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Application Performance Monitoring FOR DUMMIES®

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Chapter 1

Understanding Application Performance Monitoring

In This Chapter

- Considering why a focus on applications is important
- Defining why Application Performance Monitoring is necessary
- Discovering the basics of APM

Application Performance Monitoring (APM) is a critical technology for most organizations today. The problem with managing applications is the complexity of the environment. Applications no longer reside in one location or rely on a simple set of services. It's entirely possible that you don't actually know precisely which set of components your application relies upon. APM can help simplify the complexity. In addition, APM can provide information you can't obtain anywhere else, such as the business impact of a failure. APM can also help you to predict and avoid disruptions.

If you find this technology compelling, read on because this chapter is for you.

About This Book

This book is designed to provide anyone with monitoring experience with a good overview of APM. You discover what APM is, why it's important, the problems it solves, and how you can begin deploying within your application environment. You also get some use cases.

Icons Used in This Book

This book contains a number of helpful icons to identify information of special interest. Pay particular attention to the paragraphs that have these icons to get the most out of the book.

If you don't take anything else away from any given section, you need to pay particular attention to this material.

This icon indicates technical information that may or may not interest you, but it's there for the asking.

These paragraphs point out special tricks or techniques you can use to do something faster or with greater ease.

Watch out! When you see this icon, read the information several times to keep yourself out of trouble.

Understanding Why Applications Matter

Applications are the lifeblood of organizations today. They perform critical tasks for users and are the source of revenue that most organizations require to grow. The service that you or your group provides is important, but only in that it contributes to the application as a whole. Each component of the application contributes its part to the overall service that is offered to customers and determines the experience the user has when customers access your online services.

The most important reason that applications matter is that you want to be able to concentrate on strategic initiatives that drive revenue and make your IT organization more productive. Applications are the linchpin of strategic business initiatives because in many cases, this is your first line of communication and offer of services to your customers. If there are concerns, you can't concentrate on driving those initiatives effectively. You may want to focus on these issues, for example:

- Build new services that serve your customers
- Align better to strategic business objectives

- Create smaller, more strategic projects
- Prioritize where to spend organizational efforts
- Spend more time on strategic initiatives while reducing costs

Understanding Why APM Matters

APM provides a strategic tool to help organizations function more efficiently — how an organization can work efficiently toward goals that improve productivity and reduce friction between groups. In short, APM provides a new tool you can use to determine the causes of failure within your application environment and to simplify problem determination, while simultaneously improving the bottom line of your business. The following sections describe why APM matters to your organization in greater detail.

Determining which roles typically work with APM

You may initially think that only a small number of people in your organization will work with your newly acquired APM solution. However, anyone who manages an application or is concerned with the end-user experience in any way, or needs to understand how the application affects the business, will work with it. Everyone from the manager who needs to know how an outage will affect the bottom line to the Database Administrator (DBA) who requires information about database issues that have an impact on the application can use APM. Of course, people such as developers and network administrators will also depend on APM to obtain the troubleshooting information required to locate and fix a problem.

Viewing APM as simply a method of finding errors once they occur is a mistake, however. APM collects real-time and historical data, and uses it to build a complete picture of the application and dependencies. Over time, as the application data accumulates, it becomes possible to predict performance behavior based on baselines and determine where issues are occurring so that you can hand the problem off to the person who owns the problem. For this reason, system architects,

testers, and developers also rely on APM because it helps them optimize performance and availability throughout the application lifecycle.

Grasping how APM improves organizational efficiency

Everyone has encountered situations where application management becomes a turf war. The scenario is one in which management domain stakeholders gather together to discuss a particular issue and end up spending most of the time pointing fingers at each other. In the end, these meetings lead to reduced productivity due to a lack of collaboration. The essential issue is that no one really knows where the problem lies or whether a problem is a composite of several issues. This *siloed* approach to application management means that each group remains in its own management domain, unaware of how the service supported by that group affects the application as a whole.

