Modern Applications Require Modern APM Solutions

A SolarWinds APM Suite Whitepaper

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The State of Application Performance Management and What You Will Learn

Application performance management (APM) was first introduced in the mid ’90s as a means to address complex Java applications built to J2EE application servers. Then in the early part of the 2000s, APM evolved to address the newly invented n-tier application and the resulting distributed application architecture. Now the application architecture is shifting again to an even more distributed approach oriented around microservices running in containers.

This paper will explore how today’s applications need to be monitored based on business needs and challenges driven by increased complexity, including:

» Digital Transformation
» Evolution of the technology stack
» Multi-cloud architectures and platforms
» Dynamic nature of the stack

Finally, and most importantly, this paper explains how APM must evolve to become more comprehensive, simpler to implement, and more affordable in order to address this explosion of new applications in production.

DIGITAL TRANSFORMATION AND THE IMPERATIVE TO DIGITALIZE CORE BUSINESS PROCESSES

Digital Transformation means the key business processes of the company get implemented in software. This creates the following imperatives for the teams building and managing these applications in production:

» Drive online business results – Revenue, customer acquisition, customer service, customer satisfaction, market share, and reputation

» Time to market – Implement key business processes in software more quickly than both current and emerging competitors

» Rapid and continuous improvement – Rapidly improve those digitized processes to compete and gain market share

» Great customer experience – Web and mobile experiences must be available 24/7 and offer excellent performance (responsiveness to user actions)

» Fast resolution of problems – Every online system has issues, but they need to be prevented as often as possible and solved as quickly as possible
» **Scale in response to demand** – If the system is subject to spikes in demand (like online retail and financial services), then it needs to be able to respond to dramatic increases in load without suffering from reliability and performance problems.

» **Be cost-effective** – Modern application teams need to be efficient with their time and avoid overspending on legacy and expensive toolsets.

In summary, the teams building and supporting all of these new applications at every enterprise must now be as agile in building the new applications, and in enhancing them over time to keep them competitive as software vendors have become. The infographic below shows the important Digital Transformation trends for 2019.
COMPLEX MULTI-CLOUD ARCHITECTURES

Today the question is not whether to do cloud, but which clouds and how many different ones will be deployed. Enterprises who want direct control of their underlying infrastructure have an on-premises, private or hybrid cloud using a vendor like VMware vSphere. Alternatively, organizations who don’t wish to set up or maintain their own cloud servers choose public clouds like Amazon AWS and Microsoft Azure. In reality, most organizations have a blended, multi-cloud architecture where public clouds are integrated with the existing on-premises private or hybrid cloud. The multi-cloud architecture is needed for two main reasons: 1) In many cases, latency- (performance) and security-sensitive applications still need to be run in dedicated data centers on dedicated hardware and 2) The public cloud behaves entirely differently than a private cloud, assuming stateless applications.

This means for cloud operations teams, the cloud is a source of increased complexity, not a source of simplification. In these complex environments, it’s crucial the APM tools not become a source of complexity and management overhead themselves.

INDUSTRY CHANGES CAUSED BY DIGITALIZATION

Digitalization is creating unprecedented demand for the resources (primarily the people) who know how to implement business processes in software (software developers and architects) and the people who know how to operate complex application systems in production with high reliability and performance (cloud and applications operations).

The most important architectural change is the shift to a microservices architecture that allows each microservice to be independently enhanced—leading to dramatically shorter application development cycle times, dramatically increased technical and business agility, and dramatically increased online competitiveness.
The demand to implement business processes in software exceeds the supply of knowledgeable people, which is fueling a set of innovations designed to speed the delivery of software into production, and ease the process by which highly complex, dynamic, and scaled out applications are supported in production.

**INNOVATION AND DYNAMIC BEHAVIOR ACROSS THE STACK**

The imperative to digitalize core business processes, and the resulting shortage of people who can do the work is fueling a set of process and technology innovations designed to speed business functionality implemented in software into production. These process innovations—DevOps and continuous integration (CI)/continuous delivery (CD)—and technology innovations (containers, and the dynamic infrastructure upon which they run) are being brought to bear to help development teams be more agile and effective to help support teams deliver better reliability and performance results to the business. These layers of innovation and dynamic behavior are outlined and illustrated below.

- **Shifts in application architecture** – In order to be able to evolve digital services more quickly and frequently, the applications are being broken into microservices where each individual function runs in its own container. This creates thousands and sometimes hundreds of thousands of individual microservices, which are each running in their own containers needing to be monitored and managed.

- **Accelerate delivery of code in production** – The process of getting code into production is being automated as much as possible with CI/CD. This facilitates hundreds and sometimes thousands of changes in code in production every day.

- **Many different languages** – The variety of tasks needing to be implemented in code, and the need to do more with less skilled developers, has driven a proliferation of languages. It’s not unusual for one application to be composed of components written in three or four different languages.

