

Sun Management Center — Managing the Integrated Enterprise

Technical Brief



1998-1999 Sun Microsystems, Inc.
901 San Antonio Road, Palo Alto, California 94303 U.S.A

All rights reserved. This product and related documentation is protected by copyright and distributed under licenses restricting its use, copying, distribution and decompilation. No part of this product or related documentation may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any.

Portions of this product may be derived from the UNIX® and Berkeley 4.3 BSD systems, licensed from UNIX Systems Laboratories, Inc. and the University of California, respectively. Third party font software in this product is protected by copyright and licensed from Sun's Font Suppliers.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 and FAR 52.227-19.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

TRADEMARKS

Sun, Sun Microsystems, the Sun logo, and Sun Enterprise are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries. UltraSPARC, SPARCCompiler, SPARCstation, SPARCserver, microSPARC, and SuperSPARC are trademarks or registered trademarks of SPARC International, Inc. in the United States and other countries. All other product names mentioned herein are the trademarks of their respective owners.

All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the United States and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

THIS PUBLICATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

THIS PUBLICATION COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN; THESE CHANGES WILL BE INCORPORATED IN NEW EDITIONS OF THE PUBLICATION. SUN MICROSYSTEMS, INC. MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED IN THIS PUBLICATION AT ANY TIME.



Please
Recycle



Contents

The Evolution of Enterprise Computing	1
System Management and the Enterprise	2
Challenging the IT Infrastructure	2
The Struggle for Effective Enterprise Management	3
The Changing Role of Systems Management	4
Managing the Integrated Enterprise—Sun Management Center ...	4
Sun Management Center—Key Features	5
Intelligent Agent-Based Architecture	8
Three-Tiered Architecture	10
Developer Environment	11
Sun Management Center at Work	13
Managing Computing Resources in the Small Company	13
Managing the Growing Enterprise—Medium and Large Environments	15
Managing the Global Enterprise	20
Summary	26

References.....	27
------------------------	-----------

Sun Management Center — Managing the Integrated Enterprise



The Evolution of Enterprise Computing

The evolution of enterprise computing has had a dramatic impact on the role of system management. In the mid 1970s, mainframes were the primary focus of computing power. With their ability to process large amounts of data and centralize information, mainframes became the workhorse of organizations that could afford them. As companies grew, mainframes became overburdened, and enterprises turned to lower cost minicomputers. By distributing the computing load, precious mainframe resources were freed for critical jobs.

Over time, the distribution of work across mainframes and minicomputers became common. However, technology continued to advance, and the personal computer (PC) began making its mark in the industry. With their low cost, personal computers could be found on most desktops—a trend that continues to this day. While PCs addressed some of the personal productivity needs of users, they failed to provide the compute power needed by technical and commercial users. During this time, workstations, servers, and client-server computing emerged and revolutionized how many jobs were accomplished.

Client-server technology enables companies to easily distribute information throughout the organization and deliver higher performance and greater system flexibility than legacy systems and PCs. With the ability to be reconfigured quickly, data and applications can be moved to wherever they are needed most. Today, users can tap distant corporate databases from their desktops or access files and applications on their own systems, even if they are a continent away.



Client-server technology has not only replaced expensive minicomputers and small mainframes, it has enabled organizations to do business anytime and anywhere.

With the rise of distributed computing, organizations found that they needed a way to tie all of their disparate computing resources together into a coherent whole—and the enterprise network was born. Today, enterprise LANs and WANs play a critical role in the success of organizations.

System Management and the Enterprise

System management and administration has long been a difficult issue for organizations. Typically, individual users managed their own desktops, departments managed minicomputers, and MIS managed mainframes. Without corporate standards for resource configuration and management, organizations found it difficult to determine where systems were deployed, how they were employed, and when they needed maintenance.

Over time, administrators assumed the responsibility for desktop configuration and maintenance. System administration became typified by the number of administrators supporting systems for small pockets of users. Each group utilized different computing resources, management tools and techniques, and procedures. This diversity resulted in configuration inconsistencies, a high cost of ownership, significant enterprise network complexity, and the need for a large, highly skilled administrative staff.

In an effort to improve efficiency, administrators standardized corporate procedures and began using network-aware tools. While limited in functionality, these tools helped administrators perform work remotely, ensured network performance, and eased computing hardware monitoring and maintenance. While hardware components could be monitored, administrators still lacked the tools to address software, application, service, and platform configuration and availability to meet the ever increasing challenges placed on the IT infrastructure.

Challenging the IT Infrastructure

IT organizations must provide more information faster and with greater reliability and accuracy in order to remain competitive in an increasingly efficient global marketplace. Indeed, increased competition and new market opportunities are driving widespread changes in the way organizations use information technology. Organizations are discovering they need new ways to



differentiate themselves. They have learned that technology, better data distribution, integrated business processes, and networked communications are essential if they are to improve customer relationships, increase global corporate collaboration, streamline overhead costs, and use information more effectively to enhance the value of their products and services to customers.

In addition, the changing nature of computing paradigms and technologies, combined with insufficient system management tools, has left IT organizations with environments that are expensive to manage. This struggle continues to worsen as the demand for mission-critical computing grows.

Mission-critical environments and customer demand are raising expectations of acceptable service levels. As a result, distributed computing environments must be more reliable, available around the clock, and easier to diagnose and service. Systems must run continuously for longer periods of time without interruption. Problems must be isolated and repaired without impact on business operation. Disruption of platform availability during routine service must be avoided and critical applications and services must always be available upon demand.

The Struggle for Effective Enterprise Management

While every organization strives to meet the rising challenge of providing increasing levels of service, it is imperative that associated support costs remain low. IT organizations must manage the enterprise infrastructure, including desktop and server systems, data storage subsystems, applications, and the networks that connect them, yet maintain high levels of service. To be effective, IT organizations must also reduce complexity and cost. They must leverage the existing limited skill base, lower human capital expenditures, and consequently minimize the number of people required to keep the enterprise operating at peak efficiency.

These vast demands have left IT organizations struggling with the complexity of the enterprise and the networked systems they employ. Rapidly changing trends are widening and deepening the breadth and depth of knowledge required, making it difficult for existing system administrators to keep pace with technology advancements. While the number of trained personnel is decreasing, the cost of maintaining them is rising. One important way to reduce costs is to simplify the job administrators do most—systems management.



The Changing Role of Systems Management

Enterprise management is an end-to-end solution that enables organizations to manage systems, applications, and the networks that connect them. Achieving the continuous operation of servers, desktops, storage subsystems, relational databases, transaction monitors, and complex applications like SAP, Baan, and PeopleSoft, is a difficult and time consuming task. While no single application can provide best-of-breed enterprise management solutions that meet every requirement on every platform, organizations can employ applications that are designed to solve common problems, yet can be adapted and extended to meet the specific needs of a particular environment.

