The APM Revolution

How Kubernetes Changes the Paradigm

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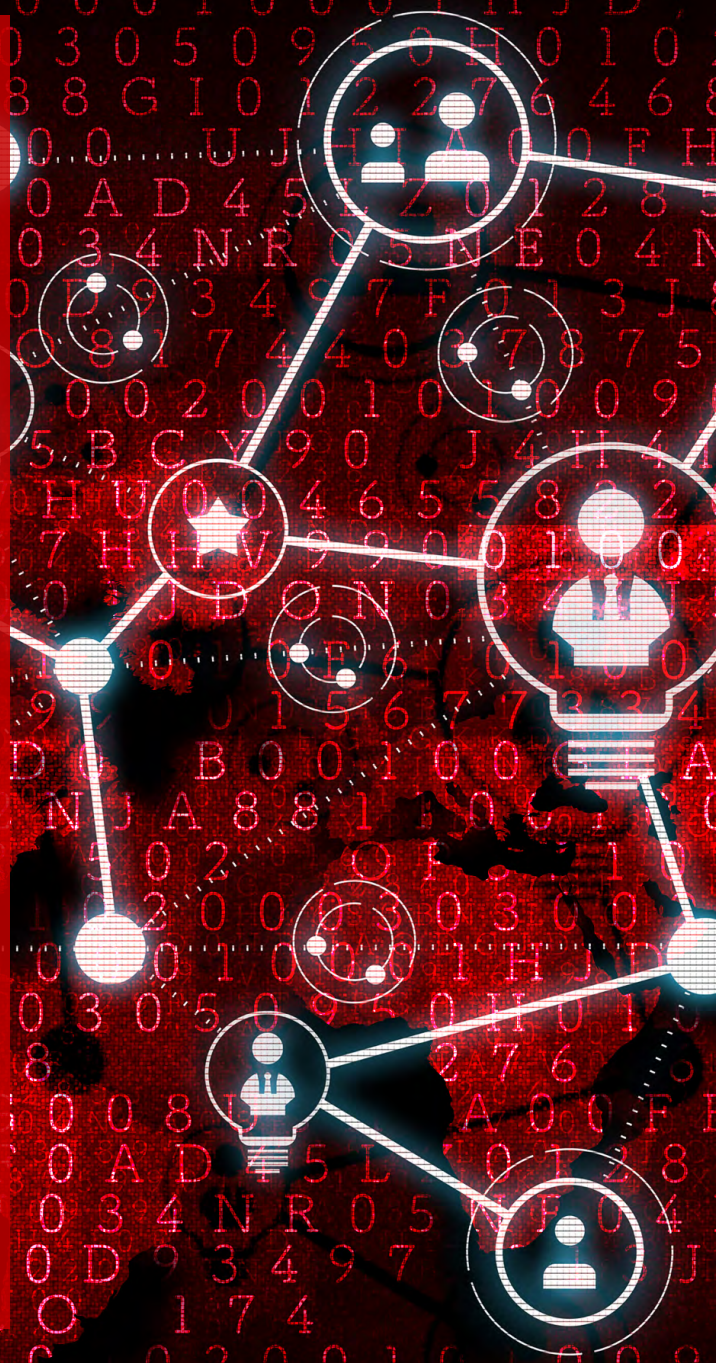
Welcome to the APM Revolution

Application performance management (APM) has existed as a discipline within the IT industry since at least the early 2000s, when tools like Wily first appeared on the scene. Yet despite being a relatively "old" type of technology (by IT standards, at least), the APM ecosystem is witnessing massive innovations.

You might even say that we're in the midst of an APM revolution.

APM is more complex than ever, due in no small part to the rise of platforms like Kubernetes. In this eBook, we discuss how APM has evolved, and how it is being upended by the demands of platforms such as Kubernetes.



Where We Started: Traditional APM

When APM first appeared, the fundamentals of the technology were pretty straightforward: you collected data, analyzed the data for anomalies or patterns that could signal a problem, then manually addressed the problem.

First-generation APM tools excelled at collecting data and alerting IT teams when something appeared to be off, based on preset configurations that defined what was "normal" and what was not.

Little about this changed fundamentally for the first fifteen years or so of APM's existence. The tools became a little more user-friendly. Alert management grew more sophisticated, reducing instances of alert fatigue. The APM ecosystem grew much more diverse, with a variety of commercial solutions appearing alongside the original open source monitoring platforms. And many APM platforms shifted from an on-premises architecture to a SaaS model.

Yet despite these changes, the core functionality of APM remained the same: your tools collected data, analyzed the data, and sent you alerts. The types of environments managed by APM didn't change much either. Until about five years ago, most teams were still monitoring the same types of virtual and physical servers and monolithic applications that they had been using since the early 2000s.

Microservices Fuel Radical Growth in Infrastructure Complexity

Things began to change starting around the middle of the last decade, which touched off an APM revolution. This was the result of a variety of factors.

One spark for the APM revolution was the need to manage the performance of more complex types of applications and infrastructure. As Docker containers (which appeared in 2013) and Kubernetes (which debuted two years later) gained massive adoption, and as development teams migrated to microservices architectures, the nature of application environments and the infrastructure hosting them changed radically.

Today's environments consist of many more layers and moving pieces. It's no longer enough to collect just basic monitoring data, like whether a server is up or how long an application takes to respond.

Instead, APM tools must now be able to collect and interpret a broad range of data from all of the different components of an environment, understand the relationships between different data points, and interpret them collectively to generate meaningful insights. The root cause of a performance problem in one microservice could lie within another microservice, or deep within one of the infrastructure layers that hosts the microservice. In a Kubernetes environment, a failure could be caused by any of the various components of Kubernetes—the API server, the Kubelet agent, the master node, or a worker node.

