
6 OpenStack, "OpenStack User Survey: A snapshot of OpenStack users' attitudes and deployments", April 2016, URL: https://www.openstack.org/assets/survey/April-2016-User-Survey-Report.pdf
7 Forrester, "Brief: OpenStack Is Now Ready For Business," Paul Miller and Lauren E. Nelson, September 9, 2015, URL: http://www.openstack.org/assets/pdf-downloads/Brief-OpenStack-Is-Now-Ready.pdf
8 OpenStack, "OpenStack User Survey: A snapshot of OpenStack users' attitudes and deployments", April 2016, URL: https://www.openstack.org/assets/survey/April-2016-User-Survey-Report.pdf

"The reality is that open source monitoring tools don't offer complete coverage of these hybrid IT environments."

organizations need to gain robust capabilities for tracking and managing performance, availability, utilization and service levels. However, while establishing these capabilities can be challenging in many circumstances, OpenStack environments can present intensified challenges.

Many OpenStack deployments are comprised of a diverse, expansive range of locations, and may require monitoring across multiple facilities and clouds, and thousands of hosts and hundreds of thousands of virtual machines (VMs). Within OpenStack environments, many different software components, which are known as projects, may be employed, and each needs to be tracked to ensure service levels are ultimately met. Further, in these environments, containers and VMs can be deployed in seconds, and may only run for minutes or hours, which represents a stark contrast to legacy infrastructures, where systems would often be deployed and run for years.

While open source monitoring tools can be used for monitoring OpenStack, organizations that employ these alternatives often run into significant obstacles. These tools require manual coding, configuration and integration just to enable basic tracking and alerting and they often require third-party add-ons, which can add additional layers of complexity. These tools also require significant effort to operate and adapt to changes on an ongoing basis, and, as environments grow, so does the amount of time and effort required, which can ultimately overwhelm lean internal teams. Further, these tools lack more sophisticated capabilities, such as multi-tenancy support, so, if an enterprise IT team wanted to provide cloud services for different business units, multiple instances of monitoring code may need to be deployed and supported.

Exacerbating all these challenges is the fact that organizations are typically running a mix of OpenStack, cloud services and traditional infrastructures. For example, a survey of OpenStack users found that 82 percent of OpenStack deployments exist in parallel with other cloud platforms. Specifically, 77 percent said their deployments also interact with Amazon Web Services (AWS).[9] The reality is that open source monitoring tools don't offer complete coverage of these hybrid IT environments. If an organization adds monitoring tools specifically for OpenStack, the result will be multiple, isolated monitoring tools, which presents a number of challenges:

- **Disjointed alerting**. With myriad monitoring tools, IT teams are exposed to inconsistent, fragmented alerting, with each tool generating unique data, alerts and escalation processes. Not only does this mean a lot of work in compiling and aggregating data for reporting, but administrators may have to deal with issues like so-called "alarm blizzards" when one system failure has a ripple effect on other systems.
- **Time-consuming troubleshooting**. When issues arise, administrators struggle because distinct teams each need to check their own tools to try and identify the source, adding to the effort and complexity associated with managing IT environments.
- **Limited insights into service levels**. Working with multiple tools, teams fundamentally lack insights into the performance of the end-to-end infrastructure and the business services that users rely on. IT teams have a hard time gaining timely, useful insights needed to pre-empt issues, so they remain consumed with reacting to problems after the fact, and service levels suffer.
- **Lack of holistic insights for capacity planning**. Relying on isolated tools, IT teams struggle to track resource utilization across various storage silos. As a result, it is time consuming and difficult to intelligently allocate workloads and make optimized infrastructure investments.

9 OpenStack, "OpenStack User Survey: A snapshot of OpenStack users' attitudes and deployments", April 2016, URL: https://www.openstack.org/assets/survey/April-2016-User-Survey-Report.pdf

Finally, in spite of all their benefits, OpenStack environments represent fundamentally new technologies for most internal enterprise IT teams. Particularly if they're not staffed with experts that have deep experience with these platforms, internal teams may struggle to contend with up-front deployments and ongoing operation and tuning.

The Opportunity for Service Providers: Managed Monitoring Services for OpenStack

Given its massive adoption, OpenStack software is likely to be playing an increasingly prominent role in your existing customer accounts and prospect organizations. This reality is fueling increasing demand for OpenStack vendors and partners. While some large organizations will invest in hiring and training staff to acquire the OpenStack expertise needed to deploy and support OpenStack implementations, many will rely on service providers. By leveraging the services and expertise of partners, organizations can realize faster onboarding, gain access to proven reference architectures and avoid common pitfalls. Those service providers that can help customers with their OpenStack deployments can therefore deliver significant value, and gain a distinct competitive advantage. Service providers that gain the necessary experience and expertise can work with organizations that have already implemented OpenStack, and those who have yet to do so.

