

Universal Management Agent

White Paper

Executive Summary

This white paper discusses the IBM Universal Management Agent™(UMA) and its relationship with IBM Netfinity® Manager. We also briefly discuss the IBM Personal Systems Group (PSG) Universal Management Initiative. The cornerstone of IBM PSG's Universal Management Initiative is to deliver PC-based Life Cycle Management solutions based on industry standards, while supporting IBM's highly instrumented and uniquely manageable hardware. These Universal Management tools are designed specifically to integrate within our customers' chosen management environment. The result is that IBM customers are able to spend less time managing IT assets and more time running an efficient and effective business.

IBM's Universal Management Agent, initially released in July 1998, is a systems management tool that provides the necessary industry-standard software to take advantage of the systems management features built into IBM PSG products. UMA replaces other management services shipped with IBM clients including Client Services for Netfinity Manager and Intel®'s LANDesk® Client Manager (LCM) because it is a new agent based on ingredients from both these services. UMA is another product, along with Wake on LAN® and Alert on LAN™ delivered through the IBM/Intel Advanced Manageability Alliance, established in October 1996. UMA initially supports Intel processor-based clients compliant with Intel's Wired for Management (WfM) specification for Microsoft® Windows® 95, Windows 98 and Windows NT®. UMA provides Desktop Management Interface (DMI) services, an HTTP server and a Web browser as the default interface. Also included are upward integration modules for Tivoli® Inventory, Tivoli Netview™, Microsoft Systems Management Server (SMS), Intel LANDesk Client Manager and installation support for the Tivoli Management Agent (TMA), making IBM systems Tivoli-Ready™.

IBM's Netfinity Manager is a suite of tools targeted at centralized hardware management of IBM PCs, Netfinity servers, Thinkpad® notebooks, and IntelliStations®, as well as non-IBM Intel-based clients. Netfinity Manager is an integral component of IBM's Universal Management initiative with many features, including RAID, cluster and capacity management tools for advanced Netfinity server management that helps manage networked PC-based assets with ease and efficiency throughout their entire life cycle. Netfinity Manager also integrates with higher level enterprise or workgroup management tools such as those available from Tivoli, Microsoft, Hewlett-Packard® and Intel. Netfinity Manager v5.2 is 100% compatible with UMA.

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Introduction

To command their organization's information technology resources effectively and efficiently is a dream of information systems professionals everywhere. With the proper knowledge, planning and management tools, the Total Cost of Ownership (TCO) of network clients and servers can be reduced dramatically, thus saving huge amounts of operating funds on an annual basis. Unfortunately, two problems have interfered with the achievement of this goal in the past. First, the level of effort required to manage heterogeneous (and often proprietary) systems has exceeded the resources available to many IS organizations. Second, hardware management tools have not met the challenges posed by today's extremely complex client/server environments.

Now companies of virtually any size can gain control of their PC hardware with IBM's Universal Management Technology—a comprehensive set of superior, standards-based hardware management tools. These tools have been designed to provide stand alone PC hardware management capabilities for small to mid-size operations or to complement higher-level systems management products in the larger enterprise.

Advanced management can help users produce a wealth of benefits, many of which go directly to the bottom line: faster deployments, increased reliability, reduced downtime, reduced service and support costs, all of which enable end users and IS personnel to focus on running the business instead of running the systems. These benefits can significantly impact the most compelling benchmark of technology expense—the Total Cost of Ownership. This all-encompassing term covers the life cycle of systems, from acquisition to disposal, and the associated costs of deploying, updating and maintaining IT resources. And, as many business professionals will tell you, reducing TCO is not just a good idea, it is a marketplace mandate.

IBM Universal Management

The Strategy

IBM's Universal Management strategy is based on the following three concepts:

- Industry standards that create open and scalable² management solutions by combining the best qualities of IBM's award-winning Netfinity Manager software with systems management technologies from Tivoli, Microsoft and Intel. This combination offers customers leading-edge systems management that enables them to exploit and implement IBM leadership technologies, and provides an environment for managing IBM and non-IBM³ DMI-enabled desktops, workstations, notebooks and servers.
- Leadership Manageability Solutions give system administrators more control with less complexity. Reducing TCO through better systems management has traditionally been a problem of integration: diverse, incompatible and, often, proprietary management tools are difficult to use or integrate in a complementary manner. Also, IS managers face a serious lack of integration among the many heterogeneous system components that comprise a company's IT resources. Universal Management can help solve these issues by providing tools to address systems management throughout the entire life cycle of PC-based assets.
- Seamless integration of new management tools into enterprise and workgroup management applications. IBM's Universal Management components are designed to provide the tightest level of integration with an organization's chosen enterprise management environment. This provides a complementary relationship that exploits the existing investment in systems management tools and training. Points of integration include native population of inventory data, forwarding of SNMP alerts, native console access to specific distributed (client-based) functions, customized installer scripts, database queries and management information files (MIF), and others.

The Components

IBM's Universal Management platform includes four major components:

- Universal Management Agent™ is a systems management program based on LANDesk Client Manager and Netfinity Manager technologies that installs on individual systems and sends system data and conditions to the workgroup or enterprise systems management software. UMA seamlessly and natively integrates into systems management applications (like Tivoli Enterprise™, Tivoli NetView, Microsoft Systems Management Server (SMS), Intel LANDesk Management Suite and others) and runs on supported IBM desktops, ThinkPad notebook computers, IntelliStation workstations and Netfinity servers, as well as non-IBM PCs.³ UMA can also be accessed directly from the network administrator's console or a peer workstation on the network with a Web browser using preset user IDs and passwords. UMA provides the necessary software to take advantage of incremental systems management features built into IBM personal computers.
- Netfinity Manager provides a powerful suite of tools for PC hardware management to deliver greater life cycle management for IBM Netfinity servers and client systems, including desktops, workstations and mobile systems. Like UMA, Netfinity Manager is designed to integrate seamlessly into enterprise-wide systems management applications. Through this integration, enhanced information unique to IBM hardware can be accessed using enterprise management packages already in place.
- Universal Management Life Cycle Tools provide additional management capabilities throughout the life cycle of networked system hardware, with the goal of reducing TCO.
 - Enhanced client system data protection is a UMA interface to the SMART Reaction™ solution installed in SMART Reaction-supported client systems.

- Remote Control is a UMA-compliant version of Artisoft CoSession Remote 32[®], which enables remote control of client systems on the network.
 - Remote Diagnostic is a UMA-compliant version of PC Doctor, which enables remote diagnostics of network client systems.
 - System Update provides easy downloading of system-specific drivers and BIOS updates directly to the client system or enterprise console from the IBM Internet support site.
 - EZ-ADMIN allows temporary changes to the Zero Administration Settings on the client.
 - LANClient Control Manager™ (LCCM) is a server-based application that simplifies and automates setup, configuration and deployment of client systems in a networked environment, including unattended installation of UMA itself. LCCM also enables unattended, ongoing lower-level management of networked IBM PCs such as BIOS updates or virus scans.
 - Update Connector Manager allows an administrator to easily find and download various system updates for IBM client systems using any Internet connection.
 - RAID Manager is a tool used to monitor, manage and configure an assortment of RAID adapters and arrays without taking the PAID system off line.
 - Cluster Manager is a service for Microsoft Cluster Server that promotes ease-of-use and increased productivity, as well as event and problem notification for a clustered server configuration.
 - Capacity Manager is a tool used to collect server performance data and display this data graphically for up to 30 days, allowing an IT manager to identify potential bottlenecks, optimize system resource use and plan for future system upgrades.
 - System Monitor is a tool used to monitor a host of hardware components in client systems such as disk space, CPU, LAN and memory utilization, as well as environmental conditions.
 - Advanced System Management allows remote access to the Advanced System Management processors in Netfinity servers to manage the system even if it is powered off or the operating system is frozen.
- Technology Enablers are hardware and firmware built into IBM products to which the other three universal management components can link to perform specific functions. Examples include the following:
 - DMI Instrumentation for standards-based systems management interface
 - Asset ID™⁴ for inventory and improved asset management
 - Alert on LAN for error reporting and security notification
 - Wake on LAN for remote system power-on for off-hours maintenance
 - S.M.A.R.T. Alert for activation of backup programs in the event of a hard disk drive Predictive Failure Analysis (PFA) alert
 - Preboot eXecution Environment (PXE) for unattended automated system deployment
 - System Management Processor is a “processor within a processor” that monitors a Netfinity server and its OS, allowing remote access even when powered off

The Universal Management Agent

Overview

UMA provides standards-based software services for IBM desktops, notebooks, workstations and servers, as well as non-IBM PC hardware³ to enable management in any customer environment. Through incorporation of key technologies from LANDesk Client Manager, UMA includes a DMI 2.0 service provider and takes full advantage of client systems designed to the Intel Wired for Management (WfM) 1.1 specification. UMA will add CIM-based instrumentation as it becomes available.

