Sun Microsystems
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- Allows a "toggle" feature to view the historical system call and process list information

Additional Features

- Ability to adjust certain parameters such as screen update interval, disk transfer rate, terminal transfer rate or use of colors
- Can be run in "background" with information stored in ASCII format
- Allows user defined max values to be set that will activate an alarm condition

8.10.2 Contacts

For US domestic and International,

Mr. Steven Holland,

Unidirect Corporation
One Venture Street 150
Irvine, CA 92718
TEL: 1 (800) 755-UNIX
TEL: 1 (714) 453-2999
FAX: 1 (714) 707-3095

- Dell UNIX SVR4
- Univel UNIX SVR4.2
- Solaris 2.x

System Information Reporting

- Shows four CPU parameters: inactive, user, kernel and i/o wait
- Shows memory usage as well as swap and paging activity
- Displays hard disk and buffer activity for both reads and writes
- Displays tty character i/o activity
- Displays auto-average for processor and memory usage

Process Screen

- Displays all currently running process
- Can be sorted by user id, process id, start time, processor time used, cpu%, terminal id, or memory usage
- Use page up/page down and arrow keys to navigate through the list
- Allows authorized user to kill a process right from the screen

Tunables Screen

- Shows usage of number of processes, inodes, files, region tables, and record locks
- Displays a ‘df -v’ type status of all mounted file systems
- Shows total system calls, number of reads, writes, forks and execs

Playback Menu

- Allows recalling of information previously collected in a background mode
- Displays average, low and high marks for each bar
- Can set the max data collection for the background file
- Uses “database” search capability to locate specific problem areas
- Allows “fast frame” option for a video type history playback

Product Marketing

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For Europe,

System Specialisterna
46 31 86 38 40
Tethys
33 1 30 60 06 06

8.10 Unidirect System Performance Tool (SPT)

System Performance Tool is a “real time” application program that provides complete system performance reporting for the UNIX operating system. SPT graphically illustrates important system resources and provides the user with a process list to monitor all currently running applications. The program may also be executed in “background” and the information collected written to an ASCII file, which can be displayed later for further analysis. Now, the average UNIX user will be able to diagnose problems on a system that even the most experienced administrator would have had difficulty detecting.

8.10.1 Platforms Supported

- SCO UNIX SVR3, Xenix System V
- Interactive UNIX SVR3
- AT&T UNIX SVR3 and SVR4
- Motorola Delta 8000 UNIX (RISC)
- IBM AIX for RS/6000
- Wyse UNIX SVR3

- data aggregation from probe or other aggregation sets

8.9.5 Platforms Supported

8.9.5.1 Servers

- SPARC-based system Solaris 1 and Solaris 2.3 or later
- Convex C-Series running ConvexOS 10.x and 11.1
- Cray Research CRAY C90, M90, EL, Y-MP, X-MP and CS6400 running UNICOS 6.1, 7.0, 7.C and 8.0
- Unisys U6000 SVR4 or later
- Unisys Series 2200 SB4R4 or later
- Unisys A-Series Mark 39 or later

8.9.5.2 Clients

- SPARC-based system Solaris 1 and Solaris 2.3 or later, with X-Windows or Open Windows
- IBM PS/2 or compatible running MS-Windows 3.0 or later
- Unisys U6000 with X-Windows or PGE

8.9.6 Contacts

For US domestic and International,

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Clear Lake, IA 50428
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FAX: 1 (515) 357-2778

- System-wide and Workload Analysis
  - management-style graphs
  - simultaneous reporting from multiple systems
- Process-level Reporting
  - custom data reduction
  - user-defined sorting, combining, ordering of data
- Workload Characterization
  - default set at installation
  - custom characterization on site
- Additional Server Functions
  - automated correlation analysis
  - most active resource reporting (TopN)
  - server-based reporting
  - alarms and thresholds
  - derived parameters
- Additional Client Functions
  - Motif user interface
  - pre-defined report set
  - site-specific report creation
  - desktop environment save/restore
  - data export to desktop applications
  - Postscript support
- Data Sources
  - system activity counters
  - process accounting
  - disk space availability
- Data Storage
  - internal database manager
  - multiple aggregation set
  - custom data reduction
- Aggregation Set Characteristics
  - data collection at unique time intervals
  - calendar stored with data

The data collection probes for the applicable system are installed with the server software. Any data collected by the probes is held in the Baseline database for future retrieval.

8.9.3 Client Software

The TeamQuest GUI can run as either X Windows, Open Windows, or Microsoft Windows applications, so you can analyze performance from a UNIX workstation or a PC. You can display multiple report windows simultaneously, with each report potentially coming from a different system or even a different architecture.

Report can be displayed in any of a wide variety of formats, including text, line, area, stacked bar, cluster bar, pie and scatter plots. Report views can be easily changed so you always have the best picture of the data. You can change colors or hatch patterns, modify the titles and labels, and automate the report with text.

The interface comes with a set of predefined report definitions matches to the data collected on server, so you are ready to being analysis as soon as the installation is completed. You can modify the predefined reports or add any site-specific reports you need.

Performance data and report can be exported from the interface into other applications. You can also copy and paste graphs directly into management reports or produce hardcopy output.

8.9.4 Features

The following lists the features and functions of TeamQuest Baseline.

- Report Types
  - real-time monitor
  - historical analysis
  - trend analysis
- Performance Views
  - system-wide
  - workload level
  - process level

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8.9 TeamQuest Baseline

TeamQuest Baseline is a fully-functional performance analysis and capacity planning package. It uses a client/server architecture to present performance at the system level, workload level, and process level. Performance bottlenecks can be found and cause/effect relationships can be investigated using various views of the data and automated correlation analysis.

8.9.1 Architecture

TeamQuest Baseline uses a client/server architecture consisting of the Baseline server software and a GUI. The server software runs on the host system and collects and maintains performance data. The user interface runs on the desktop and presents performance data retrieved from the host in the form of text reports and graphs.

8.9.2 Baseline Server Software

The Baseline server software uses probes to collect data from existing system instrumentation, ranging from overall system statistics to specific workload and process information. The data is aggregated and stored in the database for future retrieval. The amount of data to retain and time interval for collection are configurable.

Baseline aggregates data at multiple time intervals. Data representing system activity for small intervals of time, usually under a minute, is used to view current system performance. Data aggregated over longer periods of time, ranging from minutes to days, is used to examine past performance and to plan for future needs with trend analysis. Data representing each time interval is stored in separate aggregation sets within the database. You can configure the database to store each aggregation set for as long as the data is needed.

The server software supports automated correlation analysis. When you find a peak in a performance parameters, you can correlate it with other parameters in the database to determine possible cause/effect relationships.

Cooperative Reporting

Provides another point of integration above and beyond those facilitated by Cooperative Consoles, a standard SQL interface for reporting. Reports such as trend analyses can be applied to data from any type of managed resource, or several at once.

Project ENCOMPASS

Is fully compatible with SunConnect's other products, and includes features like networked multi-user operation; at runtime applications choose which project ENCOMPASS server to use from anywhere across the network, freeing operators from location specific tasks. API independence means this product can support any of the emerging network or system management API standards. Project ENCOMPASS is an object-oriented management platform defined by GDMO, and kernel compatible with the OmniPoint specifications from the Network Management Forum (NMF)

8.8.3 Availability and System Requirement

SunNet Manager 2.2

Hardware: SPARCstation or SPARCserver

Operating System: Solaris 2.2 or greater

Windows Environment: OpenWindows 3.1 or greater

Main memory: 32 Mbytes

Disk: 400 Mbytes

Availability: Shipping now.

8.8.4 Contacts

Sun Sales Offices Worldwide.

UK Reseller and Integrator,

Micromuse Ltd.,
Disraeli House,
90 Putney Bridge Road,

- iostat - Disk I/O, CPU, and tty statistics
- ippath - IP packet route trace information
- iproutes - IP route table and statistics
- layers - Protocol layer statistics
- lpstat - Printer status
- ping - IP connectivity information
- rpcnfs - RPC and NFS statistics
- snmp - MIB I,II and enterprise subtree
- snmpd - SNMP agents for SPARC systems
- sync - synchronous interface statistics
- traffic - ethernet traffic analyzer

Database/Topology Map Services API

This API provides the mechanism to modify the database and customize the topology display.

8.8.2 Futures

SunConnect's future range of products:

- SunNet Manager

- Cooperative Consoles

- Cooperative Reporting

- Project ENCOMPASS

One of the primary goals of these new products is the multi operator, multi console, domain type architecture.

Cooperative Consoles

Cooperative consoles link multiple SunNet Manager platforms into a common distributed repository, which allows for straightforward transfer of control between operators.

Proxy Agents

These agents provide two primary benefits; they allow management applications to manage objects of virtually any protocol, and they localize network management polling activity to minimize network traffic.

SNMP

The Simple Network Management Protocol is the current industry standard for the exchange of management information. SunNet Manager includes all the basic SNMP mechanisms. SNMP proxy agents are bundled, which distribute SNMP traffic round the network. An SNMP Set Tool automates control of SNMP agents, whilst the SNMP Trap Daemon translates and forwards traps to the Event Dispatcher for distribution to registered management applications. The 'mib2schema' utility translates standard SNMP MIBs into an easy to understand format, abstracting users from the ASN.1 definitions.

8.8.1.3 APIs

Three application Programming interfaces enable vendors and users to build powerful tools to complement the SunNet Manager functionality:

Manager Services API

This API provides communication services based on ONC RPC, a more network efficient set of calls than SNMP or OSI. Secure RPC mechanisms can also be used.

Agent Services API

This API provides the ability to manage multi-protocol environments via an intermediary protocol, by developing proxy agents. The following agents are bundled in with SunNet Manager, and were written using the Agent Services API:

- diskinfo - disk information
- etherif - ethernet interface statistics
- hostif - interface statistics
- hostmem - memory utilization
- hostperf - host performance data

Auto Management

This feature lets users monitor resources immediately by starting pre-defined event requests. These event requests are started for elements supporting SNMP v1 and v2, hostperf (host performance) and ping (reach-ability). Notification of an event is configurable as one of icon effect, audio effect, send mail to, and send to program.

Request Management

This facility provides users with the ability to define and launch tools, called 'requests', which gather management data from the network and system resources. Tabular and graphic formatted reports summarize the data gathered. Data Requests allow the operator to gather values for selected attributes over time. Event Requests allow operators to monitor changes in event attribute values based on pre-defined thresholds. If a threshold is exceeded, SunNet Manager automatically alerts operators with audio, visual, electronic mail or programmatic responses. The Request Viewer is a tool to view, select and manipulate requests for all managed elements.

Browser Tool

The Browser Tool allows users to take captured data and generate reports, review logged element information, and perform comparative trend analysis. Data can be selectively edited and sent to the Grapher Tool.

Grapher Tool

This tool visually presents dynamic or logged data in 2D or 3D graphs and charts. It is useful for identifying statistical trends. For example, graphs can be easily created to compare server CPU utilization percentage, observe peak loads, network segment performance etc. Both real-time and logged data may be displayed on a single graph display or with multiple graph displays side by side. The Solaris Snapshot utility can be used to capture graphs for printing, email or documents etc.

8.8.1.2 Distributed Management Architecture

SunNet Manager is based upon a distributed architecture which gives users the ability to manage heterogeneous multi-vendor networks of varying size and complexity, from tens of nodes to tens of thousands of nodes. This architecture scales by spreading the processing load round the network with *proxy agents*.

Sun pioneered a program, called *The Sun Net Manager Partners Program for Management Solutions*. This partnership includes leading device vendors, ISVs, distributors and

integrators who add significant value to the SunNet Manager environment. The current list includes over 100 partners. More than 11,000 customers currently use SunNet Manager.

8.8.1 Product Details

This description focuses on three key areas: user tools, distributed architecture and APIs.

8.8.1.1 User Tools.

The SunNet Manager user tools enable operators to monitor and control network and system resources. GUI interfaces and point and click actions simplify procedures and reduce training time.

SunNet Manager Console

This is the central management application and allows operators to initiate management tasks and display data. Users can perform configuration tasks, identify faults and perform diagnosis, monitor resources and capacity plan. The topology map display depicts objects on the network, called elements (glyphs), and logical/physical connections between them. Bitmap backgrounds (e.g. maps etc) can be displayed behind the topology maps. Views are connected hierarchically to display various levels of the network environment, and can contain logical as well as physical relationships between entities.

Discover Tool

This tool can be used to automatically create the management database and build a graphical representation of the network. It seeks out IP addresses one or more hops away, as well as SNMP addressable elements, and adds each discovered element to the run-time database, displaying the representative element icon on the topology map. The user may customize the display of discovered elements.

CPE uses base SAS to analyze data and generate reports. From these you decide where bottlenecks in system are

8.7.1 Interface

SAS interface style. Sort of MOTIF/3270 type of interface.

8.7.2 Packaging

Requires base SAS product and layers on top of it.

8.7.3 Contacts

For US domestic,

Mr. Jeff Creech,

SAS Institute
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8.8 SunSoft Sun Net Manager

SunNet Manager supports a variety of industry standards for the management of diverse computing environments.For example SNMP is bundled with the product, so SunNet Manager can manage TCP/IP networks right out of the box. When used with SunSoft and third party add-on products, SunNet Manager can manage diverse environments such as DECnet, FDDI, and AppleTalk networks. SunNet Manager can also interact with IBM's Netview management system. The following SunSoft products provide add-on capabilities to SunNet Manager:

- SunLink SNA Peer-to-Peer 8.0
- SunLink DNI version 8.0
- SunLink X.25 version 8.0
- SunLink CMIP version 8.0
- PC-NFS version 3.5/4.0 from SunSoft.

Mr. Francois Stieger, VP Europe, Afria, Asia-Pacific,

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FAX: 33 (147) 640392

For UK,

OpenVision London Office
London, UK
TEL: 44 (276) 683060
TEL: 44 (817)811200

8.7 SAS CPE

Sophisticated tool for analysis of performance data captured by other products.

It supports data captured from the following products:

- SunNet Manager 2.x, including SNMP MIB-II, Cisco, Cabletron and other MIBs
- Cabletron Spectrum
- HP Performance Collection Software
- Concord Communications TRAKKER
- Landmark Systems Probe/Net
- Base UNIX accounting information (sar, iostat, etc.)

It allows automated data reduction, i.e. reduce daily extensive data into data suitable for monthly or yearly analysis. It can perform extensive queries and receive a myriad of reports.

Data analysis works in the following manner:

- data collected by whatever tool
- data is converted into SAS datasets called Performance Data Base (PDB)
- you decide how much detail to keep in data for daily, weekly, monthly, yearly basis

8.6.4 OpenV*Perform

This is an event driven performance management tool that provides a single screen view of real-time performance parameters. Performs similar tasks as Event Manager but appears to be targeted towards simple SA needs.

HW/SW Platforms:

- SunOS, Solaris, HP-UX, AIX

Database Support:

- Sybase, Oracle, Informix

8.6.5 OpenV*Trend

This product provides capacity planning capabilities using historical data. It then provides output in graphical format.

HW/SW Platforms:

- SunOS, Solaris, HP/UX, AIX

Database Support:

- Sybase, Oracle, Informix

8.6.6 Contacts

For US domestic,

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Pleasanton, CA 94566
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Ms. Barbara Vaylor, US Marketing Manager,

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For Europe, Africa, Asia-Pacific,

8.6.3 OpenV*Event Manager

This allows a user to automate monitoring of system events in a heterogeneous environment. Uses systems management by exception, no polling for events.

Includes monitoring of over 100 system activities including:

- Processor idle time
- Swapping
- Message logs
- Memory available
- Memory used
- Network activity
- I/O activity
- Processor utilization

Monitoring agents can be written for specialized needs.

HW/SW Platforms:

- HP/UX
- SunOS
- Solaris
- AIX
- Sequent ptx
- Hitachi OSF/1
- SVR4.2 for Intel
- Sequoia SVR4

Database Support:

- Oracle R 6&7

- Informix R 5&6

- OpenV*Perform
- OpenV*Spooler
- OpenV*Trend

8.6.1 OpenV*Accounting

This allows tracking and management of computing resources in a UNIX distributed environment. This can then be used for IS forecasting, budgeting, and planning. Statistics stored in an SQL database can then be used for chargebacks.

HW/SW Support

- SunOS, Solaris, HP-UX, AIX,

Provides a Motif or OpenLook GUI based frontend

8.6.2 OpenV*Batch Scheduler

Performs all-purpose scheduling and queue management using screen based frontend. Has the following features:-

- Support unlimited number of concurrent jobs across a network
- Does load-leveling on systems
- Operators control job allocation
- Users can control job dependencies and priorities
- Provides additional security and user privileges

HW/SW Support:-

- Solaris 2.2,
- SunOS 4.1.3,
- AIX,
- HP/UX,
- Sequent ptx V 2.10,
- NCR 486 UMX VR4

8.5.1 Availability

Available on Solaris 2.2, 2.3 and SunOS 4.

Also available for DEC, DG, HP, IBM, ICL, NCR, Pyramid, Sequent, Unisys.

Display is performed using a Windows PC as the host.

8.5.2 Contacts

For UK and Europe,

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For Asia-Pacific,

Mr. Savas Unsal,

RAM
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8.6 OpenVision Product Suite

OpenVision provides a suite of products that cover many areas of system management, capacity planning and performance. The products are as follows:

- OpenV*Accounting
- OpenV*Batch Scheduler
- OpenV*Event Manager

Measurement data is compared to thresholds when it is collected. When a threshold is breached the icon representing the Unix system changes color - yellow for warnings, red for danger, flashing for multiple alerts. You may click on the icon to see alert details including which element of the system was affected. If the Analyst product is also being used you may click on the alert for a detailed view of the performance measurements. There is also an alert summary facility to list all alerts that have been logged. Reports may be printed of alert summaries.

Analyst

Analyst integrates system level and user oriented performance measurements, allowing the administrator to discover which users have consumed the most resource and what the users were running (process level). Graphical and tabular reports highlight the performance of all systems being monitored. Graphs and reports may be copied to other windows applications and also printed with notes, headers and footers. If the Sentinel product is in use you may view the Alert Summary to guide any investigation.

Explorer

Explorer provides tools to investigate trend analysis, identification of seasonal variation and smoothing techniques. Time series are extracted from the PDB and accumulated at differing granularities (e.g. shift, daily, weekly etc.) for analysis. Button controls allow the user to sort, subset and customize individual reports. Graphs may be created in 2D or 3D formats. If the Sentinel product is in use you may view the Alert Summary to identify trends and patterns in the occurrence of performance alerts.

Planner

Planner predicts the effects of changes in the workload or configuration on end user service levels. Although device utilizations vary linearly with changes in the workload, response times do not due to resource contention. Planner employs advanced mathematical techniques to accurately predict the effect on response times of any such changes. Models are easily and quickly generated from the PDB. You may define utilization thresholds for each device and response time and throughput targets for each workload component. Breaches of these targets will be highlighted in a choice of report or graph formats.

