

VERITAS i³ for PeopleSoft

APPLICATION PERFORMANCE MANAGEMENT VERITAS i³ FOR PEOPLESOFT

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1. EXECUTIVE SUMMARY

Experienced PeopleSoft Personnel recognize the need to include application performance best practices throughout the entire application life cycle from development to deployment and operation. The most significant challenge facing PeopleSoft administrators today is defining a systematic process to understand application behavior, usage patterns, service levels, and to alert the right people of problems before they affect business users and help them drill down to the root cause. Another major challenge is measuring the actual service being delivered to the end-user and then being able to determine the end-to-end service time contributors. These measurements are needed to make the appropriate tuning, design or architectural changes, as well as integrating the PeopleSoft application with other legacy or third party applications.

These challenges become even more important with the advent of PeopleSoft 8, which introduces new technologies like web servers, J2EE servlets and Jolt. Paradoxically, these new technologies demand more responsiveness and around-the-clock high performance than their less complex client-server applications. The process of rolling out an application from development to production is a tedious and time-consuming activity that may result in business dissatisfaction if proper Application Performance Management is not properly employed.

VERITAS i³ for PeopleSoft (VERITAS i³) is the industry's first solution that defines Application Performance Management in a way that quickly and efficiently captures and correlates PeopleSoft application metrics (e.g. user activated URLs, invoked J2EE servlets, called Jolt APIs to the Tuxedo services and database SQL statements) across the entire PeopleSoft infrastructure. **VERITAS i³** presents these important metrics in a manner that promotes crisp communication, rapid problem detection, correction, and verification throughout the application life cycle. This paper describes this unique approach.

2. INTRODUCTION

By their very nature, PeopleSoft applications are highly complex and mission-critical. They run on a complex, multi-tiered environment where performance and performance management are a must. After all, the service you provide your PeopleSoft business users is only as good as your performance.

Organizations require 7x24 access to their PeopleSoft applications from anywhere. PeopleSoft has provided web access through the introduction of the new Pure Internet Architecture (PIA). Now, customers can access their traditional PeopleSoft applications using a web browser. While this provides for faster deployment time and lower Total Cost of Ownership (TCO), it also introduces an element of unpredictable load on the system. Users can now access their information from anywhere at any time.

Web access implies new components like web servers, J2EE servlets and Jolt. Performance management in these environments becomes more difficult because there are more components involved, more failure points and more technologies that interact among themselves and to other applications as well. For the end-user, it means more functionality and convenience, but for PeopleSoft administrators, it means more responsibility and complexity.

Moreover, the current economic climate is leaving many IT departments increasingly overworked and understaffed. Many companies are rushing to finish their PeopleSoft implementation phase, which includes customization and changes, by paying less attention to critical issues such as performance, scalability, and load. When the system "goes live", serious performance problems often appear. Unfortunately, by this time they have become very expensive to find and fix. If more attention had been paid to these critical issues earlier in the cycle, performance problems could have been detected and corrected before end-users were affected, thereby, preventing any business losses from poor PeopleSoft performance.

VERITAS Software has developed an Application Performance Management solution for PeopleSoft that spans the entire PeopleSoft IT infrastructure, including the new PIA. This paper discusses the challenges, solutions and benefits VERITAS i³ provides for performance management of PeopleSoft applications.

3. THE TYPICAL ENVIRONMENT

There are essentially two PeopleSoft architectures. The first, and the older one, comprises a “fat” client connected directly to Tuxedo and the database. PeopleSoft 8 introduces a major change with PIA, which includes web servers, Java servlets running in a J2EE servlet engine (e.g. Weblogic or WebSphere), Jolt, Tuxedo server process, and a database (e.g. Oracle, SQL Server or DB2/UDB). The new technology supports thousands of web users accessing the system from any location.

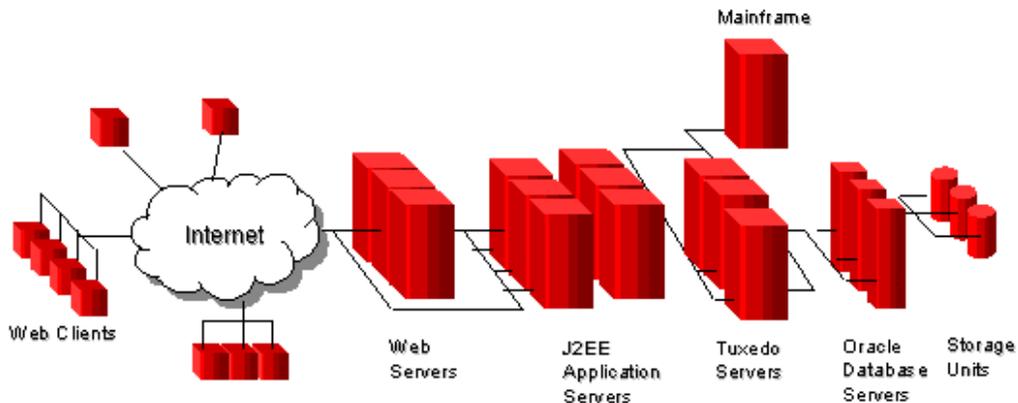


Figure 1: PeopleSoft 8 Architecture Diagram

A PeopleSoft 8 PIA architecture is composed of the following components:

- PeopleSoft web components, which include a web server component, Java servlets, and Jolt running on a J2EE application server
- PeopleSoft Application components, which implement PeopleSoft applications and services, using Tuxedo as its underlying technology
- Database

Each application component can be deployed on a different tier or alternatively, several components can occupy the same tier. In Figure 1 above we have the following tiers:

- Web server
- J2EE server, which includes the servlet engine and servlets like PSP, PSC, and CS and the Jolt component
- Application server, which runs the different Tuxedo services like PSAPPSRV
- Database server

A typical usage scenario starts with a user connecting to the PeopleSoft web server to request a page (i.e., a PeopleSoft panel):

- The web server anticipates the request and forwards it to a J2EE servlet, which is responsible for building the answer page
- The servlet creates a Jolt message that is sent to Tuxedo
- Tuxedo, upon receiving the request, looks at the service being called and sends it to the appropriate Tuxedo server process running that service
- The activated Tuxedo service fetches the required data from the database using SQL statements
- Tuxedo returns a response to the activating servlet, again through Jolt, which in turn, builds an answer page and sends it back to the user

The new generation of PeopleSoft 8 applications adds new functionality as well as new components/tiers to manage. Managing such environments presents many formidable challenges.

