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## Contents



# Compaq Desktop Management - Intelligent Manageability for IBM OS/2 Warp

***Abstract:*** *Intelligent Manageability is Compaq's management solution that lowers the total cost of ownership by making PCs more manageable and less expensive to own. This technical guide discusses the full set of Intelligent Manageability features available for Compaq Deskpro 2000, 4000, 6000, EP, and EN series running IBM's OS/2 Warp Connect and Warp 4.0 operating systems.*

## EXECUTIVE SUMMARY

Compaq's Intelligent Manageability features that support IBM OS/2 Warp Connect focuses on three areas to manage the cost of maintaining Compaq desktops:

- Asset Management
- Fault Management
- Security Management

Compaq's Intelligent Manageability package for OS/2 that addresses these desktop management areas includes the following software components:

- SNMP (Simple Network Management Protocol) Agent for OS/2
- DMI (Desktop Management Interface) agent for OS/.
- Local Alerter for OS/2
- Remote Management Utility Toolkit for OS/

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Compaq Desktop Management -Intelligent Manageability for IBM OS/2 Warp
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# Overview

Desktop computers are becoming far more expensive to maintain than the capital costs of the hardware itself. Long-term cost of ownership studies put the yearly cost per desktop PC from $4,000 to $12,000. The largest part of this cost is from providing service and support to end users. A recent report by the Gartner Group estimates that the Total Cost of Ownership (TCO) of an Intel based PC over its expected five-year life is $41,439. More than 30 percent of this cost is direct technical support and maintenance for end users.

To control these costs, system administrators are implementing high-level system management tools such as Compaq's Insight Manager product. Furthermore, corporations are implementing management tools into their corporate policies. These tools provide asset and license management that can report asset data to a corporation's fixed asset department or license data to prepare for an audit.

Not only do system administrators need these tools on site, but they need the tools to work remotely across different sites. This saves the system administrator from expensive and time consuming travel to support or maintain a desktop in a distributed environment.

OS/2 Warp 4 is typically used by power users. A power user is an end user that requires a lot of resources from the PC. This type of end users tends to require an extensive amount of support and service. They expect the hardware running OS/2 Warp to be reliable and maintained. Because power users of OS/2 are typically sophisticated enough to tinker with systems to match their own preferences, instead of corporate policy, the system administrator needs to have management tools that can detect failures before they occur, along with notification of failures when they actually happen.

Compaq has addressed the desktop management needs for OS/2 users in its Intelligent Manageability for OS/2 package. Intelligent Manageability is Compaq's response to customers' needs for easy-to-manage PCs in a stand-alone and distributed network environment.

The Intelligent Manageability for OS/2 package is designed to be a solution for customers of OS/2 Warp Connect and Warp 4 to control the total cost of ownership for their PC. This is accomplished by providing the Remote Management Utility Toolkit for OS/2, SNMP and DMI Agent for OS/2, and the Local Alerter for OS/2.

These tools cover the three areas of desktop management:

- Asset Management – provides you with detailed configuration information about the PC and allows the System Administrator to inventory and track PCs and their components from one central location.
- Fault Management – provides you and the System Administrator with pre-failure and other Alerts. Pre-failure Alerts generate advance warning to minimize downtime and data loss from hardware failures.
- Security Management – prevents unauthorized access to critical data and valuable PC components.

Compaq's Intelligent Manageability package for OS/2 that addresses these desktop management areas includes the following software components:

- SNMP (Simple Network Management Protocol) Agent for OS/2 – responds to any SNMP requests issued by a SNMP management console such as Compaq Insight Manager or Tivoli Net Finity TME10.

- DMI (Desktop Management Interface) agent for OS/2 – invokes the agent to serve requests from any DMI management console.
- Local Alerter for OS/2 – works in tandem with the SNMP agent to Alert the user with pre-failure and failure notifications.
- Remote Management Utility Toolkit for OS/2 – is designed to aid System Administrators in preparing and performing ROM Flash or security changes of a remote machine.

In addition, the Intelligent Manageability package for OS/2 will allow administrators to remotely flash the Read Only Memory (ROM) of a target desktop from a server through the use of a third-party Software Distribution Application (SDA) such as IBM's Net Finity Server or Microsoft's System Management Server (SMS).

# Asset Management

Asset management is the process of tracking valuable PC assets over the network from a central management console. Gathering asset information remotely will save the cost of visiting each desktop system to gather inventory information. Furthermore, asset management provides an efficient way of determining system configurations for diagnosing end user problems.

The Intelligent Manageability package for OS/2 provides a number of asset control features for Compaq Desktops running OS/2 Warp Connect or OS/2 Warp 4. These features supply data such as model and serial number of desktop components along with revision levels of firmware and ROM. Given all these features the system administrator or end user will be able to retrieve important system configuration information.

## SNMP and DMI Agent for OS/2 Delivers Asset Control

Asset Control provides the capability to track PC component information. All Asset Control information is stored in the hardware devices and can be retrieved by Compaq Insight Manager or other third party management applications, such as Tivoli TME10, through the SNMP Agent for OS/2.

The Asset Control features available on Compaq Deskpros running OS/2 are:

- **System Serial Number, Manufacturer and Model** – Compaq assigns a serial number, the manufacturer and model information to each unit. This data is automatically stored in the computer's hardware.
- **Hard Drive Manufacturer, Model and Serial Number** – Hard drive manufacturer, model and serial number are stored in the hard drive firmware and extracted via the hard drive driver.
- **Monitor Manufacturer, Model, and Serial Number** – Compaq's Asset Control Monitors have been designed to conform to VESA's Display Data Channel (DDC) specification. This data channel provides a way for the monitor to automatically communicate configuration and asset information to the PC.
- **Asset Tag** – The Asset Tag is intended to be used as a repository for storing company-specific property asset numbers for easy tracking. The Asset Tag is stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Computer Setup.

- **System Board Revision Level** – This feature allows management software to read the revision level of the system board. When the factory builds a new system board, the revision level is digitally encoded into the hardware and cannot be modified.
- **ROM Revision Level** – System ROM revision levels are identified by the date of release. Each time a new ROM revision is flashed onto the system boards, the ROM revision level is updated. The ROM revision date is stored in an industry-standard memory location so that management software applications can poll this location and report the information.

