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Website Performance Monitoring Best Practices, KPIs and Tools

A guide to achieving effective website performance monitoring.

Executive Summary

Challenge

Today, simply having a website for your business is not enough. To attract and keep customers, you need one that delivers an excellent user experience.

Achieving this goal can be challenging. In addition to demanding well-designed, intuitive websites, modern users set an exceedingly high bar for site performance. A number of shortcomings might cause a site to fail to meet those expectations. Many users will abandon a page that fails to load within three seconds, for example, and a one-second delay in page load time results in 11 percent fewer page views. Also notable is the fact that users form a lasting impression of a website within just the first 50 milliseconds of a visit. In addition, search engines punish slow-loading websites with lower rankings, which makes it more difficult for new customers to find your business. (For more on these statistics and other user expectation data, see CA's Infographic "Is Your Website Stacking Up to Customer Expectations?")

Opportunity

Indeed, a poorly performing website will quickly undercut the investment a business makes in creating the site and setting up infrastructure to host it. Even the best-designed website will fail to please users if it loads slowly, throws errors or is intermittently unavailable. And world-class website hosting infrastructure will deliver little business value if software performance problems cause page load delays or other performance issues.

Thus, in order to delight customers and maintain healthy returns on the investment your business makes in its websites, monitoring your website performance is crucial.

Benefits

Implementing an effective monitoring strategy for modern websites is challenging, but it's essential for pleasing users and making the most of the resources businesses invest in their websites.

This white paper explains how to address common website monitoring challenges and discusses best practices for interpreting and acting on website monitoring data.

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SECTION 1:

The Challenges of Website Performance Monitoring

Monitoring website performance may not seem particularly daunting. Technologically speaking, the Web is a relatively old and well-established platform. The Web servers that are used in most cases today (Apache® HTTP ServerTM, NGINX® and IIS) have been around for decades and are very stable. Compared to newer technologies, like Docker containers or serverless computing, websites can seem relatively simple and straightforward to monitor.

Yet the fact is that today's websites, and the hardware and software that powers them, are not what they used to be. They are complex, dynamic entities whose performance can degrade for a number of reasons.

Performance problems come in multiple forms

Effective website performance monitoring requires staying abreast of a diverse set of potential performance issues.

In addition to simple downtime that makes a website unavailable, slow page load times create serious customer experience problems, as previously noted. So do website display or formatting issues that can occur when some components (such as certain CSS files) fail to load properly. In this case, even though overall page availability and load times may appear fine, user experience is still inadequate.

Things don't (always) fail at once

Similarly, given the complex nature of modern websites and the myriad components on which they rely to display information to end users, it is often the case that a specific component might fail to perform properly while the rest of the site appears to function normally. Individual Web pages might load too slowly, for example, or a payment transaction might take too long to complete.

Component-specific performance issues such as these cannot be detected by simply monitoring a home page or collecting metrics about overall site performance.

Uncertain root causes

In order to address website performance problems effectively, organizations must be able to trace root causes quickly. This can be difficult, however, because the root cause of a performance problem is often hard to detect based on surface-level manifestations.

For example, consider the case of an image that fails to load quickly on a Web page. There are many possible root causes for this issue. The server hosting the image might be overloaded with other requests. Network bandwidth could be insufficient on either the server side or the client side. The image resolution might be too high for a user's device to process quickly. An underperforming API could cause slow loading of externally hosted images—and so on.

In this scenario, simply knowing that the image is loading slowly is insufficient for tracing the root cause quickly.

Multiple deployment environments

When you maintain a website, you rarely have the luxury of supporting only certain hardware and software platforms. Informing users that your site is incompatible with their operating system or browser will quickly turn them away from your brand. So too will a site that performs erratically on a particular platform because it has been improperly tested and monitored on that platform.

For these reasons, modern businesses have to monitor websites across a range of potential deployment environments. These include a diverse mix of different Web browsers and operating systems, which include both traditional computing platforms and mobile platforms.

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You can't control all performance issues (but users expect you to)

A stark reality of website monitoring is that some website performance issues, such as network bandwidth limitations on a user's local network, are beyond the control of your developers and admins. Even so, users will form a negative impression of your brand if your site underperforms due to these issues. The onus remains on companies to optimize performance, even if they can't fully control the environments and infrastructure of their users.

Effective website monitoring is important for meeting this challenge. While it may be impossible to correct issues beyond your team's control, you can at least identify and mitigate them. If users in a particular geographic region are experiencing slow load times because of bandwidth limitations on their networks, for example, you could take steps to reduce the amount of data those users need to download in order to use your site.

Web pages are big, and getting bigger

Measured in terms of data, Web pages have grown consistently in size and will likely continue to do so as users expect more and more from the sites they visit. The average page contains more than three times as much data today than it did just eight years ago.

