HP management tools for Oracle9*i* Real Application Clusters (RAC)

Introduction

Oracle9*i* Real Application Clusters (RAC) is a clustered database product that provides transparent application scalability by quickly and efficiently sharing clusterwide caches for coordinated data access. Oracle9*i* RAC provides near-linear scaling transparency with the ability to rapidly add nodes and disk storage. In an Oracle9*i* RAC environment, every server acts as a backup for every other server in the cluster. Users of a failed server can be quickly failed over to an active server.

A successful introduction of monitoring and management of Oracle9*i* RAC clusters through the use of software such as HP Systems Insight Manager and HP ProLiant Essentials Performance Management Pack can improve the overall reliability of an Oracle9*i* RAC solution.

The core HP Systems Insight Manager software delivers the essential capabilities required to manage HP server platforms running Microsoft® Windows®, Linux®, and HP-UX.

HP Systems Insight Manager can be extended to provide system management with plug-ins for storage, rapid deployment, and software version management.

Need for the solution

With the complexity of Oracle9i RAC clusters and the importance of applications based on Oracle9i RAC, a flexible solution is required to provide data to effectively manage the entire business process. HP Systems Insight Manager and ProLiant Essentials Performance Management Pack can be used to provide information to the IT staff to help them keep all processes operating effectively with minimal errors.

HP Systems Insight Manager (SIM)

HP SIM is a distributed, client/server software solution that provides service-driven event and performance management of business-critical enterprise systems, applications and services through its ability to monitor, control, and report on the health of a system. HP SIM features include:

- **Easy and rapid installation**. Installs on your server platform of choice running HP-UX, Windows or Linux.
- **Automatic discovery and identification**. Automatically discovers and identifies systems attached to the network. Use Discovery Filters to prevent discovery of unwanted system types. Manual discovery options are also available.
- **Fault management and event handling**. Provides proactive notification of actual or impending component failure alerts. Automatic Event Handling allows users to configure policies to notify appropriate users of failures via e-mail, pager, or short message service (SMS) gateway. Also enables automatic execution of scripts or event forwarding to enterprise platforms such as HP OpenView Network Node Manager or HP OpenView Operations.
- **Consistent multi-system management**. Initiates a task on multiple systems or nodes from a single command on the central management server (CMS). This eliminates the need for tedious, one-at-a-time operations on each system. The integration of single-system aware

tools makes them multiple-system aware, allowing them to execute simultaneously on multiple nodes.

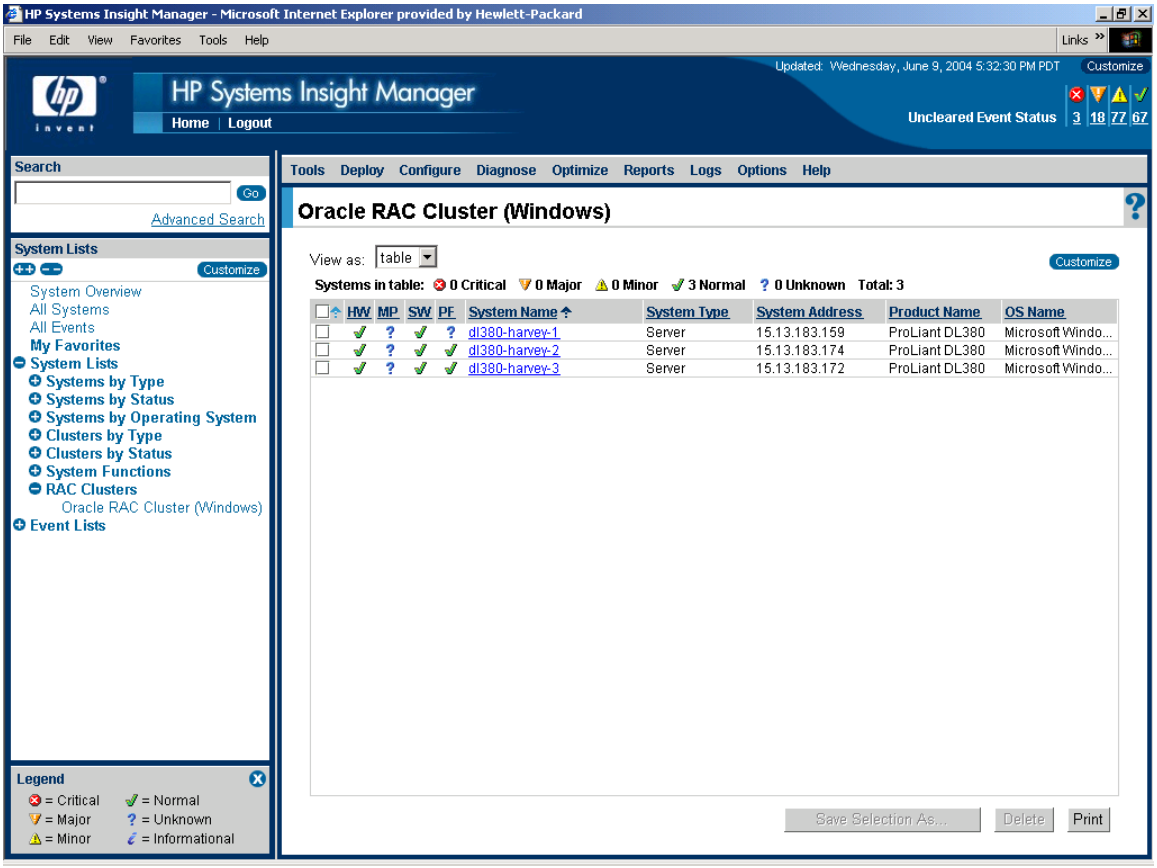
- **Secure remote management**. Leverages operating system security for user authentication and Secure Sockets Layer (SSL) and Secure Shell (SSH) to encrypt management communications.
- **Role-based security**. Enables effective delegation of management responsibilities by giving systems administrators granular control over which users can perform which management operations on which systems.
- **Tool definitions**. Defines tools using simple XML documents that enable you to integrate off-the-shelf or custom tools. These tools can be command line tools, web-based applications, or scripts. Access to these integrated tools is governed by role-based security.
- **Data collection and inventory reports**. Performs comprehensive system data collection and enables you to quickly produce detailed inventory reports for managed systems. Reports can be saved in HTML format or exported to comma-separated values (CSV) format for easy incorporation into popular reporting packages.
- **Snapshot comparisons**. Enables you to compare configuration snapshots of up to four different servers or configuration snapshots of a single server over time. This functionally assists IT staff in pinpointing configuration issues that can contribute to system instability.
- **Version control**. Automatically downloads the latest BIOS, driver, and agent updates for HP ProLiant servers running Windows and Linux. Identifies systems running out-of-date systems software and enables system software updates across groups of servers.
- **Two user interfaces**. Provides a web browser graphical user interface (GUI) and command line interface (CLI) to help incorporate HP Systems Insight Manager into your existing management processes.

HP SIM System View

HP SIM System View allows you to view all the managed systems. You can customize the view to group related devices. Figure 1 shows a customized view of a 3-node Oracle 9iRAC cluster. The table in the System View provides the following links at the left of each system name:

- **HW**: System Management Homepage
- **MP**: Management Processor (iLO or RILOE)
- **SW**: Version Control Agent
- **PF**: Performance Management
- **System Name**: System Page

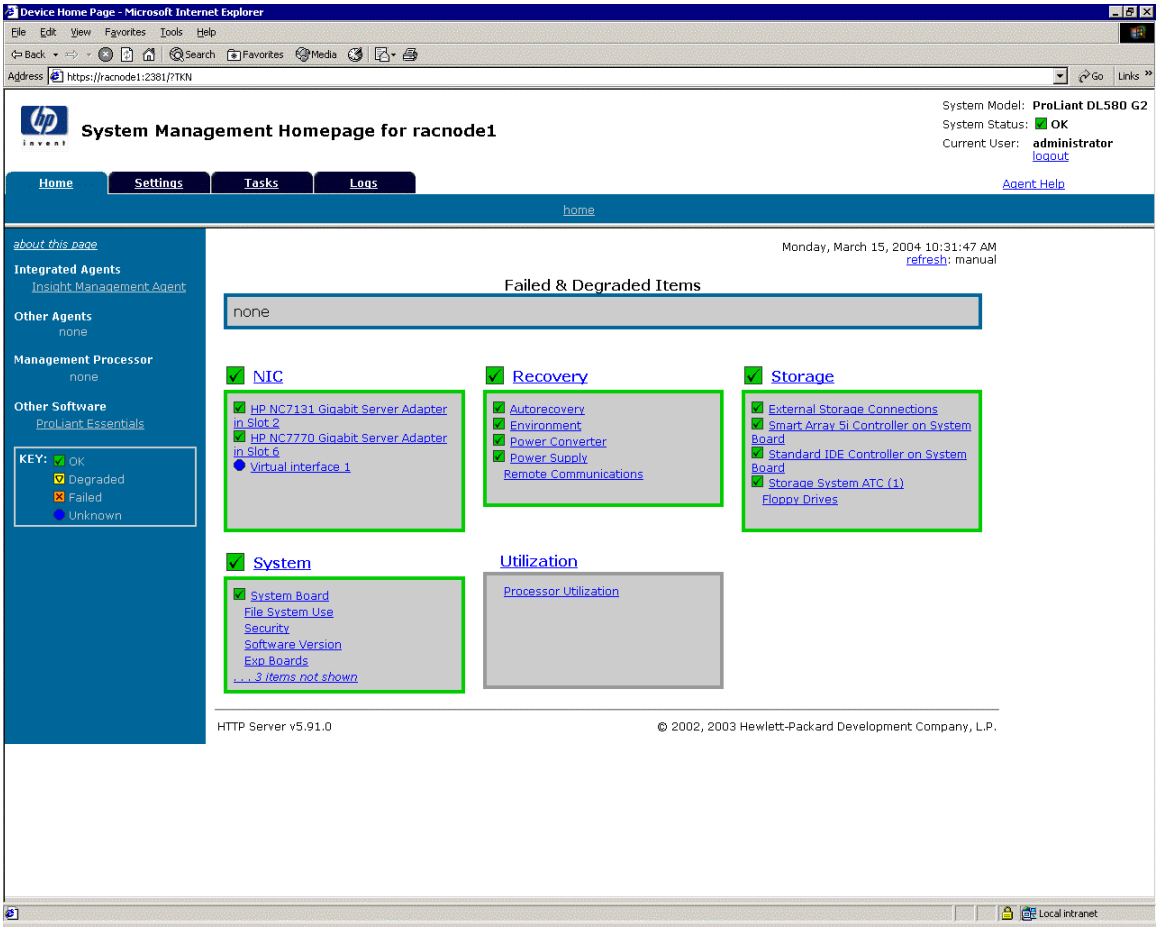
Figure 1. HP Systems Insight Manager - 3-node Oracle 9iRAC cluster



