The Three Views of APM
ABSTRACT

Application performance management (APM) used to be just a buzzword for SysAdmins. Now, with the emergence of cloud services and businesses built around software as a service (SaaS), APM is a necessity at all levels of an organization. In this whitepaper, we look at the need for and benefits of APM from the view of three different roles: the developer, the system operator, and the application owner.

Application developers need APM to track performance through their code and across the various services upon which the application depends.

System operators can only make informed decisions about infrastructure if they have a clear picture of all the moving pieces, with log analysis and accurate alerting. APM provides this.

Application owners ask altogether different questions, ultimately caring most about end-user (customer) experience. APM can provide metrics to inform the owner’s decisions regarding the bottom line.

As we outline the benefits of APM, we’ll touch briefly on how the SolarWinds® APM Integrated Experience brings the necessary APM tools into a centralized suite for seamless adoption at all levels of the organization.

INTRODUCTION

Whether your business application is facing challenges with its new growth or you’re one of the 30% of companies struggling with increasing user churn, your ability to respond is hamstrung if you’re operating blind. Without metrics to illuminate where your application is delivering—and where it’s drowning—you have little insight about how to move forward.

APM surfaces these core metrics.

- Why does the “view shopping cart” page take so long to load?
- Why do our servers always experience sluggish database connections on Wednesdays?
- How much downtime have we had since our migration to that new provider?
- Why have we been seeing a dramatic drop in usage from users in South America, but we haven’t been seeing this anywhere else?

With a 50% increase in year-over-year spend on SaaS products by companies in 2019, businesses built around SaaS live and die on their speed, uptime, and user experience. Will your SaaS business still be around in 2022, when SaaS businesses alone are forecast to generate US$140 billion in revenue? Does your business have clear insight into those metrics? APM gathers and centralizes metrics into actionable reports and insightful visualizations, making it pleasant and easy to find the answers to your questions.
However, your role in the organization informs the kinds of questions you’re asking. If you’re an application developer focused on code quality, the questions you ask of your APM tools—and the benefits you enjoy—are different than if you’re a system operator focused on infrastructure management. If you’re the application owner or a stakeholder looking at the business’s bottom line, then your questions are different as well.

In this whitepaper, we’ll consider APM from the perspective of these three different roles: developer, system operator, and application owner. We’ll look at how APM addresses the focus areas for each role. Along the way, we’ll also consider how the SolarWinds APM Integrated Experience couples solutions for each role into a single, centralized service.

**APM AS A DEVELOPER**

First, let’s look at how an application developer can take advantage of APM. As an application developer, you’re focused on the code. You might be focused on web server code, cron job scripts, database queries, or API calls. More likely, you’re focused on all these things. At the end of the day, you care most about the path a user’s request takes through your code. Where are the bottlenecks? What can be optimized? Why are there exceptions? Let’s see how APM helps.

**Tracing**

Tracing tracks the path of a request through your application. At the highest level, request tracing measures speed and efficiency for the following:

- Code execution
- Database calls
- External API calls
- Gathering assets

Where is your application spending most of its time? An effective APM tool can provide a high-level waterfall analysis capable of quickly exposing bottlenecks and inefficiencies.
Code profiling

Though high-level tracing is helpful, sometimes code profiling yields the details necessary for making decisions about optimization or resource prioritization. Code profiling tracks and times requests through your application code's function calls, providing a clear picture of how expensive certain code paths or algorithms are. These metrics help answer the following developer questions about how to prioritize development:

- Should we really spend more time optimizing a database query when the real bottleneck seems to be the network connection to the database?
- Why are we devoting so much time to refactoring a module when it looks like the code path is never even reached?
- The timings look like something about a function call is suspect. Should we put an engineer on it to research further?

Application metrics

Effective APM tools come bundled with agents designed to sample, collect, and aggregate real-time performance metrics from an application. These metrics provide a holistic understanding of how your application is functioning. Response times, request counts, error rates, and other metrics are all collected and funneled to dashboards, which help the developer know the state of the application at any given moment.

To reduce overhead, these types of application metrics are often taken as random and periodic samples. Collection agents, written for use in every major programming language, are easy to set up and begin integrating into an application's code.

