APM Buyer’s Guide
This guide is meant to help DevOps and Site Reliability Engineers (SRE) teams understand and compare the options in the application performance monitoring (APM) solutions market. We'll look at why you need an APM solution, consider the components a complete APM solution offers, and then compare in detail three APM solutions offered by: SolarWinds®, Datadog®, and Splunk®.

INTRODUCTION

Application performance monitoring (APM) means different things to different teams. In general, it typically refers to managing or monitoring the various aspects of your application, such as transaction time, code performance, network performance, and user experience.

APM is often seen as a critical tool for engineering teams and organizations monitor and improve their systems. These tools provide quantifiable, actionable information on performance and availability, helping ensure a business doesn't have to rely on subjective and lagging reports from users.

Why is this important? Consider the following research:

- A user will bounce from a webpage or app if the load time is greater than five seconds.
- Too many requests in a webpage to load content causes a slowdown; the average request count is 105 (U.S. websites).
- Web servers should respond within 1.3 seconds to return the first byte of data; the average time is 2.2 seconds (U.S. websites).
- 91% of unhappy customers simply leave.

The performance and availability of your app are critical to success.

APM TODAY

Early APM solutions were released in the 1990s by companies like Precise Software Solutions and Optier; these solutions were focused purely on the management of applications rather than monitoring. As APM matured, companies like AppDynamics and Dynatrace released products in the 2000s, shifting from management to monitoring. In the 2010s, with the introduction of containers and container management systems like Kubernetes®, there were many new entrants to the industry.

With all these changes, Gartner has redefined APM; in 2021, APM is defined as “software that enables the observation of application behavior and its infrastructure dependencies, users and business key performance indicators (KPIs) throughout the application’s life cycle.” APM tools today are specifically designed to provide insights into issues users face, ensuring businesses can prioritize addressing issues and ensuring customer satisfaction.
COMPONENTS OF AN APM SOLUTION

Using this modern definition, we can bucket the functionality offered by an APM suite into three pieces of functionality:

1. A system to monitor and manage performance and availability
2. Tools to detect, notify, and diagnose issues in complex/distributed systems
3. A mechanism to provide visibility and context to the business for their systems' health

To support this functionality, APM suites typically contain four tools:

4. Real and synthetic user monitoring
5. Infrastructure and application performance monitoring
6. Tracing, profiling, and exception tracking
7. Log ingestion and searching

These tools enable engineers to gather information about the systems, work with product managers to better understand what issues a user may be facing, and align roadmaps to address issues.

For the remainder of this article, we’ll look in detail at these various aspects and how several products in the market—SolarWinds, Datadog, and Splunk—stack up.
REAL AND SYNTHETIC USER MONITORING

Let’s start with user monitoring. As the name suggests, user monitoring is what happens as users move through different paths in a system. There are two types of user monitoring: real user monitoring (RUM) and synthetic monitoring.

RUM is monitoring actual users as they move through your system. Synthetic monitoring is using bots to run automated tests and scripts to mimic user interactions and behaviors. Both types monitor the system and functionality, but RUM is passive. Synthetic is active, allowing teams to provide tests and validation of features before they’re exposed to end users. However, this doesn’t discount the necessity of RUM; being aware of user activities can help direct the product team to understand usage patterns and other pain points.

Let’s look at how SolarWinds, Datadog, and Splunk do end-user monitoring.

SolarWinds

Synthetics— SolarWinds provides three types of synthetics: uptime checks, advanced checks, and page speed checks. Uptime checks are more fundamental; they allow you to send requests to a URL or TCP/UDP port, perform a DNS lookup, or test an email server. All checks have additional options. URLs can be customized to include authentication information, extra headers, or a POST request data payload. Checks can be configured to fail after specific timeouts and retries, and alerts can be generated after a customizable amount of time.

SolarWinds Synthetics Dashboard
Advanced checks allow for creating scripts that can perform complex tasks—for example, testing the user creation and sign-up flow or helping ensure purchases work as expected. Page speed checks (which are billed as advanced checks) test how quickly a page is rendered within a browser and show a breakdown of the resources loaded, the content sizes and requests, and the domain the content was loaded from.

**RUM**—RUM is incredibly easy to configure; simply inject the script into the webpage, and it collects data. The load time distribution, top pages, load times, page views, and active sessions will be collected and displayed. It’s possible to filter by page, platform, browser, and country, helping you focus on key segments.

