

HP Performance Tuning Framework

User Guide

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Introduction

The HP Performance Tuning Framework (hereafter abbreviated as PTF) has been developed to assist workstation system administrators and technical users who would like to configure and tune their machines for optimal performance with certain third-party applications. Hewlett-Packard has a long history of close cooperation with engineering teams at the major independent software vendors in the technical markets. This utility is the framework through which the years of technical experience and knowledge can be shared with users of HP workstations.

Overview

When a new workstation gets delivered to an engineer's desk, the process of configuring the software for productive work begins. The administrator must install the applications the engineer will need, and establish connection to shared data repositories. It is easy for the administrator to move on to the next challenge once the engineer has the applications and data needed to start working. However, the engineer's productivity may suffer if some configuration steps are skipped. For example, 3D graphics rendering performance and image quality could be decreased by use of an unsupported graphics driver, or the engineer may not have full access to the capabilities of the new machine due to reduced default system settings.

The HP Performance Tuning Framework assists workstation system administrators by quickly guiding their configuration of workstations used to run certain technical applications. Several key features of PTF that provide this assistance are:

- a thorough configuration inventory displayed on the [Configuration Page](#) along with easy access to the Hewlett-Packard QuickSpecs document for the particular workstation model
- a listing of available drivers for the machine's graphics card along with the application names that have certified each one; this information is presented on the [Graphics Driver Page](#), which also includes a button to easily download and install the desired driver
- an [OS Tuning Page](#) for Windows XP Professional customization
- a [Performance Check-Up Page](#) for Windows Vista that helps with workstation performance assessment
- a report of the plug-in and add-in application software, USB Plug-and-play device information and driver for the 3Dconnexion motion controller connected on the workstation; this information is presented on the [3Dconnexion Page](#), which also includes a button to start and stop the driver

- a collection of application-specific tuning pages that deliver knowledge and experience derived from Hewlett-Packard's long history of intimate involvement with the application development teams
- a set of tools that can help users understand how system resources are being used by the applications running on their workstations; this is presented on the [Resource Usage Page](#)

What's New in PTF

Several new features have been added to recent PTF releases:

- Support for newly-released desktop, mobile, and blade workstations models
- Recognition of, and graphics certification reporting for, many new applications, including:
 - Adobe Creative Suite 4
 - Autodesk AutoCAD 2009
 - Autodesk AutoCAD MEP 2009
 - Autodesk Maya 2009 & 2009 x64
 - Alias StudioTools 13.0 & 13.5
 - Autodesk 3ds Max 2008 & 2009 & 2009 x64
 - Autodesk AliasStudio 2008 & 2009
 - Autodesk AutoCAD Mechanical 2007 & 2008 & 2009
 - Autodesk Inventor 2009
 - Autodesk Revit Architecture 2009
 - Autodesk Revit MEP 2009
 - Autodesk Revit Structure 2009
 - Bentley MicroStation V8i
 - Dassault Systemes SolidWorks 2009 & 2009 x64
 - Dassault Systemes eDrawings 2009
 - Dassault Systemes SolidWorks Simulation 2009
 - HSMWorks ApS HSMWorks 2009 & 2009 x64
 - PTC CoCreate OneSpace 2008 & 2008 x64
 - Siemens PLMS I-DEAS 6
 - Siemens PLMS NX6 & NX6 x64
 - Siemens PLMS SolidEdge ST & ST x64
- The information displayed on the HP CMI Output Window can be saved to a file.
- Configuration Tab Page includes Proxy information, RGS installed version.

System Requirements

The following sections describe the specific network, software, and hardware requirements of the HP Performance Tuning Framework.

Network Requirements

An internet connection is crucial to the proper and successful operation of PTF. Each time it runs, PTF attempts to connect to its server looking for an updated copy of the PTF database. If a connection is made and a newer database is found, PTF immediately downloads it. Similarly, the PTF utility itself may require an update, possibly to fix a defect or add support for a new third-party application. Finally, a major feature of PTF is its ability to download and install graphics drivers, an operation which clearly requires access to the PTF server over the internet.

All of these connections utilize the same HTTP protocol as standard web browsers. Both direct connection to the internet and connection through a firewall via an HTTP proxy server are supported by PTF. Upon startup, a direct request is made to the remote server using the system's Internet Options proxy settings, which are configurable through the Windows Control Panel and Internet Explorer. If that first request times out (after approximately ten seconds), the user is warned that connection to the PTF server could not be made, and that execution will continue with the current version of the PTF database.

System Internet Options that utilize an Automatic Configuration Script are now supported by PTF. If a workstation is able to use a browser to connect to internet addresses, such as <http://www.hp.com>, then PTF should not have any trouble connecting to its server.

Software Requirements

PTF has been developed for 32-bit and 64-bit versions of the Microsoft Windows XP Professional and Windows Vista operating systems using version 2.0 of Microsoft's .NET Framework. The .NET Framework installation is checked during the installation of the HP Performance Tuning Framework. If the .NET Framework runtime is not found on the workstation, then the installer will present a Microsoft .NET Framework Version 2.0 download site. The user must select the Windows 32-bit (x86) or Windows 64-bit (x64) download depending on operating system.

Due to PTF's ability to install drivers and modify system settings, the user running PTF must have Administrator privileges.

Third-party applications are not required to run PTF. However, their presence is represented through the content of some of PTF's tabbed pages. For example, when supported applications are found on a machine, PTF can report graphics driver certification information relative to only those installed applications. Also, on the [Applications Page](#), the installed, supported applications are listed first, before the supported applications that are not installed.

[Supported Applications](#) lists the applications recognized by PTF, and describes the available application-specific features in greater detail.

Hardware Requirements

PTF extracts its computer and graphics card certification information from a database that is updated frequently by the HP engineering team working with the software vendors. As Hewlett-Packard and the graphics card vendors release new hardware, the database will reflect up-to-date certification results to provide accurate configuration recommendations.

Attempting to run PTF on a non-HP workstation is not permitted by PTF. Computers manufactured by HP should succeed at launching PTF, however, only HP workstation models are supported by the graphics driver certification database and other Configuration Page features. These workstation models are currently supported:

- HP xw3100 Workstation
- HP xw3400 Workstation
- HP xw4000 Workstation
- HP xw4100 Workstation
- HP xw4200 Workstation
- HP xw4300 Workstation
- HP xw4400 Workstation
- HP xw4550 Workstation
- HP xw4600 Workstation
- HP xw5000 Workstation
- HP xw6000 Workstation
- HP xw6200 Workstation
- HP xw6400 Workstation
- HP xw6600 Workstation
- HP xw8000 Workstation
- HP xw8200 Workstation
- HP xw8400 Workstation
- HP xw8600 Workstation
- HP xw9300 Workstation
- HP xw9400 Workstation
- HP Z400 Workstation
- HP Z600 Workstation
- HP Z800 Workstation
- HP Compaq nw8000 Mobile Workstation
- HP Compaq nw8240 Mobile Workstation
- HP Compaq nw8440 Mobile Workstation
- HP Compaq nw9440 Mobile Workstation
- HP Compaq 8510w Mobile Workstation
- HP Compaq 8710w Mobile Workstation

- HP EliteBook 8530w Mobile Workstation
- HP EliteBook 8730w Mobile Workstation
- HP ProLiant xw460c Blade Workstation
- HP ProLiant xw2x220c Blade Workstation

PTF's graphics driver library contains drivers for these graphics cards:

AMD ATI Technologies Inc.