4. PERFORMANCE MANAGEMENT CHALLENGES

Spreading PeopleSoft applications across multiple tiers makes it hard to pinpoint the source of any performance problem. Among the many challenges are:

- A comprehensive, yet straightforward way to measure the end-user experience by geographic location
- The ability to define, measure and commit to organizational business objectives and Service Level Objectives
- 7x24, real-time collection of performance metrics across the PeopleSoft infrastructure with very low overhead
- Correlating large amounts of performance metrics to quickly isolate a problematic component (i.e., network, web server, J2EE servlet, Jolt, Tuxedo or the database)
- Analyzing large amounts of data, if available, to pinpoint performance issues and recommend solutions
- Coping with unpredictable load periods and handling massive transaction/data volumes
- Proactively managing the system when deviations from normal behavior occur and assuring that satisfactory service levels are maintained
- The ability to find PeopleSoft users and transactions that directly impact performance and those that are most easily influenced by performance degradation
- The ability to define normal and abnormal application usage behavior through baselines to identify problem patterns before the end-user is affected
- Monitoring PeopleSoft external Java or Tuxedo interfaces to legacy and third party applications
- The ability to maintain historical data for trending, exception reporting and capacity planning

These challenges are not covered by system management frameworks, synthetic robots testing the system from multiple locations, or by “stovepipe” snapshots from individual servers along the application path.

System frameworks are extremely well suited for determining system availability. Unfortunately, they do not focus on the end-user experience, activity and usage. Therefore, if all system parameters look OK, how can we tell that location X or certain users suffer from poor response-time, or why certain PeopleSoft URLs are slow? Moreover, if we don't collect and correlate activities across tiers, how can we tell if the problem is because of a poor Tuxedo service or a problematic SQL statement?

Robots provide external samples of synthetic transactions. They neither reflect the real load on the application and its distribution, or the real transactions that are executed. Real application traffic could vary dramatically from simulated traffic. For example, you have distributed robots at three locations but today, unbeknownst to you most of the traffic is coming from a fourth location. Another example would be if users suffer from bad response times for certain transactions while a robot simulates other transactions. Moreover, synthetic activity is only activated periodically, which causes a gap in continuous 7x24 data collection of performance metrics. What happens between one synthetic sample and the next one?

Robots can actually create more unnecessary work on the system that compete directly for critical resources with your end-users. Additionally, any simulated transactions that perform a commit to the database need to be removed from the system.

The stovepipe approach, which takes snapshots from individual servers like J2EE, TUXEDO, and Oracle do not provide an answer to the problem either. Snapshots provide very coarse information, generic statistics taken from each tier separately, and no correlation across tiers. For example, you can look at Java servlets, Tuxedo or Oracle metrics and still not understand which component is causing the bottleneck for a problematic transaction. By following the real-end user transaction across the PeopleSoft tiers, we discover that there is a long running Tuxedo service due to long running SQL statements in the database. Snapshots would tell you that the average Java Servlets, Tuxedo and SQL response times are OK, but they cannot tell which Tuxedo services or SQL statements belong to which transactions, therefore, they cannot help much in isolating the problem.

Metrics for end-to-end application analysis must be captured with agents having application knowledge and visibility. Also, they must reflect the end-user's experience. Real-time performance metrics should be collected 7x24 and

correlated across the PeopleSoft application infrastructure path, enabling problem isolation and root cause identification.

Data collected from different tiers and application components must be correlated. For example, correlation of Java servlets with requested Jolt messages and Tuxedo calls, and further correlation between Tuxedo and SQL statements sent to the database. Without correlated data, it may take an exorbitant amount of time and effort to isolate the problem and find its root cause because of the granularity and amount of activity and parallelism. For example, we have detected that all users executing a specific PeopleSoft transaction or a specific URL suffer from long response times. Where is the problem? Is it the network, web server, Java servlet, Tuxedo or the database? Without correlating granular metrics across tiers we would not be able to isolate and solve the problem. In our example, looking at a correlated view reveals immediately that the problem is Tuxedo. Drilling down into Tuxedo shows that there is a long queue. The solution is simple: launch an additional Tuxedo server process.

Collecting performance metrics 7x24 and correlating them is mandatory, but not enough to provide a useful PeopleSoft performance management solution that directly addresses the challenges mentioned earlier. Collected data must be kept for long-term analysis, exceptions, baselines, trending and capacity planning. Based on historical data, we can calculate the typical PeopleSoft behavior. For example, there are peaks each Monday morning and at month end. Knowing the behavior, we can generate exceptions for abnormal behavior or set the right SLA thresholds. Another example is based on historical data where we can calculate the database table growth and allocate enough space in advance, or create appropriate indexes to reduce the fetch times.

As we have seen, infrastructure frameworks provide critical system and network management 'bottoms-up' detail but do not look at end-user and transaction activity. Robots provide external samples of synthetic transactions and the stovepipe approach looks at each tier separately providing generic statistics for that tier only. These approaches lack the power to find, isolate and focus on the root causes of performance degradation as well as the real end-user response time experience. **VERITAS i³ for PeopleSoft** fills this gap by providing the actual end-user experience and application end-to-end response time contribution detail. This enables PeopleSoft administrators to "see" how their applications are performing from the perspective of their end-users and to correlate the experience to the underlying application components in terms of end-to-end performance contribution. This is a very powerful combination.