One component of enterprise management, and perhaps the most pressing problem organizations face, is *systems management*. Focusing on the management of the hardware platform, operating system, and storage components, systems management provides the monitoring, performance, and resource management that is essential to ensuring systems remain operational. Monitoring and adjusting CPU utilization and network bandwidth allocation enables application response time and service level requirements to be met. In addition, storing data for trend analysis enables effective capacity planning and resource management. When systems such as these operate at peak efficiency, organizations are better equipped to make better decisions faster—a factor that can mean the difference between surviving and thriving in an increasingly competitive marketplace.

Managing the Integrated Enterprise—Sun Management Center

Conventional tools cannot support the move from managing small pockets of disparate systems and services to that of managing the integrated enterprise. IT organizations need an integrated set of systems management tools—a platform that offers common services for all enterprise management applications. Such solutions must also have a consistent look-and-feel, implement enterprise-wide security procedures, integrate with other management tools, and enable new functionality to be added with ease.

The most advanced systems management tool from Sun to date, Sun Management Center offers a single point of management for all Sun systems, the Solaris™ operating environment, applications, and services for data center and highly distributed computing environments. With Sun Management Center, IT organizations can efficiently manage and arbitrate between users, applications, and resources (Figure 1).

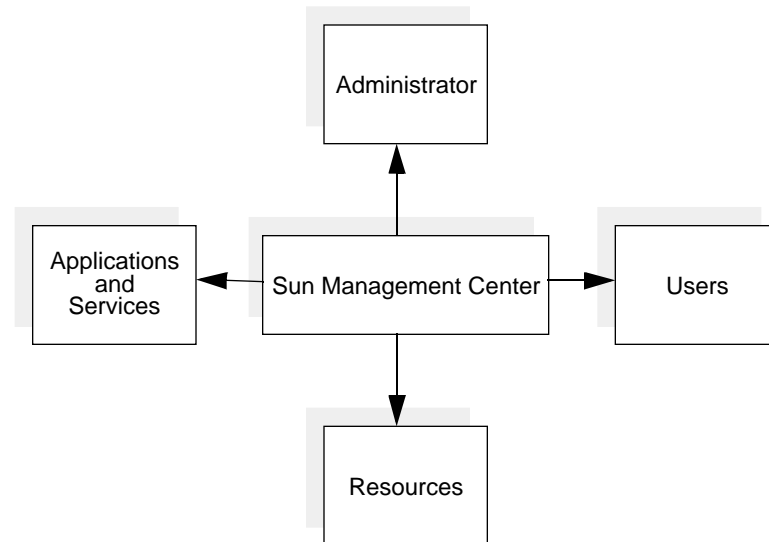


Figure 1 Sun Management Center provides a single point of management for the enterprise

Sun systems, which have long been the preference for both technical and commercial computing users, capitalize on Sun's strengths in reliability, availability, and serviceability. Enterprise management tools, however, must be designed to understand the systems they intend to manage—and no one knows how to manage Sun systems better than Sun. As a result, Sun Management Center gives administrators the most comprehensive tool for managing Sun systems, as well as a platform that integrates easily with other enterprise management tools.

Sun Management Center—Key Features

Sun Management Center is Sun's next generation enterprise system management tool. Designed to support Sun systems, Sun Management Center provides a platform upon which the enterprise can base its administrative and management operations to ensure all systems and the services they provide are highly available. A powerful tool for managing the enterprise network, Sun Management Center enables system administrators to perform remote system configuration, monitor performance, and isolate hardware and software faults all through an easy-to-use graphical user interface.



Reliability, Availability, and Serviceability (RAS) Features

- *Proactive and automated management of complex and common administrative tasks, reducing the likelihood for costly errors and ensuring availability.*
- *GUI using Java technology, providing heterogeneous GUI support, a common look-and-feel for all Sun Management Center applications, and the flexibility to manage the enterprise from any Java-enabled platform, thereby increasing administrator efficiency. The GUI supports dynamic reconfiguration and multi-pathing, ensuring high system availability.*
- *Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and ensuring availability.*
- *Predictive failure analysis, enabling administrators to predict potential memory and disk hardware failures on a statistical basis, thereby enhancing decision making and increasing availability.*

System Administration Tools

- *Health monitoring, a sophisticated set of heuristics that incorporates a large body of administrative knowledge, including an intelligent rules-based health monitor that correlates metrics and gives suggested steps for resolution, resulting in simplified administration.*
- *Log-file scanning, enabling administrators to search and parse logs and registers for a particular status—the foundation for application health monitoring.*
- *Physical viewer, displaying photo-realistic images of hardware components and pointing to components with an associated event, enabling administrators unfamiliar with a particular Sun platform to quickly determine which components need to be replaced.*
- *Logical viewer, presenting a tree hierarchy of the managed host or domain, including all hardware and operating system components. If an event is associated with a particular component, the logical viewer will identify its exact location within the hierarchy.*
- *Event and alarm management, providing administrators with the information they need when they need it.*
- *Real-time performance analysis, enabling administrators to isolate potential and existing bottlenecks.*



Integration Features

- *Single event model, enabling information to be shared with multiple consoles or users with ease.*
- *Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli TME 10 TEC 3.6, HP OpenView ITOps, and Computer Associates Unicenter TNG, thereby providing a complete enterprise management solution*
- *Full SNMP (versions 1, 2c and V2usec) and RMI connectivity, enabling information to be shared with other enterprise management tools*
- *Console development guide, enabling organizations to integrate new or legacy applications with the Sun Management Center console*

Scalability and Customization Features

- *Common management platform, scalable from a single system to thousands of server and desktop systems.*
- *Configuration flexibility, enabling Sun Management Center to be configured out of the box to best fit the needs of the environment, as well providing easy customization for new rules, scripts, actions, etc.*
- *Extensible agent architecture, enabling administrators to add functionality and management features with ease.*
- *Developer environment, enabling organizations to plan, design, develop and integrate third-party applications, tools, and customized solutions based on the Sun Management Center framework*
- *Rules writing documentation, enabling rules to be created and customized for the SunMC environment*

Security Features

- *Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions.*



Ease-of-Use Features

- *Single point of management, enabling effective use of administrative resources.*
- *Dynamic agent modules, enabling functionality to be added or removed asynchronously and dynamically*
- *Domain-aware agents, enabling the dynamic system domains supported on the Sun Enterprise 10000 server and its associated resources to be monitored independently*
- *Multiple system support, enabling administrators to monitor and manage all Solaris Operating Environment systems remotely.*
- *Logical element grouping, enabling the grouping of Sun systems by geographical location, server role, administrative responsibility, etc. The status of the individual systems are summarized by the group, as events and alarms are issued to each system.*
- *Hierarchy and topology viewer, a central management application that displays the hierarchy and a topology map of all the objects that are being managed.*
- *Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and OIDs to identify specific types of systems*
- *Console wrapper, giving users easy access to native UNIX commands*

Intelligent Agent-Based Architecture

Most traditional systems and network management products are console-centric, forcing processing to be done at a centralized location. Inherently less reliable, console-centric solutions require an excessive amount of network bandwidth.