- FireGL 8700
- FireGL 8800
- FireGL X1
- FireGL Z1
- FireGL T2-64s
- FireGL T2-128
- FireGL V3100
- FireGL V3300
- FireGL V3350
- FireGL V5100
- FireGL V5600
- FireGL V7200
- FireGL V7700
- FirePro V3700
- FirePro V5700
- FirePro V7750
- Mobility FireGL T2
- Mobility FireGL V5000
- Mobility FireGL V5200
- Mobility FireGL V5600
- Mobility FireGL V5700
- Mobility FireGL V5725

NVIDIA Corporation

- Quadro2 MXR
- Quadro2 EX
- Quadro2 Pro
- Quadro4 NVS
- Quadro4 380 XGL
- Quadro4 550 XGL
- Quadro4 580 XGL
- Quadro4 750 XGL
- Quadro4 900 XGL

- Quadro4 980 XGL
- Quadro FX 330
- Quadro FX 370
- Quadro FX380
- Quadro FX 500
- Quadro FX 540
- Quadro FX 540M
- Quadro FX 560
- Quadro FX 560M
- Quadro FX 570
- Quadro FX 570M
- Quadro FX 580
- Quadro FX 770M
- Quadro FX 1000
- Quadro FX 1100
- Quadro FX 1300
- Quadro FX 1400
- Quadro FX 1500
- Quadro FX 1500M
- Quadro FX 1600M
- Quadro FX 1700
- Quadro FX 1800
- Quadro FX 2000
- Quadro FX 2700M
- Quadro FX 3000
- Quadro FX 3400
- Quadro FX 3450
- Quadro FX 3500
- Quadro FX3600M
- Quadro FX 3700
- Quadro FX 3700M
- Quadro FX 3800
- Quadro FX 4500
- Quadro FX 4600
- Quadro FX 4800
- Quadro FX 5500
- Quadro FX 5600
- Quadro FX 5800
- Quadro NVS 290
- Quadro NVS 295
- Quadro NVS 440
- Quadro NVS 450

These 3Dconnexion motion controllers are currently supported:

- USB Spaceball 5000
- SpaceTraveler
- SpacePilot
- SpaceNavigator
- SpaceExplorer

User Interface

The HP Performance Tuning Framework employs a simple user interface (see [Figure 1](#) - The Welcome Page). Controls on the main window include: a *User Guide* button, which displays this document; an *About* button, which displays the current PTF version number, database timestamp, and other support information; a *Save Configuration* button, which saves workstation configuration information to a file; an *Exit* button, which terminates the program; and a collection of tabbed pages, which contain the user-interface controls that perform the tuning operations of PTF. The individual tabs are labeled to indicate the area of configuration contained on the page. Click on each tab to display its corresponding page.

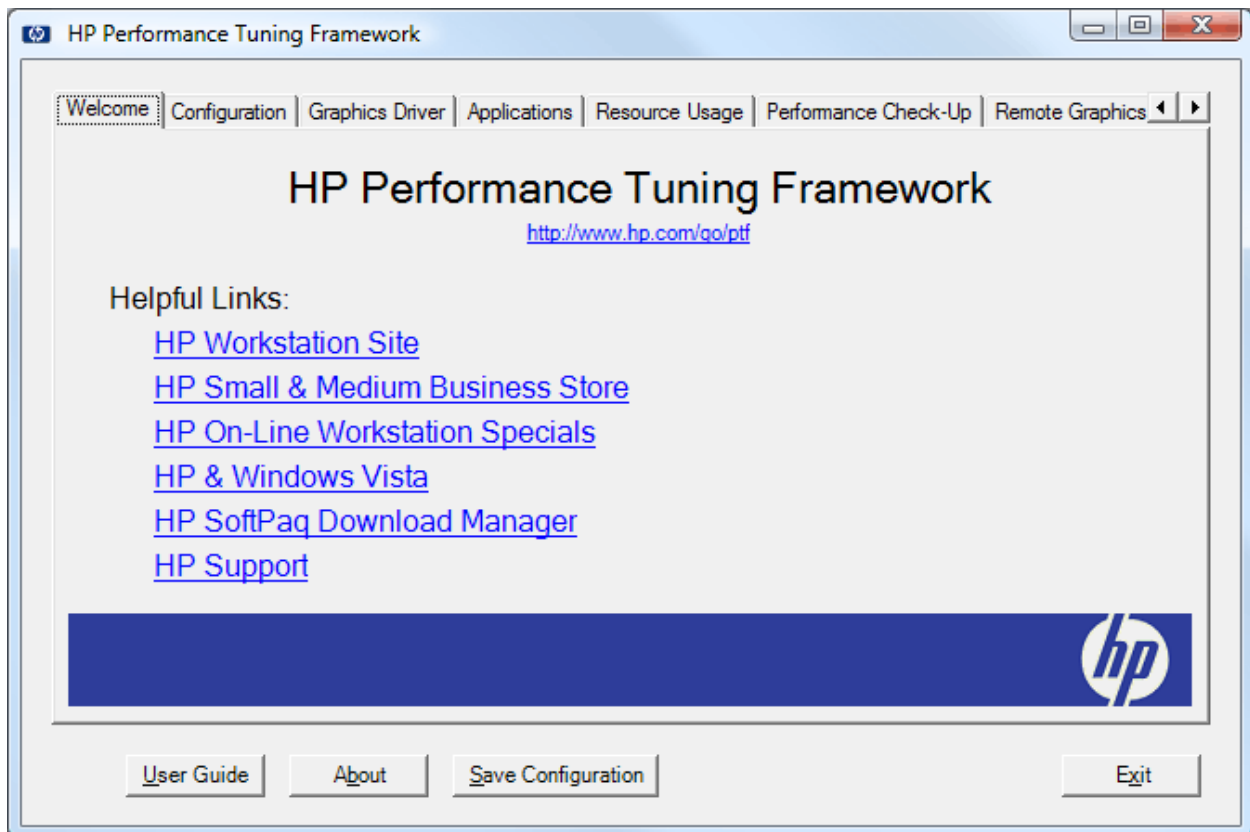


Figure 1 - The Welcome Page

The Splash Screen

The Performance Tuning Framework uses a splash screen to convey its progress during start-up processing. The current area of system interrogation or interface construction is reported at the bottom of the window.



Figure 2 - The Splash Screen

Occasionally while the splash screen is displayed, PTF will find an updated version of either its database, or PTF itself, which it will download and install. Minimal interaction is required to complete these updates; simply follow any prompts to complete the download and allow PTF to start. [Dynamic Updates](#), discusses these situations in greater detail.