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### Pricing*

Pricing for synthetic monitoring is by type of check and the number of alerts generated, starting at 10 uptime checks and scaling up to 30,000.

<table>
<thead>
<tr>
<th>UPTIME CHECK</th>
<th>ADVANCED CHECK</th>
<th>SMS ALERTS</th>
<th>PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
<td>50</td>
<td>$10/mo.</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>350</td>
<td>$95/mo.</td>
</tr>
<tr>
<td>500</td>
<td>50</td>
<td>1000</td>
<td>$435/mo.</td>
</tr>
<tr>
<td>1000</td>
<td>80</td>
<td>1000</td>
<td>$830/mo.</td>
</tr>
</tbody>
</table>
**Datadog**

**Synthetics**— Datadog Synthetic Monitoring breaks their synthetics tests into two options: API (including multistep) and browser-based tests. API tests can be performed at various network levels (HTTP/S, TCP, SSL, DNS, and ICMP, but not UDP) and are all configurable with URLs, methods, headers, POST body information, hostnames, ports, and so on. API tests can also be chained together, allowing end-to-end REST APIs to be invoked.

Browser tests require a starting URL and optional global variables shared across all requests. Unlike SolarWinds, which can record steps and provide an editor, Datadog requires installing a Chrome® browser extension to record the actions.

**RUM**— The RUM offering from Datadog operates for web applications along with mobile devices. This requires declaring their SDK as a dependency and deploying it as part of the application. The default dashboard includes information about performance, number of page views, errors, and load times.

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**Pricing for RUM** is by the number of page views, starting at 100,000 page views and scaling to 1 billion.

<table>
<thead>
<tr>
<th>NUMBER OF PAGE VIEWS</th>
<th>PRICE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000</td>
<td>$10/mo.</td>
</tr>
<tr>
<td>1 Million</td>
<td>$75/mo.</td>
</tr>
<tr>
<td>10 Million</td>
<td>$400/mo.</td>
</tr>
<tr>
<td>100 Million</td>
<td>$2,745/mo.</td>
</tr>
<tr>
<td>1 Billion</td>
<td>$15,000/mo.</td>
</tr>
</tbody>
</table>

*Pricing in USD as of 08/12/2021
**Pricing**

**Pricing for synthetic monitoring** is based on the type of test and the quantity; unlike SolarWinds, you must purchase them separately. Unfortunately, Datadog doesn’t provide detailed information about volume discounts.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>API TEST</td>
<td>10,000 $5/mo.</td>
</tr>
<tr>
<td>BROWSER TEST</td>
<td>1,000 $12/mo.</td>
</tr>
</tbody>
</table>

**Pricing for RUM** is based on sessions, and again, Datadog doesn’t provide detailed information about volume discounts.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUM</td>
<td>10,000 sessions $15/mo.</td>
</tr>
</tbody>
</table>

**Splunk**

**Synthetics**— Similar to SolarWinds, Splunk synthetic monitoring offers three types of tests: browser tests, API tests, and uptime tests. However, their offerings are split up across Standard and Enterprise levels where certain features are gated.

**RUM**— Unlike SolarWinds and Datadog, the RUM offering from Splunk is more focused on detailed metrics, such as load times, errors, time-to-first-byte, largest contentful paint, and so on. Their offering is web-only, similar to SolarWinds, and can be injected into webpages via a script link or an SDK.
Pricing

Splunk synthetic monitoring pricing, similar to Datadog, only includes the first tier, with no publicly available information on volume discounts. We're using their Standard pricing for comparison.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Test</td>
<td>$4/mo.</td>
</tr>
<tr>
<td>Browser Test</td>
<td>$12/mo.</td>
</tr>
<tr>
<td>Uptime Test</td>
<td>$1/mo.</td>
</tr>
</tbody>
</table>

Splunk RUM pricing is also bifurcated across Standard and Enterprise packages. Again, we can only share the starting price.