UMA supports Microsoft Windows® 95, Windows® 98 and Microsoft Windows NT 4.0. UMA includes the ability to communicate client systems data natively using TCP/IP to enterprise management consoles (like Tivoli NetView and Tivoli Enterprise) and workgroup systems management suites (such as LANDesk Management Suite and Microsoft SMS). UMA can send environment alerts to various enterprise management packages via the Simple Network Management Protocol (SNMP). In fact, UMA is capable of translating DMI information to SNMP format, as well as specifying multiple SNMP destinations for any alert. For access to UMA client system information and management functions via a Web browser, UMA supports Microsoft Internet Explorer 3.02 and above.

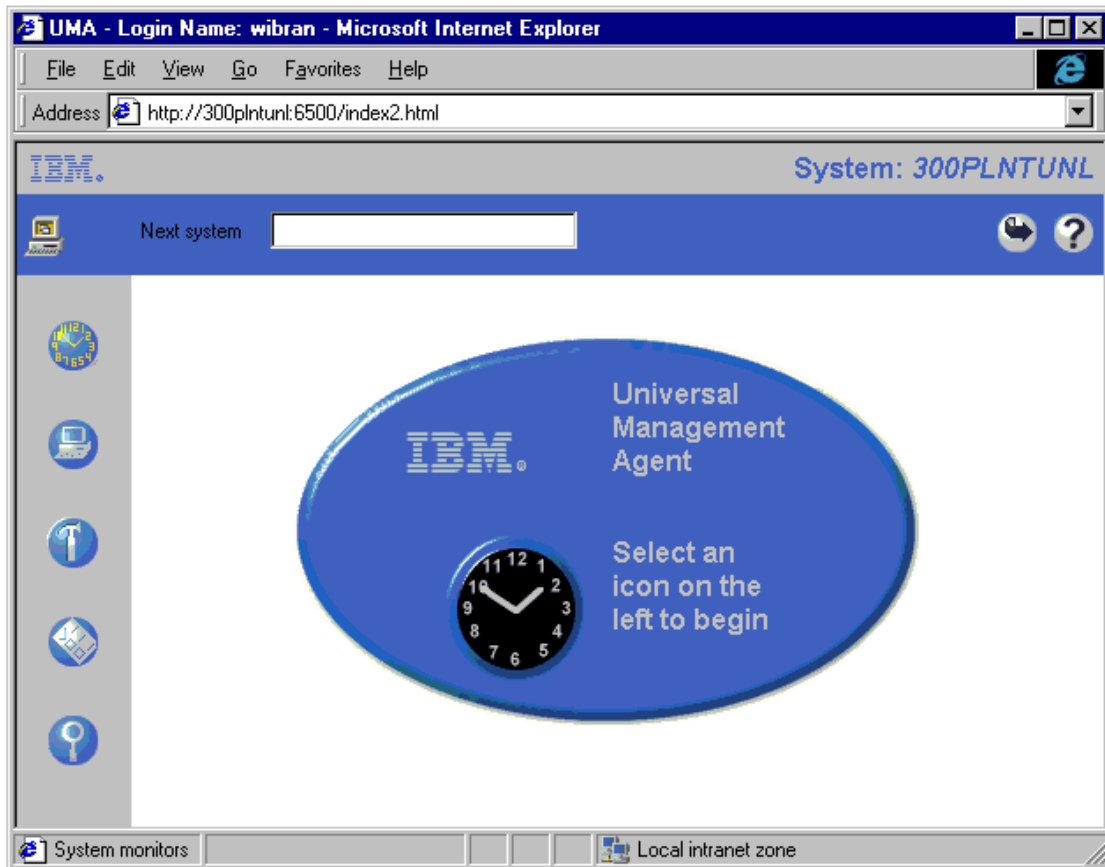


Figure 1. IBM Universal Management Web-based interface

UMA includes five categories of critical capabilities, represented by the icons along the left edge of the UMA web-based interface (see Figure 1). Each of the following categories is described in detail in the following sections:

- System Monitors help to manage system health and events, alarms and responses
- Resource Utilization includes information on how client resources are used
- Advanced Management Tools include *Alert on LAN* and DMI information
- Inventory Data includes information about financial components, such as lease/purchase date, warranty information, client system hardware and software components and end-user data
- Configuration and Diagnostics include client system configuration, support and user-administration tools



System Monitors

With the capacity to monitor the health attributes of the client system instant notification of problems or potential problems with the system or its environment can be made available. By tracking component performance and proactively diagnosing and fixing problems, IS professionals can maximize system uptime and minimize data loss, while ensuring computer and network resources will be available as the business grows.

PC Health Monitor

PC Health Monitors are designed to help administrators understand client system resource and environmental conditions. Proactive systems management and support is possible because potential problems can be detected before they reach a critical point. PC Health Monitors are a part of the System Resources group and include the following monitors:

- Hard disk drive predictive failure analysis (PFA) allows the administrator to track the conditions of any S.M.A.R.T. client system hard disk drive and take action before the drive actually fails
- Low virtual memory indicates when the client system environment is getting low on memory resources
- Low hard disk drive space allows monitoring and correction of problems before the end user runs out of hard disk drive resources
- Chassis intrusion detection helps detect theft and can provide unattended client system support
- Low or high CPU temperature, power voltage and low fan speed help detect an unhealthy client system environment and prevent the damage that can develop if such conditions are not corrected

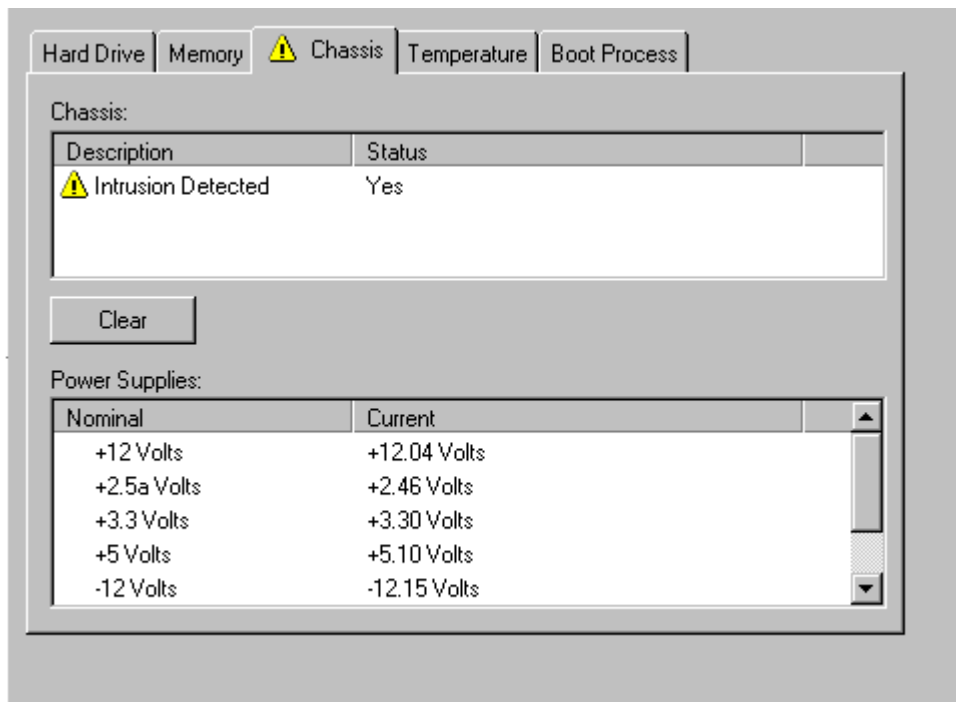


Figure 2. UMA information from the PC Health option showing a chassis intrusion detection

Events, Alarms and Responses (EAR)

Events, alarms and responses provide a way to configure systems to enable automatic response to system hardware and software conditions. EAR can be configured by either the system administrator or the end user (within administrator-defined limits). For example, a system administrator can configure all the client systems attached to the network to respond to a S.M.A.R.T. alert on the hard disk drive by paging the administrator and using SMART Reaction to start a backup of the troubled hard drive. The PFA alert is considered an event, while the backup and page are each considered responses. The following sections will cover EAR in more detail.

