Implementing Proactive Application Performance Management
Implementing Proactive Application Performance Management

Contents

Introduction: The Need for Application Performance Management ...........................................4

The Key Challenges of Performance Management .................................................................5

Identifying the business risks ..................................................................................................6

The economic costs of reactive performance management .....................................................8

Proactive and reactive performance management: pay now or pay later ..............................9

The challenges of proactive performance management ..........................................................10

Proactive service level management .....................................................................................11

The benefits of proactive performance management .............................................................12

Supporting Proactive Performance Management with Symantec i' .....................................12

Making Proactive Performance Management a Reality with a Performance Management Center .................................................................15

Performance Management Center ......................................................................................15

A methodology for deploying the PMC ................................................................................16

Summary .................................................................................................................................18
Introduction: The need for application performance management (APM)

We are at a stage of IT evolution in which businesses are successful only if they manage the risk presented by IT. The decreasing cost of hardware and software has increased the dependency of different enterprise processes on IT. This dependency creates a risk that IT Operations must manage to support a competitive and viable business.

In this context, IT Operations focuses mostly on service availability, while performance issues, which are as damaging to the business, are mostly treated in a reactive mode—after rather than before the problem affects a large business population. The economic consequences of reacting to performance problems rather than tackling them at the first sign of degradation are significant. In a reactive mode, the business impact is already felt and the business losses already consumed when the problem is addressed.

However, managing application performance has never been more difficult. Multiple factors are converging to make the situation increasingly critical.

- **Increasing application complexity.** Application performance has always been important, but it’s increasingly difficult to achieve as applications become more complex, with interdependencies and multiple tiers.

![Figure 1. The Changing Nature of the Enterprise Application](image-url)
• **Increasing reliance on n-tier applications.** For many organizations, Web-based applications have become the primary interface with employees, customers, and business partners—essential to daily operations. The organization faces significant risk exposure if the application is not able to perform up to expectations. A problem in a single tier can have widespread implications. Poor performance can result in lost revenues, loss of confidence, poor publicity, and brand degradation.

IT organizations are starting to address performance risk by looking at application performance management strategically. The best approach to managing performance, of course, is to identify and correct problems before they affect the application's users—proactively. Improving problem detection and monitoring/analyzing infrastructure and application behavior is key to proactive performance management. Implementing this strategy helps businesses manage risks associated with service performance.

This paper addresses strategies for implementing proactive application performance management. It discusses the risks and challenges, introduces Symantec i³™ as an enabling technology, and presents a methodology for deploying proactive application performance management.

**The key challenges of performance management**

With the maturing of open systems, there has been a fundamental shift in IT and its role in the business. There was a time, 10–15 years ago, when companies talked about gaining competitive advantage from IT. Now, with a relatively mature open systems market, anyone can buy and implement packaged software for Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM). Businesses now rely on IT for their very survival. Enterprises can no more function without IT than they could without electricity or telephones.

While IT was once a source of competitive advantage, it is now a potential source of business risk. Businesses can now be competitive only if they manage the risks of IT. Application availability and performance are essential to maintaining parity with competitors. These factors can be measured in the broader category of service delivery.
Identifying the business risks

In a 2005 survey of IT infrastructure managers at companies with more than a billion dollars in revenue, Forrester Research found that guaranteeing consistent, end-to-end application performance was the top challenge identified by the survey respondents.¹

“For what are your top three issues in managing corporate IT infrastructure?”

<table>
<thead>
<tr>
<th>Issue</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent end-to-end application and service performance guarantees</td>
<td>87%</td>
</tr>
<tr>
<td>Unplanned infrastructure changes resulting in incidents and downtime</td>
<td>73%</td>
</tr>
<tr>
<td>Unanticipated infrastructure effects from consolidation and new application projects</td>
<td>49%</td>
</tr>
<tr>
<td>Misconfiguration of network objects</td>
<td>28%</td>
</tr>
<tr>
<td>Wide area network performance</td>
<td>25%</td>
</tr>
<tr>
<td>Other</td>
<td>37%</td>
</tr>
</tbody>
</table>

Base: 67 enterprise IT infrastructure managers at $1 billion-plus companies (multiple responses accepted)

Figure 2. Top Five Challenges for Enterprise IT Infrastructure Managers¹

For 87 percent of the respondents, consistent, end-to-end performance was one of their top three infrastructure issues and their most important challenge. It’s not enough to have fast performance—we want it consistently, all the time. And when performance is not good, we want to understand why as quickly as possible.

