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Docker Monitoring

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



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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 organizations are increasingly gravitating toward container-based approaches like those from Docker. This paper offers a detailed look at the drivers that are prompting the adoption of Docker—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.

Container-based Development: A Key Element of Digital Transformation

The digital transformation imperative

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 approach that will be increasingly vital in supporting digital business transformation: container-based applications.

Hurdles posed by legacy application development and delivery approaches

In the application economy, accelerating application innovation will be an increasingly key contributor to business success. However, for many businesses, legacy application development and delivery approaches represent significant inhibitors to agility. Long application release cycles make it difficult to keep pace with rapidly changing customer requirements and competitive threats. Every time code is moved, whether into development, testing, staging or production environments, organizations run the risk of having bugs surface.

Relying on traditional approaches, organizations also lack the flexibility they need. They struggle to move applications into cloud or hybrid environments because environmental variables create complexity in terms of testing and troubleshooting. Given the monolithic nature of applications, it is difficult to make updates or code changes in one area without introducing unintended consequences in another area of the application.

The result is that organizations struggle with a rigid, inflexible infrastructure, slow development and delivery cycles and an inability to scale—factors that represent increasingly grave obstacles to an organization's ability to compete.

“For many businesses, legacy application development and delivery approaches represent significant inhibitors to agility.”

“Containers can be spun up and taken down in seconds, making it easy to scale application services to support rapidly varying demands.”

Why container-based application approaches are so vital to digital transformation

Container-based application approaches offer the promise of addressing the challenges outlined above. Through this approach, code is packaged with all required dependencies and configurations, so it is self-contained and portable.

Given their profound benefits, container-based applications are increasingly moving into production environments. One survey showed that 79 percent of respondents were running container technologies in 2016, and 76 percent of this group had deployed containers in production. By contrast, only 38 percent of respondents had deployed containers in production in 2015.¹

One reason for their rapidly growing popularity is that containers offer organizations a number of significant advantages over virtualization. Containers share some system resources, which makes them leaner and reduces system overhead. As a result, containers help organizations get more out of their physical resources.

Compared to virtualized services, the low overhead of containers translates to the ability to spin up and copy containers quickly, which enables faster and easier scaling. Finally, almost all major container offerings are open source, which is appealing for organizations looking to avoid vendor lock in.

In addition, by leveraging container-based approaches, organizations can realize the following advantages:

- **Enhanced developer experience.** When leveraging containers, developers don't have to spend hours just to set up development environments. They can avoid wasting time on such efforts as spinning up new instances and making copies of production code to run locally. With containers, developers can take copies of live environments and run them on any endpoint that's running the container engine. Because containers are packaged with all configurations and dependencies, developers can be assured that an application will work as designed in any environment.
- **Rapid scalability.** Containers can be spun up and taken down in seconds, making it easy to scale application services to support rapidly varying demands.
- **Tool flexibility.** Containers can give developers much more flexibility. Developers can choose from a broad range of tools, so they can use what's best for their given coding language and application requirements, without having to worry about internal tool conflicts.
- **Deployment flexibility and portability.** Organizations can gain far greater flexibility in terms of deployment environments. Containers make it easy for developers to move containers from one environment to another, and know they will work. As a result, organizations can move applications from one data center to another or from a data center to the cloud, regardless of the underlying physical or virtual infrastructure, without having to make any application changes.
- **Reliability.** Because of their packaged, independent nature, containers also make it easy to ensure that different components can be scaled up or swapped out in one container, without having a potentially negative impact on other containers.

¹ DevOps.com and ClusterHQ, "Container Market Adoption: Survey, 2016," URL: <https://clusterhq.com/assets/pdfs/state-of-container-usage-june-2016.pdf>

“On average, survey respondents reported a 13-times increase in the frequency of software releases.”

Docker: A Strategic Enabler of Digital Business Transformation

Today, Docker is the leading provider of container technologies. By delivering an innovative suite of container solutions, Docker is squarely addressing a lot of fundamental requirements for digital transformation. The company's platform sits at the center of three foundational aspects of modern application development strategy: the moves to the cloud, microservices and DevOps. It is by coupling the advantages of containers with all these approaches that organizations can realize the most compelling gains in a range of areas, including improved business agility, faster innovation, greater flexibility and enhanced operational efficiency. Ultimately, Docker is enabling organizations to continuously innovate and enhance their services ahead of others in their industry.