Sun Management Center is based on the industry-wide manager/agent architecture. In this paradigm, a manager acting as a management station executes applications which monitor and control systems by sending requests to the agents that are managing them. Agents—pieces of software that perform all data requests and management functions—have access to critical management information and respond to manager requests (Figure 2).

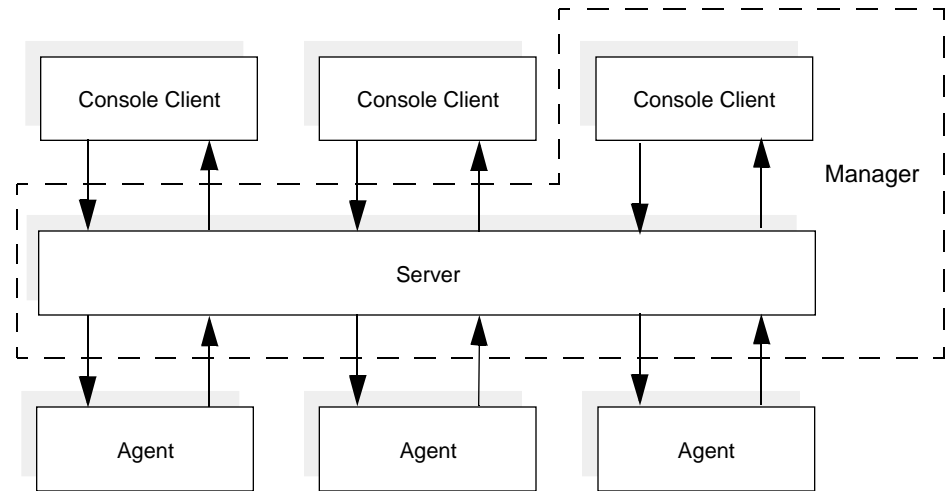


Figure 2 Sun Management Center utilizes agent technology

Utilizing an object-centric, dynamic, intelligent design, Sun Management Center enables processing to be done at the source—where the managed object is located. By distributing management intelligence, Sun Management Center enhances the reliability, availability, and serviceability of the enterprise network. Sun Management Center employs autonomous agent technology, a technique in which agents are not dependent on other software components, and all data collection and processing is done locally at the agent. Based on SNMP technology, these agents collect and process data locally, and can act on data to send SNMP traps, run processes, etc., even if connection to the manager is severed. These intelligent agents can monitor dynamic system domains, as well as initiate alarms, notification, or specific actions based on collected data or messages through customizable rules and thresholds.

Because no one package can meet every demand of the enterprise, additional modules can be dynamically loaded to Sun Management Center agents from the console—without disruption to the management system—providing administrators with a flexible and extensible application that can be tailored to form a comprehensive enterprise management solution that adapts to their changing needs.



Three-Tiered Architecture

Sun Management Center utilizes a three tier architecture that provides a high level of scalability and distribution (Figure 3).

- *Console Layer*

The console layer constitutes the user interface of the Sun Management Center system. The console provides administrators with visual representations of managed objects, as well as the ability to manipulate attributes and properties associated with them. Based on Java technology, the console is platform-independent and portable, and can be easily customized and extended for a variety of computing environments.

- *Server Layer*

The server layer provides management services on demand, enabling effective and efficient high performance operation. The server layer can support multiple consoles, enabling several administrators to view the enterprise network simultaneously. Acting as a service broker to the console, the server layer consolidates and optimizes multiple console requests, thereby minimizing network traffic. Communication with the console layer is through a well-defined client application programming interface (API). This interface can also be used by third-party tools to gain access to data collected by Sun Management Center agents.

All users are authenticated by a *security server agent* or *helper application*, ensuring that administrators access and manage only the systems within their designated control. Additional server agents provide management services, including topology, event, and data management.

- *Agent Layer*

The agent layer consists of agents and probes that manage objects such as desktops, servers, dynamic system domains, storage subsystems, and network hardware and software. The agents utilize rules-based technology to determine the status of managed objects. Agents can then generate alarms or perform actions automatically based on the detected events, thereby providing auto-management, including predictive failure analysis.

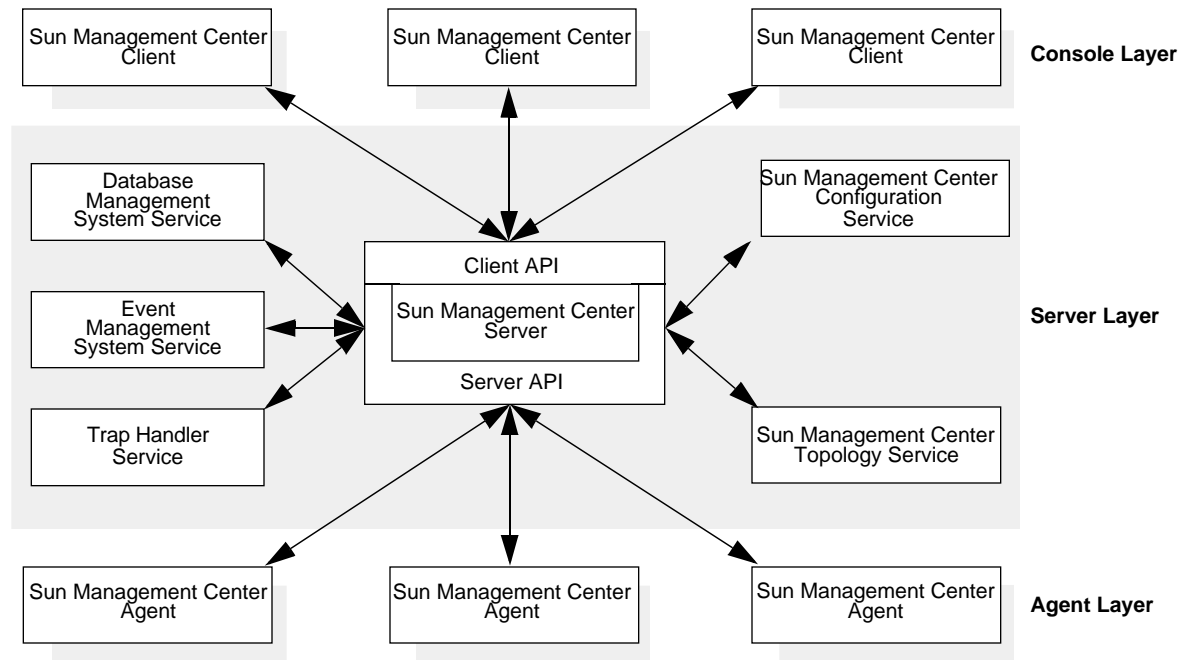


Figure 3 Sun Management Center employs a three-tiered, agent-based architecture

Developer Environment

No two computing environments are the same, or have the same requirements for system monitoring and management. As a result, organizations need the ability to create solutions that meet their diverse needs, as well as ensure enterprise-wide integration of critical management tools. The Sun Management Center Developer Environment provides application programming interfaces (APIs) and tools that help organizations plan, design, develop and integrate third-party applications, tools and customized solutions with the SunMC framework.