5. THE VERITAS i³ METHODOLOGY

It is vital for all organizations to understand the importance of a systematic approach to managing performance issues and to realize the inherent ineffectiveness of ad-hoc problem solving. The foundation of the **VERITAS i³ for PeopleSoft** solution is a methodology designed to facilitate the rapid detection, isolation, analysis, correction and verification of application performance problems. All organizations can benefit from the discipline that VERITAS i³ brings to the performance management process. The VERITAS performance management methodology enables you to use a proven process, as well as proven supporting solutions, to implement effective performance management within your organization.

The VERITAS performance management methodology comprises five stages:

- **Detect** – Proactively identify the symptoms that could indicate a performance problem
- **Find** – Identify the problematic tier and application component
- **Focus** – Discover the root cause of the problem
- **Improve** – Take the steps required to improve performance
- **Verify** – Make sure the steps taken have achieved the desired goal

These stages combine to form a process that provides a systematic approach to finding and resolving all kinds of performance issues, both predictable and unforeseen.

For example the methodology begins with an automated proactive detection (**Detect**) through baselines and SLAs, using built in alert capabilities. Alerts can be directed to the appropriate infrastructure framework, organization, or person based on what was detected. Alternatively, the appropriate person in your organization could periodically

detect some long service times while reviewing the performance trends of elements such as J2EE servlets, Tuxedo services, database calls, etc.

Depending on the issue detected, the PeopleSoft application manager can view the application, end-to-end, and isolate (**Find**) the problematic tier and application component that is the source of the degradation. Problems could be caused by network delays, long running servlets, Jolt, long running Tuxedo services or long database access time. The process of finding the problematic component is end-user focused, so that we actually follow the end-user transaction or the interfaced application all the way from the time the user activates the transaction.

After finding the problematic component, an in-depth analysis of that component has to be done to focus on the root-cause of the problem (**Focus**). For example, finding that Tuxedo is the problematic component, we would like to understand which Tuxedo service is causing the problem, whether it's because of a long queue wait time or processing time. Another example is in the case of Java servlets. We would like to look at the different methods called, including Jolt and Tuxedo calls through Jolt to understand whether it is because of a specific method or long running Tuxedo calls.

After focusing on the problem's root cause comes the actual fixing of the problem (**Improve**). If we continue with our earlier Tuxedo example, launching additional Tuxedo server processes fixes a long queue time waiting for a Tuxedo service.

Once the fix has been applied, we should verify (**Verify**) that indeed we fixed the problem and it will not reappear. Utilizing long-term information kept in the Performance Warehouse, we can examine service time before and after the fix has been applied. This shows whether or not we fixed the problem and if service times are as expected.

6. VERITAS i³ FOR PEOPLESOFT

VERITAS i³ for PeopleSoft focuses on providing your organization with the ability to measure and monitor your application performance end-to-end from the browser, to the web server, Java servlets and Jolt, the Tuxedo server processes and through the database right into the physical storage.

Conceptually, VERITAS i³ is composed of Insight, Indepth and Inform functionality. Figure 2 below depicts the architectural components of VERITAS i³.

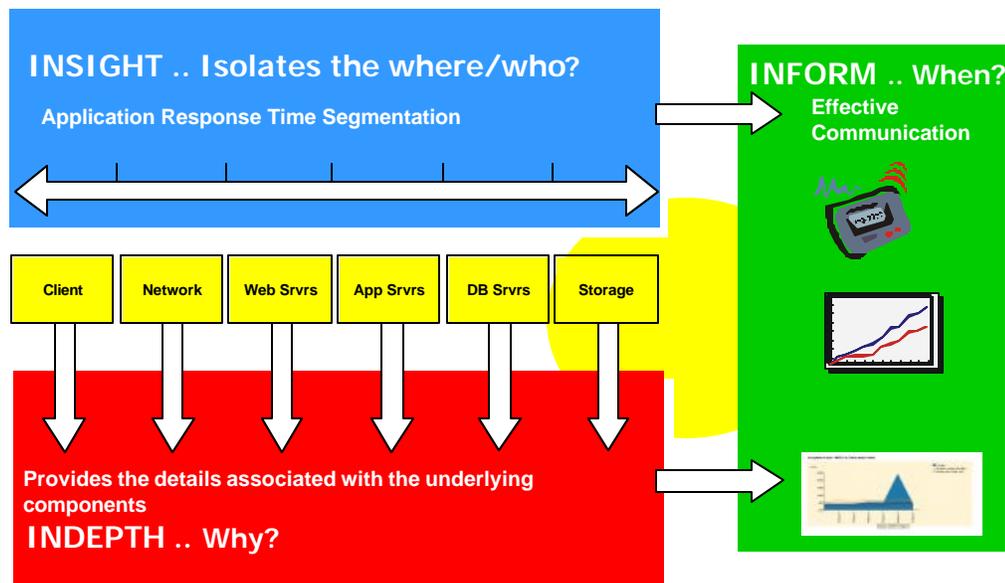


Figure 2. VERITAS i³ Architecture Diagram

VERITAS Insight provides the agents and logic required to enable your IT organization to see the end-to-end response time contributions across the client, network, web, J2EE, Tuxedo and database servers and to isolate the components which are responsible for slowdowns and performance bottlenecks. The whole process starts by examining the end-user experience, measuring the actual web-user response time at the application, transaction or page level. Then, upon detection of a response-time objective or baseline breach, the problematic tier and component are found, as described earlier in the methodology section.

VERITAS Indepth provides in-depth drilldown capability to identify the root causes of performance problems. It collects and correlates detailed component information (e.g. J2EE servlet specific information, methods, database resource consumption breakdown, slowest SQL statements, etc.).

VERITAS Inform provides the real-time and near-time alerts that are driven by exceptions to the baseline and defined thresholds. VERITAS Inform also includes the reporting components of the overall solution. This rich set of reporting capabilities enables the presentation of ad hoc reports as well as scheduled reports. These reports are particularly useful for tracking service levels, trending and conducting management by exception.