## Remote Management of Asset Control Data for OS/2 through Compaq Insight Manager

Using the industry-standard SNMP protocol found in IBM OS/2 Warp Connect and Warp 4, Compaq Insight Manager delivers world-class client server management for all commercial products from Compaq. One of Insight Manager's core features is the ability to connect to the Insight Management Agent running on all desktops and remotely view the Asset Control and other configuration data.

The Compaq Insight Manager is run on a console that communicates with Insight Management Agents running on each managed device via industry-standard SNMP.

## Remote Management of Asset Control Data for OS/2 through Third Party Management Applications

Third-party management applications such as Tivoli's TME10 or IBM's Net Finity for OS/2 are able to communicate with IBM OS/2 SNMP Master Agent. This allows Compaq's Insight Agent to filter information to the Master agent using the Distributed Programming Interface (DPI). Figure 1 shows the SNMP Architecture for OS/2.

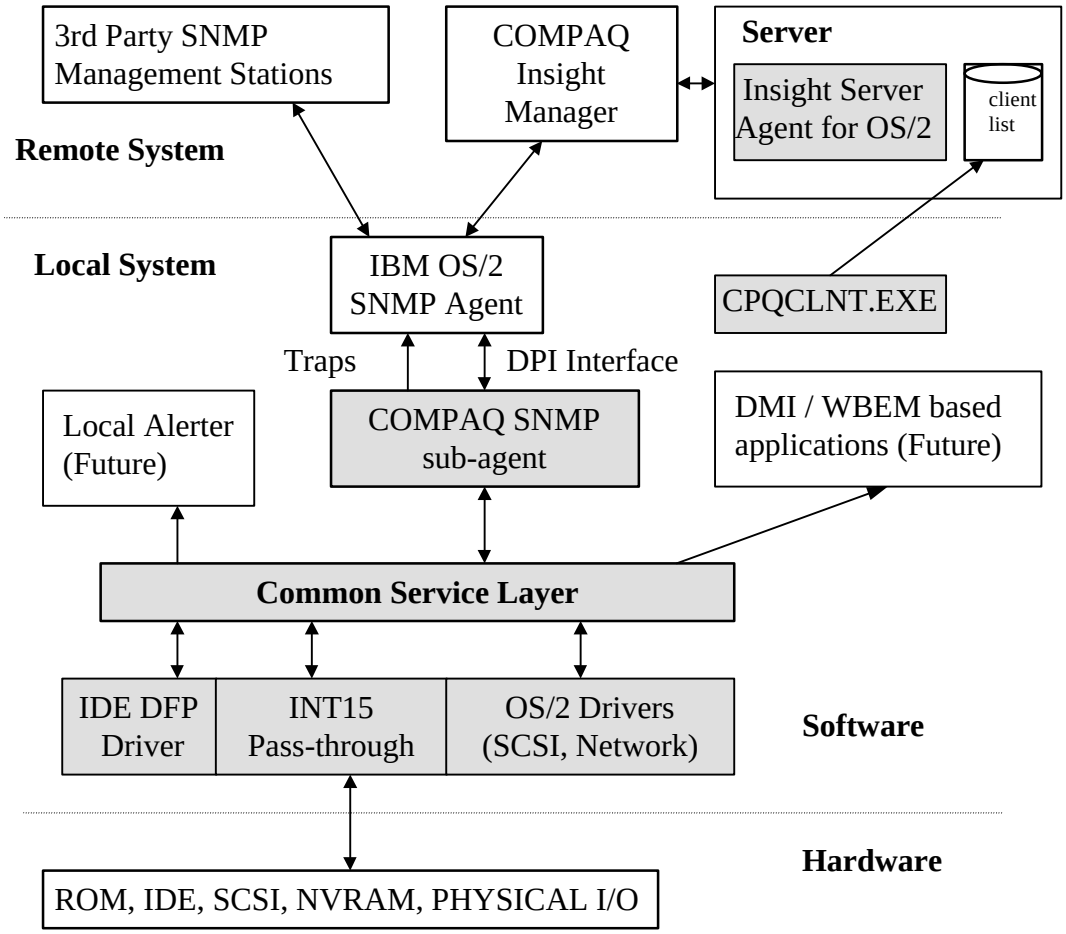


**Figure 1. Architectural overview of Desktop Management for OS/2**

# FAULT MANAGEMENT

Compaq Deskpros offer relatively easy troubleshooting because hardware and firmware have been combined with partnerships to avoid failures and allow for rapid recovery if problems occur. Their fundamental benefits include the ability to protect data and minimize end-user downtime, thus increasing the productivity of both the end-user and the PC administrator. End-users will feel more secure knowing that their systems and data are protected while the PC administrator will benefit from smoother and faster service calls that can be a significant benefit over time.

Compaq's Intelligent Manageability package for OS/2 delivers fault management through the "Local Alerter on OS/2 Desktop" feature. This feature is a native OS/2 Presentation Manager application that runs locally on the OS/2 desktop. It is intended to provide information on any change in status of certain components of the system. Using the Local Alerter feature provides the maximum protection for users of OS/2 Warp Connect and Warp 4.

# Local Alerter on OS/2 Desktop

The Local Alerter application monitors the status of specific devices using either Self-Monitoring Analysis and Reporting Technology (SMART) or Intelligent Manageability features provided by Compaq desktops.

The Local Alerter is dependent on the SNMP Agent for OS/2 to detect changes in status and generate trap notifications. Upon a change in status, the following actions will be generated by the Local Alerter:

- Notify the local user via a pop-up dialog on a good-to-bad basis
- Show the device information in a pop-up dialog for the failing device
- Log the event in a log file with time stamping
- Set default for action messages
- Set default poll frequency

When an Alert event occurs, the Local Alerter application shall notify the local user via a pop-up dialog box accompanied by an audible signal to draw the user's attention to the monitor. The Alert pop-up shall contain text explaining the type of Alert and some recommended actions along with device information.

