

**pc resource
monitoring and
performance
advisor**

application note

www.hp.com/go/desktops



i n v e n t

Overview

HP Tootools is a modular web-based device management tool that provides dynamic information about HP hardware on your LAN.

Among the many features of HP Tootools (version 4.5 onward) is the resource monitoring facility, accessible using the Tootools Management Console. This feature permits you to monitor the hardware resources of remote PCs on the network.

Why Monitor Resources?

Resource monitoring can help you to:

- Detect and prevent system resource shortages and bottlenecks
- Identify potential areas for reallocating resources
- Determine system upgrade needs and plan for them
- Determine how to maintain or improve system performance
- Troubleshoot problems on remote PCs.

How Resource Monitoring Works

For each hardware resource on a remote PC, you can:

- Enable or disable monitoring of the individual resource
- Enable or disable event alerts.

Using the Tootools Device Manager, you can perform these actions on a single remote PC or on a selection of remote PCs. Also, when you install the Tootools for Desktops DMI Agent, you can select the option to enable the resource monitoring functions.

Note that the Resource Monitoring module is always installed automatically together with the Tootools for Desktops Agent, but is not necessarily enabled: When installing the DMI agent, you must select the option to enable Resource Monitoring; when installing the WMI Agent, Resource Monitoring is enabled by default without providing a user-option.

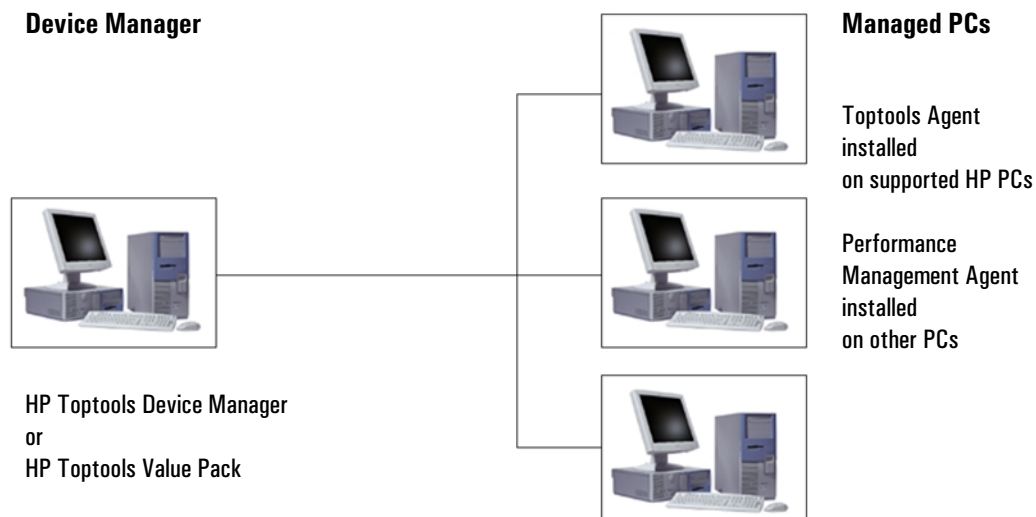
Once you have chosen the resources, Tootools monitors these resources continuously. If a resource exceeds a threshold, an alert is generated on the Tootools Management Console.