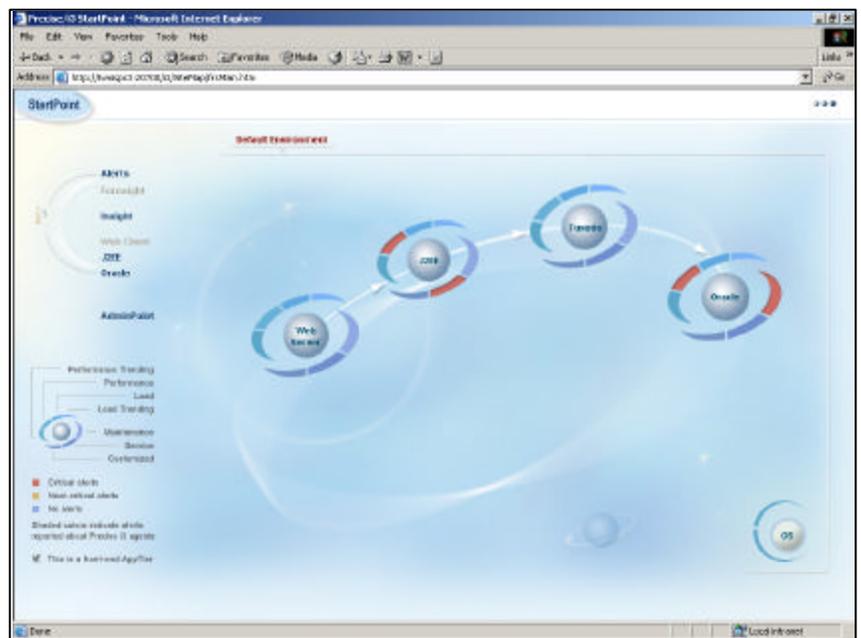
VERITAS i³ also includes the **VERITAS Performance Warehouse** to provide a common repository for long-term historical data collected by the different VERITAS i³ agents along the PeopleSoft application path (i.e. web servers, servlets, Tuxedo services, database and storage devices). This facilitates trend analysis, long-term capacity planning, and baseline calculations.

7. VERITAS i³ FOR PEOPLESOFT FEATURES

7.1 STARTPOINT (SITE MAP)

StartPoint enables a full end-to-end view of the PeopleSoft environment components, starting from the web client, to the web server, J2EE server, Tuxedo server, and Oracle database. StartPoint provides an alert overview of the different components by categories (e.g. performance or load alerts at the Oracle database). The next step is to launch one of the VERITAS i³ components.

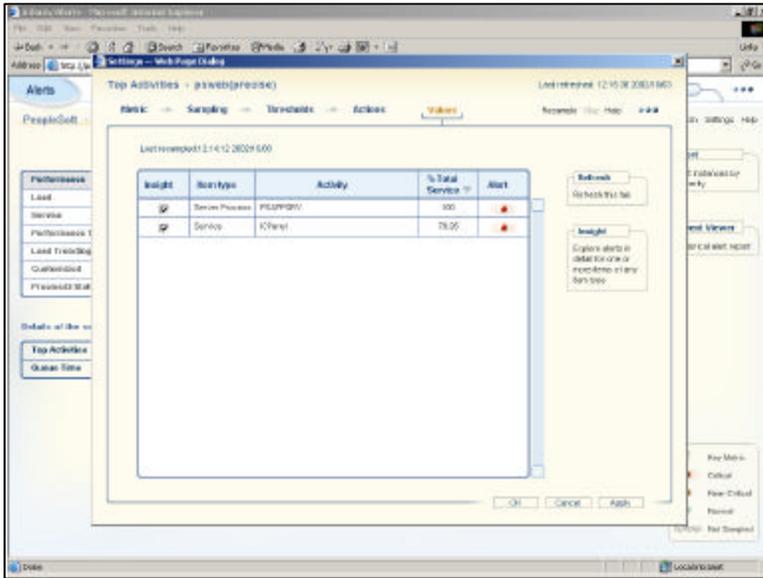
A typical scenario may start with a user launching VERITAS Insight to get an overall view of his PeopleSoft environment or proactively receiving an alert indicating a service level threshold has been exceeded. Long-term trend analysis and top resource consumers can be obtained by using long-term metrics stored in the Performance Warehouse. Easy access to the Performance Warehouse information is accomplished via VERITAS Inform for Foresight, which generates the relevant reports.



The next sections describe the main features of VERITAS i³ for PeopleSoft. The last section will put all the pieces together by providing an example of a typical scenario.

7.2 PROACTIVE MANAGEMENT BY EXCEPTION

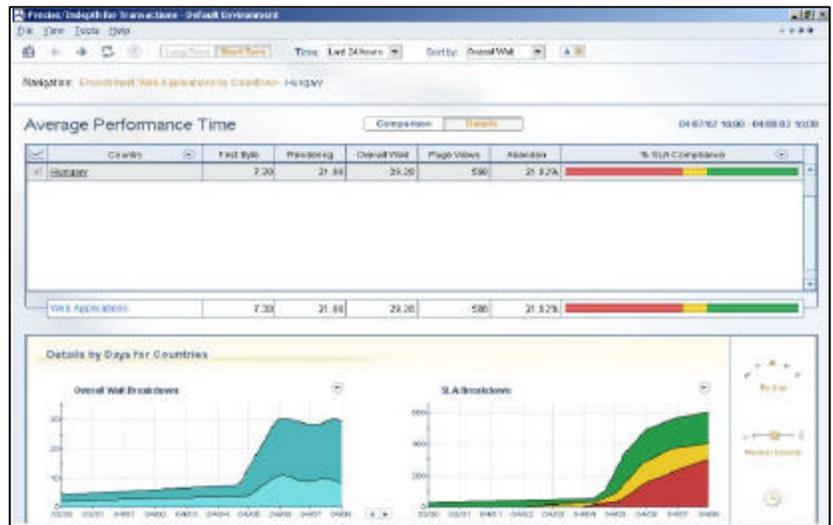
Managing a large PeopleSoft application infrastructure with hundreds or thousands of users is difficult at best. The only way to do so effectively is by working proactively rather than reactively. VERITAS i³ provides the way to do so through the use of exceptions, based on service level objectives and baselines. The next screen shows an alert generated on the Tuxedo tier.



