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IT@Intel: Using PC Client Telemetry Insights to Deliver a Premium User Experience

How an Information Technology Infrastructure Library (ITIL) framework drives improvement

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Table of Contents

Executive Summary

Empowering clients with the tools for self-service from the initial acquisition of hardware, through the lifecycle of their devices, and full circle through device refresh helps IT maintain budgets and forecast future client device needs. Leveraging telemetry is key to improving interactive employee experiences by equipping IT with insights that provide better service, device, and product configurations, resulting in overall improved employee satisfaction.

Intel IT is committed to maximizing client productivity and giving employees access to support without picking up a phone or visiting a service desk. To help achieve this they monitor all managed devices in the Intel IT ecosystem and define this as Client Health. The driving questions behind Client Health are how to quantify captured client data, how to analyze the data, and what to do with that data to deliver excellence in IT support. The answers to these questions help deliver a stable, responsive platform with the right hardware aligned to an employee's needs.

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Background

In the past, Intel employees suffered from various blue-screen and driver-related PC crashes that impacted day-to-day operations. Internal IT satisfaction surveys identified the leading employee request was a need for more stable PC performance. These issues became key concerns for Intel IT leadership. In 2014, Intel IT began to address these needs by internally creating tools and forming task forces to further identify issues in digital experience management and improve the reliability of the platform.

An initiative called the "Client Health" program was launched. Through the Client Health program, Intel IT gathered insights to better measure problems and help understand "what really happens" in employees' PCs. An Information Technology Infrastructure Library (ITIL) problem management framework was adopted to drive systematic and continuous improvement. The program was expanded beyond simply fixing employee PC stability issues to proactively observing with predictive telemetry.

Solution

Intel IT uses the Aternity Digital Experience Management (Aternity DEM) platform—a single solution providing unified monitoring for performance across all types of devices and apps—to proactively identify and resolve issues and sources of client frustration. As the market developed and a variety of telemetry solutions were released, Intel IT conducted a proof of concept test on approximately 3,000 devices. After extensive analysis, in 2021, Aternity DEM was added to the solution portfolio for the Client Health initiative, to simplify the toolset under a single umbrella. Aternity DEM enabled Intel IT to further optimize whole solutions, capturing more user experience (UX) information in real time, using a greatly improved self-service dashboard that decreased time from report to diagnosis to resolution. In early 2022, Intel IT began to roll out the solution globally across the entire PC fleet. Utilizing client telemetry data has aided in identify-ing ideal platform and form factor selection without solely relying on an employee's job role for device deployment. Proactively observing the client's overall device health has enabled Intel IT to start maximizing PC performance as well as monitor and optimize PC power consumption, resulting in an improved UX.

The Client Health monitoring program's objective is to deliver a stable, responsive platform to employees through an optimized IT and hardware stack. Intel IT uses fleet health indicators, change-management decision making, and problem management to identify and triage issues. The program's goals are to have zero impact on the user device
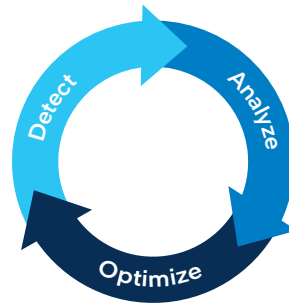

Figure 1. Intel IT uses the Detect, Analyze, Optimize method to manage their client fleet.

while being simple for IT to use and implement self-service analysis across IT support functions. Intel IT uses a Detect, Analyze, and Optimize methodology (see Figure 1) to support their global, diverse workforce while maintaining a high level of satisfaction with approximately 170,000 end-user devices (PCs and laptops) for 121,000 employees and contractors across 138 sites in 53 countries.

Our Methodology

By leveraging telemetry and a Detect, Analyze, and Optimize methodology, Intel IT proactively manages their client fleet and drives the IT Platform experience.

Detect

Three types of data points are harvested: the fault, hardware performance, and the UX indicators.

- **Detecting the fault:** This could be a crash, a blue screen, or error messages. This provides an understanding of reliability.
- **Detecting hardware performance:** CPU, memory, and application performance data. This provides insight if the device is adequate for the applications running on it.
- **Detecting UX indicators:** These may include a client's load times, launch times, PC waits, and other subjective perspectives.