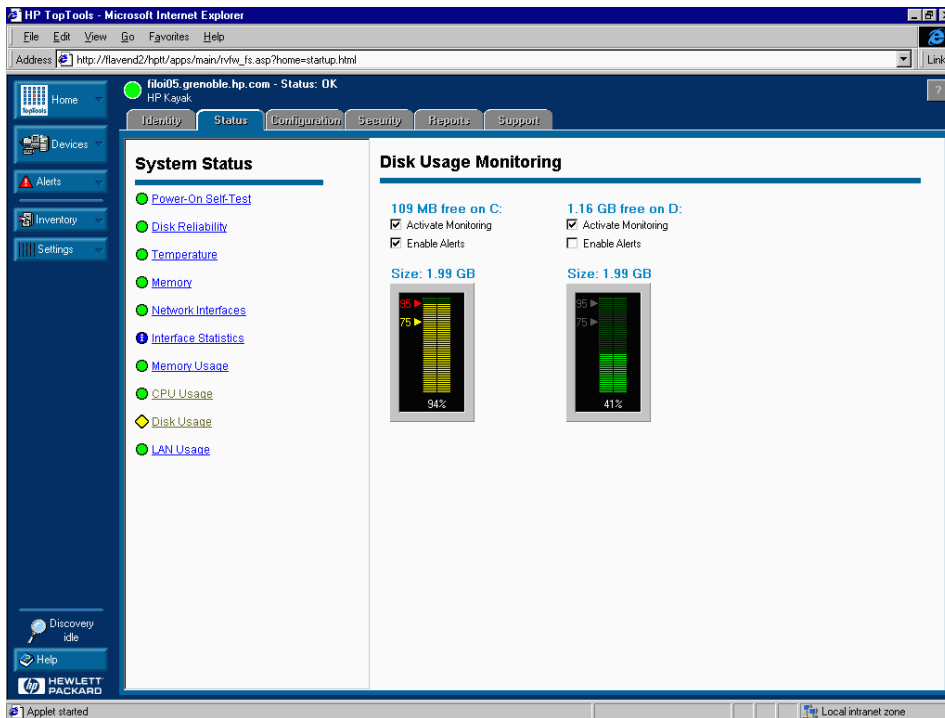
You can also view the monitoring of a remote PC's resources in real time from the Tootools Management Console.

Architecture

To set up network PC resource monitoring from Tootools, you require:

- Either Tootools Device Manager or the Tootools Value Pack installed on the Device Manager PC
- Supported HP PCs on your network must each have a copy of Tootools Agent installed and Resource Monitoring enabled
- All managed PCs other than supported HP models must each have installed a Performance Management Agent.





Resource Monitoring Example 1

This shows the monitoring of hard disk drives on a single remote Vectra PC.

The PC has two logical hard disk drives, C and D. For each, disk usage (over a time period) and the current amount of free disk space is shown.

You can disable or enable both monitoring and event alerts on each disk drive.

To change threshold values, simply drag the red or yellow arrow up or down, as desired.

To enable management of non-HP devices on your LAN using Toptools Device Manager, the non-HP PCs must run one or more of the management protocols SNMP, DMI 2.x, WMI or HTTP. The corresponding Agents must be obtained from the respective manufacturer.

For more effective management of non-HP devices, the HP Toptools Value Pack adds features for all devices including a System Performance Advisor, and SNMP trap reception for non-HP systems with loaded MIBs.

For further details, plus version information and availability of these software elements, see the 'More Information' section at the end of this Application Note.

Event Alerts

Event alerts are generated when certain pre-defined thresholds are exceeded, eliminating the need for constant visual monitoring.

Two levels of alert can be generated:

- Warning – this means that the situation has not yet reached critical level but the first threshold has been exceeded, so a warning is issued.
- Critical – this is the most serious alarm and it indicates that the level has become critical.

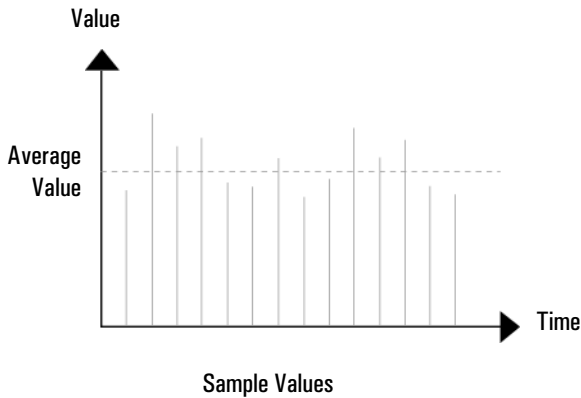
You can change these thresholds directly on the resource monitoring screen in the Toptools Device Manager.

Sampling Intervals

When monitoring resources, Toptools takes measurements in two different ways. The first, the simpler of the two, is a single measurement at an instant in time. For example, the amount of free disk space at a particular time.

The second type of measurement is taken over a fixed period of time, and reflects the average value during that time. For example, CPU usage and LAN bandwidth. This type of measurement is useful when a resource, during normal use, is subject to dramatic peaks and troughs over a short period of time. In this case, an average value is a better reflection of resource utilization, and it avoids the false alerts that would be produced when resource utilization suddenly peaks for a short period.

To get the average value, Toptools takes regular measurements in very short time intervals, for example, every 5 to 30 seconds.



