WHY YOUR APPLICATIONS NEED BEHAVIOR LEARNING "THERAPY"

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Consider this scenario: You decide to purchase a book and want to see what's available online. As soon as you log in, the retailer knows who you are and recommends the latest book from your favorite author, complete with reviews, prices, and discounts. You are delighted to discover that the author just released this book, and within a few minutes your order is complete and confirmed. Assuming that the book arrives on time, you've just had a great end-user experience.

What made this experience possible? The retailer learned about your favorite choices based on your past orders and preferences, and quickly offered you a product you wanted. *Yet, what if you ordered this book just before the holidays in December, when traffic on the retailer's Web site was much greater than normal? Would you still get that same level of service and process your transaction as quickly and flawlessly?* The answer is yes. On these types of customer sites, end-user experience monitoring provides IT with a view into the application performance and infrastructure, as well as how each end user interacts with the technology, to ensure this level of service — regardless of the conditions or variables.

End-User Behavior Learning and the Customer Experience

One of the reasons the end user had such a good experience in the example described above is because the technology delivered desired results based on learned behavior. This is like behavior therapy, which is used in psychology. Behavior therapy is based on learning theory and treats unwanted behavior through techniques that are designed to reinforce positive conduct and eliminate actions that are undesirable. The therapy is data driven and takes into account the types of behaviors that are statistically predictable based on various conditions. Therapists tend to follow a predictable model that helps them to analyze, understand, treat, monitor, and prevent undesired or abnormal behavior.

Similarly, IT has its own model and technology to identify "abnormal" behavior of applications and systems that affect the user's experience and behavior. Applying this concept to technology is known as *end-user behavior learning*, which tells IT about each person using a specific technology or application.

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Tools support end-user and application learning by leveraging statistical process control to gather data from multiple sources, establish patterns of behavior, and proactively detect subtle changes in that behavior so you can quickly identify and resolve any potential problems. This type of learning is probably the best indicator of how the performance and availability of the applications and services being delivered to your customers ultimately affect your business.

If you can monitor end-user and application behavior — and learn what's normal and what's not — then you can be more proactive in detecting a performance issue. The technology can determine the impact on users and the business, figure out the cause of the problem, and drive corrective actions to prevent the problem from

negatively affect your company's bottom line. If it takes too long for one of your customers to log in to an online application, add an item to a cart, or submit a payment, he or she may get frustrated and leave your site.

End-user behavior learning technology helps prevent this by telling you the expected response time based on the time of day, day of week, load on the system, location of the user, and so on. By understanding the expected behavior of the applications under various conditions, you can detect a slowdown before a user would actually pick up the phone and call the help desk, or even worse, abandon your site. You can also quickly assess the impact of new or modified application features on your end users.

Understanding Behavior Through Monitoring

By monitoring and learning the normal behavior of your applications — as well as that of your end users — you can understand what elements are being accessed, who is accessing them, and how they are being accessed. Not only will this help you to accurately determine where a problem is occurring, but it will also let you know which users will be affected.

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If there is a change in end-user behavior at the time of a slowdown, an alert is generated to notify an administrator or operator. For example, when a user attempts to add items to an online shopping cart, a series of steps must occur, such as requesting the user to log in, creating a new cart for the user, and then adding the selected items to the cart.

recurring. The automated analysis facilitates a positive end-user experience and is a much more effective, proactive alternative to the typical approach to fixing problems with workarounds.

Behavior learning technology understands the systems, detects deviations from normal behavior, and provides fewer, earlier, and more accurate alerts. For example, a sluggish response time is a clear indicator that something is "misbehaving" in your infrastructure and could

Each step of the purchasing process is monitored for availability, performance, and data accuracy, as well as any subsequent actions the user takes, such as repeatedly attempting to add an item to the cart or abandoning the cart altogether. By monitoring all of this information and establishing the normal performance and behavior

for any given time period, you can proactively determine when there are changes in the performance or behavior over time. For example, when a new version of an application is placed in production, you can quickly determine whether there is a change in the end-user experience or in the behavior of your end users, such as an increase in abandoned carts or failed transactions.