Docker solutions

Docker's solutions feature the following free, open source projects:

- Docker Engine, which is used to create and run Docker containers.
- Docker Compose, which is used to define multi-container applications.
- Docker Registry, which enables distribution of Docker images.
- Docker Machine, which automates container provisioning.
- Docker Swarm, which is used to manage host clustering and container scheduling.
- Kitematic, which is a desktop user interface for Docker.

The company also provides Docker Datacenter, which is commercial software that offers a complete solution for agile application development and container management and deployment services. With the solution, organizations get everything they need to run an enterprise container-as-a-service environment. Docker Datacenter is a production-ready platform that includes both open source and proprietary software that is technically validated. Customers deploy Docker Datacenter on their premises, and the software is supported by Docker.

The company also offers Docker Cloud, which gives customers everything they need to build, ship and run Docker applications from the cloud. Docker Cloud enables customers to work with their preferred cloud provider or multiple providers.

Docker customers

In recent years, a wide range of organizations has been added to Docker's list of customers. Today, both industry upstarts and established Fortune 500 companies are relying on Docker software. Customers include such recognizable names as ADP, the Department of Defense, eBay, Expedia, Goldman Sachs, Intuit, Lyft, Orbitz, PayPal, Splunk, Spotify, Swisscom, Uber and the US General Services Administration.

A survey found that Docker users reported the following benefits:²

- On average, survey respondents reported a 13-times increase in the frequency of software releases.
- More than 63 percent improved their mean-time-to-repair (MTTR) metrics.
- 65 percent report that they were able to eliminate the “works-on-my-machine” problem that plagues the development-to-production pipeline.

“Docker has emerged as the dominant container engine technology, with 94% of container users saying they employ Docker products.”

Docker momentum

The following statistics serve to illustrate the massive scope of Docker adoption, and the momentum the company has gained:

- Over the course of the prior two years, 450 million people have downloaded Docker’s open source software.³
- There are now more than 450,000 Dockerized applications in the Docker Hub and there have been more than four billion Docker container downloads.⁴
- Docker has emerged as the dominant container engine technology, with 94% of container users saying they employ Docker products.⁵
- Goldman Sachs and other firms invested \$95 million in Docker’s latest round of funding, and the company’s valuation was estimated to be \$1 billion.⁶

Customer Challenges

While the advent of Docker adoption brings significant advantages to organizations, it also presents distinct challenges. This is particularly true for the internal enterprise IT teams tasked with managing service levels and performance of applications and services running in Docker environments. The following sections offer an overview of some of the most pressing challenges.

Challenge 1: Docker introduces blind spots

Using the tools they’re accustomed to, IT teams can monitor hosts and applications. However, Docker introduces a new layer between hosts and applications that traditional tools don’t cover. This lack of visibility can expose the business to performance issues and unanticipated downtime. To address these risks, organizations need to establish specialized monitoring of Docker hosts and containers.

Challenge 2: Adding a Docker-specific point tool creates issues

The reality is that organizations are typically running a mix of Docker and traditional infrastructures and applications. Teams already have tools in place to monitor these existing environments. If they add new, Docker-specific monitoring platforms, the result is that they’ll be running several, maybe even dozens of tools in parallel, which can pose a number of issues:

- **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.

³ Docker, URL: <https://www.docker.com/technologies/overview>

⁴ Docker, URL: <https://www.docker.com/company>

⁵ DevOps.com and ClusterHQ, “Container Market Adoption: Survey, 2016,” <https://clusterhq.com/assets/pdfs/state-of-container-usage-june-2016.pdf>

⁶ CNBC, “Goldman Sachs deal lifts Docker into unicorn club,” Ari Levy, April 14, 2015, URL: <http://www.cnbc.com/2015/04/14/goldman-sachs-invests-95-million-in-docker.html>

- **Limited insights into service levels.** What ultimately matters in the application economy is the quality of the end user experience. Therefore, it's critical to be able to assess the performance of Docker infrastructure and end user experience, so administrators know whether an issue is affecting users. 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 technology silos. As a result, it is time consuming and difficult to intelligently allocate workloads and make optimized infrastructure investments.

Challenge 3: Keeping pace with dynamic environments

Docker environments deliver massive on-demand scalability. Docker environments can be continually scaled up and down to accommodate changing demand, and on an ongoing basis, containers are being added, modified and combined into new services. While this enables great benefits for the organization, it makes for highly dynamic environments that can be difficult for administrators to stay on top of. If monitoring coverage doesn't keep pace with all this ongoing change, IT teams run the risk that gaps in visibility will emerge, leaving the business exposed to downtime and other issues.