<table>
<thead>
<tr>
<th>RUM</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000 sessions</td>
<td>$14/mo.</td>
</tr>
</tbody>
</table>

Overall Comparison

The three different options all offer similar tools for synthetics testing: easy checks that can perform simple validations against an endpoint (webpage, mail server, etc.) or more complex tests that use scripts to validate an entire flow. Real user monitoring implementations are also similar—inject JavaScript* into a webpage, and the provider will collect data for further analysis. The critical difference is in pricing, as the SolarWinds approach of charging by tests rather than invocations can mean significant savings. For example, testing a single endpoint every minute would utilize 43,800 invocations, costing over $20 with Datadog. SolarWinds offers ten of those checks for $10.
INFRASTRUCTURE MONITORING

Next, let’s look at monitoring your system’s infrastructure. APM infrastructure monitoring features allow you to monitor and ensure your systems are operating correctly at scale. They give you insight into the capacity of your infrastructure and applications, identify bottlenecks and performance issues between systems, allow you to drill into the details of switches and network packets, and keep a history of network changes. These tools are often installed as agents on servers (bare metal and VMs) and can monitor modern container deployment systems such as Kubernetes.

SolarWinds

To provide monitoring, SolarWinds has their AppOptics™ product. AppOptics is split into two tiers: the first is infrastructure monitoring, which focuses solely on servers (physical and virtual) and containers. The second includes application monitoring—tracing, profiling, and exception tracking. We’ll focus on the infrastructure monitoring functionality in this section and address the application monitoring in the subsequent section.

AppOptics has two critical approaches to collecting information: using an agent running on hosts, and integrating directly with hosted services like AWS® and Azure® to collect information directly from the IaaS provider. The SolarWinds Snap Agent that runs on hosts has all of the integrations to collect data from services like Docker®, Kubernetes, NGINX®, Postgres®, Prometheus®, and so on.
Application-level metrics are collected via SDK integrations, collecting information from Java®, .NET Core, node.js®, Python, Ruby, and other languages. When different plugins are enabled within the Snap Agent, dashboards are automatically created and include charts and numeric displays to provide a default view of the information collected.

**Pricing**

*SolarWinds pricing* is by host or container, sold in packs of 10 hosts or 100 containers, at a $9.99/mo. rate, effectively costing $99.99/mo.

**Datadog**

*Datadog Infrastructure Monitoring* follows a similar approach to SolarWinds. They offer an agent that must be installed on hosts and can integrate directly with APIs provided by IaaS providers like AWS and Azure. Like AppOptics, they also offer lists and maps of hosts and containers. They also offer default dashboards based on the integrations configured.

**Pricing**

*Datadog pricing* can be slightly more complicated than SolarWinds, as they offer Pro and Enterprise tiers and price AWS Fargate serverless containers as an add-on. Each host also includes the ability to monitor ten containers (at the Pro level) for $15/mo., with additional containers costing $1/mo. With Datadog, monitoring a host with 100 containers would cost $105/mo. ($15 for the host, $90 for the extra containers).

**Splunk**

Similar to SolarWinds and Datadog, Splunk Infrastructure Monitoring uses an agent to collect information from hosts. It can also connect directly to a cloud service provider to harvest information directly. Splunk infrastructure dashboard offers pre-built functionality around cloud providers, Kubernetes, and host-level information.

**Pricing**

Splunk offers *similar tiered pricing* to Datadog—a Standard and Enterprise level. The Standard level costs $15/mo./host and includes 10 containers. Unfortunately, there isn’t any information related to costs for additional containers.
Overall Comparison

The three different providers all offer similar features and use an agent-based model. SolarWinds, Datadog, and Splunk can all hook directly into IaaS providers to extract information. Depending on which provider you choose, there may be different integrations (Datadog has a macOS® agent, for example), but they all cover the most common systems (Windows®, Linux®). The key differences are around the custom metrics and retention periods offered; SolarWinds offers 1,000 custom metrics, whereas Datadog and Splunk offer 100. Splunk offers 13-month retention for data, Datadog offers 15 months, and SolarWinds offers 18 months, allowing for a better view of usage over time.

TRACING, PROFILING, AND EXCEPTION TRACKING

This section focuses on information collected from the applications and interplay between them, allowing SRE team members and engineers to better understand flows of information and track performance bottlenecks and errors.

SolarWinds

This functionality is called Application Monitoring by AppOptics and includes collecting information directly from frameworks and libraries written in node.js, Python, Go, Java, .NET Core, and more. This information also contains traces, collecting information about a single request as it flows across different services that make up a system. Each unit of work in a trace is called a span. The OpenTelemetry project has a great primer on Traces.