These sample values are used to provide an average value over a much longer window of time, for example, over a period of an hour. It is this average value which is used to trigger alerts.

Which Resources can be Monitored?

CPU Usage

The remote PC's processor usage can be monitored. The value shows the percentage of time that the processor is busy (not idle). This measurement is taken over a fixed period of time, and reflects the processor's average usage during that time.

If the remote PC has two processors, each is monitored separately.

This measurement can be useful for detecting processor malfunctions, identifying processor undercapacity, or processor overcapacity for reallocating resources.

There are cases where the processor usage value is artificially high. For example, some screen savers use 100% of processor time when running, even though the PC is not being used. Another example is when the PC has been started but the user has not yet logged on. In some Windows operating systems, the login window that is displayed uses 100% of processor time until the user logs in.

Memory Usage

There are three useful measurements provided: swap activity, swap file usage, and physical memory.

Two of these measurements concern the Windows swap file. The swap file is a large file that the operating system uses to switch memory chunks between physical memory and the hard disk. In this way, virtual memory is created, extending the PC's available memory significantly. The PC can run much larger applications and process larger data chunks than it could without a swap file.

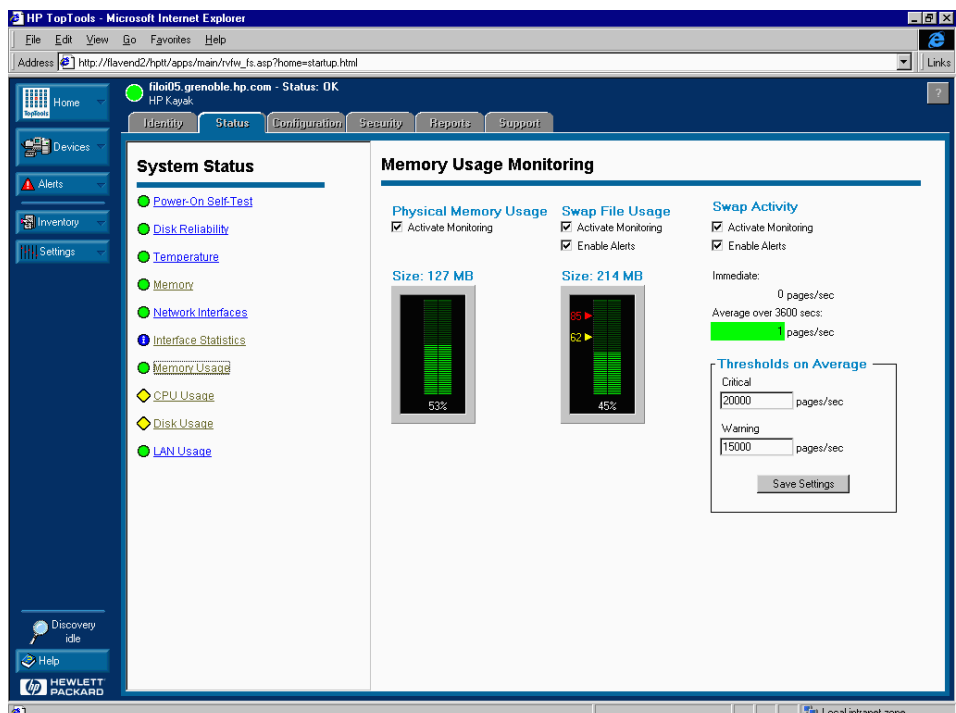
Resource Monitoring Example 2

This shows memory usage on a single remote Vectra PC

It shows physical memory usage, swap file usage, and swap activity.

You can disable or enable monitoring and event alerts for these measures (except on physical memory usage).

To change thresholds for the swap activity, simply enter new values in the space provided and click Save Settings.



Swap Activity

This measurement shows the average number of pages per second that are read from or written to the Windows swap file. This measurement is taken over a fixed period of time, and reflects the average rate during that time.

The swap activity measurement is particularly useful. A high value means that the remote PC does not have enough physical memory and it compensates by continually swapping data between system memory and the swap file. This slows down the PC considerably.

You can monitor the swap activity to easily identify remote PCs that require memory upgrades.

How high can this value go before it indicates a memory shortage? This depends on the PC. A high speed system can support a higher swap rate (without slowing down the PC) than a slow PC. With experience, you will learn which values can be regarded as too high for different types of PCs.