Challenge 4: Contending with proliferating metrics

In Docker environments additional layers and elements are added into the mix and, as a result, the number of metrics that can be generated and tracked proliferates dramatically. Further, compared to systems in legacy environments, the shelf life of containers tends to be shorter, which exacerbates the challenges posed by metric proliferation. Without intelligent monitoring and analytics, this proliferation can overwhelm operators. As a result, it's vital that IT operators establish a monitoring environment that can scale, and enable intelligent, automated tracking and alerting.

The Opportunity for Service Providers: Managed Monitoring Services for Docker

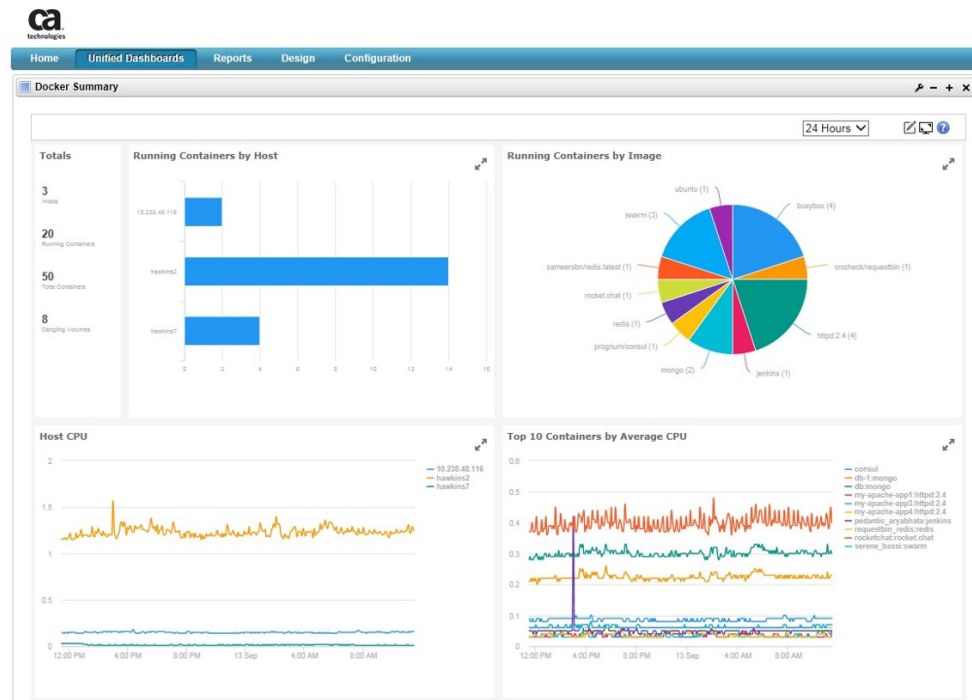
In the application economy, every company is a software company, and that includes your existing customer accounts and prospect organizations. Given their proliferation in the market, Docker solutions are likely to be playing an increasingly prominent role in your existing customer accounts and prospect organizations. The proliferation of Docker containers will therefore also present significant implications for your business. Here's what the MSPmentor wrote about the implications of Docker:

“As Docker use expands, and the current generation of legacy apps is replaced by alternatives written from scratch, there is a good chance that Docker will become the default software delivery solution. MSPs should therefore prepare for the Docker-centered future.”⁷

⁷ MSPmentor, “How MSPs Can Use Docker Containers Today,” Christopher Tozzi, October 13, 2016, URL: <http://mspmentor.net/platforms/how-mgps-can-use-docker-containers-today>

Figure A.

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



By establishing expertise and services around Docker solutions and deployments, your service provider business can establish a long-term competitive advantage.

In working with existing clients that haven't yet employed Docker technologies, your organization can leverage its expertise, and deliver significant value by offering initial consulting and integration services. Your organization can help with evaluations, architecting implementations and assisting with deployments. You can also add container services to augment additional offerings, for example, as part of a service helping design, deploy and manage cloud solutions, or as part of your application development or DevOps services.

You can gain further differentiation for these offerings by bundling in high-value and differentiated monitoring services. In addition, monitoring services can represent a great way to build a presence in new accounts that have already implemented Docker software.

By delivering compelling managed monitoring services, you can establish your organization as a trusted partner and expand your presence in your accounts. Providing these monitoring services can help you grow your offerings, revenues and market share.

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.