Analyze

Information points are analyzed through different analytic engines and statistical methodologies to quantify if there is a problem and determine what the problem is.

Four stages of analytics are deployed in the process:

- **Descriptive analytics in the detection stage** are leveraged to answer the question of what happened and are then used in trends and descriptive statistic models.
- **The diagnostic analytics stage** measures historical data against other data to determine why something happened. That information can be used in before/after or change-management processes.
- **Predictive analytics** then shed light on what is likely to happen.
- **The final stage is prescriptive analytics**, providing answers on how to remedy the problem.
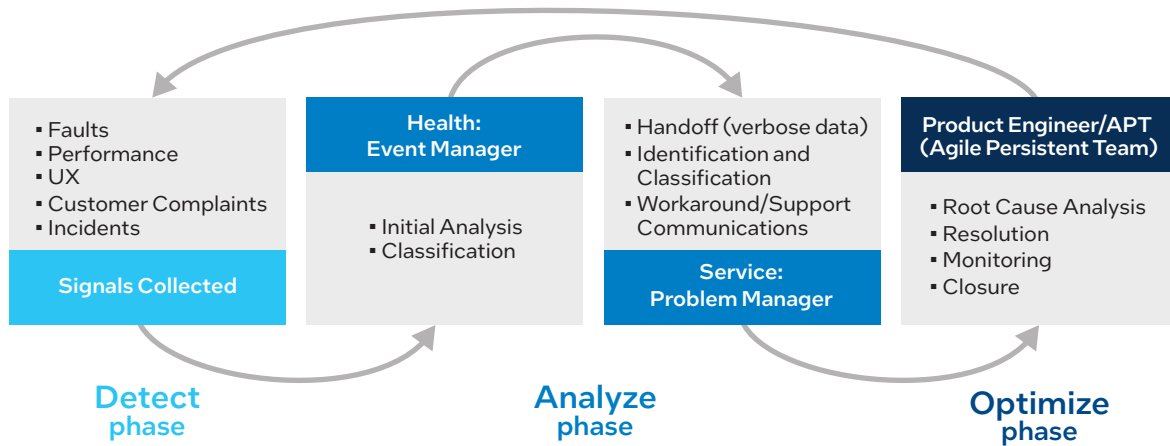
Figure 2. Telemetry Lifecycle for Problem Management (ITIL methodology).

Optimize

To ensure Intel IT is running an optimized environment, any changes to the environment are stringently validated for quality to ensure that issues aren't introduced. A ring-based methodology verifies solutions and validates that problems are truly being fixed. This methodology measures health indicators when making a change to the platform or application, such as using pilot PCs, using data-driven CAB approval (Change Approval Board), correlating change to health indicators, and performing a gradual deployment in growing rings.

Remediation occurs by working with OEMs and vendors to identify when performance is lacking and/or releasing a new patch before the issue can have a major impact on the environment.

Intel employees have high standards regarding device performance. They expect their work device to perform at or above the same level as their personal device. However, they don't necessarily consider the extra layers of security, manageability, drivers, and applications that are added to an Intel-deployed device. Because of this, Intel IT goes through a benchmarking process to compare how Intel-built devices may compare to personally-owned devices without those extra layers. This allows Intel to deliver as seamless of an experience between work and personal devices as possible.

Aternity DEM offers client-side capabilities that help IT manage the daily technology experience of employees by collecting and analyzing telemetry data from employee devices, apps, and networks. One of the agent-based solutions resides on the endpoint itself, showing IT response time between client device, network, and application back end, to resolve issues faster.

The Aternity DEM platform solution was implemented for a variety of uses to help identify user issues causing the employee frustrations. Intel IT captured detailed data such as CPU performance, memory usage, battery life, application performance, network stability, and platform responsiveness, which helps Intel IT to optimize the delivery of employee devices and applications. The captured data was leveraged to inform Intel IT's approach of Detect, Analyze, and Optimize.

Automated Help Desk

The Virtual Assistance Center (VAC) self-help tool is a custom-built client-server application installed on all Intel work devices (laptop/PC) that monitors for certain events and provides self-healing capabilities, automated self-help solutions, and notifications to the user.