- *Build modules*

The Developer Environment includes all the tools organizations need to implement dynamically loaded modules—encapsulated sets of monitoring functions that focus on a particular aspect of system or application health and performance. In particular, organizations can generate module configuration files, create and realize a data model, implement data acquisition, write data acquisition code with Tcl procedures, Shell scripts, or shared object libraries.

- *Write rules*

The detection of alarm conditions and the subsequent triggering of actions provides the core of the SunMC framework. With the Developer Environment, organizations can utilize simple alarm checking and rule evaluation techniques to provide comprehensive information transmission during an event.

- *Use the Client API*

The Sun Management Center Client API contains a set of public Java classes that can be used to retrieve data from Sun Management Center servers and agents. Built on top of the SunMC framework, the Client API provides a higher level of management functionality for the Sun Management Center console. Using this API, console applications can fetch *live* or *historic* data, support synchronous and asynchronous requests, and utilize a variety of Java Language object classes.

- *Integrate applications*

No application can provide all the unique features every organization needs. To ensure operational success, the Sun Management Center Console can be extended to include additional functionality. By integrating SunMC with other applications, organizations can utilize the strengths of each application.

- *Conform to internationalization and GUI guidelines*

The ability to display localized text is paramount in any monitoring and management environment. With the Developer Environment, organizations can create programs that utilize native language conventions for labels, error messages, heading, titles, and many other features.



Sun Management Center at Work

A scalable and extensible management platform, Sun Management Center is designed to support enterprises that range from small companies, to large nation-wide organizations, to global enterprises that span the world. By employing key Sun Management Center features, organizations at every level can raise the reliability, availability, and serviceability of their systems, applications, and services.

Managing Computing Resources in the Small Company

Enterprises must manage their computing systems and ensure they remain available, all while under budget pressures that force them to find ways to operate with fewer administrators and without redundant equipment. These issues are perhaps best understood when viewed in the context of a small software engineering organization. In such environments, engineering personnel may utilize a single local area network that is supported by a small number of servers that run development tools (Figure 4). Should a workstation or server fail catastrophically or simply become unavailable, one or more engineers—perhaps the entire engineering team—may need to sit idle until the problem is isolated and resolved.

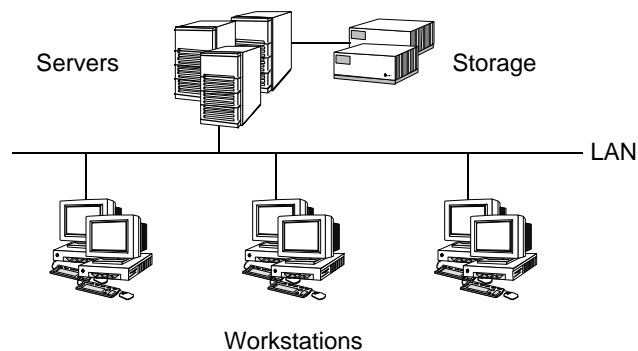


Figure 4 Organizations must keep critical servers, workstations, and other components available to users



Sun Management Center provides a host of features, including a single point of management, common management platform, single event model, proactive and automated management of complex tasks, physical configuration viewer, firmware and patch management, on-line diagnostics, and security measures.

Comprehensive Single Point of Management

Small companies on the rise pose an interesting challenge for administrators. Often characterized by a constantly changing environment with resources relocated frequently, up-and-coming organizations require administrators to physically manage lots of systems. Typically, environments such as these use point products for managing systems, or no products at all.

Junior administrators or those unfamiliar with managing multiple systems need an intelligent tool that can provide a single point of management. Sun Management Center gives administrators a single point of management, enabling them to work from their office and use time effectively. A common management platform, Sun Management Center can run on any system available to the administrator, from a small desktop system to very large servers. With the ability to be configured out of the box to best fit the needs of the environment, administrators can customize Sun Management Center with new rules, scripts and actions. Built-in rules and proactive and automated management functions handle many tasks for junior administrators, reducing the likelihood for costly errors and ensuring availability.

Physical Viewer

System administrators need to be able to determine when a system or system component is beginning to fail or has failed. If damaged components can be detected before they fail, they can be replaced before system operation is affected. If a component does fail, it must be replaced quickly in order to restore system, application, and service availability.

Junior administrators or those new to Sun systems, or experienced administrators who have received a newly released Sun system, may need assistance locating components. The Physical Viewer included in Sun Management Center helps administrators detect and isolate failed or failing components. When an event occurs, such as a fault or error condition, the Physical Viewer highlights the errant component in a photo-realistic view of the system. The actual server configuration in use forms the basis for the photo,



enabling administrators to identify precisely which component has failed. By locating a failed (or failing) component quickly, serviceability and availability are both increased.

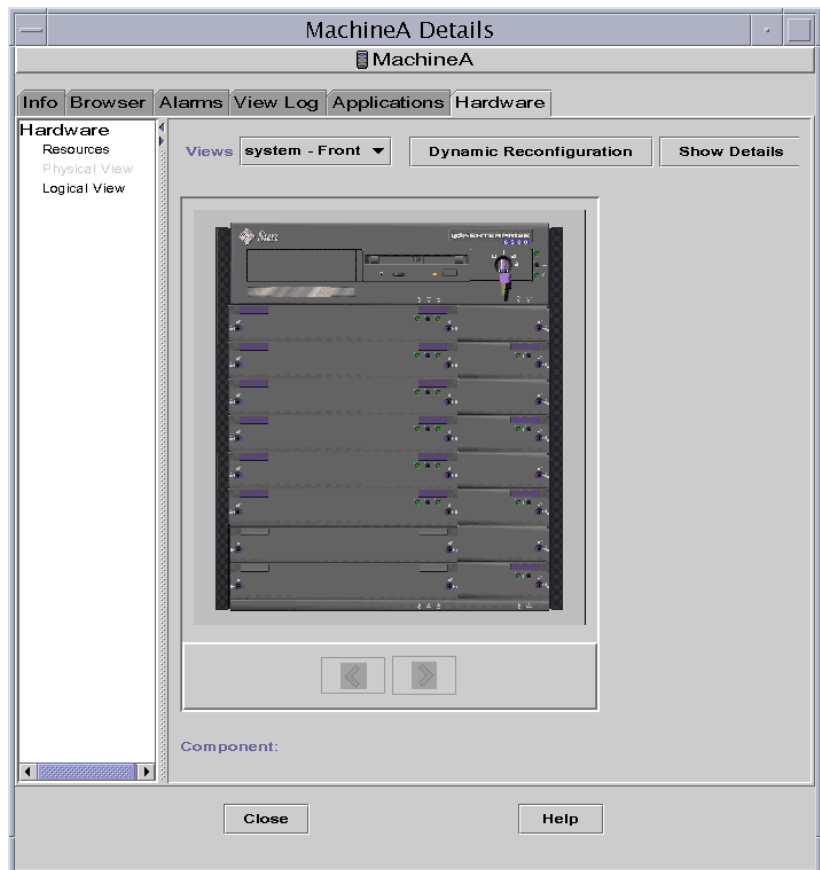


Figure 5 The Physical Viewer provides a photo-realistic view of hardware components

Managing the Growing Enterprise—Medium and Large Environments

As enterprises grow, new markets, processes, and business requirements demand larger numbers of often heterogeneous systems. Furthermore, each group within the organization may utilize one or more computing platforms. For example, a large manufacturing company may utilize a mainframe as an inventory repository, while workstations and servers may be employed by



engineering and manufacturing staff. Sales and marketing personnel may add to the complexity of the enterprise network by using personal productivity tools running on individual PCs or Network Computers (NCs). The heterogeneous enterprise computing environment that results is composed of a myriad of disparate systems spread throughout the organization (Figure 6).