HP SIM System Management Homepage

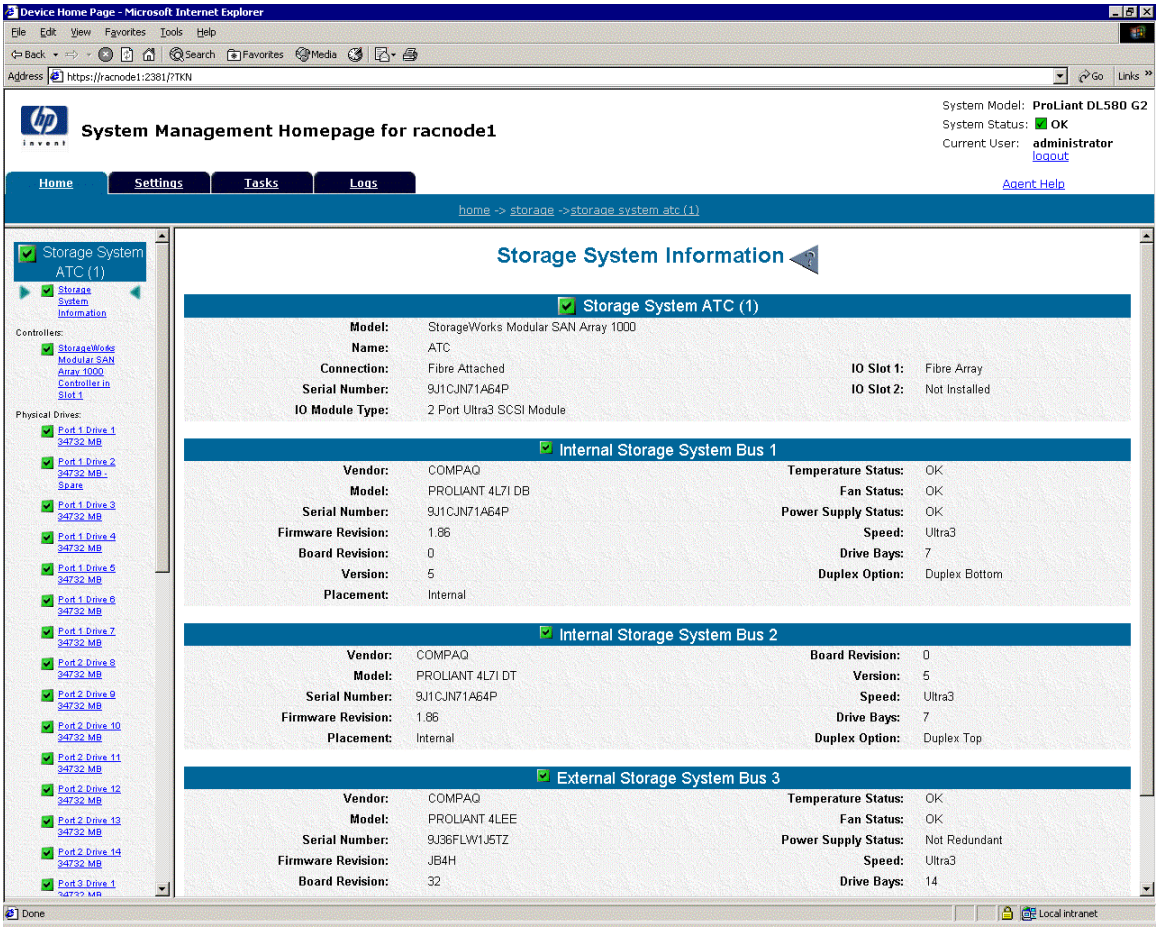
HP Systems Insight Manager provides the user with the capability to drill down to each device for detailed information on the hardware status. Clicking on the HW link from the System View opens a new browser window with the System Management Homepage for a device, shown in Figure 2. The System Management Homepage displays the overall system status as determined by the management software installed on each system. HP ProLiant Insight Management agents running on each Oracle RAC cluster member provide detailed information on software and hardware configuration and status.

Figure 2. System Management Homepage



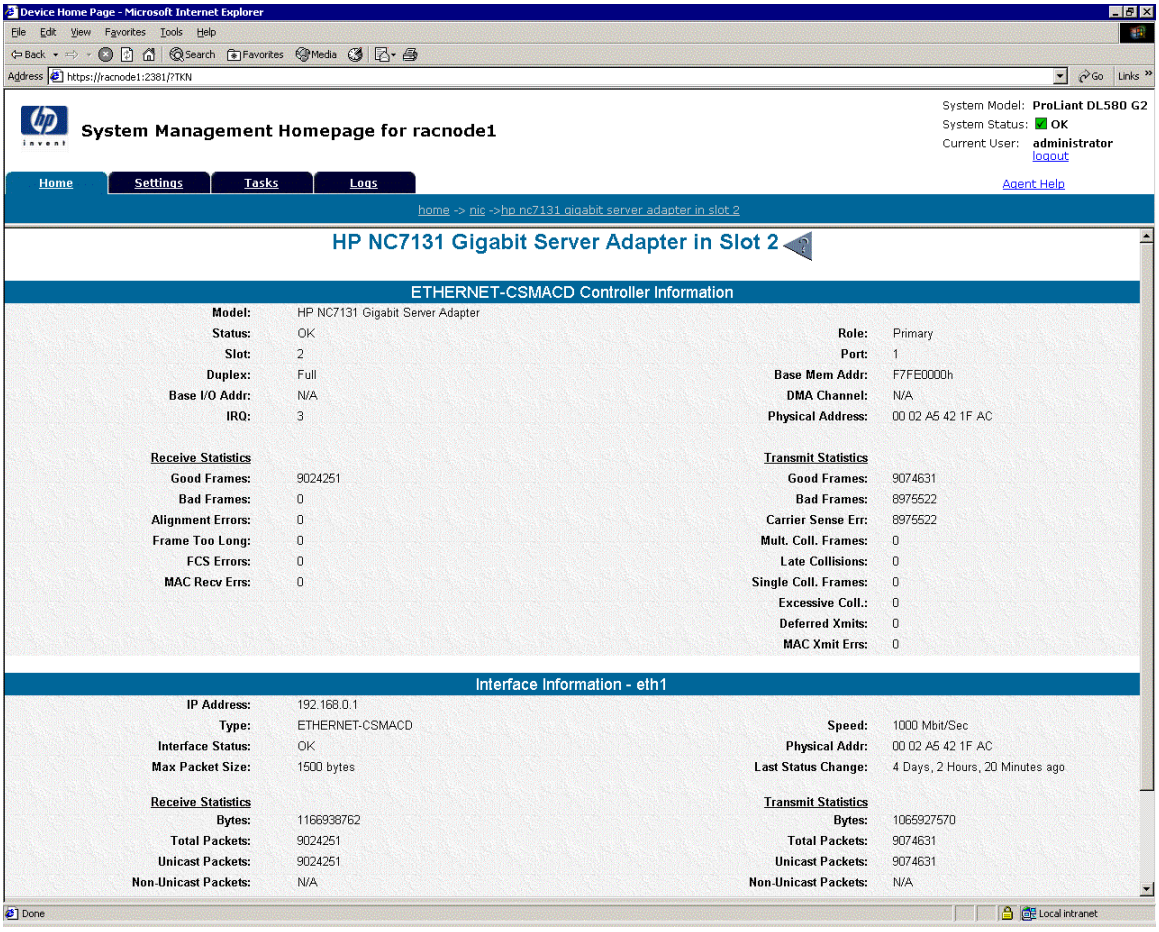
Each server in a RAC cluster can see the shared storage. The user can view the detailed information from the storage subsystem including the status of each physical drive as shown in Figure 3.

Figure 3. Storage System Information



The NIC agents provide interconnect traffic statistics and detailed configuration information, as illustrated in Figure 4.

Figure 4. NIC agents provide interconnect traffic statistics and detailed configuration information

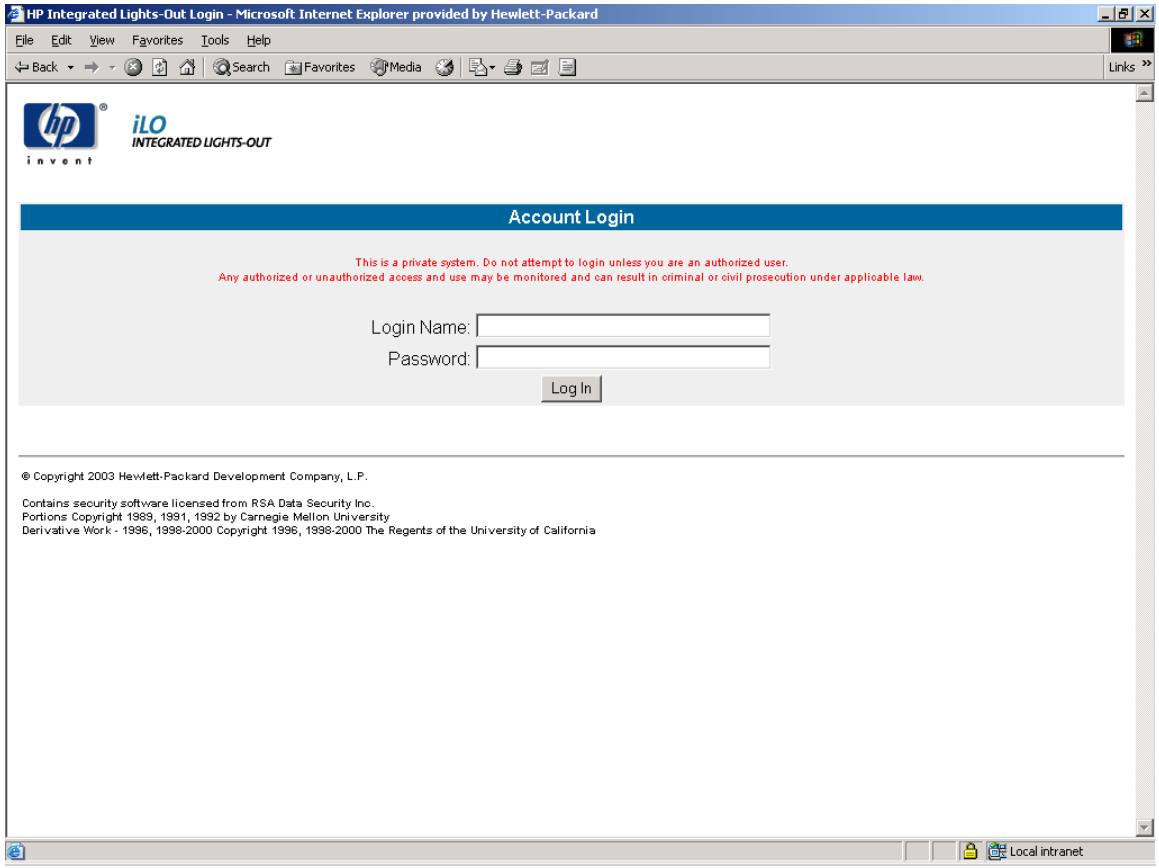


HP Lights-Out management

HP Systems Insight Manager provides the user with the capability to connect to the Lights-Out management on supported servers. Depending on the ProLiant server, Lights-Out management can be provided by either Integrated Lights-Out (iLO) or the Remote Insight Lights-Out Edition (RILOE) board.

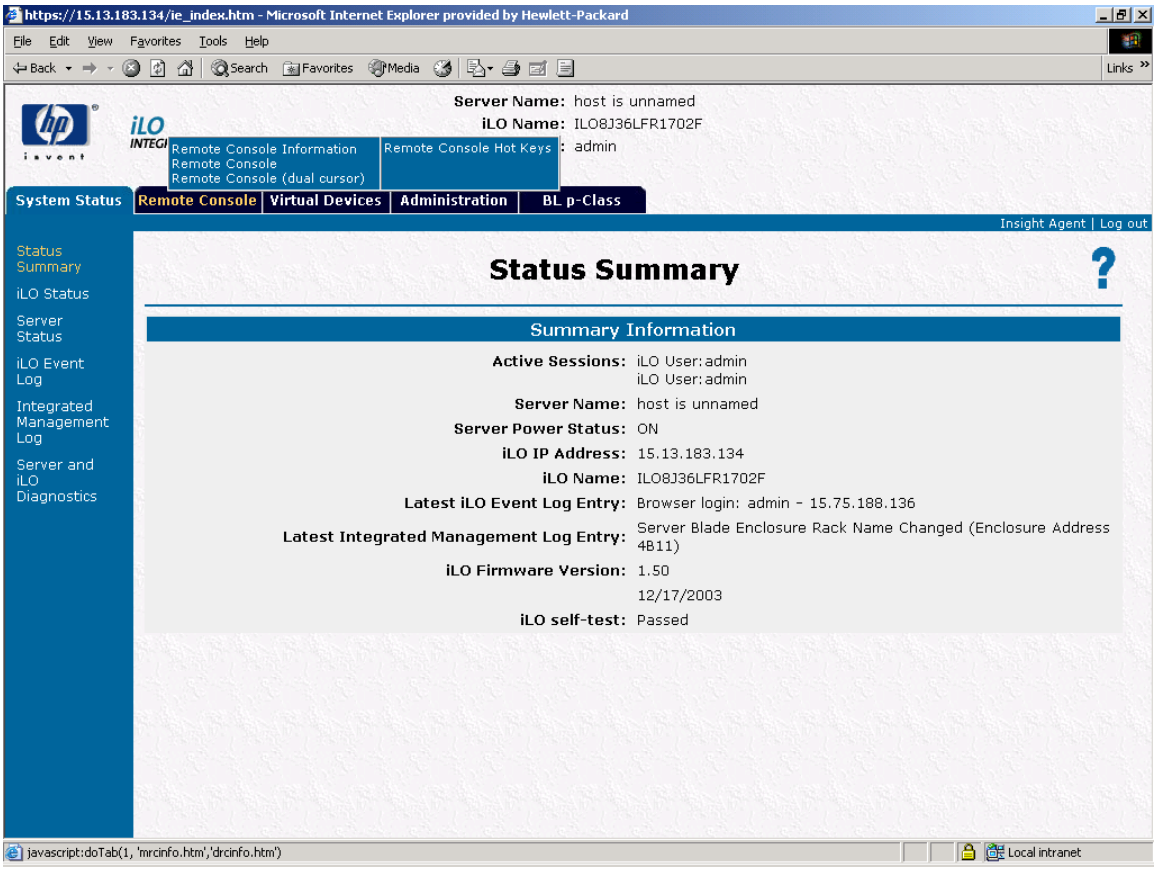
If the system has Lights-Out management capability, the MP column of the System View displays the status icon of the management processor. Otherwise, the MP column is blank. Clicking on the MP link next to the selected server name opens the Lights-Out Login in a new browser window. Figure 5 shows the iLO login screen and iLO is used for the following example; RILOE works similarly.