- **Many different services and containers** – They layer of services which applications rely upon has exploded in complexity and diversity.

- **Proliferation of data architectures** – Data architectures are not simply the top three SQL databases anymore, but also include a wide variety of NO-SQL databases as well as scale out SQL options and Graph datastores.

- **Everything virtualized** – All of the resources (compute, memory, networking, and storage) are all virtualized, meaning both the virtual and physical instances of all of these resources need to be monitored and managed.

- **Many clouds** – There are many cloud options spanning private, hybrid, and public, with most enterprises using more than one.
The above architectural (microservices), and process (CI/DC) innovations, combined with diversity in the stack and the dynamic behavior across the stack, create an unprecedented monitoring and management challenge for modern online enterprises. This challenge is compounded by a high rate of innovation, which constantly increases the complexity and diversity of the environment. In order to cope with both the complexity and the rate of change in the environment, it’s crucial APM tools be selected that can cover the complexity of the stacks and simplify the process of managing the applications in production with as little manual effort as possible.
MONITORING CHALLENGES WITH MODERN APPLICATIONS, STACKS, AND PROCESSES

The modern application, technical stack, and its dynamic behavior combined with the development process create the following new and unprecedented challenges for teams building and supporting these new applications in production:

» Modern apps are highly scaled out with many things to monitor (i.e., hundreds and thousands of microservices in production).

» Modern apps are highly dynamic with their high rate of change in scale and new versions (i.e., multiple releases of new software into production every day).

» Modern apps are incredibly diverse with many different languages and stacks, driving the need for developer productivity and ever more diversity.

» Business services are often comprised of not only the modern applications, but previously developed n-tier, monolithic, and commercial off-the-shelf (COTS) applications.

» As stated above, the environment spanning the on-premises private cloud and the public clouds are more complex and dynamic than ever.

» Due to the above factors, modern apps are quite complex and addressing issues consumes time and expensive resources. In fact, Gartner predicts, “By 2020, 75% of enterprises will experience visible business disruptions due to infrastructure and operations (I&O) skills gaps, which is an increase from less than 20% in 2016.”

» Enterprises struggle to deploy APM tools broadly and pervasively due to their complexity and cost. In Gartner’s 2019 Magic Quadrant for Application Performance Monitoring, Gartner states, “Enterprises will quadruple their application performance monitoring due to increasingly digitized processes from 2018 through 2021 to reach 20% of all business applications.” This means at the time when this note was published in March of 2019, only 5% of the applications that should be monitored by an APM solution were so monitored.
ENTERPRISE BARRIERS TO BROAD SCALE APM DEPLOYMENT

Modern enterprises with digital services implementing key business processes should instrument every applicable application with an APM tool. In addition, they should use an APM tool across the entire development lifecycle starting with development, extending through all phases of testing and QA, and into production. However, the only companies doing this are those with a limited number of applications and where such application set comprises the entire business activity of the company (think an online retailer like Newegg). The remainder of enterprises don’t broadly deploy APM for the following reasons:

- **Traditional APM solutions are complex to deploy.** There are different agents for each language and different configurations required for each application runtime. Plus, each supporting service like Kafka, ElasticSearch, Spark, and every database requires its own configuration.

- **Traditional APM solutions are complex to support in production.** If you have to support and maintain the back end for the APM solution, at scale this is as complex as supporting a major enterprise application. Even if the APM solution is delivered via a SaaS model, simply maintaining and updating all of the different agents across all the different environments is a challenge.

- **Traditional APM solutions are expensive to purchase and maintain.** Most APM vendors charge around $2,400 per monitored host per year (pricing models vary across vendors), quickly pushing the cost of the APM solution towards millions of dollars a year for any large company. This pricing makes broad scale deployment of the APM tool unaffordable for many enterprises.

In summary, traditional APM tools create difficulty for application development teams and application support teams to deploy the tools broadly in production, limiting their usefulness.
WHERE DO APPLICATION OWNERS, DEVELOPERS AND SUPPORT TEAMS GO FROM HERE?

The difficulty and prohibitive expense of broadly deploying APM tools across the entire development lifecycle and production estate has led many application support teams to use alternatives like:

» **Open source tools such as Prometheus, OpenTracing, Zipkin, and Jaeger.** While these tools are “free” from a licensing perspective, they’re costly in terms of developer time to implement and maintain. This ends up being a bad bargain for the application teams as they end up using time that could be spent to enhance and maintain the application building and supporting monitoring.

» **Infrastructure tools lacking true application and transaction visibility.** Many teams invest in tools that instrument software and hardware infrastructure and try to infer the behavior of applications and transactions from the infrastructure’s behavior. Not only does this not work, it leaves the application support teams blind when real issues with the application’s code occur in production.