Events

An event is defined as any occurrence that can be detected by the client system and registered by UMA. The following list contains a brief description of each of the events. When any of these events are detected through DMI, a response can be associated with it and executed. The following events are supported in UMA:

- S.M.A.R.T. Alert is used to generate PFA alerts to warn of hard disk drive degradation
- Disk Space Running Out indicates that hard disk drive space is critically low
- Chassis Intrusion alert is posted whenever the cover is removed from the machine
- Fan Speed alert is generated when there is a fluctuation in fan speed beyond factory-specified tolerances
- Configuration Change alert is generated when a change is made in the BIOS settings
- Voltage Range alert is generated when voltage ranges beyond the factory-specified tolerances are detected
- Temperature Range alert is generated when temperature goes above the factory-specified maximum
- Power On Self Test (POST) Error alarm is triggered as soon as the machine completes the boot process if any errors are detected during POST
- Virtual Memory Running Out indicates the machine is running critically low on virtual memory

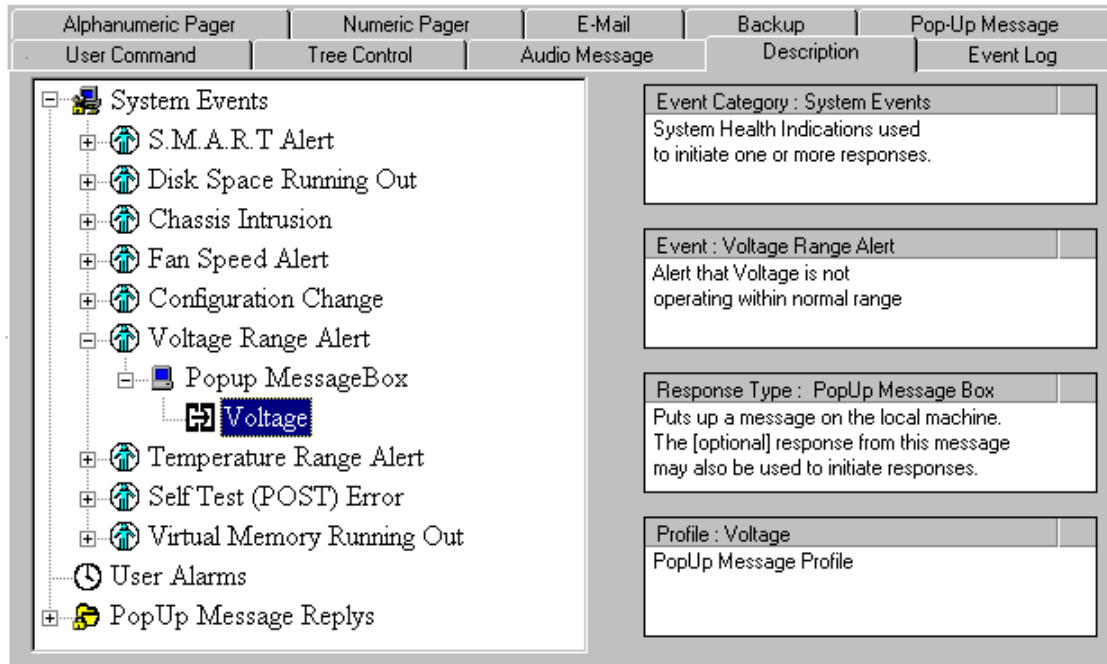


Figure 3. Events, Alarms and Responses screen

Alarms

The administrator or end-user (if allowed) can configure UMA to cause an alarm with any number of responses attached to the alarm. Alarms can be set to trigger either one time only, hourly, daily, weekly, monthly or yearly. For instance, a profile could be scheduled so that an alarm goes off at the same time every month and a monthly backup of the system is performed. User alarms are devoted to schedules that users or IS personnel have created.

Responses

The system reacts to either an event or an alarm with a response. These are easily configured and can be any of the following:

- Alphanumeric or numeric page or e-mail message is sent to designated individual(s)
- Backup can be used to launch a hard disk drive backup in the event of a S.M.A.R.T. hard disk drive alert. Supported backup systems include IBM's Automated Data Storage Management (ADSM), Seagate, Cheyenne and any other backup system that can be started by issuing a command or invoked by SMART Reaction
- User Command is used to create profiles that launch a specified application
- PopUp Message displays on the client system. The popup message can be configured to require end-user input and to take different actions depending on this input
- Audio Message plays an audio file on the client system

Profiles for each of the responses can be set up through the UMA interface. An e-mail profile could be generated to e-mail a group of system administrators, for instance, with the message that was chosen.

In addition to PC Health and Events, Alarms and Responses, System Monitors include POST Error Log and Event Log Viewer, which provide monitoring, tracking and viewing of important system events and error conditions.

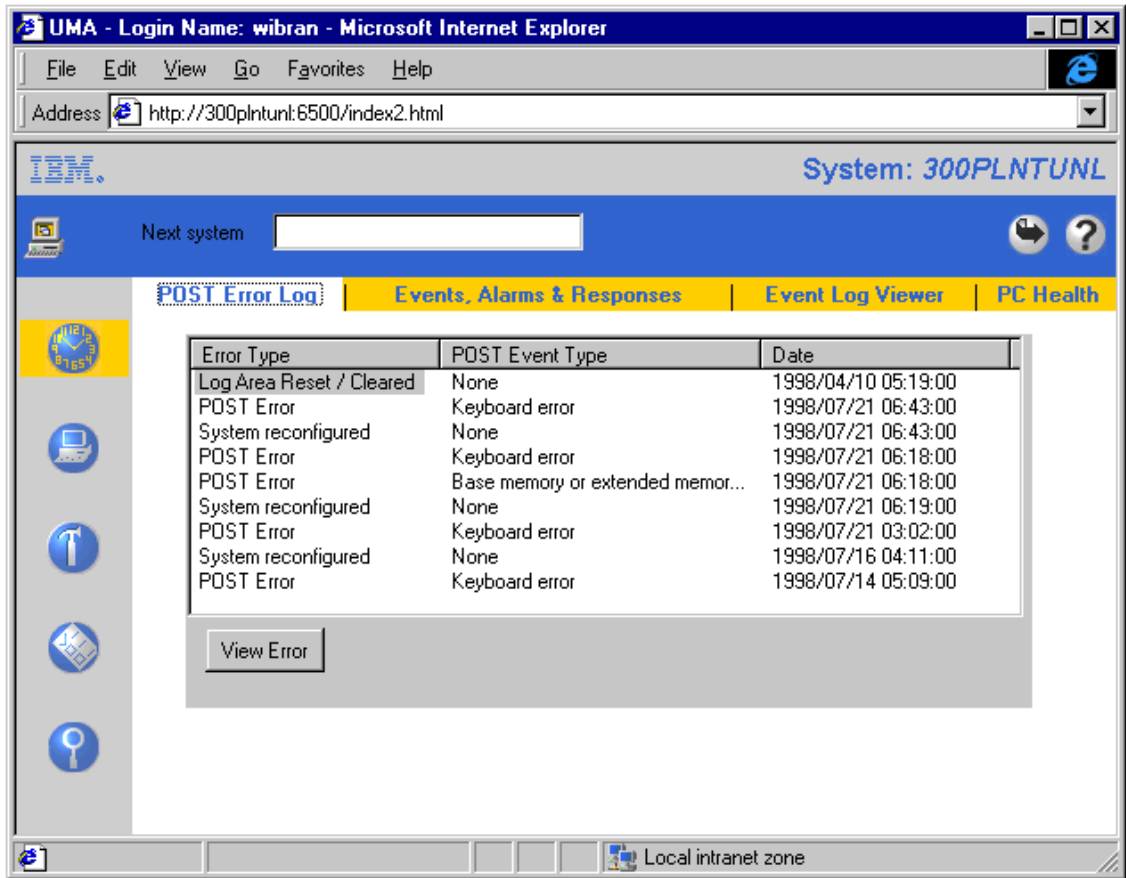


Figure 4. UMA screen showing a POST Error log



Resource Utilization

The Resource Utilization category of UMA displays the resources a system is using. This can be used to help with remote system setup, proactive problem solving and effective problem determination, as well as to enable automatic software updates. The following information is available under Resource Utilization:

- Audio resources include manufacturer, model and driver information
- Drives provides information regarding both logical and physical drives, including name, type, capacity, free space, and partition information
- Input/Output Ports summarizes serial and parallel port utilization, including name, IRQ, address, maximum speed, UART and port type
- Keyboard/Mouse displays the type of device, connector type, and driver information
- Memory provides information regarding a client system's RAM, including physical memory (both memory controller and specific modules), upgrade options and virtual memory settings
- Network summarizes data related to the network environment, including the network card itself, as well as driver information, protocols in use (and their respective settings), statistics and current network connections
- System Resources include IRQ, DMA, I/O and memory
- Video resources relate to device (manufacturer, model, current resolution and supported resolution), driver (name, version and date) and video BIOS (version and date) information
- Battery provides mobile users with information such as remaining charge and run time

