Application Performance Management for App-Driven Businesses

IEEE ⬡ computer society   IBM

Introduction

Contents

Software applications are the mainstay of modern business. Applications deliver business-critical services to customers and enable companies to function efficiently. To ensure performance and availability of their applications, companies must have full visibility and control of the applications and enabling infrastructure. If an outage or slowdown occurs, the company needs to know precisely where the problem originated, what caused it, and how to prevent it from occurring again.

It's becoming increasingly challenging to maintain visibility of end-to-end applications and manage application performance. Customers today are more selective about their services than ever before. They expect high-performing, always-available services and they publicize their user experiences on social media. At the same time, delivering services is more complicated. Many of today's businesses are using hybrid architectures and applications that leverage resources from both on-premise and cloud environments. These resources are often controlled by third parties, and as a result it is harder for businesses to obtain the availability and performance metrics needed to ensure the best possible customer experiences.

For these fundamental reasons, line of business managers, IT operations, and development teams need real-time performance data that reveals the health of their applications and infrastructure and the quality of the end-user experience. They need this information in a format that spans traditional and emerging architectures, such as on-premise, cloud, or hybrid systems.

Application performance management (APM) tools offer these capabilities, enabling companies to diagnose problems quickly and improve service quality. For companies that are using Agile and DevOps processes, APM can help improve communication and expedite software delivery. It enables continuous monitoring and testing during all phases of software delivery, including production.

This paper explains the importance of APM to today's businesses, provides recommendations that companies should consider when evaluating solutions, and suggests steps companies can take now to adopt APM solutions that meet their particular business needs.

Contents

Application Performance Management (APM) in Today's Business Environment

Software applications are essential in today's business environment, where internal and external services are delivered across mobile, social, collaboration, and cloud technologies.

Companies need applications not only to facilitate services, but to interpret massive quantities of data, compete better, and pursue new business models such as the Internet of Things. If an application has performance or availability problems that impact customers, a business can lose revenues or incur damage to its brand.

Many types of companies have experienced these problems and impacts. One example is eBay, which suffered 12 major outages along with security

breaches and accessibility issues during 2014.[1] The frequent issues drew negative reactions to online discussion boards and adversely affected the company's brand and customer trust in its services. Another example is the Chicago Board Options Exchange,[2] which experienced a software outage in 2013 that prevented trading of financial options for several hours. The outage not only affected trading, it also brought unwanted attention to the

1 "eBay Down: Twelfth Outage of the Year," by Ina Steiner, in Ecommerce-Bytes, Sept. 14, 2014. http://www.ecommercebytes.com/C/blog/blog.pl?/pl/2014/9/1410692548.html

2 "CBOE Identifies Software Glitch that Halted Trading," Reuters, in Chicago Tribune, April 26, 2013. http://articles.chicagotribune.com/2013-04-26/business/chi-cboe-outage-20130425_1_cboe-volatility-index-stock-index-options-stock-market/2

Contents

organization by prompting some competitors and regulators to question its overall role in the options industry.

Companies must have full visibility and control of application infrastructure to ensure performance and availability. Decision makers and users from company lines of business, IT operations and development need these capabilities.

Line of Business Needs: Understanding the Customer

Line of business (LOB) managers and analysts need to understand who their customers are, what the customers do with the company's applications, and what the expectations and standards are for acceptable performance, availability, or response time.

Understanding the customer is always important, but it is particularly important when customers are accessing services from mobile devices because mobile users are more likely to generate immediate feedback in public online venues. Yet in a mobile context, it is difficult for companies to understand variations in client-side performance and user experiences due to the variability in end user devices. LOB needs to be proactive and catch problems before they start and before customers react, especially if customers might react on social media.

The LOB needs to know why slowdowns and outages occur, how to prevent them in the future, and how these issues affect the customer experience and impact the business. For example, if an application takes too long to respond to a command and users drop off, the teams need to know what caused the problems and which devices, connections, or customers are affected so the appropriate personnel can get the service back to the desired speed and prevent the problem from happening again. If an application goes down or stops responding, teams need to identify the root cause and determine how to repair the problem.

IT Operations Needs: End-to-End Visibility

Application environments today are complex, often relying on third-party components such as vendor-supplied and managed servers or databases. IT operations teams need complete end-to-end visibility of all components in the environment. They need the ability to see if components have problems and they must be able to see all data flows influencing an application.

IT needs this information because it is responsible for ensuring that company-owned infrastructure and networks never cause bottlenecks or application problems. End-to-end visibility also helps IT

Contents

optimize mobile, cloud, and traditional applications to make sure that business-critical applications and infrastructure comply with service-level agreements. The IT organization also needs to generate actionable insights about service performance so teams can address help-desk issues and decision makers can be sure that internal IT services support optimum functioning of the business.