AppOptics also includes code profiling—the ability to visually represent how much time is spent in different functions/methods within the codebase. Another feature offered is Exception Handling—a dedicated view to track errors generated within the application itself.
Typically, a developer is alerted to slow performance via a broken metric threshold. They can then look to see the source of the performance issue—a container's CPU usage may have spiked. Further investigation into the container shows a specific process was stuck in a loop; traces show the service kept attempting to connect to an upstream service, timed out, and retried, causing a loop. As the users got frustrated by the amount of time taking for the request, they kept refreshing and adding additional deadlock to the system. The developer quickly issued a fix that capped the number of retries, deployed the changes, and watched the system return to normal. This is precisely what the combination of infrastructure monitoring, tracing, profiling, and exception handling was designed to solve.

**Pricing**

*SolarWinds pricing* to include application monitoring adds $15/mo. to the Infrastructure Monitoring price, totaling $24.99/mo./host. Again, these are sold in packs of 10 hosts/100 containers, costing $249.99/mo.

**Datadog**

Like SolarWinds, Datadog APM offers the ability to instrument an application to generate and send traces. They utilize the same concept of traces and spans and also support the OpenTelemetry format. Datadog Continuous Profiler also offers live profiling functionality to track where performance slowdowns are taking place in deployed applications. However, while Datadog offers an error tracking feature, it is only available for JavaScript applications.

**Pricing**

*Datadog pricing* is also different from SolarWinds. Rather than extending their Infrastructure cost, tracing and profiling are an additional charge. Adding tracing to a host comes with Datadog APM, which costs $31/mo./host; adding the Continuous Profiler increases that to $40/mo./host. A host that collects infrastructure metrics along with traces and profiles will cost $55/mo./host.

**Splunk**

As above, Splunk APM offers the same features: the ability to instrument applications written in different languages, generate traces and spans, and send them to Splunk via the OpenTelemetry format. Unlike SolarWinds and DataDog, Splunk doesn’t currently offer an ability to profile code to detect performance issues in deployed applications.
Pricing

Splunk APM uses its Standard and Enterprise pricing model, where the Enterprise level includes additional containers, higher thresholds, additional volumes, and so on. Using the Standard price—since it consists of the same 10 containers as Datadog—costs $55/mo./host. Include the $15/mo. for infrastructure monitoring, and Splunk is up to $70/mo./host.

Overall Comparison

SolarWinds shines through in its approach to APM and pricing. By combining their APM and Infrastructure Monitoring offerings, there are significant savings. SysDig’s 2021 Container Security and Usage Report states organizations have, on average, 41 containers per host. Monitoring this infrastructure with Datadog would cost $15/mo./host—this includes monitoring for the first 10 containers—with an additional $31/mo./host for the remaining containers. You’d then have to add another $40/mo./host for APM and Continuous Profiling—this includes the first 4 containers—and another $74 for the additional containers. The total cost with Datadog would be $160/mo. for an average container host.

For Splunk, your initial cost would be $15/mo./host for infrastructure monitoring and $55/mo./host for APM, but this $70/mo./host would only cover your first 10 containers. While the precise numbers from Splunk’s pricing pages are unclear, there are sure to be additional monitoring costs for the additional 31 containers. In addition, keep in mind that Splunk’s solution does not include any code profiling capabilities.

SolarWinds would cost $24.99/mo./host and another $102 for the containers. SolarWinds costs $127 for an average container host, a savings of nearly 25%! Multiply that by the tens or hundreds of these nodes, and the savings add up.

LOG INGESTION AND SEARCHING

The final portion of an APM system is logging—gathering information from all the different systems. More importantly, the search functionality provided helps ensure SRE team members and engineers can easily filter and locate information generated across volumes of logs.
SolarWinds

SolarWinds provides Loggly® as a mechanism to collect, index, and search logs. Logs can be ingested from the SolarWinds Snap Agent, directly from IaaS providers like AWS, application logs, containers logs. It’s worth looking at the integrations directly. Once logs are ingested, they can be explored across dimensions such as the source of the record or via the fields. Loggly provides an advanced query language to help discover pertinent information. This information can be linked to traces and exceptions, helping to provide additional context to any investigation. Loggly also includes a live tail feature for watching log streams in real time, which is helpful during investigations.