The Welcome Page

The Welcome Page image above ([Figure 1](#) - The Welcome Page) shows the initial Framework interface presented after the startup processing completes. The Welcome Page contains convenient hyperlinks that, when clicked, bring up relevant HP web sites in the system's default browser. When PTF is run on a workstation with no active network connections, these links will be disabled (grayed-out) to indicate that their destinations are currently unreachable.

The Configuration Page

The workstation's configuration is reported on the Configuration Page. The types of information reported include:

- the hardware and software inventory
- the system sensors
- the environment variables and their values

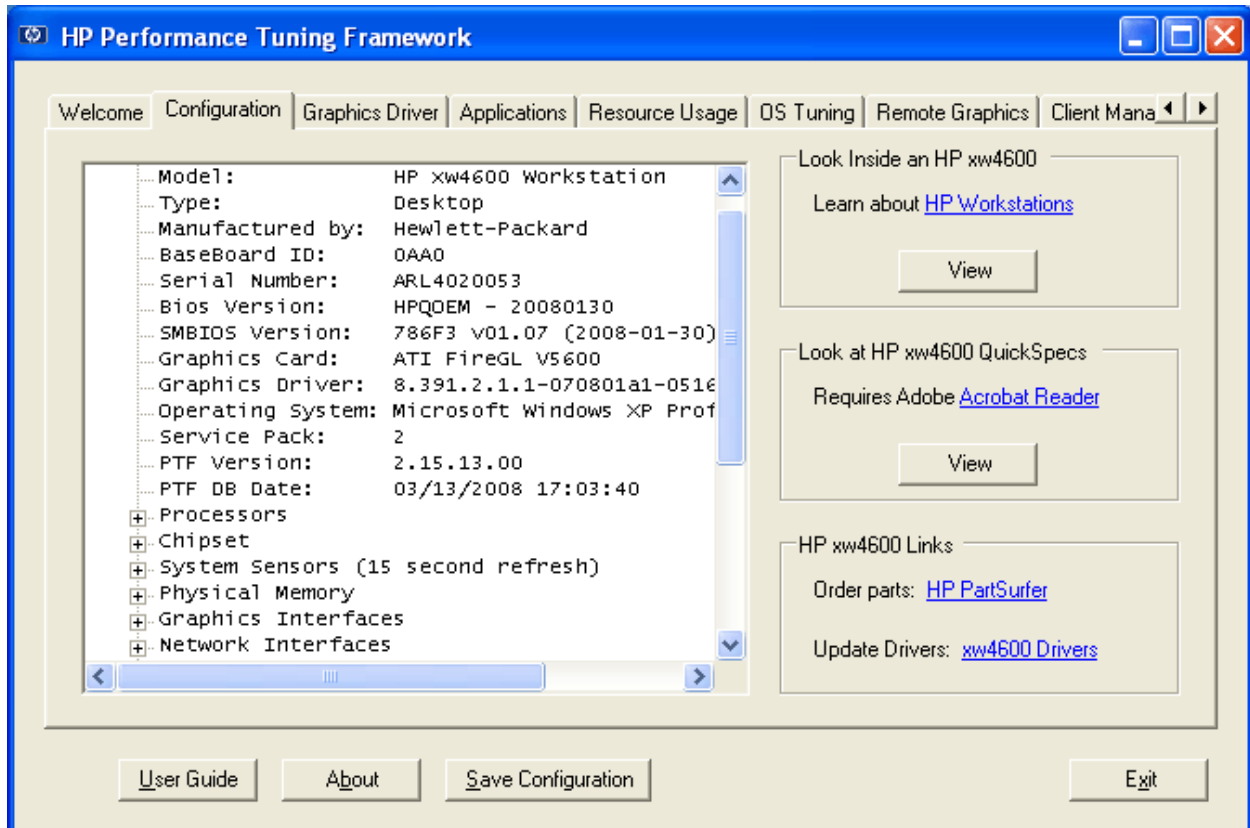


Figure 3 - The Configuration Page

Many of the top-level categories can be expanded to disclose the lower levels of detail.

The information displayed on the Configuration Page can be saved to a file using the *Save Configuration* button at the bottom of the window. Also, it can be saved or printed using the Print Options context menu, which can be displayed by simply clicking the right mouse button or depressing the context menu key on the keyboard when the mouse cursor is over the configuration data, and the print options menu will be displayed, as shown in [Figure 4](#) - The Configuration Page's Print Options Context Menu.

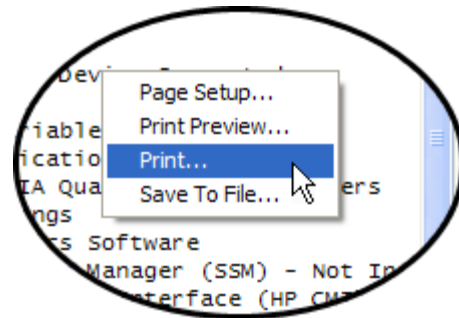


Figure 4 - The Configuration Page's Print Options Context Menu

Beyond the configuration data collected from the system and displayed on this page, access to other types of information may also be presented along the right-hand side of the screen, as shown in the [Configuration Page](#) image above. If an internal chassis image is available for this model workstation, it can be displayed by clicking on the *View* button in the *Look Inside* box to the right of the configuration data. More in-depth information about the parts and options of this workstation model is contained in the QuickSpecs document, which is also viewable from this PTF page.

The box in the lower-right corner of the Configuration Page contains machine-specific links to the HP support web site. First, there is a link to the HP PartSurfer web site to help locate additional or replacement parts for the workstation. This is followed by a link which will display the available drivers and software for the current workstation model and operating system combination. This second link is helpful when the workstation's system BIOS or component drivers need to be updated. The HP SoftPaq Download Manager (link on the Welcome Page) can also be used to maintain system drivers and optional software. Before downloading a new graphics driver from the HP site however, the application certification assistance provided on PTF's Graphics Driver Page should be consulted; often the latest driver on the HP site is not the same version that was certified by the application providers.

One of the primary features of the HP Performance Tuning Framework is its ability to organize graphics driver certification information. This organization allows a system administrator to compare potentially conflicting application requirements and make an informed decision about which driver to install. In addition to the application certification results presented, PTF can also provide driver release information direct from the HP workstation graphics lab that might help with the selection process. All graphics drivers

listed on this page are maintained on PTF's server, and can be downloaded over the network as needed.

The image below ([Figure 5](#) - The Graphics Driver Page) shows the Graphics Driver Page for a machine with several applications installed. By default, the certification data for only the installed applications are reported in the list on this page. By selecting the All Framework Apps radio button (as was done here), the certification information for all Framework applications will be displayed, giving the user a more complete view of the certification status of the individual drivers.

Not all applications perform explicit certification of graphics drivers. For example, Adobe does not certify Photoshop with specific 3D graphics drivers, however PTF does recognize it as an installed application. Hewlett-Packard recommends using one of the recently released graphics drivers that has passed the Microsoft Windows Hardware Quality Labs (WHQL) driver functionality testing, and HP's own workstation graphics lab testing. The applications for which exact drivers are not crucial will be listed with the three most-recently WHQL and HP certified drivers that support the system's graphics card.