APM simplifies the problem by providing specifics. It breaks down the barriers between groups by providing the truth and accurately pinpointing the root cause of the issue. The issue not only includes trying to discover where a problem lies, but it's also a matter of assigning the right person to fix it. APM makes it possible to know precisely where a problem exists within an application or application component because of the way the technology is designed.

Realizing how APM benefits your organization

Before a business decides to invest in a technology such as APM, there has to be a good reason to do so. The organization must receive some undeniable benefit from employing the technology. Fortunately, there are many good reasons to deploy an APM solution within your application environment. The following sections describe the two main reasons to add APM to your arsenal.

Improving the customer experience to drive more revenue

Applications are all about the customer experience. Anything you can do to make your customer happier increases customer retention and revenue. A good rule to remember is that your customer cares nothing about the application — the customer cares about accomplishing what needs to be done in the most effective manner possible. The application you support is a tool your customer relies on, which in turn helps you to make money. APM makes it possible to create a great user experience because you're always aware of what your customers are experiencing — downtime, uptime, performance, availability of services, and so on.

Communicating with business in terms they can understand

When stakeholders take a legacy-centric approach to managing the application, communication is impossible because the stakeholders focus on their particular areas. APM helps stakeholders communicate by changing the focus to the application, which provides a view into the entire application infrastructure. In short, by deploying the right APM solution, you make it possible for stakeholders to communicate about the one thing they have in common and, as a result, improve overall business functionality.

Getting Acquainted with APM Essentials

Now that you have some idea of why applications are important and how APM can help you address the requirements of managing applications, it's time to discuss a few APM essentials. The following sections tell you more about the actual functioning of APM.

Using a role-oriented, real-time dashboard

APM stakeholders receive historical data through reports and real-time data through dashboards. The dashboard should be customizable to meet a particular stakeholder's needs. For example, a DBA will see database-specific information, while

an application server administrator will see information about the application server. Likewise, a manager might see a report on how a fault will affect productivity, the end-user experience, and the cost of the outage. In sum, everyone receives a report that's specific to their particular area of interest.

Relying on combined analytics

When working with APM, everyone has their own view of the data. The APM solution should be collaborative because it allows all stakeholders to work together to determine where the issue is. With siloed tools that are focused on a particular domain, you may or may not discover an issue because you may not be focused on the application. APM provides a comprehensive view for everyone so that you can pinpoint issues very quickly and efficiently because you are focused on the application.

Defining end-user experience monitoring

The function of business applications is to make the end-user productive. The goal is to provide services that are optimized and available to the end-user. APM currently uses various techniques to ensure that the application is performing properly, but the following two methods deserve special mention.

Understanding real user-performance monitoring

One way to monitor the user experience is to check actual performance while real users are accessing services (performing tasks such as transferring money or paying bills online). Of course, APM provides the needed visibility into the application environment to see how the application performs, and how your customer is being serviced across the application environment.

Creating synthetic user-record playback

Playback allows an IT stakeholder to replay a user transaction to see what the user was experiencing at the time of a failure. In some cases, even when calling your help desk to complain about a problem, the user can't precisely explain what happened. This feature makes it possible to review the issue and take corrective measures quickly.

Performing transaction mapping

Applications have become incredibly complex. It's entirely possible that an application traverses multiple paths to obtain access to the resources it needs. In addition, the application may rely on resource dependencies of which even the application team is unsure (or doesn't know about at all). The right APM solution goes a step further by mapping the actual transactions across the infrastructure. This map creates a complete picture of the application so that it becomes possible to find errors that stakeholders would not see without the right technology in place.

Executing application monitoring

After your APM solution builds a complete map of every application and dependency component, it can begin monitoring those individual components. This process provides the detailed information about the availability and performance of the individual application elements. In general, you can divide application monitoring at the component level into the following areas:

- Java Enterprise Edition (EE) and .NET monitoring
- Portal and web server monitoring
- Packaged application monitoring
- Network, database, and end-user experience monitoring

An APM solution should be based on a single code base that allows you to add functionality as needed but is integrated and provides data that has consistent metrics.

