

Transforming PC Management with a Preventative Client Health Strategy

We are improving the user experience and increasing productivity by preventing problems or proactively fixing them before users experience an impact.

Executive Overview

To enable an improved user experience and greater employee productivity while reducing support costs, Intel IT is implementing a strategy based on preventative and proactive PC health management.

Our strategy represents a significant change in the way we manage PCs. Like most IT organizations, in the past, we primarily relied on a reactive approach to solving PC issues. The user experienced a problem, contacted the Service Desk, and support technicians attempted to fix it.

We realized that we could achieve benefits by transitioning to a strategy based on preventing problems or proactively fixing them before users contact the Service Desk. We use a variety of tools and methods to implement our strategy:

- We collect event information from PCs across Intel, analyze the information, and create solutions that we deploy to users to improve PC stability.
- We proactively monitor the application performance that users experience in the course of their job duties, identify causes of performance issues, and then create and deploy solutions.
- We provide a tool that lets users schedule resource-intensive maintenance jobs, such as malware scans, at off-peak times to avoid

interruptions to their daily workflow. The tool also collects information about problems such as faulty hard drives, enabling us to proactively replace drives before catastrophic failure occurs.

- We provide self-help tools that enable users to fix common PC issues without contacting the Service Desk.

Results to date include an estimated gain of 4,000 productivity hours due to proactive hard drive replacement and a 30 percent decrease in support tickets related to remote connectivity issues. Users have downloaded about 10,000 copies of the self-help tools, helping to further reduce support calls. By moving resource-intensive maintenance jobs to off-peak times, users are avoiding an estimated 85,000 hours of degraded performance each week.

We continue to expand our strategy to include a broader range of applications and use cases, and we are exploring the use of Intel® vPro™ technology to enable us to remotely perform proactive support activities such as rebuilding PCs.

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BACKGROUND

Intel has more than 80,000 users, all of whom rely on their PCs to be productive at work. If an employee's PC runs slowly or is unreliable, it directly impacts both the employee's productivity and overall business productivity, as well as satisfaction with IT services.

In the past, Intel IT, like most IT organizations, primarily relied on a reactive approach to solving PC issues. The user experienced a problem, contacted the Service Desk, and support staff attempted to fix it.

We realized that if we could transition to a more proactive approach—identifying and fixing issues in the environment before employees contacted the Service Desk—we could achieve considerable benefits. These include improved employee satisfaction and productivity, as well as reduced IT support costs because there would be less need for reactive support. Even greater benefits

could result from a preventative approach—identifying and addressing potential problems before they occur in the IT environment and affect users (see Figure 1).

In 2006, we deployed a PC health check tool that enables users to proactively run basic diagnostic tests and fix problems without the help of a support technician.¹

We also focused on reducing “blue screen” PC crashes. In 2009, we built a tool to collect crash dump data from users’ PCs. We then analyzed the data to identify the root cause of crashes and to develop and deploy solutions. As a result, we were able to reduce the number of blue screen crashes by more than 50 percent.²

Following these initial successes, we have expanded our efforts, developing a series of tools and methods that extend our proactive and preventative capabilities.

¹ “Proactive PC Support Improves Service and Lowers TCO.” Intel Corporation, January 2009.

² “Improving Client Stability with Proactive Problem Management.” Intel Corporation, September 2009.

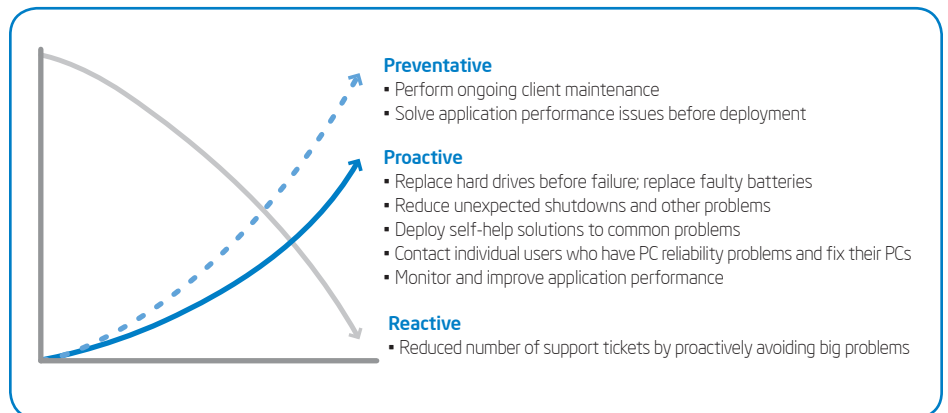


Figure 1. By increasing our proactive and preventative PC health activities, we reduce the need for reactive support.