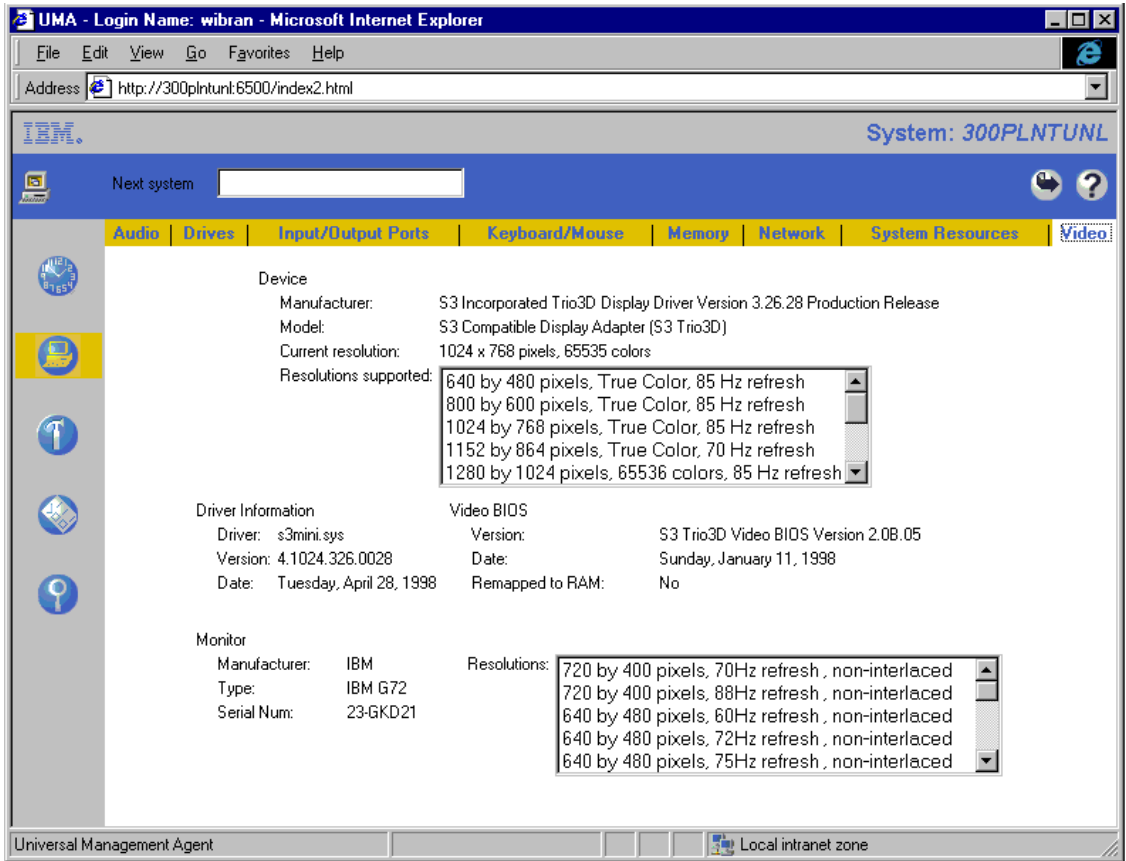


Figure 5. UMA Video resource screen



Advanced Management Tools

The Advanced Management Tools category provides access to a comprehensive set of advanced management data that originates from Alert on LAN and DMI technology.

Alert on LAN

Alert on LAN is a manageability chip that helps manage and protect networked computers, even when powered off. Unplugging a supported PC from the network or its power source, POST errors, operating system errors, opening its chassis or removing the processor generates an immediate warning and can trigger a rich array of customizable responses. *Alert on LAN* allows faster response to problems by notifying network administrators of system operating errors and hazardous environmental conditions even if the system is unattended. *Alert on LAN*-enabled systems can be seamlessly integrated into virtually any network. *Alert on LAN* is supported by both Intel and IBM as a standard for system notification. (For more information, see the *Alert on LAN* Information Brief.)

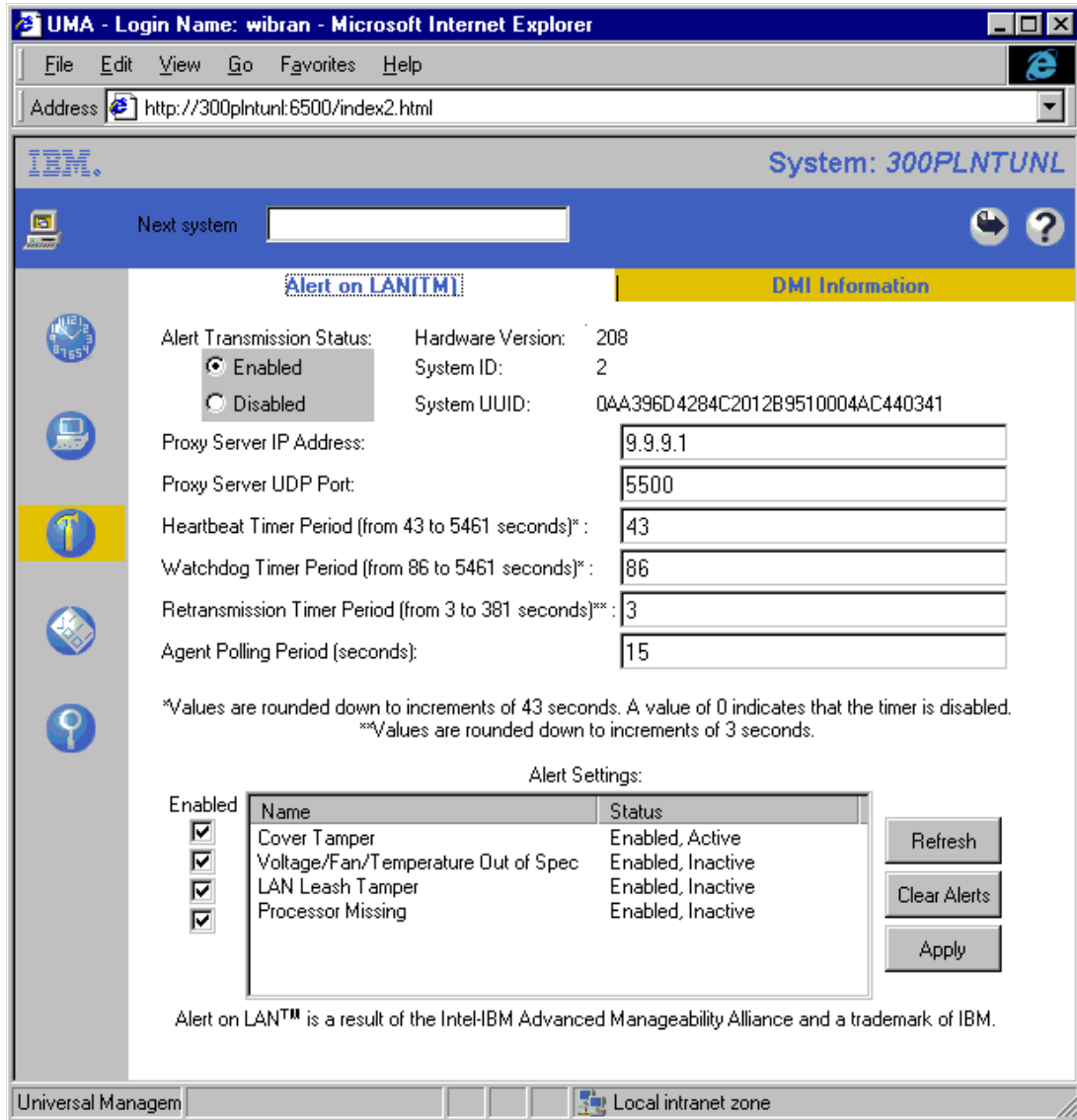


Figure 6. Alert on LAN configuration screen using the UMA Web-based interface

DMI Information

DMI provides a standard mechanism for gathering system information to enable IS managers to more easily monitor and control PC systems and their installed software. DMI may be compared with other management interfaces such as SNMP. One primary advantage of DMI is that it is supported across all major operating systems and by all major LAN management packages. In addition to the long list of standard DMI data available for non-IBM PC hardware, this screen provides access to many additional attributes available on IBM client systems and servers.