The Athene product set consists of the following components:

- Sentinel - identification and notification of performance problems
- Analyst - detailed examination of system and user resource consumption
- Explorer - Trend and statistical analysis of measurements
- Planner - Performance prediction

Performance data is collected by an Athene Data Capture Agent (Acquire) which transfers data to the Performance Database (PDB) on the Athene workstation. The parameters for the data capture, collection, transfer and updating of the PDB are all maintained by the managing console. The performance data on a target Unix machine is based on Unix meters and accounting files captured by Acquire. Both system and user data is captured at regular intervals. The PDB contains data tables which hold:

- Details of all Unix systems connected (including mixed vendor machines)

- Parameters that control separately data capture on and collection from the Unix system

- Parameters that control separately the transfer to the PDB and the updating of the PDB

- System measurement data on performance of hardware devices and resource consumption

- User measurement data on resource consumption by user name and command name

Sentinel

Sentinel provides an alerting system to monitor performance violations of user-defined thresholds. It informs the administrator of where the problem is located, when the problem occurred and what is affected. Sentinel allows you to define the scope of your computing environment by dragging and dropping icons on a screen. The screen may, for example, depict a map, a schematic of a building or a network configuration. You may associate performance thresholds with each Unix system and define how often the performance is to be checked. You may use Sentinel to report problems as they happen or for a health check of performance over the recent past.

8.4.1 Packaging

- Probe/Net ties into SNM but two other products do not require SNM
- Monitor provides similar/same information and it's own “Motif/Windows” GUI as described elsewhere in this document.
- Probe/X provides similar/same information for terminal based systems using curses.

8.4.2 Pricing

Contact Landmark.

8.4.3 Contact

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Ms. Cindy Hurst, Technical Support Manager

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TEL: 1 (800) 333-8666
FAX: 1 (703) 893-8141
EMAIL: support@landmark.com

8.5 Metron Athene/UNIX

Athene is a suite of performance measuring products with the emphasis on capacity planning, workload analysis and trend prediction.

8.4 Landmark Probe/Net

Performance monitor that works with SunNet Manager. Enables receiving of a rich overview of performance information on systems across the network.

Metrics provided include:

- Global or System Level
  - CPU utilization
  - Disk subsystem activity
  - Memory utilization and activity
  - Distribution of average and overall response times
  - Data communications activity
- User Level
  - UID
  - User-to-process and user-to-resource mapping
  - Response time per user
- Program or Process Level
  - Local and remote file system service stats
  - Socket service stats
  - User activity per program
  - Active/dormant processes
  - System resource utilization per process
  - Response time per process
- NFS Information
  - Client and Server statistics
  - Service characteristics by client load
- I/O Information
  - Breakdown by file
  - System access information by process, client and file
  - Detailed I/O access methods
  - Disk Metrics

Interface

uses same look and feel as SNM. Well integrated.

- Flow control messages
- Failed connection attempts
- Server usage by protocol

Views network as a collection of dialogs and keeps history of events. Data reduces to allow user to pick level of information they require.

Interface

OpenLook GUI

8.3.2 Packaging

Consists of an R3000 based segment monitor with 8 or 16MB RAM and a SS IPC as the console monitor. One segment monitor is used per network segment. All are managed by console.

8.3.3 Contacts

For US domestic,

Mr. David Becker, Southeast Area Sales Manager,

Concord Communications, Inc.
753 Forest Street
Marlboro, Mass. 01752
TEL: 1 (508) 460-4646
FAX: 1 (508) 481-9772
EMAIL: dbecker@concord.com

For International,

Mr. Chuck Farrell, International Sales Manager,

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FAX: 1 (508) 481-9772

Mr. Ian Boyd,

Compuware
1 Foster Avenue
Dunstable LU5 5TA
TEL: 44 (582) 477555
FAX: 44 (582) 475372

8.3 Concord Communications TRAKKER

TRAKKER is an internet/WAN monitor that uses a combination of HW/SW to provide a very complete overview of network traffic.

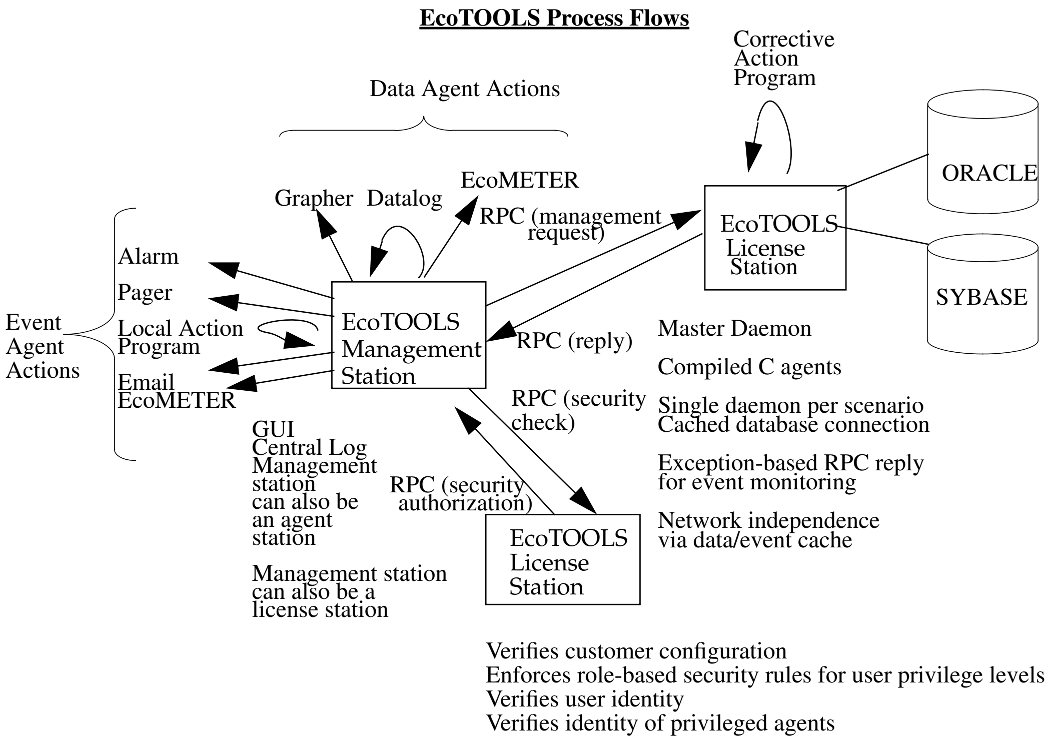
8.3.1 Product Details

Features include:

- Monitor all nodes on a segment
- Monitor all segments
- Provide a central view of the network
- No protocol expertise required
- Analyzes upper and lower protocol layers
- Provides real-time protocol information
- Monitors all layers at same time
- Extensive alarms upper layer events
- Provides a dialog history
- Processes and correlates data
- Detects faults
- Diagnoses faults

Example monitoring sessions include:

- Retransmissions
- Time outs and disconnects



8.2.2 Product Supplier

Worldwide

Jeff Kushner

Compuware Corporation
31440 Northwestern Highway
Farmington Hills,
Michigan 48334-2564
TEL: (313) 737 7556

For UK and Europe,

- Log Segments; display name, type, database, size, free space, alter database to add space

- Segments; display name, database, device, offset, size, type, detect tables that are candidates for segmentation

- Dependent Objects; display procedures, views and triggers requiring recompilation

- Stored Procedures; display name, database name, owner, creation date, access

- User Privileges; display name, default database, privileges

UNIX

- Server Configuration; discover server machines and databases

- Client/Server; discover client/server relationships and client attributes

- CPU; view amount busy, top users, load average and high, context switch rate, interrupt rate

- Paging; view rate, view top memory users

- Disk; display I/O transfer rate, space by user

- Files; find files, detect modification, monitor file system full

- Unix thresholds; process entries, semaphores, inodes

- Run away processes; detect and remove

- Security; monitor SU logins, rejected logins, UUCP access errors

NETWORKING

-Packets; monitor inbound, outbound, errors and congestion

- Connection; detect connection down and reconnect

- NFS; detect client timeouts, client calls, server calls

- Initialization Parameter limit versus used resource (process slots, session slots, transaction slots, enqueues, DDL locks, DML locks, database file entries, log files)

- Locking; monitor contention, blocking processes, repeated blockers, deadlocks

SYBASE (version 4.9 and 10)

- Engine Management; status, add, drop SQL Server

- SGA; view size, cache allocation, shared memory

- Archive Dump Space; view used and available space

- Backup Server; monitor status, detect server down, detect connection down, restart

- Blocking Processes; detect processes holding resource for long time and remove if required

- Global Statistics; available for CPU, I/O, idle time, network packet activity, resource limits

- Configuration; server configuration parameters can be tuned and server restarted

- Disk; view name, creation date, db owner, size, reserved space, data size, index size, unused space, detect Sybase mirror device off and restart.

- Database; view owners, space used by user, error log full, add new device to server, run consistency check

- Error Logs; analyze SQL Server, Open Server and Backup Server error logs

- Indexes; update distribution statistics

- License Limits; display maximum users, servers, engines

- Locking; display processes waiting on a lock, repeated lock holders, locking statistics

- Transactions; display transaction log database activity, detect long running transactions

Real-Time Process Monitoring (separately priced option)

Provide real-time performance analysis of application, system, and database processes. EcoTOOLS displays performance indicators that pin point performance problems. "Drill down" for detailed process analysis.

Agents Libraries

EcoTOOLS is supplied pre-built with a set of agents and action libraries to monitor and change the Oracle, Sybase, Unix and networking environments. What follows are details of the types of situation that can be monitored or changed within each of the aforementioned environments using the EcoTOOLS GUI interface:

ORACLE (version 6 and 7)

- CPU; monitor for Oracle processes
- Disk I/O; monitor transfer rates, reads, writes
- File I/O; monitor transfer rates, reads, writes
- Examine fragmentation, merge fragments
- Monitor tablespace size, free space, used space
- Archive log; examine used and available space and monitor for archiver being hung
- Activity; monitor transactions/sec, open cursors, checkpoints
- Global statistics; V$SYSSTAT table analysis
- Monitor for Row Chaining which can lead to increased I/O
- SGA; monitor buffer hit ratio, data cache hits
- Dead processes; detect and remove
- SQL*NET; detect SQL*NET down and allow for restart
- Oracle Instance; detect instance down and be able to restart
- Latch; monitor for contention and hit ratio
- Rollback Segments; view contention, size and statistics

Automated Operations

Respond to events by automatically dispatching preventative or corrective action programs.

Performance Monitoring

Analyze Oracle, Sybase, Unix and network performance data to improve performance and availability. Tuning Oracle and Sybase applications is a cooperative effort requiring synchronised data collection and analysis for Unix, the network and the RDBMS.

Console Management

Generate events; store, filter and consolidate console and log messages originating from Unix, Oracle, Sybase or applications.

Capacity Planning

Build an accurate historical database showing peak loads and the actual resources used by applications which may be used to project future capacity requirements. Allows the administrator to pinpoint capacity bottlenecks in real time.

Management Communication

Communicate system health and throughput and monitor service levels via color coded icons. Produce graphs and on-demand reports of historical data for batch reporting and analysis using SQL, database report generators, spreadsheets etc.

Security Monitoring

Monitor for unauthorized attempts to access secured resources. Audit passwords and authorization rules.

Configuration Management

Automatically retrieve hardware, operating system and database software inventory and track client/server connections and relationships.

8.2 Compuware EcoTOOLS

EcoTOOLS are a set of Unix based GUI systems monitoring tools which are usually deployed in a relational database environment to provide automated fault and performance management for Unix/RDBMS applications. The individual products that form the EcoTOOLS set are:

- EcoTOOLS/ORACLE
- EcoCHARGEBACK
- EcoSCHEDULER

From a central management console the user controls Unix, Network and database (either Oracle or Sybase). The user benefits from increased control, more stable applications and increased confidence in the robustness of the Unix environment. A mainframe user would probably compare EcoTOOLS with a system monitor and, while this is valid, a key difference is that EcoTOOLS is able to automate correction of problems as well as their detection and investigation.

The companion products EcoCHARGE and EcoSCHEDULER provide resource accounting and batch job scheduling capabilities respectively.

A typical customer profile that would benefit from using EcoTOOLS would be one with combinations of the following:

large networks, multiple servers, multiple locations, mission critical applications, applications requiring long uptime (7x24), shortage of in-house client/server expertise, shortage of database administration skills.

8.2.1 Product Details

EcoTOOLS is a native UNIX solution developed with the goal of bringing mainframe-like control to the Unix environment and delivers functionality crucial to managing production applications. EcoTOOLS supports the following functions:

Event Management

The administrator may monitor for Oracle, Sybase, Unix and Network conditions and take corrective actions before users suffer poor performance or application downtime.

8.1.1 Contacts

Worldwide

Patrol Software Inc

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Redwood Shores
CA 94065
USA
TEL: (415) 508 2903

For UK,

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SQL Group,
9 - 10 Westminster Court,
Hipley Street, Woking,
Surrey GU22 9LQ
TEL: 44 (483) 750330
FAX: 44 (483) 747337

Mr. Andrew Russell,

Micromuse,
Disraeli House,
90 Putney Bridge Road,
LondonSW18 1DA
TEL: 44 (81) 875-9500
FAX: 44 (81) 875 9995

SunNet Manager Integration

Patrol can be seamlessly integrated into SunNet manager. Because Patrol supports SNMP it can send traps to SunNet Manager when problems are encountered on applications, databases or machines it is monitoring. The systems administrator can then zoom into the problem area without leaving the SunNet Manager console. This facility is available with PatrolLink.

Oracle Knowledge Module

The Oracle knowledge Module comes pre-built with default monitoring intervals, alarm and warning levels, and recovery actions which may all be amended if required. It monitors the following:

Active Transactions, Alerts, Archive Free Space, Buffer Waits, Cache Buffer LRU Latch, Cache Hit Ratio, Core Memory Sorts, DBWR Checkpoints, DBWR Free Needed, DDL Locks, DML Locks, Dictionary Cache, Dictionary Cache Extra, Disk Sorts, Dump Free Space, Enqueue Latch, Enqueue Timeouts, Free Buffers, Free Fragmentation, Free Space Defecit, Free Space, Maximum Extents, Open Cursors, Processes, Recursive Calls, Redo Allocation Latch, Redo Copy Latch, Redo Entries Linearized, Redo Size, Redo Small Copy, Redo Space Requests, Rollback Waits, Table Scans, Temporary Extents, Write Complete Waits.

Unix Knowledge Module

The Unix module has been significantly enhanced at version 2 of the product. It provides the ability to monitor systems, execute standard unix commands from the Patrol console, and produce system resource reports. A sample of some of the things this module monitors are:

CPU utilization, Free Memory, Disk Transfer Rates, Swap Space Usage, Net Load, Relative Machine Responsiveness, Net Calls, Inode Cache Utilization, Processes Waiting For I/O,

Free Semaphores, Logging of Failed Logins, Logging of SU executions, Disk Transfer Rates, NFS Statistics, Paging Activity, Number of Print Jobs, Number Of Unique Users etc.

- Informix,
- Oracle Financials 9.4.

The Patrol environment allows knowledge modules to be enhanced or for new modules to be built from scratch. So existing administrative shell scripts and C programs at a given site can easily be incorporated into the patrol framework. Creating a new knowledge module, or amending an existing one, is a menu driven process in Patrol.

Ease of Use

Administrators can select an icon to apply management commands, view internal parameters, or set alarms and recovery actions in case of problems. If Patrol finds a problem it is unable to resolve, it automatically alerts the responsible member of staff by way of sound (buzzer or audio message), email or a call to a pager.

Patrol stores all events that occur on objects it is managing. The event log may be held in a flat file or a database and contains details of everything that happens to all machines, monitored databases and parameters. A parameter can be thought of as being a command which is executed by Patrol (for example checking that a particular database is not running out of space). When a parameter encounters an alert state, automatic recovery actions can be invoked. The recovery actions will be either operating system or SQL commands and these will typically be pre-defined recovery actions supplied with one of the knowledge modules or something that is site specific which has been built by the systems administrator and incorporated into the Patrol framework.

Real-Time Process Monitoring

Patrol provides real-time process monitoring and “drill down” for detailed problem analysis. These checks can be automated to allow system administrators to carry out less mundane workloads. Patrol can even monitor itself, and will shut down various monitoring functions if it detects that it is using more resource than pre-defined limits allow.

Other Products 8

The products included here have been reviewed based on the technical datasheet provided. They have not been evaluated per evaluation criteria stated earlier but are included here for easy reference.

8.1 BMC DDS/Patrol

DDS/Patrol simplifies Unix system administration and database administration by providing an integrated, easy-to-use GUI from which to manage a network of servers and workstations. The Patrol console shows all the components of the distributed system as icons. The color of the icon represents the status of the application, so that a crashed database will cause the corresponding Patrol database icon to flash red. The Patrol architecture consists of the console and remote server agents that reside on each of the managed machines. Patrol supports secondary consoles that can view and manage remote servers but cannot add to Patrol's knowledge base.

Knowledge Modules

Patrol comes with standard libraries of knowledge (Knowledge Modules). Examples of modules which are available are:

- Unix,
- Oracle (versions 6 and 7),
- Ingres,
- Sybase,

The Monitor for CICS (CICS/MVS)

The Monitor for MVS

The Monitor for DB2

The Monitor for VTAM

NaviGraph

Performance Series for VSE

The Monitor for CICS (CICS/VSE)

The Monitor for VSE

NaviGraph

Mr. Frank Torbey, VP Marketing,

Landmark Systems Corporation
8000 Towers Crescent Drive
Vienna, Virginia 22182-2700
TEL: (703) 902-8177
TEL: (800) 333-8666
FAX (703) 893-8141

7.7 Technical Support

Customer Services

Landmark Systems Corporation
8000 Towers Crescent Drive
Vienna, Virginia 22182-2700
TEL: (800) 775 5675 (LMRK)
FAX (703) 893-8141
EMAIL: tmon-support@landmark.com

7.8 Other Products

Landmarks products are bundled into three performance series -

Performance Series for UNIX, for MVS, and for VSE. They include:

Performance Series for UNIX

PROBE/X

PROBE/Net

The Monitor for UNIX

The Monitor for Sybase

The Monitor for CICS (CICS/6000)

Performance Series for MVS

The Monitor for CICS (CICS/ESA)

7.4.4 Platform Availability

The TMON for UNIX collector is available for:-

- IBM AIX 3.2.4 and 3.2.5
- HP HP-UX 9.0
- SunOS 4.1.3
- Solaris 2.3

The TMON for UNIX management console (GUI) is available for:-

- IBM AIX 3.2.4 and 3.2.5
- HP HP-UX 9.0
- Solaris 2.3

7.5 Product Licensing and Pricing Structure

Contact Landmark.

7.6 Sales Support

For US domestic,

Mr. Michael Sandoe, UNIX Products Sales,

Landmark Systems Corporation
8000 Towers Crescent Drive
Vienna, Virginia 22182-2700
TEL: (703) 902-8177
TEL: (800) 333-8666
FAX (703) 893-8141
EMAIL: mikes@landmark.com

For International,

Mr. Bob Guion, VP Worldwide Sales,

- Data communication activity
- Process wait reasons and statistics

USER LEVEL

- Response time per user
- User identification
- User-to-process and user-to-resource mapping

PROGRAM OR PROCESS LEVEL

- Response time per process
- Local and remote file system service statistics
- Socket service statistics
- User activity per program
- Active and dormant processes
- System resource utilization per process

NETWORK INFORMATION

- System resource utilization per network client
- Service characteristics by client load
- Client and server statistics

I/O INFORMATION

- System access information by process, client, and file
- Detailed I/O device access methods
- Sophisticated disk metrics

7.4.3 On-Line Help

A hypertext based help facility is provided.