Inside the proprietary self-help tool, the VAC has three scenarios:

1. **Self-remediation** that silently identifies and fixes PC issues
2. **System notifications** that alert the user about required actions
3. **Self-help tools** in the form of automated utilities to resolve issues

Using Benchmarking to Test Client Device Health

Intel IT runs industry benchmark tools to measure the power, performance, and responsiveness score on the platform, enabling the quantification of the change being introduced. Intel uses the following strategies to measure the overall platform usage:

- **Comparison benchmarks:** Entails running benchmarks on OEM builds and comparing against the IT build.
- **Before and after benchmarks:** Running benchmarks on the IT build before and after making a platform change.
- **With and without components:** Running benchmarks on the IT build, with and without the component.

To reduce variations between benchmarking results, Intel runs the first benchmark with the OEM build; the exact device is then rebuilt with the Intel IT build and the benchmark is repeated. Each benchmark is taken on the last four platform generations: 9th through 12th Generation Intel® Core™ vPro® Platforms.
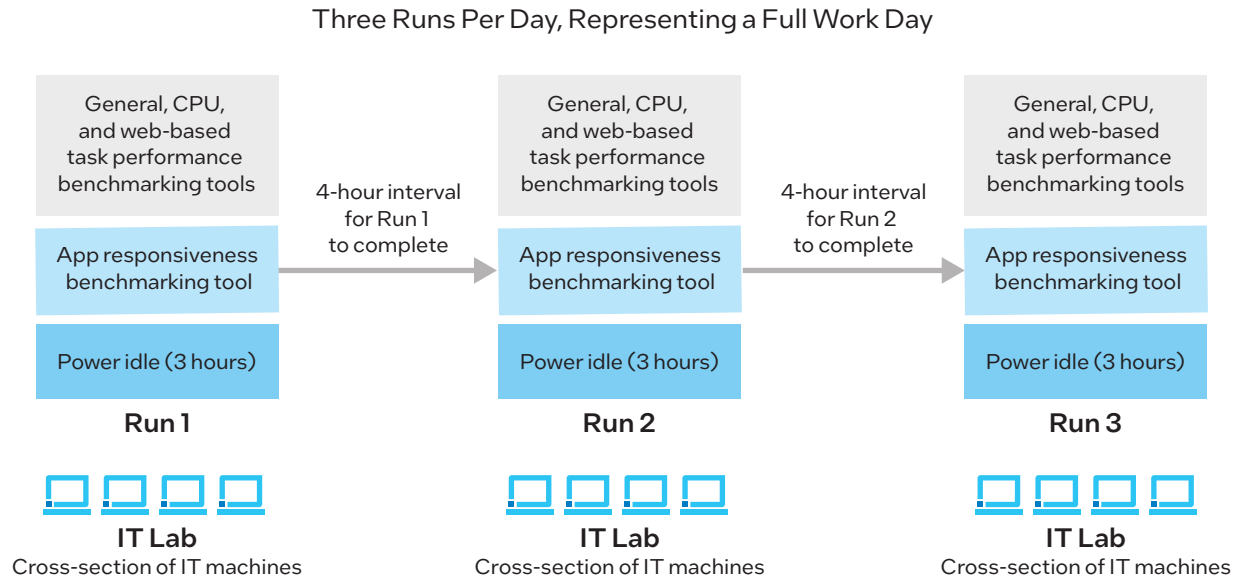
Three Runs Per Day, Representing a Full Work Day

General, CPU, and web-based task performance benchmarking tools	General, CPU, and web-based task performance benchmarking tools	General, CPU, and web-based task performance benchmarking tools
App responsiveness benchmarking tool	App responsiveness benchmarking tool	App responsiveness benchmarking tool
Power idle (3 hours)	Power idle (3 hours)	Power idle (3 hours)
Run 1	**Run 2**	**Run 3**

4-hour interval for Run 1 to complete → 4-hour interval for Run 2 to complete →

IT Lab
Cross-section of IT machines

IT Lab
Cross-section of IT machines

IT Lab
Cross-section of IT machines

Figure 3. Benchmarking Process.