Another feature of PTF is its recognition of more than one installed graphics card. When there are multiple cards present in the system, the card name field on the Graphics Driver Page becomes a selection list from which the different cards can be chosen. Driver selection data will be displayed for the card that is selected from the card list.

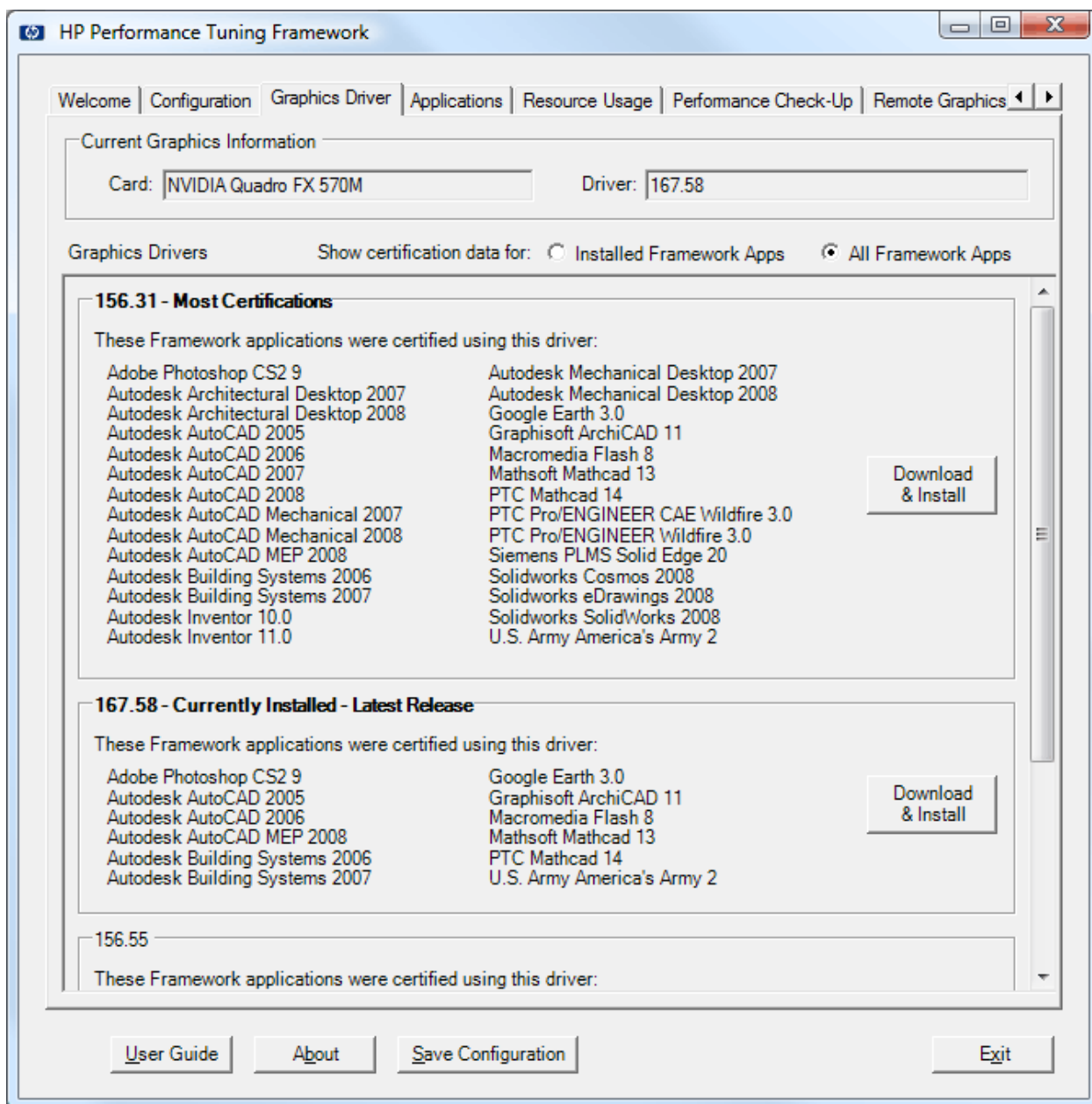


Figure 5 - The Graphics Driver Page

To determine the order in which the drivers should be presented, PTF counts how many applications have been certified with each driver version. The versions with the most certifications are listed first, and they are designated as such by the addition of the tag *Most Certifications* to their title. There may be more than one driver that had the same number of certifications, which means there will be more than one driver that report to have the most. When confronted with this situation, administrators should compare the application lists of the drivers to decide which one to load based on the anticipated workload for the system.

The remaining drivers are then listed in decreasing order of the number of applications that have certified them. In addition to the *Most Certifications* designation, two other labels may appear in the driver list. *Latest Release* indicates that this driver is the latest one recognized by HP. The driver already installed on the machine will be tagged as *Currently Installed*.

By scrolling through the list, a system administrator can select the driver that satisfies the most application certification requirements, or a different driver altogether. All drivers in the list can be downloaded and installed with the click of its corresponding *Download & Install* button.

The Applications Page

PTF recognizes the presence of many different technical applications on a workstation. The installation status of these applications is represented on the Applications Page. Installed applications are listed first, followed by the remaining applications supported by PTF.

