

HP OpenView Self-Healing Services

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Abstract

The ability to meet 24x7 computing demands is a critical business success factor. This is why HP customers need OpenView management software such as OpenView Operations, Network Node Manager and Service Desk. However, if this management software fails, the customer's infrastructure can fail without them knowing it. HP OpenView Self-Healing Services automates the support process by monitoring and reporting on HP's management suite across the customer/HP connection in order to assist both the customer and HP with problem diagnosis. HP OpenView Self-Healing Services does not automatically attempt to implement any solutions in the customer's environment, but it does reduce the time required to resolve technical issues associated with HP management software and it works proactively to minimize unscheduled downtime. HP's capabilities for monitoring, analyzing, and proactively responding to management software faults in the customer environment have differentiated HP as the leader of self-healing services for enterprise management applications.

Introduction

The lifecycle of a software fault often generates large debates on how the break/fix cycle should be handled. Fault handling often reflects the technological history of a given organization. Some organizations have a rich plethora of tools to capture, analyze and fix problems that occur in the production environment. Others simply keep track of the fact that a fault occurred and restart the production system in question, hoping that the problem will not reoccur. More sophisticated shops will have implemented a software management framework such as HP OpenView Operations to mechanically watch the infrastructure, services, and applications that make up a modern data center. These management frameworks have become so ingrained into the operating model that a framework failure constitutes a critical service failure. These kinds of failures are extremely difficult to capture, analyze, and pinpoint the root cause.

Self-Healing is the next step in the evolutionary cycle of management. Software faults are detected by both independent monitors and self-management modules in the software itself. The detection of the fault causes the traditional fault lifecycle to be instigated, but with a twist. In the current model, software faults are detected by people. Those people then contact their software support provider (e.g. HP), describing the fault and the series of events that led up to the fault. The support provider will ask the customer to collect a significant number of artifacts (files, messages, etc.), which they will then use to search databases of known problems and issues in an effort to determine if the issue is known and whether a solution exists for the issue. If known, the results will be given back to the customer, often with a directive to "try this and let me know if it doesn't work." This comprises four distinct phases: detection, collection, analysis, and reporting. The collection/analysis phase is often repeated many times, which requires a lot of the customer's effort and time. HP OpenView Self-Healing Services is the automation of this lifecycle.

Benefits of HP OpenView Self-Healing Services

As companies have become increasingly dependent on their IT infrastructure to drive business operations and growth, every moment of downtime can critically impact their business. These service disruptions can result in negative publicity, loss of customers, and a multitude of financial repercussions.

HP OpenView management software applications play a key role in efficiently managing enterprise infrastructures, so it is crucial that any HP OpenView application faults are quickly detected and resolved. By optimizing HP OpenView fault detection and resolution, HP OpenView Self-Healing

Services allows customers to spend less time managing their HP OpenView software and more time managing their business!

Specifically, HP OpenView Self-Healing Services provides the following key features:

Problem detection

- The problem is detected automatically, no user intervention is necessary.
- The HP OpenView Self-Healing Services software is “self-aware”, and can report to customers and HP support personnel when it detects an internal problem.

Real-time data collection

- The fault handler gathers real-time, context-specific data required to resolve an issue without user intervention.
- The data is collected at the time the fault occurs, reducing issues caused by troubleshooting with stale data.
- The fault handler collects targeted data relevant to the fault by using context from the application in the data collection facility.
- Verification is provided that a problem exists.
- The possibility to configure which data can be collected and which cannot is offered.

Streamlined problem analysis and recommendation

- The first interaction that the user has with HP is about a solution, not just the problem.
- The service analyzes the fault information and quickly generates a report to inform the user of potential solutions.
- Users receive potential solution information needed to resolve the issues instead of taking time to manually search for what is relevant.
- Users receive HP product patch analysis recommendations to assist in maintaining their HP OpenView implementation.
- Fault information is accumulated over time to help expedite future solutions to common problems and to provide feedback information that can be used to continuously improve the quality of the HP OpenView applications.
- Problems detected in a significant percentage of the installed base will be targeted for proactive notification to all supported customers.

Efficient support case initiation

- The system provides the ability to convert the incident into a support case that includes all analysis and collected information via a simple online interface.
- HP support engineers can begin working on the problem immediately because they have data for troubleshooting when the case is opened.

- Cases are properly documented and include data necessary to examine the defect within the proper context—at the time the defect occurred.
- The system detects the fault and submits incidents automatically, eliminating the initial customer calls about a software problem.
- Customers can submit support cases with a single mouse click
- For faults or anomalies not auto-detected, users can manually enter information to instigate the HP OpenView Self-Healing Services process.

Limited impact to production

- HP OpenView Self-Healing Services is a small, lightweight process (light footprint, minimum resource utilization) that runs in the background with minimal impact to production processes.
- The HP OpenView software environment is supported via a strong partnership and linkages with HP Instant Support Enterprise Edition (HP ISEE).

The need for HP OpenView Self-Healing Services

Although HP software support engineers provide outstanding customer assistance, they often cannot do their job without help from the customers. The support engineers need information from the customer environment in order to address a product issue, and the customer is unfortunately burdened with the mundane and time-consuming task of gathering unfamiliar information, packaging it up, and transporting it to HP. At times, there are miscommunications concerning the information that is specifically required and how it can reliably be sent to HP. It is also not unusual for support engineers to find that the initial data they requested is insufficient for solving a case. More time is then required to retrieve supplemental information from the customer. This cycle of information request and retrieval can sometimes continue for days, resulting in customer frustrations and less than ideal case resolution times.