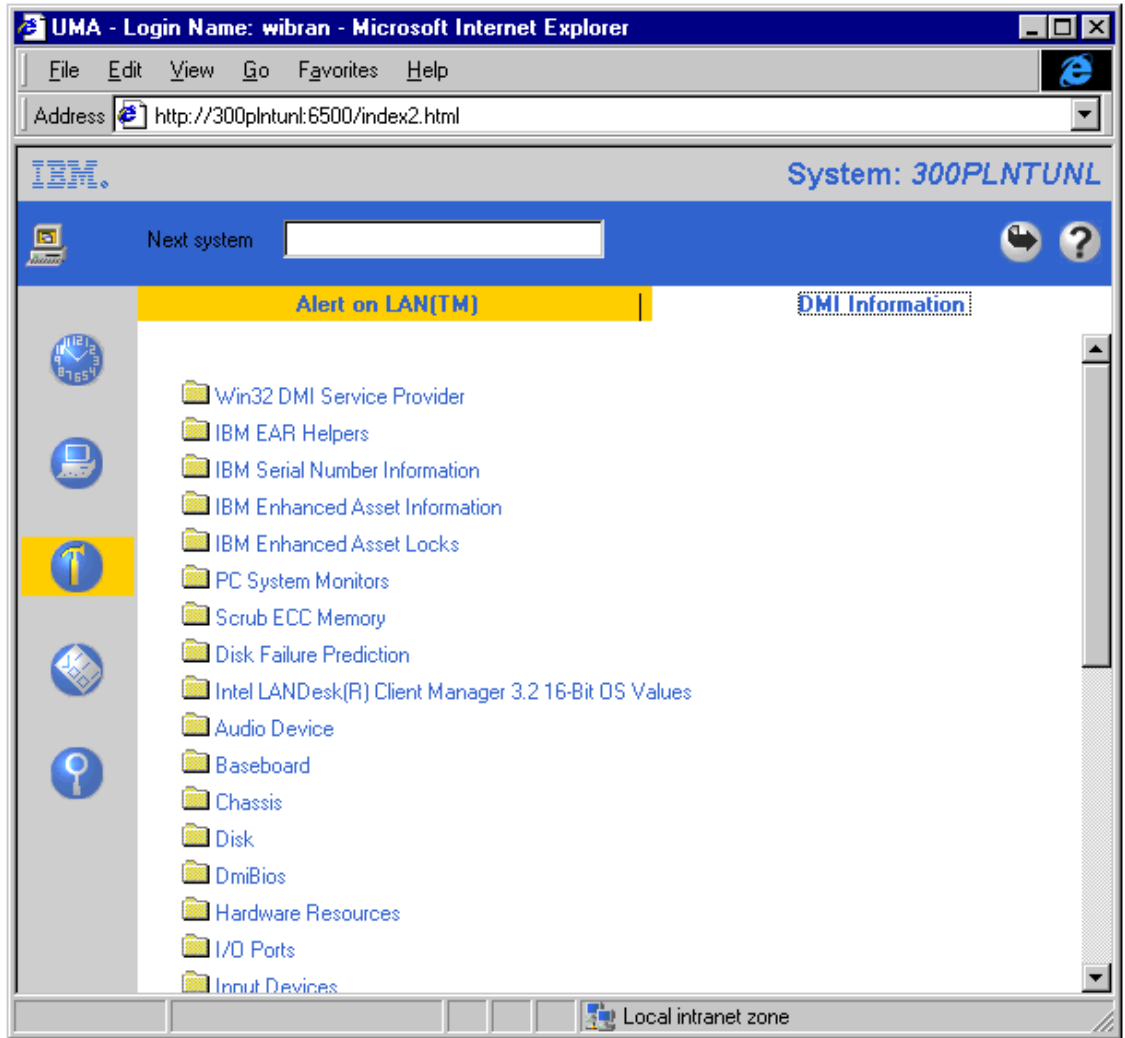


Figure 7. DMI attributes accessible by using the UMA Web-based interface

The systems management BIOS (SM BIOS) specification is an important element of the DMI roadmap. SM BIOS provides system-specific information such as the number of memory sockets on the motherboard and the size and speed of each of the installed memory modules.



Inventory Data

The Inventory Data category includes information about system hardware and software. All information can be automatically forwarded to enterprise systems management software such as SMS or Tivoli to better manage and track IT assets. UMA divides the information into the following sections:

- Software Inventory assists with software inventory and license management
- AssetCare™, as part of Asset ID, uses the Enhanced Asset Information Area to track lease, warranty, user and system information (see Asset ID section that follows)
- Basic Hardware presents a quick overview of the major hardware components
- Computer Summary presents a list of all the major computer information
- Operating System identifies the operating system environment

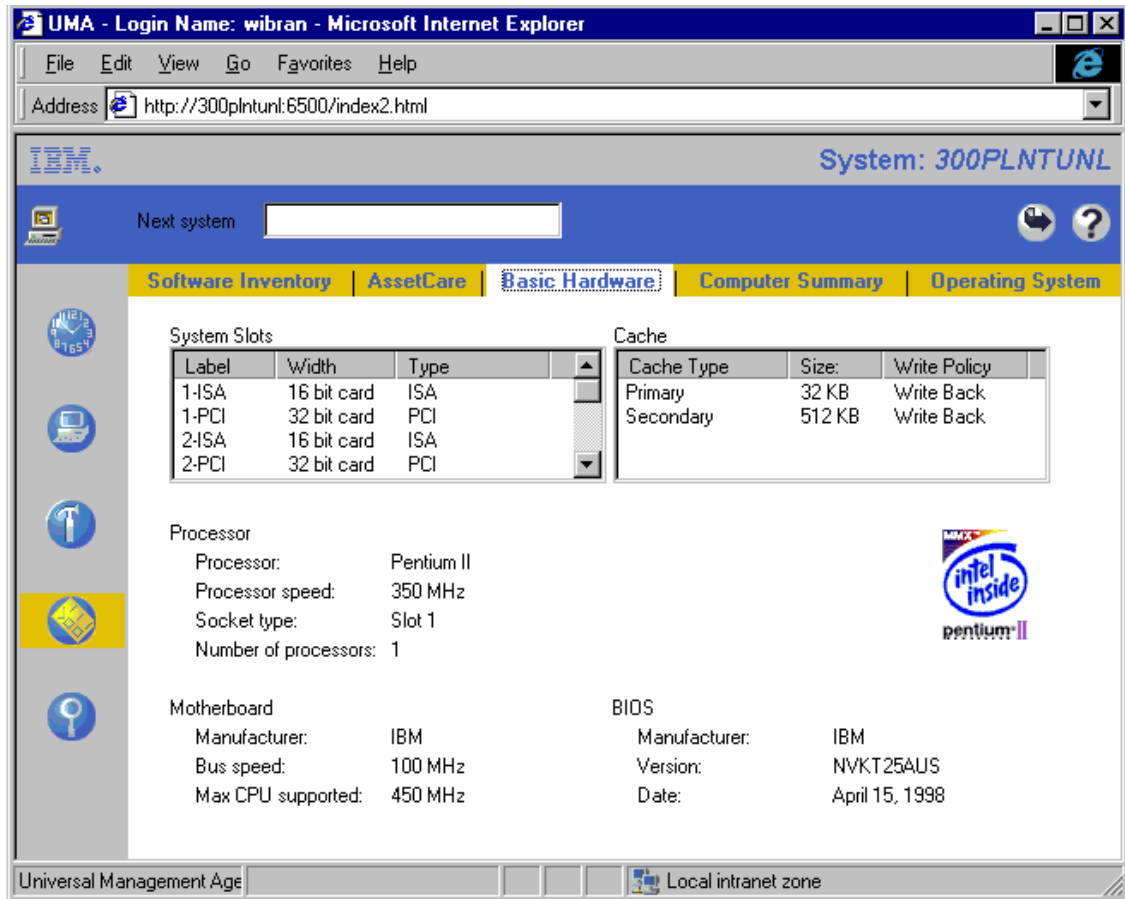


Figure 8. UMA basic hardware screen

Asset ID

Asset ID is an exciting new application of radio-frequency technology that can eliminate many of the costly and time-consuming manual steps involved in today's system deployment, inventory and tracking processes. Asset ID enables you to use a handheld radio-frequency identification reader⁴ to read and write information to a nonvolatile memory chip (EEPROM) inside an enabled system while the client is still sealed in its shipping carton. Asset ID allows you to take accurate physical inventories of systems and their components without searching for a label or opening the chassis. Simply pass the handheld radio-frequency unit near the box to read system information such as model numbers, serial numbers, processor speed, hard disk drive and memory size, as well as write any end-user information you choose to record. Asset ID can also be used to assist security personnel in preventing the unauthorized removal of client systems from the premises. (For more information, see the Asset ID Information Brief.)