The Alert dialog recommended action messages are modifiable via a "Properties" sheet. The sheet is accessible to the user by double clicking on the Intelligent Manageability icon on the desktop. In addition, the user is allowed to disable the displaying of the local Alert messages. Furthermore, using the Properties Sheet allows the user to set defaults for action messages and polling frequency to check the status of the devices.

## Supported Devices and features for Monitoring

Table 1 shows the devices that the Local Alerter supports and the way the devices are monitored through either SMART or Compaq's Intelligent Manageability feature.

**Table 1. Supported devices and monitored features for the Local Alerter application**

| Device | Feature | Monitored by |
|---|---|---|
| CPU | Unsafe system temperature | Intelligent Manageability |
| Hard Disk | IDE hard drive pre-failure condition<br>SCSI hard drive pre-failure condition<br>Ulta ATA fault condition | SMART |
| Memory | ECC memory faults<br>Memory configuration change | Intelligent Manageability |
| Monitor | Unsafe Monitor temperature range<br>Monitor hardware fault | Intelligent Manageability |
| Hood Removal | Removal of hood condition | Intelligent Manageability |

## CPU Temperature Status Alerts

The Local Alerter application displays an Alert pop-up dialog only when it determines that the system temperature has gone from the normal operating temperature range to the cautionary temperature range. The Alert pop-up remains on the screen until you acknowledge it by selecting the “OK” button. Once you have closed the temperature Alert pop-up, the Alert application will not display the pop-up again until it sees the transition from the normal operating temperature range to the cautionary range. However, if the Alert application sees such a state transition while the Alert message is still up, it does not pop-up another message thereby preventing too many similar messages floating on the screen.

A temperature Alert contains two sections of text:

- a brief explanation of the Alert and a recommendation of immediate actions that should be taken
- more detailed instructions to the user

You can edit this string by setting the Property Sheet. Press the Print button on the dialog to print the Alert message to the default printer.

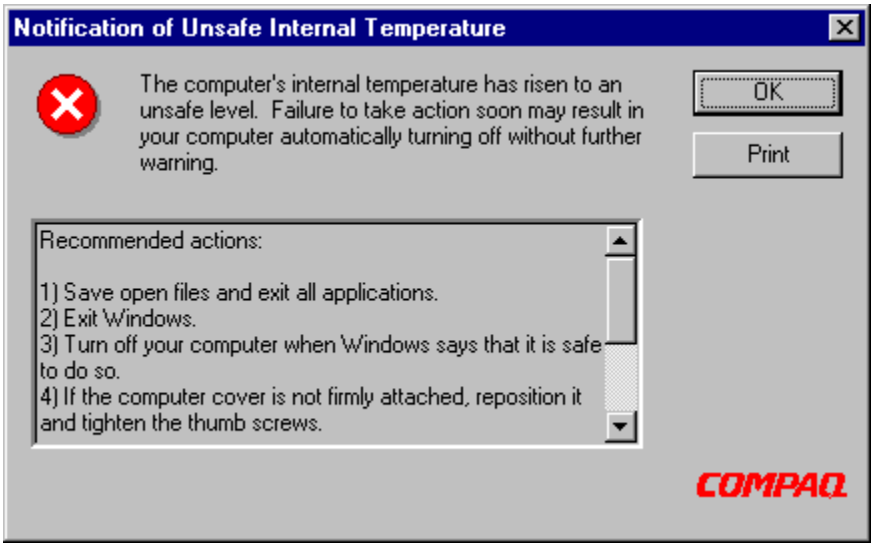


**Figure 2. Notification of CPU Temperature Alert dialog box**

## Hard Drive Pre-failure Alerts

The Local Alerter application displays an Alert pop-up when it determines that any Warranty Failure attribute value exceeds the corresponding Warranty Pre-failure threshold value. of the monitored drives.

The hard drive pre-failure notification should appear only when a specific drive transitions from an OK to a DEGRADED condition (at least one warranty attribute has exceeded its threshold). The Alert application considers a drive to be “reset” to OK if the application receives ALERT_DRIVE_OK from CSL. Each failed drive has an Alert message displaying its own information. Like the CPU Thermal Alert, if the Drive A Alert message is still on the screen and Drive A receives another state transition from OK to DEGRADED, a new message is unnecessary. However, if Drive B fails, there is another message popping up for Drive B.

The hard drive pre-failure pop-up contains three sections of text:

- a brief explanation of the Alert and a recommendation of immediate actions that should be taken
- more detailed instructions to the user

You can edit this string by using the setting Property Sheet. If the customized text exists in the file, it will display the associated user customized text rather than the default text. If a null customized string is specified, then the default message shall be displayed. Press the Print button on the dialog to print the Alert message to the default printer.

- the pre-failure hard drive information

This section of text includes the error number, disk controller and failed hard drive, serial number, model number of the drive, capacity, serial number of the drive, and the controller firmware revision.

Figures 3 through 5 outline three different requirements of “Hard Driver Pre-failure Alert” Dialogs:

- IDE Drive Pre-failure Alert
- SCSI Drive Alert
- Ultra ATA Fault

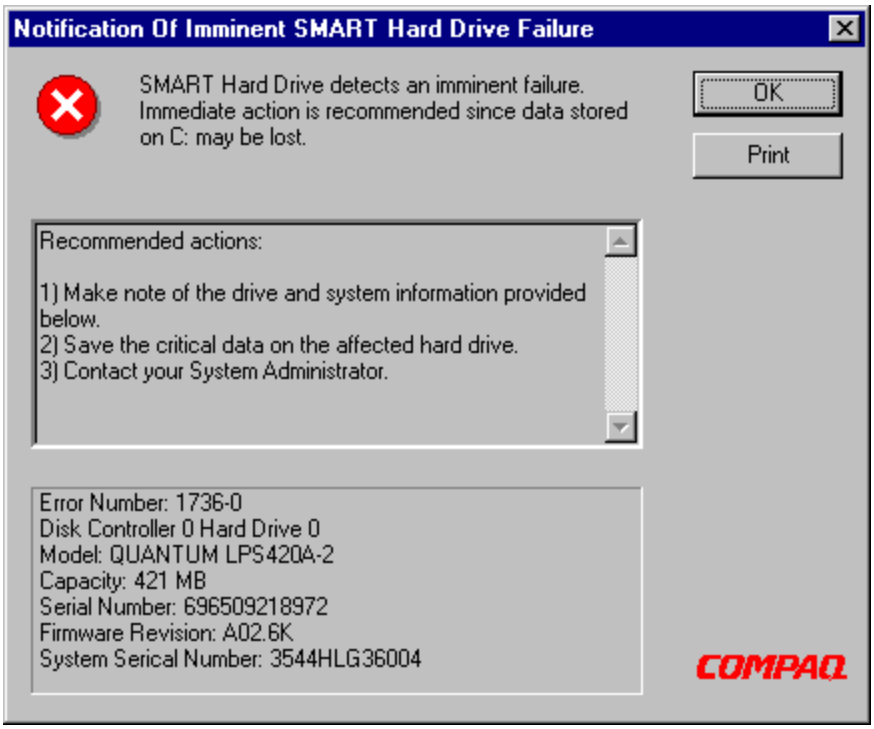

**Figure 3 – IDE Drive Pre-failure Alert**

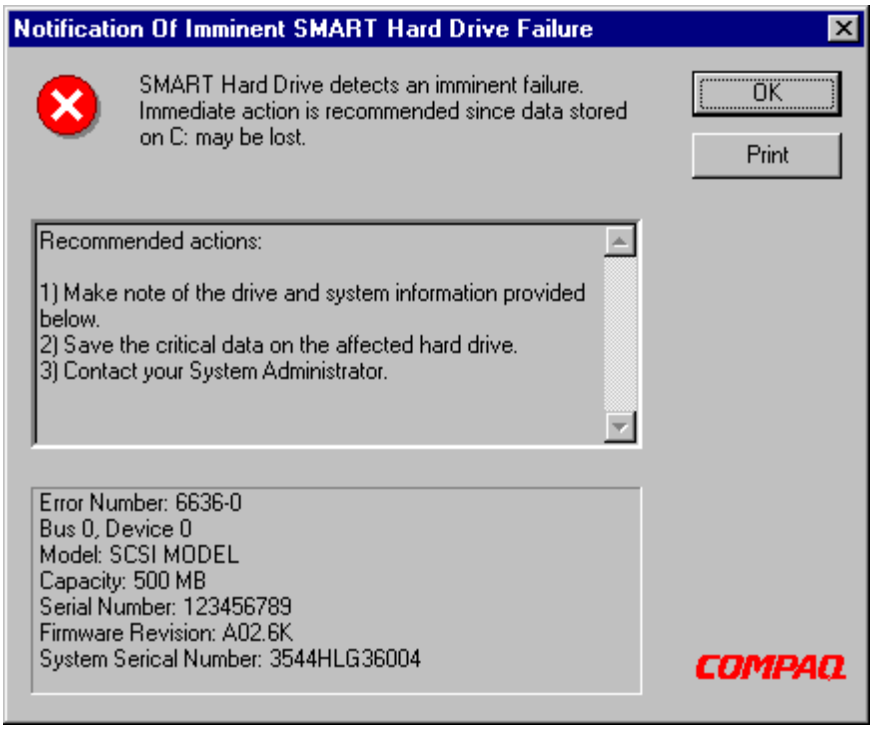


**Figure 4 - SCSI Drive Alert.**

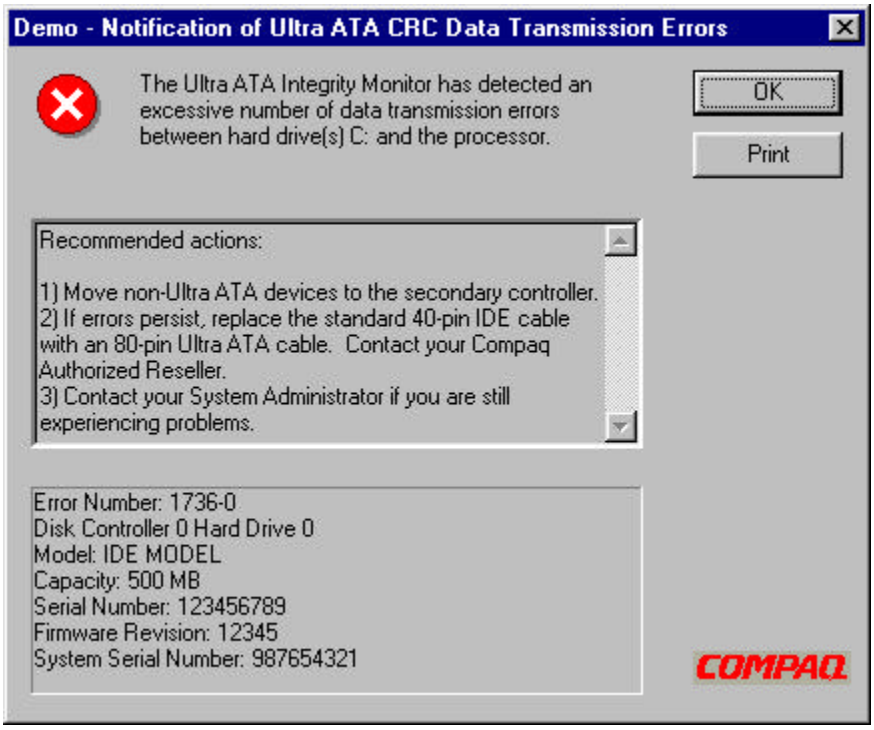


**Figure 5 – Ultra ATA Fault**

## ECC Memory Pre-failure Alerts

The Alert application displays an Alert pop-up when it detects an excessive number of correctable memory errors. There is a pop-up dialog for each ECC memory module failure. The Alert pop-up remains on the screen until the user acknowledges it by selecting the “OK” button.

The ECC Memory pre-failure notification appears only when the status of the ECC memory changes from an OK to a DEGRADED condition (at least one warranty attribute has exceeded its threshold). Like the Drive, each memory slot shall have its own Alert message.