This is why the HP Software Support organization has remained focused over the years on shortening the break-fix times for customers and simplifying our customers' lives. This has led to the creation of the HP Software Support Online portal and ultimately HP OpenView Self-Healing Services. The Software Support Online portal was created to enable customers to quickly find troubleshooting and solution information for HP software faults, as well as to locate support services – at anytime, from anywhere. With the Software Support Online portal, customers can proactively access the HP knowledge base using a web-based search engine. As a result, customers can often discover information needed to fix a problem and initiate the fix rapidly, without needing to involve a support engineer. The Software Support Online portal can also be used to track the status of logged defects, register for notification of new patch releases, and log a support call electronically – all via a web browser.

Still, there was more that could be done. HP wanted to give more time back to customers by further simplifying their support interactions and by helping to keep their HP software applications running efficiently. HP OpenView Self-Healing Services extends the capabilities of the HP software call centers and the Software Support Online portal by liberating customers from the burden of mundane support-related tasks, and by accelerating resolution times for problems that may occur while using HP software products. With HP OpenView Self-Healing Services, customers enjoy the benefits of an intelligent service that can automatically detect a fault that occurs with an HP software product running in their environment – perhaps even before they know that a fault has occurred. HP OpenView Self-Healing Services can also automatically offer troubleshooting and solution suggestions

for a detected fault, typically much faster than a human could search and locate such information. And, at the click of a web link, customers will be able to easily engage a support engineer if they wish to have HP support personnel involved with the resolution of a fault at any time.

The HP OpenView Self-Healing Services Strategy

Management for the Adaptive Enterprise

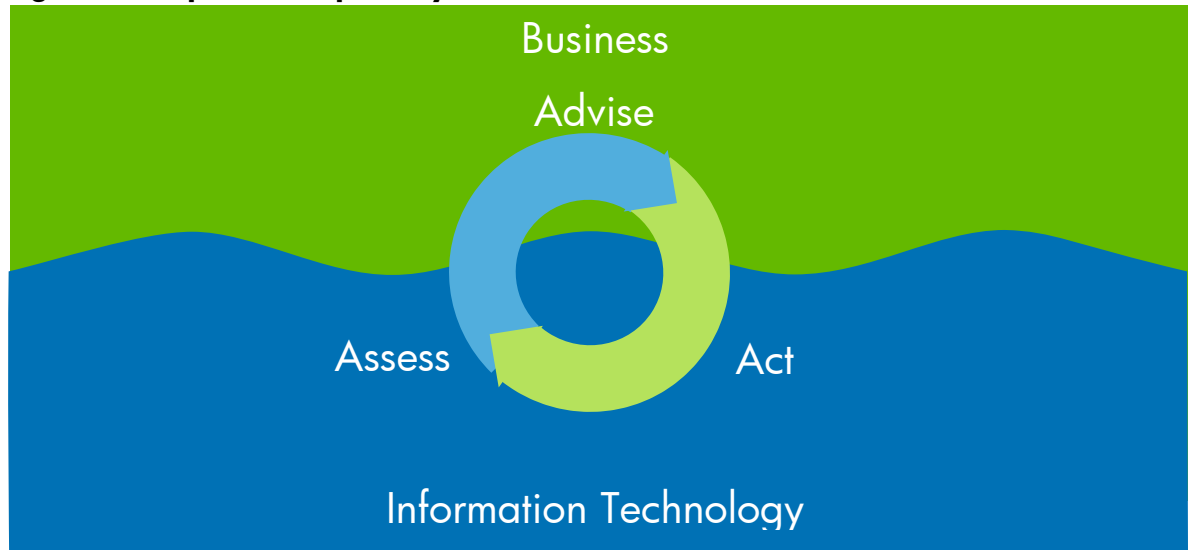
The HP OpenView network management software helps keep enterprise infrastructures running smoothly. The Adaptive Enterprise is a new paradigm in which management software can extend these capabilities by linking business goals to operational infrastructure activities in an optimized manner, and dynamically manages the enterprise infrastructure applications based on specified business requirements.

In today's world, business services are no longer tied to applications running on individual systems, but are dependent on a networked fabric of servers, storage and applications. These services are wholly dependent on the network. Therefore, network monitoring, management, and maintenance is a fundamental building block of the Adaptive Enterprise vision. Driving this requirement is the desire to fully integrate individual systems, business processes, and infrastructures across enterprises. HP Adaptive Enterprise solutions build upon the HP OpenView history in network management. This foundational component provides the core support for the management needs of distributed business processes and services.

In order to support business objectives, these distributed business processes must be able to adapt to changes both in external requirements as well as the underlying infrastructure. In the same way that traditional computational processes depend upon the operating system to provide basic services such as scheduling, resource allocation, performance tuning and fault handling, the HP Adaptive Enterprise management platform allows these distributed business processes to dynamically interact with the management capabilities that it provides.

The Adaptive Enterprise management platform connects a high level distributed business process to the appropriately virtualized services and resources upon which it depends. It models the dependencies and interactions between them, and provides the capability to initiate actions at one level that in turn invoke associated actions on the levels beneath. The business process can then access this model and invoke actions upon it programmatically, enabling the business user to adjust capacity through a familiar business application, while the underlying infrastructure reacts automatically.