Implementing database monitoring

Because there are few (if any) applications that don't rely on a database, it's essential that any APM solution provides some means of monitoring database-specific issues. In most cases, this means monitoring the database utilizing database performance analytics. When working with database performance

analytics, the APM solution relies on statistical information from the database to monitor overall database health and to monitor queries from the application to the database.

Accomplishing infrastructure monitoring

Typically, monitoring checks components that provide services to applications. For example, a database monitoring solution will check the statistics generated on database functionality. Issues can occur anywhere, including the application, network, or database. APM doesn't perform infrastructure monitoring. Normally you pair APM with solution infrastructure management tools — hopefully infrastructure management tools that are integrated with the APM solution. The APM solution monitors the infrastructure at two levels as described here.

- **Network and server monitoring:** All of the physical hardware requires monitoring. A slow switch causes problems just as easily as a poorly designed algorithm. Servers can become overburdened as easily as a database manager can.
- **Virtual world monitoring:** Often, an application runs on a virtual machine based on a piece of physical hardware. Even if the physical server is operating within tolerance, it doesn't ensure that the virtual machine is operating correctly. Consequently, APM also checks the performance of the virtual machine.

Chapter 2

Exploring the APM Use Cases

In This Chapter

- Considering the user experience
- Tracing transaction conversions
- Locating application problems
- Interacting with a CIO dashboard

Chapter 1 provides a theoretical discussion of what APM can do for you and how it does it. This chapter takes a more practical approach by discussing actual use cases for APM. The following sections describe four (of many) ways in which you can use APM to help simplify and streamline your current processes.

Performing User Experience Monitoring

It's essential to know how the user experiences the online services that your organization supports. The user experience affects the organization's revenue and IT staff efficiency in a number of ways. In addition, disruptions mean that the user can't access the services the user needs and is dissatisfied. As an example, if the user who is purchasing a product from your website has a problem, that user may instead purchase the product from your competitor. In turn, your organization not only loses revenue, but your reputation also may be tarnished in the user's mind.

The right APM solution connects both business and IT through a single point of focus, *the application.* This connectivity translates into higher application adoption rates, which result in increased user productivity. Because business and IT are both using the same solution to manage the application, they can also communicate more directly about it and become more efficient as well. The idea is that everyone has the same focus and is working together toward the same end, rather than pulling in different directions through a lack of inconsistent data that users need if they are relying on different solutions.

In order to quantify these statements, you need to look at how APM performs its task. Using an APM solution helps IT operations and application support to work together in the following ways:

- Monitor real-user response times and alert on response issues
- Monitor business conversion rates affected by delivered performance and provide alerts about subpar performance
- Indicate which users are having performance problems
- See problems exactly as the user does by replaying the user's session
- Scope the problem and assign the right resources to fix it

Increasing Transaction Conversions

Business and IT owners need a way of measuring the performance of IT initiatives and how these initiatives affect the business. In many cases, they use the success or failure of the following metrics to measure performance:

- Online conversion rates
- Brand loyalty
- Bottom-line revenue
- Customer satisfaction

Because of this focus on provable performance, these stakeholders naturally want to ensure that the user has a good

experience, and they want to be aware of any problems the user encountered while accessing the services they provide. Abandonment of the transaction is a problem for this group; only conversions show positive results. These stakeholders need to constantly collect data about users through analytics tools to improve the performance of the application and associated services.

Your APM solution needs to have the ability to manage conversion rates, including generating alerts that correspond to real-time changes in conversion rates. IT should be able to drill down into individual user transactions in order to see precisely what that user saw during the session so that it's easier to determine what went wrong. Being able to see precisely what the user sees means that the IT stakeholder can determine what happened according to:

- Content
- Application design
- Performance

This sort of deep analysis provides other benefits too. For example, the stakeholder can determine user preferences based on what users choose. In addition, it's possible to see trends based on historical data collected over time.

