IBM Instana

The six fundamental pillars of managing microservice applications

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It’s a brave new world of applications

The modern application stack has evolved. From cloud native to containers, microservices and Kubernetes orchestration, a new set of infrastructure technologies has emerged to help organizations digitally transform and move their applications faster.

In these modern applications, there is only one constant: constant change.

To effectively manage modern cloud-native microservice applications, DevOps teams need real-time visibility and automated observability. Application stakeholders need to get app data in a way that makes sense to them, at the exact time they need it.

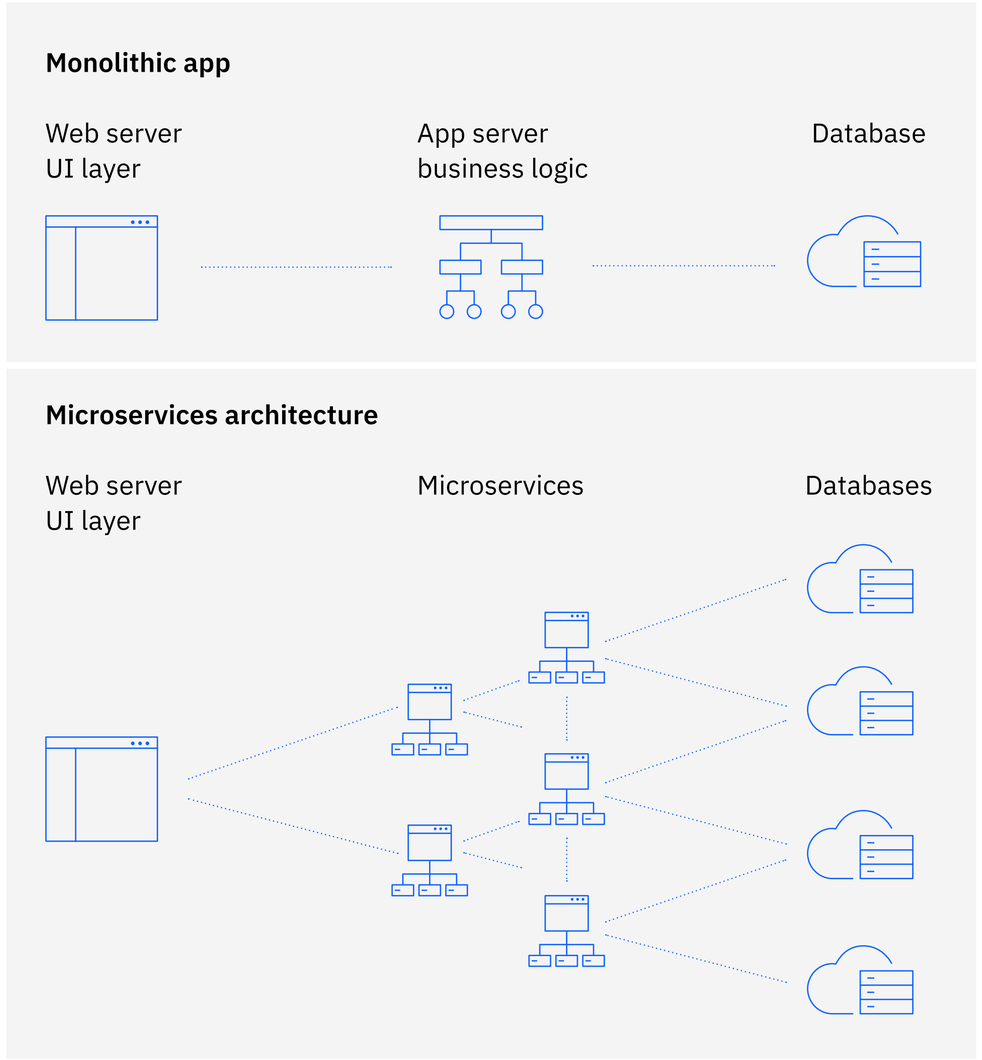


Figure 1. Not only are there more layers to a cloud-native microservice application, but each layer is more complex.