Figure 5. HP iLO Login



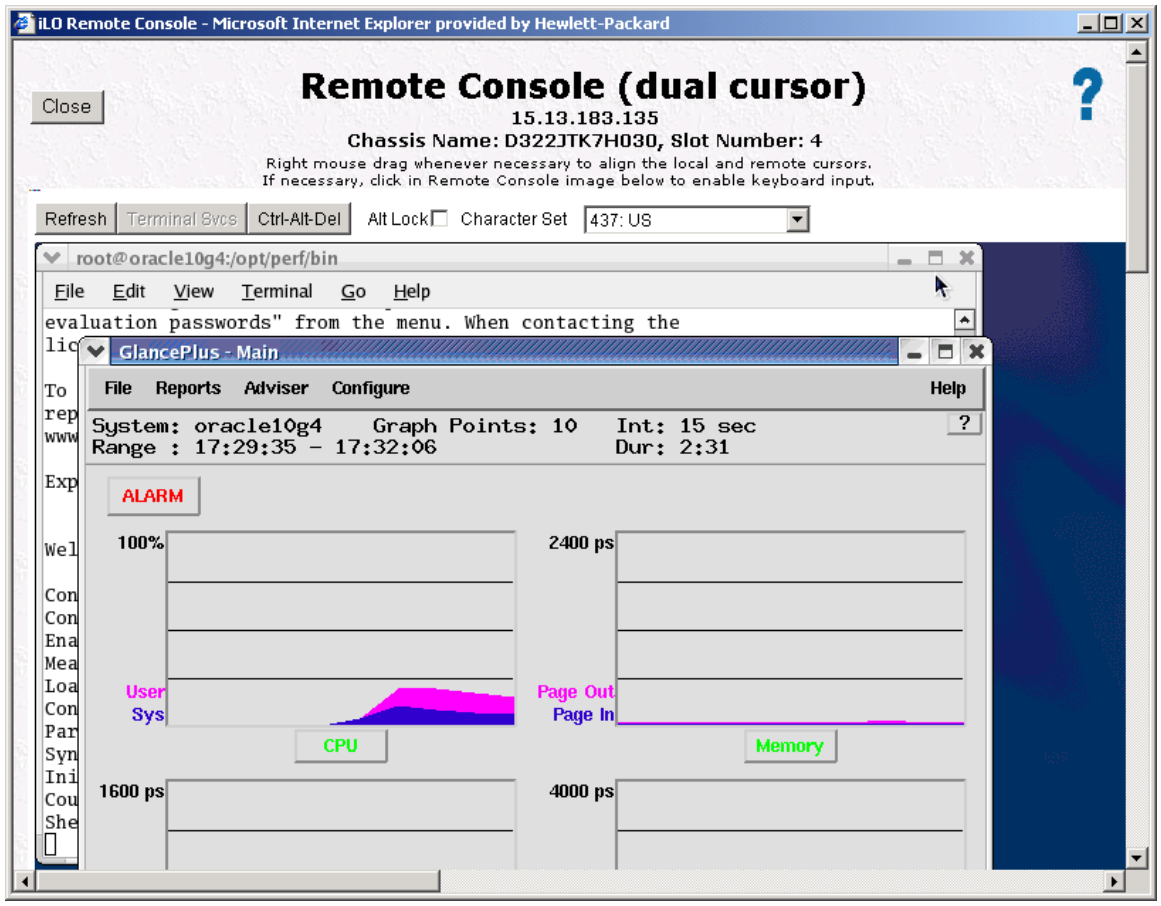
After logging into iLO, you can select to use the Remote Console, Figure 6, to manage the server from your browser.

Figure 6. Remote Console Status Summary



Remote Console, Figure 7, allows you to securely view and manage a server with Integrated Lights-Out. You can view the server console in both text and graphics modes, and use the keyboard and mouse, just as if you were standing in front of the remote server.

Figure 7. Managing a server with Remote Console



HP SIM Version Control

The SW link on the Systems List connects you to the version control agent for the selected server.

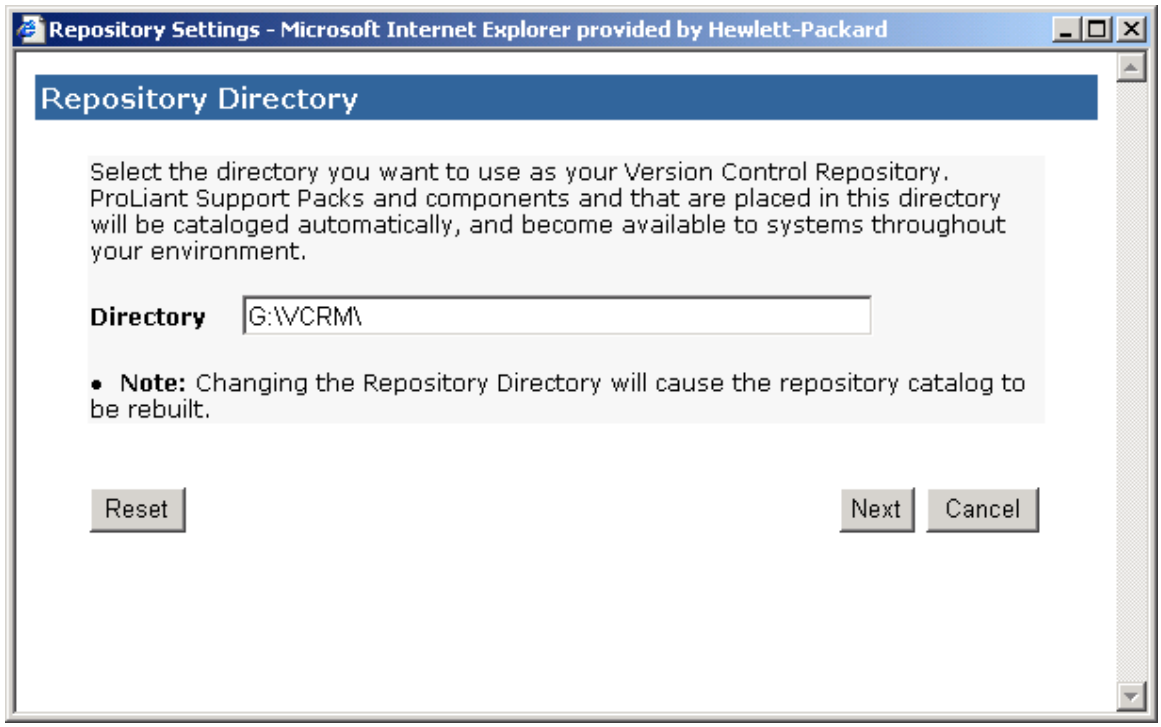
Version Control consists of the repository manager and the version control agents. The repository manager can run on the SIM server or another server, and the version control agent is installed on all managed servers.

HP SIM Version Control Repository Manager

HP Version Control Repository Manager (VCRM) enables you to manage software from HP and store it in a local repository. The VCRM catalogs system software and firmware and can be manually or automatically downloaded from http://www.hp.com. The VCRM can serve as a software baseline for your managed environment. The VCRM manages a repository containing ProLiant Support Packs and individual server software and firmware components.

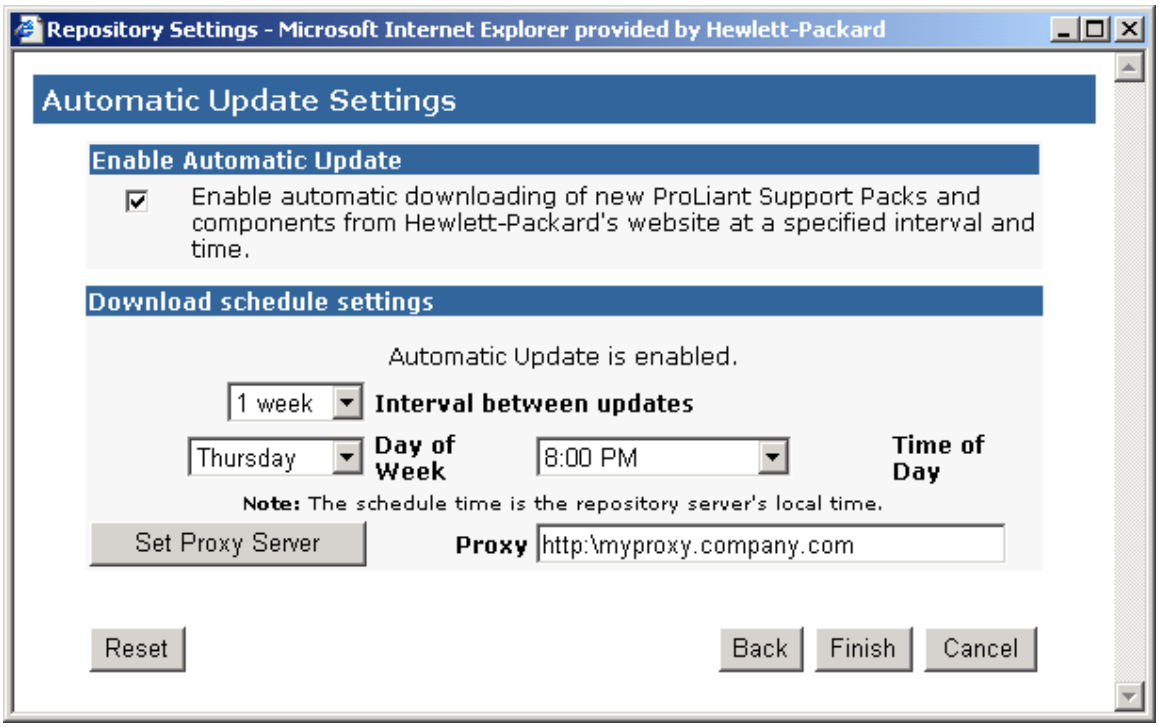
Version Control Repository configuration requires specification of the repository directory location, as shown in Figure 8.