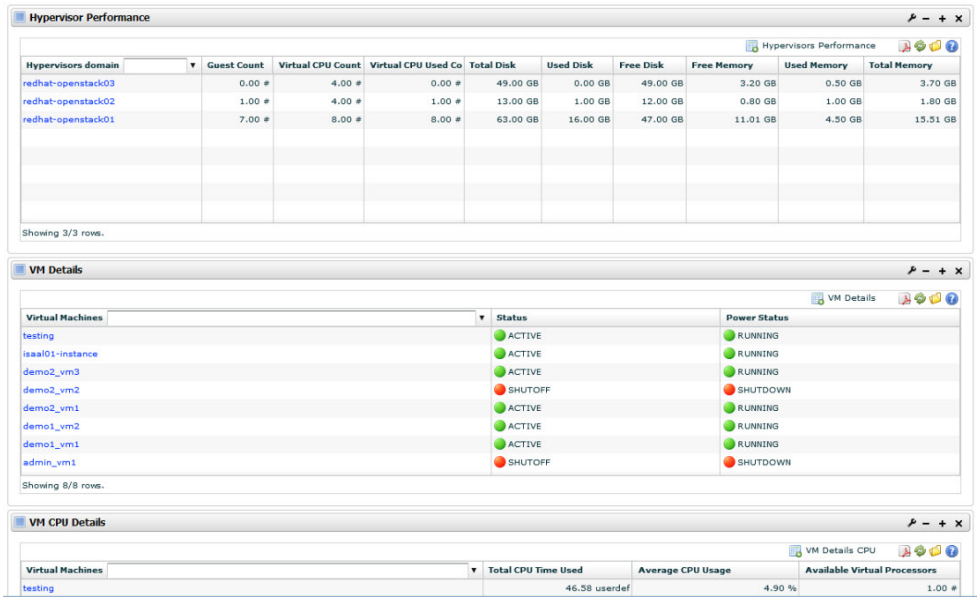
For organizations that have yet to deploy OpenStack, service providers can deliver the following offerings:

- **Initial consulting and integration services**. As organizations look to adopt cloud infrastructures, they'll often turn to service providers to help them with such efforts as evaluating various cloud services and solutions, architecting implementations and planning and managing deployments.
- **Packaged solutions**. OpenStack software requires significant system configuration effort, with a number of projects to be implemented. Maintaining the system and updating code to support OpenStack's six-month release cycle can be prohibitively time consuming for many internal teams. The time, cost and effort involved with adapting and integrating open source code leads many organizations to leverage commercially packaged and supported versions of OpenStack. Service providers can develop packaged offerings that address the specific environments and requirements of their markets.
- **OpenStack as a service**. Service providers can leverage OpenStack to deliver managed private clouds, which they can run in the customer's data center or in a dedicated external facility.

Ongoing managed monitoring services can represent a great complement to all these offerings. In addition, these monitoring services can be a great way for service providers to gain entry into organizations that have already deployed OpenStack. As a result, delivering OpenStack monitoring services will enable service providers to enhance services, expand markets and deepen account penetration.

Figure A.

With CA UIM, administrators can get at-a-glance insights into the status of OpenStack environments.



The Solution: Deliver Compelling Managed Monitoring Services with CA Unified Infrastructure Management

Delivering managed monitoring services represents a compelling opportunity for many service provider businesses. However, the only way service providers can establish monitoring services that stand out in the marketplace and deliver compelling value to customers is by leveraging robust, enterprise-grade monitoring platforms. That's why so many of the world's most successful service providers build their monitoring services on CA Unified Infrastructure Management (CA UIM).

CA UIM offers a range of technological advantages that service providers around the world are leveraging to improve service, expand offerings and boost margins. Browse the sections below to learn more about these unique strengths and the services the solution can power.