Pinpointing an Application Issue

Organizations today require a fast Mean-Time-To-Resolution (MTTR) for any problems that occur. This means that IT stakeholders must have complete visibility across silos, with deep-dive technology to locate specific issues. In order to accomplish this task in the shortest possible timeframe, IT must align application-related services with business priorities and the user experience so that it's possible to prioritize incident management.

APM solutions make it possible to use predictive capabilities so that the right professionals can repair problems before they impact the business and incur revenue losses. Stakeholders need to be able to see the entire application from top to bottom. An APM solution should include these monitoring features to ensure that the stakeholders can actually perform this task:

- Real end-user performance with user-session replay
- Application monitoring across all infrastructure platforms including Java and .NET
- Reporting on service levels in addition to the business impact of issues
- Deep database monitoring and interaction with applications
- Deep monitoring across the physical and virtual infrastructure

Using the CIO Dashboard

Management has special information needs when it comes to applications, and the CIO dashboard provides this information. Here are some of the considerations that the CIO dashboard addresses:

- **Service Level Agreement (SLA) requirements:** The application or service must meet SLA requirements to ensure availability. If the application or service doesn't meet these requirements, there are real-world consequences, including SLA penalties that cost the organization money.
- **Historical data:** In addition to meeting the SLA requirements, an APM solution can provide management with historical data that shows whether the application is improving or deteriorating over time.
- **Actionable data:** The APM solution provides actionable data to ensure collaboration between IT and the business on the same business goals.

The APM solution needs to provide data that makes it easier to understand whether the application or service is supporting business goals. It can perform this task at three different levels:

- Optimized IT performance and availability
- Fast determination and triage of issues
- Comprehensive views across all management domains

It's essential that the APM solution provide deep visibility into the application and services, and into the customer experience using the same solution. In short, the dashboard should provide a complete business perspective without the need to enlist other tools.

Chapter 3

Implementing APM in Your Organization

In This Chapter

- Considering the importance of simplifying APM
- Realizing that a successful APM needs a defined process
- Understanding the technical considerations of APM planning
- Taking APM baby steps

The previous chapters focus on what Application Performance Monitoring (APM) is and why you need it. Of course, knowing that something is useful isn't the same as knowing how to implement it. That's what this chapter is about — adding an APM solution within your application infrastructure to gain the tangible benefits it can provide.

The Importance of Simplicity

The application environment can be incredibly complex. Most applications today cross multiple tiers and often share resources with other applications, making it a difficult task to monitor the environment. Many APM solutions are complex because they must provide performance data about all transactions across this complexity. Choosing the right APM tool can simplify the APM process. When you implement an APM solution, strive for simplicity in every respect; and as your organization and application environment grows, you'll find that you actually garner more benefits. If you start small and grow, your implementation and process can mature. The following sections describe issues your organization should consider in making your setup simple and easy to maintain.

Simplifying data interpretation

Anytime a failure in the application occurs, you need to find the cause quickly and easily. No one want's to have angry users calling the help desk complaining about application performance.

Seeing everything

An important concept regarding APM is being able to see an overview of application health or a collection of data that's relevant to a specific stakeholder's dashboard. For example, an IT executive may see Service Level Agreement (SLA) information, while a Database Administrator (DBA) may see information about database performance. In both cases, the information is pertinent to the resources that the stakeholder is responsible for maintaining. Managing application performance requires collaboration between many different stakeholders and perspectives. Here are the most important considerations:

- Managing the application as one entity
- Presenting the right information to support collaboration
- Maximizing each stakeholder's efficiencies in the performance of a task

Otherwise, it's too easy for failure points to lurk in the one place you didn't look. Simplification involves sorting through the data and creating a view that is valuable to that particular stakeholder. In addition, you need to keep the dashboard straightforward so it's easy for anyone to use.

The concept of being able to see everything at a glance (without long delays) is important because even the most highly qualified support personnel can't find something they can't see.