¹ “Top Five Challenges for Enterprise IT Infrastructure Managers—And How to Resolve Them,” Forrester Research, March 10, 2005
When performance is slow, user productivity suffers. If the application users are employees, then the productivity of the business suffers. If the users are customers or business partners, then revenues may be affected. And when there is a performance problem, IT has to spend resources and time trying to identify and solve the problem—degrading IT's productivity as well.

The survey cited above shows that businesses are aware of the risks of performance problems. But they’re not doing a very good job of proactively preventing those problems. Other research by Forrester reveals that:

- End users report 73 percent of performance problems through the service desk, which means the problems are not detected by infrastructure management and monitoring solutions. \(^2\)
- It takes an average of six service desk calls to identify the problem owner. \(^3\)
- The typical SLA specifies that 95 percent of level 1 problems are answered in two hours. \(^4\)

Fault management systems aren’t identifying the problems—users are. When the user calls, the problem has already happened and affected at least a portion of the workforce or customer base. The costs are already incurred. If you can detect the problem before it affects end users, you can prevent the impact on availability and productivity. Businesses need to manage performance proactively.

---


\(^3\) “Intelligent Infrastructure Event Management,” Forrester Research, 2003

\(^4\) “SLA Benchmark Metrics,” Forrester Research 2001
The economic costs of reactive performance management

Despite a poor record detecting performance problems, IT is actually spending more on infrastructure and service management. In Figure 3, the green line represents salaries and benefits for IT personnel; the yellow represents software investments; and the red, hardware investments.

Ten years ago, IT was spending roughly as much on salaries as on hardware and software. But the green salary line has distanced itself from the other lines, and is growing at a faster rate than hardware and software expenditures. The complexity and number of applications implies an increase in management personnel, and IT organizations are facing a dual problem: While they’re not doing a very good job of managing service delivery, their costs are increasing. They risk reaching unsustainable cost levels.
Proactive and reactive performance management: Pay now or pay later

There are costs to both proactive and reactive performance management. Using proactive performance management, the costs fall primarily to the IT department, which must dedicate resources to problem identification, analysis and resolution, and solution validation and implementation.

In a reactive approach, the IT department still performs these tasks, after the fact of the performance problem. Additional costs borne by IT might include the cost of external services (to address or solve the problem) and the cost of data recovery.

However, if the performance problem affects the production environment, other parts of the business bear the variable costs of reduced productivity and lost revenue.

![IT Costs + Productivity Costs + Lost Revenue = Real Costs](image)


Figure 4. Proactive Performance Management Now or Pay Later

Productivity costs. In terms of productivity costs, poor or unresponsive performance can be as significant as an outage. If the problem affects production systems, it can incur overtime costs, as work not completed during working hours needs to be done later.

Lost revenue. To calculate lost revenue, you would need to include orders not received during the outage, plus unrecoverable business if a customer chooses to switch to another vendor during the outage.
If you compound those costs, it becomes clear that there is a tremendous economic advantage in becoming more proactive and detecting performance problems before they are visible to the customer or end user.

The challenges of proactive performance management

Why aren’t IT organizations doing this today? Why are most problems reported by the users rather than detected in advance by IT?

The most time-consuming and resource-intensive aspect of incident management is the process of identifying the source of the problem. Once you identify the source of the problem, the rest of the processes could be streamlined by using a better process—which is why so many people are looking at ITIL (Information Technology Infrastructure Library, www.itil.co.uk) today. This is where an efficient performance tool can contribute significantly.