Development Needs: More Time to Focus on Writing Code

Developers want to focus their efforts on writing code and creating feature enhancements. Debugging software problems or searching for performance bottlenecks for applications that are already in production distracts from development work. Dealing with software problems also impacts time-to-market for new applications, services, improvements or other changes the company wants to deploy. These types of delays can affect a company's business performance or competitiveness.

To alleviate these challenges, developers need tools that can identify and diagnose the root cause of performance problems at the code level. They need this capability, even in production environments, so they don't need to spend time recreating

a problem in a preproduction environment to identify its root cause.

Importantly, developers also need tools that can replace the "war room" process used to find, solve and correct software problems. The war room process can take weeks if teams can't find the source of the problem, and it can become counterproductive if it leads to friction between teams that are delegated to this work.

Visibility and Control for Agile and DevOps Processes

Most companies have begun or plan to implement Agile software development practices and continuous delivery (DevOps) tools to speed up the software delivery cycle and collaborate better across organizational silos. As teams adopt these methods they require detailed real-time data about application performance. APM can be used to support these strategies and improve communication and collaboration among LOB, IT operations and development.

The challenges of maintaining visibility and reducing risks associated with application performance problems are expected to increase. This is because hybrid approaches to cloud adoption—with companies keeping some services on-premise and

Application Performance Management for App-Driven Businesses

Contents

other services in the cloud—add complexity to performance monitoring and management.

Also, the use of hybrid (composable) applications is growing as more and more businesses run on applications that use hardware or software supplied or managed by multiple vendors. This approach offers cost efficiencies and minimizes in-house responsibilities for the deployments but gives third-parties more control over individual components and services. This introduces a new risk for businesses because if one component does not perform as well as others the functionality and user experience of an application can be affected, reducing its value in the market. There is no way to know if the third parties are delivering the required user experience or performance characteristics and no way to guarantee this performance.

Contents

Key Benefits and Capabilities that APM Provides

Based on a broad range of case studies, IBM has found that companies employing IBM's APM solution can overcome the challenges described above to gain significant operational, service availability, and performance benefits. Companies can diagnose problems up to 90% faster by identifying the root cause of a problem, whether it originates from a component, browser, user interface, or line of code. They can improve availability by 60-90% by visualizing bottlenecks that isolate where the problem is occurring. They can reduce the number of outages by 50% or more by identifying performance issues before problems occur.

These benefits are possible because APM enables companies to look deeply into infrastructure and applications to identify and resolve any issues that can disrupt service before the issues turn into outages, slowdowns, or other problems that affect end users.

Depending on the solution employed, APM can be used to monitor the following:

- ◆ Individual components or the end-to-end infrastructure supporting an application, including application servers, web servers, databases, and others.

- ◆ The interfaces that enable applications to run across different platforms.

- ◆ Applications that run on on-premise, cloud-based or hybrid architectures.

- ◆ The quality and effectiveness of the end-user experience for actual or simulated users. For example, companies can see how often users receive error notifications. They can also monitor the response time the user experiences and see how the response time

Contents

is influenced by the client's device or net-work, mobile systems or services the customer uses, or the company's servers.

◆ The response time for the performance of an application transaction, including contributions to that response time from individual components and the specific network hops that take place during an end-to-end transaction.

◆ Code-level performance, including stack trace and database query details.

APM tools can also collect, integrate, and manage performance data to yield data analytics and business insights in convenient dashboards. These tools can be used by LOB management and technology specialists in IT operations, development, and other departments to make business improvement decisions.

Two APM Case Studies from IBM Customers

Kaiser Permanente used IBM APM to evaluate a new health care application that was responding slowly during initial testing. It used APM to track and visualize performance of 15 subprogams. By pinpointing problems and adjusting the code accordingly, Kaiser was able to reduce a 10-second response time to less than one second. Today, with the APM tool installed, developers no longer need to run traces manually and can focus more time on coding projects.

Central Depository Company in Portugal, a financial services firm, used IBM APM to monitor its end-to-end IT environment and business-critical applications. Its solution was able to find the root cause of key problems in 5 minutes, improve uptime by 99.9%, improve service-level agreement (SLA) levels by 98%, and decrease customer complaints by 79%.

Contents

When to Adopt APM

Companies should employ APM if their software applications are critical to the success of their businesses. APM is also recommended for companies that are using Agile methods and DevOps processes because it helps expedite software delivery and supports continuous development tools and strategies.

APM is relevant to large and small companies

Most large companies (64%) are using some form of APM but they are typically using tools for monitoring individual domains or components, such as the server, storage, and network, rather than holistically addressing the end-to-end system that is powering the business service.[3] This siloed approach can detect technology component issues but does not show the end-to-end effect of component performance problems on the end user. APM

solutions that provide comprehensive visibility will overcome these drawbacks to give companies a more holistic view of their services and systems.