Figure 1 Adaptive Enterprise Cycle



HP OpenView Self-Healing Services is an integral part of the Adaptive Enterprise management strategy and portfolio. It assesses the management software environment, advises the customer with potential solutions to problems, and enables the customer to act quickly to resolve the problem. This automated cycle ensures that the enterprise management software remains available and operational, which in turn enables the customer to focus on running their business.

Built-in supportability

New applications being developed by HP are incorporating the ability to be “self-aware”. This means that the application monitors its own actions and can trigger a support event without customer intervention. These self-aware applications dramatically improve the ability to determine root cause through the use of failure contexts passed to the collection facility.

Customer focused and quality driven

HP OpenView Self-Healing Services enables HP to continue providing its customers with the best support experience in the industry. HP OpenView Self-Healing Services enabled products have invented a new way of not only providing support to customers, but also managing the support experience for them. By managing the support experience, HP is taking the lead and delivering on a promise to deliver high tech at a low cost.

HP OpenView Self-Healing Services was born out of a focus on the customer. The question was asked, “How can HP mobilize tools and knowledge to really make a positive difference for customers?” The answer was to put HP assets together in such a way that they could be provided not as disjoint pieces but instead as a valuable product capability and service to our customers. After sharing and shaping the idea with several customers, a pilot was launched to engage customers, which helped drive and shape the first releases of HP OpenView Self-Healing Services. HP has continued this tradition by actively engaging customers in beta testing, feedback, and collaboration for every release of Self-Healing Services. As is already the case, customer feedback and collaboration will continue to be the key drivers of evolving self-healing capabilities and services.

HP OpenView Self-Healing Services is a significant and meaningful new way of providing support, and has been intentionally designed to be a simple solution built on a strong foundation of trust between HP and customers.

HP OpenView Self-Healing Services has been developed because of a passion to enable customers to succeed. Most companies utilize support tools and information to resolve customer issues. HP is the only company who has put these assets into an end to end product capability and solution that automatically delivers value to the customer twenty four hours a day, seven days a week. Instant and automatic access to fault detection, data collection, analysis and knowledge sources have all been developed with one goal in mind, "To manage the support of HP software so that customers can put all of their focus on using HP software to run their businesses."

Why should customers have to choose between innovation and price? HP OpenView Self-Healing Services are quickly being deployed across the HP OpenView software portfolio as a part of the foundation support offering. All customers with HP Software Support are able to use Self-Healing Services today for no extra charge. Additionally, the Self-Healing Services capabilities will ultimately be extended to HP OpenCall and HP storage software products.

Highlight:

All HP Software Support customers are able to use HP OpenView Self-Healing Services today for no additional charge.

Why should customers have to choose between stability and agility? HP OpenView Self-Healing Services allow our products to continue to release quickly while providing an ability to evolve as environments change. HP OpenView Self-Healing Services provide immediate access to support tools and resources that are continuously evolving.

HP OpenView Self-Healing Services and industry standards

The latest industry standards and best-in-class technologies have been utilized in the HP OpenView Self-Healing Services program where appropriate. The Self-Healing Services system relies heavily on standardized java / J2EE technologies with Service Oriented Architecture principles guiding the end to end design. All data exchange technologies are based on XML, and the latest Oracle technologies are used for data persistence. The JSP web pages used for displaying and managing Self-Healing Services are contained within an Apache Struts framework. Additionally, web service interfaces are available as a means of interaction between Self-Healing Services server components and other internal HP systems.

The Self-Healing Services server infrastructure is also geared for high-availability, with web services and JMS communications used to guarantee service delivery and ensure that customer incidents are processed in a timely manner. High-powered servers are globally distributed to manage the load of arriving customer events and information. The servers are also redundant - if one server fails, traffic will be diverted automatically to a backup server until the primary server comes back on line.

The HP Instant Support Enterprise Edition (ISEE) program comprises another set of technologies that are leveraged by the HP OpenView Self-Healing Services program. ISEE is positioned to deliver a common, secure connection between HP and customers. The connection is based on encrypted HTTP and is used by other HP organizations for self-healing hardware support. There are over 170,000 HP ISEE installations at customer sites across the globe.

In the future, industry standards and leading technologies will continue to be leveraged, ensuring that the best possible self-healing solutions are offered to customers with every release.