More website data means more potential performance problems. In addition to squeezing network bandwidth in ways that could undercut performance, larger data payloads also increase the risk of data validation or formatting problems on your website because there is more data to process.

Website testing visibility is limited

While testing websites prior to deployment can help reduce the number of bugs and performance problems that reach end users, website testing won't prevent these problems entirely. You can't realistically test against all potential deployment environments, and the accuracy of test results is limited.

Although you can and should test websites and website updates before deploying them into production, you should also monitor them in real time post-deployment in order to identify and correct performance problems that appear in production.

Microservices

Today's websites are rarely deployed as monoliths. The infrastructure that hosts them is often broken into a number of distinct services that interact with one another in complex ways. One service might support your website's front end, for example, while other services connect it to a database or allow users to log in.

While modern website architectures are more agile, all of their moving parts also make monitoring more difficult. In addition to having more distinct components to monitor, you have to track how those components interact and identify problems with APIs or network sockets that cause website performance issues.

SECTION 2:

Achieving Effective Website Performance Monitoring

While the reality of modern website monitoring is challenging, it is possible to address. Companies committed to delivering the best user experience and protecting the investments they make in their websites should adopt the following strategies and tools for optimizing website performance.

Website performance KPIs

Identifying, collecting and analyzing key performance indicators (KPIs) for website performance is one essential process in finding and fixing issues that could undercut user experience.

Website performance KPIs include:

- **Uptime**. Uptime, which measures the time during which a website is available, is the most basic KPI. As noted above, effective uptime tracking requires monitoring uptime across the entire site, and for all components. By collecting and analyzing uptime data, organizations can identify which parts of their sites become unavailable most frequently. They can also measure how their efforts to improve website performance increase uptime.

- **Time to first byte**. Time to first byte (TTFB) measures how long it takes for your Web server to begin delivering data to users. Although a healthy TTFB rate does not necessarily mean that pages load fully in an adequate period, TTFB allows you to assess how quickly users begin seeing some elements. Poor TTFB rates can lead to high user abandonment rates because users assume a site will not load at all if they have to wait several seconds to see any activity.

- **Complete page load time**. The time it takes a page to load completely is another crucial KPI. As noted above, many users will tolerate page load delays of only a few seconds before they abandon a site. Like uptime, page load time must be tracked across the entire website. In addition, it should be measured for users in different geographic regions and with different configurations, since these variables can impact load time significantly. Knowing that some users experience acceptable page load time is not enough to ensure adequate performance for all users.

- **Search query response time**. If your website has a search feature, measuring the speed of response to requests is an important means of measuring your ability to meet user experience expectations.

- **Bounce rate**. Bounce rate, which refers to the percentage of users who leave the site after viewing only one page, is not solely an indicator of performance. It also measures other factors, such as how well a site's content aligns with user expectations. Nonetheless, high bounce rates could indicate performance problems that are driving users away, so this is another important KPI to collect.

These KPIs measure website performance specifically. There are several other metrics that marketing teams might want to monitor to analyze website impact, such as the length of user sessions, how many pages users view per visit and conversion rates for website content. You might look for monitoring tools that can also help you collect these types of metrics (but they are beyond the scope of this white paper, which focuses on website performance).

Website performance monitoring tools

Effective website monitoring requires tools that support several different types of monitoring, including:

- **Uptime monitoring**. Tools that check to determine whether a website is available, and will send alerts when it is not, are crucial for helping you detect availability problems before they impact users. While some uptime monitoring functionality is provided by infrastructure monitoring tools that track the availability of the infrastructure that hosts your website, you should not rely on infrastructure monitoring tools alone, because website availability problems could result from failures at multiple levels of your software stack.

- **Transaction testing**. Many of the components of modern websites are interactive. Monitoring the performance of these elements requires transaction testing, which can detect and help resolve issues related to user tasks such as searching the site, logging in and submitting a payment.

- **Synthetic monitoring**. Synthetic website monitoring uses scripts to simulate user interaction with websites in order to assess how a site responds to a given action. Synthetic monitoring makes it easy to simulate and monitor website performance under a range of different conditions.

- **Real-user monitoring**. Unlike synthetic monitoring, real-user monitoring involves tracking website performance while your site is being used by real users in a "live" environment. Real-user monitoring requires more time and resources to perform, but it delivers a deeper level of insight into website performance. In most cases, businesses should perform real-user monitoring on mission-critical elements of their sites while relying on synthetic monitoring to provide a broad level of coverage for other elements.

- **Analytics-based monitoring**. Using the KPI data described above, businesses can perform AI-assisted analytics that help identify and resolve performance issues. For example, data analytics can provide insight into how user traffic impacts performance at different times of day, or which performance indicators correlate with key user actions, such as making a purchase or leaving the site.