To address the above shortcomings in traditional APM tools, a new approach is required. This approach must deliver the following benefits to application development and support teams.

» **Comprehensive support of application architectures** – The reality is most teams must support a mixture of monoliths, n-tier SOA, and modern microservice-based applications. Modern APM tools need to provide full code visibility and full transaction tracing across all three application architectures.

» **Easy to implement and support in production** – Modern APM tools need to be simple to deploy and update at scale and shouldn’t disrupt the flow of releases of the applications into production.

» **Affordable to deploy at scale** – Traditional APM vendors have priced their products to maximize the revenue they get from each customer, and not to make it easy for customers to deploy these solutions deeply and broadly. Modern APM solutions need to make this easy for application development and support teams.
THE SOLARWINDS APM SUITE

The SolarWinds® APM Suite—Pingdom®, AppOptics™, and Loggly®—combines user experience monitoring with custom metrics, code analysis, distributed tracing, log analytics, and log management to provide unmatched visibility into modern applications. A key feature of the suite is all the major types data are collected, including logs, traces, metrics, and both synthetic and real end-user experience data. The suite is also unique in how its feature functionality works across all three major architectural patterns for application development—monoliths, n-tier SOA, and microservice-based applications. This is depicted in the diagram below.
PINGDOM

Pingdom is a web application and end-user experience monitoring solution that uses synthetic transactions and real user monitoring to provide user experience monitoring and the proactive ability to help ensure key applications and services are running before an actual user logs on. The key features of Pingdom are:

» Page speed monitoring and alerting

» Visualization of page load elements to identify bottlenecks

» Proactive SSL monitoring

» Synthetic and real user monitoring

» Automated uptime checks every minute

» 100-plus probe servers around the globe

» Validated alerts to reduce false positives

» Root cause analysis

» Shareable reports and integrations PagerDuty, Slack, Opsgenie, etc.

» Integration of Pingdom metrics into AppOptics for a complete end-to-end view of performance

» Highly affordable pricing for uptime, transaction, and real user monitoring
AppOptics is a SaaS-based infrastructure and application monitoring solution offering performance monitoring, tracing, and custom metrics for hybrid and cloud custom applications. The key features of AppOptics are:

» One product for infrastructure and application monitoring

» Heatmaps to isolate outliers and trends

» Distributed transaction tracing with code profiling to quickly pinpoint issues

» Host and container maps to visualize infrastructure

» Multidimensional filtering and proactive alerts

» Real-time elastic dashboards, easy to customize

» 150-plus cloud ready integrations, including 30 for AWS

» Rich API allowing easy creation of custom infrastructure, application, and business metrics

» Bi-directional, automated integration of trace IDs into logs in Loggly

» Very affordable pricing in comparison to all other APM solutions
Loggly is a unified log monitoring and analytics solution providing full-stack, multi-source log aggregation, and log analytics to show events in context, highlight patterns, and detect anomalies for deeper insights. Loggly is highly scalable, allowing fast searching across large datasets. The key features of Loggly are:

» Simple setup with an agentless hosted service
» Massively scalable for even the largest environments
» Support for both structured and unstructured log data
» Quick searching with log aggregation and consolidation
» Parses and structures log data to accelerate issue identification
» Anomaly detection for significant changes in event frequency
» Bi-directional integration of logs into AppOptics via trace IDs
Summary

The SolarWinds APM Suite is the only offering in the APM market providing ease of implementation, fast time to value, and an affordable price point, helping enable teams to scale the solution across all enterprise applications and throughout the entire development to production software management process. The key advantages of the SolarWinds APM Suite are:

1. The integration of synthetic end-user experience data, real end-user experience data, logs, code profiling, application performance metrics, and traces into one solution.

2. Pricing that makes it affordable for enterprises to deploy the APM Suite broadly (across all applications), and deeply (across the entire development lifecycle).

3. In AppOptics, both the code profiling and the tracing work across traditional monolith and SOA (n-tier) architectures as well as the newer microservice-based architectures. No other APM solution offers these capabilities across all three types of application architectures.
ABOUT SOLARWINDS

SolarWinds (NYSE:SWI) is a leading provider of powerful and affordable IT management software. Our products give organizations worldwide—regardless of type, size, or complexity—the power to monitor and manage their IT services, infrastructures, and applications; whether on-premises, in the cloud, or via hybrid models. We continuously engage with technology professionals—IT service and operations professionals, DevOps professionals, and managed services providers (MSPs)—to understand the challenges they face in maintaining high-performing and highly available IT infrastructures and applications. The insights we gain from them, in places like our THWACK community, allow us to solve well-understood IT management challenges in the ways technology professionals want them solved. Our focus on the user and commitment to excellence in end-to-end hybrid IT management has established SolarWinds as a worldwide leader in solutions for network and IT service management, application performance, and managed services. Learn more today at www.solarwinds.com.

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