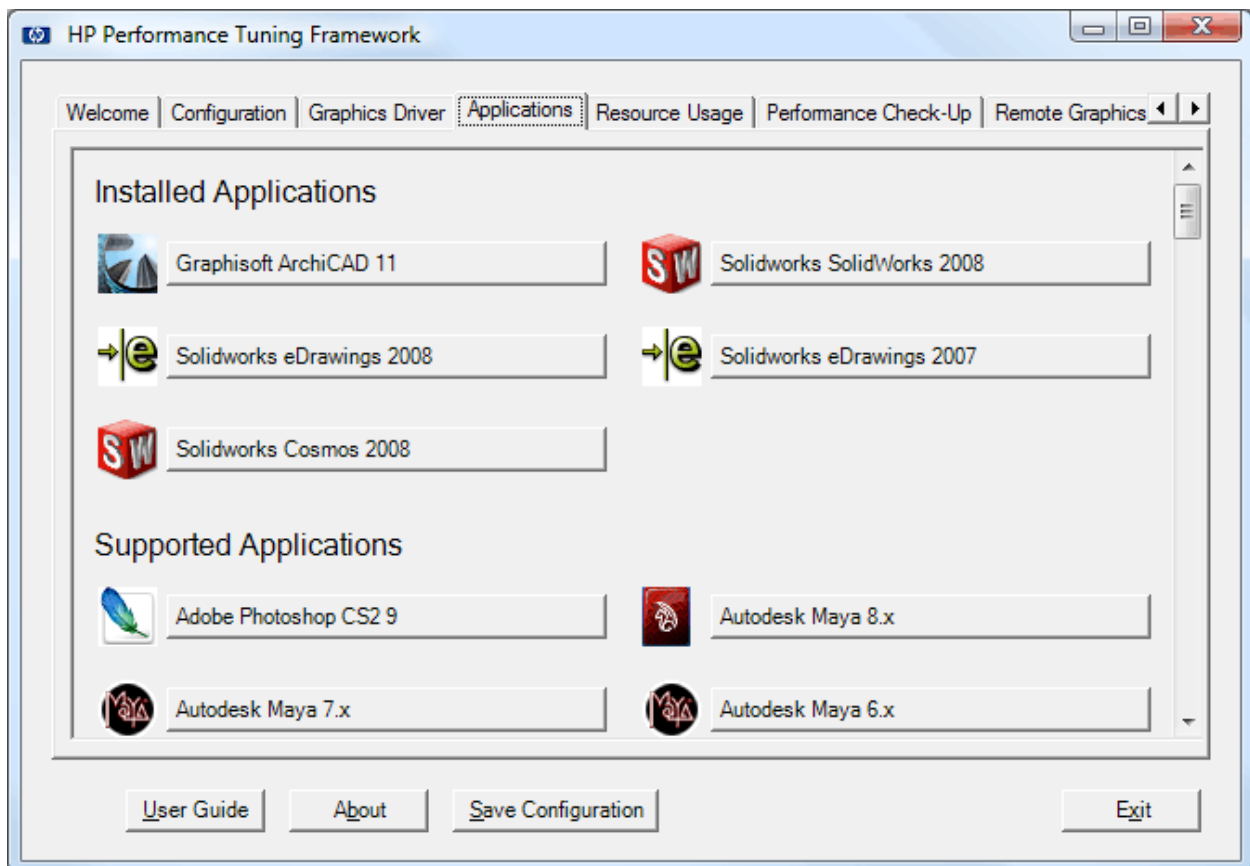


Figure 6 - The Applications Page

An application form can be displayed by clicking on the logo or button. A new form will be displayed containing information and tuning controls specific to that application. The Siemens PLMS NX4 form shown below is an example.

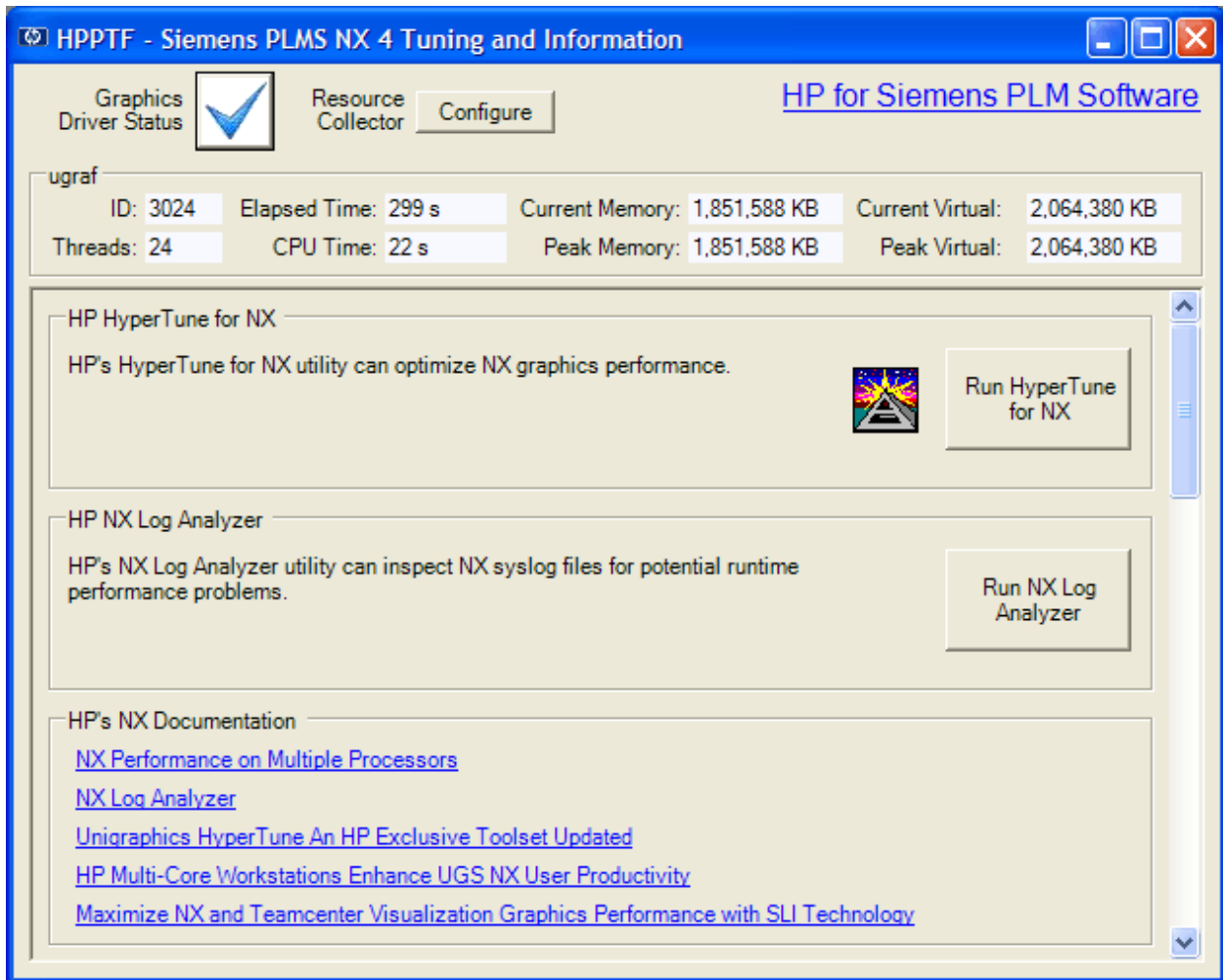







Figure 7 - The Siemens PLMS NX4 Applications Form

Across the top of the form is a dashboard that shows important status information about the application. First there is a button with a visual representation of this application's certification status of the currently-installed graphics driver. The image shown on the button indicates the extent to which the selected application supports the driver. PTF will use the following status images:

	<p>No driver installed</p> <p>There is no 3D driver installed; the system is using the default 2D VGA driver.</p>
	<p>Unknown driver</p> <p>The driver is not recognized by PTF, therefore there is no certification information for this driver in PTF's database.</p>
	<p>Unsupported driver</p> <p>This driver precedes any driver versions tested with this application or this is not one of the recent WHQL and HP certified drivers suitable for applications that do not certify explicit 3D drivers.</p>
	<p>Supersedes supported driver</p> <p>The installed driver is more recent than the version tested with this application.</p>
	<p>Supported driver</p> <p>The application vendor tested and certified the installed driver, or this is a recent WHQL and HP certified driver that is recommended for applications that do not test explicit 3D drivers.</p>

To the right of the driver status button is a button that controls the Resource Collector. The button will either be labeled *Configure*, where it will launch the Resource Collector's configuration dialog, or *Summarize*, where it will produce a summary dialog showing the results from previous collections. Completing the top row of the dashboard is a hyperlink to the Hewlett-Packard web page containing information specific to the application, if one exists.