Asset Information Chip

The upsurge in the number of PCs used in today's networked environments combined with an ever-growing component theft problem require the implementation of an effective electronic inventory solution. IBM's Asset Information Chip provides a solution with essential tracking and theft-detection capabilities.

Asset	Serial Number	Information
CPU 0 S/N	11S01K3136ZJ151D848030	Pentium II 350 MHz
Hard Drive 0 S/N	WD0WDA0928	6.00 GB
System Unit S/N	1S686224U23KY036	IBM BIOS NVKT25AUS
Motherboard S/N	11S61H1052Z1J1KG4370BP	IBM - 100 MHz Bus
Monitor S/N	23-GKD21	IBM IBM G72
Power Supply S/N	J14wW4280V3	
DIMM 0 S/N	1C00006208A7CA0216	64 MB

Figure 9. Information found in the Asset Information Chip

IBM stores vital component information, including unique serial numbers, in the Asset Information Chip. DMI-compliant systems management software (like Netfinity Manager) provides the capability to add customized information (e.g., lease, department, end user, asset tag) onto the EEPROM itself. Components initialized into the EEPROM include the CPU, system number, motherboard and power supply. A second EEPROM contains information about memory DIMMs and firmware within the hard disk drive.

Using UMA to access the Asset Information Chip, you can:

- Conduct scheduled or dynamic electronic inventories
- Note changes in configurations since the previous inventory
- Automatically update inventory information with each inventory performed



Configuration and Diagnostics

The Configuration and Diagnostics category contains functions that help configure UMA and determine system problems. UMA Configuration and Diagnostics includes Memory-Scrubbing and User Manager.

Memory-Scrubbing is used to correct latent errors in Error-Correcting Code (ECC) memory and includes DIMM Status and Scrubbing Controls. ECC memory is designed to correct errors of a single-bit nature. Based on a concept of simultaneous polynomial equations, the read-back process generates a correction profile over any incorrect data. This handles the great majority of memory errors encountered on a typical desktop PC or mobile computer, because all used memory addresses go through the read-write process on a fairly regular basis.

However, two characteristics of workstation and server hardware contribute to the increased probability of errors being missed by the ECC. First, these systems are often configured with large amounts of RAM—sometimes in excess of one gigabyte. Second, these systems are designed to run for many months without being rebooted. These two factors combine to allow large segments of RAM to contain data (such as that related to the operating system itself) that

do not change for long periods of time. The longer data remains untouched, the higher the probability of single bit errors becoming multiple bit errors, which cannot be corrected via ECC.

The Memory-Scrubbing process ensures that all memory locations are routinely “flushed” and rewritten properly on a regular basis. This simply allows ECC to perform its intended function. The scrubbing controls can be manual or scheduled to be automatic in intervals of one to seven days at a selected hour of the day (0-23 hours).

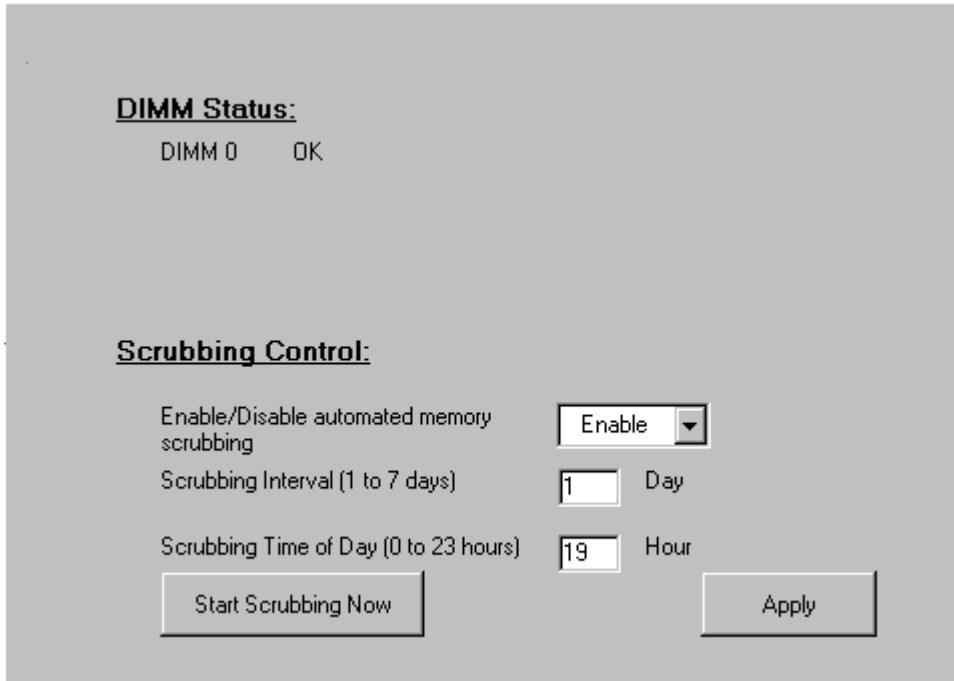


Figure 10. UMA interface for Memory Scrubbing

User Manager is used to configure UMA security features. Users can be added or deleted and permissions can be set to one of four levels, including browser, user, power user and administrator.

Enterprise and Workgroup Integration

UMA integrates upwardly into the leading enterprise management solutions, providing access to UMA features and functions from the enterprise management console already employed by an organization. In fact, UMA includes native installer packages for both Tivoli Management Software and Microsoft SMS. These packages can be used, with the respective enterprise management solution, to install UMA on any client systems already discovered in the managed environment.

Tivoli Management Software

Tivoli and IBM have simplified the systems management landscape. Tivoli Management Software, the industry-leading network computing management solution, continues to evolve to meet customer needs for comprehensive, integrated, cross-platform management in enterprise environments. UMA provides the ability to integrate into various pieces of the Tivoli Enterprise Management Software family, including Tivoli Enterprise, Tivoli Inventory (part of the Tivoli Management Framework) and Tivoli NetView. Through this integration, customers gain the

ability to perform management operations such as software distribution, inventory, user administration and distributed monitoring.

Tivoli Enterprise

Tivoli Enterprise software provides a comprehensive framework of systems management capabilities to manage all IT resources including systems, networks, applications and databases. UMA has been designed to seamlessly integrate with Tivoli Enterprise software to provide enhanced information for IBM hardware installed in the managed environment.

UMA provides five key points of integration into the Tivoli Enterprise family of products:

- Detailed IBM valued-added information is provided to the Tivoli Inventory product using a custom MIF file.
- A setup program is provided to automatically configure the SQL database, create a custom profile manager and profile, and create queries to access all value-added inventory information.
- A setup program and a File Package Definition file is provided to simplify installation of UMA onto client systems using Tivoli Software Distribution.
- UMA can forward SNMP traps to the TMR server.
- Automatic installation of Tivoli Management Agent 3.6 is provided via the UMA installer.

Tivoli Inventory

The Tivoli Inventory database (configuration repository) must be configured in order to handle UMA Inventory data. This is accomplished by executing the UMA setup program on the Tivoli Management Region (TMR) server and selecting the Enterprise installation method with the Tivoli Inventory option. The Enterprise installation process creates the necessary UMA Profile Manager, the custom UMA profile, the UMA Query Library and the appropriate SQL tables, views and queries for the RDBMS server in use. RDBMS scripts are provided for MS SQL, Oracle, Sybase, and DB/2.

UMA provides the following points of integration with Tivoli Inventory:

- The UMA Installer enables the installation of Tivoli Management Agent (TMA) version 3.6 on the client system, thereby making it a Tivoli Endpoint.
- UMA inventory data is added to native Tivoli inventory. During inventory profile distribution, hardware and software information is gathered on each client system and saved in a file. Inventory scan results are organized into categories. Tivoli Inventory converts data in this MIF file to a format that can be saved in an SQL database.
- The UMA setup program provides ready-made queries for all UMA inventory data. The queries appear as icons under the Policy Region on the TMR server.

Tivoli NetView

Because UMA is Tivoli-Ready, any supported client system running UMA can be instantly discovered by Tivoli Netview on the network.

Integrating data and contextual support with Tivoli Netview

UMA provides Tivoli NetView with "DMI-on-demand" definition and displays files for all client-based tools and services. Client information integrates into NetView natively, and the information is accessible using Tivoli icons. NetView provides both a direct connection to the DMI service provider on the UMA system (a demand-poll for DMI information) as well as a customizable means of displaying the retrieved DMI data.