- Manage by exception. By establishing thresholds for metrics within systems or groups with TMON for UNIX, you receive advanced warning before problems become severe.
- Understand true system behavior and improve system management decisions. Gather data on hundreds of system performance metrics, many of which are impossible to obtain without TMON for UNIX.
- Control the extent and volume of recorded data. With TMON for UNIX you get extensive data logging for system performance and exceptional events. This allows for comprehensive and cost-effective capacity planning. You also can record data in standard file formats that permit easy transport into analysis applications.
- View clear, concise graphical performance information for rapid problem isolation and resolution. Whether your management platform is a network management framework or a specialized GUI, TMON for UNIX presents meaningful performance management information.

7.4 Technical Report

7.4.1 Evaluation Platform and Software Version

The evaluation copy of Landmark TMON for UNIX was a beta II version, for Solaris 2.3.

The operating environment was a SPARCstation 10 Model 51 running Solaris 2.3 for the monitored node and a IPC running Solaris 2.4 alpha for the TMON management console.

7.4.2 Features

The Monitor for UNIX provides metrics for:-

GLOBAL OR SYSTEM LEVEL

- CPU utilization

- Memory utilization and activity

- Response time distribution

7.2 Company Profile

Landmark Systems Corporation is a Virginia based high technology organization that develops and markets industry-leading enterprise performance management software worldwide. Established in 1983, Landmark has an installed base of more than 7,000 sites in more than 70 countries. Landmark has kept pace with today's changing information systems environments by migrating its products across mainframe and distributed systems.

Landmark provides performance management solutions for the enterprise. Whether an organization's computing environment is centralized, decentralized, or a mixture of both, Landmark extends its performance management solutions across multiple computing environments. By integrating performance management monitors for operating systems, relational databases, network subsystems, and transaction processing systems, Landmark continues to distinguish itself in the industry by its products' ease-of-use.

7.3 Product Positioning

The Monitor for UNIX (TMON for UNIX) is Landmark's performance monitor for HP, IBM, and Sun systems. Using proven distributed performance data collection technology, it allows you to examine and control performance of distributed UNIX systems from a single point of control.

TMON for UNIX lets you define groups of systems, users, or applications. You can take advantage of UNIX management tools to adjust system parameters, suspend or kill processes, and set resource limits.

TMON for UNIX allows you to set alarms and responses based on user-defined thresholds for groups and systems. It provides comprehensive performance information at the system, user, process, and resource level. This information is presented through a logical and intuitive graphical user interface (GUI). TMON for UNIX also provides access to the leading network management frameworks. Its performance GUI and supporting architecture give you the power to manage all your critical UNIX systems.

Manage Your Distributed Systems Effectively and Easily:-

Landmark TMON for UNIX 7

7.1 Landmark TMON for UNIX Product Overview

The Performance Series for UNIX gives users the ability to maintain peak system efficiency in distributed computing environments with a set of comprehensive monitors for the UNIX operating system. Probe/X is a curses based single system monitor. Probe/Net is a Sun Net Manager specific monitor. The Monitor for UNIX incorporates all data collected by the probe products.

The Monitor for UNIX (TMON for UNIX) gives users the ability to examine and control performance of distributed systems. It increases system availability by improving response time and providing the information required to troubleshoot system performance problems. It enables users to observe resource utilization and workload interactions which makes it possible to optimize resource allocation. It is an important debugging tool in that it makes it possible to track application behavior. Finally, TMON for UNIX aids capacity planning activities by tracking and recording performance activity of managed systems.

TMON for UNIX data can be accessed from open management platforms such as Sun Net Manager, HP OpenView and IBM NetView. Installation and start-up information for these products is provided.

6.3.8 SUN Platform Requirement

It requires Solaris 2.3 and one of the following architectures, Sun4c, sun4m and Sun4d. A X-workstation display with a minimum of 1152 x 900 resolution and 8 color planes.

6.4 Product Licensing and Pricing Structure

Contact HP for pricing information. GlancePlus is the most inexpensive tool surveyed if you only want to monitor a single system.

6.3.3 On-line help

The on-line Motif-style help provides useful and detailed information. It is hypertext based and allows quick navigation such as back track or home topic. It also provides keyword search facility and a search history of those help pages that you have visited.

Another powerful feature of the help facility is "continuous help". Once chosen, the pointer becomes a question mark, which you could point at any item on the screen and click for the help page on that item. You could move this question mark pointer around on the screen and get help from almost anything you want.

The other useful feature of this help facility is the ability to display bit-mapped graphics on the help windows and having instructional lines drawn to point out the relevant items on the bit-mapped display. The bit-mapped display resembles the actual display. The only feature lacking is that there is no print function in the help facility.

6.3.4 License Configuration

A special 40-digit key is required in a specific key file.

6.3.5 Software Distribution

It comes on a CD media. It requires about 8-MByte of disk space.

6.3.6 Installation

Installation is straight-forward and it automatically detects the Sun4 architecture and installs the binaries accordingly.

6.3.7 Platform Availability

HP GlancePlus (Motif-based interface) is available on HP3000 MPE/V, HP3000 MPE/iX, HP9000 HP-UX, IBM RS/6000 AIX, and Sun SPARC Solaris. HP GlancePlus (character-mode user interface) is available on HP-UX only.

6.3 Technical Report

6.3.1 Evaluation Platform and Software Version

The evaluation copy of HP GlancePlus is a released version, version A.00.00 for Solaris 2.3.

The operating environment on which this copy of HP GlancePlus was evaluated are a 8-way SS1000 running Solaris 2.3 FCS.

6.3.2 Features

Here are some of the features of GlancePlus:

- The rules-based adviser interprets performance data and identifies bottlenecks. You can use the default set of rules or create your own rules.
- Graphical and tabular on-screen color reports show your system's performance and resource utilization in real-time.
- You can view metrics at the global, application, or process level.
- You can use alarms to monitor your system. You can use the default alarm thresholds or define your own.
- You can define the order of the data columns and sort criteria. You can also define filters to see only those processes that are of interest to you. There are a variety of display options, colors, and fonts.
- You can define the data sample intervals and durations for graphs.
- You can monitor system performance while tending to other tasks by using GlancePlus in icon mode.
- The on-line help facility provides quick answers to your questions about GlancePlus.

HP GlancePlus 6

6.1 HP GlancePlus Product Overview

HP GlancePlus for Sun SPARC Solaris systems is a performance monitoring and diagnostic tool that helps you get the best possible performance from your computer systems. HP GlancePlus for Sun SPARC Solaris systems examines on-line system activity, identifies performance bottlenecks when they occur, and permits problems to be resolved quickly and knowledgeably.

If you need historical data collection on your system's activity, then there is the HP Performance Collection Software (HP PCS) for Sun SPARC Solaris system that can collect and summaries key parameters. It was not tested in this study.

6.2 Product Positioning

GlancePlus is a real-time performance monitoring and diagnostic tool. Real-time is the key word here. GlancePlus shows you, what's going on inside your computer right now. You define the time interval yourself ``right now" can mean what your computer was doing a second, a minute, or an hour ago.

GlancePlus is a low cost performance monitor. It does not have as many features as the other products tested, but it costs a lot less, is very easy to setup and use and has a good on-line help system.

TEL: 44 (737) 778-400

5.8 Other Products

BGS BEST/1-Visualizer is a MicroSoft Windows program that is able to analyze consolidated data from BEST/1 for UNIX, BEST/1 for AS400, BEST/1 for OS/2 and so on. It provides the following features:-

- Automatic daily performance reporting which helps to understand performance of distributed system by answering questions like, "How are key applications performance?", "Compared to history?", "To plan?"
- Graphical bottleneck detection and analysis which aids to pinpoint problems and test-drive solutions by answering question like, "Can I tune the system or relocate work to reduce exceptions?"
- Comprehensive "What-If?" performance modeling to help in reducing risks in sizing client/server systems by answering questions like, "Do I have to add hardware? Which models? Where? When?"
- Management reporting on performance and capacity helps to save money by optimizing resource expenditures by answering, "Can I support recommendations? Justify expenditures?"
- Enterprise-wide performance assurance to ensure a consistent approach to multi-platform performance and capacity management

For Germany,

BGS Systems, GmbH
Steinhof 39
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FAX: 49 (211) 248 550

For Italy,

BGS Systems s.r.l.
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10143 Torino
Italy
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FAX: 39 (11) 473-1295

For France,

BGS Systems France
Technopolis
175 Rue Jean Jacques Rousseau
92138 Issy les Moulineaux Cedex
France
TEL: 33 (1) 4108 1190
FAX: 33 (1) 4108 8506

5.7 Technical Support

For US domestic and International customers,

TEL: 1 (617) 891-0000
(9:00 am to 7:00 pm Eastern Standard Time)
FAX: (617) 891-6622
EMAIL: support@bgs.com

For European countries and UK,

- BEST/1-Analyze for UNIX
- BEST/1-Predict for UNIX
- BEST/1-Manager for UNIX
- BEST/1-Visualizer

5.6 Sales Support

For Japan/Far East/Pacific Rim and US domestic,

Mr. Bryan Quickmire, VP of marketing

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For Canada,

BGS Systems, Inc.
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FAX: 1 (416) 338-1675

For UK,

Mr. Andy Bird, Managing Director,

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England
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FAX: 44 (737) 779060

A queueing model is a simplified representation of a system. It consists of,

- the resources available in the environment, such as CPU, disks, etc.
- the performance characteristics of various resources (CPU performance ratings, the number of processors, disk performance ratings in terms of seek time, rotation time, and transfer rates and etc.)
- the workloads present on the system and their characteristics (load in terms of transaction volume and number of users, CPU time and I/O counts by devices required for each transaction, and etc.)

The components in the model includes:-

- Network
- Nodes
- Disks
- Logical Volumes
- Workloads
- Transactions
- Hardware Table

5.4.4 Platform Availability

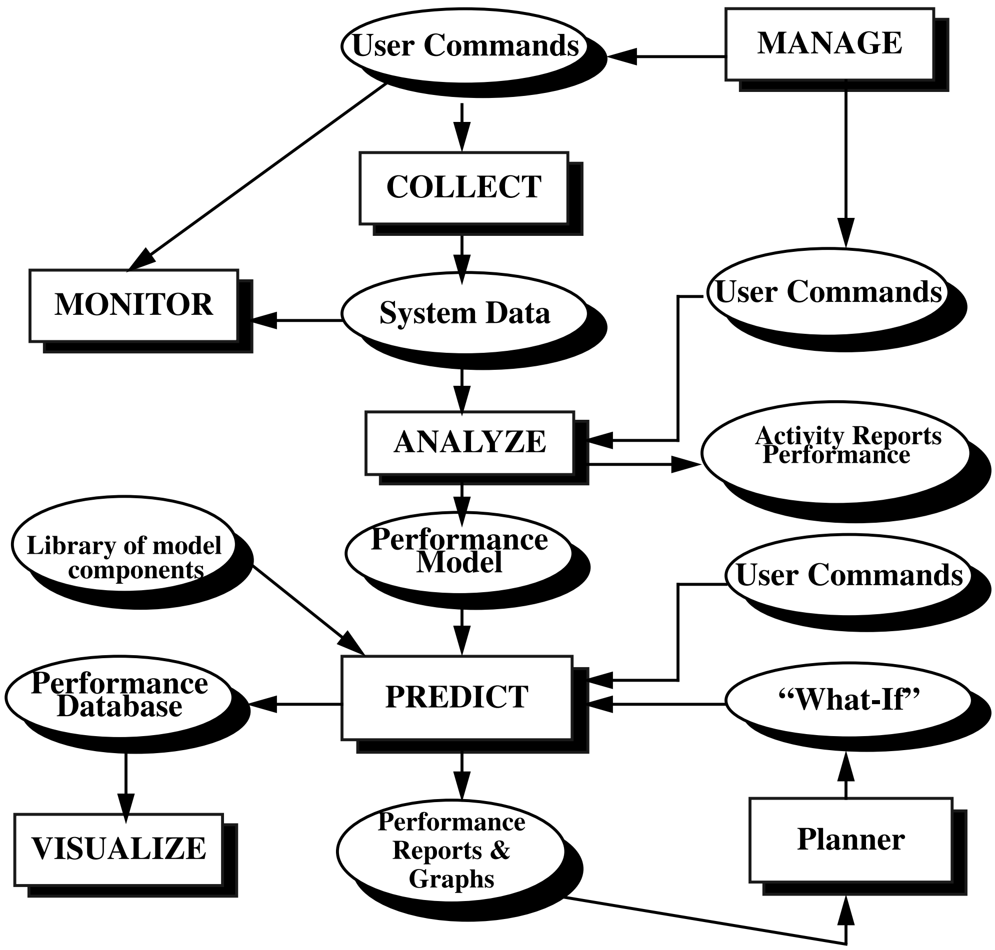
BEST/1 for UNIX is already available on the IBM AIX platform from June 93. The version for Solaris 2 and SunOS 4 ships in early 1995. A version for HP-UX also became available during 1994.

5.5 Product Licensing and Pricing Structure

Conceptually, BGS's pricing and licensing philosophy is targeted at commercial accounts (medium to large companies). As such, a single enterprise-wide license is provided for "BEST/1 Performance Assurance for UNIX" software as an integrated solution. The fee for such license includes support for all UNIX variants (Solaris, AIX/6000, HP-UX, etc.). Contact BGS for pricing information. Individual software components included in the package are:

- BEST/1-Collect for UNIX
- BEST/1-Monitor for UNIX

BEST/1 for UNIX Product Family



5.4.3 Features

BEST/1 for UNIX Predict module uses a queueing network model of a system, analyzes it using mathematical analysis techniques, and produces reports concerning the performance of the system represented by the model.

text window as corresponding alarm conditions are graphically reflected by color changes in the consoles node map. Regardless of where the monitor console is running. BEST/1 agents can be configured - by node, by domain, or by alert condition - to take any combination of alarm actions. In addition to monitor console notification and issuance of SNMP traps, BEST/1 agents can send e-mail, and execute any agent-accessible shell script. All metrics supported for alerting purposes can be selected for display at the monitor console. Displays and drill-downs can be specified in ad-hoc fashion or pre-defined display policies. A single display can graph multiple metrics for one node, or a single metric for multiple nodes.

Analyze is used to analyze the performance data of interconnected systems, and apportion processing into meaningful unit-of-work definitions. It provides the flexibility to tailor/change workload definitions after data collection. It allows performance data from one or more systems to be grouped according to meaningful client/server transactions and business oriented workloads. The analyze module provides the capability to define multi-node client/server workloads, reduce data, and automatically build a single model that includes all nodes, devices, and workloads. It includes on-line data browsing (graphical and tabular) to examine the overall resource usage over a period of time, and to simplify the selection of time periods to zoom in on performance problem areas.

Predict is used to answer "What if...?" questions to evaluate alternatives for current performance problems and plan for expected capacity needs. It allows the administrator to work interactively to see how configuration and workload changes affect system performance. After the administrator evaluates the results, he/she can obtain performance statistics in a variety of reports or graphs. A performance model can also be built from scratch using the predict components and no measurement data.

Visualize consolidates performance data from multiple platforms into a performance history database. It provides a graphical visualization of developing bottlenecks, file node routing, subsystem performance, and workload performance. It can be used to compare actual versus planned forecasts, and help to provide management reporting to justify resource expenditures.

BEST/1 helps you to define adequate computing facilities for your environment, so that performance objectives are met without excessive or unnecessary changes in your environment. As a result, you can meet service level objectives with the most efficient use of your resources.

5.4 Technical Report

5.4.1 Evaluation Platform and Version

The evaluation copy of BEST/1 for UNIX is a released version, version 2.0 for AIX 3.2.5 on IBM RS/6000.

The operating environment on which this copy of BEST/1 for UNIX was evaluated are a IBM RS/6000 Model 560 and a IBM RS/6000 Model 320 running AIX 3.2. The Solaris 2 version is due out in early 1995.

5.4.2 Concepts

BEST/1 for UNIX currently contains six major components:

- Collect
- Manager
- Monitor
- Analyze
- Predict
- Visualize

Collect is used to gather and store raw performance data for Monitor, Analyze and Predict. It stores data in a spill file, and maintains real-time data in shared memory for Monitor.

Manager is used to schedule data collection, reporting, and archiving, to automate the administrative tasks. It is a new module that was not present in the evaluated version, but which is part of the first Solaris release.

Monitor is a new module that was not present in the evaluated version, but which is part of the first Solaris release. It is used for viewing alarm conditions as well as defining them. Notification messages are displayed in a scrollable

system topology, application mix, or number of users can be altered in the model; new results can be obtained in seconds. After each evaluation, output performance statistics can be viewed in either tabular or graphic form.

5.2 Company Profile

BGS Systems, Inc., founded in 1975, is a public company headquartered in Waltham, Massachusetts. With over 40,000 installations worldwide, BEST/1 has become the de-facto standard for performance and capacity management in heterogeneous distributed environments. The company's strategy is to provide Enterprise-Wide Performance Assurance for all major computing platforms. BEST/1 Performance Assurance products are now available for UNIX, MVS, VM, AS/400 OS/2 and OpenVMS systems. Support for Windows NT and Novell will be provided in the future.

5.3 Product Positioning

BEST/1 for UNIX is a software product from BGS Systems used for monitoring, alerting, measuring, evaluating, predicting, visualizing, and reporting the performance of distributed UNIX systems. Its real-time components enable the detection of real-time alerts for user defined alarm conditions, without imposing a high overhead, for continuous display or event management to a central monitoring console. Its performance history database can be used to track long term performance and pinpoint developing bottlenecks. Its analysis and predict components can be used to answer various "What if...?" questions concerning capacity planning, performance tuning and system applications design. These questions typically concern issues such as the following:

- Predicting how new applications or growth in existing workloads will affect your system performance.
- Determining which applications consume the most resources.
- Determining when a system will require an upgrade.
- Determining whether moving workloads from one node to another eliminates performance problems.
- Determining which components, such as CPU, I/O, or memory, should be replaced, or added, when a hardware upgrade is necessary
- Evaluating hardware alternatives for an upgrade.

BGS BEST/1 for UNIX 5

5.1 BGS Best/1 for UNIX Product Overview

BEST/1 for UNIX products fit into the BGS Performance Assurance framework. Performance Assurance is a process supported by an integral suite of products for guaranteeing acceptable service to critical business systems at optimal cost. Performance Assurance provides a consistent approach to managing performance and capacity across the major computing platforms in use today. This consistency, together with a high degree of automation, allows existing personnel to support client/server applications running on diverse platforms while minimizing training requirements and implementation efforts. For distributed UNIX environments, BEST/1 for UNIX is a suite of products to address the needs of system management in the areas of performance management, real-time alerts and diagnostics, graphic visualization from a performance history database, and capacity planning.