Also, few IT organizations have built performance measurement into service-level agreements. Most SLAs are based on availability criteria, not performance. Availability is easy to understand and measure. But this is too narrow a view. An application that is too slow to use is not truly available to the user. IT’s response that “the server is up” will not be sufficient to the frustrated user.

SLAs have gradually been changing to include additional criteria of performance and accuracy. These attributes are more difficult to measure and understand, but essential. Accuracy means that the end user does not see a 404 error, but in fact sees the right page with the right information. Performance, availability, and accuracy must go together in service-level agreements.

Finally, the structure of the IT organization makes performance management a challenge. At a very high level, proactive performance management is a two-step process.

• The first step is to look critically at the performance of a service and understand which tier or area is degrading the performance.
• The second step is to pass the problem to a technical specialist who can analyze the problem and make the appropriate correction.

In surveys, Forrester has found that large organizations typically have decentralized performance management groups (Forrester Research, 2006). This makes it very difficult to pinpoint the source of a problem or to resolve problems across multiple organizations. These groups tend to manage by committee.
Midsized organizations, when they do have performance management groups, are more likely to have centralized groups, which stand a better chance of success. Identifying an issue in a complex application requires a global, holistic approach, and a centralized performance management function is better suited to look at issues globally than a group that specializes in a particular technology.

Of course, there are still a great many businesses without any dedicated performance management resources. These are the companies that simply throw hardware at performance problems, figuring that hardware is less expensive than performance tuning. This approach is costly and often not effective. If you have a hardware performance problem, you need to fine-tune the problem to identify its source. If the new CPU is faster but uses the same I/O bus, and the performance problem was an I/O constraint, then the upgrade won’t go far toward solving the problem. Furthermore, adding hardware is counterproductive, as adding hardware increases operational and management costs.

**Proactive service-level management**

IT organizations often depend on staff with strong technical skills for identifying and resolving application problems. To solve problems proactively, you need a global view of what the problem might be, as well as expertise in nearly every infrastructure and application component. These skills are difficult to find in one individual.

To manage service delivery proactively, you need:

- **Improved alerts**: the ability to detect small variations in performance for early problem detection. Many performance issues take time to deadlock; you have time to identify them and take action before they become worse.
- **End-to-end visibility**, or the “vertical slice” view of the application. It is important to be able to see what the user is experiencing; what the Web server, application server, and database server are doing; and so on. Full, end-to-end correlation will guide you to the source of a problem.
- **Statistical and historical application and infrastructure data**. It is important to know the distinction between normal performance for a specific time period and performance that is out of range.
- **Optimization of the infrastructure supporting service delivery**. If you maintain historical information about infrastructure performance, you can understand the normal operating range of your infrastructure. Looking at sustained successive workloads, you can, by using a power function (the ratio between workload and response time or the number of potential transactions processed per second of response time) determine the optimal range of operation, and use it as a baseline for normal operations.
The art of architecture and capacity planning is not far from performance management.

**The benefits of proactive performance management**

It is clear from the discussion above that the current, reactive model to service delivery performance management cannot be sustained over time without exposing the business to significant risk. By deciding on a proactive performance management approach, companies can reduce these risks and ultimately reduce costs.

To put proactive performance management in place, you need to start with service monitoring and response time monitoring capable of identifying problems before your users do.

With that monitoring and alerting in place, you can identify problems, quickly and accurately. You can also analyze end-to-end performance to the end user, so you manage performance from the client’s perspective. And you can detect and correct application errors.

A proactive approach ultimately helps business productivity by reducing the productivity losses of production performance problems, and by freeing IT resources from reactive troubleshooting to other strategic initiatives.
Supporting proactive performance management with Symantec i3

Proactive application performance requires a combination of people, processes, and technology. Symantec i3 is an enabling technology that supports proactive performance management.