Figure 8. Version Control Repository Settings



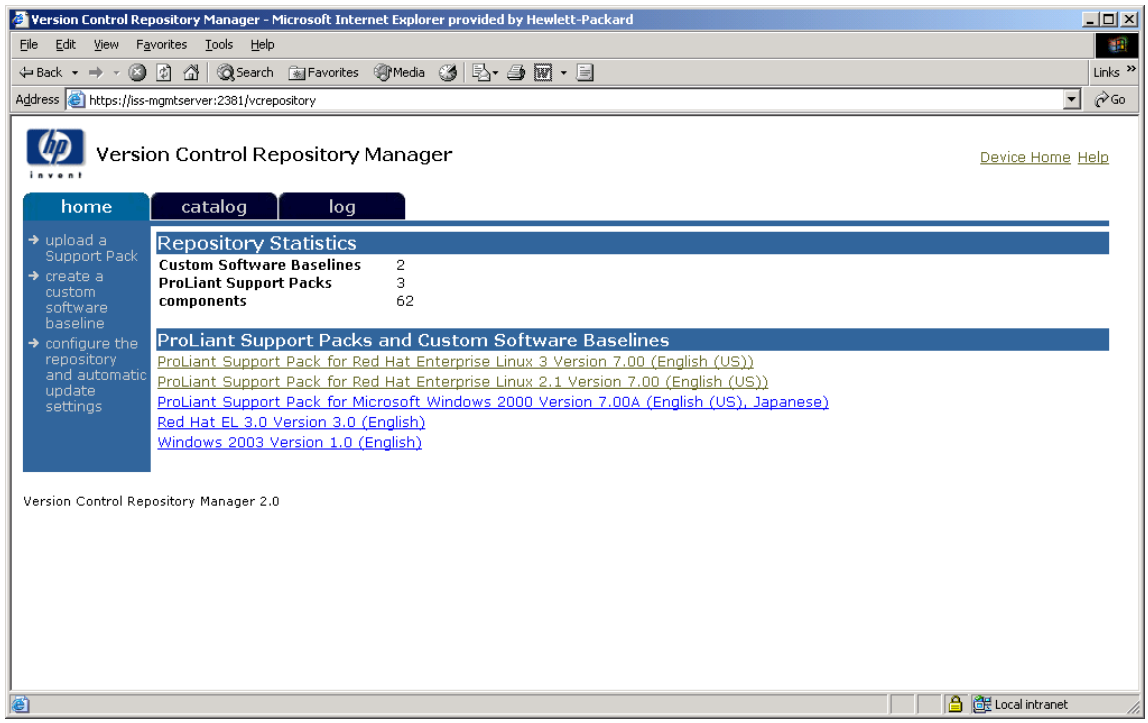
Automatic update settings are configured by specifying how often to automatically download the latest HP software and firmware from the HP download site (see Figure 9).

Figure 9. Version Control Automatic Update Settings



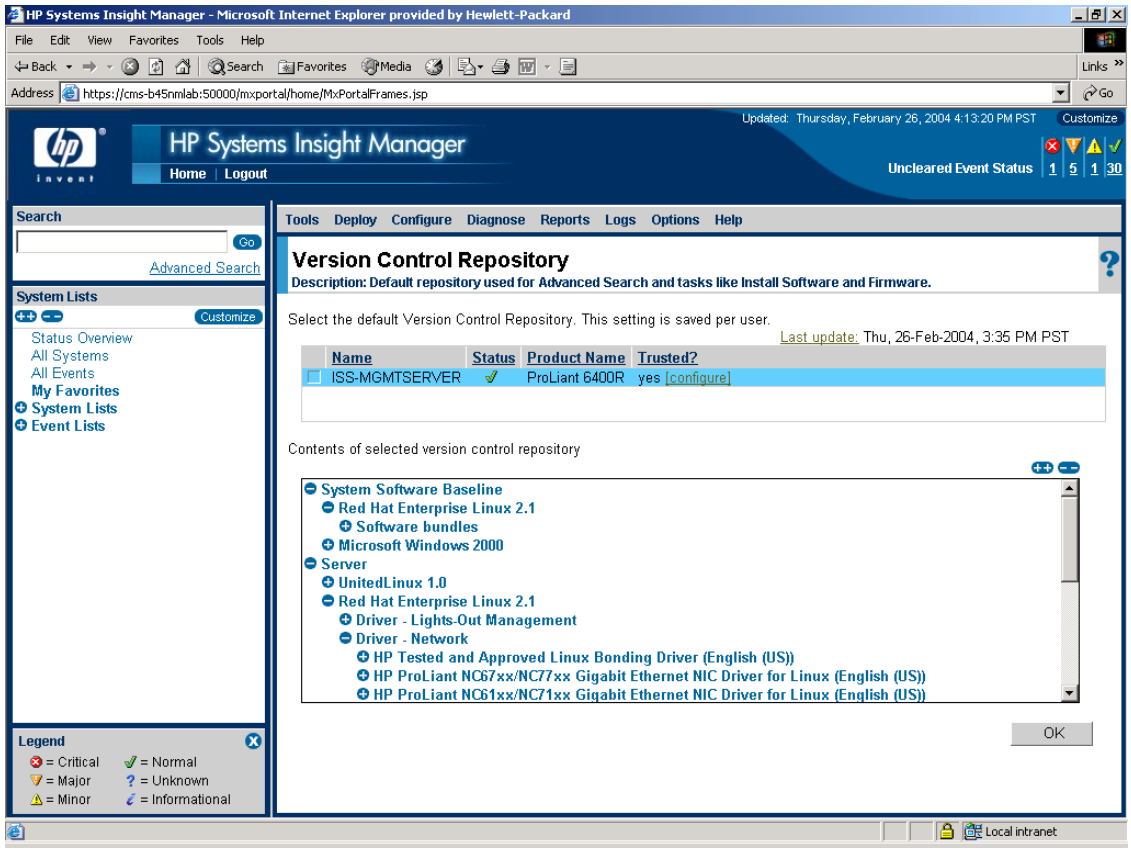
During installation of VCRM, you can choose which ProLiant Support Packs you wish to download, as shown in Figure10. You can also manually download and add new support packs to your repository later in addition to creating custom baseline packages.

Figure 10. HP VCRM – HP ProLiant Support Packs



The Version Control Repository is integrated with SIM and requires configuration of a trust relationship between the VCRM and all the Version Control Agents on each managed server in order to allow remote software deployment, as illustrated in Figure 11.

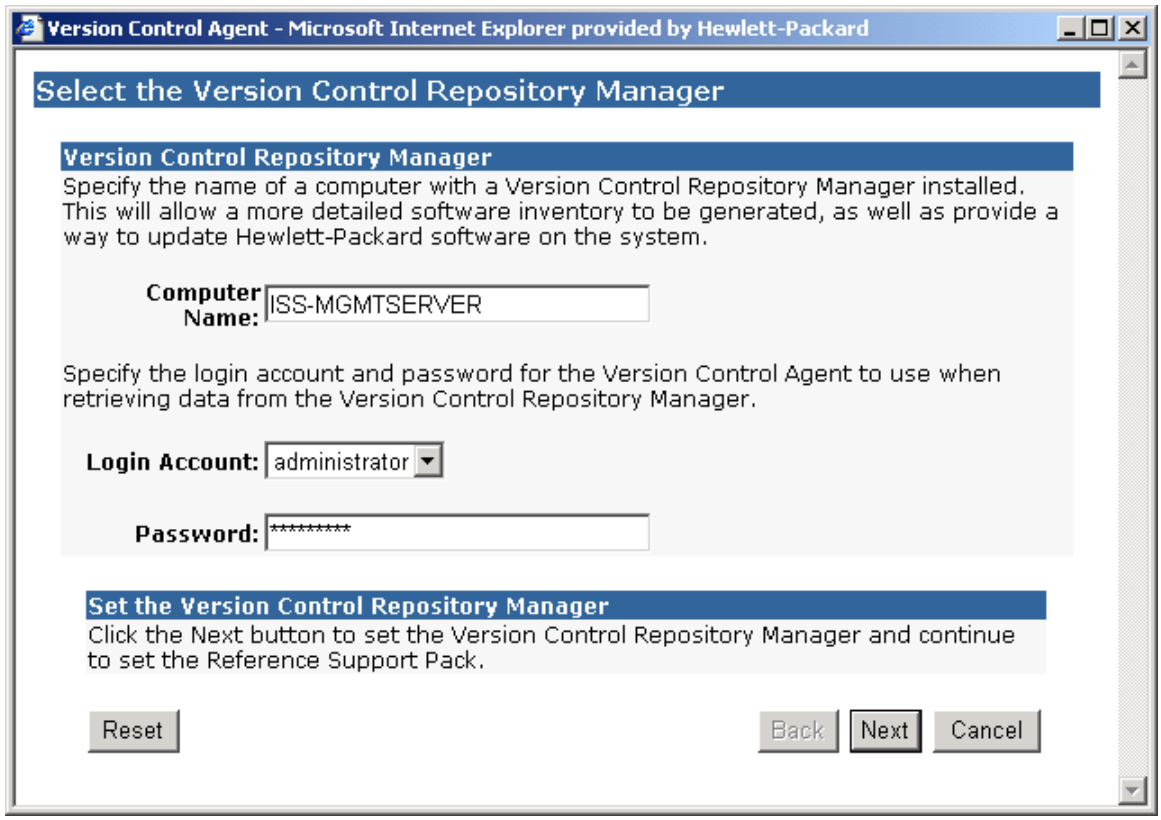
Figure 11. Trust relationship between VCRM and Version Control Agents on each managed server



HP Version Control Agent

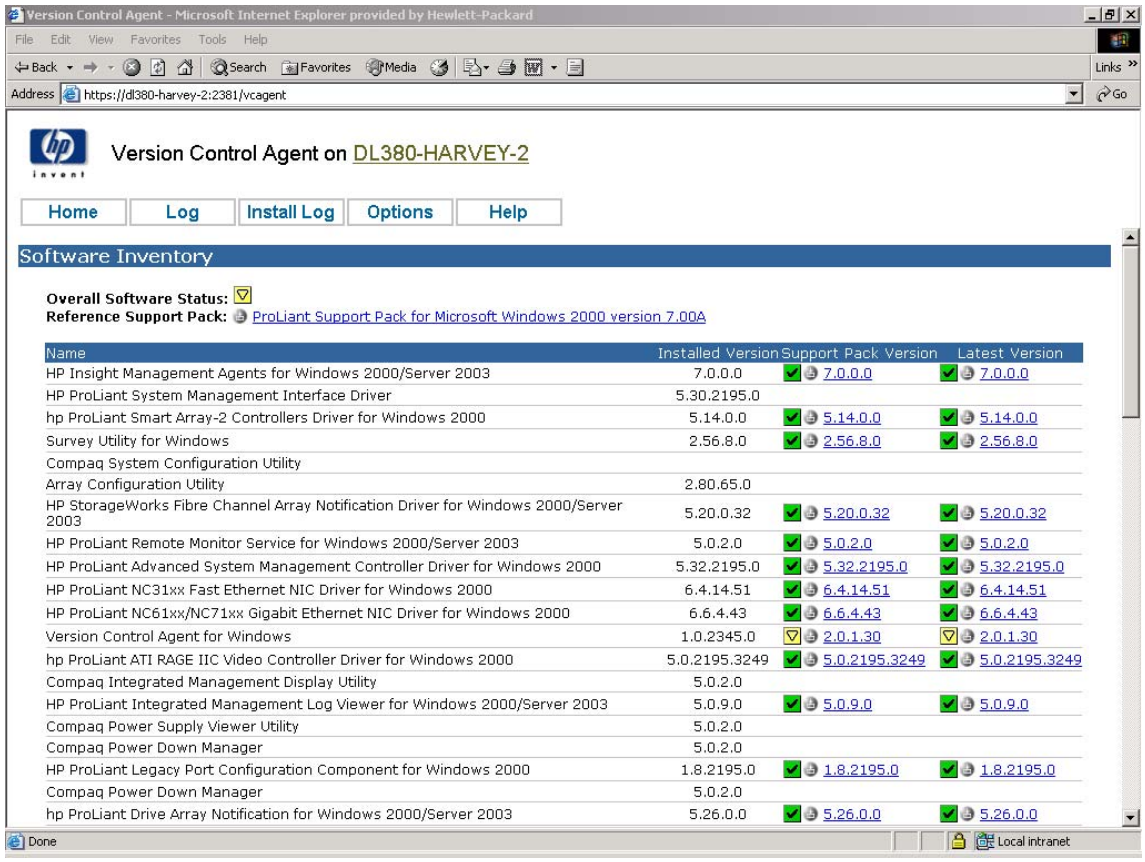
The HP Version Control Agent (VCA) is an HP Insight Management Agent that is installed on each server and enables you to see all of the installed HP software and firmware. The VCA is configured to connect to the VCRM (see Figure 12) allowing easy version comparison and software update from the repository.