Pricing

Loggly pricing has four tiers: Lite, Standard, Pro, and Enterprise. We’ll ignore Lite as it’s a solid free offering for a single user, focusing instead on distributed systems built with larger teams.

<table>
<thead>
<tr>
<th></th>
<th>STANDARD</th>
<th>PRO</th>
<th>ENTERPRISE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volume</strong></td>
<td>1GB/day</td>
<td>Up to 100GB/day</td>
<td>As required</td>
</tr>
<tr>
<td><strong>Source Groups</strong></td>
<td>3</td>
<td>5</td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Retention Period</strong></td>
<td>15 days</td>
<td>15-30 days</td>
<td>$15-90 days</td>
</tr>
<tr>
<td><strong>Custom Parsing Rules</strong></td>
<td>0</td>
<td>10</td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Starting Price</strong></td>
<td>$79/mo.</td>
<td>$159/mo.</td>
<td>$279/mo.</td>
</tr>
</tbody>
</table>

*Pricing in USD as of 08/12/2021
Datadog

As with Loggly, Datadog Log Management can ingest logs from many different sources, from applications to infrastructure to IaaS providers. However, unlike SolarWinds, Datadog splits ingestions from indexing. This means it’s possible to send a large volume of logs to Datadog but only choose a subset to be indexed for searching.

Similarly, the Datadog Log Explorer allows for searching using their query syntax. They also include a live tail feature that streams not only the indexed logs but all ingested logs. This may cause confusion as information may flow by that can be searched for but won’t have any results.

Pricing

Due to Datadog splitting up ingestion from indexing, their pricing is different from SolarWinds. Ingestion or scanning is a fixed rate of $0.10/GB/mo. Retention rates are a bit different:

<table>
<thead>
<tr>
<th>RETENTION PERIOD</th>
<th>COST (PER 1M LOG EVENTS/MO.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three days</td>
<td>$1.06</td>
</tr>
<tr>
<td>Seven days</td>
<td>$1.27</td>
</tr>
<tr>
<td>5 days</td>
<td>$1.70</td>
</tr>
<tr>
<td>30 days</td>
<td>$2.50</td>
</tr>
</tbody>
</table>

Splunk

Unlike SolarWinds and Datadog, Splunk’s original product was a log ingestion and searching platform. However, with the pivot to the cloud, they introduced the Splunk Log Observer. This is very similar to the offering provided by SolarWinds and Datadog, ingesting data from various sources via an agent or directly from a hosting provider, indexing them, and providing an ability to search for them.

However, unlike SolarWinds and Datadog, which offer a robust query language, Log Observer’s search is somewhat basic. It relies on the user filtering on fields to help get to the relevant result. Like the other two options, they also offer a live tail feature.

Pricing

Pricing for Splunk Log Observer follows the same approach as Datadog, splitting by ingestion ($0.10/GB/mo.) and indexing ($5.00/GB/mo.). There’s no retention period since the cost is by the volume of data processed.
Overall Comparison

SolarWinds, Datadog, and Splunk all offer very similar features: collecting and processing logs, allowing information to be categorized and searched, and watching the logs flow in real time. The difference comes down to pricing. If we pick 30 days and have 1GB/day of logs being ingested (i.e., 30GB/mo. of data), that would cost $153 with Splunk, but only $79/mo. with SolarWinds.

THE APM CHOICE

These industry-leading products have similar approaches in what they do and how they do it. They all offer ways to monitor infrastructure and systems, run tests to ensure systems are always functional, and provide mechanisms to dig deeper into understanding performance and troubleshoot issues as they happen.

However, there are differences. Splunk’s origins as a logging company shine through in their on-premises offerings with a more recent pivot to the cloud.

Datadog, on the other hand, started as an APM tool and later added on features like tracing and logging, and has more recently started to focus on Lambda, IoT, and security.

SolarWinds offers the same cloud monitoring suite as Splunk and Datadog, enabling full-stack introspection, synthetic testing, along with dashboards and alerts, but at a lower price point.
With similar features, the key differentiator becomes value. SolarWinds synthetics tests don’t charge per invocation but for the test case. Similarly, the SolarWinds APM tool has two tiers: infrastructure monitoring by itself and the expanded feature set including tracing, profiling, and exception tracking, allowing you to save money by only using the functionality you need. SolarWinds does what you need when you need it, and at a better price than other companies.

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