The heart of BEST/1 for UNIX capacity planning component is the queueing theory engine. The engine evaluates a model of a network of UNIX machines. To plan for the growth of an existing system, the administrator constructs the input model by reducing measurement data collected using other components of the BEST/1 for UNIX toolkit.

To size a new system, the administrator constructs the input model from libraries of hardware configurations and workloads shipped with BEST/1 for UNIX or built from data collected on similar systems. In either case, the administrator works interactively, asking "what if" questions and seeing how configuration and workload changes effect system performance. Hardware,

- New applications such as accounting

4.4 Product Licensing and Pricing Structure

Contact Amdahl for details.

4.5 Sales Support

For US domestic,

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, CA 94088-3470
Tel: (408) 746-6000
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Fax: (408) 738-1051
Fax: (408) 773-0833

For Europe Northern Area,

Tel: +44 (81) 572-7383
Fax: +44 (81) 577-2871

For Europe Central Area,

Tel: +49 (89) 57834 0
Fax: +49 (89) 57834 222

For Europe Southern Area,

Tel: +33 1 (47) 65 78 00
Fax: +33 1 (47) 65 78 78

For Canada,

Tel: (416) 510-3111
Fax: (416) 510-3353

For Asia Pacific,

Tel: +61(2) 964-7999
Fax: +61(2) 957-6021

- X-Scheduler and Basic Reporter Information - 2-MByte
- Software Installation and Release Note - 2-MByte
- Package Binaries - 1.3-MByte
- Performance Data Storage - 50-MByte

If all are installed, it would require about 130-MByte disk space.

4.3.8.3 *Future Product Directions*

OpenTune is the second product in the suite of Amdahl A+View Systems Management Software suite. A+UMA was the first. They recognize that in the current version of OpenTune functionality is wanting, and there are plans to enhance functionality such as collecting user-process data (by an enhanced and updated version of A+UMA), modeling capability, improving the alarms and so on. New data types such as process data will be added for the next release of OpenTune, together with enhancements to the user interface. This release is imminent.

Support for AIX/6000 and HP-UX will be added to A+UMA in phases. This will enable all A+UMA-based performance management products to monitor heterogeneous environments.

OpenWatch, a threshold monitor for distributed servers that utilizes A+UMA data, was introduced in the 4th quarter of 1994. With OpenWatch, customers can monitor a large number of servers without allocating expensive personnel resources to the task. OpenWatch Distributed Threshold Monitor optionally works with SNMP (Simple Network Management Protocol) network managers to provide exception-based performance management to distributed heterogeneous environments. When used with SunNet Manager, it will also permit the user to invoke OpenTune through the SunNet Manager menu.

Capacity planning and modeling tools will be offered in 1995 to allow accurate system and network expansion planning based on existing UMA and SNMP data.

The longer term future for Amdahl's A+UMA-based products will include:

- Addition of network data
- Addition of application data, including databases and user applications
- Addition of advice for less experience users

4.3.6 Documentation

Provided are: Software Installation and Release Notes, A+UMA Administration Guide, and OpenTune User Guide. All of these documents are available in PostScript format on the CD. Also, there are other PostScript documents on the CD. (Please see Sun Platform Requirement on these documents)

4.3.7 Software Distribution

The media are Cartridge Tape or CD in SVR4 package format.

4.3.8 Installation

Installation is straightforward using pkgadd.

4.3.8.1 Platform Availability

Full range of SUN SPARCstations and SPARCservers running Solaris 2.3 are supported. OpenTune is also able to monitor systems running Solaris 1.1 or the Amdahl UTS operating system. Amdahl is in the process of porting OpenTune to other platforms.

4.3.8.2 Sun Platform Requirement

Both Amdahl A+UMA and OpenTune require SPARC compatible machines running Solaris 2.3.

For the management console running OpenTune, it also requires X11R4 or X11R5 (or OpenWindows v3.3) and it preferably has more than 24-MByte of main memory.

The followings are the suggested disk space required.

- A+UMA Administration Guide - 20-MByte
- Introduction to A+UMA - 2-MByte
- OpenTune User Guide - 10-MByte
- OpenTune Tutorial - 40-MByte

4.3.3 Features

Amdahl OpenTune allows setting of various sampling intervals.

It allows data thresholds to be defined. When a threshold is exceeded, an alarm is displayed and an optional audible alarm with varying volume could be set.

It provides a lot of graphing options such as line, area, bar and pie-chart graphs. It provides multiple variables per graph. It scales with linear or logarithmic scale. There is also color coding and 3D effect with variable rotation. The graphing capabilities are one of the best features.

It also provides a limited form of capacity planning by using the historical database to manually extrapolate future performance.

4.3.4 Limitations

You can only view a single host at a time, and you cannot view two windows of two different periods of the same host at the same time, for comparison.

There is only one level of threshold. Also, only one condition triggers an alarm. There are no default thresholds, and you would have to turn on a selection out of almost a hundred. This makes it difficult to use.

There is no indication of which alarm has triggered. Also, there is no alarm or event history.

It could take a long time just to display data that is not cached. That is, if OpenTune requests data from the data storage, it takes a long time to go through the MLI to obtain data from DSL. This makes it tedious to use in some cases.

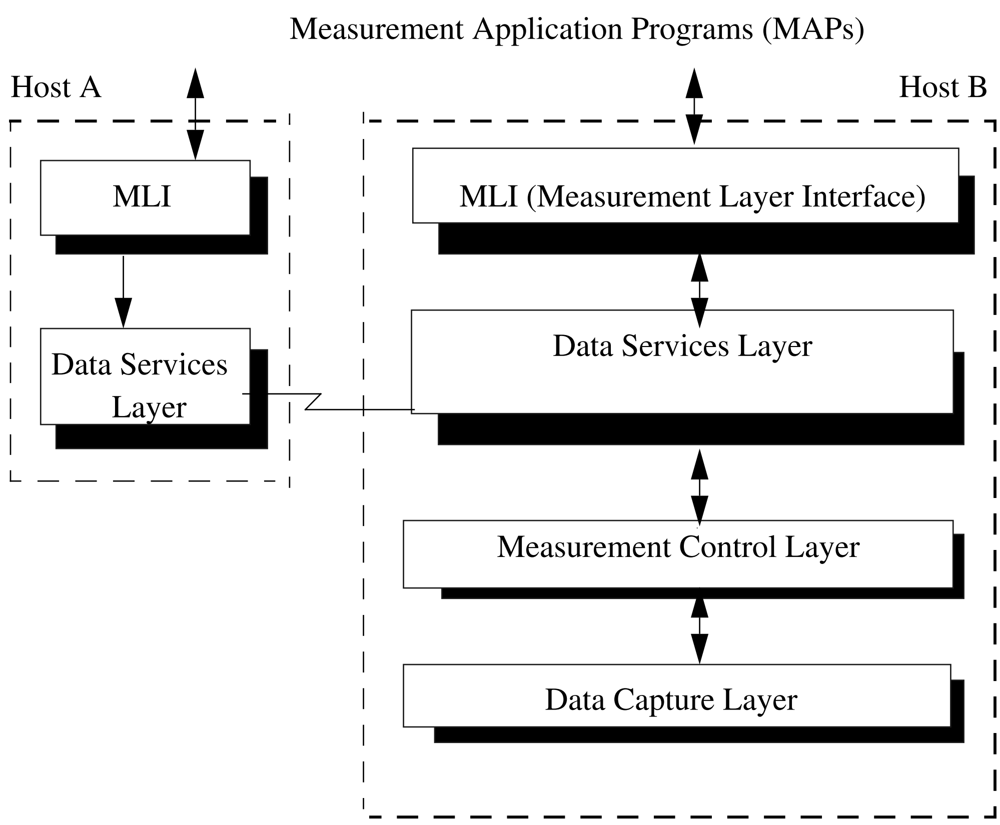
It takes a long time (3 minutes) to initialize OpenTune when it starts up.

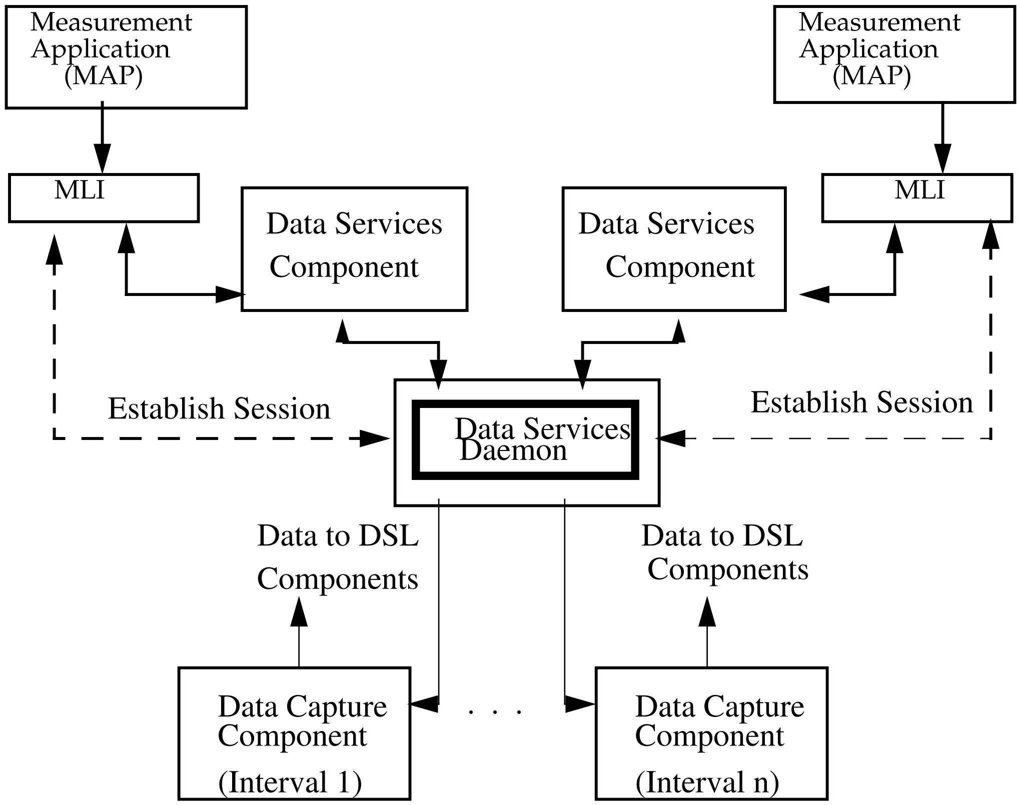
4.3.5 On-line help

The on-line Motif-style help provides multiple levels of help with Hypertext “buttons” in text. It also provides a history of help screens selected.

3. Extensibility - for dynamically adding new measurement data providers.
4. Common Data Storage - for efficient access and maintenance of historical performance and accounting data.
5. Distributed Services - for implementing remote measurement services using MAPs in a distributed heterogenous environment.
6. Single Collection Source - for reduced overhead; multiple requests for the same data result in a single collection.

Amdahl OpenTune provides data collection and capturing based on A+UMA DCL. It also provides data services via A+UMA DSL. It provides monitoring of current system performance as well as allows historical analysis of performance trend.

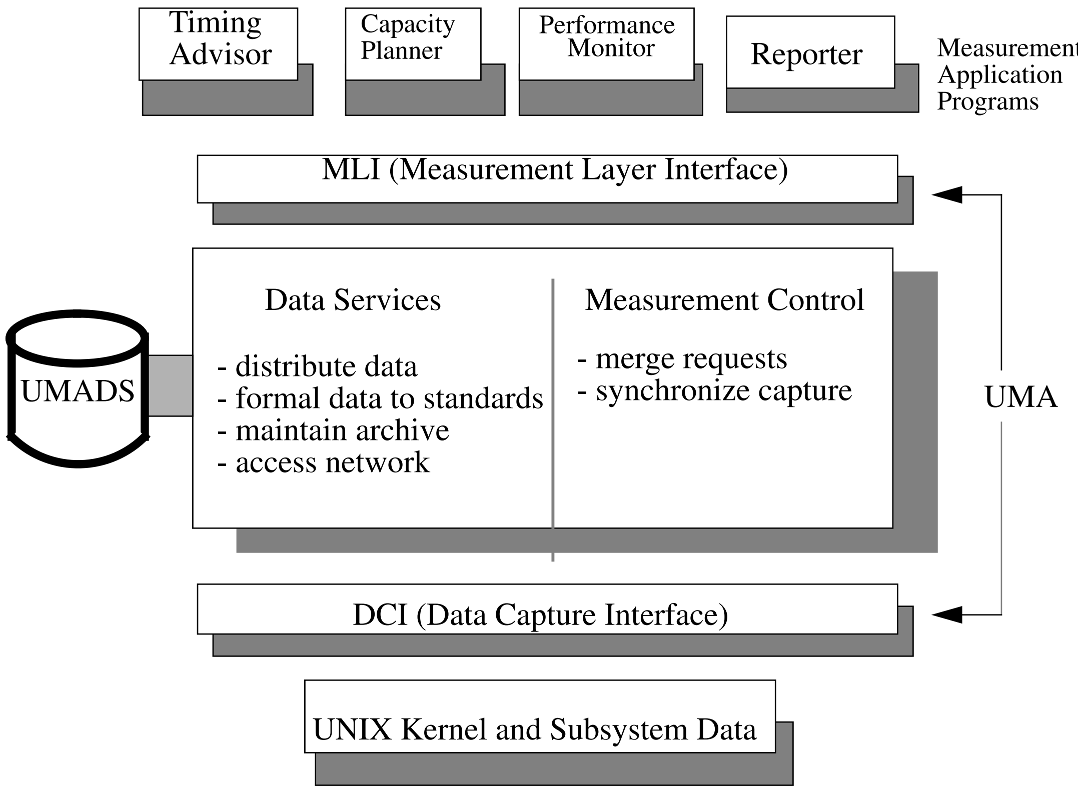




UMA results from the work of the Performance Management Working Group (PMWG), which is a working group within the Computer Measurement Group (CMG). It has been submitted for consideration as a standard to X/Open but it is still incomplete and subject to change.

The emerging UMA standard should provide the following benefits:

1. Shared Service Facilities - for common measurement control and data delivery mechanisms for sharing performance data among different service requestors.
2. Measurement Transparency - for insulating the MAP from the underlying measurement procedures, and thus providing application portability.



The Data Capture Layer (DCL) provides extensive collection of performance management metrics as defined in A+UMA data pool. DCL also allows multiple hosts data to be collected when run on multiple hosts. A standard Data Capture Interface (DCI) ensures a consistent interface of providing this data to the Management Control Layer (MCL).

The Amdahl OpenTune requests data through the Measurement Layer Interface (MLI) from the Data Services Layer (DSL) and displays them on the management console.

4.3 Technical Report

4.3.1 Evaluation Platform and Software Version

The evaluation copy of OpenTune is version 2.0 (beta) which is the first release of OpenTune on Solaris 2.3. OpenTune v1.0 was available earlier on Amdahl's UTS operating system.

The operating environment on which this copy of Amdahl OpenTune was evaluated was an 8-way SS1000 running Solaris 2.3 FCS.

4.3.2 Concepts

Amdahl OpenTune is a Management Application Program (MAP) in the A+UMA model. It only provides display capability of the data that is collected by the underlying layers in the A+UMA model.

Amdahl OpenTune 4

4.1 A+UMA and OpenTune Product Overview

A+UMA is Amdahl's implementation of the Universal Measurement Architecture, an emerging standard which defines interfaces for the gathering, management, and reporting of performance data. A+UMA, which will form the basis of all of Amdahl's performance management tools, currently supports Solaris 2.3 and later versions of UTS.

OpenTune is a powerful X-client motif-based performance monitor which analyzes and graphically displays UMA-based performance data. OpenTune is one of the A+View System Management Software products. Amdahl OpenTune is the first performance management tool to use the emerging Universal Measurement Architecture (UMA) specification standards.

4.2 Product Positioning

OpenTune's initial implementation is based on Amdahl's implementation of the UMA specification, which is known as A+UMA (Amdahl-Universal Measurement Architecture).

This specification defines a set of APIs for performance management in multi-vendor UNIX environment.

The UMA standard is still being revised, so Amdahl are tracking revisions of the standard as they occur. UMA is in the process of becoming an X/Open standard, but it will be some time before it is finalized.

3.5 Product Licensing and Pricing Structure

There are 4 classes of SharpShooter Activity Monitor. They are not based on model but on the total amount of disk the system is configured with. Contact AIM for pricing information. The classes are defined as follows:

- Enterprise Server: Server with >25G total disk
- Super Server: Server with >10G and <25G total disk
- Standard Server: Server with <10G total disk
- Workstation: Workstation with <1G total disk

3.6 Sales Support

For US Domestics,

Sharpshooter Sales Support

AIM Technology
4699 Old Ironsides Drives, Suite 150
Santa Clara, CS 95054
TEL: (408) 748-8649 EXT 204
TEL: (800) 848-UNIX
FAX: (408) 748-0161
EMAIL: sharp@aim.com

Table 3-1 AIM International Resellers

Territory	Reseller	Contact	Phone
United Kingdom	Transformation Software	Nigel Williams	+44 844 261 456
France	Axlan S.A.	Olivier Granboulan	+33 1 34 65 94 44
Germany, Austria and Switzerland	Interchip GMBH	Peter Heggenstaller	+49 89 12 68 01-0
Netherlands	Triple-P Open Systems	Jos Epema	
Japan	Marubeni	Mike Hikita	+81 3 3507 4562

3.4.8.3 SubNet Monitor

One SPARCstation running SunOS 4.1.x, Solaris 2.2 or Solaris 2.3 with enough compute capacity per subnet, since it could consume 15-20% CPU utilization on a SPARCstation 2 class system. This was tested on a SPARCstation 10 and no noticeable performance degradation was found, monitoring one busy ethernet.

3.4.8.4 Database Hub

This could be the same machine as one of the Client Activity Monitor. This would require about 50-MByte disk space for the software distribution and 2-MByte disk space per Client Activity Monitor as well as a quarter-inch QIC-24 cartridge tape drive.

3.4.8.5 Others

Interphase network co-processor (NC 2.0) are supported with SPARCsystems running SunOS 4.1.2. Additional drivers are supplied with the software distribution.

SPARCsystems with SunOS 4.0 are no longer supported with SharpShooter version 2.2 onwards.

3.4.9 Future Product Direction

There are three main tasks for AIM to evolve its SharpShooter to be a full-fledged network and system performance management product.

- Firstly, enhance its existing product by incorporating on-line solution guide (currently, hardcopy only) and hypertext help. Adding command execution and SNMP traps for alarm triggering and so on.
- Secondly, add-in more functionality by collecting and making use of user process data.
- Lastly, making it heterogenous by porting to other OS platforms such as AIX and HP-UX.

3.4.6 Installation

AIM have recently released a GUI based network install system that is a big improvement and makes SharpShooter one of the easiest products to setup. A complete network of systems can be installed in one operation. As each system is specified, its network access permissions are checked. After all systems have been specified, the longer job of distributing copies of the software and performing the installation occurs “hands-off”, so the administrator can do something else. After installation, all parts of the system are immediately enabled, and will start to generate alarms and collect data. Network access permissions can then be removed.

