**Introduction**

In today's business world, user expectations for application performance are incredibly high. This comes at a time, when, from a developer's standpoint, challenges are constantly growing.

In particular, developing business applications today is more complex than when a single application ran on dedicated hardware with its traffic running over a corporate backbone network. Now, applications typically are comprised of multiple components, each running on different systems (virtualized, distributed, hybrid, and cloud) all interconnected using a variety of company-owned, public Internet-based, or even cellular networks.

To build such modern applications, developers could use some help. That is where application performance management (APM) solutions come in. Here are 10 ways developers can use APM to improve the quality and performance of their software:

1. **End-User Experience Monitoring:** End-user experience monitoring is the first step to ensuring applications will be well-received by employees, clients, and customers. APM helps developers understand the end-user experience by capturing data on an application's end-to-end performance. This information can be used to identify problems and isolate potential performance bottlenecks.

2. **Deep-Dive Performance Monitoring of Application Components:** Common sense dictates that in order to ensure suitable performance levels for an application comprised of many components, a developer needs data on the performance of each component. An APM solution should offer this functionality to help understand where improvements can be made or problems eliminated. Monitoring the performance of applications components can be used to baseline overall performance and proactively detect unusual behavior before it impacts end users. In particular, a solution should provide code-level visibility into components such as Java/.NET applications, web servers, middleware, portals, and commercial application components.

3. **Analysis of Multi-Step Transactions:** Many applications are dependent on the smooth execution of several operations and transactions. From the end user's perspective, it is the accumulative time of all of these transactions that matter. From a developer's perspective, the only way to gain insight into how a multi-step transaction performs is to be able to see the interdependencies of the various components. APM solutions that provide such granular monitoring and management can help a developer better understand where delays might occur. This information can then be used to help improve business transaction completion rates.

4. **Transaction-Based Troubleshooting:** As noted in the point above, APM solutions that can analyze multi-step transactions can be quite useful. Even better are solutions that leverage that information and aid in troubleshooting. An ideal solution would help quickly identify the slowest transactions and detect such things as memory leaks. A developer can use these details to resolve problems in a shorter time and ideally be more proactive and prevent performance problems from happening in the first place.
5. **Runtime Application Architecture Discovery:** As more applications run in virtualized and cloud environments, and their complexity increases with the use of multi-component approaches, there is a growing need for information about the runtime environment. Mapping the environment manually is impractical as components could quickly shift from one system to another. An APM solution that can automatically discover the runtime application architecture can provide a better understanding of how network topologies interact with the application architecture.

6. **Root Cause Analysis:** A key to ensuring optimal performance is the ability to do root cause analysis of end-to-end application sessions. Today, root cause analysis is more complex and harder to conduct because of the dynamic nature of corporate infrastructures. Application components might run as instances on company-owned servers one minute and as instances on a public cloud service the next. Developers need the ability to isolate performance bottlenecks to individual instances in order to fix issues related to the network, databases, or the application code itself.

7. **SLAs and Metrics for Business Managers:** Developing a great, high-performing application is one thing. Getting recognition for that and convincing business managers is another. APM can be used to provide metrics to show that an application meets the business needs it was created for. For example, APM can help demonstrate that service level agreements (SLAs) are of a certain level and meet the application's stated requirements. Simply put: SLAs and other metrics are an easy way to convey complex performance information to business managers.

8. **Analytics and Reporting:** Runtime environments and performance requirements change over time. Instances of application components might be moved from one physical server to another or to a cloud service. A customer service department might experience incredible growth, placing new demands on infrastructure to meet consistent end-user performance levels. APM can help in these areas by gathering performance data over time. That data can then be reviewed to spot new patterns, which might need attention. Collection of performance information and presentation of that data can help inform the business of future issues that might impact the end-user allowing time to address them before they become a problem.

9. **Addressing the Role of Internet in an Application's Infrastructure:** The growing use of cloud computing for business applications introduces an interesting performance issue that must be taken into consideration. Cloud-based application component traffic will take various paths over the Internet to the end user. This can introduce unpredictable performance characteristics when trying to measure end-to-end application performance. A performance measurement taken one second can yield a very different value the next second, day, or week. Developers must take this variability and unpredictability into account. One way to do that is to rely on APM to measure or monitor performance over a large number of times and form an average of the discrete measurements.

10. **Mobile User Issues:** Many applications today are accessed by users on their mobile devices. Beyond screen formatting issues, developers must factor in the bandwidth a user with 3G/LTE/4G service will have compared to, for example, a desktop user on a wired LAN. APM could be used to help assess the
end-to-end performance of a given application for such mobile users. In many cases, the cellular connection might be the limiting factor for performance. If this can be ascertained, and if access by mobile users is essential, APM could help guide code modifications to accommodate these users.

Riverbed as Your Technology Partner

Given the many ways APM can help developers guarantee that their applications meet their stated business performance requirements, companies should look for a solution that takes into account all aspects of an application's performance.

In particular, companies need an APM solution that provides deep visibility into the performance of complex, multi-tier applications. The solution must give a developer complete insight into the performance of applications, from the browser to backend databases. This is an area where Riverbed Technology can help.

Riverbed’s APM suite integrates end-user experience monitoring with code-level transaction tracing and monitoring of application and system performance metrics. This gives application support teams and developers the information they need to more quickly and collaboratively identify, troubleshoot, and debug application performance issues.

Specifically, AppInternals Xpert software offers high-resolution performance monitoring of application components. To that point, AppInternals Xpert performs fine-grained monitoring of hundreds of thousands of performance metrics across application components including Java, .NET, web servers, databases, OS, and storage. Applications are instrumented automatically to provide the greatest visibility with the lowest overhead.


About Riverbed

*Riverbed® is the leader in Application Performance Infrastructure, delivering the most complete platform for Location-Independent Computing. Location-Independent Computing turns location and distance into a competitive advantage by allowing IT to have the flexibility to host applications and data in the most optimal locations while ensuring applications perform as expected, data is always available when needed, and performance issues are detected and fixed before end users notice. Riverbed’s 24,000+ customers include 97% of the Fortune 100 and 95% of the Forbes Global 100. To learn more, go to [http://www.riverbed.com/](http://www.riverbed.com/*)