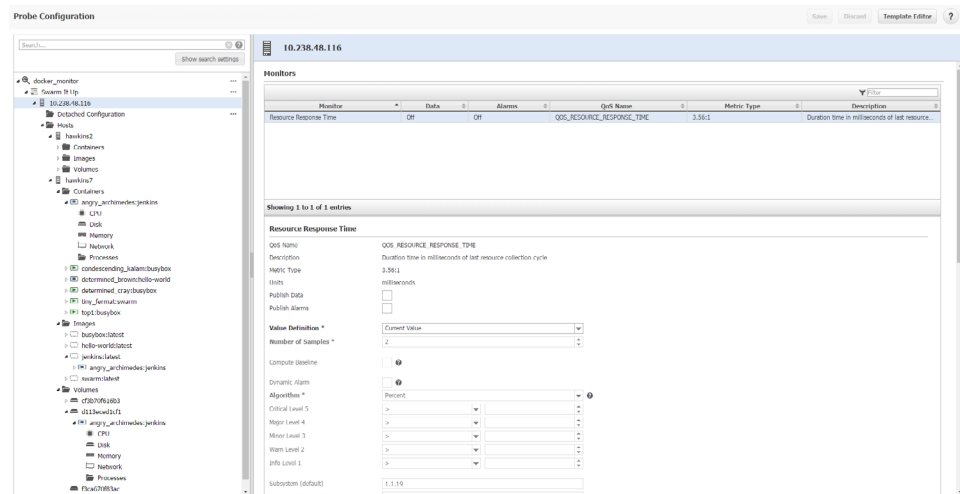
Comprehensive capabilities that fuel unified monitoring services

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 managed monitoring services in Docker environments:

- **Extensive Docker coverage.** CA UIM can help your business deliver compelling, high-value managed monitoring services to clients running Docker. With CA UIM, you can track and optimize the health, availability and performance of your customers' Docker deployments, including Docker host systems, individual Docker containers and the services running on them. The solution can provide comprehensive coverage and insights, delivering metrics on resources, hosts, containers, images, volumes, CPU, disk, memory, networks and processes.
- **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. CA UIM offers prepackaged dashboards that provide performance status of Docker hosts and each container running on them. With the solution, you can establish baselines of every metric being tracked, and have the solution automatically issue alerts when deviations from baselines occur. This helps make monitoring data more accurate and trustworthy, and reduces the administrative effort associated with monitoring. In addition, with CA UIM, you can leverage predictive analytics capabilities that help you proactively identify issues before the user experience suffers.
- **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 B.

CA UIM offers templates that streamline configuration.



- **Automation for dynamic Docker environments.** With CA UIM, you can efficiently manage monitoring of highly dynamic Docker environments, so you can reduce gaps in visibility while streamlining administration. The solution can automatically and instantly discover new Docker hosts and containers. With the solution, you can use templates and dynamic thresholds to ensure the right monitoring settings are applied to each component.

Unified monitoring services powered by CA UIM

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

- **Unified Docker environment monitoring.** Combine CA UIM and your Docker expertise to provide around-the-clock monitoring services of customers' critical Docker 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.** Docker 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 are now running in production environments. Deliver unified visibility of the entire custom application stack deployed in your customer environments, including Docker containers and hosts, databases and applications running on top of Docker and hardware and networking 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. Docker containers, 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.

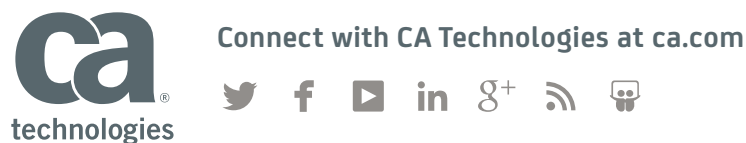
Within each of these offering categories, your organization can provide multiple levels of service. For example, in addition to standard performance and availability monitoring, your organization can offer advanced, predictive analytics, dashboards and remediation services. With CA UIM, your organization 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 Docker containers or may soon be doing so. By leveraging CA UIM and establishing Docker 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 Docker, visit the **“What is Docker?”** page and **partner page**.

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**.



CA Technologies (NASDAQ: CA) creates software that fuels transformation for companies and enables them to seize the opportunities of the application economy. Software is at the heart of every business, in every industry. From planning to development to management and security, CA is working with companies worldwide to change the way we live, transact and communicate—across mobile, private and public cloud, distributed and mainframe environments. Learn more at **ca.com**.