3.4.7 Platform Availability

Full range of SUN SPARCstations and SPARCservers running SunOS 4.1.x, Solaris 2.2 or Solaris 2.3 are supported. Refer to SUN Platform Requirement below for details.

SPARC based Solbourne and Auspex servers are also supported.

AIM plan to make the software available on other platforms in the future.

3.4.8 Sun Platform Requirement

3.4.8.1 Management Console

A SPARCstation running SunOS 4.1.x, Solaris 2.2 or Solaris 2.3 with color monitor and OpenLook or Motif Window Manager, with at least 16-MByte (recommended 24-MByte) of RAM and at least 32-MByte (recommended 48-MByte) of swap space. It also supports remote X-terminal display units.

3.4.8.2 Activity Monitor

SPARCservers running SunOS 4.1.x, Solaris 2.2 or Solaris 2.3.

3.4.3 License Configuration

The license comes on a piece of document called a Program Authorization Certificate (PAC) with all the keys and other information on it.

A GUI based (OpenLook) license configuration program is provided to assist the user to administer the license key. Two 16-character keys are used to identify the customer and the assigned license.

The licence program allows you to monitor activity on a set of servers. Demonstration licences enable you to install the product on several systems up to the limit encoded in the temporary key. Perpetual licences are available in either node-locked or floating configurations.

This GUI tool can be called on its own or within the SharpShooter Control Panel. In fact, if you are short of the number of File Server Agents or Control Monitors, you could un-license some of the nodes so as to free-up some for the nodes that you want to monitor, as long as the limitation posed by the license key is not exceeded.

Demonstration licences can be obtained by email from sharp-license@aim.com.

3.4.4 Documentation

3.4.4.1 Solution Guide

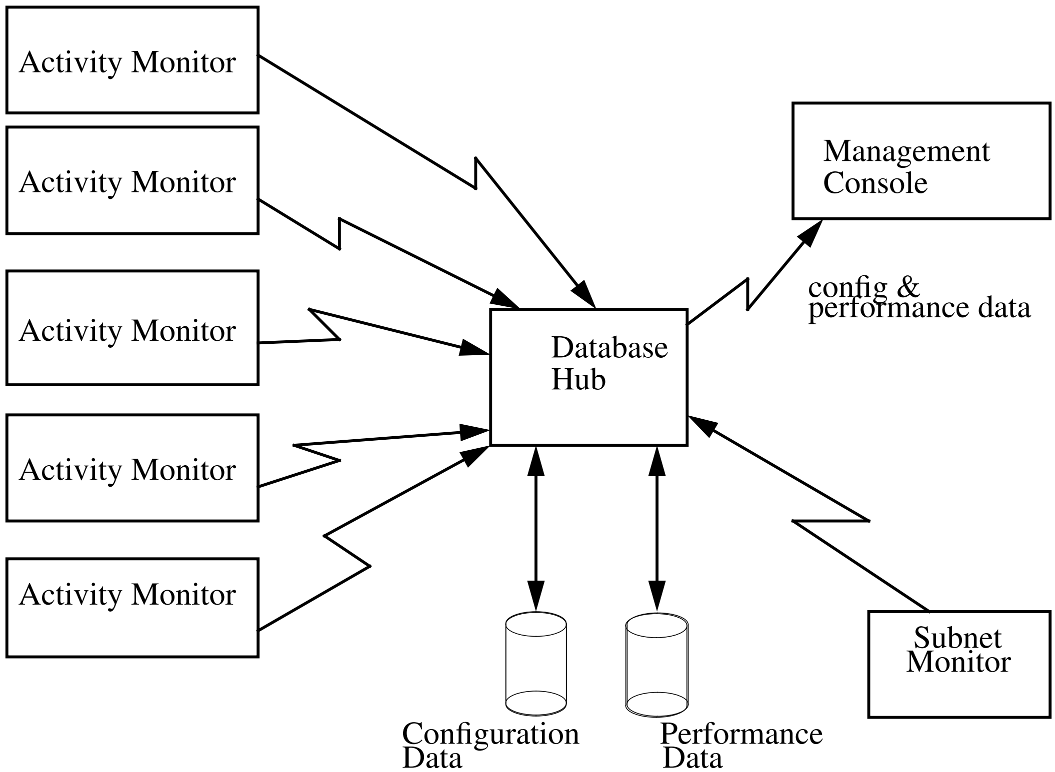
This manual attempts to provides common performance problem and suggest possible solution which would address these problems and even an explanation on why the solution was proposed.

It lists down about 20 categories which include, e.g., poor server NFS response, overloaded CPU, memory bottleneck, file system almost full etc.

3.4.5 Software Distribution

The software requires an estimated 50-MByte disk space to install. It requires an additional 50-MByte disk space to store a few weeks of performance data for a few servers.

The media is 150-MByte QIC-24 format tape cartridge.



In the case of Client-to-Server NFS Response Time, SharpShooter constructs a Data Envelopment Analysis (DEA) model for each client/server relationship. For example, in NFS Response Time by Client repeating instruments, a client/server relationship is being modeled which uses the profile to identify an efficient level of service for the client and the Predicted Average Response Time for the server. A DEA is a type of linear programming, to compare many data points, each with multiple attributes, to determine relative efficiency.

In addition, problems are recorded as events and an alarm is sent to the Control Monitor to alert the Network Administrator.

SharpShooter's Event Monitor consolidates system and network alarms in a single screen. Events may be defined to diagnose system bottlenecks, detect NFS response time problems, NFS load imbalances, storage utilization problems, and server overloads or crashes. Sharpshooter comes with pre-set "expert" alarms which diagnose many common performance problems and which may be tuned via the GUI to a site's specific requirements.

System and Network Activity Monitoring

Sharpshooter's management console provides useful information about system activity, performance and resource usage on a series of high-level monitors or detailed low-level analyzers.

A monitor is a window which contains one or more instruments representing resource utilization such as network activity, NFS activity, NFS response time, and NFS retransmissions.

Available monitors include NFS throughput monitor, Disk storage monitor, NFS response time monitor, Subnet load monitor, System activity monitor and the Network services monitor. These monitors provide information and identify problems for each server and network.

3.4 Technical Report

3.4.1 Evaluation Platform and Software Version

The evaluation copy of AIM SharpShooter is a released version, version 2.2.1 for Solaris 2.2 and 2.3.

The operating environment on which this copy of SharpShooter was evaluated are SC2000 16-way running Solaris 2.4 EA1, SS1000 8-way running Solaris 2.3, SS10 M514 running Solaris 2.4 EA1.

3.4.2 Concepts

Sharpshooter is a workgroup oriented product which can be deployed in departments which range in size from one to twenty-five servers and several hundred workstations. SharpShooters goal is to simplify performance management, by providing a simple, easy to use product which allows system managers to monitor system activity, troubleshoot performance bottlenecks, and plan for future growth.

Sharpshooter is a client/server application, which consists of four functional components. They are:

- Activity Monitors are installed on servers, and capture system performance utilization statistics, including CPU, memory, disk, storage utilization, and detailed networking activity.
- Subnet Monitors capture network utilization and NFS response time statistics, and run in the background on one client workstation per segment.
- The Database Hub consolidates performance data collected by all Activity Monitors and Subnet Monitors into a central database. In addition, this component manages the data collection, retention, and analysis facilities within SharpShooter.
- The Management Console is a GUI (OpenLook) based application which is used for performance monitoring, troubleshooting system and network bottlenecks, and long term analysis to plan for future growth.

The Management Console is the users view into SharpShooter. Its capabilities include:

<u>Event Detection, Definition, and Management</u>

3.2 Company Profile

AIM Technology provides performance management and management software and services to users and manufacturers of computer systems and networks that use industry standard operating systems and networked protocols such as UNIX, TCP/IP and Sun ONC/NFS.

AIM's products are used worldwide by virtually every computer manufacturer and by many end-users to compare and manage performance. AIM's benchmarks and system monitoring and administration packages are standard at hundreds of government agencies and Fortune 1000 companies.

AIM Sharpshooter is sold via direct sales in North America, and by technical distributors in Europe and Japan.

Founded in 1981, AIM Technology is privately held and is headquartered in Santa Clara, CA. AIM is divided into two business divisions which share technical leadership and work closely with their customers to provide state-of-the-art solutions.

The System Management Division offers end user easy-to-use, real-time software that monitors how effectively their systems and networks are performing, and helps them identify and implement problem solving strategies.

The Performance Measurement Division offers computer manufacturers and end users cost effective methods to evaluate UNIX and system performance on a wide variety of hardware.

3.3 Product Positioning

AIM Technology offers SharpShooter software to address performance management and capacity planning for your UNIX servers and networks. Performance management is the discipline of regulating computer activities to ensure predictable response times while optimizing throughput.

AIM SharpShooter is both an easy-to-implement and easy-to-use solution that provides for both centralized and departmental performance management. Data collection and analysis are fully automated to reduce the performance analyst and system manager’s learning curve. Both real time monitoring and long term analysis are included to support pro-active problem solving and capacity functions.

AIM SharpShooter 3

3.1 Sharpshooter Product Overview

SharpShooter targets performance bottlenecks in your server before they cripple your network.

Most network management systems overwhelm you with obscure statistics for analyzing a limited set of problems - usually those that are least likely to occur. And usually after your network has crashed. SharpShooter goes beyond data collection. It heads off trouble before you experience costly downtime and loss of valuable data. And it provides you with the answers you need to make your network run more efficiently.

A true expert system, SharpShooter is a full-fledged centrally-managed performance monitoring application. Its “closed-loop” system begins by letting you set your own goals for server and network performance. Built-in artificial intelligence then pinpoints and alerts you to any deviations from those goals, and provides solutions designed to help you adjust your network load before your resources are exhausted. SharpShooter gives system managers the ability to fully exploit existing resources, avoid unnecessary hardware purchases, and more accurately project future expansion.

▼ Summary

Table 2-16 Multivendor Heterogenous Environment

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Solaris 1.x managed node	Yes	Yes	Yes	Yes	Yes
Solaris 2.x managed node	Yes	Yes	Yes	Yes	Yes
Other managed node	Auspex, Solbourne	Amdahl UTS IBM AIX, HP-UX	IBM AIX HP-UX Others	IBM AIX HP-UX	IBM AIX, HP-UX
PC as managed node	No, but network monitored	No	Yes with OS/2	No	No
Solaris 1.x management console	Yes	No	No	Yes	No
Solaris 2.x management console	Yes	Yes	Yes	Yes	Yes
Other management console			Windows PC	IBM AIX HP-UX	IBM AIX, HP-UX

cases the pagedaemon scan rate (this obscure measure is the most useful substitute) is not even available for use in an alarm so it is not possible to set an effective alarm for memory shortage.

Table 2-15 Performance Metrics

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Overall CPU	Yes	Yes	Yes	Yes	Yes
Individual CPU	Yes	Yes	Future	Yes	Yes
Overall CPU counters	Yes	Yes	Yes	Yes	Yes
Individual CPU counters	No	Yes	Future	No	No
Memory can use scan rate metric	No	Yes	Yes	No	No
Overall disk	Yes	Yes	Yes	Yes	Yes
Individual disk	Yes	Yes	Yes	Yes	Yes
Per process disk I/O data	No	No	Basic	No	Extensive
File system	Yes	Yes	Future	No	Yes
File aging	Yes	No	No	No	No
Swap space	Yes	Yes	Future	Yes	Yes
Network interface	Yes	Yes	Yes	Yes	Yes
NFS service	Yes	No	No	No	No
Network loading	Yes	No	No	No	No
User process	No	No	Yes	No	Yes

2.17 *Multivendor Heterogenous Environment*

This refers to the ability of the product to run in a heterogenous multivendor environment.

- File systems data
- Swap space data
- Network interface data
- Network loading data
- User process data
- Miscellaneous kernel data

However, the usefulness of the product is not necessarily proportional to the number of performance metrics it collects. Rather, it should be based on the amount of processing of these performance metrics and the information after processing provided to the administrator.

It is very easy to confuse an administrator by providing too much information and too many unconfigured options. The primary metrics should be the main focus of attention. It is also vitally important to document the expected behavior of a raw or derived metric, and its underlying algorithm.

Summary

The kernel provides an extensive collection of information (usually reported by sar, vmstat, iostat and netstat) which all these tools read. There are a few distinct differences. AIM Sharpshooter samples the global activity on each network, not just packets addressed to the systems being monitored. BEST/1 monitors and models the resource usage of processes over time. TMON obtains detailed information about the I/O performed by each process. Most tools make the unwise assumption that the administrator has a good understanding of both computer architecture and the inner workings of the Solaris 2 kernel.

All of these tools measure some of the memory related kernel variables, and several monitor and display the amount of free memory. This provides little useful information and no useful threshold alarms can be applied. In most

Summary

Table 2-14 Data Modeling Methodology

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Data modeling	NFS	No	Yes	No	No
Methodology	DEA	NA	Queuing Networks	NA	NA
Partnership with statistical analysis software vendor	No	No	No	NA	Yes SAS/CPE
Allows "What-If" questions	No	NA	Yes	NA	NA
Allows "What-If", set change and predict performance level	No	No	Yes	No	No
Allows "What-If", set performance level, suggest change required	No	No	Future (provided now on AS/400)	No	No
Provides prediction and forecasting of performance level	No	No	Yes	No	No

2.16 *Performance Metrics*

These section lists some of the performance metrics which are collected (but they are not necessarily displayed). Sometimes they are known as performance resources, objects or parameters.

These performance metrics can be classified broadly below:-

- CPU data
- Memory data
- Disk data

- If the “saturation cutback” switch is off, then BEST/1 shows the response time of some workloads or transactions as <infinite>, i.e., extremely long and calculates the device utilizations for the offered load. Some of the utilizations will be greater than 100% and give you an idea of additional capacity needed.
- If the “saturation cutback” switch is on, then BEST/1 determines the load that can be sustained (i.e., throughput will be less than the total arrival rate or offered load) and gives the response time and utilizations for the sustainable load.

As far as I know, it is one of the very few tools in the market that allows “What-If” questions.

2.15.4 HP GlancePlus

Since HP GlancePlus is only intended to be a low-cost real-time performance monitoring tool, data modeling is not applicable.

2.15.5 Landmark TMON for UNIX

According to Landmark, TMON for UNIX is not position to provide any capacity planning. Instead, their strategy is to work with a statistical analysis software package such as SAS/CPE to process the data collected by Landmark TMON for UNIX.

- Uni and Multi processors
- Identical nodes
- Disk drives
- Logical volumes
- Local and remote file servers, with built in knowledge of NFS
- Client server workloads and transactions,
- Several different types of transactions in the same workload
- Independent and dependent (triggered) transactions
- Synchronous and asynchronous dependent transactions
- ASCII and X terminals, with built-in knowledge of X protocol
- Amount of private and shared memory required by a transaction
- The way memory is used by transactions
- CPU priority scheduling
- Multiprogramming Constraints to deal with finite number of servers
- Networks of different types and speeds

Using these, BEST/1 calculates CPU, disk, memory & network utilizations, throughput rates, queue lengths and response times, Workload and transaction response times, throughputs, and resource utilizations. BEST/1 for UNIX also calculates paging rates and computes the amount of memory required to substantially eliminate paging.

The model reflecting all the above information is built by Analyze. One can also build workload and transaction libraries with predefined definitions for re-use and sizing studies. Once the data model is built, it allows to ask "What-If" questions and BEST/1 for UNIX will perform mathematical calculations to predict the system impact.

BEST/1 for UNIX uses mathematical modeling techniques to analyze the performance. If the presented load results in one or more components becoming saturated, the following happens:

2.15 Data Modeling and Performance Forecasting

This is the ability to model the data captured and collected. It provides a baseline to perform prediction and forecasting of performance including capacity planning.

As stated earlier a measure of the usefulness of a tool to predict performance level and service level is the ability of the tool to answer “What-If” questions.

2.15.1 AIM SharpShooter

It uses a type of model which AIM terms a Data Envelopment Analysis (DEA) model. A DEA is a type of linear programming, to compare many data points, each with multiple attributes, to determine relative efficiency.

In NFS Response Time by Client instruments, a client/server relationship is being modeled using the DEA model which uses the profile to identify an efficient level of service for the client and the Predicted Average Response Time for the server.

However, you cannot use AIM SharpShooter to predict NFS response time as it does not accept your input on workload and time-frame. A study of the historical trend data would help in capacity planning.

2.15.2 Amdahl OpenTune

It does not provide any modeling on the data.

According to Amdahl, they intend to add performance forecasting capability into Amdahl’s Performance Management Product Suite. Details have not been made public yet.

2.15.3 BGS BEST/1 for UNIX

BGS BEST/1 product line started with the capacity planning software for the mainframe. This trait is evident in its BEST/1 for UNIX product. It uses queueing networks theory extensively to model every possible aspect of the system. BEST/1 for UNIX's modeling capabilities include:

- Representation of multi-vendor heterogeneous environment
- Memory in the system

2.14.5 Landmark TMON for UNIX

Collected log data can be replayed through the monitor display. This approach is useful in some cases for troubleshooting but it does not provide the type of long term trend graphs needed for management reports.

▼ Summary

None of the products reviewed provides hints or suggestions on historical data. This would be a very useful feature especially for an administrator who is managing heterogenous platforms (with different behavior) as well as a network of many systems. It would not be easy for an administrator to pick out a trend or bottleneck.

The usual triggering of alarms based on metrics exceeding thresholds does not give an overall feel of the system in a longer period of time, such as a week or so. Only the BGS BEST/1 for UNIX product provides long term analysis of the system.

Table 2-13 Analysis of Historical Data

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Keep Historical Data	Yes	Yes	Yes	No	Yes
Generate long term trend graphs	Yes	Yes	Yes	No	No
Same GUI for Viewing Historical and Current Data	No	Yes	Yes	NA	Yes
Alarm Processing on Historical Data	No	Yes	Yes	NA	NA
Provides Analysis Plan	No	No	Yes	NA	NA

2.14.1 AIM SharpShooter

A separate graphing option is used to view historical data. This differs from the normal instruments used in AIM SharpShooter to present current performance data. The graph is simple line graph and there is no option to manipulate them. Also, the thresholds set do not work for these graph. Further, there is no hint or suggestion on the trend of the selected graph. When data is reduced for display it can be shown as both average and peak values for each plotted time step

In other words, it provides the graph but it does not provide the analysis plan for you.

2.14.2 Amdahl OpenTune

The same interface used for current data is used for historical data. Also, both the current data and historical data could be zoomed in on. The threshold set will be filtered through the historical data set and any alarm conditions flagged. However, there is no hint or suggestion on the trend.

In other words, an interactive graph is provided, but you must know how to interpret the results on your own.

2.14.3 BGS BEST/1 for UNIX

BEST/1 for UNIX, by its nature, provides historical data analysis. It provides a measure of the transaction and workload and flags using alarms (called Objective Levels by BGS) potential problems with throughput or response time.

Visualizer provides Calendar charts, Trend Analysis charts, SQC (Statistical Quality Control) charts are coming soon.