Exception handling

What about when something goes wrong? When a user hits a 500 error or a data set is out of sync, application developers can couple their exception handling with APM monitoring, providing immediate alerts and stack tracing. Improved troubleshooting ranks high as a reason for APM investment, second only to improving customer experience.

In an APM dashboard, you can examine regularly occurring exceptions in context. It simplifies the detective work of determining root cause, and you can quickly discover and deal with code bugs.
AppOptics: The developer-centric piece of an APM suite

Whether it’s high-level tracing or detailed code profiling, SolarWinds AppOptics™ provides developers with the instrumentation tools and dashboards necessary to know—and know with confidence—what exactly is going on with their code. Application metrics in AppOptics are facilitated by collection agents available across various platforms and languages. For answering the development team’s “What exactly is going on with our code?” question, APM via AppOptics is a strong option.

Tracing in AppOptics illuminates time spent along each hop of the request path.

Request rates, error rates, and other crucial metrics receive clean and clear visualizations.
APM FOR THE SYSTEM OPERATOR

The developer, however, is not the only one who will benefit from APM. System operators—your DevOps and infrastructure management team—need just as much actionable insight to make informed decisions affecting the bottom line. The focus of the system operator is the infrastructure: all the pieces of the machine that, working in harmony, deliver the application to your end user. With this different focus, the system operator approaches APM with different needs.

Infrastructure state

Cloud services are predicted to rake in over US$330 billion in revenue in 2021. On top of this, the cost of horizontal scaling has decreased dramatically. This means system operators no longer maintain one or two servers. They manage entire fleets: dozens upon dozens of bare-metal machines, VMs, and containers. Without APM to provide a high-level overview of what machines are under what load or what servers are beginning to reject requests and fail, the task of the system operator can be overwhelming.

APM needs to provide views of infrastructure deployments supporting filtering, grouping, tagging, and sorting. Configurable metrics and threshold ranges for highlighting problem areas and raising alerts are imperative. At any given moment, a system operator needs to be able to access a single host’s CPU usage, memory load, disk I/O, and network I/O.

Beyond knowing the state of a single machine at any given moment, the system operator also needs a clear view of how resources are interconnected. How are different nodes in the application machine—whether it be databases, cache servers, third-party services, content delivery systems, or other resources—connected with and dependent upon each other? Node mapping visualizations provided by APM systems make it simple to pinpoint problems in your overall infrastructure.

Monitoring and alerts

No system operator can keep an eye on everything at all times. APM provides rules for capturing and evaluating metrics against customizable thresholds. Once certain thresholds are crossed—for example, dropped network packets or an uptick in malicious HTTP requests—alerts are raised. Alert notifications can be sent out via integrated services or even custom webhooks or service hooks. Alerts are also captured for proper visualization on dashboards, overlaid on system metrics for context.

System operators need to act on alerts and note when alerts have been resolved or need escalation. APM systems can be configured with counter-thresholds dictating when an alert can be cleared.
Log analysis

For the system operator, logs are indispensable. One survey of over 1,000 engineers had just over 90% of respondents report they use log management and analysis for observability. Logs contain a wealth of information, often pointing the system operator to the precise cause of an infrastructure failure. The massive amount of information in logs, however, is a double-edged sword, as it becomes an impractical amount of information to sift through manually.

- Eight users reported timeout issues within the span of 10 minutes yesterday. Were they all trying to do different things on the same host (server problem), or were they all trying to do the same thing on different hosts (code problem)?
- Every time the server receives a PUT request to this endpoint, we see a spike in database connections. What’s going on there?
- Friday mornings always show an unusually high number of user connectivity complaints. Are there automated processes or jobs running at that time and hogging resources?

APM brings log monitoring, data aggregation, and easier filtering and searching to the table. Rather than hunting and pecking through the log files of four different machines, a system operator using good APM tools can see and search through the log files as one interwoven stream.

APM is essential for system operators

Because infrastructure management touches so many aspects of APM, system operators would benefit from a central APM system capable of integrating all the necessary tools. While AppOptics can provide all the infrastructure state insights, monitoring, and alerts, tools like SolarWinds Loggly® and SolarWinds Papertrail™ add powerful log analysis to the system operator’s toolbelt.