As a company grows, additional system administrative staff may not be added in an effort to keep operating costs low. While it is imperative for organizations to remain cost-conscious, hardware and software systems still require attention in order to achieve the availability requirements of the organization. As a result, administrators need to be able to perform corrective actions without leaving the central office. To aid this effort, IT organizations need a single point of administration, enabling effective use of personnel while reducing overhead costs.

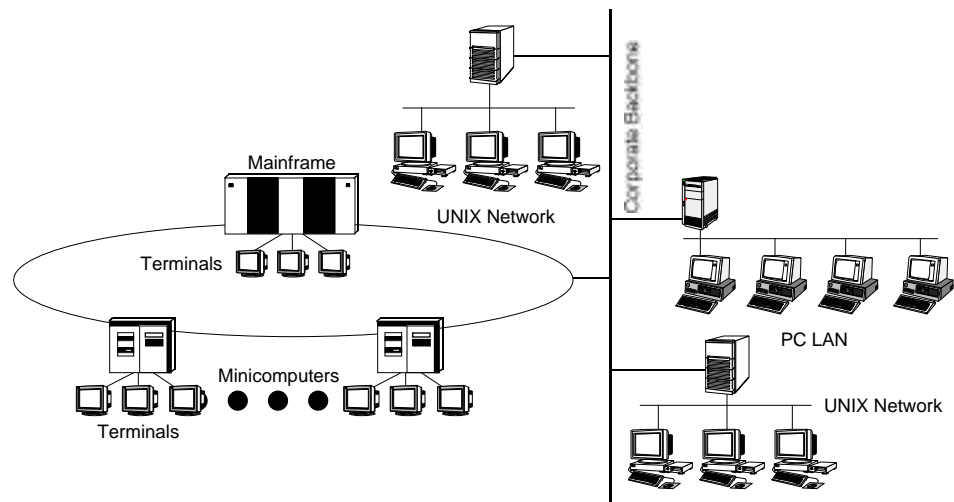


Figure 6 Larger companies are often comprised of disparate systems that are spread throughout the organization

Sun Management Center incorporates a variety of features that assist organizations by enabling the central administration and increasing administrator effectiveness, including multiple system support, a logical viewer, security measures, and event and alarm management.

Logical Viewer

The use of complex computing systems is forcing system administrators to find an intuitive way to view the system. While physical views help junior administrators to identify particular components that need replacement, they do not provide a condensed view of a large configuration. The Sun Management Center Logical Viewer gives administrators a tree-like hierarchy of a managed host or domain, including all hardware and operating system components. When a component fails, the Logical Viewer identifies its exact location within the hierarchy, enabling administrators to determine quickly where the problem lies. After honing in on the problem with the Logical Viewer, administrators can view the component at issue with the Physical Viewer.

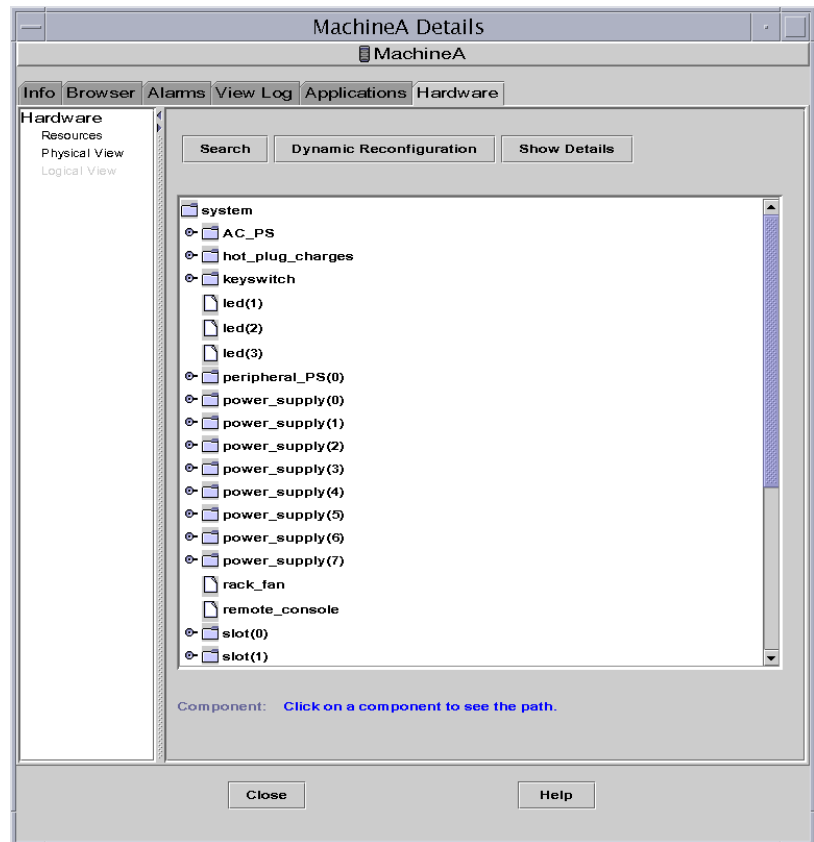


Figure 7 The Logical Viewer provides a compact hierarchical view of a managed host or domain



Multiple System Support and Logical Element Grouping

The size and nature of large heterogeneous computing environments places many demands on system administrators. System resources, including CPU, memory, and disk subsystems, as well as operating system software and networking infrastructure must all be monitored and managed. Administrators need to find ways to group resources and make associations that help them more easily identify and service all the system components related to a particular function.

Sun Management Center helps administrators partition system function and create associations that aid system identification in the event of a failure. Sun systems can be grouped by geographical location, server role, and administrative responsibility, as well as other categorizations.

