Sufficiently Advanced Monitoring is Indistinguishable from Testing

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In digital landscape user experience is paramount and organisations must ensure their applications and systems are functioning optimally at all times. Traditional testing and monitoring practices have long been relied upon to achieve this goal. However, the line between testing and monitoring is becoming increasingly blurred with the emergence of synthetic monitoring.

The Evolution of Testing and Monitoring

Historically, software testing and system monitoring have been separate processes, each serving distinct purposes. Testing was primarily performed during the development lifecycle to identify and fix bugs, errors, and other issues before releasing the software to users. Monitoring, on the other hand, was conducted post-release to continuously observe and measure system performance, identify bottlenecks, and ensure availability.

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Synthetic Monitoring

Synthetic monitoring bridges the gap between testing and monitoring by simulating user interactions with digital services in a controlled and repeatable manner. Synthetic Monitoring employs software-based agents to actively measure performance metrics. An agent is nothing but a collection of scripts that mimic real user behavior and interactions with an application. The term "synthetic" is used because it does not rely on traffic generated by real clients and end-users. It is also known as active monitoring or active probing since the agents make active attempts to connect with the target system and collect performance data, regardless of whether real end-users are accessing it or not. Probing is typically conducted at regular intervals, allowing us to continually assess the state of the target system from an end-user perspective. This approach offers the advantage of promptly identifying and addressing unavailability or performance degradation events before they impact any end-users.

Canary

AWS refers to these synthetic monitors as "canaries" (like "canary in the coal mine"). A canary is a script that can be customized and is typically coded in JavaScript or Python. These scripts can be scheduled to run periodically in order to monitor application endpoints and APIs. Canaries emulate customer behavior by following the same paths and executing the same actions, enabling continuous verification of the customer experience even when there is no actual customer traffic on the applications. Utilizing canaries allows you to identify and address any issues before they impact your customers.

Indistinguishable from Testing

The essence of synthetic monitoring lies in its ability to mimic real user interactions accurately. By emulating user journeys, synthetic monitoring can provide insights into system behavior, response times, and overall performance, just as if real users were accessing the system. This close resemblance to actual usage patterns makes it virtually indistinguishable from traditional testing methods.

Benefits of Synthetic Monitoring

Synthetic monitoring allows organizations to identify and rectify performance issues before they impact real users. By simulating a variety of user scenarios, it can catch potential problems and bottlenecks that might go unnoticed with traditional monitoring approaches. It can detect issues such as slow page load times, performance degradation, or unresponsive features, enabling organizations to proactively address them and enhance user satisfaction.

Synthetic monitoring offers end-to-end visibility across complex architectures and third-party integrations. It can monitor not only the application itself but also the underlying infrastructure, APIs, databases, and external services. This comprehensive view enables organizations to identify the root cause of performance issues and take appropriate corrective actions.

With synthetic monitoring, organizations can easily scale their testing efforts by simulating thousands of user interactions simultaneously. It also enables the reproduction of specific user journeys to diagnose and troubleshoot issues, facilitating faster resolution and minimizing downtime. More importantly, it promotes reusability.

In addition, synthetic monitoring can utilize existing end-to-end (E2E) tests as well as API contract tests as part of its monitoring strategy. For instance, if you are using Postman for API contract testing you can re-use your test collection for synthetic monitoring with very minimal effort. You can either use Postman monitoring feature or rollout your own probes using Newman.

Challenges and Considerations

While synthetic monitoring offers numerous advantages, it is important to consider some potential challenges. To start, synthetic monitoring relies on predefined scripts that simulate user interactions. Striking a balance between creating realistic scripts and accounting for the complexity of user behavior can be challenging.

Like testing, synthetic monitoring requires ongoing maintenance and continuous updates to ensure scripts remain up to date with application changes. Otherwise, the monitoring may fail to accurately reflect the user experience.

While synthetic monitoring provides valuable data, it cannot fully replace real user feedback and the insights gained from genuine user experiences. Organizations should complement synthetic monitoring with other forms of testing and monitoring to ensure a comprehensive understanding of their systems.

What about RUM?

Real-User Monitoring (RUM) tracks web page performance from the browser, measuring the performance as experienced by the end users. RUM is generally best suited for understanding long-term trends whereas synthetic monitoring is better well suited to regression testing and mitigating shorter-term performance issues during development. RUM and synthetic monitoring are complementary.

Conclusion

Synthetic monitoring has emerged as a powerful approach that seamlessly combines the benefits of testing and monitoring. By replicating real user interactions, synthetic monitoring enables organizations to proactively identify and address performance issues, thereby enhancing user experience and minimizing downtime. With its ability to scale, provide comprehensive insights, and harness artificial intelligence, synthetic monitoring has become an essential tool for businesses aiming to deliver high-quality digital services in today's fast-paced world. Embracing synthetic monitoring allows organizations to stay one step ahead, ensuring their systems are always performing at their best.