If the application is running while PTF's application tuning form is visible on the Windows desktop, a panel showing parameters of the executing process is added to the application's form. The information is updated every five seconds.

In addition to the dashboard, the application forms provide access to application-specific tuning functionality. For example, there are two application-specific tuning features shown on the Siemens PLMS NX form shown above: *Run HyperTune for NX*, and *Run NX Log Analyzer*. As new tuning techniques arise for the supported applications, Hewlett-Packard will add new buttons to expose them. For specific information about the tuning features associated with each supported application, refer to the appropriate section in [Supported Applications](#).

The Resource Usage Page

PTF can help users understand how various system resources are being used by the applications running on their workstations. As shown in the image below, the Resource Usage Page contains the interface used to configure the PTF Resource Collector, as well as buttons to launch the interactive Resource Usage Plot, and configure of the Large Memory Address Space (3GB) option of the Windows operating system.

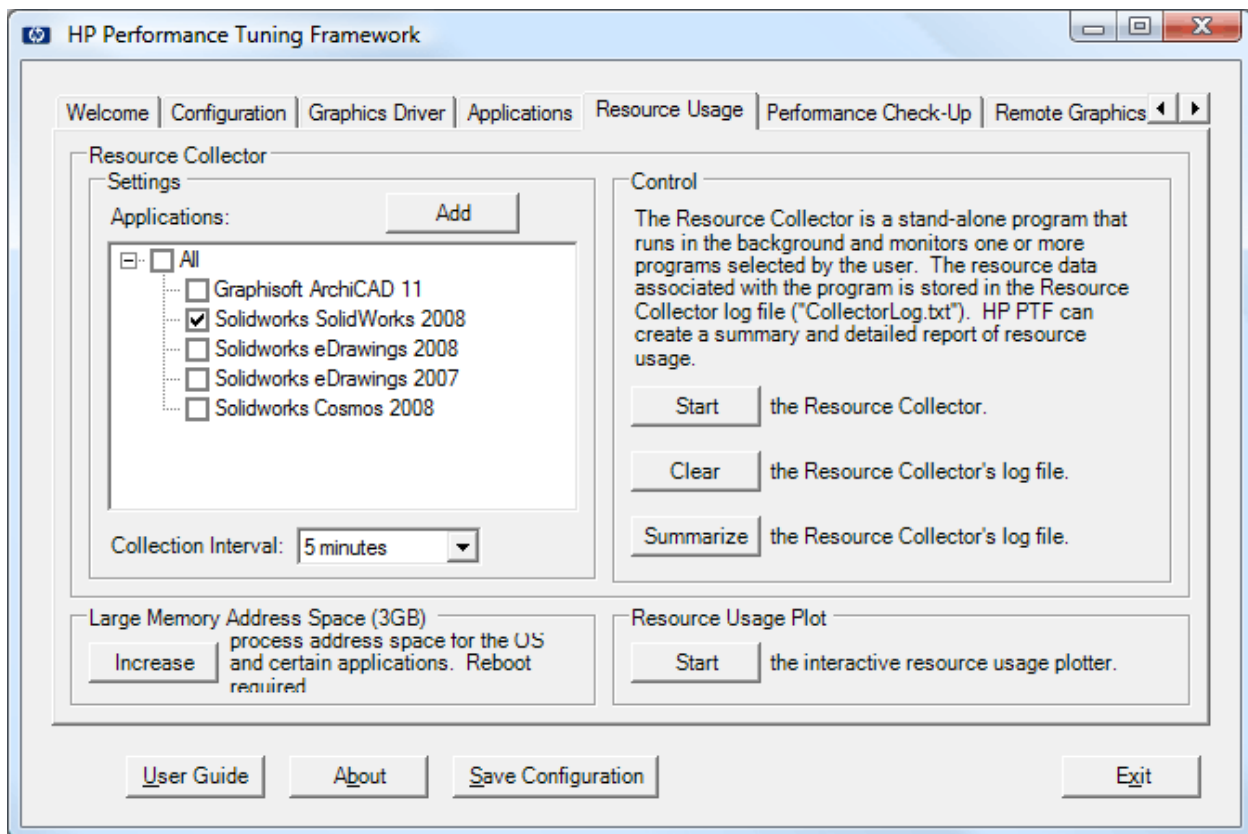


Figure 8 - The Resource Usage Page

Resource Usage Plot

When a Windows workstation runs low on available memory, the operating system's virtual memory mechanism can often free enough physical RAM to allow a workload to run to completion. It is convenient to rely on this safety net when temporarily working with uncharacteristically large datasets, however as the memory requirements of an engineer's daily workload grows, this convenience comes at the price of lost productivity. The virtual memory components of an operating system must take over the computer to reorganize the data stored in physical RAM. During this time, a user application must wait until memory has been cleared before it can continue processing.

As shown in the image below the currently-executing processes/programs are listed on the left; clicking on a program name in the list will assign a color and begin plotting that program's memory usage. Applications that are supported by PTF are automatically recognized and plotted, as was the case for SolidWorks (SLDWORKS) and Adobe Photoshop below.