Figure 12. Version Control Agent configuration



Using the VCA, the user can install a custom software baseline, a ProLiant Support Pack or individual software components from the Version Control Repository Manager. The SW icon for the selected server on the HP SIM System View will automatically change when the Version Control Agent detects that installation of a new software package is required on the managed server, as shown in Figure 13.

Figure 13. VCA detection of available updates



HP ProLiant Essentials Performance Management Pack

The ProLiant Essentials Performance Management Pack (PMP) is a performance management solution that detects and analyzes hardware bottlenecks on HP ProLiant servers and HP StorageWorks MSA500/MSA1000 shared storage devices. PMP analyzes performance information to determine if there is a developing or existing performance bottleneck issue. PMP is automatically installed with HP SIM 4.1. PMP calculates performance status, updates information available for display on the HP SIM Homepage, generates alerts to HP SIM, and logs information to the PMP database. PMP 3.0 comes with 5 free licenses. A license is required for each server and storage subsystem you want to monitor.

The Systems Insight Manager console, displayed in an Internet Explorer browser window shows performance status in the PF column. Icons in this column indicate the current performance state of a server.

The PF link on the Systems List connects you to the Performance Management Pack for the selected server. The Online Analysis window allows you to drill down into the following components:

- Processors
- Memory
- Network connections
- Storage
- Host Buses

The Performance Management Pack enables you to watch and analyze in real-time the performance of a monitored server and to view recorded data sessions directly from the PMP repository.

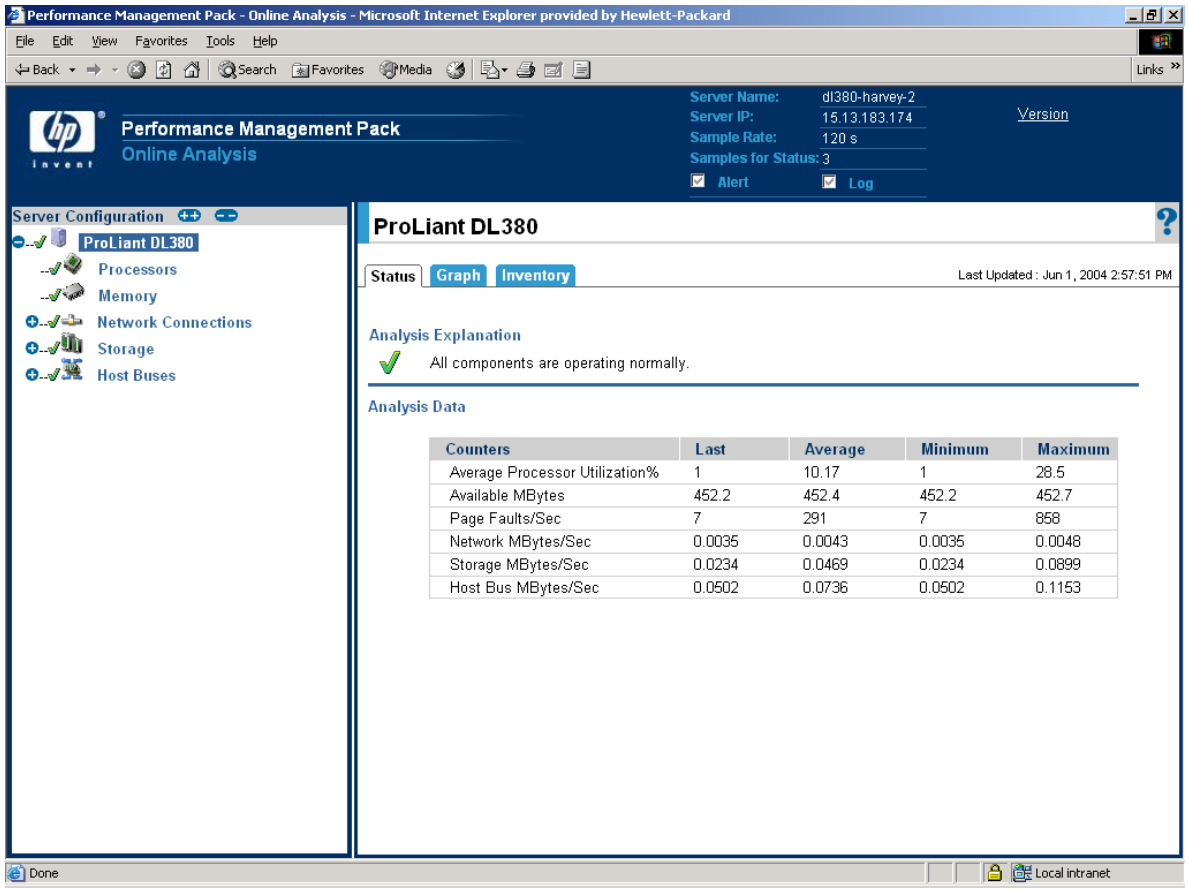
PMP can operate in four modes:

- **Monitor**: Enables monitoring of the status of servers, updating information displayed by Systems Insight Manager and Performance Management Pack. Analysis information and debug performance issues can be viewed using the Online Analysis tool.
- **Monitor and Alert**: In addition to the capabilities enabled with "Monitor," this mode sends alerts to Systems Insight Manager whenever the status of a server changes.
- **Monitor, Alert and Log**: In addition to the capabilities enabled with "Monitor and Alert," this mode stores detailed performance information in the PMP database for later reporting or playback, using the Offline Analysis tool.
- **Monitor and Log**: Enables monitoring of servers and stores the performance in the PMP database for playback later.

Online Performance Analysis

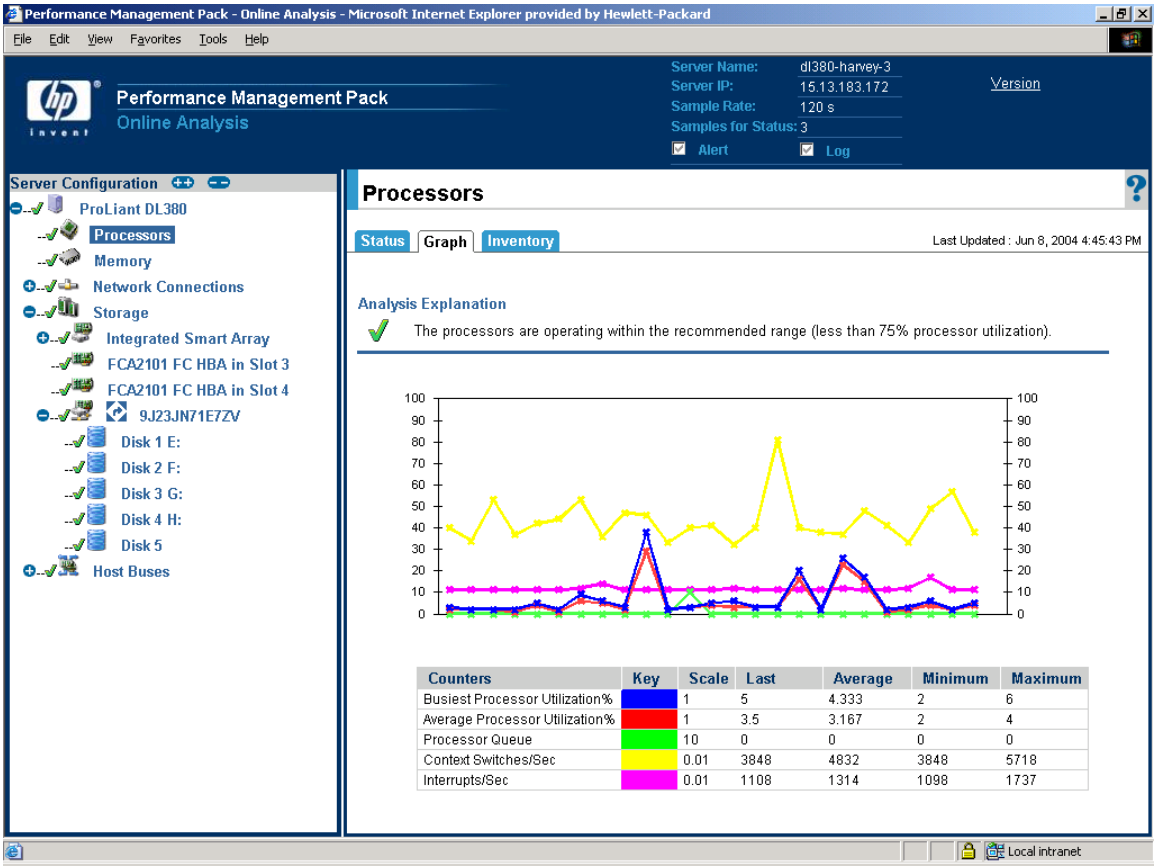
Online Performance Analysis allows the user to view the most current performance statistics. Selecting the Status tab, the user sees the overall status window with current summary statistics, as shown in Figure 14.

Figure 14. Online Performance Analysis – status tab



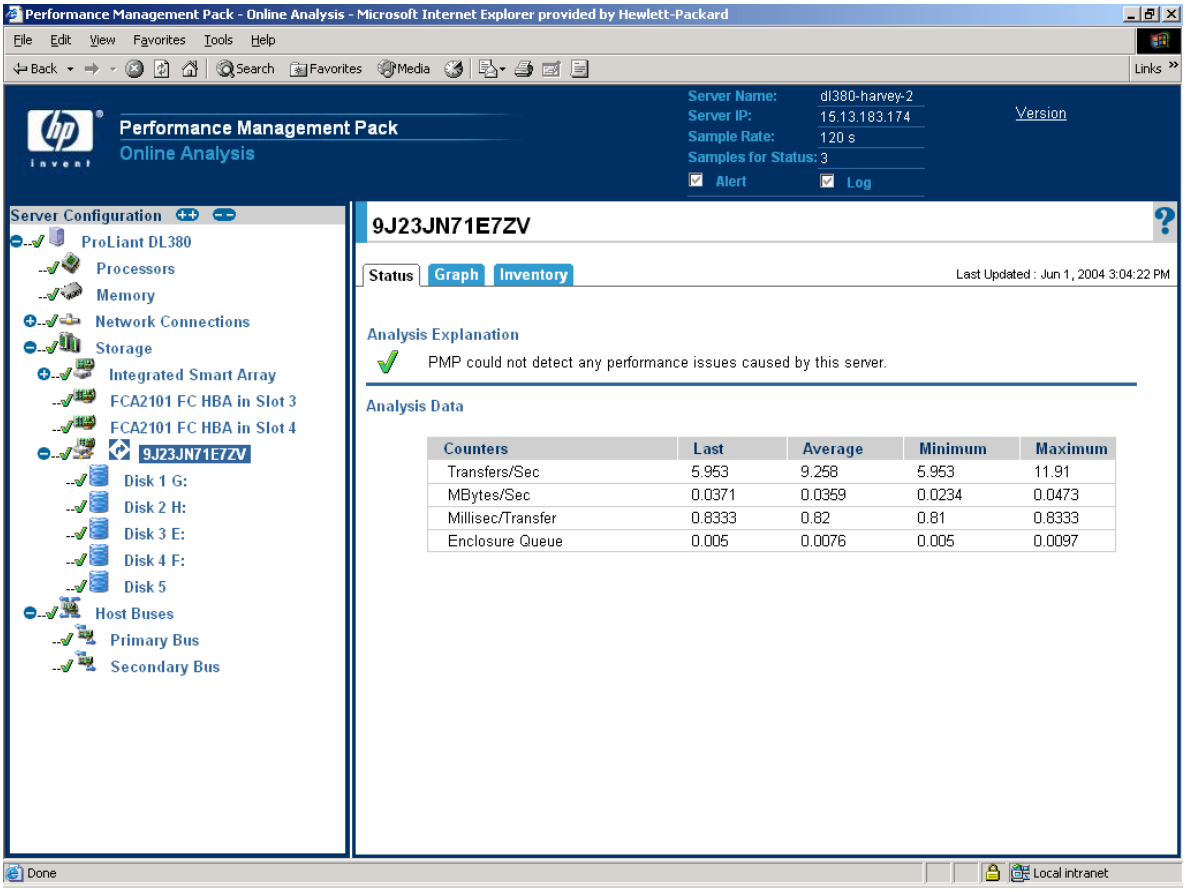
Selecting the Graph tab shows the statistics based on the sampling rate (Figure 15). Sample rate is determined by the SNMP settings for the HP Insight Management Agents on the managed device. The graph shows the data from the last 25 samples. The default SNMP settings for HP Insight Management Agents is 2 minutes.