HP OpenView Self-Healing Services Implementation

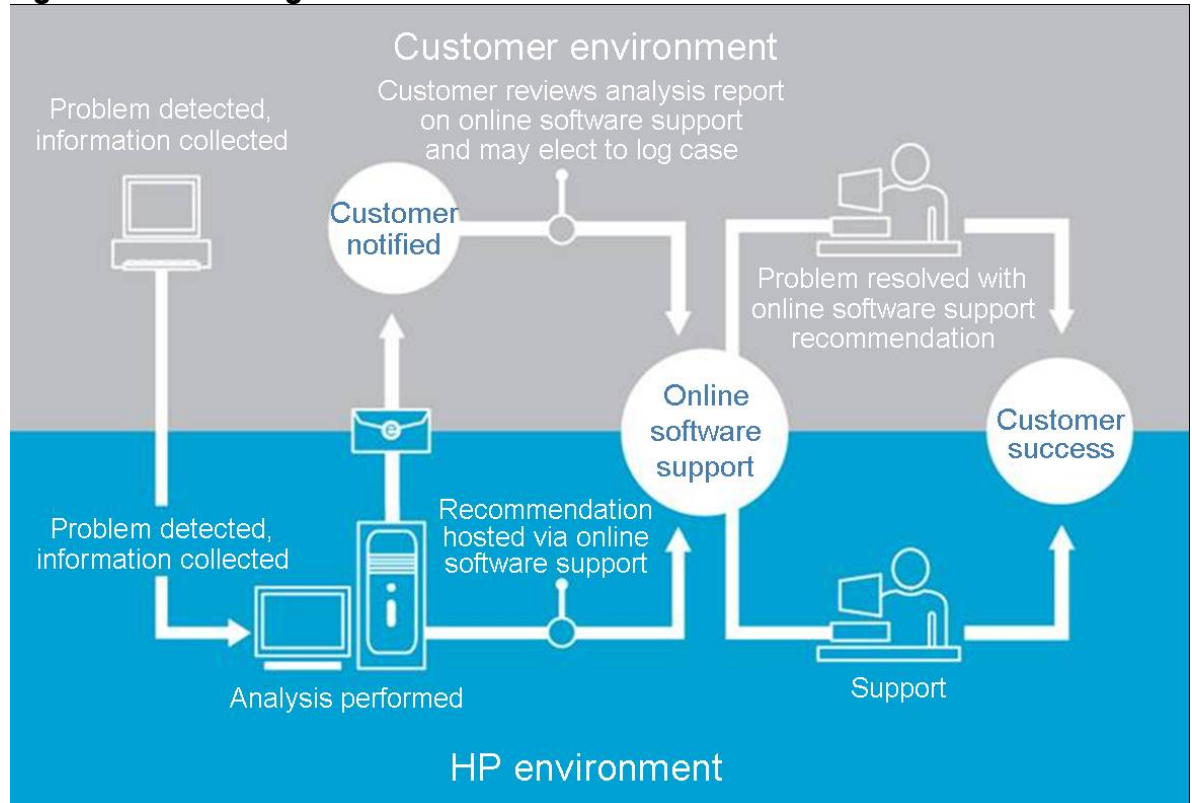
While other technology companies are still talking about self-healing, HP has already delivered an initial set of self-healing services to customers. Implementation of HP OpenView Self-Healing Services is composed of eight key functions. These include fault detection, data collection, data transport, entitlement, analysis, reporting, notification, and enhanced support case submission

Process summary

To enable HP OpenView Self-Healing Services, a Self-Healing Services client must reside on a system with management software (e.g. HP OpenView Operations, Service Desk, Network Node Manager, etc) in the customer environment. The management software either sends a fault event directly to the Self-Healing Services client or the Self-Healing Services client automatically detects a fault in the management software that resides on the same server, and collects troubleshooting data and system information relevant to the fault at the time that the fault occurs. If the customer environment is setup to support communication with HP, then the Self-Healing Services client transmits the fault data to HP where the data is analyzed to determine possible known solutions and the patch status of the management software on the customer system. These analysis results are published to the Software Support Online portal in a private and protected area. Next, an email notification is sent to the IT administrator at the customer site. The email contains a web link directing the customer to their analysis report on the Software Support Online portal. A web link on the analysis report page permits the customer to automatically submit a support case if the analysis results do not adequately address the problem or if the customer wishes to pursue the resolution of the problem further without consulting the analysis results.

The following diagram illustrates this process.

Figure 2 Self-Healing Services Process Flow



Fault acquisition

Faults are detected in one of three ways.

- The application itself determines that something is not operating properly.
- A monitoring application determines that the software is not operating properly
- The customer determines that the software is not operating properly.

If detection was done through an external application (application self-detection or third party monitoring), the Self-Healing Services client is notified of the fault using an HTTPS transaction. The Self-Healing Services client uses business and logical rules to process and route the fault event. Any given event can be ignored, suppressed, held, or submitted to HP. The customer can optionally set a notification to be sent to a management console indicating a Self-Healing Services event has arrived.

The client can be configured to ignore specific events. This would be used in the case of faults or events that are known and need no further handling. An example would be "message browser full" events for companies that do not monitor their message browser.

Suppression is used to prevent event storms within Self-Healing Services. When the Self-Healing Services client is notified of a fault, it will not process that fault again until the specified time window has passed. By default a triggered event will not re-trigger Self-Healing Services processing within a user-configurable period of eight hours.

Data collection

Events that are not suppressed or ignored due to the rules applied to them are treated as formal support incidents. The first step in processing an incident is to perform automatic data collection focused on the problem being handled. The type and amount of data is controlled by the context of the fault and the specific application that has the problem. Whenever the fault is detected by the software, it passes information known as context to the Self-Healing Services client. This context is data that allows the collector to target specific data relative to the fault. This also prevents collecting large amounts of irrelevant data.

All collections include the base operating environment; OS, version numbers, etc. All collections also include installed OpenView application information such as the supported applications installed, the versions of the supported applications, and the list of installed patches. This allows for detection of missing patches, conflicting patches, and conflicting applications. Targeted collections include key data specific to the application such as log files and environment settings.

The Self-Healing Services data collectors are created in the HP OpenView R&D labs, and shipped with the latest product versions for which they apply. New data collectors can easily be integrated with an existing Self-Healing Services client.

Data transport

Once collected, the data is stored on the customer system. If the customer's environment is set up to support data transfer to HP and their configured Self-Healing Services policies allow it, then the fault and collected data are sent through the Self-Healing Services client communication gateway (which uses an HP Instant Support Enterprise Edition (ISEE) client) to deliver the incident to HP via a secure, encrypted connection.