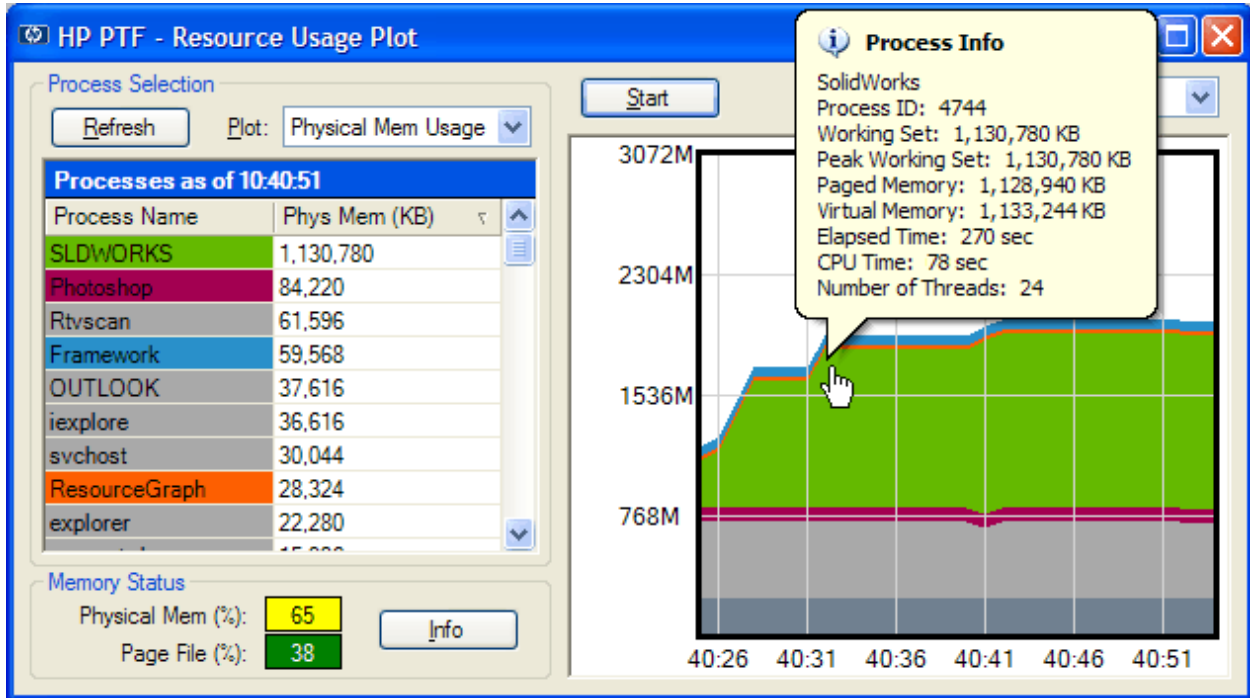


Figure 9 - The Resource Usage Plot

This image was taken on a machine with three gigabytes (3GB = 3,072MB) of system RAM. The dark gray area at the bottom of the plot represents the amount of physical RAM being used by the Windows operating system, and the lighter gray area corresponds to all the applications that are not being individually highlighted. The white space above the plotted processes shows how much RAM was available during the sampling periods.

A vertical time-division line is drawn for each fifth sample, and it is labeled with the minutes and seconds past the hour. If the plot is stopped and restarted, a thicker time-division line is drawn to call attention to the break in the sampling sequence. Each time-division line also corresponds to a refresh of the process list. It is during these refreshes that PTF will notice if any supported applications have been started since the previous refresh. The Refresh button can be used to force PTF to recognize a newly-launched application; this could be desirable when using the longer sampling periods.

When the left mouse button is clicked within the plot, information describing the current memory region is displayed. In the image above, the user clicked in the green area of the plot that corresponds to the SLDWORKS process. Similar information is presented when the mouse cursor is stopped over a name (not clicked) in the process list on the left

side of the page. The pop-up will include a warning message and audio alarm if virtual or physical memory is at a warning or critical state.

The Resource Usage Plot monitors the physical memory and virtual address space in use for each process that is highlighted. If a monitored process consumes greater than 70% of the total system memory or 80% of the maximum process virtual size, PTF will enter a system event. Events can be inspected using the Event Viewer utility which can be launched from the Administrative Tools group in the Performance and Maintenance section of the Control Panel. An example is shown below in which Pro/ENGINEER has utilized more than 80% of the maximum process virtual byte limit.

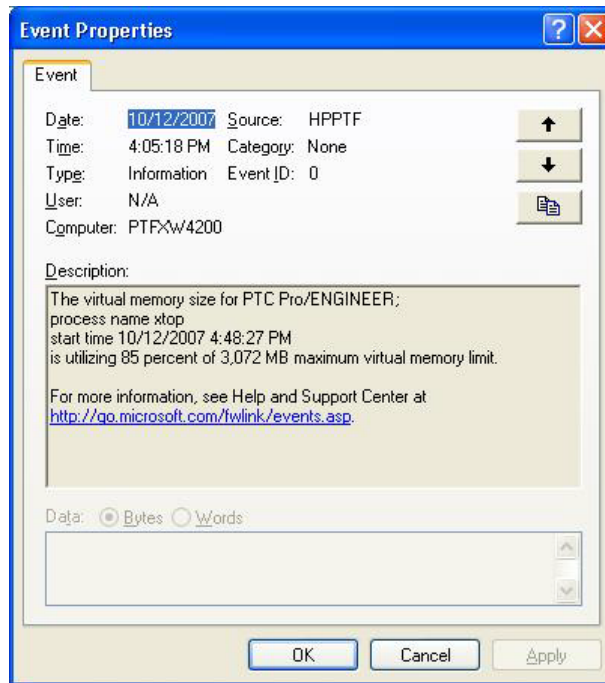


Figure 10 - PTF System Event Log Entry

A double-click on a highlighted process will display the Capacity Meters form (see [Figure 11](#) - Capacity Meters Form). The Capacity Meters form provides a visual warning when either the working set or virtual bytes size of the process reaches a warning (yellow) or critical (red) level. In the image below, the SolidWorks process has consumed over 70% (yellow) of system RAM and over 80% (red) of the maximum possible virtual byte size. The Working Set value is the amount of process address space that is considered most active and located in system memory. The Commit Size is the amount of process memory that has been allocated space within the system paging file. The Virtual Bytes is the Commit + Reserve process memory. It is the Virtual Bytes value that indicates the true size of a process.

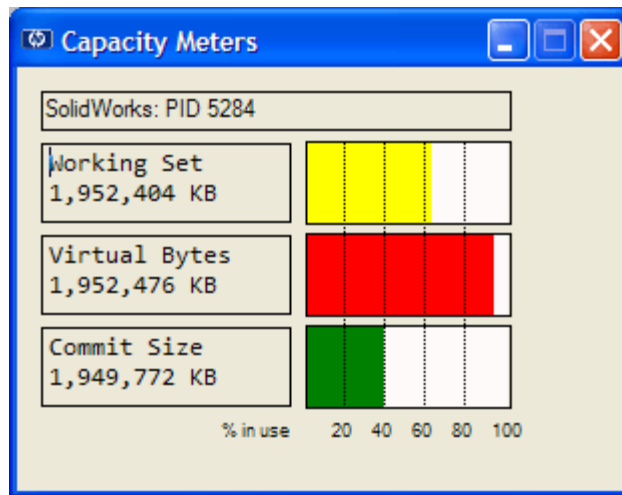


Figure 11 - Capacity Meters Form

The plotted data on the Resource Usage Plot can be switched to Page File Usage by changing the *Plot* selection box above the process list. The page file usage of the currently selected processes will automatically be plotted for the existing samples. The total page file capacity shown is a combination of the system RAM and page file(s). The page file value is same as the Windows Task Manager Virtual Memory column on XP and the Commit Size column on Vista.

The current memory usage percentages are displayed below the process list, with a color-coded indication of the amount of free space. Green indicates that the levels are good, while yellow means that free memory is diminished, and red connotes extremely low availability where paging activity may decrease application performance. The *Info* button will display the current memory usage values, as well as advice on how to alleviate memory pressure if the system has exceeded PTF's memory thresholds.

Processor Affinity

The HP Performance Tuning Framework provides a simple mechanism to implement processor affinity. The Processor Affinity setting controls which processors the process will be allowed to execute on. Using the *Set Affinity* command limits the execution of the program or process to the selected processors and might decrease overall performance. By default, the Windows task scheduler will allow processes to run on all available processors.

To change the processor affinity for a process within PTF, simply click the right mouse button over the desired process name in the Resource Usage Plot, and select *Set Affinity*. In the case shown in [Figure 12](#) - The Set Affinity Dialog, Adobe Photoshop was the program selected by right clicking. The dialog shows Photoshop running on a dual-processor workstation. The user could select a single processor for the program to run on. This setting will stay in effect until the program is terminated; future executions of the program will return to using all available processors.