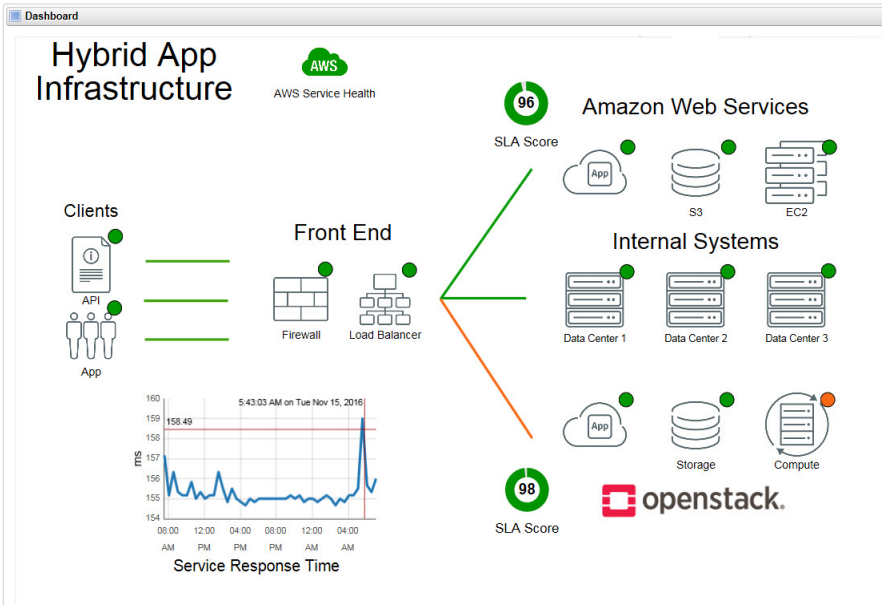
Comprehensive capabilities that fuel unified monitoring services

To maximize revenue potential and customer value, your service provider business needs to leverage monitoring platforms that can provide visibility across customers' IT environments and from the top to the bottom of their IT stacks. CA UIM offers the comprehensive capabilities that are critical to establishing successful OpenStack managed services:

- **Extensive OpenStack coverage**. CA UIM can help your business deliver compelling, high-value managed monitoring services to clients running OpenStack software. With CA UIM, you can track and optimize the health, availability and performance of your customers' OpenStack deployments. The solution provides comprehensive coverage and insights, delivering metrics on resources, availability zones, controller nodes, computing nodes, service endpoints and volumes. The solution offers visibility into OpenStack projects, including Swift, Keystone, Nova, Neutron, Cinder, Glance and Horizon. The solution also offers extensive coverage of VM instance metrics, tracking CPU, disk, memory and network.

Figure B.

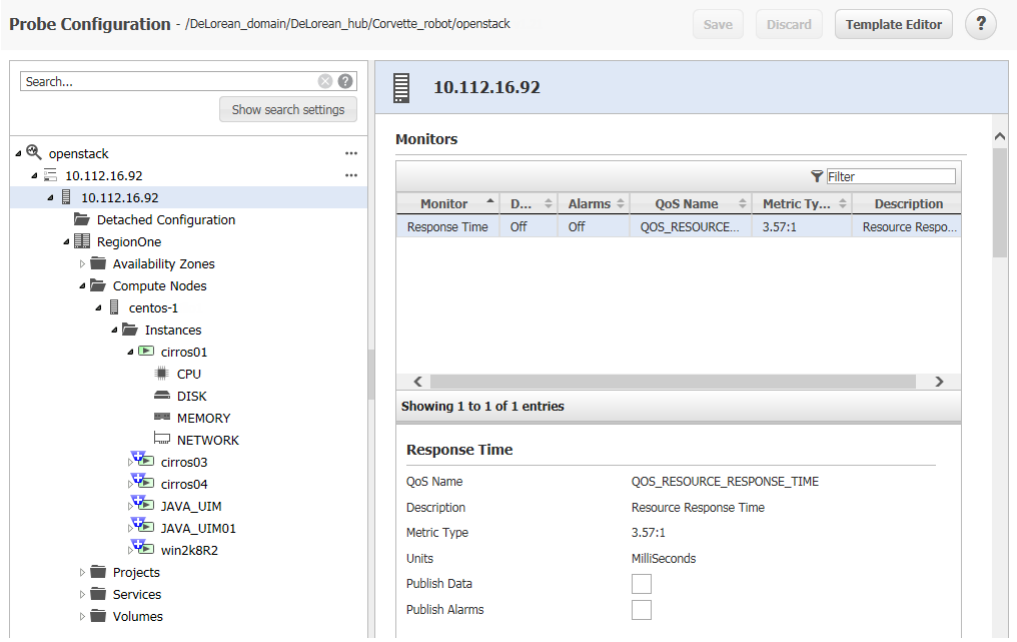
CA UIM offers complete coverage that spans hybrid IT environments.