Research indicates that isolating the source of performance problems is the most resource- and time-consuming task in resolving those problems. i3 supports proactive performance management, in part, by solving this problem. With efficient identification and isolation of performance problems, it is easier to put the people and processes in place to address problems before they become crises.

To address performance problems proactively, you need to understand the end-user experience. Performance problems can appear anywhere along the application transaction path. For example, a customer using an online banking application interacts with several tiers of application infrastructure, from the Web server to the underlying storage:

In identifying and implementing performance management technologies to support a proactive strategy, it is important to select a tool that offers both broad and deep performance analysis. It must be able to monitor and manage performance across the entire transaction path, and offer deep analytics within each tier. Without visibility across all tiers of the architecture, you may think you’re solving a problem when in fact you are only addressing a symptom of the underlying problem or fixing the wrong thing.
Symantec i3 offers visibility into each major tier of the transaction path. It simplifies the complex and time-consuming task of identifying and solving application performance problems, and minimizes the impact of performance problems by identifying them before they affect the end user.

There are three components to the i3 solution suite: Indepth™, Insight, and Inform.

- **Indepth** provides a deep understanding of each major tier of the transaction path. Agent-based technology is installed on each tier within the architecture. Indepth pulls detailed information into a single performance warehouse—providing real-time analysis of what's happening in production environments. This information is stored so that users can also conduct historical trending and analysis.

- **Insight** provides correlation across architecture tiers. Insight helps you be sure you are fixing the root cause of a problem, not just a symptom. It accurately identifies the tier causing the slowdown so you can align the right resources to correct the problem. In terms of the broader performance management practice, Insight helps functional groups within IT collaborate more effectively by providing a common tool and visibility into where performance problems are occurring. This alleviates the finger-pointing and debating that otherwise occurs when there's a performance issue spanning multiple groups.

- **Inform** provides alerting and reporting, and helps organizations conduct analysis and communicate findings throughout the organization.

The i3 solution is offered in configurations to provide end-to-end performance analysis for specific application environments. Symantec is committed to supporting heterogeneous application environments, regardless of back-end database, middleware, and packaged or legacy applications.

Key technical benefits offered by the i3 product family include the ability to perform end-to-end correlation, support for root cause analysis, expert tuning advice (SmarTune), adaptive instrumentation, and a single performance warehouse.
Using i3 as enabling technology for proactive performance management provides several significant business benefits:

- It improves business productivity by reducing production performance problems and their related productivity impact. In addition, it minimizes time spent identifying performance issues so that IT teams can fix issues quickly and get back to work.
- It reduces cost and application chain inefficiencies by identifying the biggest performance problems, and by ensuring that you fix problems appropriately. By identifying and fixing the correct problem, your team can minimize or postpone expenses (such as new hardware investments) that are traditionally incurred in attempts to solve performance issues.
- It improves organizational efficiency by solving the most time-consuming part of the problem management process, and by eliminating the finger-pointing that occurs in case of problems.

Standardizing on a single performance warehouse enhances IT efficiency.

Making proactive performance management a reality with a Performance Management Center

Delivering proactive performance management requires a combination of three elements: people, process, and technology. Technology alone is not enough; you need to manage the technology within the IT infrastructure, working within the IT organization and with domain experts. In this section, we’ll discuss the process and people parts of the equation.

Performance Management Center

When you deploy the i3 technology to address performance management issues, you’re actually deploying a new, critical application in the IT infrastructure. The application consists of agents that collect data, a performance warehouse, and a workstation that allows you to analyze the contents of the warehouse and take action on the performance information.

As with any other application, someone needs to have ownership. At Symantec, we believe this should be the functional responsibility of a Performance Management Center.

A Performance Management Center (PMC) helps organizations take a holistic view of performance. To use a medical analogy, a patient with a headache doesn’t go to directly to a brain surgeon. The patient first goes to see a general practitioner, who asks questions and determines the appropriate course of treatment.
In a similar way, the PMC does not replace the domain experts already in place—the database administrators, system administrators, J2EE experts, and others. But by taking an end-to-end view of performance problems or threats, the PMC can pass problems on to the appropriate domain experts, with detailed and accurate assessments of the issues at hand.