Organizations need not choose just one type of monitoring tool. They can (and in most cases, should) adopt multiple tools in order to provide comprehensive visibility into the performance of their sites.


SECTION 3:

Conclusion

Implementing an effective monitoring strategy for modern websites is challenging, but it's essential for pleasing users and making the most of the resources that businesses invest in their websites.

CA Technologies offers a suite of tools that can help meet your website monitoring needs. From synthetic website monitoring to application and infrastructure monitoring and user experience analytics, CA provides the solutions organizations need to collect all types of website performance KPIs and gain holistic visibility into the way users experience their websites.

CA App Synthetic Monitor

Uses synthetic transaction monitoring to check the behavior of your website and identify where bottlenecks or problems occur—from slow page response times to erratic behavior of login pages,


shopping carts and even APIs. As a result, you can proactively manage the end-to-end performance of your Web applications to deliver an exceptional end-user experience.
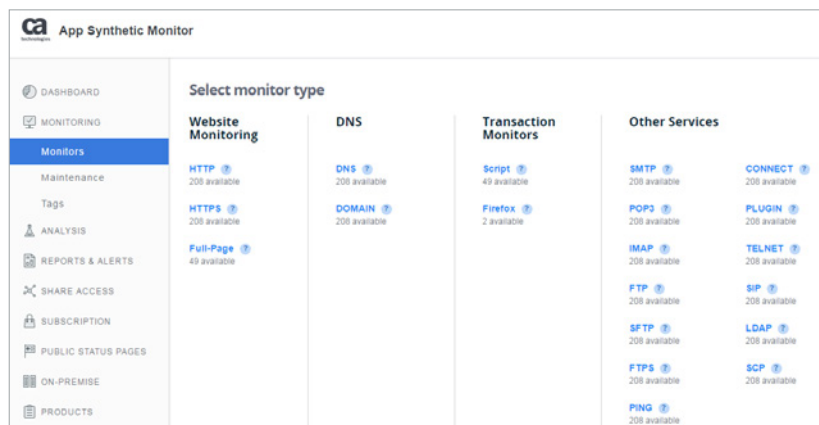
CA Application Performance Management

Proactively monitors and provides diagnostic insights into applications across mobile, Web, cloud, microservices, containers and mainframe. Patent-pending analytics provide expertise in the form of guided assisted triage workflows for in-depth, root-cause diagnostics across development and production applications, simplifying and speeding the time it takes to find and fix issues.
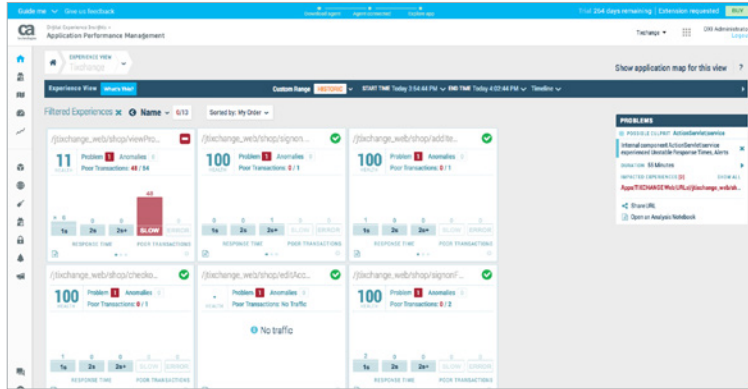
CA App Experience Analytics

Uniquely combines user behavior with operational performance, providing intuitive reports that reveal a deeper understanding of customers' overall digital experience. Using these insights to optimize the user journey helps you retain and attract new customers, increase revenue, achieve faster resolution times and deliver innovations quickly by boosting development productivity.
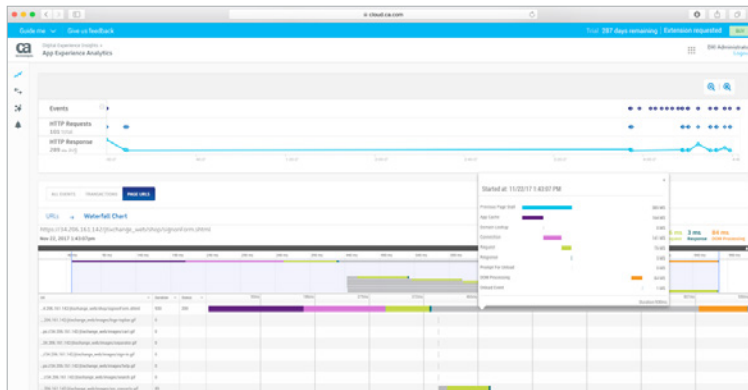
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