- **The most comprehensive coverage of cloud and hybrid IT environments**. CA UIM provides a solution for monitoring all elements across a heterogeneous IT environment—all with a single product, architecture and console. CA UIM supports more than 140 technologies, including physical and virtual servers, networks, storage systems, databases, applications, user experience, public and private clouds, power and cooling infrastructure and more. With CA UIM, you can monitor and manage virtually all business applications—whether they're running in SaaS, hosted or virtualized environments. With CA UIM, service providers can quickly address new, high-growth markets and changing customer demands.
- **Intelligent alarms and predictive analytics**. CA UIM offers sophisticated alarm functionality that enables fast, effective response when issues arise. The solution offers dynamic thresholds that minimize false alarms and improve staff productivity. In addition, with CA UIM, you can leverage predictive analytics capabilities that help you proactively identify issues before the user experience suffers. The solution can provide a prioritized list of problems that represent situations administrators should watch.
- **Multitenancy support**. CA UIM provides true multitenancy—enabling service providers to use a single instance of the solution to support many customer infrastructures. As a result, you can centrally and efficiently monitor and manage all customer environments. At the same time, the solution enables you to deliver secure, tailored reports, dashboards and portals to each customer.
- **Scalability to support large-scale deployments**. Many of the world's largest cloud providers, service providers and hosting providers rely on CA UIM to deliver the high scalability required. With CA UIM, organizations get the monitoring scalability they need to serve more clients with existing staff, serve larger clients and monitor more devices and simultaneous events. CA UIM features an efficient, high-performance event processing engine that can scale to support event volumes generated from tens of thousands of servers. Plus, it offers a secure, reliable and efficient client access model that can support hundreds of concurrent connections.

Figure C.

CA UIM offers templates that streamline configuration.



- **Automation for dynamic cloud environments**. With CA UIM, you can efficiently manage monitoring of highly dynamic OpenStack environments. With the solution, you can use templates to set up automated, agentless monitoring of VM hosts and guests. In addition, you can integrate with VM management applications to discover new hosts and virtual environment guests and automatically deploy monitoring through predefined templates, and gracefully retire monitoring when VMs and hosts are intentionally decommissioned.

Unified monitoring services powered by CA UIM

By delivering comprehensive coverage of OpenStack environments and the entire IT infrastructure, CA UIM can help your organization maximize the business opportunities presented by the emergence of OpenStack software in your markets. By leveraging CA UIM, your organization can deliver a range of monitoring services:

- **Unified OpenStack platform monitoring**. Combine CA UIM and your OpenStack expertise to provide around-the-clock monitoring services of customers' critical OpenStack implementations. With CA UIM, you can deliver a compelling monitoring service that offers deep coverage of all aspects of customers' complex implementations—and provide the vital insights needed to optimize service levels. Monitor availability, performance, usage and more.
- **Unified custom application stack monitoring**. OpenStack environments can often be composed of a complex mix of open source and commercial software, and hardware and networking components from a number of vendors. And, as outlined above, a range of critical applications can be running in these environments, including DevOps tools, cloud services, e-commerce applications, big data analytics and NFV. Deliver unified visibility of the entire custom application stack deployed in your customer environments, including OpenStack, applications running on top of OpenStack and infrastructure that's running underneath. In addition, you can use synthetic transaction monitoring to track performance from the end user's perspective.

- **Unified business service monitoring**. Today, any given business service your customers operate may rely on different technology stacks and hybrid IT environments, including different hosted infrastructures, cloud services and on-premises data centers. OpenStack code, not to mention a wide range of other systems and technologies, can be deployed within each of these locales. Tracking service levels across these composite, hybrid environments can present a real challenge for customers, particularly if they're relying on a collection of point tools. By leveraging CA UIM, you can deliver unified visibility across these environments and track service levels from end to end, no matter where underlying components reside. As a result, your organization can provide significant, strategic value to customers.

Within each of these offering categories, your organization can provide multiple levels of service. For example, in addition to standard performance and availability monitoring, your organization can offer advanced, predictive analytics, dashboards and remediation services. With CA UIM, your organization can also provide advanced capacity planning services that leverage comprehensive visibility across technology and service silos.

Conclusion

Regardless of the markets you serve, chances are good that the customers you work with have either implemented OpenStack software or may soon be doing so. By leveraging CA UIM and establishing OpenStack monitoring services, your business can provide significant value—and help accelerate customers' digital transformation. Through these services, your organization can expand its revenues, margins and market share.

For more information about OpenStack, visit the company's **software page** and **marketplace**.

For more information about CA UIM, please visit the **product page**. For more details on how CA supports service providers, see the **CA service provider page**.

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