Swap File Usage

This shows the amount of swap file space currently being used.

The total amount of space that the swap file can potentially use is also shown. The total amount of space available depends on the operating system settings used, and, in some cases, available disk space.

If there is not enough free space for the swap file, memory allocation can fail, disrupting applications and even causing their operations to fail.

You can monitor this measurement to identify remote PCs that require a different swap file setting in the operating system, or more disk space (by installing a second hard disk, for example).

Physical Memory

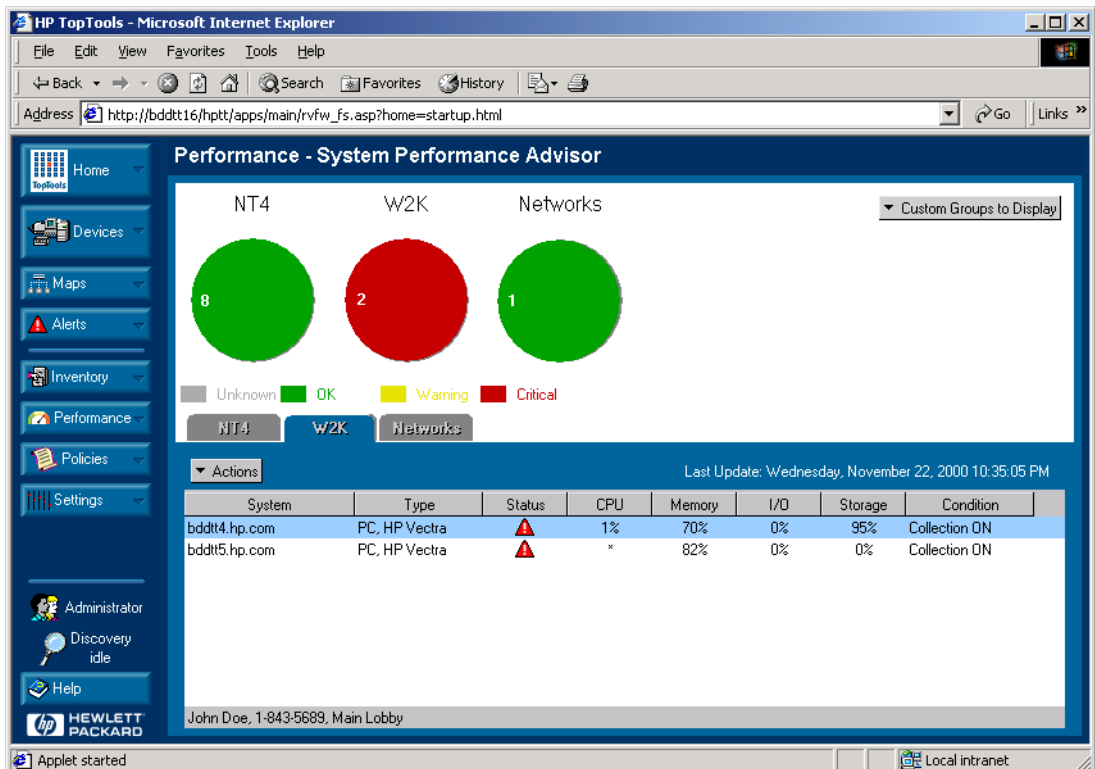
This shows the amount of memory, in bytes, currently used on the remote PC. The total amount of memory is also shown.

This measurement is not used to detect memory shortages, since Windows memory management uses swap files. Therefore, if all physical memory is being used, it does not mean that there is a memory bottleneck. Rather, it is provided for information only. Consequently, no alerts are generated for this item.

Performance Advisor Example 1

This window shows the current settings for performance monitoring. You can select which remote systems to monitor.

The information on each remote system includes System Identity, Type, Status (alerts), CPU Use, Memory Use, Disk Input/Output, Storage (capacity) and Condition (performance data collection).



Disk Usage

Two measurements are provided: disk activity and disk space.

Disk Activity

This shows the percentage of time that the PC's hard disk drives are busy. A hard disk is busy if it is performing an input or output operation. This measurement is taken over a fixed period of time, and reflects each disk drive's average activity during that time.