Event and Alarm Management

The centralization of administrative resources helps ensure effective enterprise management. With the need to lower operating costs and reduce administrative overhead, IT organizations are finding that administrators need tools that automate tasks and alert them to problems immediately. Sun Management Center accomplishes these goals and aids system, application, and service availability by providing a host of fault and event management features (Figure 8):

- Fault detection, isolation, and notification via SNMP traps
- Rules-based event management
- Event correlation
- Event-based actions and notifications
- Event filtering based on priority and severity
- Event and log display mechanisms

By alerting administrators to problems (and potential problems) as they arise, error and fault conditions can be isolated and resolved quickly, minimizing—and potentially eliminating—system downtime. In addition, the ability to perform repair and restoration actions automatically reduces the amount of involvement required by the administrator and shortens repair time, thereby increasing system, data, application, and service availability.

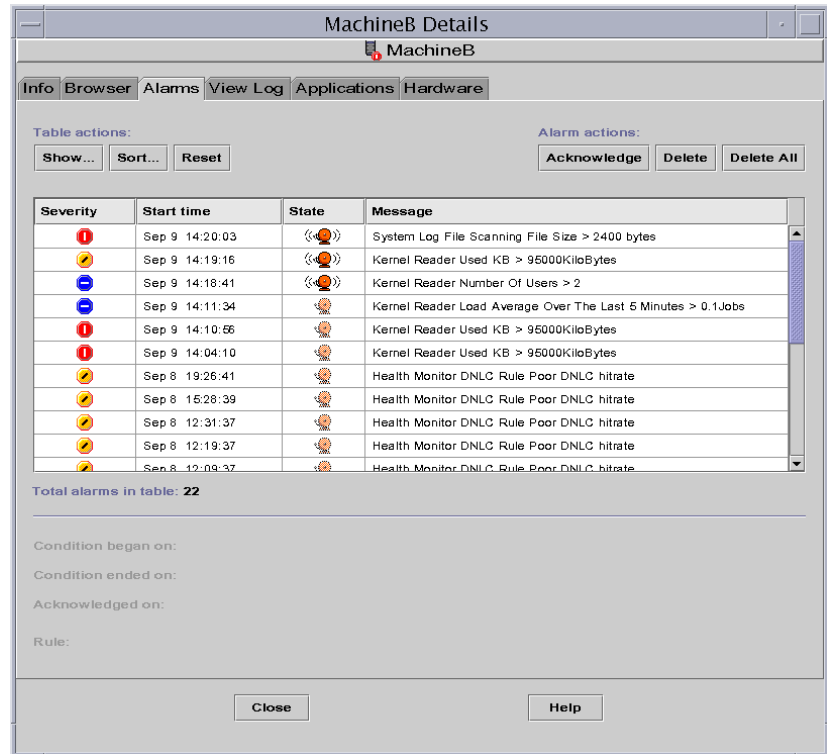


Figure 8 Sun Management Center automates tasks and alerts administrators to problems immediately

Security Measures

Large and small organizations alike rely on advanced security mechanisms to protect their networks and consequently their business. Indeed, many industries, including engineering, finance, health care, and government, need the highest levels of network security and guaranteed privacy.

Sun Management Center includes a host of security mechanisms to ensure users are authenticated and granted access only to the areas of the system in which they are permitted.



Security features of Sun Management Center include:

- User validation
- Administrative domains
- Access rights
- Encryption

Managing the Global Enterprise

Everyday, work is increasingly done by teams rather than individuals. The faster, leaner, process and team-oriented organizations are proving that individuals must collaborate. Because computers are such an integral part of business, systems must support this new work methodology. One example of team collaboration is the “tiger team” approach to problem solving. Tiger teams require individuals from all departments, regardless of location, to participate in critical meetings electronically. For example, a critical manufacturing problem might require resources from manufacturing, purchasing, sales and marketing, and engineering in order for problem isolation, resolution and implementation to be successful.

Indeed, corporate collaboration is needed daily in order for global enterprises to operate efficiently and effectively. International banks must access accounts, obtain information, and perform transactions around the clock. With branches in multiple locations and automated teller machines distributed around the world, personnel and system collaboration is imperative. In addition, systems and services must remain available—every minute a system is down results in lost revenue. Such matters are time critical, and often cannot wait for individuals to fly to a central location. Communication must be swift, making system, network, and resource management a key requirement for the global enterprise.

Sun Management Center helps mitigate the management problems faced by the global enterprise by providing topological views, auto-discovery of systems, active management through the support of dynamic reconfiguration and dynamic system domain management, log file scanning, historical data logging, and the ability to extend the system’s functionality as need dictate. These features help the IT organization ensure the enterprise operates at peak efficiency and availability.

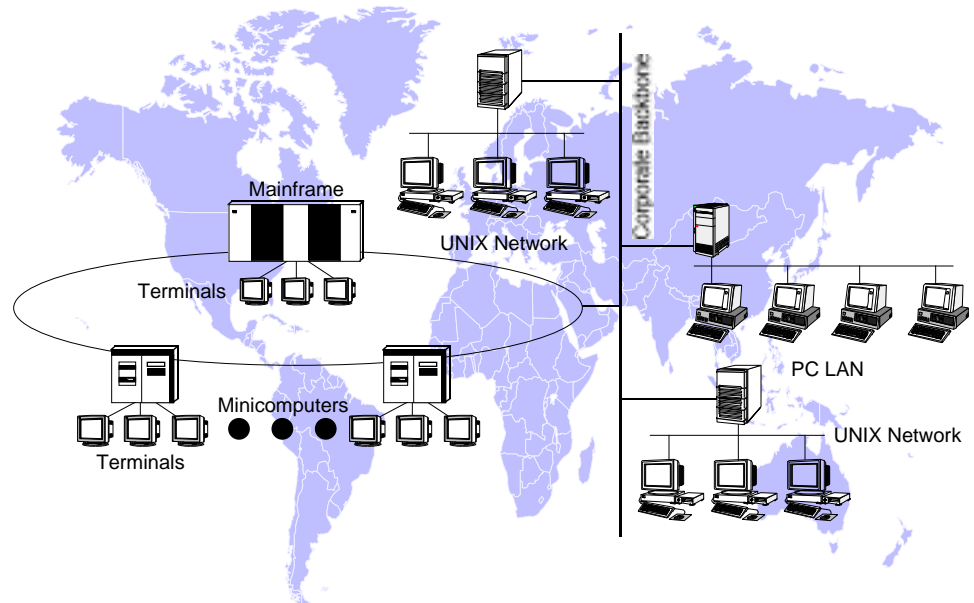


Figure 9 Global enterprises need to ensure systems, data, applications, and services remain available to ensure corporate collaboration

Topological Views

The breadth and complexity of global enterprise networks presents administrators with vast amounts of computing resources to monitor and manage. While physical and logical views aid the identification of specific component failures, they do not provide a representation of the entire network environment. Abstract tools that display the network by group or function are needed to help monitor and isolate problem areas.

The Sun Management Center Topology Viewer gives administrators a schematic hierarchy of networked systems. Administrators can view the entire network, subnets, groups of servers, administrative domains, and geographical locations, and drill down in each to a detailed view of systems and components. With the Topology Viewer, administrators can obtain high level and low level views into the working of the enterprise network (Figure 10).