Pinpointing the issue

A problem with some monitoring solutions is that they alert on everything but don't tell you which alerts are important to the business, your applications, or the end-user experience. An effective APM solution filters the data and helps you to see which alerts affect that application in a way that degrades the end-user experience. What you want to see are alarms that

are associated with key business services, SLAs, or end-user groups so that you can manage issues that matter to the business or to those items. The tool provides the flexibility and modularity required to adapt to the monitored environment.

Defining fast time to value

Getting your APM solution implemented quickly and effectively is a key to obtaining value from it. The following tips help you get value from your APM solution quickly.

- **Defining the processes:** APM is a process where a stakeholder can understand what to do next in a given situation when the application isn't performing as anticipated. Rather than blame one party or another, the APM solution can help guide the entire group into locating one or more sources of problems and fixing them.
- **Understanding that the key is collaboration:** The point of an APM solution isn't to make everyone see every aspect of the application and supporting infrastructure. Each stakeholder will still be a specialist in a particular area. However, the group as a whole must understand the one thing they have in common, which is the application. Collaboration focuses on the application and what's needed to maintain its performance despite what an individual stakeholder sees in a particular area.
- **Considering marginal situations:** Monitoring will tell you that a particular feature is working within the designed range. For example, the database may be processing requests within the given speed range. However, a user may still have a bad experience with the application, even if all of the elements appear to work properly when several marginal elements all add to an issue and cause a performance problem. An APM solution can help you locate these sorts of problems and get them fixed quickly.

Developing low ownership cost

The cost of ownership for the APM solution will be a major contributor to its acceptance in the organization. The best way to reduce costs is to find a single, modular solution that meets your needs. A unified technology reduces the number

of tools and interfaces required to implement the APM solution, which reduces the cost of ownership. Reducing the complexity of the APM environment by using a single solution also reduces personnel costs.

APM is a technology that doesn't require you to recode your application and perform a special rollout of it.

Evolving with business needs

Businesses are akin to living entities in that a healthy business grows. As a consequence, the APM solution you select must grow with the business and provide enough flexibility to accommodate new application scenarios and capabilities. In addition, the processes that the APM solution supports must change as the business moves from a technology-centric to an application-centric approach.

Look for an APM solution that provides data to all users for monitoring the environment that helps them to make informed decisions within their domain.

Providing value

IT and business managers typically look to implement products that help the bottom line in some way. The value of an APM solution comes from providing real-time and historical information about application performance and end-user experience that is relevant to a given stakeholder and the business. In addition, an APM solution reduces the time required to become aware of a problem that impacts the business and provides automated workflows and relevant metrics that help resolve those problems quicker than you can by using other solutions.

Communication is key to implementing an APM solution and resolution process. The APM solution must communicate events to the personnel assigned to address them effectively. An APM solution must do more than display a message box on a screen somewhere and hope that someone sees it.

If your APM solution doesn't provide the right information, you'll find that it's significantly harder to determine and resolve issues and makes staff unproductive.

Defining organizational considerations

Even if you choose the right APM solution and have an excellent plan for implementing it, your goals for the organization can ultimately fail if you don't consider its needs. People need to understand why APM is important to them and how it can help them do their job better. They also need to see APM as a useful technology and not as a threat.

Considering cultural issues

The culture inside your organization partly determines how hard it will be to implement and successfully use an APM solution. Many organizations are described as warring fiefdoms intent on walling up their own portion of the application domain so that no one can accuse them of not doing their fair share. Successfully using an APM solution means breaking down walls so that the various groups can cooperate, even if they continue to peer at each other with a certain amount of distrust.

Using an APM solution helps stop the finger-pointing that naturally occurs within an organization, including the long and arduous process of meetings to determine issues. APM makes it possible to locate the precise source of an application fault so that repairs can occur outside an environment of recrimination. In short, APM will change the culture of your organization, but these changes occur slowly and the people in the organization must be willing to embrace the change.

As part of this change process, you need to model how your organization performs work. For example, you must determine how the development team currently ensures that an application performs well prior to release into the production environment. In addition, you need to know how your organization currently analyzes, diagnoses, and solves application issues. This is known as determining the proactive and reactive process models. The *reactive process* model describes what occurs after an application experiences a failure. The *proactive process* relies on using historical and real-time data to monitor in the present, predict future trends, and proactively adjust for them.