02

The difficulty of modern applications

As organizations adjust the technology stack to facilitate faster development and deployment of applications, you face new requirements for basic performance monitoring along with application observability and visibility.

The challenges of managing the performance of modern applications are consistent regardless of programming language, cloud provider or even different technology choice. What makes these applications difficult to deal with is the vast distributed nature of the applications coupled with the constant change bombarding both the development and operations (DevOps) teams.

A new application stack demands new monitoring requirements

The complete set of requirements to effectively manage these highly dynamic, massively distributed application environments is specific and crafted to ensure all stakeholders get the information they need when they need it.

To help you understand what it takes to effectively monitor the performance of cloud-native applications, this ebook presents the six pillars of managing modern microservice applications. It details the six critical concepts of monitoring and management that are essential to any solution's ability to provide continuous value to teams responsible for these applications.

Highlighting automation and AI-assisted technology, here are the pillars for effective application performance monitoring (APM) of modern applications. It's important to note that if any single pillar is missing, the other five can collapse. So if a monitoring or observability solution doesn't have all six pillars, it could leave management gaps that contribute to application issues and many wasted bridge calls trying to fix them.

The six pillars of cloud-native microservices APM

Automatic, continuous discovery and mapping

Cloud, container and microservice native

AI-powered incident monitoring, problem resolution and troubleshooting

Precise high-fidelity visibility

Real-time full stack application data model

Integration into development, deployment, and continuous integration and continuous delivery (CI/CD) pipeline tool set

1. Automatic, continuous discovery and mapping
There's an old saying in computing: "garbage in, garbage out." In order to apply an AI approach to performance management, the core model and data set must be up to date and flawless. Meanwhile, DevOps needs up-to-date visibility for an accurate picture of every application's structure and dependencies. IBM Instana™ continuously and automatically discovers components, architecture and dependencies of each application's full technical stack and the request patterns or map of the distributed services—with zero configuration.

2. Precise high-fidelity visibility
Enabling AI requires data precision and accuracy. After automatically discovering the components and structure of the application, IBM Instana collects the industry's most accurate monitoring data. Metric data is streamed at one-second intervals and every request through the application is captured in a trace. This data is the source for our AI training and the basis for giving the user deep visibility into microservice applications.

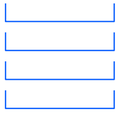
IBM collects all the needed data automatically and in real time:

- **Time-series metrics for the full stack** including infrastructure, cloud, container, process, middleware and application metrics
- **All changes, events and errors** for all monitored components
- **Full distributed traces,** mapping every request and transaction

3. Cloud, container and microservice native
Modern applications continuously change, are deployed across hybrid clouds and take advantage of containers and orchestration such as Kubernetes and D2iQ, all designed for high-speed delivery. Meanwhile, the microservice architecture fosters wide diversity. Engineers can choose the programming language, middleware and databases best suited to code their microservice. Scale, complexity and constant change are the new realities. Older tools, designed before the advent of cloud-native technologies, can be difficult and labor intensive to configure and maintain, which can lead to potential visibility gaps.

IBM Instana is designed to operate in the modern world. With zero configuration, it naturally aligns with the infrastructure, clouds, containers, orchestrators, middleware and languages to automatically keep pace with and visualize your microservice application.

Even in constantly changing environments such as Kubernetes, IBM Instana automatically discovers the full stack of your application and manages its performance continuously.

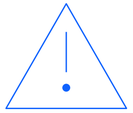


4. Real-time full stack application data model

The core technology powering IBM Instana is its internal data model, the dynamic graph.

- The graph is a model of your discovered application with all physical and logical components, its technology components, dependencies and configuration.
- The graph understands logical components such as traces, applications, services, clusters and tablespaces.
- The graph updates its model in real time, whenever any change occurs to the application, through continuous discovery by the agents.
- The graph maintains the dependency models needed to enable the precise, AI-powered troubleshooting, prediction and problem resolution capabilities of IBM Instana.
- The graph is flexible—allowing IBM Instana to dynamically describe architectures of any complexity, layering, virtualization and the like—so you're ready for future architecture trends.