Figure 15. Online Performance Analysis – graph tab



Performance statistics for MSA storage are also available (Figure16).

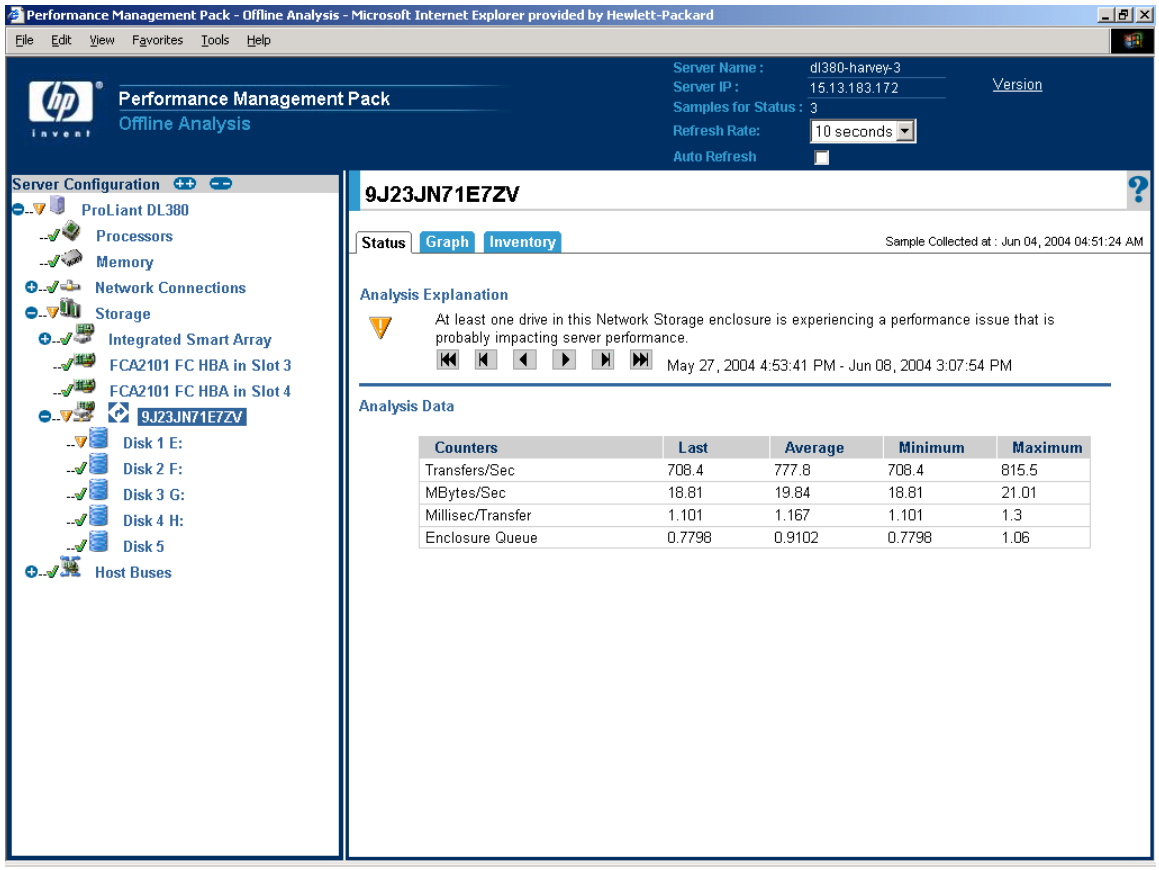
Figure 16. Performance statistics for MSA storage



Offline Performance Analysis

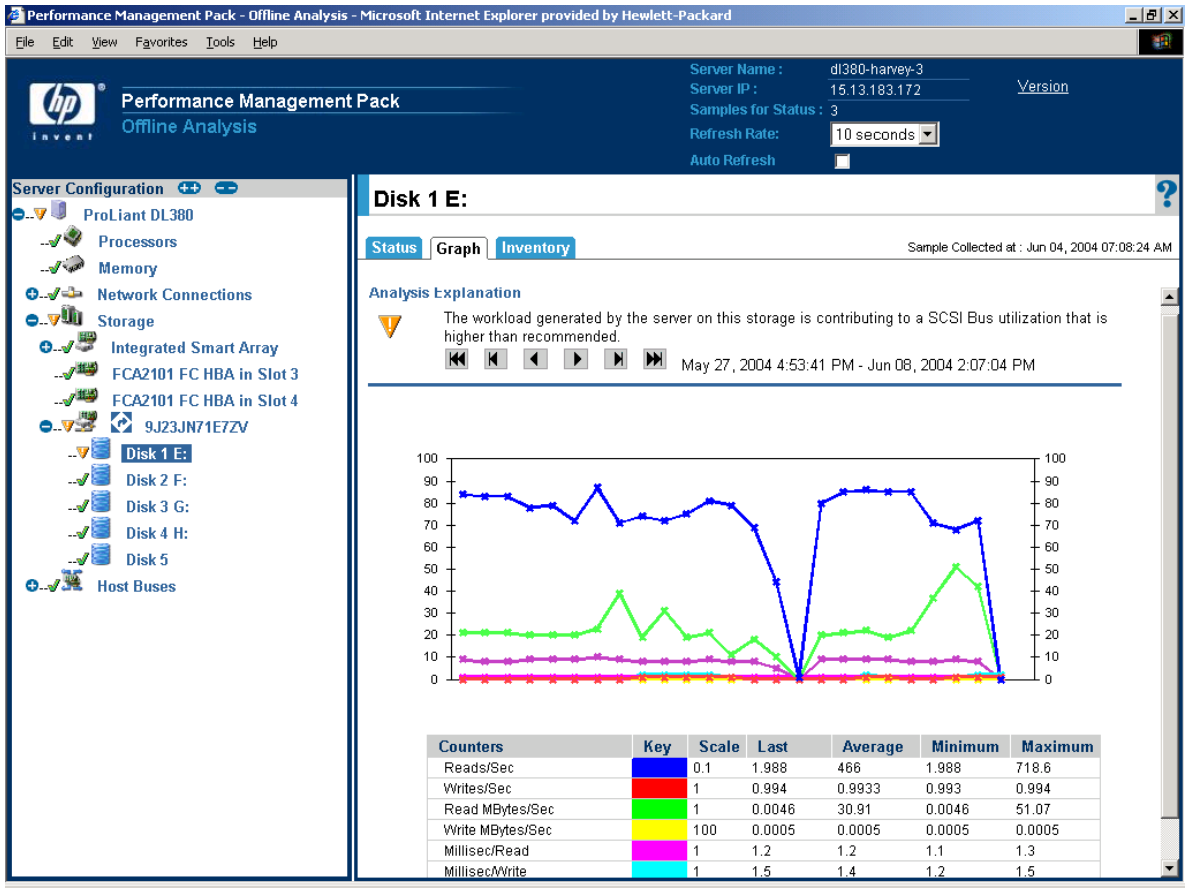
Performance Management Pack enables offline analysis of performance data. Performance data can be viewed from a database that has been captured and logged over a specified time period. This tool enables manipulation of the rate at which data is played back for analysis by speeding up or slowing down the refresh rate or selecting specific points in the presentation of previously captured events without regard to chronology. See Figure 17 for details.

Figure 17. Offline Performance Analysis



Offline analysis allows users to go back and review system bottlenecks. When problems are detected, an explanation is given along with possible causes. Recommended actions may be provided (see Figure 18).

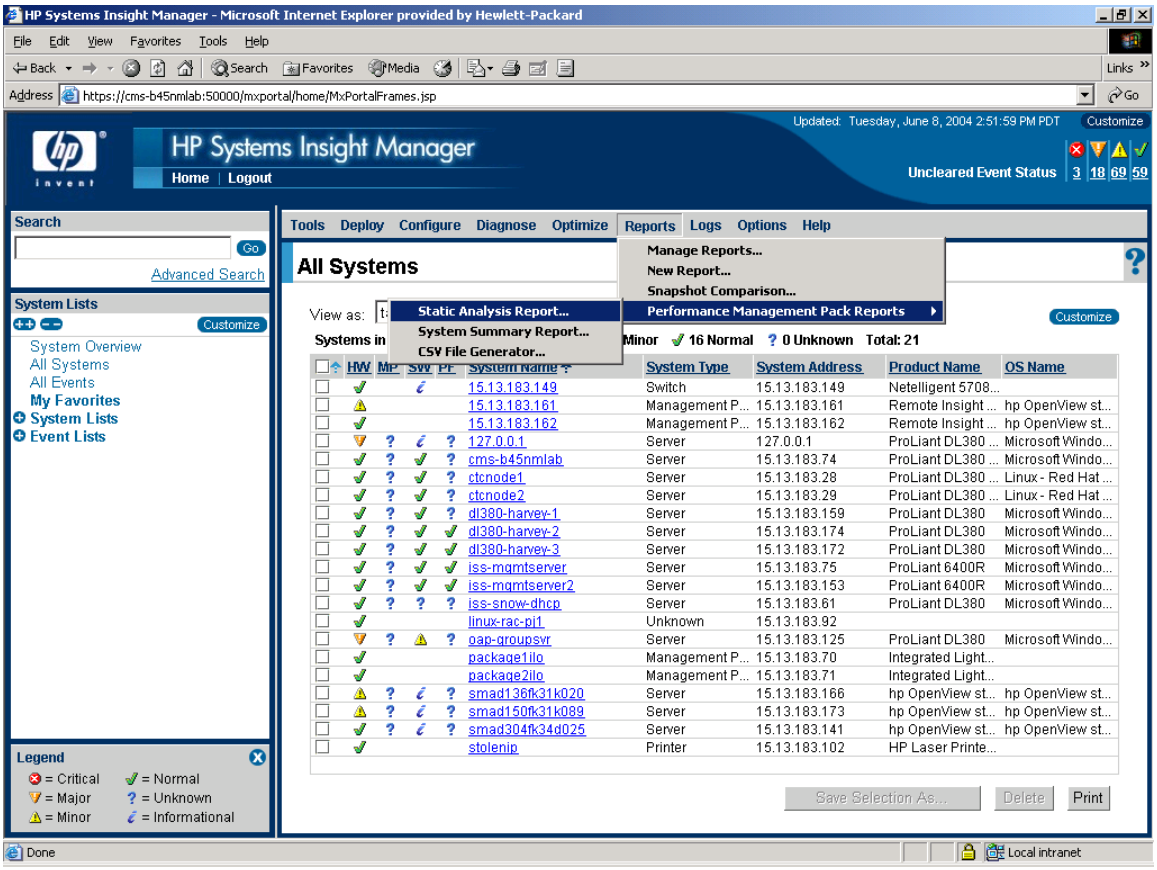
Figure 18. Offline Analysis – problem detection and resolution