The following figure demonstrates a Tivoli NetView 5.1 console view of an IBM PC 300PL running UMA. Notice that IBM Universal Management Life Cycle Tools for supporting IBM's Advanced Management Tools, including AssetCare and Alert on LAN, as well as generic system information are available through native icons of the Tivoli NetView console.

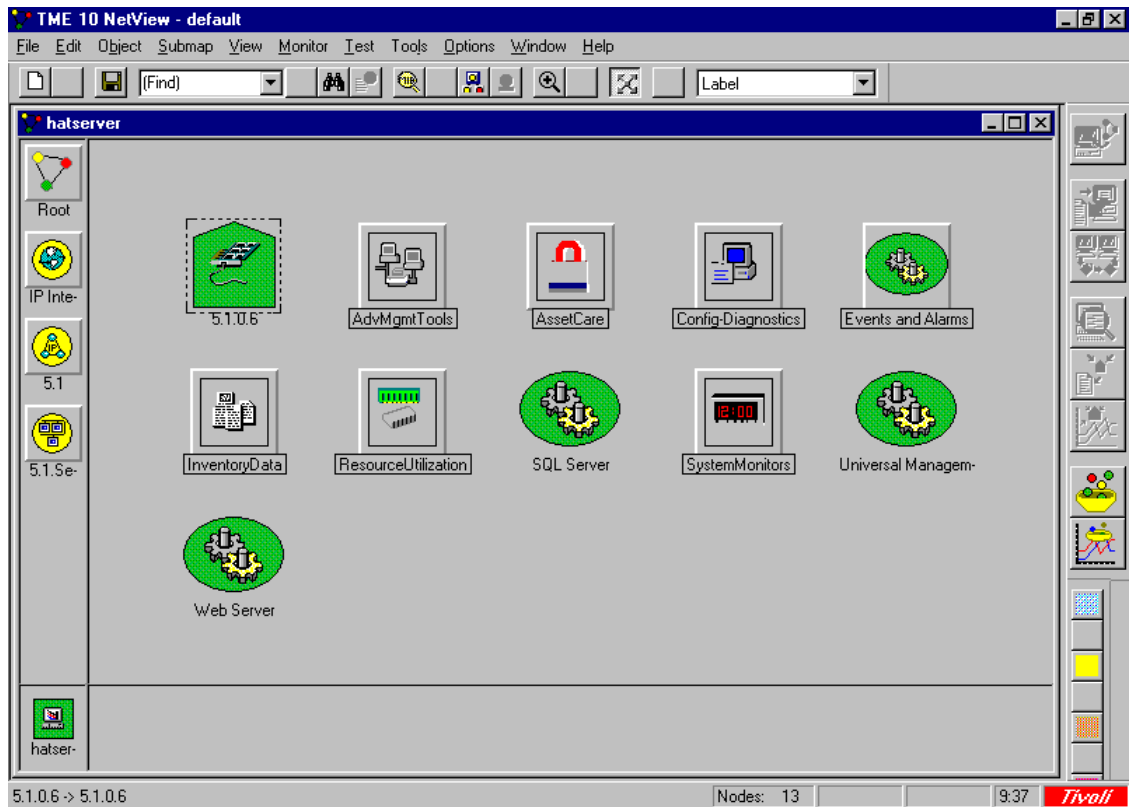


Figure 11. Tivoli NetView 5.1 console view of a client system running UMA

Interconnection of UMA events with Tivoli Netview

Events that occur on the client system are conditionally forwarded upward to Tivoli NetView. This supports the programming of any event—whether or not it is to be responded to locally or forwarded upward. SNMP is the universal language of event transmission and reception used with UMA and Tivoli Management Software. UMA supports three standard types of input events:

- DMI indications
- Alarms from an internal scheduler
- Yes or No responses to message box questions

UMA is extensible to allow the addition of other event types in the future, even in the field. All UMA events can create local responses, output DMI indications or send SNMP alerts to one or more SNMP managers. Following is an example of how a Tivoli NetView console might display UMA-generated client-specific information integrated into the NetView native database with custom views of DMI and eventually WBEM information.

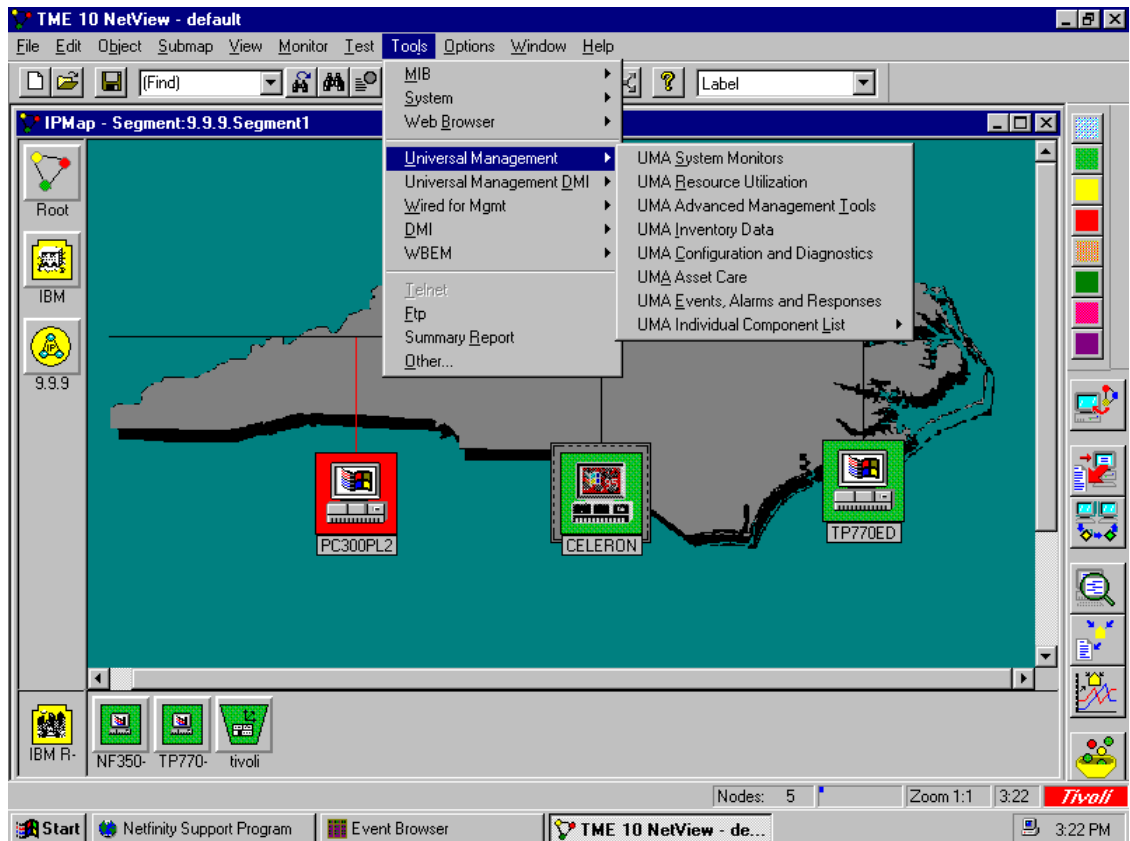


Figure 12. Tivoli NetView console showing direct access to various UMA functions

Alert Management

UMA sends the same SNMP alerts that the NetView systems management application would natively understand since it is an SNMP receiver (i.e., SNMP manager). The events are logged and Tivoli NetView custom log viewer filters provide multiple views for UMA alerts.

In addition, UMA can be configured to respond to events locally. That is, a UMA-managed client system can respond immediately and independently to any event it detects (page an administrator, back up a hard disk drive, etc.). UMA can then follow up by forwarding the alert to the enterprise management application for reporting. This may be particularly useful when managing an IBM Netfinity server where hardware component failure can be immediately relayed so that service can be dispatched, as well as being logged and tracked via Tivoli as part of an enterprise view.