Alerts can be generated on the end-user client tier breaching an SLA as well as on other tiers across the PeopleSoft infrastructure.

End-user experience and SLAs

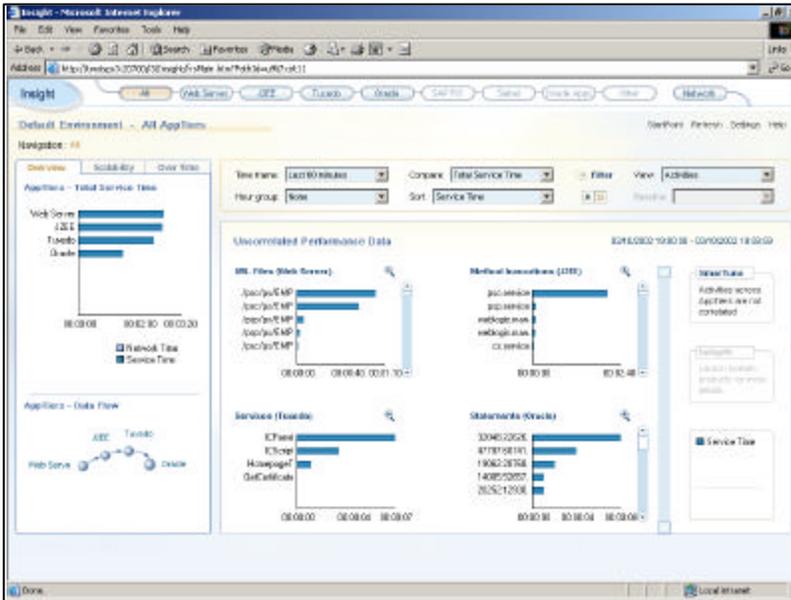
End-users are of the utmost importance. If end-users are satisfied, application managers are satisfied. VERITAS i³ provides a way to measure exact response-times as seen by end-users and to define SLA threshold on those metrics. This screen shows an example of SLA breaches and the times when breaches happened.



7.3 CORRELATED END-TO-END VIEW

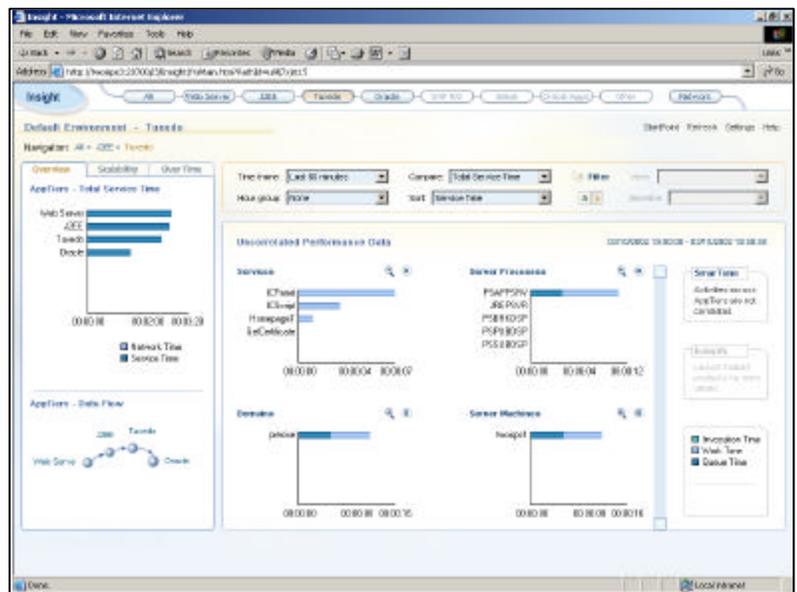
Launching VERITAS Insight provides an end-to-end view of the different tiers and components. This view is correlated across components, from URL-to-SQL, which means that you are able to view, for example, the SQL

statements executed by a specific Java servlet or a Tuxedo server process. The screen below shows an example for such an overview screen.