This measurement is only used in Toptools Value Pack and is only available for PCs running Windows NT or Windows 2000.

Disk overactivity could indicate, for example, memory shortages through swap file activity (described earlier) lack of free disk space, or an inadequate mass storage system. For example, this PC could benefit from replacing the IDE system with a faster SCSI system.

Disk Space

The current free disk space and total disk space is shown for each logical disk (that is, for each hard disk partition on the PC).

This is useful for viewing the PC's current hard disk configuration and usage. For example, if there is not enough free disk space on one of the logical disks, the PC may benefit from a different disk partition setup or even a disk drive upgrade.

Network Usage

Three measurements are provided: LAN I/O packets, LAN I/O error rate, and LAN bandwidth utilization. These measurements are provided for each LAN card installed in the PC.

These measurements are all taken over a fixed period of time, and reflect the average value during that time.

LAN I/O Packets

This measurement shows the number of network packets received and sent by the LAN card.

It can be useful for determining that the PC's network connection is working correctly, as well as for showing network traffic patterns.

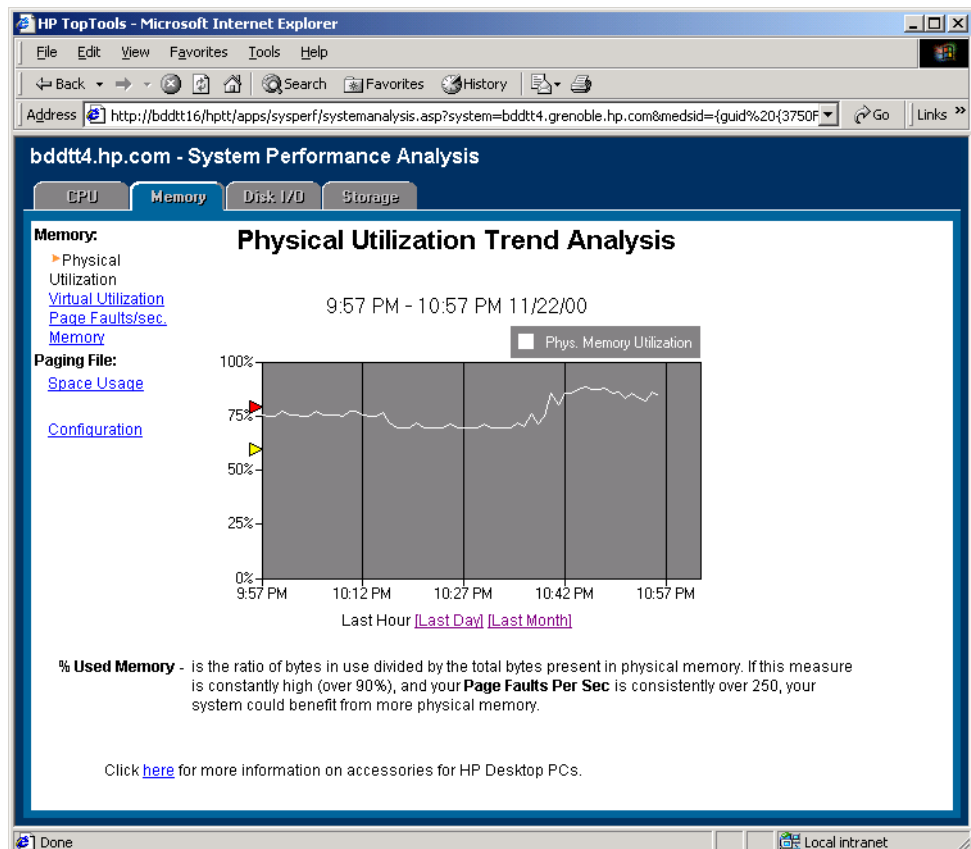
This measurement is only used in Toptools Value Pack and is only available for PCs running Windows NT or Windows 2000.

Performance Advisor Example 2

This shows a remote PC's memory usage over the last hour.

You can also view the memory usage over the last day, the last week, and the last month.

Similar trend analysis information is available for CPU, disk input/output, and disk capacity.



LAN I/O Error Rate

This measurement shows the percentage of network packets sent and received that contained errors.

This is useful for spotting network errors and for isolating problem areas. For example, a very high error rate between a specific PC and a hub could point to a faulty network cable between these two devices.