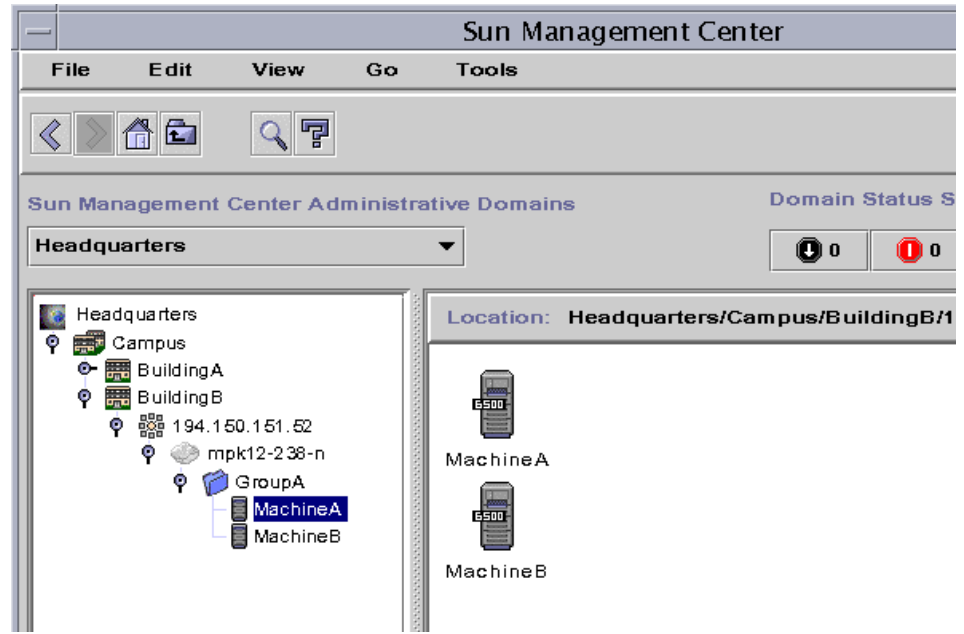


Figure 10 The Topology Viewer provides a series of views into the enterprise network

Auto-Discovery of Systems

Large organizations often find it difficult to keep track of systems. To be effective, IT organizations must find better ways to keep track of constantly changing and growing configurations. By knowing which systems are employed where, resources can be moved more efficiently as needs dictate. Sun Management Center helps administrators obtain system information through automatic discovery (Figure 11). For each system, IP address, subnet address, and hostname information can be collected. In addition, OIDs can be used to identify specific types of systems. As a result, administrators can monitor how systems are deployed, as well as how the networking infrastructure is employed.

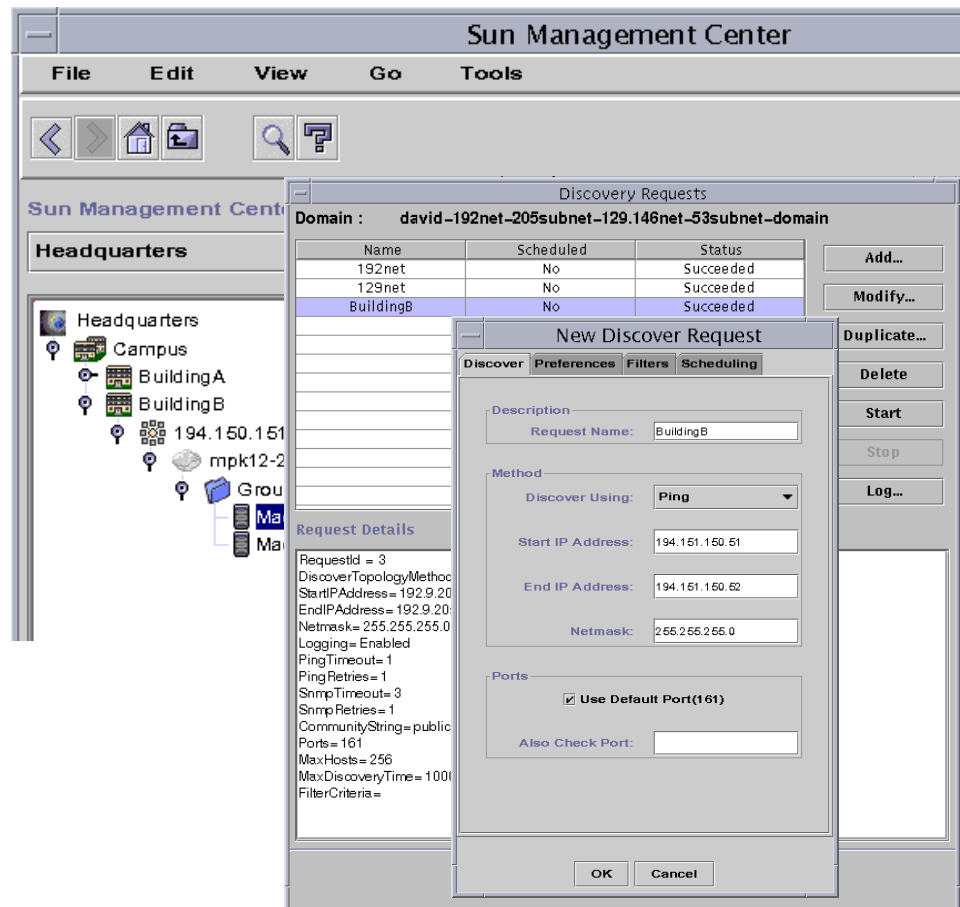


Figure 11 Sun Management Center helps administrators obtain system information through an automatic discovery mechanism

Health Monitoring and Log File Scanning

Health monitoring is a critical component of application availability, but organizations must determine what it means to be “healthy”. Consequently, IT organizations need to be able to customize the definition of a healthy hardware or software system. Some organizations may require predictive analysis to ensure problems are fixed before they affect the enterprise; others may only need to have attention called to catastrophic failure conditions. Sun Management



Center utilizes a sophisticated set of heuristics that incorporates a large body of administrative knowledge, including an intelligent rules-based health monitor that correlates metrics and gives suggested steps for resolution and action.

System administrators may not be geographically close to the system they manage. In such environments, determining what has caused a system failure can be a difficult and time consuming task. The foundation for health monitoring, *log file scanning* allows administrators to search and parse logs and registers for particular status codes, enabling administrators to identify how a system has failed, as well as how many systems have failed for the same underlying reason.

Active Management

When systems, components, operating software, or applications fail, administrators must quickly resolve the problem and return the system to operation. By employing active configuration management controls, dynamic reconfiguration, system domain management, and alternate pathing, system administrators can ensure that repair can be accomplished while the system remains on-line and servicing users. In some cases, administrators can choose to have other systems carry the load while repairs are performed, enabling organizations to select the level of availability that best suits their needs. Additional trend analysis can be performed through add-on tools, enabling mathematical projections to be generated based on historical data.