The ECC memory pre-failure pop-up contains three sections of text:

- a brief explanation of the Alert
- detailed instructions to the user
- the ECC memory module information

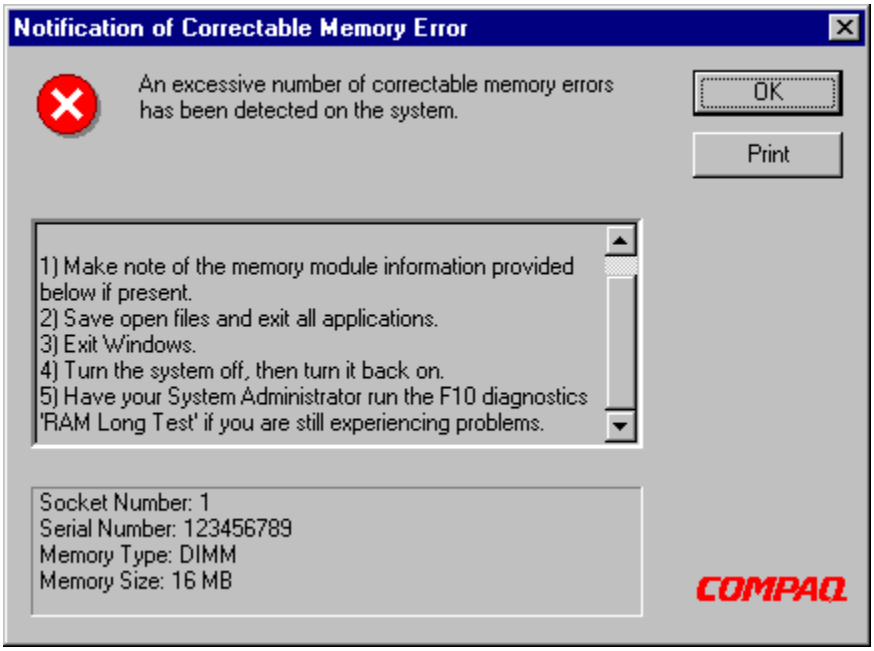


**Figure 6 - ECC Memory Alert.**

However, some of the ECC memory modules do not report the pre-failure memory module and thus the memory asset information will be empty.

## Monitor Temperature and Monitor Hardware Status Alerts

The Alert application displays an Alert pop-up when it detects that the monitor temperature out of range or the monitor hardware fault (power voltage out of range, power current out of range, horizontal deflection, vertical deflection, I/O controller operation failure). The monitor Alert pop-up contains three sections of text:

- a brief explanation of the Alert
- detailed instructions to the user
- the ECC memory module information

Figure 7 outlines the requirements for “Monitor Temperature Alert” Dialog.

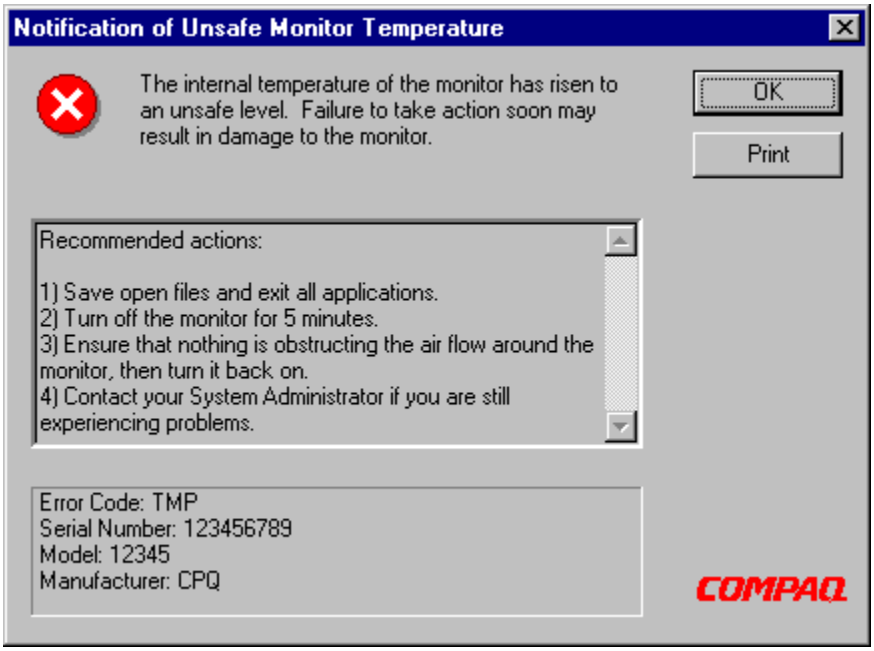


**Figure 7 - Monitor Temperature Alert**

Figure 8 outlines the requirements for “Monitor Hardware Pre-failure Alert” Dialog.

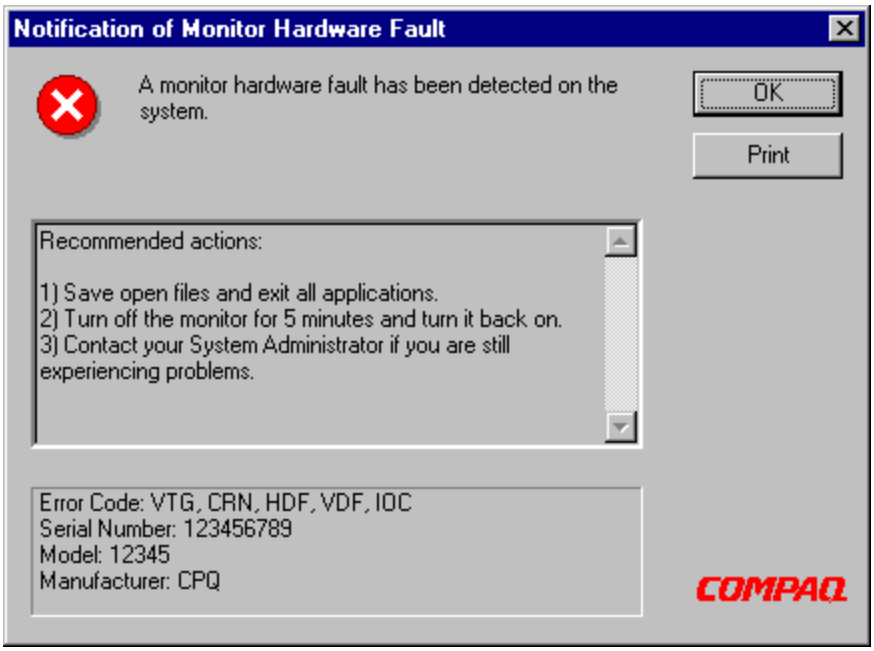


**Figure 8 - Monitor Hardware Pre-failure Alert**

## Properties Sheet

Under OS/2 Warp connect and WARP 4.0, you can access the Properties Sheet from the Intelligent Manageability icon on the Desktop. The Properties Sheet allows you to view and customize the recommended text for the Alert and customize poll frequency.