If the customer wishes to inspect or withhold information to be transferred to HP, they can set up a policy to hold incidents. This allows them to inspect and manually release events to HP as they see appropriate. There is no requirement that any information ever be sent to HP, because the client by default runs without a connection to HP and must be manually enabled by the customer to communicate with HP. However, this would prevent the customer from receiving valuable reports on patch status and potential solutions to the problem at hand.

Highlight:

The customer is in full control of the data sent to HP. The customer may also choose to not send any data to HP.

Once the fault data has been sent and received at HP, it is processed by a number of distinct services that are synchronized by a coordination engine.

Entitlement verification

At HP, the fault data is first processed by an entitlement system, which determines if the customer's support ID is valid. If the support ID check fails, then the data is not processed and an email notification is sent to the customer to inform them of the issue. The email also includes a URL that will take the customer to a Software Support Online portal web page where the customer can re-enter the support ID to rectify the entitlement verification.

Analysis

After the customer's support ID has been validated, the coordination engine forwards the fault diagnosis data to the analysis service engine. The analysis service engine runs several analysis services:

- Patch Analysis – The customer's software patch level are compared to current patches in order to determine what patches (if any) are required to bring the customer's system up-to-date.
- Solution Document Search – The HP Software knowledge bases are searched for troubleshooting and solution documents that match the problem.
- User Forum Search – The HP ITRC message forums are searched for troubleshooting and solution documents that match the problem.
- Product Configuration Analysis – In the case of an OVO or NNM fault, additional analysis is performed to identify system parameter settings that may lie outside recommended bounds.

Reporting and notification

Next, the generated analysis results are formatted as an analysis report that is published to the Software Support Online portal in a private and protected area (the report can be accessed externally only by the customer.) Once the report is available for viewing, an email notification is sent to the customer. The email includes an embedded URL that will take the customer to the published analysis report on the Software Support Online portal.

Customers whom log in to the Software Support Online portal to access their analysis reports will find a wealth of information that can be used to accelerate troubleshooting or quickly solve the management software problem. However, HP recognizes that there can be times when the customer may not find the analysis report detailed enough to help solve a particularly difficult problem, or the customer may not wish to attempt to solve the problem by consulting the analysis report. In these situations, customers can select a support case submission URL at the end of the analysis report. If this link is selected, a support case will automatically be created based on the data gathered from the customer system and the generated analysis results. In addition, the support engineer is given full access to an HP internal, secure solution knowledge center containing the collected data and additional trending analysis tools. This allows the support engineer to quickly review the nature of the fault conditions before contacting the customer, which translates into faster resolution times even for cases where the customer needs additional assistance from the support engineering team.

Highlight:

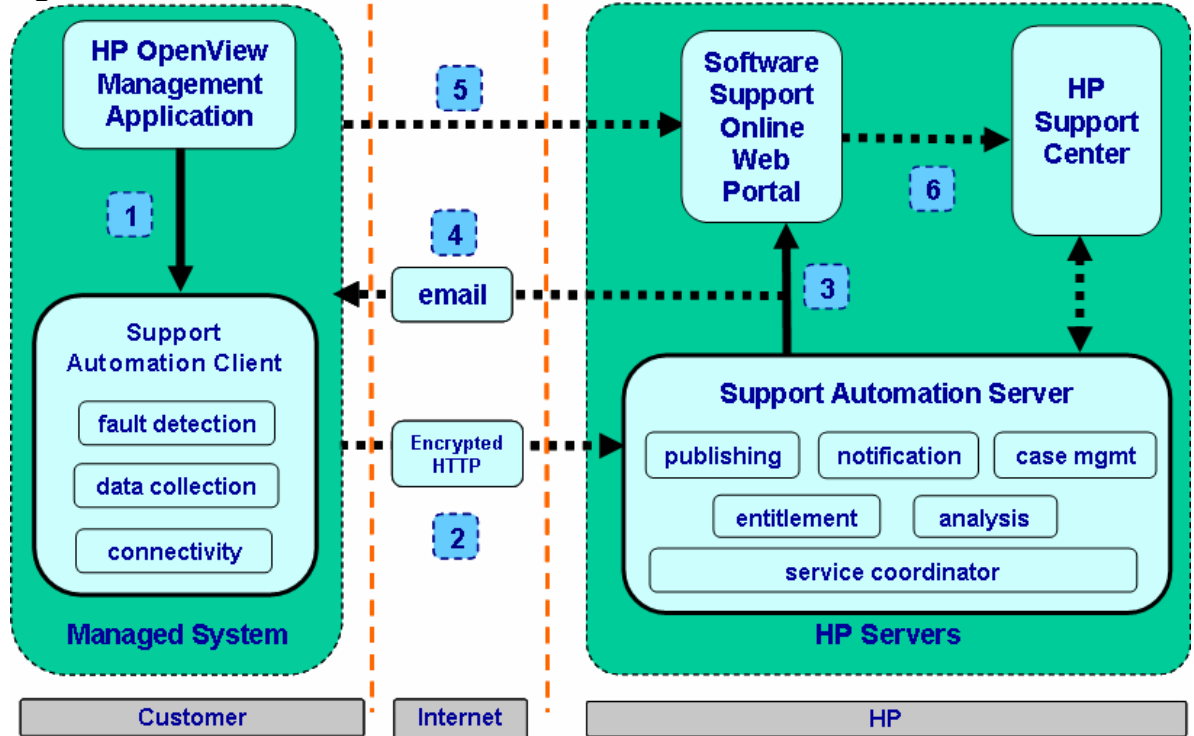
The customer can get additional help by simply clicking a link to create a support case. The information provided by Self-Healing Services helps the support engineer to more quickly solve the problem.