Small companies are often focusing most of their efforts on growing their businesses. As they are building their businesses and serving a small customer base, companies may not feel the need to monitor or manage application performance. However, as these businesses gain customers and market scale, APM becomes very relevant because it enables companies to rigorously monitor performance to ensure the business is delivering a user experience that will keep existing users satisfied and attract new customers. APM is also relevant when the success of the business is highly dependent on customer-facing applications. If applications are the primary channel for a company's services and sales, a company can use APM to ensure that these business-critical applications perform as required and do not fail.

---

3 Application Performance Management is Critical to Business Success. Forrester Research, 2014. http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=SA&subtype=WH&htmlfid=TIL14093USEN

Application Performance Management for App-Driven Businesses

Contents

APM Supports Agile and DevOps Practices

As companies start to accelerate their development life cycles and begin to use Agile methods and DevOps tools, they can use APM to break up silos and help teams work better together to address performance issues and quickly solve problems.

Agile methods can benefit from APM because in the faster delivery cycles that Agile facilitates, companies can often overlook serious issues if they do not have appropriate application, infrastructure, and end-user experience monitoring in place. Companies run a risk that performance problems will be overlooked or errors will be detected too late and the customer experience will be adversely impacted.

The DevOps approach to software development, which enables development and operations teams to work together to help expedite software delivery, is increasingly used to help LOB managers, IT operations, development and others work together and share tools and processes to improve communications and ensure their companies deliver high-quality applications to the market.

APM is very relevant to DevOps because APM supports and enables continuous monitoring during all phases of the application life cycle, including development, test, and production. It breaks down silos between LOB, IT operations, and development that have prevented these teams from working efficiently in the past. Because APM can quickly reveal how new code will affect application performance, it is particularly beneficial to companies that are trying to push out numerous releases in a day or week.

Contents

5 Recommendations for Getting Started with APM

How an enterprise adopts and uses APM will depend on a range of company-specific conditions and business objectives. Factors to consider include the type and extent of the application performance problems the company is experiencing, the particular APM capabilities the company needs, pricing preferences, and the complexity of the application environment.

Following are some steps decision makers can take now to evaluate these factors and begin the transition to APM:

1: Identify your information needs or pain points

The first step is to identify the application performance information needed or the performance problems that must be addressed.

For example, do LOB managers want to better understand the company's customers? Do LOB, IT operations, and development need to improve visibility of application performance across internal or external systems? What kind of visibility is needed to develop the type and depth of data the company needs? Does the company need to improve IT operations and the way operations and development teams collaborate? Does the company need to reduce outages or identify bottlenecks that are slowing services?

By answering these types of questions, companies can better decide which types of tools are most appropriate and will deliver the most value.

2: Start small, then add capabilities

The most practical approach is to smart small and expand APM capabilities as information needs and

Contents

pain points increase. Use synthetic monitoring initially to gain an idea of application availability and response time under simulated conditions; this will provide enough information to spot problems (although it won't resolve them). If synthetic monitoring reveals problems, APM can be used to perform resource monitoring of relevant infrastructure and application components and to generate analytics and reports for critical applications that are in production. Resource monitoring can provide valuable information quickly without requiring installation of instrumentation, and it can reveal if and where instrumentation should be installed for further analysis. If needed, capabilities can be added to monitor response time and the end-user experience, track transactions, or view and diagnose code-level performance problems for applications at various stages of development and at all levels of the stack.

If the primary need is to get up and running quickly to provide almost immediate value, consider starting with a SaaS solution for APM. The SaaS option alleviates the need to install infrastructure, which reduces up-front costs, and it will reduce operational costs as well because the vendor will set up the APM solution and manage it. A SaaS solution can be more economical for small businesses compared to on-premises approaches and makes it easier for any company, large or small, to benefit from economies of scale as their businesses grow and monitoring needs increase.

3: Compare vendors

Selecting a vendor depends on many factors, including the vendors' capabilities and approaches to APM.

Companies evaluating vendors are advised to consider the vendor's coverage of the application stack. Make sure the solution can truly monitor the components the application runs on, such as the specific application server, HTTP server, or database. For each component covered, make sure the solution has the visibility needed to meet the company's APM objectives and that the solution can provide the depth of information required, whether the information pertains to the health of a server or specific lines of code.

 Also consider how the vendor delivers the data. Are the data tabulated so the company can integrate the information with its own visualization tools? Does the vendor provide analytics and insights that help identify the source of the problem and guide remediation? These capabilities and services can make a difference in the effectiveness of a solution.

Contents

4: Consider pricing

There is no unified approach to APM pricing. Factors to consider include the type of trials offered, the purchase price, the costs associated with specific components or services, and maintenance costs.