The state of your infrastructure in AppOptics is easy to understand and navigate.
With countless moving pieces, map views for interconnectedness have become indispensable.

Making use of all these tools together in a central system is possible with the SolarWinds APM Integrated Experience. In the APM Integrated Experience, the tools don’t simply live next to each other in a nav bar. They work together as integrated systems.

For the system operator, APM is critical. With “system sprawl” in today’s use of cloud services and third-party providers, the only way a system operator can answer the hard questions about imminent failures or root causes is by relying on APM.

APM FOR THE APPLICATION OWNER

Ultimately, whether or not an application cost-effectively delivers a winning user experience determines whether or not the business built around the application lives or dies. The application owner, which could be a co-founder, CEO, investor, or stakeholder, also has questions about application performance. The application owner’s questions, however, are vastly different from the developer or the system operator.

What kind of experience are my users—my customers—getting from our application?

One Gartner® report predicted 60% of monitoring spend would focus on business-relevant metrics. For the application owner, APM also provides important answers.
User experience monitoring

Up until now, our APM focus has been on internal system numbers and metrics. What about the numbers more directly related to user experience? An application owner cares most about application performance in the end user’s browser:

- What parts of the webpage take the longest to load, and why?
- Has it been worth it to pay for the CDN service in Europe, and is the latency to the CDN service in North America tolerable?
- How many minutes of downtime did we experience last week, and how many customers were affected because of it?

An APM solution needs tools designed to monitor end-user experience and browser performance, check for server health from around the globe, and analyze last hop accessibility and speed checks.

Dashboards and visualizations

Dashboards are designed to create and display a wide array of charts and metrics in a clean and organized manner. Whether the need is for time series data or big number displays, these dashboards can provide quick and clear metrics about an application’s business performance:

- How many users are currently logged in?
- How many of our subscription-based users have begun using the new feature we just rolled out?
- What percentage of our users come to us from South Korea?

An APM system providing charts, key performance indicators, and beautiful visualizations is an invaluable tool for application owners. With metrics in hand, the owner is ready to answer to the board or make the next sales pitch.
Integrated tools for the application owner

For real user monitoring and uptime monitoring, an application owner would look to SolarWinds Pingdom®. Dashboards and metrics visualizations would come through AppOptics. All these tools work together as a symphony in the APM Integrated Experience. Armed with APM tools, the application owner no longer makes critical business decisions blindly.

Real user monitoring provides insight into actual business-relevant metrics like end-user experience.

Big number displays and dashboards convey key indicators to provide a quick and clear overview of your business.
CONCLUSION

APM benefits all levels of the organization

Metrics drive decisions. This is true at every level of the organization—from the engineering team and the DevOps team to the management team. Concrete metrics provide direction, lend confidence, and confirm the prudence of past decisions. Whether your role is in the boiler room or in the boardroom, APM is necessary for providing the metrics to make informed decisions.

The SolarWinds APM Integrated Experience

As we’ve looked at APM from the viewpoint of three roles, we see different roles require different tools to answer different questions. For businesses experiencing the blessed pain of colossal growth, centralizing APM tools into an integrated suite simplifies their processes. For businesses suffering through user churn or crippling system downtime, an integrated suite of APM tools likewise brings a central place to find all the answers.

The SolarWinds APM Integrated Experience—which bundles together tools like AppOptics, Loggly, Papertrail, Pingdom, and more—provides a seamless and streamlined suite designed to bring actionable insights and metrics to developers, system operators, and application owners alike.
ABOUT SOLARWINDS

SolarWinds (NYSE:SWI) is a leading provider of simple, powerful, and secure IT management software. Our solutions give organizations worldwide—regardless of type, size, or complexity—the power to accelerate business transformation in today’s hybrid IT environments. We continuously engage with technology professionals—IT service and operations professionals, DevOps and SecOps professionals, and Database Administrators (DBAs) – to understand the challenges they face in maintaining high-performing and highly available IT infrastructures, applications, and environments. The insights we gain from them, in places like our THWACK® community, allow us to address customers’ needs now, and in the future. 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 observability, IT service management, application performance, and database management. Learn more today at www.solarwinds.com.