Understanding where to be cautious

Indeed, APM is exciting and can greatly reduce costs associated with application downtime. It's easy to get caught up in everything that APM can offer and want to implement APM immediately. Typically, for certain organizations, you want to add APM capabilities in small steps using the following process.

1. **Model how your organization works using proactive and reactive process models.** The proactive model describes what development does to ensure your application works properly before you release it into the production environment. The reactive model describes how the organization deals with faults once they occur in the production environment.
2. **Select a tool that makes it possible for you to monitor application performance successfully.** Chapter 1 discusses the requirements for such a tool.
3. **Create a map of all the application dependencies.** You need to know how your application works before you can monitor it. In many cases, you'll already have a database that at least partially maps the application dependencies; the more complete you make this map, the better APM will work in your organization.
4. **Choose the right individuals to perform the actual application performance monitoring.** Given the right solution, the personnel you choose to perform the monitoring need not be IT professionals. In fact, APM tools are specifically designed to make monitoring easier so that you don't have to hire highly skilled personnel.

Asking the right questions

The APM solution that you implement in your organization performs a basic task of answering questions about the application. It should answer more than the simple question about whether the application is working and if not, which part of the application has failed. For example, an executive may want to know how much a failure is costing the company, while a DBA may want to know precisely which query is causing problems in the database. Each stakeholder has

different questions that require answers and if the APM solution doesn't provide those answers, it isn't doing its job. The following sections describe some of the answers an APM solution should provide.

For yourself

The APM solution needs to provide answers about precisely where an application has failed and what to do about that failure. It's a process that defines how to react when a failure occurs so that the problem is fixed quickly. In addition, the historical data provided by the APM should point out potential failures based on the failures that occurred in the past. The act of predicting a failure before it actually occurs makes it possible to proactively manage the problem, rather than reacting to it later.

For coworkers

Everyone working in an organization will have different questions to ask of the APM solution. Part of the problem for most organizations is that there is too much data to digest. The APM solution filters the data and presents the most pertinent information to a particular stakeholder — information that helps the stakeholder to make intelligent decisions about application management easily and quickly.

Making use of existing investments

Whenever possible, use your existing *monitoring investments* (monitoring tools that provide specialty domain monitoring or infrastructure monitoring) as a starting point, and then rely on an APM solution to provide the overall application-centric view of performance. The APM solution will also fill in the gaps of your monitoring products. Integrate existing monitoring investments with the APM solution to keep the size of the project and the costs low, and then replace the legacy tools at a later date as needed.

Understanding how APM can rock your world

At some point, you might even decide to create a separate role for what's called the Application Performance Manager.

This role isn't absolutely required to make use of APM in any organization, but having an Application Performance Manager can have benefits.

Developing a List of Technical Considerations

The key to APM is to start with a few key business-critical applications. Don't make the mistake of wasting time on non-critical applications that won't make an immediate difference. Start small by choosing one or two critical applications. Leverage any existing monitoring tools by integrating them with an APM solution to produce a complete end-to-end picture of your application. Fill gaps left by the monitoring tools with additional APM technologies.

You may want to start your APM implementation within a test environment. The test environment is designed to help simulate a real-world environment so that you can use it to check whether your APM solution is configured to work properly in such an environment. Finally, you can roll out your application with a level of confidence because performance and availability should be optimized.

This test environment won't tell you anything about the real-time end-user experience. There is no simple way of re-creating a real-time environment.

Once you have a plan in place for rolling out APM in your organization, you need to implement the plan. Of course, you'll want to verify that your organization meets specified goals after each phase. First, it's important to create a list of goals and ensure that the goals are met. You can then move on to ensure that APM fulfills its purpose and doesn't become an organizational burden, rather than an aid.

Eventually, you'll have all the kinks worked out of your APM setup. Everything will be configured, the personnel trained, and the culture will have changed to accept the precise nature of fault detection that APM provides.