PREVENTATIVE AND PROACTIVE MANAGEMENT TOOLS

Our strategy represents a significant change in the way we manage PC client health. We are seeking to improve the user experience and increase productivity by preventing problems or proactively fixing them before users experience an impact.

Our goal is also to increase IT efficiency by proactively developing solutions to common problems. This reduces the amount of time spent in reactive mode—responding to employee support requests in order to fix problems that have already occurred. By reducing the need for reactive support, we reduce IT costs overall, which frees resources that can then be directed toward developing new services.

The strategy also represents a shift away from the traditional IT focus on adding new technology features. Instead, we measure success in terms of improvements in the quality of service delivered to users. For example, we set goals such as increasing the number of proactive fixes and reducing the number of problems that require users to contact the Service Desk.

The strategy depends on a close partnership between IT engineering and operations groups. Together, these groups define and implement the strategy: The operations group gathers customer feedback to help identify focus areas and new requirements, while the IT engineering group is responsible for investigating the identified problems and creating solutions.

Key elements of the strategy include:

- We use a variety of monitoring tools to gather information from individual PCs. We aggregate this data and use business intelligence tools to identify issues and analyze trends. Based on this information, we create and deploy solutions to fix the identified issues.
- We provide tools that automate PC maintenance tasks and allow users to control when tasks run. This enables employees to schedule resource-intensive maintenance jobs at off-peak times, so that the jobs do not interrupt daily workflow. In the past, Intel IT dictated when these tasks occurred.
- We developed solutions that allow employees to fix common problems without contacting the Service Desk.
- When we identify a significant problem on an employee's PC—such as a failing hard drive—we proactively contact the employee to address the problem before a catastrophic failure occurs.

Key Monitoring Tools

We use a variety of monitoring tools to gather information from users' PCs. In this paper, we focus on two complementary toolsets:

- Tools included in Microsoft Windows 7* to log and analyze system events. Because we are deploying Microsoft Windows 7 enterprise-wide, these tools provide us with a view of our entire environment. The limitation is that it only enables us to analyze information that is written to the event log, which represents a subset of the issues that the user may experience.

- Software that analyzes application performance from an end-user perspective, allowing us to identify and solve application performance problems. This provides information about specific applications that is not available from Microsoft Windows 7 event logs; however, information is available for only a limited number of PCs in our environment.

MICROSOFT WINDOWS 7* EVENT LOGGING

We use tools included in Microsoft Windows 7 that capture information about system events, allowing us to monitor platform stability, identify the cause of common problems, and apply fixes.

On PCs running Microsoft Windows 7, a variety of events are automatically recorded in an event log on each system. This includes information such as boot time, unexpected shutdowns, wireless LAN connection time, and an index of overall system stability. An agent on the PC forwards the log information to a central repository. We then transfer this aggregated information to a database for analysis.

Analyzing this data gives us an objective view of the health of users' PCs across Intel. This view is based on real data collected from all PCs running the OS, rather than relying on often-subjective information reported by individual users to the Service Desk. For example, we can see trends in the number of PCs that suffer from unexpected shutdowns, and we can see how long it takes to boot individual users' PCs. By analyzing this information, we identify the root cause of specific problems and create fixes that we can apply across the entire IT environment to deliver benefits for all employees.

We have used this approach to analyze problems such as unexpected shutdowns and wireless disconnections. By examining the trend in unexpected shutdowns, we pinpointed some key causes, including a specific version of the disk encryption software installed on some employees' PCs. We identified that an upgraded version was designed to fix the issue, and we used business intelligence tools to verify its effectiveness by comparing shutdown rates on PCs with the original and new versions. The upgrade was subsequently implemented in the environment. As we continued to monitor users' PCs, we observed that, as a result, the number of unexpected shutdowns experienced by users declined by more than 25 percent over a six-month period.

We also have a pilot program to identify employees who have PC reliability problems; we proactively contact them, requesting that they bring their systems to a support center for repair.

APPLICATION MONITORING

Slow application performance directly impacts user productivity and satisfaction with IT. However, in the past, our ability to optimize application performance has been hampered by the difficulty of identifying the performance issues that are actually experienced by users across our environment. Reasons include:

- Lab tests may not reflect performance in Intel facilities and other locations around the world, which are affected by local conditions such as network load and bandwidth. Because of this, an application that performs well in the lab may cause problems when it is deployed to users.
- Platform-level monitoring tools, such as those included in the client PC OS, do not

measure the application response time experienced by the user.