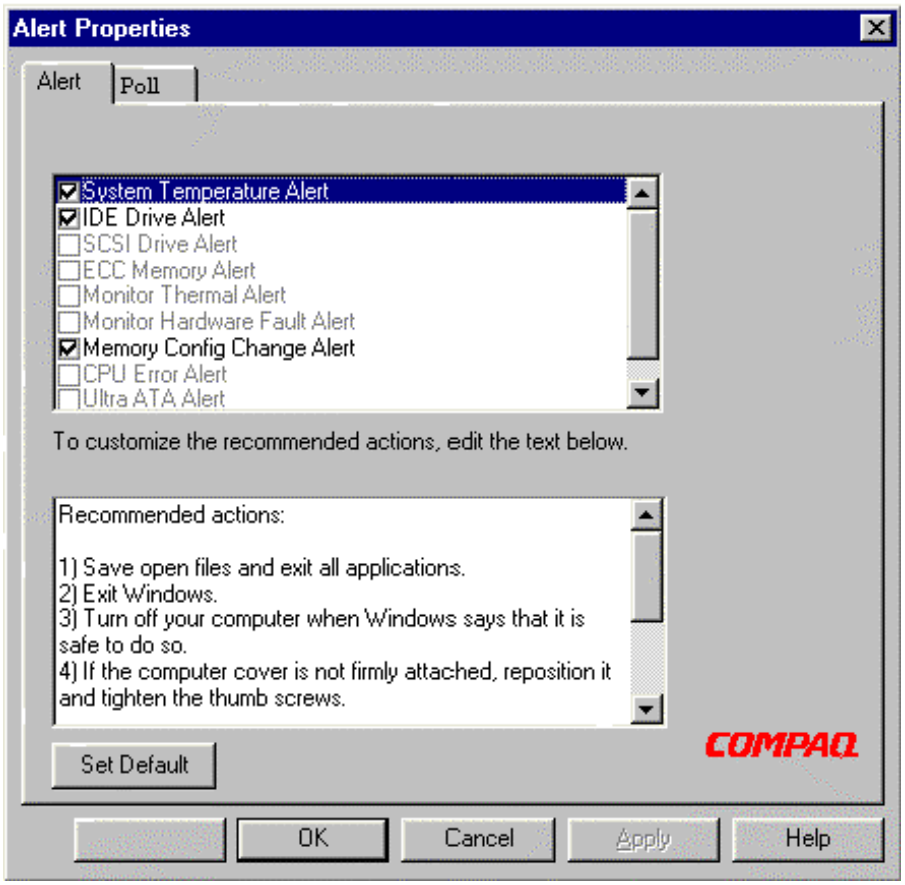


**Figure 9 - Alert Page**

## Hood Removal Notification

The Local Alerter displays a pop-up dialog to notify you that the hood on the computer has been removed or is not closed properly.

# SECURITY MANAGEMENT

Greater access to information through computer networks has benefited companies in many ways but it has also caused serious problems with computer security. Fortunately, Compaq has addressed security management issues with two features:

- "Memory Configuration Change Alert"
- Remote Management Utilities for OS/2

These two features provide a total package of preventing security violations on Compaq Deskpro computers.

## Memory Configuration Change Alert

The Alert application displays an Alert pop-up when it detects that the memory configuration has been changed and update the current configuration in the cpqmem.log file.

The Memory Configuration Change Alert pop-up contains three sections of text:

- a brief explanation of the Alert
- detailed instructions to the user
- the previous and current configuration information

The Compaq Insight Management Agent monitors the memory configuration tracking the serial number for each memory module. During the boot process the memory configuration is verified and, if a memory configuration change is detected, an Alert message is displayed.

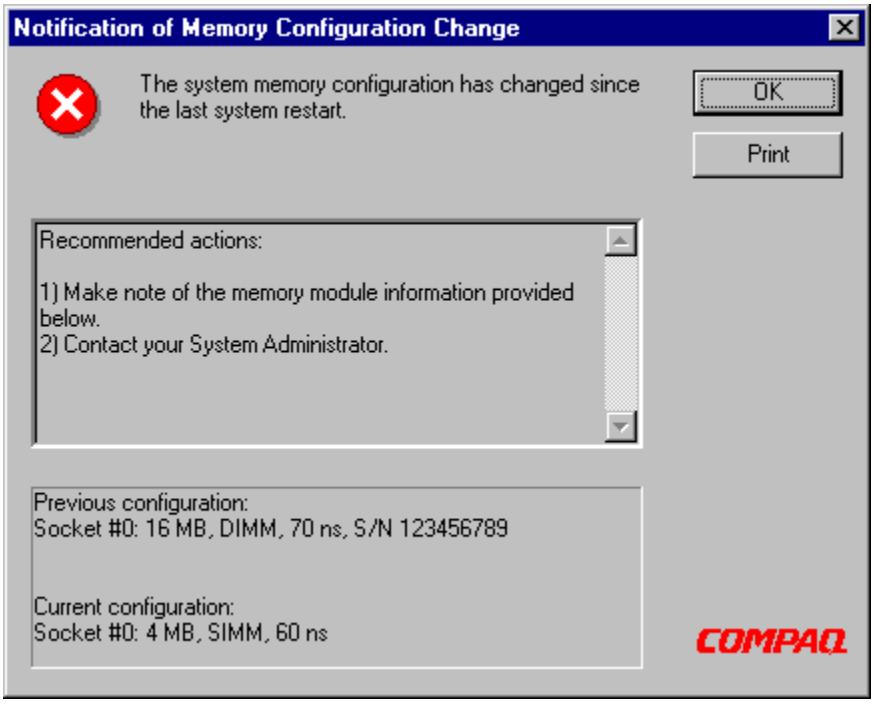

**Figure 10 - Memory Configuration Change Alert.**

## Remote Management Utilities for OS/2

Remote Security setup will allow the system administrator to set/reset the security attributes of the remote machine. This utility consists of tools to aid system administrators in creating packages (group of files) for downloading to a remote system using a third-party Software Distribution Application (SDA). The downloaded software is executed on the remote machine by SDA that will lead to remote security setup. This Compaq support toolkit will consist of a Graphic User Interface (GUI) utility with a command line interface also defined.