Intel IT performance benchmarking includes:

- **Quantification of enterprise and general-purpose tasks** including productivity, application launch, browsing, and conferencing.
- **Measurement** of web-based workloads, HTML5, CSS, DOM, and JavaScript performance.
- **Analysis of CPU-intensive general-purpose algorithms** such as compression, compilation, database processing and encryption.
- **Idle benchmarking** to quantify which applications and processes are draining battery life.

Understanding Users Through Personas

Typical Intel job roles are numerous and diverse, from manufacturing technicians to system engineers to program managers. As seen in Figure 4, using qualitative, quantitative, and operational data to understand the behavior, IT identified a set of client personas: Builder, Meeting Master, Co-working Crew, Road Warrior, Gear Head, and Free Dweller.

Using device telemetry and persona information, unique clients can be fit with the right device. However, the challenge when when using personas to allocate devices is that clients of the same persona may have different compute and mobility needs.

Builder
- Mostly in lab/factory
- Emails/calls from desk

Meeting Master
- Always in meetings
- Rarely at their desk

Co-working Crew
- Primarily works from desk
- Collaborator
- Typically co-located with core team

Road Warrior
- On the road
- At customer site
- Works from home more than one day a week

Gear Head
- Software/hardware-focused
- "Heads down" with equipment
- Several monitors

Free Dweller
- Able to work anywhere at the office
- Need a powerful and lightweight laptop

Figure 4. Device telemetry and persona information helps fit clients with the right device.
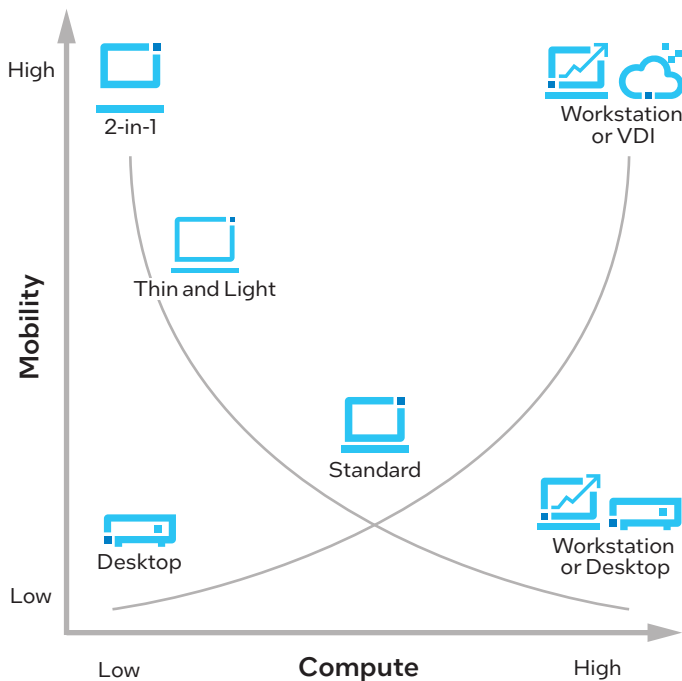
Figure 5. Determining Appropriate Client Form Factor.

Healthy Fleet Management Starts with PC Selection

Allocating devices by persona can be challenging as clients of the same persona may have different needs. This can be addressed by analyzing a unique compute vs. mobility index for each user (Figure 5). Using device telemetry to measure this index Intel IT can key in on a variety of compute factors: the client's existing device CPU utilization, which applications they run, wait times to load applications, and how much memory is utilized. A client's mobility is analyzed by using WLAN telemetry and access points to assess the number of days spent in different locations, as well as the percentage of time spent using battery, and number of charging cycles.

By assigning a compute/mobility index to a client they can be fitted with an appropriate device. For example, an employee with a low to medium compute and high mobility index will be able to select a thin and light or standard device, whereas an employee with a high compute and low mobility index may be more suited to a desktop PC or mobile workstation.

Intel designs their PCs with their own operating system and drivers that meet benchmarked standards for the platform and UX. Intel IT leveraged client telemetry analytics to define their new PC fleet standard as having an Intel® Core™ vPro® i7 processor, 16 GB RAM, and on a 3-year refresh cycle to maximize employee satisfaction and balance ROI.