In 2009, we began to address this problem using a tool that measures application performance—from the perspective of an end user—on individual PCs in the Intel IT environment. We collect this data from a representative sample of 7,000 PCs across different geographical regions, using an agent installed on each PC. The agent measures the time required for specific activities, such as sending an e-mail message or launching an application.

We define specific applications and activities that we want to monitor, such as loading a Web site or sending an e-mail message. The software measures the time taken to complete each activity and collects this information into a central database. We then use the business intelligence capabilities of the software to analyze performance and identify causes of problems. For example, we can determine which network locations, hardware configurations, or other factors are typically associated with slow response time.

By analyzing data from this relatively small sample of PCs, we are able to identify application performance bottlenecks and then create and deploy solutions that benefit all employees.

We are using the software proactively, to analyze performance of applications already in production. In addition, we have begun using the software as a preventative measure to identify performance problems with new applications before widespread deployment.

Proactive: Production Applications

We used the software to monitor the corporate intranet, which employees across Intel use every day.

By analyzing the data, we determined that page loads took four times as long in some geographic regions compared to others. We examined which factors were most closely associated with slow page loads and identified key factors—including the subnet used by the employee and the type of hard drive installed in the employee's PC, as shown in Figure 2.

We then took a series of actions to improve performance, including network enhancements and page redesigns. As a result, performance at problem locations improved and became comparable to performance across the rest of Intel's environment.

We also conducted a similar analysis for Intel's internal social media platform, e-mail client, and collaboration software, and achieved performance improvements.

Preventative: Piloting New Applications

We have begun using the same technology as a preventative tool. By piloting a new application to users who have PCs with the application monitoring agent, we can identify performance problems that occur in the Intel environment and address them before widespread deployment. This was not previously possible.

Identifying and fixing problems at the pilot stage means that the subsequent production release performs better. This means users are likely to accept it more quickly, resulting in faster adoption of new capabilities across the enterprise.

We are currently using this approach in tests of a new version of our whole-disk encryption tool, to analyze the performance impact before enterprise deployment.

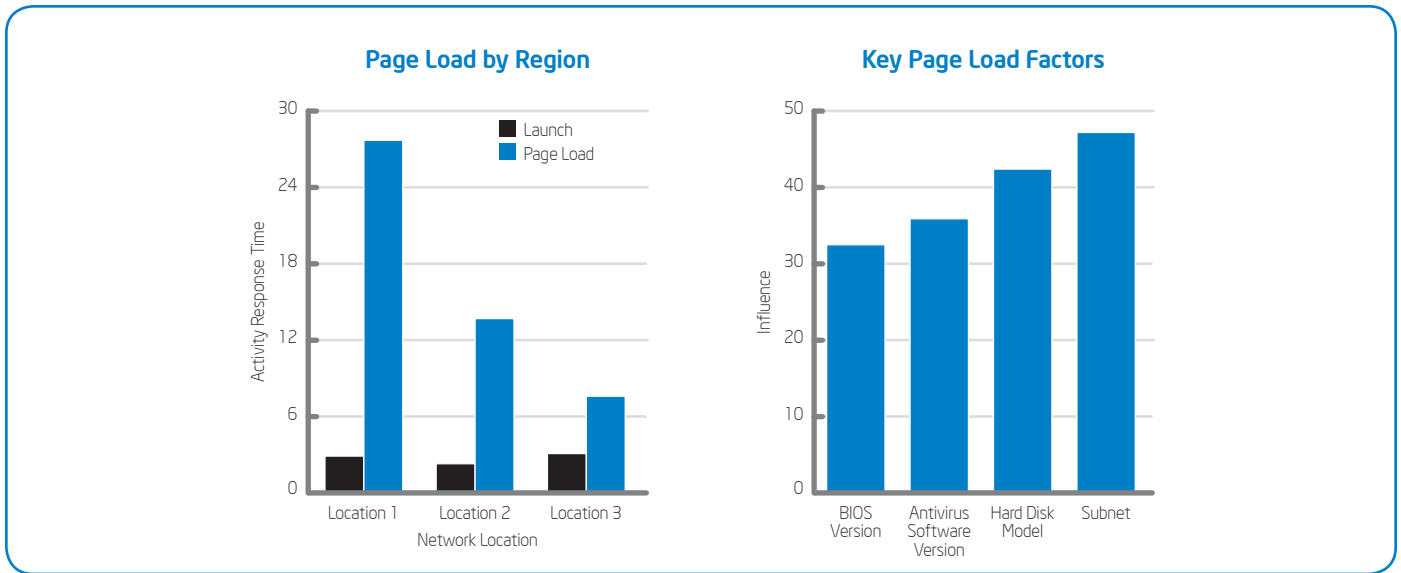


Figure 2. Intel corporate intranet Web site performance analysis.