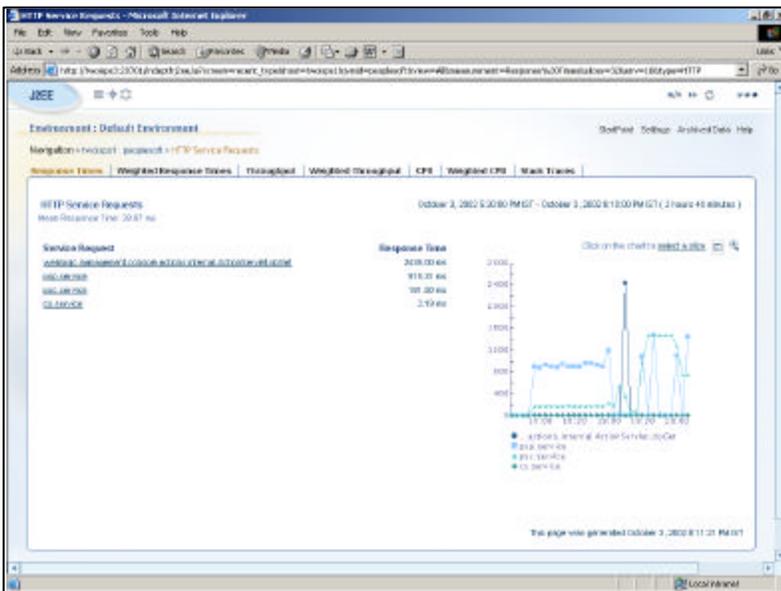
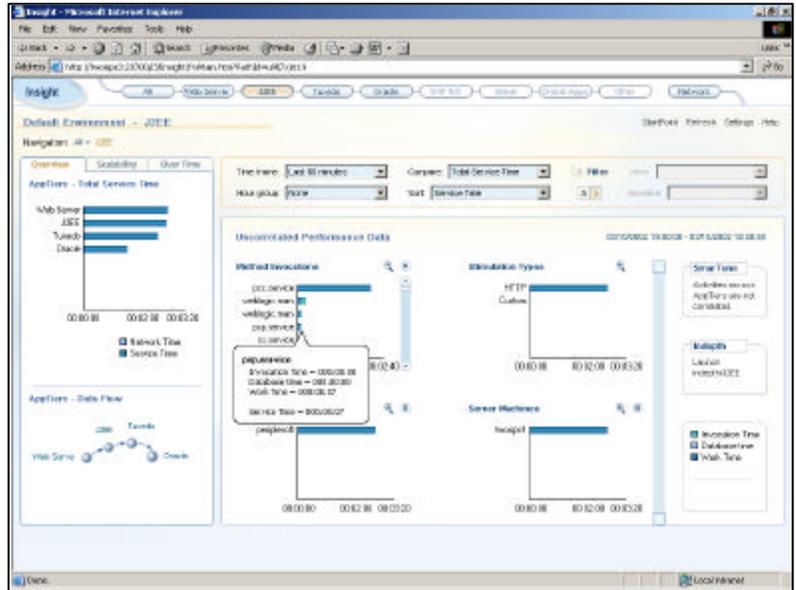
On the upper left side, **App Tiers – Total Time**, we see the different tiers, web server, J2EE, Tuxedo and Oracle. In this example, we immediately identify that Tuxedo and Oracle are the main contributors to response time (bars in this chart are cumulative). Just below, we can see the PeopleSoft application **App Tiers Data Flow**, from the web server to the database.

The main part of the screen displays the main data entities for each component. For the web server it would be URLs, for J2EE - servlets, for Tuxedo - services and for Oracle - SQL statements. Since Tuxedo and Oracle are the main contributors to the slow response time, let's start by exploring Tuxedo. On the upper horizontal menu, choose Tuxedo to get more details on what is going on in the Tuxedo tier.



In Tuxedo we reveal more details on the PeopleSoft Tuxedo server processes, Tuxedo services and Queue times. In this example, we immediately see excessive queue time in the Tuxedo service PSAPPSRV (the dark blue part in the graph). A typical fix for this problem is to launch additional Tuxedo server process.

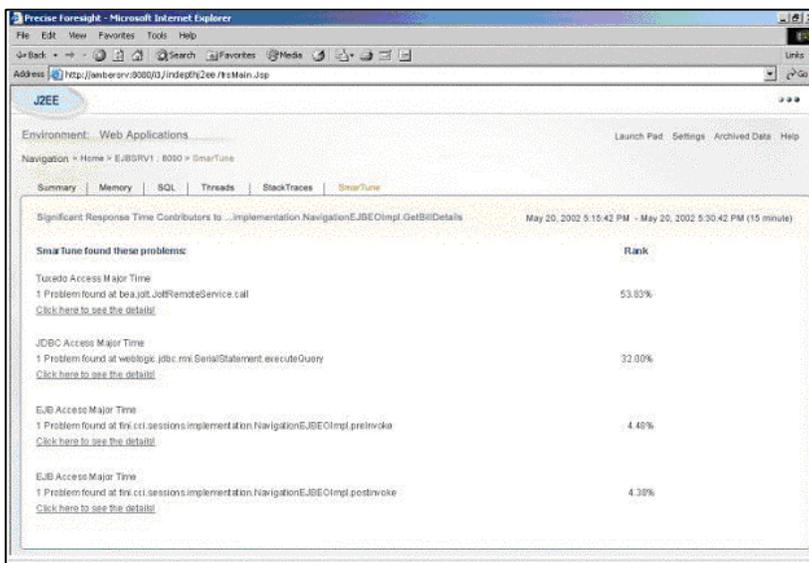
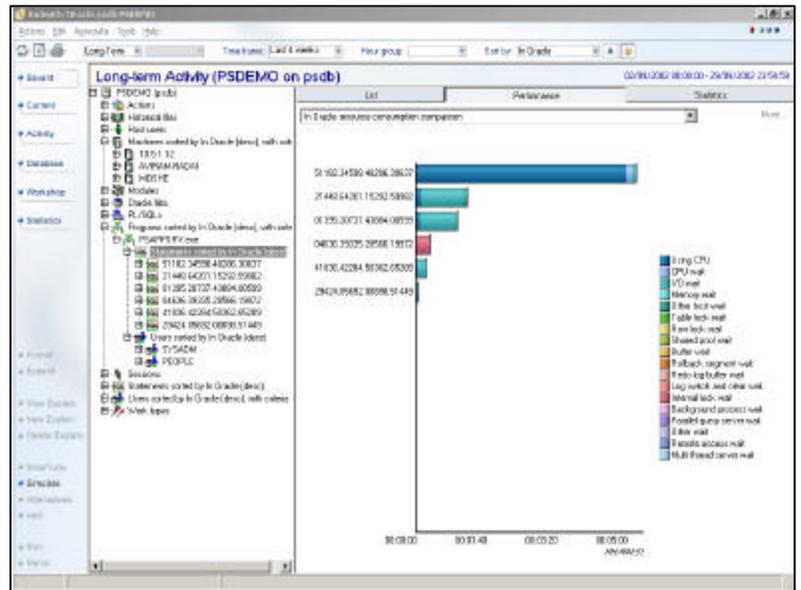
To investigate deeper into J2EE servlets, let's choose J2EE on the top menu. Performance metrics for the PeopleSoft servlets and JVM are displayed.