Without a comprehensive model that includes the architectural makeup of an application, any intelligent analysis will be limited to simple data correlation, so you could overlook some relationships.



5. AI-assisted monitoring and troubleshooting

It's worth repeating that modern applications—cloud-native, microservices, container-based, orchestrated and multicloud—are extremely complex and dynamic. The only constant among these applications is that they are constantly changing. In this type of system, AI is the best choice to discover and understand the components, dependencies and overall health of the system.

For AI to effectively work, there must be a robust underlying model that includes these elements.

- Automatic discovery of all system components and all interdependencies between those components
- Configuration data for each system component
- Performance data for each component
- An understanding of how components are used together to produce desired outcomes.

Next is real-time detection and understanding of any events—new components, updated components and eliminated components. The model and real-time event detection drive the AI-assisted discovery and mapping, deployment, monitoring and troubleshooting required for production application monitoring.

The best way to break this data into pieces that can be understood by both machines and humans is using "Google golden signals." These signals include transaction rate, error rate, latency and saturation. These derived metrics together represent the overall health of the application system.

The final piece of monitoring a complex system is to eliminate the noise. With millions of metrics and events, how do you keep the human operators from becoming overwhelmed? The answer is simpler than you might think: focus on service impacts only. This method uses the most constrained resource, human operator time, to provide the most positive impact and maximize the application user experience.

Even with a smaller focus on service-level incidents, it's practically impossible for any single stakeholder—whether Dev or Ops—to understand how pieces work together and where an individual change might impact overall service levels. That's where the final piece of AI is applied: to identify the incident and events, correlate them through the dependency model, and identify the triggering event. Pinpointing the time, event, system and other specifics gives the monitoring users the exact information they need to find and fix the problem before major service impacts occur.

6. Integration into development and CI/CD pipelines

As application teams start taking advantage of new technology and architecture choices, app releases can become more frequent, be deployed by more individuals and impact more users. Modern APM solutions must recognize this shift in the application delivery process and integrate with the latest set of mission-critical tools—development and CI/CD pipeline management solutions.

Of course, effectively managing integrated release performance requires capabilities we've previously discussed: one-second metric granularity and three-second alerting. After a software release, the faster the Ops team can discover if the release has issues, the better.

Beyond the fidelity and granularity of the metric set, it's important for the APM solution to understand—programmatically—when releases occur, what their impact is, and whether or not the releases achieved the appropriate performance and success levels.

There are three critical capabilities you should be looking for.

- Real-time update and change detection
- Release identification and tracking
- Immediate feedback on new component performance

You need all three capabilities to have an effective APM tool that relates to modern software practices such as continuous delivery and agile development cycles. The bonus feature that you want to look for is integration with a release management solution, such as Jenkins, which allows you to both auto-tag releases and understand where potential hotspots are.

04

Put IBM Instana to work for you

IBM Instana provides an industry-leading real-time automated enterprise observability platform. Its application performance monitoring capabilities are ideal for organizations operating complex, modern, cloud-native applications. IBM Instana is ready to go to work anywhere your workloads run—in public clouds, private clouds, hybrid clouds, on mobile devices, on premises or in an IBM® zSystems™ environment.

IBM Instana gives you expanded control over modern hybrid applications, thanks to its precise metrics, full end-to-end traces for all transactions, and AI-powered contextual dependencies discovery inside hybrid applications. The platform automates application discovery, agent deployment and monitoring configuration across the full microservice technology stack. It can reduce troubleshooting with automatic root cause analysis and mass correlation of requests, metrics, traces and profiles. The platform identifies the triggering event and most likely cause of each incident.

See the power of IBM Instana for yourself. Sign up today for a free 14-day trial of the full version of the product. No credit card required.

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Produced in the United States of America
May 2023