However, it does not provide any hints or recommendations.

2.14.4 HP GlancePlus

HP GlancePlus does not keep historical data.

Table 2-12 Definition and Processing of Events or Alarms

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Stores alarm or event history in log	Yes	No	Yes	Yes	Yes
Alarm or event history log format	Propriet-ary	Propriet-ary	Propriet-ary	Propriet-ary	Propriet-ary
Allows acknowledgment of alarms	Yes	No	Yes	Yes	Yes
Allows deletion of acknowledged alarms	Yes	No	Yes	Yes	Yes

2.14 Analysis of Historical Data

In order for an administrator to perform trend analysis, historical data needs to be kept. The ability of the product to display data in various graphical formats makes it easy for the administrator to pick out any trend or potential bottleneck. I am also looking for the product's ability to highlight trends and potential bottlenecks for the administrator (taking the guesswork out). I call this ability an analysis plan.

Once you are using historical data, there is too much detail to deal with. A product which would filter out these data for the administrator and present the outcome (or analysis) of these trend data would be very useful.

The measures that are useful to monitor current system performance may not be as useful when it comes to long-term performance trends of the system.

Nevertheless, with proper study of the trend data as well as experience gained from study of the historical graphs, it is possible for an administrator to perform basic capacity planning.

Table 2-12 Definition and Processing of Events or Alarms

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Allows AND conditions (multiple metric conditions) to define event or alarm	Yes	No	Yes	Yes	No
Audible beep when alarm is triggered	Yes	Yes	Yes	Yes	Yes
User-defined audio message	No	No	No	No	No
Send Email when alarm triggered	Yes	No	Yes	No	Yes
Execute command when alarm triggered	No	No	Yes	No	Yes
Send SNMP trap when alarm triggered	No	Yes with Open Watch	Yes	No	No
Provide off-line hint or suggestion when alarm triggered	Yes, hardcopy only	No	No	No	No
Provide on-line hint and advice when alarm triggered	No	No	No	No	No
Provides automatic corrective action when alarm triggered	No	No	No	No	No
Provides event or alarm history	Yes	No	Yes	Yes	Yes

However, TMON does not allow you to define new alarms which use a different metric and a new threshold or to combine several metrics into one alarm.

When a alarm is triggered, there are two possible actions which Landmark call the Externalization. These are E-mail action and execute a specified command. According to Landmark, they will be incorporating SNMP traps to trigger an enterprise SNMP Network Manager such as the SunNet Manager.

They also have an alert history which basically shows all triggered alarms.

Summary

They all have different alarm mechanisms. I feel that the differentiating factor should be the usefulness of the vendor-supplied default alarms. AIM SharpShooter stands out at this as it provides the most sensible alarms, as well as a hardcopy solution guide to assist the administrator when an alarm occurs.

Table 2-12 Definition and Processing of Events or Alarms

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Provides threshold mechanism for events or alarms	Yes	Yes	Yes	Yes	Yes
Level of threshold (or levels of severity of event and alarms)	2	1	6	2	2
Supply default thresholds	Yes	No	Yes	Yes	No
Allows re-configuration of threshold	Yes	Yes	Yes	Yes	Yes
Allows user-defined alarm	Yes	No	Yes	Yes	Yes
User interface to define or modify alarm thresholds	GUI	GUI	GUI	Syntax Adviser	GUI

(yellow color code), the number which exceeds threshold (red color code) and the number which meet objectives (green color code) out of the total number of monitored resources.

There is an event or alarm history log display in the BEST/1 Monitor application, and Visualizer (running under Windows on a PC) provides an Exception Summary report.

Service level objectives for the following resources can be defined

- response time for workloads and transactions in seconds,
- utilization percentage for networks, nodes, and disks.

2.13.4 HP GlancePlus

HP GlancePlus provides an alarm advisor which provides rules for triggering alarms or alerts. A set of rules come default with the HP GlancePlus software. If you want to modify or add rules, you could do so by using the Advisor Symptom Window within HP GlancePlus to modify or add rules and then re-compile the rules. It requires a lot of expertise to create or modify a rule and not all system measurements are available as rule variables.

There are two levels of alerts, one is the Critical Alert in <Red> color and the other the Warning Alert in <Yellow> color. A Critical Alert is more severe than a Warning Alert.

The set of alarms or alerts are sometimes called “expert alarms” by HP GlancePlus which are generated based on the probability of the bottleneck variables from the Adviser Symptom Window.

There is also an alarm history window.

2.13.5 Landmark TMON for UNIX

Landmark TMON for UNIX provides a GUI interface for modifying existing alarms. Alarms are triggered based on whether the value of the metric exceeds the threshold. There are two levels of threshold, one is <Yellow> and the other <Red>. A <Red> alarm is more severe that a <Yellow> one. You could also specify the interval over which these threshold happens. Also, there are many boolean operators available such as >, <, >=, <=, ==, !=, increment by, decrement by, changed and so on.

These thresholds, once exceeded, produce an alarm condition. By default, Amdahl OpenTune is shipped with no thresholds turned on and more than 80% of the thresholds have no default conditions. This makes the administrators job even harder, since he or she would have to depend on his or her own experience and guesswork to turn the events on and also to specify a reasonable value without causing false alarms. Also there is no history of alarms nor acknowledgment of alarms triggered. Further, it only displays conditions of why the alarm occurred on the “cmdtool” window from which you invoke OpenTune. An unsuspecting administrator may not know the existence of the alarm conditions.

Amdahl OpenTune does not allow you to have user-defined alarm conditions.

Since OpenTune could allow you to view either the current data or historical data using the same GUI interface, the alarms defined are active for both modes of usage. However, for historical data, the alarms may not be relevant and they would cause a repetition of warning beeps when the historical data is being cached by the management console. This is an annoying feature.

2.13.3 BGS BEST/1 for UNIX

In BGS BEST/1 for UNIX, the definition and processing of events and alarms is available with a new product, BEST/1 Monitor. It enables the detection and delivery of real-time alerts for user-defined alarm conditions, without imposing a high overhead, to a central monitoring console. All metrics supported for alerting purposes are also supported for real-time display.

In BGS BEST/1 for UNIX, a set of service level objectives can be defined in the Predict module. There are two levels of objectives, one is guideline and the other threshold. A threshold condition is more severe than a guideline condition.

The guideline value is used for the management console to warn the administrator if a metric is exceeding the set guideline levels. The threshold value is used for the management console to warn the administrator when performance is unacceptable, exceeding the threshold value.

These values are used to compare with existing monitored values, and if exceeded, a color coded slice of the pie status would be displayed. This pie status basically indicates the number of conditions which exceed guidelines

The terms used vary from one vendor to another.

2.13.1 AIM SharpShooter

AIM SharpShooter includes an event definition screen which is GUI based and is part of the management console program. Complex multivariable conditions can be specified using the GUI and a complete set of useful default alarms are provided.

In AIM SharpShooter, there are two levels of events, one is displayed <Yellow> and the other <Red>. A <Red> event is considered Danger threshold and thus more severe than the <Yellow> event which is the Caution threshold.

When an event occurs, the main event display window will flag the particular event in its required color code. It displays important information about the descriptions of the event and the condition why it occurs. It also provides the name of the host where the event took place.

The events displayed on the management console can be acknowledged and then deleted. Also, if the configuration of that event calls for mail delivery to a particular user, this action will be taken at the same time that the event occurs. Currently, the only action that can be done is mail delivery, which is limiting. The action should include generic UNIX command so as to allow a variety of other actions to be taken. For example, UNIX scripts to page an administrator. According to AIM, in the future they will be incorporating SNMP traps and executing custom UNIX commands beside E-mail as other possible actions when an alarm is triggered.

The alarms are not active when processing graphs of historical data.

2.13.2 Amdahl OpenTune

OpenTune provides close to hundred threshold conditions. However, there is only one level of threshold. Furthermore, a threshold condition is always a metric being greater than a certain value for a certain number of seconds. There is only one metric associated with one threshold. It cannot be smaller than a value or equal to a value. You also could not specify *and* or *or* relationships between metrics since they are all single-metric thresholds.

Summary

AIM SharpShooter stands out as far as NFS performance is concerned. BGS BEST/1 for UNIX provides a higher-level understanding of performance metric such as transaction and workload response time and throughput which are not available from the other vendors. Landmark TMON obtains data that is not normally available to get extensive per-process file I/O information.

BEST/1 for UNIX is the only tool evaluated here that accepts user-defined application performance measurements. For example if you instrument your own application to measure response time and throughput in some way it is useful to pass this information to the performance tool.

Table 2-11 User Process or Application Performance

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Monitor user process	No	No	Yes	No	Yes
Collect user process data	No	No	Yes	No	Yes
Type of process data collected	NFS only	NA	Standard ps info	NA	Extended process I/O
User-defined application measurements	No	No	Yes	No	No
Monitor database process and transaction	No	No	Yes	No	No

2.13 *Definition and Processing of Events and Alarms*

There are generally one or more thresholds defined (by default or by user), to generate events or alarms which are displayed on the management console and/or processed by other means. Most of the time, there are two levels of alarms or events based on severity. One is the soft-limit and the other a hard-limit, with the hard-limit typically more severe than the soft-limit if the values are exceeded.

- incorporate transaction counts from other measurements
- define standard units of work or pseudo transactions corresponding to the use of certain amount of resources (CPU seconds or IO counts) by the processes to do work.

In the first two methods, a BEST/1 created transaction corresponds to an external transaction whose response time corresponds directly to the response times seen by the users. The last method allows you create (pseudo) transactions whose response time is related to the response time seen by the user. You can establish service goals and do predictive what-if analysis of changes in the response time for capacity planning in terms of these transactions.

BEST/1 for UNIX provides powerful primitives for workload definition. It allows you to establish client server relationship among processes running on same or different nodes and to reuse the previously existing definitions, as well as customize workload definitions using the GUI. BGS is working on the ways to further simplify the task of workload definition. These ways include smarter default workload characterization and use of additional database measurements regarding database server and client processes as well as database user, session and connection measurements. The detailed support for Oracle and Sybase is expected to become available at the end of January 1995.

2.12.4 HP GlancePlus

The version of HP GlancePlus evaluated does not monitor user processes, a later release adds this function.

2.12.5 Landmark TMON for UNIX

TMON for UNIX monitors and displays information about processes and can also summarize by user. The information available is much more extensive than is normally collected as there is a special device driver added to the kernel. Detailed file I/O data is available on a per-process basis.

AIM SharpShooter uses the Activity Monitor server to sample the network and estimates on the NFS throughput. It also uses the Proxy node to sample packets on the network and estimates the NFS response time.

According to AIM, they will be incorporating per-process performance related data in the next release of SharpShooter.

2.12.2 Amdahl OpenTune

It does not measure per-process specific resource information. This is due to the current A+UMA implementation which does not capture per-process information

However, they will be incorporating per-process performance related information in the next release of A+UMA and thus OpenTune as well.

2.12.3 BGS BEST/1 for UNIX

BGS BEST/1 for UNIX samples process information at quite a high rate. This and other proprietary techniques allow BGS to deal effectively with the processes that terminate between samples. Process information is presented in a collection of reports for each analysis interval.

BEST/1 for UNIX Analyze analyzes the process activity on the system and classifies it into workloads and transactions. A workload consists of a set of transactions done by a set of users. A transaction should be thought of as a unit of work that results in processing with resource consumption and has a response time or completion time. This processing may involve either

- complete execution of a process in its entirety (start to finish), e.g., the cd or ls command, or
- complete execution of a set of processes together (e.g., a process and all of its children such as in make), or
- some processing by a process, such as an emacs or vi process, or
- some processing done by a collection of processes, such as that done by Oracle server processes for each transaction.

This method is quite flexible and allows you to

- define a transaction to explicitly correspond to the execution of a set of processes

▼ Summary

Table 2-10 Data Export Feature

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Allows export of data as ascii	Yes	No	Yes	No	Yes
Data storage format	Informix C-ISAM	A+UMA	UDF	NA	Propriet-ary
Partnership with statistical analysis software vendor	No	No	No	NA	SAS/CPE

2.12 User Process or Application Performance

User processes in general provide the *what* part of an answer to a performance problem. What is the process that is using up all the resources? Which process is causing the bottleneck? This is where you could make out the culprit user or application, so that the applications or whatever the user is doing could be suspended.

Furthermore, an application's performance is always different for different users. It is usually difficult to define application performance. In general, throughput and response time are not available. For example, it is difficult to measure response time if the application program does not cater to it by having start of transaction and end of transaction timings built in to the application program itself.

In this section I look at the kind of information a product could provide as a result of collecting or monitoring process data. In fact, some of the products do not monitor the processes at all.

2.12.1 AIM SharpShooter

AIM SharpShooter does not measure specific user applications. However, it measures NFS performance very well, in terms of throughput and response time.

Output could be a printer or a file. This makes the data export feature very flexible. However, the export to file goes into a standard directory only. You then have to move the file to other directory.

2.11.2 Amdahl OpenTune

Amdahl OpenTune stores its data in A+UMA data storage format. It does not need to export the data out. Rather, another Management Application Program (MAP) which is UMA-compliant would be able to retrieve the data using UMA Management Layer Interface (MLI).

However, as far as I know, Amdahl OpenTune and OpenWatch are the only MAPs available in the marketplace today.

2.11.3 BGS BEST/1 for UNIX

BEST/1 for UNIX exports data so that it can be integrated into an enterprise-wide view of all the systems an administrator is interested in. BEST/1 data from IBM Mainframes, AS/400s, OS/2 systems, RS6000 Unix systems, DEC VAX VMS systems, HP systems, SunOS 4 systems and Solaris 2 systems can all be integrated together using a PC/Windows based application called Visualizer. BGS refers to this as a Performance Assurance capability for the enterprise.

BEST/1 for UNIX stores data in UDF format designed for migration to PMWG UMA. Visualizer can export data to spreadsheets (Excel, Lotus 1-2-3) and graphs in windows metafile format (.wmf extension). The underlying Visualizer data is contained in Paradox database format.

2.11.4 HP GlancePlus

Since HP GlancePlus does not log the data, it has no data export features.

2.11.5 Landmark TMON for UNIX

The data is stored in a proprietary binary format that can be exported as an ascii table. The start and end time can be specified. Each data category is chosen individually to be exported. Landmark recommend SAS/CPE for further analysis.

These are all in graphical format and can be further drilled-down. TMON for UNIX provides a very good overview of the current performance of a system including several useful measures that are not collected by the other tools.

Summary

In general, all the products evaluated here provide an average or better overview of a system current performance level.

Table 2-9 Overview of Current System Performance

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Number of metric or parameters that can be displayed at the same time	Many	4	Many	Many	Many
Automatic refreshing of data on screen	Yes	Yes	Yes	Yes	Yes
Ability of providing an overview	Good	Average	Not Evaluated	Good	Very Good

2.11 Data Export Feature

This is the ability to export the performance data captured to other formats for spreadsheet or statistical analysis software.

2.11.1 AIM SharpShooter

It provides a GUI window for exporting the data to a couple of formats which could be used to import into other programs for processing and statistical analysis.

It allows either Lotus 1-2-3 or Microsoft Excel type time-stamps as well as standard time-stamps. Also, field delimiter, column headings types and column width could be specified. The data type and range could be selected.

2.10.3 BGS BEST/1 for UNIX

BGS BEST/1 for UNIX, provides a real-time current system performance overview with a new product, BEST/1 Monitor, which was not available at the time of this study.

BEST/1 for UNIX provides an Analyze function for a current system overview based on *near-time processing* of collected interval data. A tabular report can be generated for each functional area of interest.

Current system performance can be further analyzed using the Predict component. Visualizer allows to compare it with past system performance. Monitor overviews performance in real time.

2.10.4 HP GlancePlus

HP GlancePlus only monitors one system at a time. It provides an overview of CPU Usage (%), Memory Usage (%), Disk Usage (Pages/Sec), and Network (Packets/Sec).

These could be in Resource History, Vertical Bars, Horizontal Bars and Pie Charts graphs. Each of these areas could be furthered broken into details. Some of these details are in graphs and others are in tabular reports. Both of these get refreshed automatically at regular sampling interval (default is 15 seconds).

In fact, even if HP GlancePlus is minimized as an icon. The icon provides an icon-used overview of CPU, Memory, Disk and Network in four small Vertical Bars, and these are updated every sampling interval. This is a very useful feature of HP GlancePlus.

Using HP GlancePlus is like running vmstat, iostat and netstat in a graphical format.

2.10.5 Landmark TMON for UNIX

By default, Landmark TMON for UNIX provides what it calls System Overview, and I/O Overview. The System Overview provides CPU Activity (%), and System Activity (includes interrupt rate, syscall rate, switch rate, pagein rate and pageout rate). The I/O Overview provides Filesystem Activity (which includes reads, writes and throughput) and Network Traffic Statistics (which includes tcpin, tcpout, udpin, udpout, icmpin, and icmpout).

2.10.1 AIM SharpShooter

AIM SharpShooter provides an integrated network wide alarm history as the initial screen. You select a metric or a server to view the current performance. AIM SharpShooter provides a Server Monitor screen which contains eight instruments, with each instrument providing a graph of the current level of performance of the following metric:

CPU Usage (%), Memory Usage (MByte), Disk Busy (%), Disk Storage (MByte), Network Services (Packets/Sec), NFS Throughput (Operations/Sec), NFS Response Time (msec) and NFS Retransmissions (%).

Each of these could be zoomed in on for more details. This overview allows you to correlate what is happening on the server easily.

Note that the NFS Response Time and NFS Retransmissions are collected by a Proxy Node which is not the Activity Monitor Node. Therefore, you do not get any data on these two instruments if you do not configure a Proxy Node in the network. According to AIM, they felt that having those two metrics on the overview provides a more comprehensive picture of the server. I agree with them.

2.10.2 Amdahl OpenTune and OpenWatch

Amdahl OpenTune monitors one system at a time, and it provides the administrator with two windows for that system. You can view the current performance level of two metrics, plus the disk I/O overview, of the monitored node at the same time. By default, only the overall CPU usage of the monitored node is displayed in one window, and the other is empty.

This limits Amdahl OpenTune's ability to provide an overview of the system. However, it does provide a wide variety of graphing options to these two windows, if desired.

However, according to Amdahl, OpenTune is positioned to allow an administrator to zoom in on a few metric in the historical data storage. The other new product from Amdahl, called OpenWatch, is designed to provide a more complete networked system overview. It is possible to start up OpenTune to monitor a particular system identified by OpenWatch.

2.9.5 Landmark TMON for UNIX

TMON for UNIX collects data from each system in a log. The log file can be sent to any system and one system can collect multiple logs. The logs can be replayed through the display with user specified start, end and replay rate.

Summary

All except HP GlancePlus collect data for historical data trend analysis. Only Amdahl A+UMA stores the data in an emerging open standard data storage format that could be read by other vendors.