The security attributes that the system administrator can set are the following:

- Quick Lock – allows the administrator to disable the keyboard and mouse interface from within an application. To re-enable the input device interface and access the application, you must enter the Power-ON password that was established in the security package.
- Quick Blank – allows the administrator to blank the screen from within an application. To re-enable the screen the power-on password must be provided.
- Removable Media Boot – prevents computer startup from the removable media drives.
- Removable Media Write – prevents the user from writing to the removable media drives and allows only read access from these drives.
- IDE Controller – prevents computer startup from the devices connected to the IDE controller.
- SCSI Controller – prevents computer startup from the devices connected to the SCSI controller.
- Serial Ports – prevents the transfer of data through the integrated serial interface.
- Change Administrator Password – allows the administrator to remotely change the administrator password. This prevents reconfiguration of the computer until the password is entered.
- Smart Cover Lock – inhibits access to the interior of the computer to prevent unwanted configuration changes or component removal.
- Smart Cover Sensor – is a combination of hardware and software that can Alert administrators when the computer cover or side panel has been removed.
- Universal Serial Bus (USB) – prevents the transfer of data through the integrated USB interface.
- Ownership Tag – displays the owner of the computer at startup.
- Asset Tag – a unique number or text string that is used to help track a specific computer system.

## Security Package Creation Utility

Before the system administrator can control security attributes, the generation of execution scripts and a security package must be developed using the Remote Utilities for OS/2. Table 2 shows the content of a standard security package for OS/2.

**Table 2 Standard Security Package for OS/2**

| Filename | Description |
|---|---|
| Execution Scripts (SDA specific) | Using SDA commands |
| CPQSCOS2.EXE | Target machine application to set security features |
| CPQSECURE.SST | Security file containing administrator password. The password will be in encrypted form, *(This needs to be verified ).* It also contains the security feature values. |
| Summary.txt | Contents of the Summary Dialog box saved to a text file for reference. |

The execution scripts are created through the use of the SDA tool used by the system administrator. The executable CPQSCOS2.exe is a file that runs on the remote desktop and sets the security features on that machine. Before setting any security features, the administrator's password on the remote machine is verified with the password in the package. If there is a match then the security changes are made. Otherwise, the program exits with appropriate error messages.

A normal execution flow for Remote Security Configuration is as follows:

1. The administrator launches the Remote Management Setup Utility.
2. The administrator selects a Security Template Input file from the user interface.
3. The administrator enters the administrator's password for the target machines.
4. The administrator configures the security options he wishes to set on the target machines.
5. The administrator chooses a new folder for the target application to reside and exits the user interface.
6. The administrator uses a third party SDA to remotely execute the target application on the target machines.
7. Error messages and log files are returned to the administrator, if possible.

All the packages generated by the Remote Utilities for OS/2 are stored in the Compaq Remote Package directory.

## Remote ROM Flash

The Remote ROM flash feature allows the administrator to flash ROM of the remote machine from the administrator console. Remote ROM flash utilities will supply a software tool to aid system administrators in creating packages (group of files) for downloading to a remote system using a third party Software Distribution Application (SDA). The downloaded software (members of this utility set) is executed on the remote machine by SDA, that will lead to remote ROM flashing. This Compaq support toolkit will consist of a GUI utility with a command line interface also defined.

## Package Creation Utility (RSTUPOS2.EXE).

The administrator sitting at the server runs this utility. This GUI utility accepts the filename of the ROM image and the remote machine administrator's password, then creates a package. The constituents of this package are given in Table 3:

**Table 3 Constituents of the Remote ServerPackage / /**

| Filename | Description |
|---|---|
| Execution Scripts (SDA specific) | Any scripts needed by this utility to properly execute on the remote machine. These need to be developed. |
| RMFSHOS2.EXE | Utility needs to be developed to Flash ROM. This runs on the remote machine. |
| <filename>.OCX | ROM Image file. Compaq provides ROM image. RMFSHOS2.EXE should accept the ROM image file name as a parameter. |
| CPQSECUR.SST | Security file containing administrator password. The password will be in encrypted form, *(This needs to be verified )* |
| Summary.txt | Contents of the Summary Dialog box saved to a text file for reference. |

## Utility for flashing the ROM (RMFSH0S2.EXE).

This utility runs on the remote machine (client). Its job is to verify the setup password on the remote machine with the one that is given during creation of the package. If they match, then flash the ROM. If not, exit with appropriate error messages.

Compaq systems have a fail-safe mechanism in case the ROM becomes corrupt, either due to a failed flash or for other reasons. When the ROM becomes corrupt, you cannot boot the computer normally. However, part of the ROM is protected by the Boot Block feature that will let you re-flash the ROM from a Compaq ROMPaq diskette. After you have reflashed, you can then boot your machine normally.

Error messages and log files are returned to the administrator if possible. This is dependent on the Software Distribution Application package being used. Error messages are also logged in the log files of the remote systems where failure occurred.