Client Maintenance Tool

Performing maintenance tasks regularly helps ensure that clients remain stable over time and continue to perform well. Regular maintenance can therefore reduce support costs and improve productivity.

However, some maintenance tasks, such as malware scans, are resource-intensive. While they are running, they significantly degrade PC performance—and often annoy users.

In 2008, we developed a client maintenance tool that solves this problem by enabling the user to schedule maintenance tasks so they run at night or at other off-peak times, when they do not affect productivity. These tasks include malware scans, disk defragmentation, and routine installation of software updates.

While performing these tasks, the client maintenance tool also carries out another important function: It gathers information about the health of key hardware components, such as the hard drive and battery, from sources such as files from component suppliers. This

information is collected into a central repository for analysis and reporting. We then use this information to proactively contact users and perform preventative maintenance.

For example, the tool gathers information about disk errors, enabling us to identify hard drives that have a high likelihood of failing in the near term. If a hard drive fails, it has a major impact on the user and results in a significant support cost. We avoid this by proactively contacting users and replacing their hard drives before failure occurs.

We also monitor battery health to identify batteries requiring replacement, and we have begun monitoring temperature to identify PCs that are in danger of overheating.

Self-Help Tools

Many of the calls that the Service Desk receives are generated by a relatively small number of common problems that are encountered by a large number of users. We realized that by enabling users to fix these

problems themselves, we could significantly reduce the number of the calls the Service Desk receives.

In 2010, we identified a number of the most common problems and developed automated solutions for them. Users can run these solutions themselves; in many cases, this allows them to quickly solve the problem without calling the Service Desk.

We currently have more than 10 tools that enable users to reset forgotten passwords, detect and disable plug-ins causing a Web browser to crash, and diagnose and solve problems with our office productivity suite.³ These solutions are posted on an internal Web site; to make them even more accessible to users, we plan to include links to the solutions within the client maintenance tool. The site receives about 800 user visits each week; so far, users have downloaded more than 10,000 copies of the tools.

³ "Best Practices for Migrating a Large Enterprise to Microsoft Windows 7*." Intel Corporation, October 2010.

Table 1. Client Health Management Strategy Results

Tool	Benefit	Results
Microsoft Windows 7* Event Logging	Gathers and analyzes data about events such as unexpected shutdowns and boot times.	Improved system performance and reliability for all users; analysis contributed to a 25% reduction in unexpected shutdowns. Also used to proactively address problems with individual users' PCs.
Application Monitoring	Analyzes application performance problems actually experienced by employees across Intel.	Solved corporate intranet portal performance problems.
Client Maintenance Tool	Allows users to schedule PC maintenance during off-peak hours; identifies failing components for preventative maintenance.	Employees avoid an estimated 85,000 hours of degraded performance each week. Estimated gain of 4,000 productivity hours by replacing hard drives before failure.
Automated Solutions	Allows users to fix problems without contacting the Service Desk.	Employees have downloaded more than 10,000 copies for use.

SUMMARY RESULTS

Our proactive and preventative client health management strategy is already helping to improve user productivity while reducing reactive support effort.

Key results are summarized in Table 1.

Reducing the Impact of Resource-intensive Utilities

About 19,000 employees have been actively using the client maintenance tool to move resource-intensive jobs such as disk defragmentation to off-peak times. As a result, an average 4.5 hours per client, or 85,000 hours in total, of degraded performance are moved to off-peak hours. Currently, use of the tool is optional; we expect the benefit to increase as some maintenance tasks become mandatory.

Proactive and Preventative Maintenance

We completed more than 4,300 proactive activities for individual users during 2010, as shown in Figure 3, exceeding our goal of 3,500. This saved IT support cost and enabled increased productivity. An additional

benefit is user satisfaction: Employees typically are both surprised and appreciative that Intel IT has identified problems with their PCs and contacted them before they are even aware that the problem exists.

HARD DRIVE REPLACEMENT

Using the client maintenance tool, we identified more than 1,000 hard drives with problems and replaced them before catastrophic failure occurred. Each replacement represents a considerable time savings, both for employees and for support staff. As a result, proactive hard drive replacement resulted in an estimated productivity gain of 4,000 hours during 2010. Replacement before failure requires cloning the hard drive, which takes a support technician about two hours on average, depending on the amount of data, and results in about the same amount of user downtime. Use of the tool enables us to identify more hard drives that can be replaced within the warranty period, at no charge to Intel. In contrast, responding to a hard drive failure requires about six hours of support technician time to rebuild the system and recover data, plus the same amount of employee downtime. Additional time is required to install applications, and there is a risk that the employee will lose work in progress.