Expert Analysis

Like the examples above, we can choose the relevant tier from the upper menu and explore more details on that tier. Even more details, for experts, are obtained by using one of the VERITAS Indepth products for J2EE or Oracle (on the right side of the screen). Expert analysis provides very detailed performance data for each specific tier. For example, we can look in more details at each one of the Java servlets, including the Jolt methods invoked by the servlet.

At the Oracle level, detailed resource consumption break-down, SQL statements, users and programs are provided. Moreover, a unique feature correlates an SQL statement back to its PeopleSoft user name, easily identifying which user is responsible for generating problematic statements. This screen shows detailed resource consumption of SQL statements generated by PSAPPSRV.

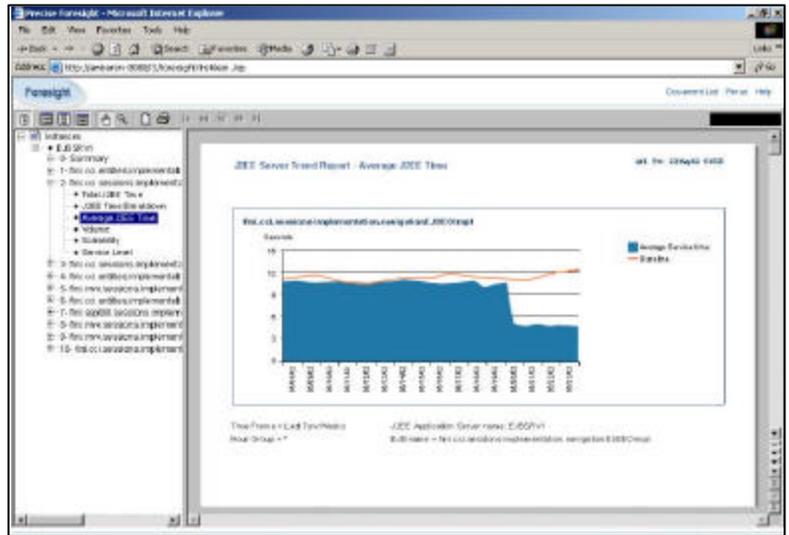


SmartTune – Automatic Analysis and Recommendations

VERITAS³ also provides a powerful automatic analysis component for the PeopleSoft servlets, Jolt and the connection to Tuxedo, which ranks the possible reasons for the bottlenecks and provides explanations. This is an excellent tool for inexperienced personnel or even experienced ones that would like to save time and get right to the reason for the problem. On the database tier, there is an Index Tuning advisor that helps create indexes as well as an additional component for simulating the impact of indexes before they are actually created.

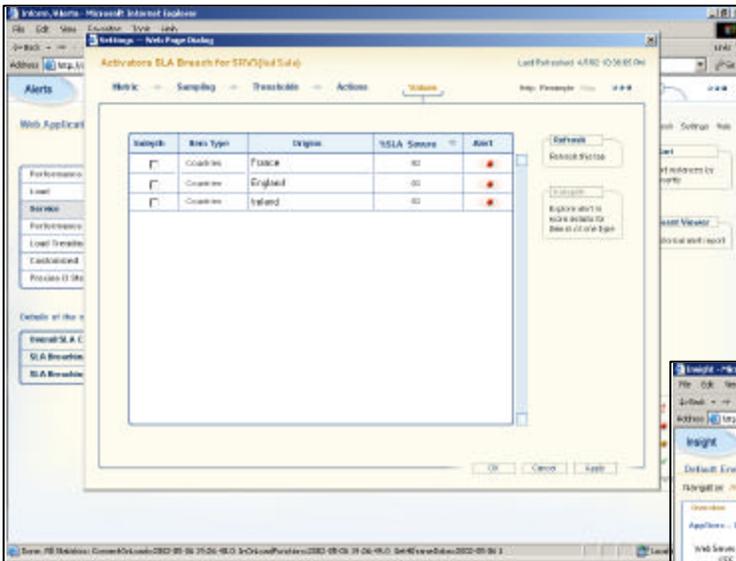
Long-term Analysis

Performance metrics collected from the client tier, web server, J2EE servlets, Tuxedo and the database are kept in a long-term repository called the Performance Warehouse. These metrics can be used for trending and capacity planning. VERITAS i³ provides a mechanism that utilizes the Performance Warehouse to generate hundreds of out-of-the-box 'smart' reports.



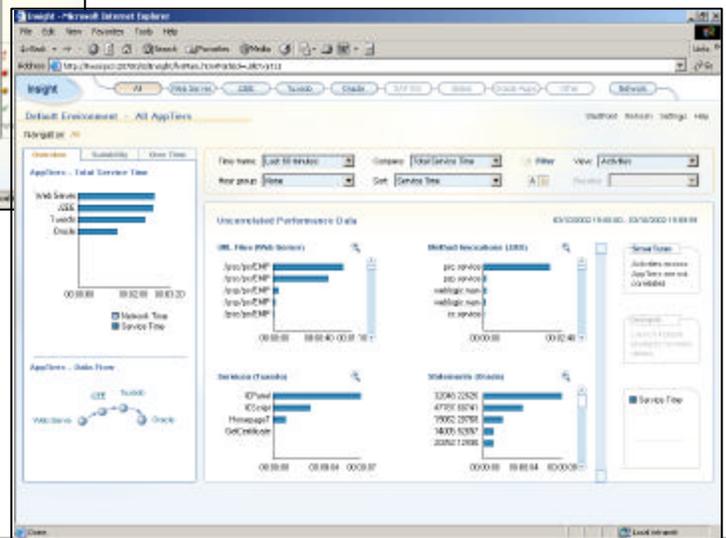
Putting all the pieces together – A Typical Scenario