Today, many organizations handle incident management by putting together “SWAT teams” to collect data to determine root cause. Each specialist uses their own tools, with views into their own tiers. This data cannot be easily correlated—which leads to the finger-pointing phase of problem resolution. The PMC provides an end-to-end view of performance across all functional IT teams.

The PMC also can proactively leverage the data in the $i^3$ performance warehouse for greater value. As with any data warehouse project, the value of the data increases as you put it to additional uses. In the case of the $i^3$ data, potential applications include:

- SLA reporting
- Tuning advice
- Utilization reporting
- Level 1 diagnostics
- Application profiling
- Trend analysis
- Capacity planning

For example, the PMC can run “quality-of-service” reports using data in the performance warehouse collected by $i^3$, detecting slowdowns before users complain and mobilizing the appropriate resources to investigate. In addition, the team can analyze resources and trends in support of capacity planning. The data can be used to correlate business activity with infrastructure usage or to perform application profiling for new applications.

**A methodology for deploying the PMC**

Deploying a proactive application performance management practice, with a Performance Management Center and the $i^3$ solution suite as enabling technology, is a significant undertaking. Organizations should clearly outline their expectations and timelines.

Symantec Professional Services has devised a methodology for implementation that broadly follows the ADIM (Assess, Design, Implement, and Model) model.
1. Phase 1: In the first phase, the environment is assessed and the instrumentation is designed.

2. Phase 2: The second phase is to deploy the APM technology, validate the data warehouse contents, and roll out into production. At this stage, the project starts delivering significant value with end-to-end monitoring of critical applications. Companies approach this phase in one of two ways.
   - In an application-centric approach, companies instrument the most critical applications first, followed by the next-most-critical, and so on.
   - In an infrastructure-centric approach, companies focus first on specific application tiers, like J2EE, and then expand the solution to other tiers.

3. Phase 3: In phase three, the PMC team is built, the performance management application processes are defined, the alerts and reports are created for early reporting and trending, and so on.
4. Phase 4: In the fourth and final phase, the PMC develops a range of performance services valuable not only to IT operations but also to IT overall and the organization as a whole. For example, the PMC can benchmark an application upgrade to ensure that it won’t degrade performance. It could monitor resource consumption by business activity and use that data for capacity planning.

The PMC can participate in all four phases of the application lifecycle: planning, building (through testing), operations, and maintenance/new feature rollout.

Taking a structured approach to implementing a performance management practice helps companies achieve a rapid return on investment and identifies key deliveries along the journey that validate the progress.

Summary
The cost of reactive application performance management is far greater and less predictable than the cost of proactive management. Reactive performance management costs are borne not only by the IT group, but also by application end users, who may be employees, customers, or business partners. The potential productivity and revenue losses can be significant.

Enabling technologies such as Symantec i3 accelerate end-to-end performance identification and resolution—but technology alone is not sufficient. You cannot simply put some software in place and feel you’ve implemented a proactive performance management strategy. Long-term success requires a combination of people, processes, and technology.

One strategy for addressing proactive performance management is building a Performance Management Center within the organization. This group will have responsibility for supporting the enabling APM technologies, and will be the first point of contact for problem isolation and resolution. Using end-to-end APM technologies with correlation across layers offers a central, trusted source for performance information and helps the PMC best leverage domain experts to address issues.

With this group and technology in place, organizations can gain the long-term benefits of proactive performance management. In addition to identifying and solving problems quickly, the data collected by the performance management application can support additional, performance-related services, such as new application profiling, capacity planning, and SLA reporting.

Symantec can help ensure a successful adoption of proactive performance management with the industry-leading i3 technology and APM professional services.
About Symantec
Symantec is the world leader in providing solutions to help individuals and enterprises assure the security, availability, and integrity of their information. Headquartered in Cupertino, Calif., Symantec has operations in more than 40 countries. More information is available at www.symantec.com.