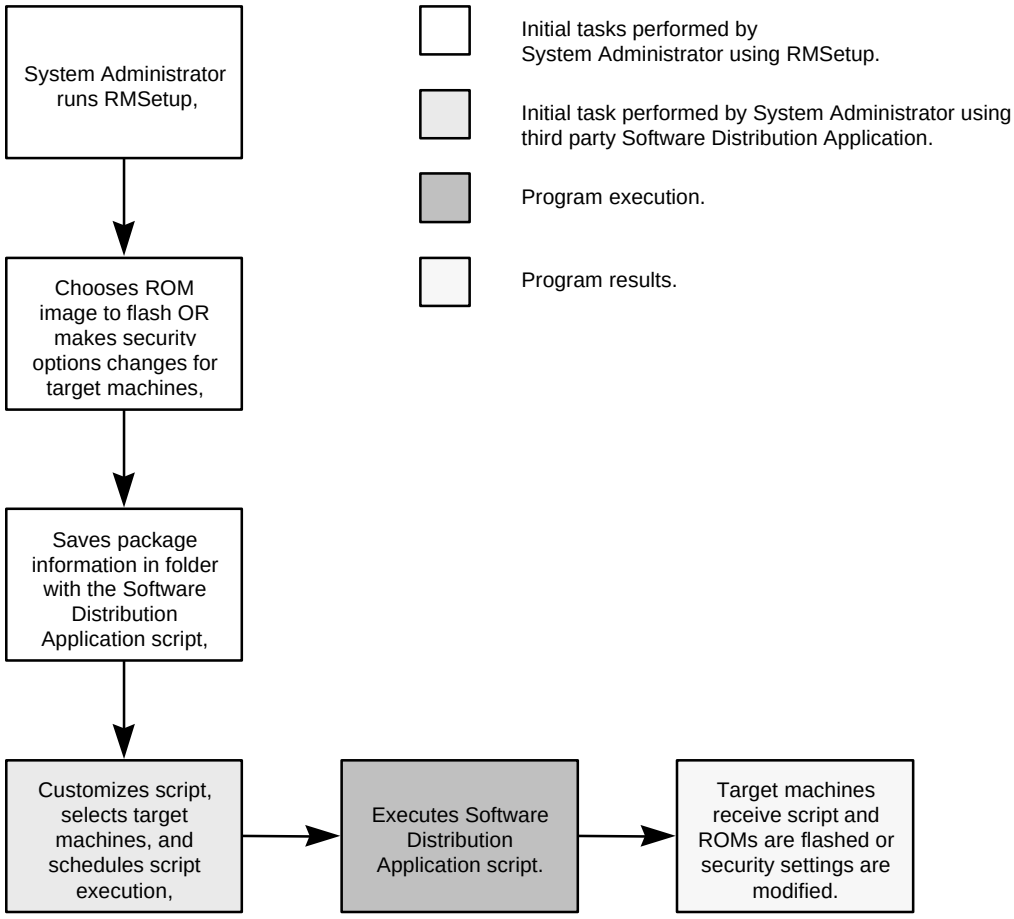


**Figure 11. Process Flow to create and distribute Security and ROM Flash images**

Using the Remote ROM Flash feature reduces system administration costs because it allows system administrators to maintain Compaq Desktops from a central location at the server instead of having to go to individual desktops. This is possible because the Remote Utilities for OS/2 provides two utilities:

Remote WakeUp - allows the system administrator to boot a remote machine

Remote Shutdown.- uses help from the SDA tool to shutdown Compaq Desktops.

When the Desktop is rebooted the ROM is flashed and then shutdown. When the Remote WakeUp utility boots the Compaq desktop, it upgrades the ROM.

# Intelligent Manageability Features

The Intelligent Manageability features are a combination of hardware and software features. The hardware features are present in all the machines, regardless of the operating system that is running on the system. Table 4 lists the set of Intelligent Manageability features supported by NT/Win95 and OS/2 Warp that were broadly classified in the previous section.

**Table 4 Intelligent Manageability Features**

| S. No. | Feature | NT Agents | OS/2 Agents | Hardware/ Software |
|---|---|---|---|---|
| **Asset Tracking & Security** | | | | |
| | Insight Personal Edition for viewing all the diagnostic details of the computer. | Supported | Planned for 1Q'99 | |
| | Replicated Setup | Supported | Not Supported | |
| | Remote System Installation | Supported | Supported | |
| | Net PC technologies | Supported | Supported (Does not support MS Zero administration toolkit) | |
| | System Serial Number, Manufacturer and Model | Supported | Supported | |
| | DIMM Serial Presence Detect | Supported | Supported | |
| | Hard drive Manufacturer, Model and Serial Number | Supported | Supported | |
| | Monitor Manufacturer, Model and Serial Number | Supported | Supported | |
| | Asset Tag | Supported | Supported | |
| | System Board Revision Level | Supported | Supported | |
| | ROM Revision Levels | Supported | Supported | |
| | Remote Security Management | Supported | Supported | |
| | Remote ROM flash | Supported | Supported | |
| | Remote Wakeup and Remote Shutdown | Supported | Supported | |
| | ACPI Ready Hardware | | | Hardware feature |
| | DMI Bios | | | Supported on all hardware |
| | Dual State Power button | | | Hardware feature |
| Software Updating and Management | | | | |
| | Compaq Management Solutions Partners Program | Supported | Not Supported | |
| | Compaq Restore CD | Supported | Not Supported | |
| | Compaq Info Messenger | Supported | Not Supported | |
| | Desktop Management Interface 2.0 | Supported | Not Supported (Supports DMI version 1.1) | |
| | Enhanced Support Software CD and WWW site | Supported | Supported | |

| S. No. | Feature | NT Agents | OS/2 Agents | Hardware/ Software |
|---|---|---|---|---|
| **Fault Notification and Recovery** | | | | |
| | Local and Remote Proactive Backup | Supported | Not Supported | |
| | Local and Remote Management - ECC Fault Prediction | Supported | Local Management is under development | |

| S. No. | Feature | NT Agents | OS/2 Agents | Hardware/ Software |
|---|---|---|---|---|
| | Local and Remote Management - Ultra ATA Integrity Monitoring | Supported | Local Management is under development | |
| | Local and Remote Management - Monitor Fault Diagnosis | Supported | Local Management is under development | |
| | Local and Remote Management - SMART II Hard Drives | Supported | Local Management is under development | |
| | Local and Remote Management - Thermal Sensor | Supported | Local Management is under development | |
| | ECC System Memory | Supported | Supported | Hardware feature |
| | ECC Fault Prediction with Prefailure Warranty | Supported | Supported | Hardware feature |
| | SMART II Hard drives and Prefailure Warranty | | | Hardware feature |
| | Thermal Sensor | | | Hardware Feature |
| | Surge Tolerant Power Supply | | | Hardware Feature |