Most vendors will provide some type of free trial so companies can evaluate the solution at no cost before making their purchase commitments. The terms of the trial can vary from vendor to vendor. Trial services can be offered on a purely freemium basis, as a free service with restrictions, or as a limited-time trial that typically allows 30 days of usage at no cost.

After a company has tried a service and decided to make a commitment, it will need to consider several pricing strategies and features. Purchase prices can vary widely.

For example, APM can be priced per monitoring agent or per server. Per-agent pricing can be attractive at the time of purchase if the company has just a few agents, but as more agents are added, costs will go up. This approach can be risky for companies that do not know how many agents they will need in the future. Price per server requires a higher upfront cost than the per-agent approach, but the company only pays once for the server and can add agents as needed over time. The per-server

price scales easily with growth, gives companies a way to manage costs, and is more predictable for companies compared to the per-agent approach.

Pricing can also vary depending on APM components, services, features, or options used. Synthetic transactions, for example, can be costly. Companies use synthetic transactions to simulate application usage and monitor performance under the simulated situations, but the transactions are priced on a per transaction basis. If a company uses this capability frequently, the service price can increase accordingly.

Maintenance costs come with running APM on premises. The costs can accrue as companies design and plan the architecture for the on-premises solution, administer it, and perform ongoing maintenance and upgrades of hardware and services. These types of costs are avoided with SaaS approaches.

5: Consider hybrid APM capabilities

Many companies have on-premise APM solutions and want to add cloud-based APM. They want to leverage resources from both environments to deliver innovative, convenient applications to their customers. A hybrid approach lets the company mix and match the amount of APM delivered via

Application Performance Management for App-Driven Businesses

Contents

its on-premise solution or SaaS while maintaining complete end-to-end visibility from a unified dashboard.

The hybrid approach is extremely advantageous for large enterprises that want to keep some APM in house but not all of it. For example, a company might want to keep and manage some applications on the premises for security reasons while offering other applications via a SaaS solution. The hybrid approach is also practical and cost effective for companies that plan to migrate an on-premise stack to SaaS.

Contents

Conclusion: APM and IBM's Role

Application performance management is strategically important for companies that need to ensure the performance and availability of business-critical software applications. With APM, line-of-business managers, IT operations and development can have end-to-end visibility of their application performance and service conditions. They can get very granular data about the end-user experience, infrastructure, application, transaction details, or code-level performance, and they can visualize it in real time.

Managers and teams can use APM to see the implications of the data on an application; make real use of the information to reduce outages and slowdowns and improve availability; and better understand their customers and optimize the customer experience. APM can also support continuous delivery (DevOps) processes to help teams from across the company better understand performance conditions and collaborate better to improve the entire software delivery cycle.

APM is fundamental to IBM's efforts to support businesses with strategic solutions that improve their capabilities to efficiently deliver high-quality services to the market. IBM's APM features are designed to meet on-premise, cloud, and hybrid requirements and can integrate with DevOps tools.

IBM's solution for APM gives companies the capability to

♦ **Identify performance issues before users are affected**—The solution includes a unified user interface that provides a single view across on-premise, public, and private cloud applications; easy-to-navigate dashboards; and best-in-class monitoring coverage.

♦ **Isolate where a problem is occurring**—Companies gain visibility of the end-user experience to pinpoint problems and isolate bottlenecks before service-level agreements (SLAs) are impacted. The solution can track

Contents

100% of application transactions through the entire application domain.

◆ **Resolve problems faster, before the business is impacted**—Companies can use the solution to search and diagnose problems up to 90% faster. The solution can determine the exact moment an application experiences an issue. It can recognize anomalous behavior to predict potential outages.

In the future, IBM's solutions for APM will integrate end-user monitoring with business-oriented analytics and insights to help companies quantify the business value of an application. Companies will be able to see which sites users visit, the users' geographic locations, demographic characteristics and other trends.

Learn More

IBM looks forward to helping enterprises implement easy-to use, feature-rich APM solutions for cloud, on-premise or hybrid environments. Monitoring can be integrated with DevOps tools and processes such as IBM UrbanCode Deploy, IBM Control Desk, IBM Rational Performance Tester and others. For more information, please contact your IBM account manager or visit the following sites:

◆ IBM Service Engage
https://www.ibmserviceengage.com/application-monitoring/learn

◆ IBM Bluemix—Monitoring and Analytics
https://console.ng.bluemix.net/catalog/monitoring-and-analytics/

For further reading, please refer to the following papers:

◆ APM SaaS and Analytics Step Up to Meet the Needs of Modern Applications, Mobile Users, and Hybrid Cloud Architectures. IDC Custom Solutions, 2014.

◆ Application Performance Management is Critical to Business Success. Forrester Research, 2014.

◆ Ovum Decision Matrix: Selecting an Application Performance Management Solution, 2014-2015. Ovum Consulting, 2014