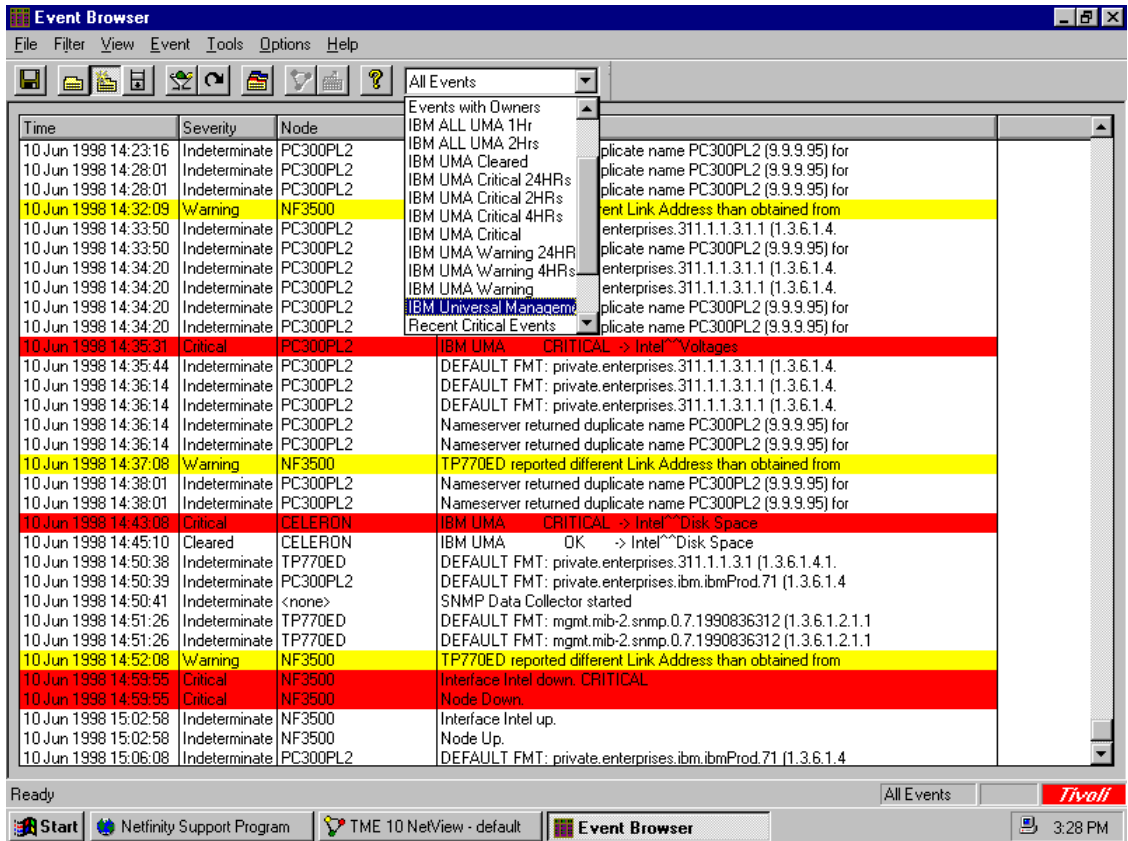


Figure 13. Tivoli NetView console display of UMA-generated alerts

UMA uses Tivoli's provisions for responding to SNMP traps where control is passed to the Tivoli console running UMA-Console Support Code (not on the local UMA client system). This further decodes the SNMP message and interacts with the Tivoli console to determine which responses the system administrator would like to invoke, if any. Choices include e-mail, paging, command execution, audio message playback and message box display.

Microsoft Systems Management Server (SMS)

Microsoft SMS centrally manages Windows 95, Windows 98 and Windows NT machines on a network of literally any size, enabling administrators to detect all powered-on client systems in the network, to inventory their software and hardware configurations and to return key information to a central database that can be queried.

SMS identifies and maintains a central inventory of client systems and servers after automatically installing its client management agent on all client systems from a single location. SMS can remotely control screen, keyboard and mouse, execute programs or reboot individual Windows 95, Windows 98/NT-based machines, as well as examine performance and events. Additionally, electronic software distribution and installation allow the system administrator to perform unattended software installations using inventory information to properly target machines. Likewise, remote diagnostic tools allow the network administrator to perform remote troubleshooting and problem resolution for networked workstations and servers. SMS Network Monitor Agents support password protection and Microsoft SMS takes advantage of the built-in security and networking features in the Windows NT.

UMA integrates into SMS to access UMA functions directly within the SMS framework for proactive problem determination, more extensive system alerts and extended SMS functions. The UMA integration gets the DMI and system information and pulls it into the SMS database to provide more accurate and dynamic access to Life Cycle Management Tools.

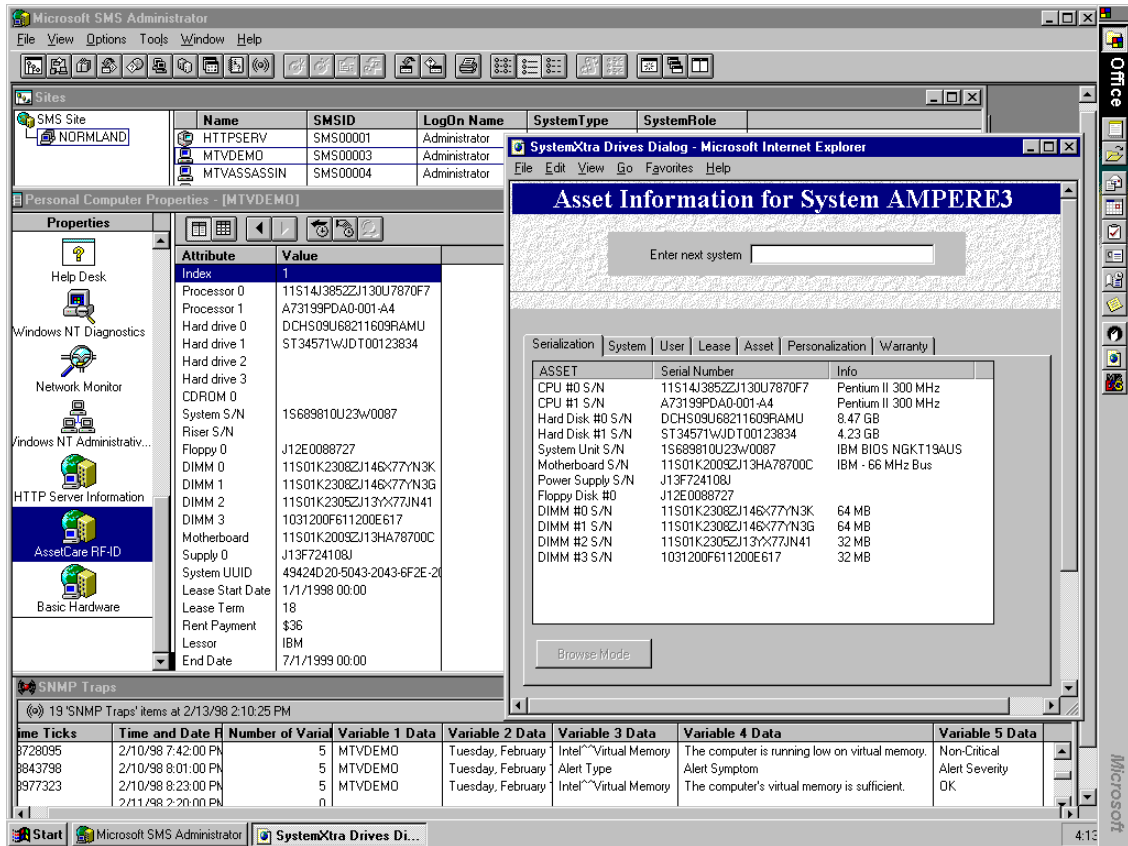


Figure 14. UMA functions being accessed directly from the Microsoft SMS framework

Intel LANDesk Client Manager

Intel LANDesk Client Manager (LCM) provides the ability to discover client systems running the LCM agent. The LCM console displays the discovered client systems, but does not offer grouping capabilities. Client systems may also be selectively discovered based upon the set of management services that are resident on the client system. IBM extensions to LCM in UMA provide Web browser access directly to client systems running an IBM system management Web server (but do not provide client systems discovery). UMA provides a mechanism to add tools into some workgroup managers that allow UMA functions to appear on the workgroup manager console. Discovery of the client system is performed using the workgroup manager's agent resident on the client systems.

For More Information

For information via the World Wide Web	www.ibm.com/pc/us
For product and dealer location information	1 800 426-2968
To access the IBM PC Company Bulletin Board	1 919 517-0001
For product information sent directly to your fax machine	1 800 IBM-3395 (1 800 426-3395)

¹ A product of the IBM/Intel Advanced Manageability Alliance that includes LANDesk features.

² Scalability is not perpetual. Some limitations apply.

³ Planned availability 1Q99.

⁴ Asset ID allows your personal computer to be "scanned" by various radio-frequency devices supplied by third-party companies. These scanning devices are planned to be available in 4Q98.

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