Table 2-8 Data Capture, Collection or Logging

	AIM Sharp-Shooter	**Amdahl Open-Tune**	**BGS BEST/1 for UNIX**	**HP Glance-Plus**	**Landmark TMON for UNIX**
Data Collection	Yes	Yes	Yes	No	Yes
Data on Local Disk Storage	Yes	Yes	Yes	NA	Yes
Data on NFS-mounted Disk Storage	Yes	Yes	Yes	NA	Yes
Data Storage Format	Informix C-ISAM	A+UMA	UDF	NA	Binary log

2.10 Overview of Current System Performance

If a particular system is of interest, the overview that the product provides to the administrator is important. An overview of a systems current performance is defined as the first performance data screen that you would see when you select a particular host or server. I find this feature important as having data on one metric may not be a meaningful event, but if associated with other activities for a sustained period may be a cause for concern. An overview of a system tells you more than a particular metric of a system. For example, a high CPU utilization does not necessarily indicate a problem exists. But if, at the same time, disk utilization and response times are very high, then it could potentially indicate an overloaded system condition.

This time scale of these Instruments can be specified by the administrator for viewing and analysis later. AIM SharpShooter uses the data to construct a model to predict the performance envelope of an NFS server.

By default old data is purged after a few weeks to prevent disk usage from becoming excessive. The purge delay is configurable for different types of data.

2.9.2 Amdahl OpenTune

Amdahl uses A+UMA Data Storage format to store all the data collected by all the nodes on the network. The data storage could be defined as local or NFS mounted disk space. A+UMA Data Storage format allows other Management Application Programs (MAP) other than Amdahl OpenTune to query them in a known standard way. The current A+UMA store does not contain process related information.

The default setup is awkward to configure in a networked systems environment, since you have to have to configure each host manually. This is not an issue if you only have a few large servers.

2.9.3 BGS BEST/1 for UNIX

BEST/1 for UNIX collects process based data as well as system utilization data. The data is stored on a central system for analysis later. Data are stored in BGS UDF (Unix Data Format) format architected for migration to X/Open UMA. BEST/1 Manager implements policies for retaining and archiving the data.

2.9.4 HP GlancePlus

Since HP GlancePlus only provides near real-time monitoring of a single node, it is not intended to provide data collection as a feature and therefore does not provide data logging at all.

There is another product from HP called HP Performance Collection Software that runs on Solaris which is positioned to perform this.

Table 2-7 Performance Management Life Cycle

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
What-If Question, Set Change and Predict Performance Level	No	No	Yes	No	No
What-If Question, Set Performance Level, Predict or Suggest Change Required	No	No	Future (present in BEST/1 for AS/400)	No	No
Management Reports	No	No	Yes	No	No
Long-term Exception Analysis	No	No	Yes	No	No

2.9 Data Capture, Collection or Logging

This is the ability of the software to log the performance data being captured (or collected) over time. The collected data usually provides the historical data used for long-term trend reporting and analysis.

2.9.1 AIM SharpShooter

AIM SharpShooter provides a flexible method of storing the data. To increase the performance of collecting data, the data could be cached on the local disk storage. For ease of administration, the data could be stored on NFS mounted disk storage. The data is subsequently consolidated onto the AIM SharpShooter Data Server Hub using RPC calls.

AIM SharpShooter node collects performance data every 2 minutes and stores it on the Data Service Node on the network. It also provides up-to-date information every 2 minutes on the management console. The management console polls the Data Service Node for the data and displays it in many *Instruments*, which are graphical displays in a window.

▼ Management Life Cycle Summary

All of the products evaluated here provide monitoring capability.

Only BGS BEST/1 for UNIX provides performance forecasting by using the "Set Change and Predict Performance Level" What-If questions.

None of the products as tested can take automatic direct corrective action. Most can send email or run a fixed Unix command on the machine used as the display. For example it would be useful to parameterize a command and run it on a system that was short of swap space to add more swap automatically. BGS have recently added the ability to run a command on the monitored node to the BEST/1 Monitor product.

Table 2-7 Performance Management Life Cycle

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Collect data	Yes	Yes	Yes	No	Yes
Monitor real-time snapshot	Yes	Yes	Yes	Yes	Yes
Plot historical trend directly	Yes	Yes	Yes	No	No
Threshold for real-time snapshot	Yes	Yes	Yes	Yes	Yes
Threshold for historical data	No	Yes	Yes	No	Yes
Analysis plan for historical trend	No	No	Yes	No	No
Set objectives and implement change	No	No	Yes	No	No
Automatic corrective action	No	No	Yes (Monitor)	No	No
Forecast or Project	No	No	Yes	No	No
Modeling techniques	Linear Programming (NFS)	No	Network Queueing Model	No	No

continuously collect data, analyze it, manage it and generate appropriate utilization, response time and exception reports/graphs for the analyst as well as management. BGS has recently added capabilities for real time performance monitoring including alerting and displaying of performance data of many nodes from a central console as well as detailed measurement analysis, alerting, reporting, and prediction capabilities for RDBMS such as Oracle and Sybase.

2.8.4 HP GlancePlus

HP GlancePlus is the simplest entry level product in the family of performance management products that HP provides. HP GlancePlus provides monitoring of the current performance of a system at any given time. It does not collect the data monitored and therefore could not be used to provide trend analysis for historical data. Also, it does not provide projection or prediction of performance. HP Performance Collection Software has recently become available for Sun systems but was not evaluated.

To aid the administrator in identifying current bottlenecks, HP GlancePlus provides a historical display of alarms, which the administrator could modify to suit his or her environment. The rule-based alarms follow a special syntax required by the HP GlancePlus syntax advisor.

2.8.5 Landmark TMON for UNIX

Landmark has been shipping Probe/Net and ProbeX products for some time, which provide network performance monitoring on various platforms. Landmark TMON for UNIX (The MONitor for UNIX) is a consolidation of these products.

TMON for UNIX, in its beta form as tested, provided graphical snapshots of near real-time performance data. It did not log the data captured nor provide historical data summaries. It also does not provide performance forecasting. Production versions do log the data and provide the ability to replay logged data through the system. The user can control start and stop times, and replay data faster than it was collected. To summarize data for a report it can be exported in spreadsheet form.

It uses alarms to assist the administrator to identify potential performance bottlenecks. A fixed Unix command can be specified to run when an alarm triggers.

2.8.3 BGS BEST/1 for UNIX

BGS has various BEST/1 products available on mainframes and minicomputers which are used for capacity planning. BGS BEST/1 for UNIX also provides a capacity planning function. The product set tested did not include subsequent additions which provide real-time alerts and monitoring, Oracle and Sybase RDBMS support, and 7x24 distributed system management support.

The BEST/1 for UNIX product family contains many new functions not found in BGS's traditional product set. In addition to traditional capacity planning capabilities, BGS's Unix product line provides support for Performance Management Life Cycle. BGS has termed this support *Performance Assurance*.

BEST/1 Collect measures and logs performance data for systems and processes. Based on the data collected and the workloads as defined by the administrator, BGS BEST/1 for Unix provides an Analyze module to fit this information to a queueing network model of the distributed UNIX client server environments. Predict uses this model to perform forecast and projection of the system performance.

An administrator could use the Analyze module to monitor current performance, if needed, but they are presented in tabular report format.

Alarms or what BGS called Objectives could be specified by the Predict module. But the concepts of Objectives in BEST/1 for UNIX may not correspond to one single metric exceeding a threshold but rather a definition of a more higher level terms such as user classes, transaction classes, transaction, and workload etc. exceeding the set threshold. These terms arise from the need to model the various activities that are going on in the systems. This modeling capability, coupled with network queuing model, provides BEST/1 for UNIX the ability to predict performance and service level in terms of transaction throughput and response time, given a change in the system environment, such as a CPU upgrade.

In fact, BGS BEST/1 for UNIX also allows you to ask "What-If" questions such as, "What-if I upgrade the CPU", or "What-if I increase the amount of memory", or others. It is able to predict the performance level in terms of response time and throughput and other impact to the system.

BEST/1-Visualizer for UNIX provides a historical performance database, and interactive structural performance analysis capabilities using several custom designed graphs. BEST/1-Manager provides the method to automatically and

based on a set threshold level. However, it does not provide any hint or advice on what actions need to be taken to address the problem once an alarm is triggered.

Depending on the triggered alarms, an expert may be able to isolate the bottleneck of the performance problem.

OpenTune does not provide forecasting or projection of performance and therefore the administrator would have to study the historical data and try to make out some of it based on the trend observed.

2.8.2 AIM SharpShooter

AIM SharpShooter started its life as a network performance monitoring tool. It can collect detailed network data. AIM SharpShooter has a module which also collects system performance data and they provide an user interface which allows monitoring of all these network and system resources using the same GUI.

The user interface provides a alarm history which provides a quick summary of events that have happened. There are a set of events that are pre-defined by AIM but you could modify them or add new ones to suit your own environment.

A hardcopy SharpShooter Solutions Guide provided by AIM lists the conditions of all the events that are pre-defined, with descriptions and suggested solutions if any of these events are triggered. Explanation of why the solution is suggested is also given. In some of the events, the related Screens or Graphs or Reports which AIM feels is relevant to that event are listed to help the administrator identify and pinpoint the bottleneck.

AIM SharpShooter provides current performance data in screens which they call Instruments. It provides a default of 2 hours of data on these Instruments. For historical data, a separate graph of a specified period of interest is available.

AIM SharpShooter does not provide any forecast or prediction of performance. As in the case of Amdahl OpenTune, the administrator would have to use their own judgement based on a study of the historical trend.

Table 2-6 On-Line Help

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Search function	Yes	Yes	Yes	Yes	Yes
Help history	No	Yes	Yes	Yes	Yes
Allows bit-mapped images in help screen	No	No	Yes	Yes	Yes

2.8 Performance Management Life Cycle

As stated earlier, a life cycle of performance management is broadly classified as the following:-

1. Collect, Monitor and Understand
2. Analyze, Identify and Isolate
3. Set Objective and Implement
4. Forecast or Project

Here, we will look at how each product helps in the various steps.

2.8.1 Amdahl OpenTune

Amdahl OpenTune is an user interface application program as defined by A+UMA, an implementation of a draft version of the Universal Measurement Architecture X/Open standard. (A detailed treatment of A+UMA and UMA will be covered in Amdahl OpenTune chapter). Basically, the collection of raw data is done by A+UMA and the viewing and monitoring of these collected data is achieved through Amdahl OpenTune which formats the raw data into various graphical forms.

OpenTune provides the ability to provide near real-time (or current) performance of the monitored node. It also has the ability to allow the administrator to view historical data using the same user interface. To assist the administrator in identifying problem areas, alarms can be defined to trigger

Summary

In general, all the products evaluated here provide adequate GUI interfaces. In particular, Landmark TMON for UNIX provides the prettiest interface.

Table 2-5 GUI Interface

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
OpenLook, Motif or COSE CDE	OpenLook	Motif	Motif	Motif	Motif
Allow change of default color	No	No	No	No	No
Iconized display active	No	No	No	Yes	No
Drag and drop	No	No	Yes	No	Yes
Central control of all displayed windows	No	No	No	No	Yes
Use of icons on windows	No	No	Yes (Monitor)	Minimal	Very Pretty
Ease of use of GUI	Very Good	Good	Good	Very Good	Very Good

2.7 On-Line Help

I include it here for completeness sake. Please refer to the respective Vendor section for details.

Table 2-6 On-Line Help

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
On-line help	Yes	Yes	Yes	Yes	Yes
Hypertext	No	Yes	Yes	Yes	Yes

The next level are graphic and tabular reports including breakdowns of response times. Visualizer provides a variety of structured purpose built graphs such as File Server map, node map, I/O diagrams, Calendar graphs, Top 10 graphs etc.

2.6.4 HP GlancePlus

The management console display uses Motif GUI interface. Remote display using X11 protocol is supported.

The layout of the GUI is neat and functional. The main window is the centre of activity and launches other detailed graphs and reports. Also, you could see the alarm history by clicking on the ALARM button.

As mentioned earlier, the iconized version of HP GlancePlus is still active and is able to provide a icon view of the system performance (in bar chart).

2.6.5 Landmark TMON for UNIX

The management console uses Motif GUI interface. Remote display using X11 protocol is supported.

Landmark TMON for UNIX provides four windows at start-up. One is the main window for TMON for UNIX. The other is the Launch Manager. The last two are the I/O Overview and System Overview. There are many well-designed and colorful icons used on every windows. For example, an icon of a traffic STOP light stops the window, a ORANGE light suspends the window, a GREEN light resumes the window, and an icon showing a power drill is used to drill-down to further details. Also, these operation on each window could be centrally monitored and controlled from the Launch Manager. You can close or open any window from the Launch Manager which are represented by an window icon with open shuttle and an window icon with closed shuttle. The main windows contain other utilities as well as the alerts history.

Drag-and-drop ability is also available in launching additional reports, graphs, and gauges for the particular host.

type of GUI when monitoring current performance from when you are viewing historical data. You can have as many windows as the management console could support.

Further, the graphs for the historical data are only a display and you cannot manipulate the graphs at all. In other words, if you need to zoom in on a finer time-frame, you need to re-submit with a new time-scale for a new graph to be drawn. Also, the alarms could not be used in the historical data display.

2.6.2 Amdahl OpenTune

The management console uses Motif GUI interface. Remote display using X11 protocol is supported.

The main screen occupies the entire monitor screen by default. In the upper middle part of the main screen is the time scale with four status displayed in different colors. The status are unread, cached, read and alarm. Displaying cached data is fast enough, but uncached data takes rather a long time to load.

Inside the main screen are two windows which, at any one time, allows one system metric to be displayed in each window. At the same time, an independent window for the disk I/O activities could be displayed. The maximum number of system metric that could be displayed is 2 + those of disk I/O. A very wide selection of graphical display options is available.

Whether you are viewing current or historical data, you would use the same user interface. Also, all the alarms which were set will also be armed on every interval that you choose. In other words, the alarms worked on current or historical data.

2.6.3 BGS BEST/1 for UNIX

The management console display uses Motif GUI interface. Remote display using X11 protocol is supported.

The GUI leads you through the sequence of operations required to collect data, analyze it and base predictions on it. The default display shows small pie charts that indicate the levels of various metrics and indicate which metrics are exceeding their targets.

▼ Summary

Table 2-4 Central Control of Software

Detailed Features	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Auto-starting of watchdog process using rc files	Yes	No	Yes	No	Yes
Allows central starting and stopping of all daemons on all or each of the nodes	Yes	No	Yes	No	Yes
Interface to perform central control	GUI	NA	GUI	NA	NA
Allows status update of daemon running on nodes	Yes	NA	Yes	NA	Yes
User-defined startup schedule database	Yes	Yes	Yes	NA	NA
Allows 24-hours continuous run	Yes	Yes	Yes	NA	Yes

2.6 GUI Interface

2.6.1 AIM SharpShooter

The management console (called by AIM the control panel) uses an OpenLook style GUI interface. Remote display using X11 protocol is also supported.

The layout of the GUI is neat and functional. The main window is the centre of all activities which also contain the alarm history on screen. All monitored resources are displayed using the same style instrument except the graphing option for historical data older than the default 2 hours. You get a different

2.5.2 Amdahl OpenTune

There is no central control of software on all the nodes. Each node needs to be started-up manually or based on the schedule database which is user-definable.

2.5.3 BGS BEST/1 for UNIX

All nodes in a user-defined domain can be started or stopped simultaneously in the Collect module in a GUI interface. You can also monitor the status of the collector daemon from the same window. The capability for running 24 hours, 7-day a week, non-stop is provided with new products, BEST/1 Manager and BEST/1 Monitor, which were not available at the time of this study. They also provide the ability to tailor start-up scheduling. The collected data can be managed centrally and processed automatically through Manager.

2.5.4 HP GlancePlus

There is no central control.

2.5.5 Landmark TMON for UNIX

Using groups of hosts a predefined configuration of logs and alarm monitors can be launched on several systems at once.

Summary

Of the systems evaluated several have been extended since they were tested. AIM SharpShooter has a very good set of features for monitoring a network of systems and the network itself.

Table 2-3 Central Monitoring of Distributed Systems

	AIM Sharp-Shooter	**Amdahl Open-Watch**	**BGS BEST/1 Monitor**	**HP Glance-Plus**	**Landmark TMON for UNIX**
Central Monitoring of Distributed Systems	Yes	Not as Tested	Yes	Via Remote X Display only	Yes
Monitor Single System, if needed	Yes	Yes	Yes	Yes	Yes
Ability of Central Monitoring of Distributed Systems	Very Good	Not Tested	Not Tested	Poor	Not Tested

2.5 *Central Control of Software*

This refers to the ability to start, stop or obtain status of the various performance management processes or daemons that are needed on each monitored node in the network. This is especially useful for an administrator with a network of systems to perform data collection, monitoring and so on. It would be a tedious task to start each node manually, one at a time. This is an important feature for administrating a workgroup of distributed and networked nodes.

2.5.1 *AIM SharpShooter*

AIM Sharpshooter incorporates a GUI interface to control the managed nodes from the management console (or control panel). By default data collection is automatically disabled during the night and weekends. The GUI allows the days and times to be modified on a per system, per metric basis.

2.4.4 HP GlancePlus

HP GlancePlus is a performance monitoring tool which provides a snapshot of the monitored node that is running the HP GlancePlus program at that time. Therefore, it does not provide a single view of all the shared resources on the nodes on the network, but rather, a single view of the particular node of interest.

On the other hand, since the displays of HP GlancePlus running on different nodes could be exported to a single management console via X11 protocols, you could see the real-time performance of a number of nodes on a single console by exporting the displays on the console. This method will incur more network overhead.

2.4.5 Landmark TMON for UNIX

TMON for Unix allows host groups to be defined. Alarms and reports can be installed and monitored on a per group basis. This functionality was not present in the evaluated beta release.

2.4.1 AIM SharpShooter

Since AIM SharpShooter started out as a network performance monitoring tool, it inherently provides the ability to monitor all the shared resources on all the monitored nodes on the network. It also provides drill-down capability to monitor the shared resources in more details.

For example, you could view the NFS response time of all the servers on the network at the same time. And if a particular server is of interest, you could drill-down to view each of the client-to-server pair response time for those NFS clients which this particular server is serving.

Also, if a particular node is of interest, an overview of that particular node in terms of CPU, memory, disk, NFS and network could be monitored. At the same time, you could monitor two or more nodes overview at the same time.

2.4.2 Amdahl OpenTune and OpenWatch

Amdahl OpenTune uses A+UMA architecture and thus is able to capture and collect performance data on multiple nodes. However, it provides monitoring of a single node only at any one time.

However there is a new product called Amdahl OpenWatch which provides the ability to monitor and set thresholds on multiple nodes in a single management console. It was not available at the time of this study.

2.4.3 BGS BEST/1 for UNIX

BGS BEST/1 for UNIX provides a concept called ‘domain’ which is a logical grouping of nodes. It allows monitoring of resources on a domain at the same time using the Analyze and/or Predict modules of BGS BEST/1 for UNIX.

In fact, BGS BEST/1 for UNIX associates users and transactions (a transaction is a group of user processes) on these nodes in a domain to form workloads which are client-server based.

BGS BEST/1 for UNIX has a new product, BEST/1 Monitor, that provides real-time monitoring and alerts for multiple nodes. BEST/1 does analytical modeling of data link and physical layers of such network types as ethernet, token ring and FDDI.