Traditional APM tools can't handle that type of complexity, which is why modern APM has shifted toward microservices-aware tools that can map the complex relationships between the various parts of an application and the infrastructure on which it runs.

When the Concept of "Normal" No Longer Applies: The Need for Dynamic Baselining

A related factor driving rapid innovation in APM today is that we're living in a new normal in which there is no normal—at least when it comes to application monitoring and management.

The profiles of modern application environments change so rapidly that it has become impossible to establish a baseline of ordinary activity and use it to detect anomalies. The number of instances of an application (or a microservice within an application) could fluctuate constantly in response to changes in demand. So could the resources allocated to host infrastructure or the network traffic patterns within the environment.

Amidst this constant change, APM requires a new approach based on dynamic alerting thresholds that can distinguish between unremarkable changes and those that signal a meaningful issue. Conventional APM tools were not designed to do this, but next-generation solutions are embracing the need for dynamic interpretations of software environments.

AIOps Emerges, Accelerating the Revolution

AIOps, too, has become a key force behind the APM revolution.

Although the term AIOps didn't appear until 2016, you could argue that AIOps existed before then in practice, since IT operations teams have long used data analytics to help provide visibility into software environments. However, what changed in recent years is that AIOps has grown much more sophisticated, with tools that are capable not just of reacting to events or making suggestions about how IT engineers should act, but also of automatically remediating problems themselves.

Along with that change has come important new opportunities for APM tools. In the past, the role of data analytics within APM was limited mostly to helping to parse log files in order to draw out relevant patterns or anomalies. Today, data analytics can do much more by making prescriptive recommendations and driving automated decision-making on the part of AIOps tools.

Put another way, AIOps means that APM platforms are gaining critical new types of functionality that extend data-driven automation across APM workflows. Instead of just using analytics to interpret monitoring data and leaving the rest of the work up to engineers to perform manually, AIOps is enabling more automated and systematic approaches to APM.

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The Future of APM

Although it's hard to say exactly what APM will look like a few years from now, it's clear that it will be distinguished in several key respects from the way APM has worked for most of the past two decades. In the future, APM will be characterized by:

- **Greater focus on automation**. Automation within APM platforms will not just be an advanced feature that can be applied to some workflows, but a core, across-the-board type of functionality.
- **An ability to manage constant change**. The old paradigm of defining a baseline of "normal" activity and measuring anomalies against it will go away, with APM tools becoming more and more adept at understanding the constant fluctuations within the environments they monitor.
- **The mapping of complex relationships**. APM tools will be able to understand how the various components and layers of a software environment interact, and how changes in one component impact others.

These features are where the APM revolution has us heading. It may take several more years for them to achieve maturity, but it's a safe bet that, by 2025 or so, APM will look nothing like it did circa 2015.

Example: OpenShift and the Monitoring Implications

Red Hat OpenShift Container Platform is the leading enterprise Kubernetes distribution. That's because it has been a part of the Kubernetes open source community from its inception, and it has built on Kubernetes by bundling all of the components that an enterprise needs to get started with containerized applications. The OpenShift distribution starts with pure upstream Kubernetes and integrates additional open source projects into a supported platform. These products provide hundreds of additional function points, including enhanced role-based access control, single sign-on, continuous integration/ continuous delivery pipelines, a private registry, and a web console.

The goal of OpenShift is to offer a consistently managed and provisioned platform that provides developers with the same experience no matter which type of infrastructure they use. This allows for seamless migration and growth from private clouds to hybrid and multi-cloud infrastructures.

OpenShift has enough functionality built in that most teams will be able to begin working with containerized applications as soon their cluster is up and running. However, OpenShift does not provide industry-leading solutions for every aspect of running in production. A primary example of this is in the area of monitoring. Open source products feature out-of-the-box monitoring and reporting, but these offerings have limitations when it comes to alerting and scalability. Further, these tools don't provide a holistic view across all aspects of the platform, and they lack any capabilities for tracking interdependencies that exist outside of the Kubernetes environment.

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Prior to selecting AIOps from Broadcom, 61% of surveyed IT organizations said they struggled with complexity of modern environments. (source: TechValidate. TVID: **676-F3E-C70**)

How DX APM Can Help

DX Application Performance Management (APM) is fully integrated with AIOps from Broadcom to combine full-stack observability with the intelligence and automation capabilities needed to effectively manage today's most complex enterprise environments.

DX APM simplifies the complexity introduced by these modern microservices architectures by helping operations teams:

- Gain full-stack visibility into the health and performance of Kubernetes clusters, projects, services, pods, and containers together with hosted apps and microservices.
- Automatically view dependencies between applications, orchestration platforms, containers, and cloud services.
- Reduce alarm noise and speed root cause analysis by using dynamic performance baselining to distinguish real problems and anomalies from minor alerts.
- Eliminate repeat problems by detecting patterns and automating remediation tasks.
- Optimize workloads and resources for cost and performance by providing detailed metrics to enable you to better assess your cluster capacity.

Conclusion

The rapid emergence of microservices technologies in enterprises has fundamentally altered the nature of APM. Just as Kubernetes has revolutionized the way applications are architected and run, it also revolutionizes the way application performance needs to be tracked and managed.

To learn more about how DX APM can help you cost effectively manage and scale your Kubernetes workloads, be sure to visit the **Kubernetes monitoring page**.

To learn more about how to get started with Kubernetes and OpenShift, be sure to review our white paper, **Establishing Effective APM Implementations in Kubernetes Environments**. This paper offers practical guidance on the essentials of launching your implementations in a way that will set you up for long-term APM success.

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