Results

Successful Patching and Self-Healing

In 2021, these new self-healing tools resolved more than 1.3 million issues (70,000 fixed via self-help), reduced the number of IT incident tickets by 30%, and resulted in a 40% faster resolution time. This allowed the service desk to meet its service-level agreement 95% of the time with an escalation rate of less than 0.05%[6] All of these innovations support Intel IT's long-term objective to provide end-users with the right tools to fix issues, without help-desk support.

The strategic system of Detection, Analysis, and Optimization has produced positive results. The focus on patching, updates management, platform stability, and client health has been a winning strategy. Unexpected shutdowns decreased by 40% over a 40-week period.

Extended Telemetry Support

By employing the Aternity DEM platform, Intel IT can improve support for specific users and devices. Rather than being routed through the problem management process, all detected device anomalies are labeled a Proactive Incident and the user is engaged to resolve the issue. If hardware related issues are detected, the user is prioritized for a Hardware Upgrade. Additionally, near real time telemetry allows the help desk to reduce investigation time when troubleshooting a PC (Figure 6).
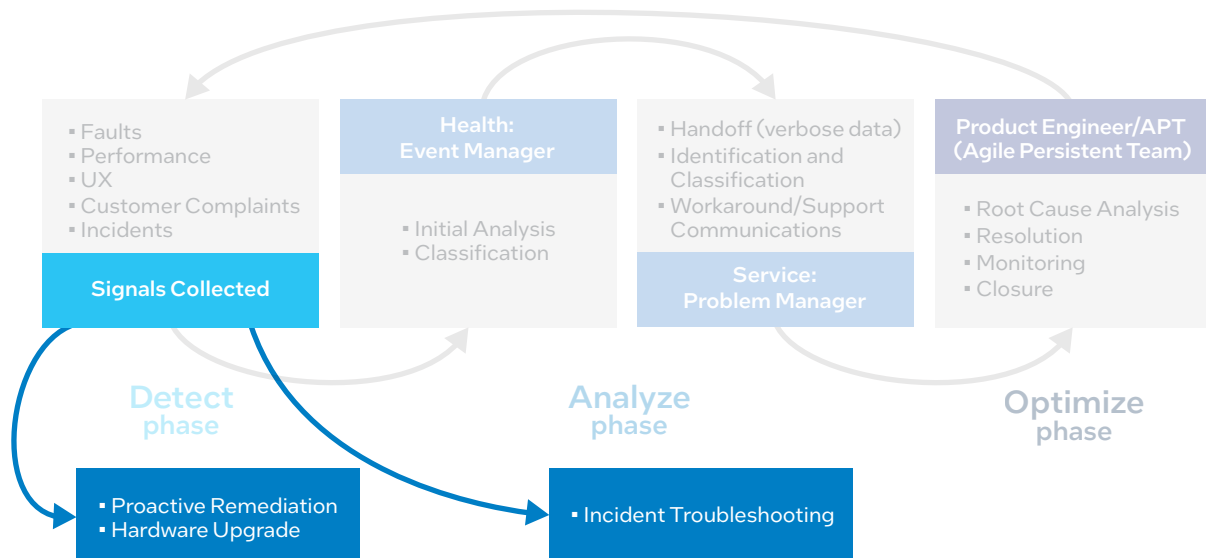

Figure 6. Enhanced ITIL results in instant incident resolution via dashboard as well as proactive device recommendations.

Conclusion

Intel IT has leveraged the client telemetry data captured for an impressive list of wins. In addition to resolving the original problem of critical PC performance, they have also defined optimal PC specifications for the organization and a methodology that allows employees to self-select the best-fit device. Additionally, this resulted in the development of self-healing tools that can be used for employee-led remediation, increasing productivity. In 2022, across the corporate fleet of over 190,000 managed devices, satisfaction from Intel IT PCs jumped by 27.4% since 2020. By continuously refreshing data models and methods to identify issues, Intel IT delivers a consistent and highly mobile-capable experience that improves productivity, creates a seamless experience across platforms, and delivers a stable workspace.

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