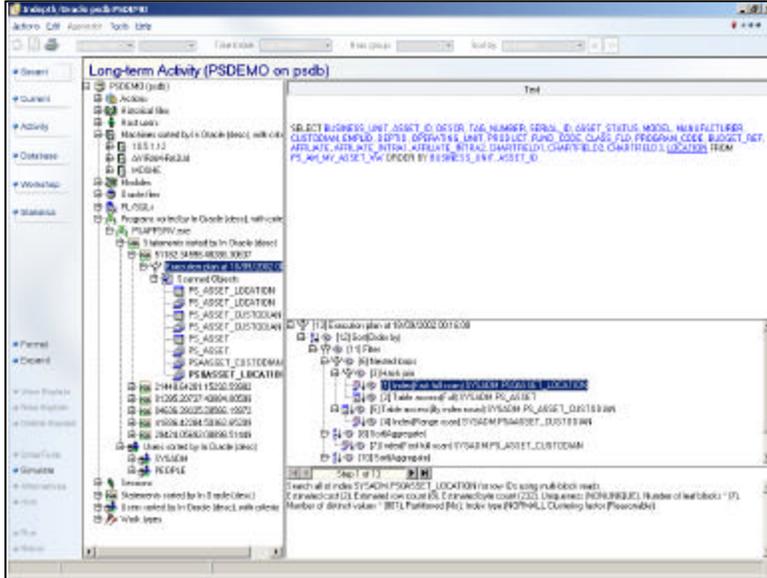
Now that we have familiarized ourselves with VERITAS i³ for PeopleSoft features, let's look at a typical scenario. Proactively monitoring the system, we receive a few alerts indicating that end-user service level exceptions have been exceeded.



Looking closer at the details show that alerts are not specific to one geographical location, which indicates that most probably the problem is in the back-end infrastructure. The next step is to launch VERITAS Insight and look at the overall picture.

From VERITAS Insight, we immediately discover that Tuxedo and Oracle are the main contributors to response time. From further investigation of Tuxedo we see that there is a slight queuing problem, but most of the time is due to long response-times at the Oracle database.





Drilling down into Oracle reveals that most of the time is attributable to inefficient fetch table rows, doing FULL TABLE SCAN instead of using indexes. Adding the right index can improve response times tremendously.

To summarize, we started from an alert, indicating response-times thresholds were exceeded. We looked at the end-to-end architecture, web, J2EE servlets, Jolt, Tuxedo and Oracle. We isolated the problem to Oracle and found that an index was missing. We also verify that after adding the index, response-time returned back to an acceptable level and, once again, we are meeting our SLA objectives.

Going from problem detection to problem resolution follows the VERITAS ⁱ methodology **Detect, Find, Focus, Improve and Verify** as described earlier in the methodology section.

8. BENEFITS OF VERITAS ⁱ

From a business perspective, VERITAS ⁱ for PeopleSoft can significantly reduce PeopleSoft slowdowns, achieving fast Return On Investment (ROI) while maintaining low Total Cost of Ownership (TCO).

VERITAS ⁱ for PeopleSoft helps organizations to:

- Optimize end-user response time; improve overall Quality of Service
- Reduce "roll-out" time of your PeopleSoft 8 upgrade projects
- Eliminate "blamestorming" through the use of breakthrough TotalCorrelation™ technology
- Find the definitive root cause of performance degradation in minutes
- Resolve problems faster using SmarTune's expert advice
- Proactively detect potential problems before they impact end-users
- Improve end-user satisfaction
- Increase ROI - detect, find and solve problems quicker
- Effectively manage and tune the application
- Defer equipment and associated software licenses and support costs until they are actually needed
- Understand capacity requirements, based on current PeopleSoft application usage and growth patterns

In summary, VERITAS ⁱ for PeopleSoft is an excellent vehicle to measure and improve performance objectives, providing all the necessary mechanisms to realize significant savings in cost and effort while effectively managing application performance.

9. SUMMARY

Managing the performance of PeopleSoft applications is a unique challenge that requires a unique solution. PeopleSoft applications have become an essential part of many organizations. This trend continues to grow with the introduction of PeopleSoft 8 applications, architecture, functionality and technology. While this is a great advance for end-users by improving business efficiency, productivity and satisfaction, it imposes significant challenges for PeopleSoft administrators.

Experience has shown that there is a direct correlation between service level and both productivity (internal) and revenue (external). There is also a direct correlation with expenses incurred to achieve the service level. The penalty for not meeting the users' performance expectations will mean loss of business, loss of opportunity and failure to realize a ROI for the effort and operational expenses.

Delivering the right level of service is fundamentally more difficult due to the inherent complexity introduced by multiple tiers, a mixture of new and old technologies in the path (e.g. J2EE servlets and Tuxedo services), as well as database calls and storage access.

VERITAS i³ for PeopleSoft addresses these challenges and actually simplifies the deployment and management of PeopleSoft applications. Using **VERITAS i³ for PeopleSoft** helps companies manage service levels, contain costs, maximize the efficiency of the operational investment and improve the service levels experienced by the end-users.

VERITAS i³ for PeopleSoft is the industry's first solution that provides a way to quickly and efficiently capture and correlate PeopleSoft application metrics like URLs, J2EE servlets, Jolt, Tuxedo services and SQL statements across the PeopleSoft infrastructure. It presents these important metrics in a manner that enables crisp communication, rapid proactive or reactive detection, correction and verification throughout the application life cycle.

VERITAS i³ for PeopleSoft sets a new milestone in PeopleSoft performance management by delivering a comprehensive integrated software solution that addresses the major performance challenges of PeopleSoft multi-tier application components. This solution:

- Provides proactive management through exceptions, SLAs and baselines
- Provides a way to define and measure organizational business objectives and SLAs
- Provides an integrated and correlated view of performance across tiers
- Continuously monitors real users, real data and real PeopleSoft transactions as opposed to simulated or synthetic activity monitoring
- Isolates the problematic component: network, web server, Java servlet, Jolt, Tuxedo, database or inefficient access to storage devices
- Identifies the root cause right down to the J2EE method, Tuxedo service and SQL statement
- Provides best practices corrective actions and recommendations
- Provides a long term performance repository for analysis, trending and capacity planning
- Operates in a production environment with minimal overhead
- Fits all phases of the application lifecycle

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