REAL VERSUS SYNTHETIC USERS

End-user monitoring should extend to both the real user and the "synthetic" user. With synthetic transactions, you can simulate types of actions — without actually having to put users on the system. This involves setting up a scenario and running that scenario repeatedly to establish a baseline and compare the performance for that same series of steps from one day to the next. This is especially useful for assessing whether changes to the application or to the environment in which it runs will affect the end-user experience. When combined with "real" user monitoring, synthetic transactions can help you determine if performance is impacted by the volume or location of users or by a change in the application or environment.

RESPONSE TIME

Application performance monitoring solutions can detect problems based on the end-user response time rate. They not only detect problems as soon as a single user experiences them, but they also capture all data necessary to quickly prioritize, diagnose, and resolve the problem. As a result, you know what problems your users are experiencing and how to prioritize them based on the type of issue and the potential impact on the business. Behavior learning solutions evaluate this data, identifying behavioral patterns so that you know when application response times and the end-user experience are slower — or faster — than usual.

Applying the Data to a Behavioral Model

Data models are used to look for differences between the normal and abnormal state to get an indication,

preferably ahead of time, of abnormal behavior in an application that needs attention. An abstraction layer, on top of all the information coming in, establishes and maintains a normal state by automatically associating application performance with the time periods when

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people access the applications (such as from 8 a.m. to 6 p.m.). This automatically factors in how many people are involved and where those people are located when they access the applications. This behavior learning capability is more predictable because it's looking for subtle deviations from normal.

For example, when IT does something dramatic, such as modifying a configuration that fundamentally changes the way information is routed from one point of the infrastructure to the data center, latencies may be introduced. Similarly, if more people join a business unit and the amount of traffic they produce goes up, then, from a behavioral perspective, you can look at the increased traffic as normal growth. As long as you see a curve moving in a controlled way, all is well, and the normal state is adjusted to reflect the change. However, when a change is sudden or erratic, you need to be notified immediately so you can take corrective actions.

What End-User Behavior Learning Tells You About the Business

If you see a slowdown in the volume of transactions completed (or an increase in the number of abandoned carts), you can correlate that type of business information to

the end-user and application response times. This can be a key indicator of a problem with a service and can trigger someone to look into the issue. The performance of all the individual components, in and of themselves, may appear to be satisfactory. However, when you put it all together, the applications being delivered may not be performing satisfactorily to the end user. That's why end-user experience and behavior monitoring are so important. This powerful combination gives you the experience of the end user and the potential impact on the business, not just the performance of individual servers, network devices, or applications that are all running independent of one another.

VISIBILITY IN THE CLOUD

Understanding the end-user experience is also key to monitoring your services in the cloud. In the cloud, you don't always have access to the infrastructure and applications being delivered. When IT, as a consumer of cloud services, doesn't monitor the experience of end-users accessing those services, you have no idea whether the services are performing well and meeting expected service levels. However, if you monitor the end-user experience when trying to access the cloud, then you have a better sense of whether your customers are getting the service you paid for and expect.

Closing Thoughts

Like a good therapist, behavior learning technology analyzes behavior (in this case, of end users and applications) with the goal of maximizing health (in this case, of IT and the business). The technology provides real-time visibility related to the end-user experience so that you can detect problems more quickly, efficiently, and effectively to support the business. You can do a better job of identifying the root cause of the prob-

lem, as well as remediating application and infrastructure issues before they impact critical business services. Finally, you can avoid costly application outages, increase customer satisfaction and loyalty, improve the availability and quality of service, and optimize the costs associated with managing business critical applications and services.

For more information about end-user experience monitoring and behavior learning, visit **www.bmc.com/end-user–experience** and **www.bmc.com/proactivenet**.

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