Performance Management Reports

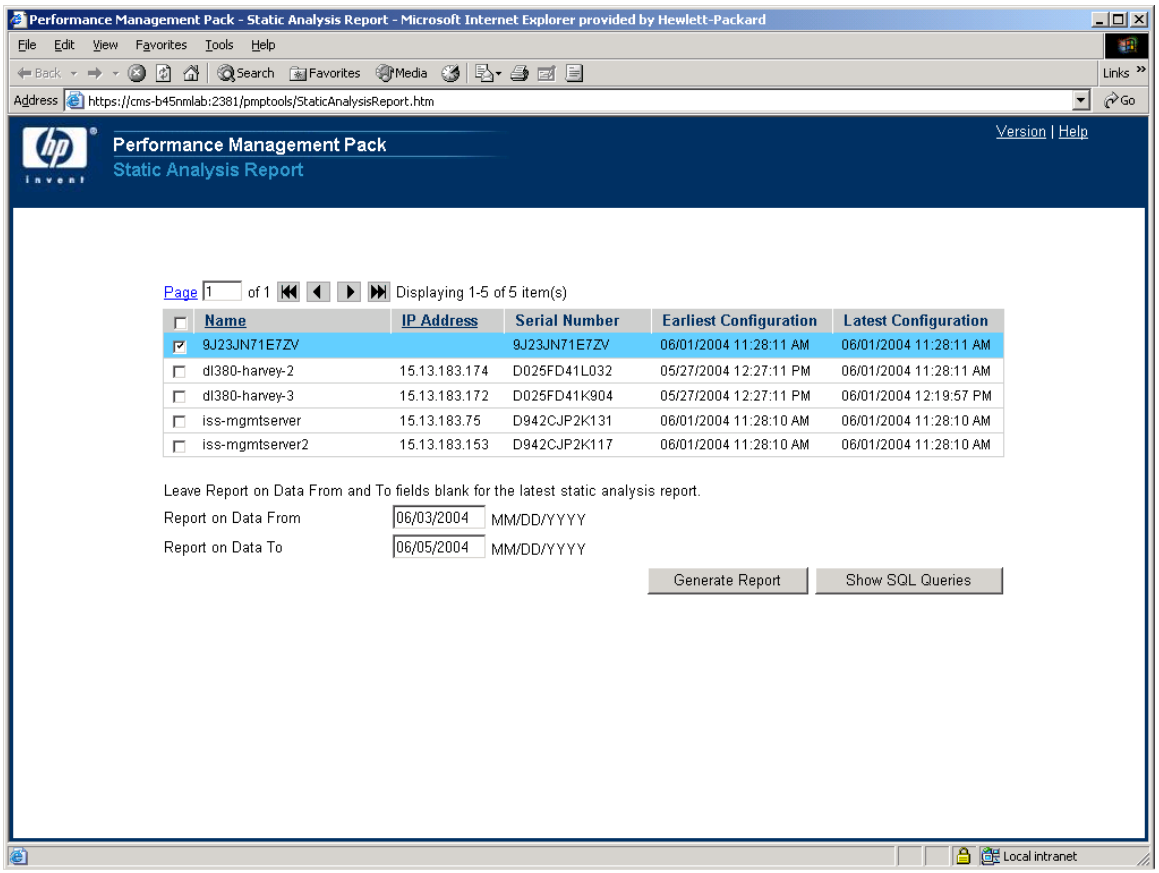
PMP can be configured to store all performance data measurements. Stored data can be converted to reports and generated from HP SIM. The report provides a summary of the performance statistics for the time range selected. Static Analysis and System Summary Reports are available by clicking on **Reports**, as shown in Figure 19.

Figure 19. Performance Management Reports



Static analysis reports can be generated for servers or storage devices – see Figure 20.

Figure 20. Static analysis reports – servers or storage

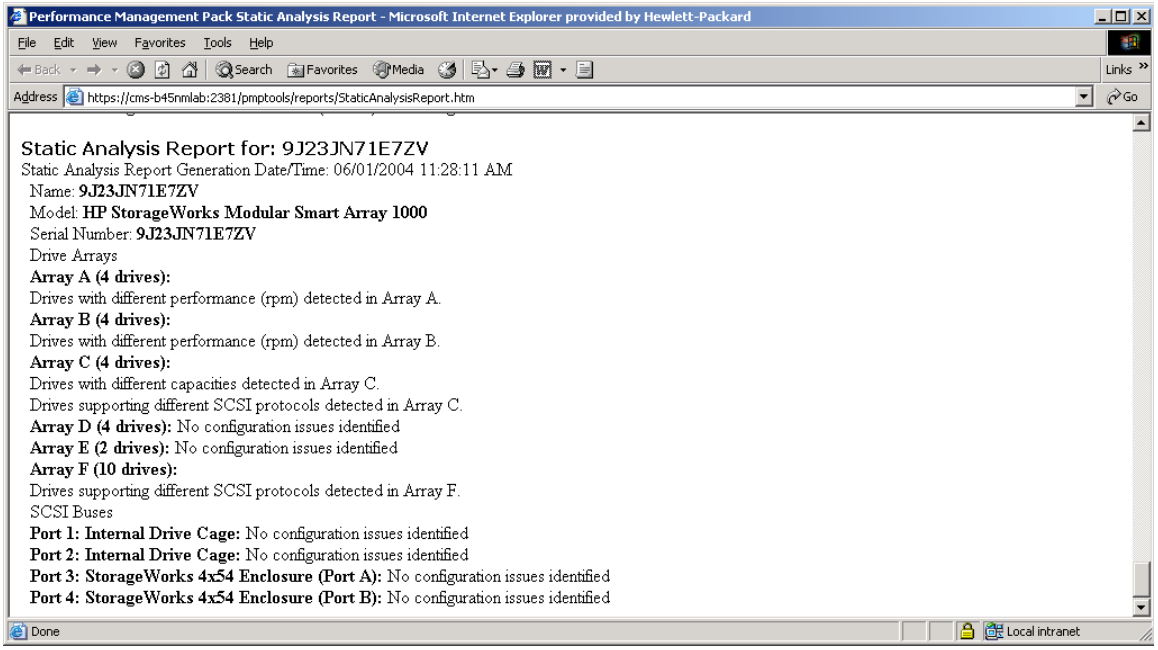


PMP performs static analysis on the configuration information gathered by SIM hardware discovery. See, for example, Figures 20 and 21. The static analysis report displays the performance status of the six server components.

- **Processors**
  - A mix of CPUs with different speeds
  - A mix of CPUs with different cache sizes (processors)
- **Memory**
- **Network Connections**
  - A network connection that is running at lower than its maximum speed
  - A network connection that is running in half duplex mode
- **Storage**
  - A fast physical disk drive plugged into an enclosure that cannot support the drive's maximum I/O capabilities
  - A slow physical drive plugged into a fast enclosure
  - A RAID array consisting of a mix of drive speeds
  - A RAID array consisting of a mix of drive capacities

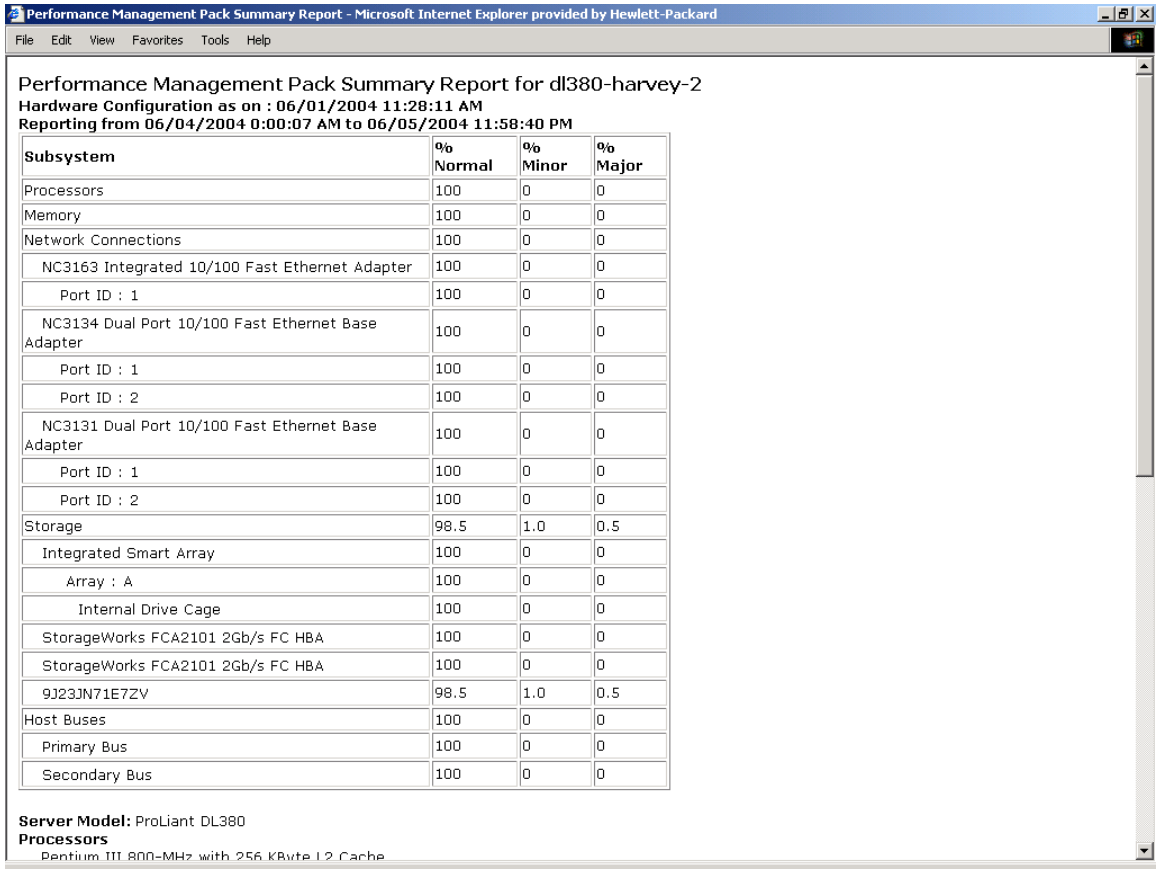
- **Network Storage**
- **Host Buses**
  - Ability to detect bus "overloading," that is, too many I/O resources plugged into the same bus on a multi-bus server
  - Ability to detect a device with unknown performance
  - A 64bit PCI card is placed in a 32bit PCI slot

Figure 21. Static analysis of configuration information



A System Summary report, as shown in Figure 22, can be generated for servers. The first section of the report consists of a table listing what percentage of time each server component was in a bottleneck state during the selected interval, providing a convenient method for gauging the health of a server. The second section of the summary report includes a detailed system configuration listing, providing the same information available for each component using Online Analysis.

Figure 22. System summary report (in two parts)



Performance Management Pack Summary Report - Microsoft Internet Explorer provided by Hewlett-Packard

File Edit View Favorites Tools Help

Performance Management Pack Summary Report for dl380-harvey-2

Hardware Configuration as on : 06/01/2004 11:28:11 AM

Reporting from 06/04/2004 0:00:07 AM to 06/05/2004 11:58:40 PM

Subsystem	% Normal	% Minor	% Major
Processors	100	0	0
Memory	100	0	0
Network Connections	100	0	0
NC3163 Integrated 10/100 Fast Ethernet Adapter	100	0	0
Port ID : 1	100	0	0
NC3134 Dual Port 10/100 Fast Ethernet Base Adapter	100	0	0
Port ID : 1	100	0	0
Port ID : 2	100	0	0
NC3131 Dual Port 10/100 Fast Ethernet Base Adapter	100	0	0
Port ID : 1	100	0	0
Port ID : 2	100	0	0
Storage	98.5	1.0	0.5
Integrated Smart Array	100	0	0
Array : A	100	0	0
Internal Drive Cage	100	0	0
StorageWorks FCA2101 2Gb/s FC HBA	100	0	0
StorageWorks FCA2101 2Gb/s FC HBA	100	0	0
9J23JN71E7ZV	98.5	1.0	0.5
Host Buses	100	0	0
Primary Bus	100	0	0
Secondary Bus	100	0	0

Server Model: ProLiant DL380

Processors

Pentium III 800-MHz with 256 KByte L2 Cache

HP SIM Tools

HP SIM provides a variety of powerful tools for RAC administrators. Administrators can deploy software to multiple machines and run standard command line tools on multiple servers all from the browser-based user interface. In addition to the features described in the previous sections, HP SIM provides the following capabilities:

- **Device Ping**. Enables you to ping one or more systems
- **Disk Thresholds**. Defines the Normal, Minor, and Major ranges for disk utilization on monitored nodes. Used to set and remove disk thresholds
- **Managing Custom Commands**. Displays all custom commands created, so you can create new commands, schedule or run existing commands, and edit and delete custom commands.
- **OpenSSH Install**. Runs from the Central Management Server (CMS) and installs the OpenSSH service onto target Windows systems and automatically completes the required configuration on the CMS. OpenSSH allows you to securely issue commands to remote machines.
- **Initial ProLiant Support Pack Install**. Enables you to install software to managed systems
- **Property Pages**. Enables a user with full configuration rights to view the Property pages on any web-based enterprise management (WBEM) system including WBEM properties that help describe the target system on the network, WBEM properties that help determine the status of the system, and an inventory of the target system based on WBEM properties
- **Replicate Agent Settings**. Enables HP Systems Insight Manager to retrieve and optionally edit web agent configuration settings from a source system, and distribute that configuration remotely to one or more target systems through their web agents
- **System Page**. Displays all the information related to a specific system, including general information of the system, the status of the system, and a list of URLs that are related to the system

Using HP SIM to simultaneously launch tasks or commands on multiple servers allows you the freedom to manage your environment from anywhere using a browser. Run tasks immediately or schedule them to run at a specified time, as illustrated in Figures 23 and 24.