Summary

All except HP GlancePlus are built with client-server architecture in mind. To monitor more than a few servers in a coordinated manner a client-server system is recommended. For a single server the extra cost and complexity may not be worthwhile.

Table 2-2 Client-Server Architecture

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Client-Server	Yes	Yes	Yes	No	Yes

2.4 Central Monitoring of Distributed Systems

This feature is not as critical in a single host environment as it is in a distributed systems environment. It provides the administrator the ability to monitor shared resources on the networked nodes in a single view at the same time.

Some of the performance management software products use this ability to provide useful information such as NFS response time, transaction and workload response time and throughput which are either inherently client-server or could be distributed onto different systems on the network.

Monitoring means the ability to view the raw data collected (or captured or logged), in near real-time snapshots. The views could be in graphical or in tabular-report format.

Today, it would be common to find an environment where not only there are multiple networks linking the various systems, but also multivendor heterogenous systems running different operating system environments.

In this discussion here, it is limited to central monitoring of homogenous system environment. I will discuss the heterogenous environment at a later stage.

2.3.1 AIM SharpShooter

AIM SharpShooter is inherently client-server. Different systems on the network can perform one or more SharpShooter functions. These functions include wire load monitoring using AIM SharpShooter Proxy, system monitoring using AIM SharpShooter Activity Monitor, performance data storage using AIM SharpShooter Data Service Hub, and console program using AIM SharpShooter Management Console. Up to three simultaneous Management Consoles can be active on separate systems. They all share a single Data Service Hub and maintain a consistent view of the data.

2.3.2 Amdahl OpenTune and OpenWatch

Based on A+UMA model, it is inherently client-server. A node running OpenTune need not be the same node that is collecting performance data. The Amdahl OpenWatch product performs high level monitoring of multiple systems on a network.

2.3.3 BGS BEST/1 for UNIX

BGS BEST/1 for UNIX is also built around the client-server architecture. The collector nodes can be different from the monitoring node. BEST/1 supports client-server multi-node analysis.

2.3.4 HP GlancePlus

HP GlancePlus only monitors the node that is currently running the HP GlancePlus program. The HP GlancePlus program is a monolithic program and therefore, it is not client-server. Data collection only takes place while GlancePlus is running so you have to remember to start up a copy to display on your workstation each time you login. HP have other products that perform long term data collection, but they were not evaluated in this study.

2.3.5 Landmark TMON for UNIX

Landmark TMON for UNIX is designed with client-server architecture in mind. You could run the management console to query the collected data from several different systems.

Summary

AIM Sharpshooter uses the GUI effectively to combine easy install with a lot of flexibility in its network wide installation process.

Table 2-1 Ease of Install, Startup and Add-On

	AIM Sharp-Shooter	Amdahl Open-Tune	BGS BEST/1 for UNIX	HP Glance-Plus	Landmark TMON for UNIX
Installation script	Yes	No	Yes	Yes	Yes
Menu-based installation script	Yes	No	No	No	Yes
GUI-based installation script	Yes	No	No	No	No
Local or NFS mounted code	Flexible install via GUI	Local	Either	Either	Either
Software media	Tape	CD	Tape	Tape	Tape
Media format	tar	package	tar	tar	tar
Ease of installation	Very Good	Good	Good	Very Good	Good
Automatically starts up collection	Yes	No	No	No	Yes
Ease of adding more nodes	Very Good	Average	Average	Average	Average

2.3 *Client-Server Architecture*

This basically refers to the ability of the product to separate the various performance management functions onto different systems, such as running the collector program on some systems and the monitor program on a different system.

Using X11 protocol to export windows is not considered as Client-Server architecture here since the bulk of a complex performance tool’s code should not be run on the system being monitored and slow it down. All these tools can use X11 for remote display from an installed node to any X11 based system that happens to be convenient.

2.2.2 Amdahl OpenTune

Amdahl OpenTune uses the Solaris package format for installation. Installation on a single node is straight forward using pkgadd, which runs a postinstall script to configure the system.

It is difficult to add on more nodes if they are to share the Amdahl OpenTune software binary via NFS-mounted disk space. Instead, Amdahl recommends that every node installs their own copy of OpenTune software and they do not share via NFS-mounted disk space. This makes installation of multiple nodes in a networked system environment somewhat time-consuming but does avoid NFS traffic.

2.2.3 BGS BEST/1 for UNIX

The evaluation copy was not tested on Solaris. No particular problems were noted with the existing install.

BGS indicate that the Solaris installation is not different from the one tested. The multi-platform version detects system architecture for installation.

2.2.4 HP GlancePlus

HP GlancePlus automatically detects the architecture of the system (such as sun4m, sun4c and sun4d and etc.) and installs the software binary for that system architecture. After installation, a license key must be entered in a specific file. It must be installed separately on every system to be monitored.

Since HP GlancePlus is a monolithic program that monitors a single system, it starts up easily and immediately provides useful information. HP GlancePlus is relatively simple and represents the low cost and functionality end of the performance tools market. This makes it very easy to install and use to monitor a single system.

2.2.5 Landmark TMON for UNIX

Landmark TMON for UNIX installs easily. The software is loaded into an installation directory that is NFS exported and then a menu based script is run on each system to configure it. TMON automatically detects the system architecture and starts up the appropriate binary for monitoring.

- Overview of Current System Performance
- User Process and Applications Performance
- Definition and Processing of Events and Alarms
- Analysis of Historical Data
- Data Modeling and Performance Forecasting
- Performance Metrics
- Data Export Feature
- Multivendor Heterogenous Environment

2.2 Ease of Install, Start-up, and Add-On

Ease of Install, Start-up and Add-on refers to the degree of effort to install the product, the amount of time needed to get the software up and running, and to perform real work. An easy setup allows the administrator to obtain preliminary data quickly. The amount of effort that it takes to monitor additional nodes is also important (it is common for a pilot network to be setup initially for familiarization, after which more nodes in the network would be added).

2.2.1 AIM SharpShooter

First, you are required to tar in the installation directory. AIM have made the installation and add-on process a central one as well as providing a GUI interface to perform these in the latest release of SharpShooter. Although it was not tested in the initial study the new installation process is now quick and easy over multiple machines. The installation can be exported via NFS or the required subset can be automatically copied to a local directory on the other system. This provides some degree of resilience in the event of temporary network or system failure and reduces network load. If the GUI install program is always started up in the same directory it can be used to modify and extend the existing network wide installation.

Once the licence keys have been entered using the GUI Sharpshooter immediately starts to collect data and generate warning events using default rules.

Product Comparison 2

2.1 Features

All of the vendors' performance management software products come with many features. The discussion of each feature of each vendors' product is not the objective of this paper. Rather, I attempt to compare only the features which provide an administrator an effective and efficient way to take on the challenging task of managing performance, based on the life cycle of performance management.

As most of the terminology used by the various vendors differ from each other. It is difficult to provide a comparison among them. Therefore, I took the liberty of making them compatible and consistent and thus hope to make reading of this report easier.

The features compared are listed below.

- Ease of Install, Start-up and Add-on
- Client-Server Architecture
- Central Monitoring of Distributed Systems
- Central Control of Software
- GUI Interface
- On-Line Help
- Performance Management Life Cycle
- Data Capture, Collection or Logging

1.8 Other Products Reviewed

The products listed below have been reviewed based on the technical datasheet provided. They have not been evaluated using the evaluation criteria stated earlier but are included here for easy reference.

Special thanks go to Jeremy Tracey for the SunNet Manager section, Peter Manson for the DDS/Patrol, EcoTOOLS, and Athene/UNIX sections, and Mike McMullen for the TRAKKER, OpenVision and SAS CPE sections.

- BMC DDS/Patrol
- Compuware EcoTOOLS
- Concord Communications TRAKKER
- Metron Athene/UNIX
- OpenVision Product Suite
  - OpenV*Perform
  - OpenV*Event Manager
  - OpenV*Trend
- SAS CPE
- SunConnect SunNet Manager
- TeamQuest Baseline
- Unidirect SPT

Another important aspect of Forecast or Project is the ability of the product to allow an administrator to ask "What If" questions. The administrator can then determine the performance impact before making a change. There are two basic categories of these questions:

1. Set Change, Predict Performance Level

   You ask questions like, "what if I upgrade the CPU?", "what if I increase the number of users?", "what if I add more memory?", etc., and let the product predicts for you the expected performance level. The performance level could be expressed in terms of throughput or response time.

   Therefore, it allows you to determine if you should perform the actions, by predicting the impact on the system first.

   If you have already decided on a performance target, and you are trying to find out what kind of changes will bring about a result, that is within your requirement. You will have to use trial-and-error methods, and use many "What-If" questions, until you find the predicted performance level that you want. It is a tedious task.

2. Set Performance Level, Suggest Change Required

   Here, you first determine the performance level that you want to achieve, such as a certain throughput or response time of an application, then you ask questions like, "what if I want application A response time to drop from current 8 seconds to 5 seconds?", "what if I do not mind the time it takes to print report B to increase from current 8 minutes to 10 minutes?", and so on. Then let the product predict the performance impact, and suggest to you what kind of changes, you need to make in order to achieve them.

   This is a more intuitive approach, as most of us are more used to setting an objective, and carrying out an action plan to achieve that objective.

   Also, it does not require trial-and-error and thus quicker to use than the earlier types of "What-If" question. There may be several possible actions to reach a given objective, so heuristics and cost metrics need to be applied to prioritize them.

In fact, with a combination of both types of "What-If" questions, the administrator would have a very powerful tool to investigate and determine all dimensions of performance level and computing resources before actually making any change to the system.

1.7.2.3 *Analyze, Identify and Isolate*

The most common techniques used for real-time snapshot data are alarms or events generated based on set threshold. Therefore, the usefulness of these alarms (supplied by the vendors) in a real-life environment would be one of the differentiating factors for the vendor.

However, for trend analysis based on historical data, there is currently no particular technique used by these vendors to assist the administrator to identify or isolate potential and growing problems. Having the same set of thresholds operate on the historical data could trigger off many alarms in a marginal system, but may not provide much useful information.

1.7.2.4 *Set Objective and Implement*

None of the vendor products have demonstrated this functionality for UNIX. Therefore, the administrator must perform these tasks.

However, some of the vendors have indicated that they would be incorporating something like the above. A plan would be suggested to the administrator who would decide whether to go-along with the suggestion. BGS have already implemented this capability for a non-UNIX version of Best/1.

1.7.2.5 *Forecast or Project*

Typically, in order to forecast performance levels, one or more data modeling techniques are employed.

- rules of thumb
- linear programming
- network queueing model
- discrete simulation
- workload benchmark

However, discussion of the merits and demerits of each technique is beyond the scope of this paper.

- HP GlancePlus A.00.00
- Landmark TMON for UNIX v3.0 beta. (Current release adds functions and is shipping).

1.7.1 Evaluation Tests

All of the five products chosen here were tested for ease of installation, configuration and start-up. Once it is up and running, the ease of use and most importantly, the usefulness of the product in assisting the administrator to perform performance management are closely examined.

1.7.2 Techniques

Here, I will discuss the various techniques used by the five vendors in the various stages of the life cycle mentioned earlier.

1.7.2.1 Collect

This usually involves reading of `/dev/kmem` or `/dev/kstat` devices. Also it may involve reading `/proc` (procfs) for process information. The measurements are then stored away with time-stamps onto disk. In some cases data is sent over the network to a centralized store. Kstat is documented in the Solaris 2.4 manual pages for the first time. Some tools use specialized additional sources of information.

1.7.2.2 Monitor and Understand

This involves using a GUI to display the collected data, in real-time snapshot or historical form. There is usually a choice of graphical formats. It is useful if graphs are lined up so that different measures can be correlated.

The real-time snapshot data display allows the administrator to troubleshoot performance bottlenecks with the use of thresholds and alarms to pin-point the specific area. The historical data display allows the administrator to study the long-term trend and hopefully helps him or her to isolate potential problems in advance.

Table 1-1 Performance Management Software Products

Products	Collect	Monitor	Trend	Forecast
Open Systems Marketing COS/Monitor				
OpenVision OpenV*Perform				
OpenVision OpenV*Event Manager				
OpenVision OpenV*Trend				
Remedy Health Profiler				
SAS CPE				
SunSoft SunNet Manager (Network data oriented)	Not in detail	Yes	Yes	No
TeamQuest Baseline				
TeamQuest Capacity Management Facility Online				
Unidirect System Performance Tool				

The entries left blank were not evaluated in this report. We did not have the resources to evaluate every product to determine which categories were implemented *according to our criteria*. The above list is not necessarily complete but provides an idea of the wide variety of solutions available.

1.7 Products Evaluated

The following products were evaluated in detail in May/June 1994. For the final published version of this paper, the information has been updated and reviewed by the vendors involved, to be current as of October 1994. We are sorry that it has taken so long to produce a final published version of this report.

- AIM SharpShooter v2.2.1. (Current release is 2.2.2).
- Amdahl OpenTune v2.0 beta (current release is shipping and adds OpenWatch).
- BGS BEST/1 for UNIX AIX-version. (Solaris version is about to be released, monitor and database functions have been added).

- Trend Analysis

  Viewing historical data.

- Forecast

  Sometimes known as predicting or projection, or capacity planning.

Below is a list of performance management software products available in alphabetical order by company name.

Table 1-1 Performance Management Software Products

Products	Collect	Monitor	Trend	Forecast
AIM SharpShooter	Yes	Yes	Yes	No
Amdahl OpenTune/ AUMA	Yes	Yes	Yes	No
AT&T BenchMaster, XMaster, Pass/2				
BGS BEST/1 for UNIX	Yes	Yes	Yes	Yes
BMC Patrol				
Computervision OpenScope				
Compuware Ecotools				
Concord TRAKKER				
Cummings Group NCADMIN				
Datametrics				
HP GlancePlus	No	Yes	No	No
HP Performance Collection Software				
HP NetMetrix				
Independence Technology DB Analyzer and TM Analyzer				
Landmark TMON for UNIX	Yes	Yes	Yes	No
Landmark Probe/Net				
Metron Information Systems Athene/UNIX				

These tools have been used extensively to provide performance data so as to enable the administrator to isolate performance problem bottlenecks and tune overall system performance. Often, the usefulness of these tools depends heavily on the knowledge and experience of the administrator. Also, it is usually difficult to get a top level overview of the system (CPU, Memory, Disk, Network, Process, Application, Database etc.), and lastly, in a networked systems environment, trying to monitor multiple nodes at the same time and log the data is difficult. Sar can be setup on each system to log some utilization information but this does not capture network activity.

Further, the experience level of the average UNIX administrator is reducing due to the wider adoption of UNIX servers and workstations as well as the lower costs of ownership expected of these systems. At the same time, an administrator is now required to perform more tasks as well as handle more aspects of the operation.

Therefore, commercial performance management software products have begun to appear in the market and now there are many vendors who provide performance management solutions. They range from monitoring the system, to predicting the performance, to statistical analysis software.

1.6 Performance Management Software Products

There are many vendors who provide performance management software products for UNIX and specifically Solaris 2 systems.

In the industry, a number of terms are commonly used by these vendors to describe their performance management products. Terms such as Performance Monitoring, Historical Trend Analysis, Performance Tuning, Troubleshooting, Performance Analysis, Performance Forecast, Capacity Planning, Performance Assurance, etc.

To compare the various products from these vendors, four categories are defined. They are:

- Collection

  Sometimes referred to as data capture, logging or storage of performance data.

- Monitoring

  Known as viewing, or display of snapshot data.

After Step 3 is done, you would go back to Step 1 to see if the plan carried out has achieved the objective. Typically, in order to achieve Step 1 and Step 2, you would need a performance management tool of some kind.

At the same time, before a bottleneck occurs, you could also be more pro-active by trying to predict the performance and service level in anticipation of a change. For example a change in user load, applications, hardware upgrades etc. This step is known as:-

4. Forecast or Project

In real life, the steps to performance management are not as clearly defined as those stated here. Still, this classification provides the basic foundation upon which most performance management is built.

In summary, the life cycle of performance management is:-

1. Collect, Monitor and Understand
2. Analyze, Identify and Isolate
3. Set Objective and Implement
4. Forecast or Project

1.5 The Performance Tools Provided in Solaris 2

In the Solaris 2 operating system environment, there are performance related tools and utilities provided as part of the operating system

- vmstat, iostat, sar
- uptime, mpstat
- netstat, nfsstat
- perfmeter
- ps

Also, there are public domain tools that provide performance related information. Ftp to opcom.sun.ca to find these.

- top - a curses based ps that shows the top few processes
- proctool - a GUI based tool that greatly extends the ‘top’ concept

This paper contains the results of extensive hands-on experience with several products. It also provides reference information on products that were not evaluated. A feel for the state of the art in performance management was obtained, and it is apparent that this is an immature market. Many vendors are producing brand new products and adding major extensions to existing products, hoping that they have captured the needs of the users better than their competition.

Note – These products were selected based on availability, existing contacts with the vendors, time constraints and other factors. They are in no way an indication of any preference. Attempts were made to obtain evaluation copies of other products, some of which did not arrive in time for the evaluation.

1.3 Why Manage Performance?

You should manage performance to prevent performance problems from managing you! At the same time, you can improve or enhance the service level to the users, and thus improve productivity, minimize cost, and improve profits for your organization.

1.4 The Life Cycle of Performance Management

Performance Management usually starts with an understanding of the current performance and service level information. This is done by collecting performance related data, and provides a baseline when a problem occurs in the future. This allows you to determine how significant a problem is, and also its extent. This is known as the analysis stage. A plan can then be made as to what changes need to be made and finally, the change can be implemented. This is known as the corrective action plan.

In order to determine if the corrective action has helped, you would go back to understanding the new performance and service level by collecting data again.

Therefore, the various stages could be broadly classified as:-

1. Collect, Monitor and Understand
2. Analyze, Identify and Isolate
3. Set Objective and Implement

Introduction 1

1.1 What is Performance Management?

Performance Management, in essence, is the understanding, tuning and optimizing of the available computing resources in order to provide a consistent level of service to the users. These computing resources could be CPU, memory, disk, network and application related.

1.2 The Contents of this White Paper

There are many products available, but there is a difference between the promise of the glossy brochure and the reality of a product. It is also hard to compare tools which have overlapping functionality across a wide spectrum of uses. To research this subject and write this report, Steven Gan from the SMCC Singapore field office was seconded to work for five weeks in the SMCC Product Marketing Engineering group. Adrian Cockcroft of SMCC PME initiated the study, provided guidance and edited the final version of this white paper. Send comments to Adrian.Cockcroft@Sun.COM.

Some major vendors were selected and were invited to provide an evaluation copy of their software. Those vendors who supplied software in time to be evaluated assisted in the installation and testing of their products, and in some cases indicated their future plans for the product. The products evaluated cover a very wide range of both price and functionality. Comparisons made in this study are intended to show the range of functions available, so that users can make their own decision on what they need. We hope to be able to repeat this exercise eventually, to look at a different selection of vendors.

Tables

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Performance Management Tools for Solaris 2

An Evaluation of Some of the Major Vendors

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