BATTERY REPLACEMENT

We replaced more than 1,300 faulty batteries, enhancing the productivity of employees by enabling them to work for longer periods when traveling or at other times when they do not have access to a power socket. Suppliers replace batteries within the warranty period at no charge to Intel.

OTHER PROACTIVE ACTIVITIES

We conducted more than 1,900 other proactive activities, including upgrading firmware to improve performance, rebuilding systems to improve stability, and—based on temperature data gathered from mobile business PCs—vacuuming systems to remove dust and prevent overheating.

Reduction in Support Tickets

Our proactive work to address remote connectivity issues has resulted in decreased need for reactive support, demonstrated by a 30 percent decline in the number of tickets related to remote connectivity. To achieve this, we analyzed support tickets, identified the major issues in the environment, and then sought and implemented solutions.

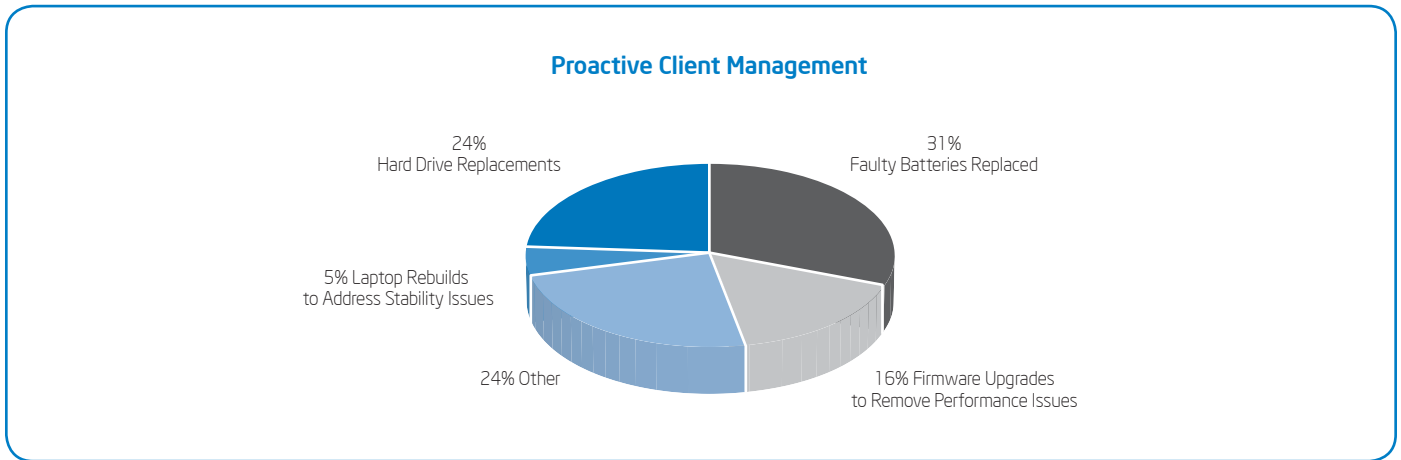


Figure 3. Problems addressed with proactive client management in 2010.

CONCLUSION AND NEXT STEPS

Our strategy represents a significant change in the way we manage PC client health. By preventing problems or proactively fixing them before users experience a negative impact, we are enabling greater user productivity and reduced support costs.

We are finalizing development of a capability that will let us extend our use of business intelligence to help analyze a broad range of problems. For example, we will be able to compare trends at different locations, or based on specific information such as driver version or the model of PC that employees are using.

We plan to continue to expand our strategy to cover a broader range of applications and use cases, and to employ new technologies for better managing PCs. For example, we

are currently developing use cases that take advantage of Keyboard-Video-Mouse (KVM) Remote Control, a hardware-based feature of PCs with Intel® Core™ vPro™ processors with built-in visuals. These use cases could enable us to remotely perform more proactive as well as reactive support activities. For example, if we identify issues with a user's PC, we could proactively contact them and remotely rebuild the PC, eliminating the need for them to come to a local support center.

ACRONYMS

KVM Keyboard-Video-Mouse

FOR MORE INFORMATION

- "Proactive PC Support Improves Service and Lowers TCO."
<http://download.intel.com/it/pdf/320075.pdf>
- "Improving Client Stability with Proactive Problem Management."
http://download.intel.com/it/pdf/Improving_Client_Stability_with_Proactive_Problem_Management.pdf

For more information on Intel IT best practices, visit www.intel.com/it.

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