Figure 23. Results from using HP SIM to simultaneously launch tasks or commands on multiple servers

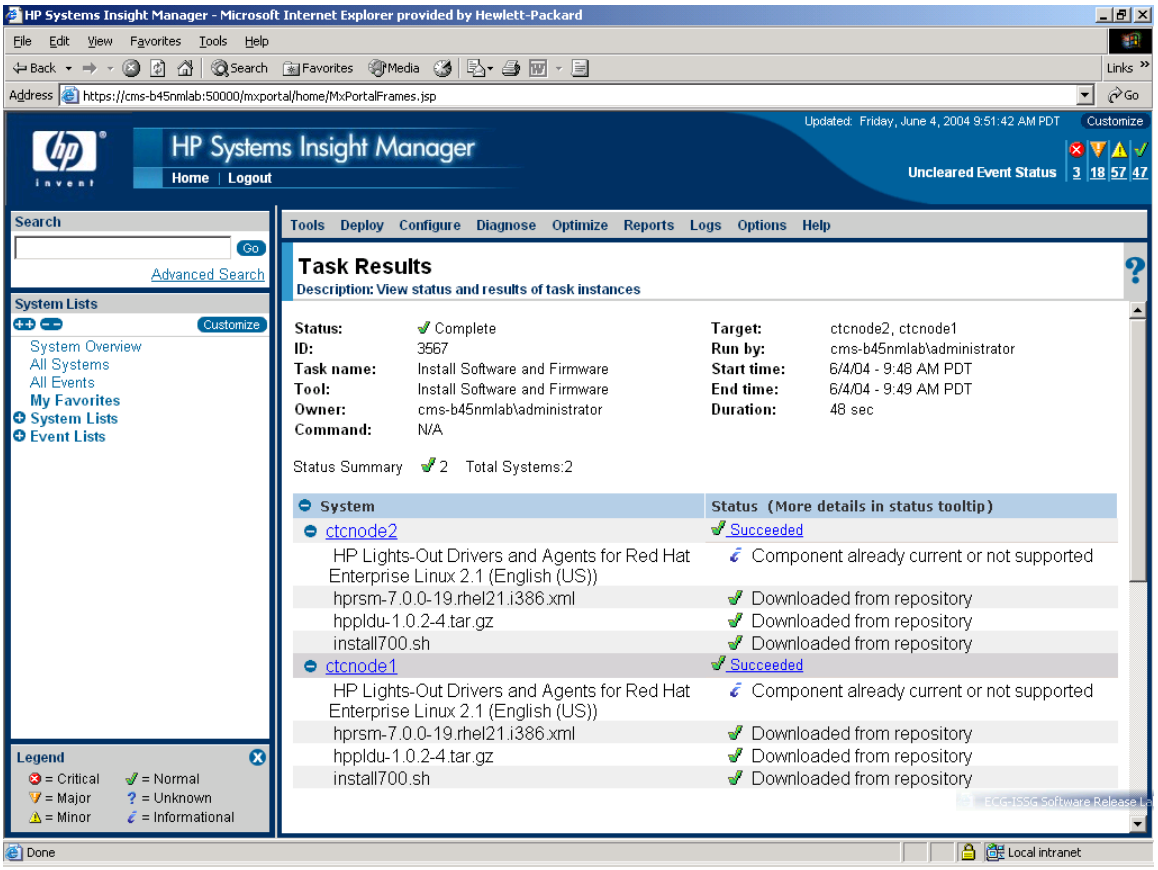
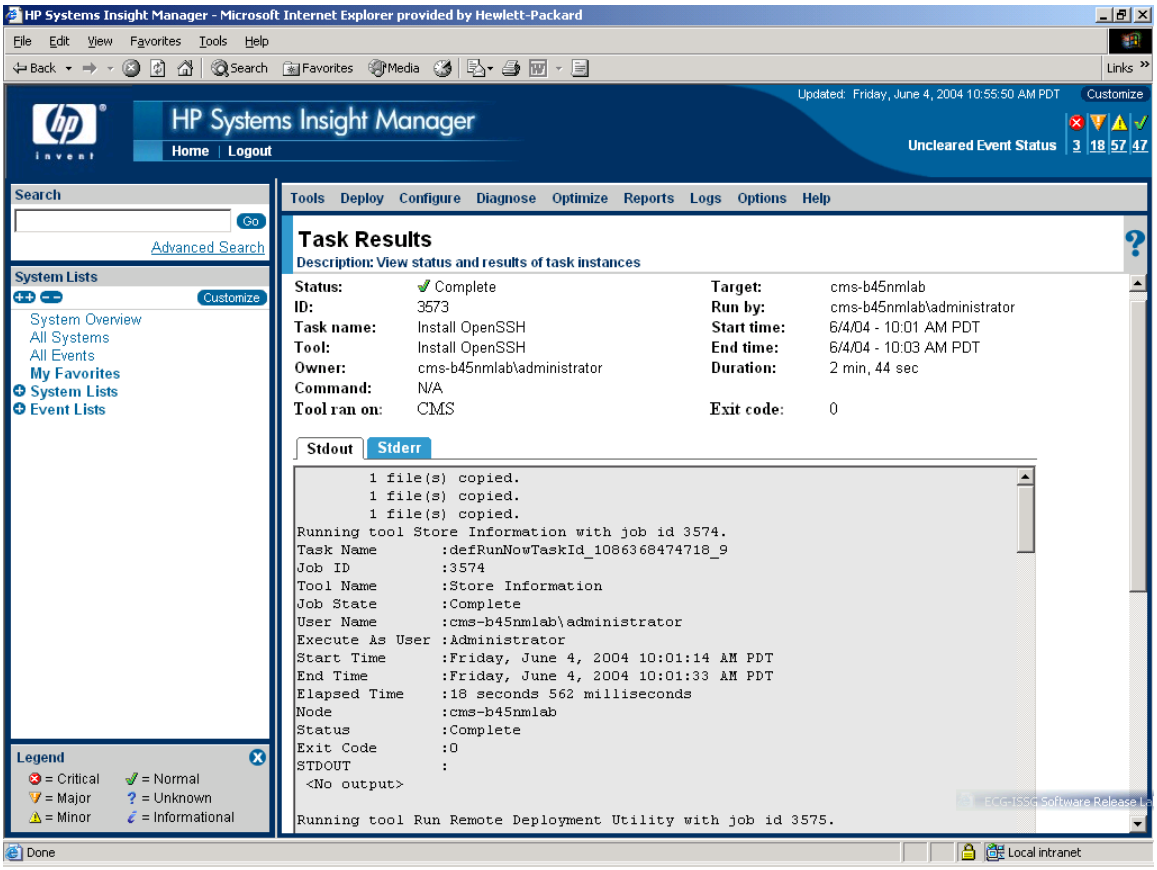


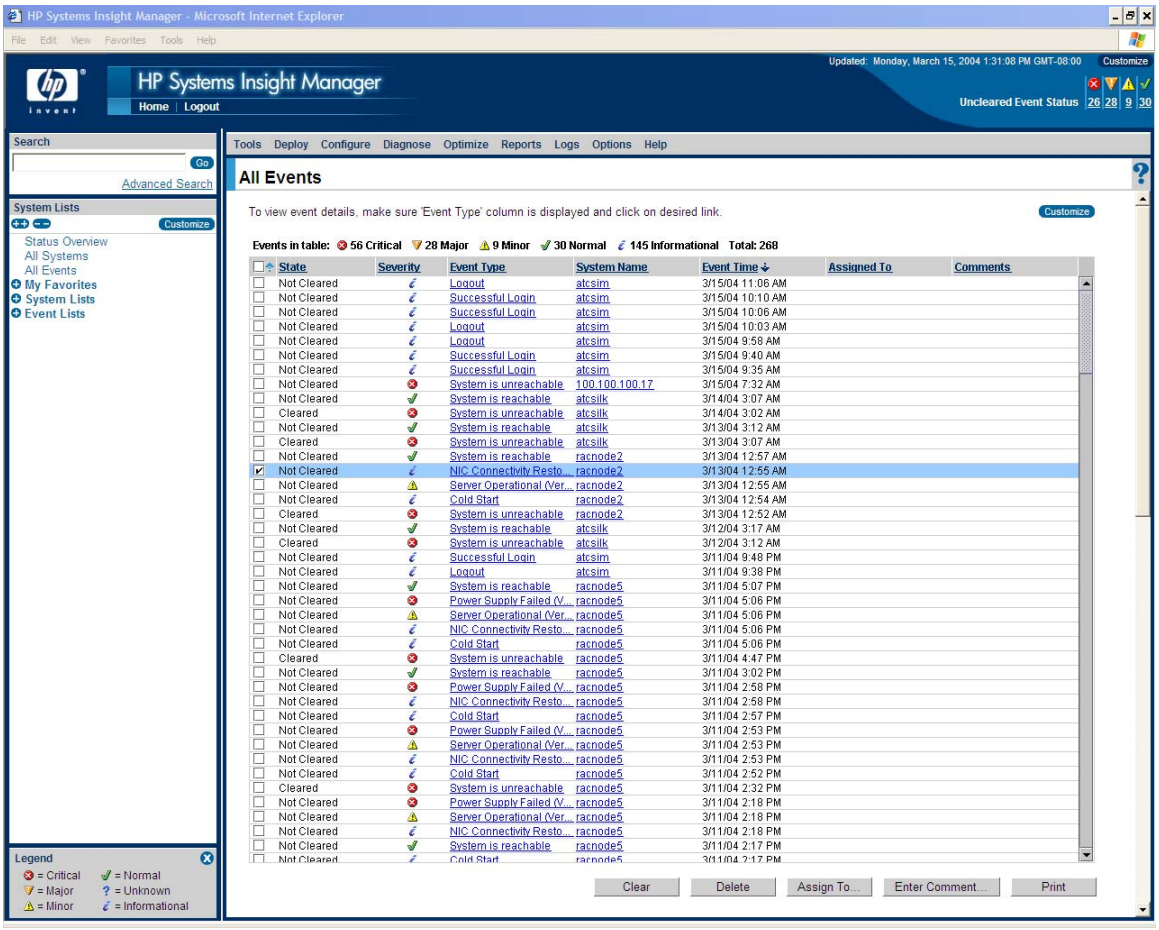
Figure 24. Results from running tasks immediately or scheduling them to run at a specified time.



HP SIM Event View

HP SIM, Figure 25, provides proactive notification of actual or impending component failure alerts. Automatic Event Handling allows users to configure policies to notify appropriate users of failures via e-mail, pager or short message service (SMS) gateway. HP SIM also enables automatic execution of scripts or event forwarding to enterprise platforms.

Figure 25. HP SIM Event View



Conclusion

Management of Oracle RAC clusters is a complex task. Using HP Systems Insight Manager as your management platform, you can improve the reliability and performance of your Oracle RAC environment. Administrators will be able to minimize or prevent most conditions that might cause an error. Using HP SIM Version Control, you can easily ensure that you are using the latest HP supported software and drivers. The HP ProLiant Essentials Performance Management Pack will help you detect and repair performance problems before users notice a problem. With HP SIM monitoring the software and hardware environment for your Oracle RAC clusters, the continuous availability of your cluster can be greatly improved.

For more information

HP Systems Insight Manager: www.hp.com/go/hpsim

HP ProLiant Essentials Performance Management Pack: www.hp.com/products/pmp

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