The Self-Healing Services system also includes several other noteworthy features. The Self-Healing Services system incorporates an incident lifecycle process that enables customers to manage their list of open incident analysis reports by dismissing (or "closing") the analysis reports that they are no longer interested in. Open incident analysis reports that have not been accessed by a customer for 30 days will also be demoted to the closed state automatically. However, customers can always access their closed incidents and re-open them if the need arises. If a closed incident is not accessed

for 90 days, it is moved to an archival state and will no longer be available for direct access from the Software Support Online portal.

The following diagram illustrates the conceptual architecture used to implement HP OpenView Self-Healing Services as described above.

Figure 3 End to End Architectural Overview

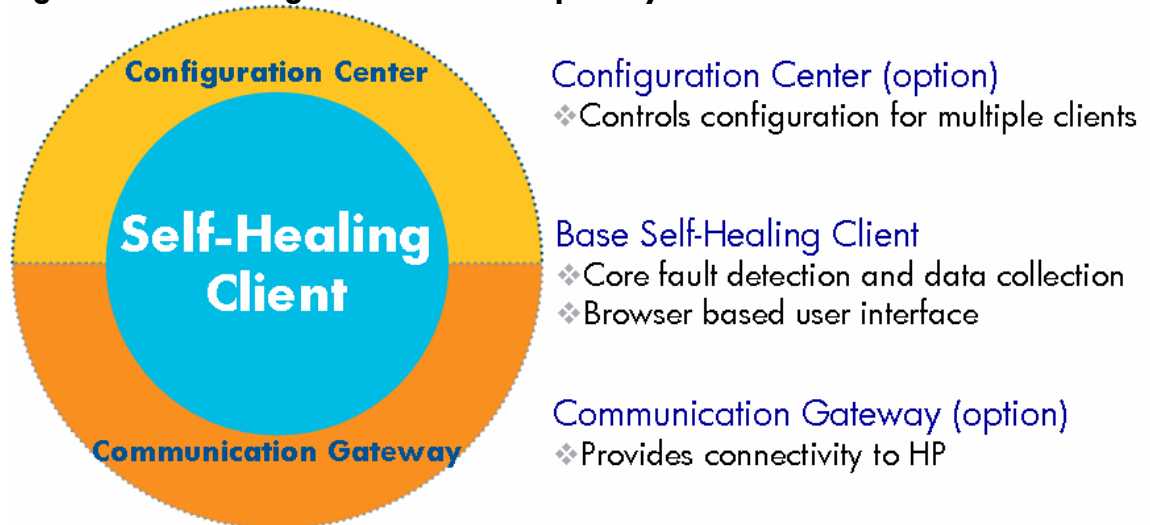


Self-Healing Services Client

Capability Set

The Self-Healing Services client has several distinct capabilities that it provides.

Figure 4 Self-Healing Services Client Capability Set



Base Client

At its core, every Self-Healing Services client performs core fault detection and data collection. Every client also provides a web browser based user interface to allow users to interact with it. In addition, the client has a few optional features that may be enabled depending on the customer's preferences. When a client is installed without any optional features enabled, it may be referred to as a managed client.

Configuration Center

The Configuration Center feature allows the client to control advanced configuration options for both the local client and for other clients in the environment. This feature allows the customer to manage the entire Self-Healing Services environment from a single location.

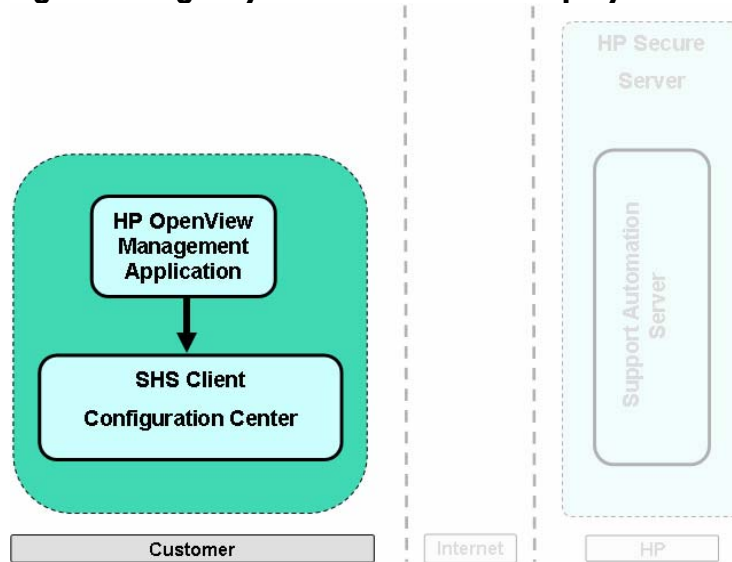
Communication Gateway

The Communication Gateway feature allows both the local client and distributed client to send incidents to the support vendor (HP). In a distributed environment, only one client with the Communication Gateway feature enabled is required to connect to HP. All other clients may connect through this client. However, multiple Communication Gateways may be enabled in each environment to provide redundancy and ensure availability. The Configuration Center specifies a prioritized list of Communication Gateways which the managed clients then attempt to use in order of priority.