This measurement is available for PCs running either Windows NT or Windows 2000 which have the Microsoft SNMP Service installed. However, in some cases, for Windows PCs without Microsoft SNMP, the Toptools Device Manager may be able to calculate an approximate value using the LAN card's DMI instrumentation.

LAN Bandwidth Utilization

This measurement shows the percentage of the LAN card's transfer capacity that is actually being used.

This information can help to optimize a network configuration, or can indicate network undercapacity. If network bandwidth utilization is nearing saturation, this is a useful warning that network facilities must be upgraded or reconfigured to provide more capacity in the areas where it is needed.

The calculation of LAN bandwidth use is available for PCs running either Windows NT or Windows 2000 and with the Microsoft SNMP Service installed. In some cases, for Windows PCs without Microsoft SNMP, the Toptools Device Manager may be able to calculate an approximate value using the LAN card's DMI instrumentation.

Typical Uses of Resource Monitoring

- You can set alerts to permanently monitor the hard disk drive space on all systems. In this way, you can ensure that there is sufficient disk space on all devices for future growth. A critical alert on a single PC may prompt you to tell the user that they must remove all unneeded files from their system. Alerts are also useful for receiving early warning of undercapacity, enabling you to plan for major disk upgrades.

- Before the installation of a new software application, you can install it in several trial PCs and monitor the PCs' page swapping rates to determine if more physical memory is needed to successfully run that application.
- If a PC user complains about a slow PC or disruptive system errors, you can monitor resources (such as memory and network usage) on that remote PC to help track down and resolve the problem.

Overhead Used by Resource Monitoring

Since resource monitoring is done by the remote PCs themselves, no network bandwidth is used for this task. Furthermore, less than 1% of the processor time is used on the remote PCs.

Alert thresholds are also stored and managed by each remote PC. If alerts are generated, a small amount of network bandwidth is used to send the alert to the Device Manager.

If you are using the Device Manager to display a remote PC's resource monitoring, requests are sent between these two devices on the network to keep the display up to date. However, even this task requires very little network bandwidth.

There are two cases in which no monitoring is done by the remote PCs, and therefore zero system capacity is used. Firstly, if resource monitoring is disabled, and secondly, if the remote PC goes into standby or sleep mode.

Toptools allows the PC to go into standby or sleep mode, rather than waking it up to continue monitoring its resources. If the remote PC goes into standby or sleep mode, it implies that the PC is not currently being used and there is no need to monitor resources.

System Performance Advisor

The Toptools Value Pack includes a system performance module. This module is a powerful tool for centrally monitoring and managing system performance of groups of PCs, servers, and the network.

It enables system administrators, help desk personnel, and VAR service providers to proactively identify, diagnose, and alleviate system performance bottlenecks on PC and PC server systems. The System Performance Advisor continuously monitors key performance parameters against configurable thresholds, providing configuration advice and upgrade recommendations based on trend analysis in the sampled data.

The System Performance Adviser contributes to:

- **Increased network and system uptime**, by providing proactive bottleneck detection with continuous, at-a-glance, performance status of all monitored systems from anywhere on the network.
- **Optimized configuration, upgrade, and replacement decisions.**
The System Performance Advisor includes one-click access to system performance histories, facilitating trend analysis and highlighting areas of sustained performance degradation that require action.
- **Improved system capacity planning**, with recording of critical performance statistics for all monitored PC and server resources, allowing a thorough understanding of actual system performance baselines.

There is no need to manually deploy performance agents on every monitored system. Toptools System Performance Advisor lets you select the systems to monitor and then automatically deploys the necessary client code. (Remote systems running the Toptools Agent already have the necessary code.) You can even configure which subsystems (CPU, Memory, Disk I/O) to monitor on each system.

Toptools System Performance Advisor collects performance data and builds a centralized database for trend analysis. From the main screen, the status of all monitored systems can be viewed as red, yellow, or green based on configurable thresholds. An at-a-glance summary is displayed with dynamically updated pie charts organized by user-configurable custom groups of devices. Access to performance trend data on any of the monitored systems is a simple mouse click away.

Information on the Toptools Value Pack can be viewed when you install the standard Toptools Device Manager.

For More Information

For product information, ordering details, and FAQs on Toptools Value Pack and other Toptools software, connect to:

www.hp.com/toptools