Real-Time Performance Analysis

Keeping the network operating at peak efficiency is a critical and time consuming job, and administrators need a mechanism that helps them understand network performance. The real-time performance analysis capabilities of Sun Management Center enable administrators to determine system workload (Figure 12). When system and network reconfigurations are performed or new equipment is added, the immediate impact of their actions can be learned, resulting in more efficient performance tuning efforts.

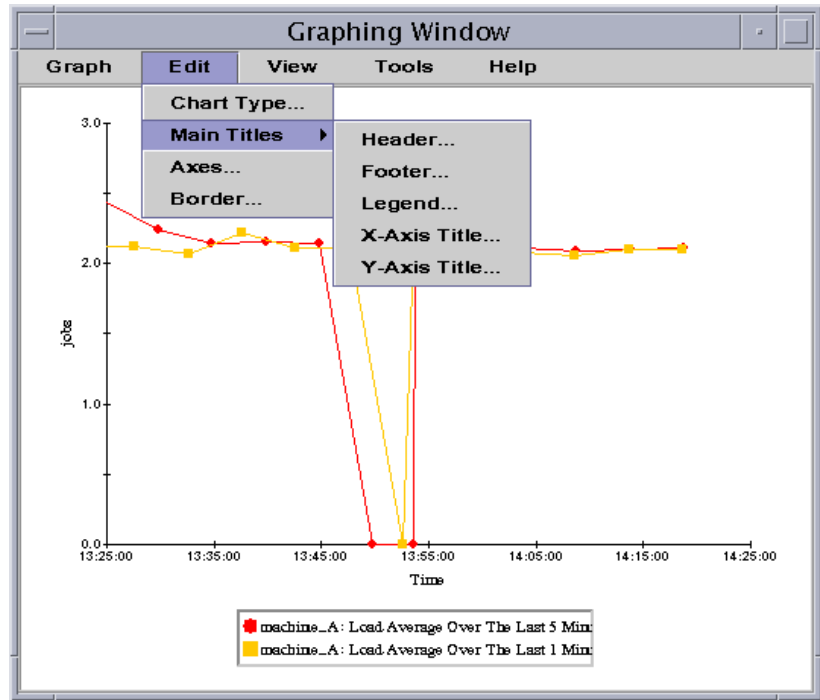


Figure 12 Sun Management Center includes real-time performance analysis tools that help administrators determine system workload conditions

Performance Management

To ensure resources are being used to their full potential, IT organizations perform a variety of analysis and planning tasks. With Sun Management Center, administrators can collect and centrally store critical system performance and configuration data for fault analysis, system sizing, and long term capacity planning.

Integrating Enterprise Management Tools

Because no one product can meet every demand of the enterprise, additional modules can be dynamically loaded to Sun Management Center agents from the console—without disruption to the management system—providing administrators with a flexible and extensible application that can be tailored to



form a comprehensive enterprise management solution. In addition, Sun Management Center has been integrated with major system management platforms such as Tivoli TME 10 TEC 3.6, HP OpenView IT Operations, CA Unicenter TNG, and Sun Enterprise Manager, ensuring organizations have a complete enterprise solution.

Summary

The evolution of enterprise computing has had a dramatic impact on the role of system management, with system management and administration proving to be a difficult issue for most organizations. With the demand for IT organizations to provide more information faster and with greater reliability and accuracy, IT organizations are finding they must find solutions that help them manage the integrated enterprise. Sun Management Center enables administrators to perform resource, system, and network management, proactively manage systems and processes, automate tasks, and add, remove, or modify functionality based on business needs. With Sun Management Center, system administrators finally have the comprehensive solution they need to ensure the lower cost of management and higher degree of system, application, and service availability that organizations need to remain competitive in an increasingly challenging marketplace.

References



Sun Microsystems Computer Company posts product information in the form of data sheets, specifications, and white papers on its Internet World Wide Web Home page at: <http://www.sun.com>.

Look for abstracts on these and other Sun technology white papers and manuals:

Delivering Performance on Sun: System Tuning, Sun Microsystems, 1998.

Sun Management Center Architecture, Sun Microsystems, 1999.

Sun Management Center 2.1 Software User's Guide, Sun Microsystems, 1999.

Sun Management Center 2.1 Developer Environment Reference Manual, Volume 1: Introduction to SDK and Agent Development, Sun Microsystems, 1999.

Sun Management Center 2.1 Developer Environment Reference Manual, Volume 2: Console Development, Sun Microsystems, 1999.

Sun Management Center 2.1 Developer Environment Reference Manual, Volume 3: Additional Material, Sun Microsystems, 1999.

Web sites of interest:

<http://www.sun.com>

<http://www.sun.com/sunmanagementcenter/>

<http://docs.sun.com>





Sun Microsystems Computer Company
ASun Microsystems, Inc. Business
901 SanAntonio Road
PaloAlto, CA94303 USA
415 960-1300
FAX 415 969-9131
<http://www.sun.com>

Sales Offices

Argentina: +54-1-311-0700
Australia: +61-2-9844-5000
Austria: +43-1-60563-0
Belgium: +32-2-716-7911
Brazil: +55-11-524-8988
Canada: +905-477-6745
Chile: +56-2-638-6364
Colombia: +571-622-1717
Commonwealth of Independent States:
+7-502-935-8411
Czech/Slovak Republics:
+42-2-205-102-33
Denmark: +45-44-89-49-89
Estonia: +372-6-308-900
Finland: +358-0-525-561
France: +33-01-30-67-50-00
Germany: +49-89-46008-0
Greece: +30-1-680-6676
Hong Kong: +852-2802-4188
Hungary: +36-1-202-4415
Iceland: +354-563-3010
India: +91-80-559-9595
Ireland: +353-1-8055-666
Israel: +972-9-956-9250
Italy: +39-39-60551
Japan: +81-3-5717-5000
Korea: +822-3469-0114
LatinAmerica/Caribbean:
+1-415-688-9464
Latvia: +371-755-11-33
Lithuania: +370-729-8468
Luxembourg: +352-491-1331
Malaysia: +603-264-9988
Mexico: +52-5-258-6100
Netherlands: +31-33-450-1234
New Zealand: +64-4-499-2344
Norway: +47-2218-5800
People's Republic of China:
Beijing: +86-10-6849-2828
Chengdu: +86-28-678-0121
Guangzhou: +86-20-8777-9913
Shanghai: +86-21-6247-4068
Poland: +48-22-658-4535
Portugal: +351-1-412-7710
Russia: +7-502-935-8411
Singapore: +65-224-3388
SouthAfrica: +2711-805-4305
Spain: +34-1-596-9900
Sweden: +46-8-623-90-00
Switzerland: +41-1-825-7111
Taiwan: +886-2-514-0567
Thailand: +662-636-1555
Turkey: +90-212-236-3300
UnitedArab Emirates:
+971-4-366-333
United Kingdom: +44-1-276-20444
United States: +1-800-821-4643
Venezuela: +58-2-286-1044
Worldwide Headquarters:
+1-415-960-1300