Flexible Deployment Options

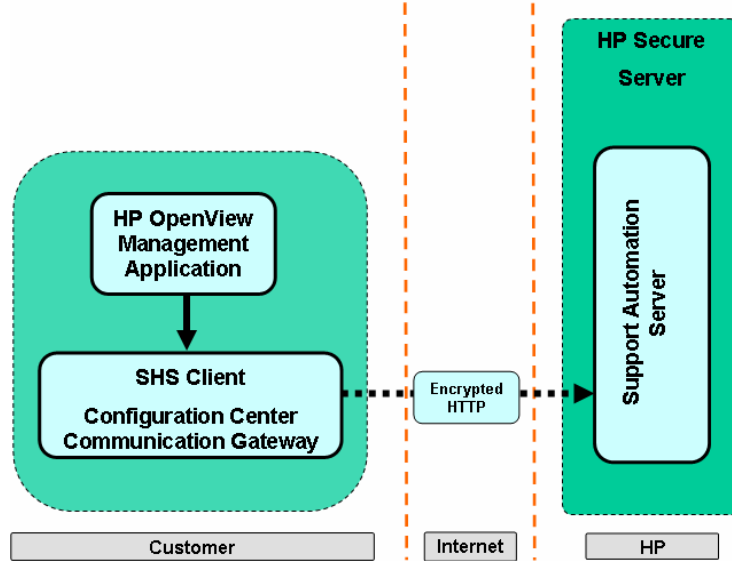
Utilizing the capability set allows the Self-Healing Services client to be deployed in a variety of customer environments according to their needs and preferences.

Figure 5 Single System Disconnected Deployment



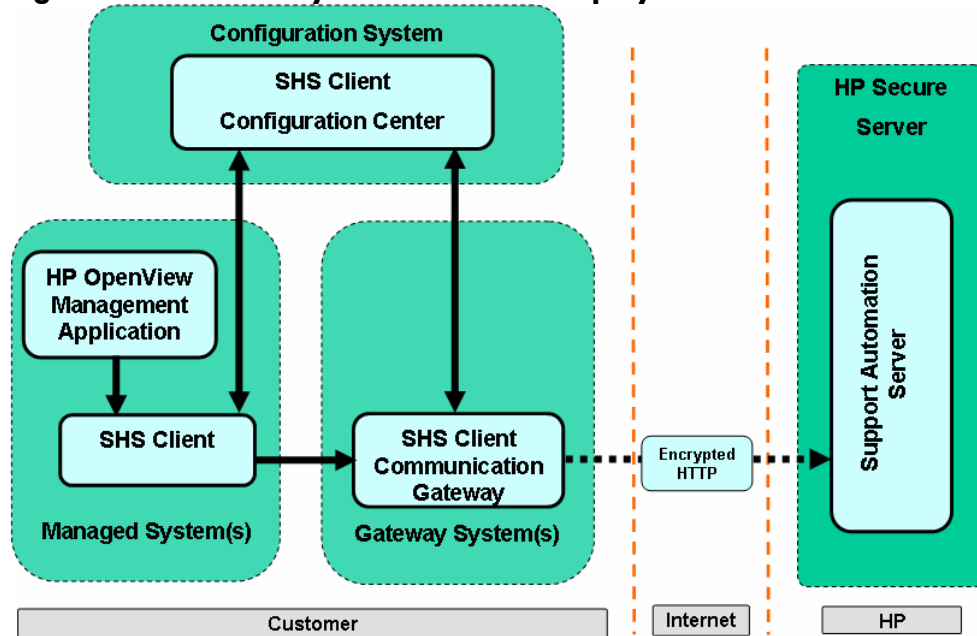
In a single system environment where the customer does not want to have any connectivity to their support vendor (HP), then they just install the Self-Healing Client on the system they would like to monitor an HP OpenView management application and enable only the configuration center.

Figure 6 Single System Connected Deployment



If a customer would later like to enable connectivity to HP, then they enable the communication gateway feature. This feature allows the client to connect to HP using outbound-only encrypted HTTP.

Figure 7 Distributed System Connected Deployment



In customer environments with multiple managed systems or where the managed systems do not have direct Internet connectivity, the customer may also distribute the Self-Healing Services client by enabling different features on a different Self-Healing Services client. An example of a fully distributed Self-Healing Services managed environment is depicted below.

In this example, a single Self-Healing Services client is installed on a single system with the Configuration Center feature enabled. One to many Self-Healing Services clients are installed on all the systems where the customer has HP OpenView management applications installed. Finally, one to many Self-Healing Services client with the Communication Gateway feature enabled are installed on system(s) that have internet connectivity. The Configuration Center controls the configuration for all the installed clients throughout the environment. The managed clients receive their configuration information from the Configuration Center and perform fault detection and data collection. They forward the incidents with collected data to the communication gateway(s) which then forward the incidents and data to HP. In an environment like this, the configuration center specifies a prioritized list of Communication Gateways which the managed clients then attempt to use. If the first Communication Gateway is unavailable, then the client will attempt to use the next Communication Gateway in the list.

Competitive analysis

"Self-Healing Services is clearly a huge differentiator for HP. This is the wave of the future. It is important for any support organization to think of Self-Healing Services as part of the overall equation, to change the way they think about supporting customers. HP once again leads the industry with innovation".

Jasmine Noel of Ptak / Noel Associates

Spring 2006

Although HP OpenView Self-Healing Services are at times mentioned in the context of IBM's Autonomic Computing strategy, Computer Associate's Sonar program, and Sun's N1 plans, these initiatives should not be confused with the HP OpenView Self-Healing Services offerings. These initiatives are centered on managing the customers' infrastructure as a whole. These initiatives focus on software, systems, and services that form dynamic links between the needs of a business and the underlying IT infrastructure on which the business depends. These initiatives are similar to the HP Adaptive Enterprise goals.

As part of the HP Adaptive Enterprise strategy, the HP OpenView Self-Healing Services program focuses on managing HP management applications, allowing the HP management applications to effectively and robustly manage customers' infrastructures. The unique set of capabilities used to accomplish this has set HP aside as the industry leader in the self-healing marketplace for enterprise management applications.

The Microsoft Error Reporting tool capabilities are comparable to the HP OpenView Self-Healing Services functionality. Microsoft Error Reporting can automatically detect a problem in a user application running on a recent Microsoft operating system, and automatically forward relevant data about the error to Microsoft via the Internet. At Microsoft, the error data is statistically analyzed to determine characteristics of fault patterns, and solution information for some faults is made available on a web site hosted by Microsoft. Although the error reporting processes are similar, HP and Microsoft have different customer bases and are focused on different environments. HP OpenView Self-Healing Services benefit customers with HP enterprise management applications, whereas Microsoft Error Reporting benefits users running personal applications in Windows environments.

Overall, HP is leading the space for self-healing of management applications in the enterprise environment. HP OpenView Self-Healing Services allows our customers to spend less time managing HP OpenView software and more time managing their business. Moreover, HP OpenView Self-Healing Services are FREE to customers as part of their foundation HP OpenView software support contract!

Future plans

In the near future, the Self-Healing Services client will be able to run local analysis in the customer environment, and will provide adaptors for integration with local support desk or case management applications. This will allow customers to handle first-level responses within their company, and will help to address the special needs of customers with highly secured (disconnected) environments that cannot send information outside of their company.

Standard web service interfaces will also play a greater role in the connection between Self-Healing Services and the Adaptive Enterprise management platform, and as a mechanism for enabling the Self-Healing Services server to be leveraged in support and technology partner environments.

The ability for support engineers to request secure data collections from the customer's environment through the Self-Healing Services framework will be added to allow better support communication. Many times the challenge in collecting the right information is hinged on the ability to communicate what needs to be collected. Allowing the support engineer to specify the collection, push it to the customer site and allow it to be run, according to customer policies, should reduce the customer resource investment for troubleshooting. Future Self-Healing Services clients will ultimately be capable of automating some of these activities as well. Based on customer policy settings, the clients will be able to take action in the customer environment to resolve well known problems. These actions might include configuration changes or patch installations, and will be either fully automated or semi-automated. In a semi-automated situation, the client would guide an IT engineer at a customer site through the repair steps.

Finally, future Self-Healing Services clients will be capable of self-updating such that they stay current in the customer environments. This will help to ensure that the latest support intelligence that HP can bring to bear on a problem will always be available.

There are also many opportunities for future analysis systems. The current analysis service engine lies at the core of the HP OpenView Self-Healing Services automated analysis functionality. It is responsible for diagnosing the data collected from the customer environment and recommending relevant solutions or troubleshooting information. The analysis service engine will reason on diagnosis and troubleshooting knowledge (i.e., patterns to recognize known problems) that is either provided by domain experts or automatically generated from previously solved cases by using artificial intelligence technology.

In the future, the analysis service engine will have a built-in learning mechanism so each interaction with the customer is leveraged to enrich and refine its knowledge to recommend more accurate solutions and build predictive capabilities. The future analysis service engine will also be segmented and improved as follows.

The knowledge-based engine

Diagnosis and troubleshooting knowledge will be gathered from experts in the form of rules and encoded in the engine. This knowledge concerns common top problems representing high call volume to maximize the impact of the engine in addressing customers' issues.

The learning engine

The engine will automatically maintain the validity of its knowledge and diagnose more sophisticated problems. It will continuously be learning from solved cases to generate new rules and update existing ones. We can also add to our collection mechanism the ability to gather data at regular time steps - a snapshot of the customer environment when it is in "healthy" (baseline) situations. By correlating healthy data with non-healthy data, the engine will build a model of "normal" situations (by means of threshold ranges for each parameter of the data). The engine will then be able to pinpoint parameters indicative of particular faults, and may even recommend correct values. This approach is useful for unseen problems and for providing decision support to engineers.

The predictive engine

The predictive engine will identify previously collected key parameters and monitor their evolution. This will enable the engine to detect trends leading to a catastrophic situation, and to determine the

appropriate remedial actions. This type of engine could also be used to assess the health and optimization of the customer environment, and to proactively suggest tuning actions.

These analysis engine advancements will enable HP OpenView Self-Healing Services to update customer systems proactively, which will help to maintain stable customer environments by preventing some faults from ever occurring.

It will also be possible to leverage future self-healing systems in support partner and technology partner environments. This will facilitate the application of the self-healing functionality to customer environments that include heavily customized and/or localized versions of management software, and will intrinsically help ensure that the capacity of Self-Healing Services will be able to keep up with the demand for these services.

For more information

HP OpenView Self-Healing Services
Documentation and Downloads
www.hp.com/managementsoftware/self-healing

HP Software Support
www.hp.com/managementsoftware/services

HP Software Customer Connection Program
www.hp.com/go/swcustomerconnection

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