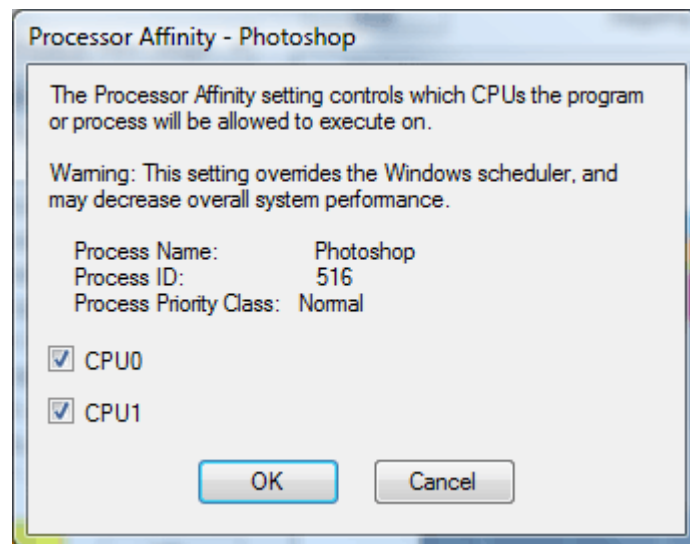


Figure 12 - The Set Affinity Dialog

Resource Collector

The Resource Usage Plot is helpful for watching memory allocation while working interactively on the system. Often minute-by-minute information is not necessary, but rather simply knowing how the system's resources are utilized over a longer period can help diagnose reduced performance issues. To accomplish this analysis, Hewlett-Packard has added the Resource Collector to PTF.

The Resource Collector is a separate process that periodically checks for the user-selected applications on a workstation. Specific memory and system resource parameters of those applications are captured and logged. After collecting data for a longer period of time,

for example a typical workday, the logged data can be summarized to see how often the limits of the system resources were approached. Based on this analysis, the fitness of the current hardware and software configuration for its dedicated tasks can be determined. Possible conclusions could be that far too often the important processes are utilizing more than the amount of physical RAM or CPU resource in the workstation, thereby relying upon the much slower virtual memory system and slower response time as multi-threaded and multi-task operation must wait to access the CPU resource.

The settings for control of the Resource Collector are defined in the main Resource Usage page. In the example above, the user has configured the Resource Collector to inspect any running SolidWorks process at 10 second intervals. More than one process can be selected from the list of PTF supported application and the user may include any additional program by using the Add button and navigating to the program executable location. Between collection periods, the Resource Collector goes to sleep so it does not consume any of the workstation's processor cycles. The Start button will launch the Resource Collector and then become a Stop button. The Resource Collector will run until the Stop button is clicked or until Windows is shut down/re-started.

The Summarize button in the Resource Collector Configuration dialog will read through the current Collector log and display a summary dialog like the one below. In this example, the log contained resource data for three applications (PTC Pro/ENGINEER, UGS NX, and Google Earth) and the user is using the mouse to select a different application to summarize. The summarized data shown is for 3,991 individual sessions of Pro/ENGINEER, where a session is one execution of the application binary. In those sessions, three were observed to have exceeded both of the first two metrics reported by the Resource Collector summary, and two sessions caused the system's available physical memory to drop below ten percent of the total amount. The last field reports that 108 sessions exhibited high CPU usage. At the bottom of the summary dialog, the maximum and average readings of physical and virtual memory usage are reported for the observed sessions.

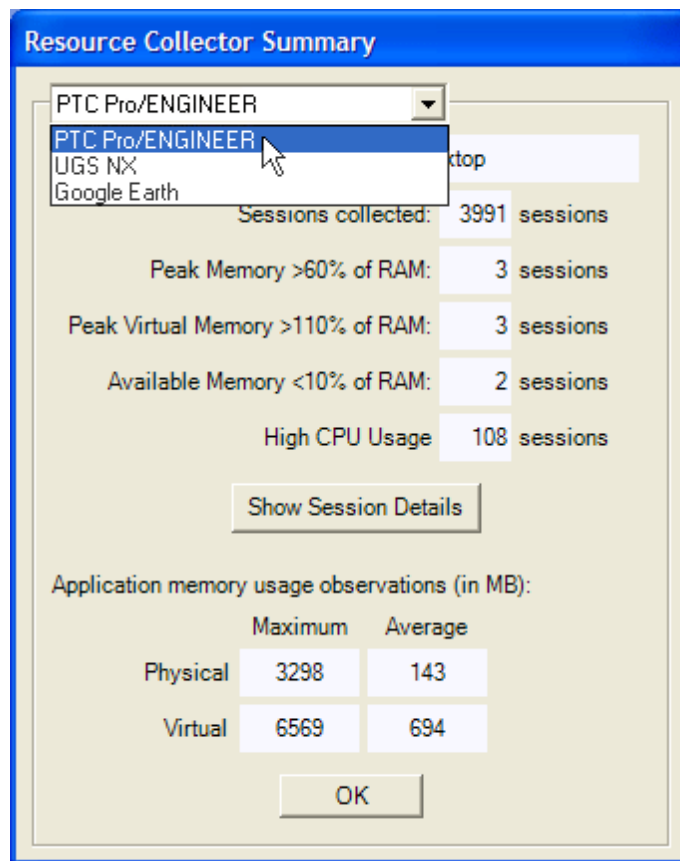


Figure 13 - The Resource Collector Summary Dialog

The Show Session Details button will display a grid listing information for the sessions recorded by the Resource Collector. Seven Pro/ENGINEER sessions are shown in the example below. Each session is identified by its Program Start time. The columns in the grid contain maximum and percentage values accumulated over the duration of each session, and tool tips will provide a longer description of data in each column. The grid's column width and row height can be adjusted, and the grid can be sorted by selecting one of the column labels. The grid displays elapsed and CPU time (in seconds), the maximum number of threads, the maximum CPU usage as a percentage across all processors, three memory metrics, and a Performance Impact for each session.

Program Start	Elapsed	CPU	Max Threads	Max CPU %	Memory Usage %	Virtual Memory %	Available Memory %	Performance Impact
1/24/2007 3:27:04	65	44	8	118	4	13	73	Application CPU Usage Very High
1/24/2007 4:29:41	66	46	8	119	8	19	68	Application CPU Usage Very High
1/31/2007 2:50:24	487	267	17	123	68	58	13	Application Memory Usage Very High Application CPU Usage Very High
1/31/2007 1:30:24	1215	774	17	123	81	83	0	Application Memory Usage Very High System Free Memory Very Low Application CPU Usage Very High
1/31/2007 1:50:24	816	492	17	123	81	83	0	Application Memory Usage Very High System Free Memory Very Low Application CPU Usage Very High
1/22/2007 1:54:17	61	40	6	94	2	11	76	OK
1/22/2007 1:55:22	36	5	9	25	3	12	75	OK

Figure 14 - The Resource Collector Session Detail Window

The Windows Version Specific Pages

Each Windows operating system version offers different performance and functionality tuning capabilities, and the HP Performance Tuning Framework can help administrators understand these different capabilities. When run on Windows XP Professional (32-bit edition only), there will be an OS Tuning Page included in PTF, and on Windows Vista, there is a Performance Check-Up Page which is useful for comparing performance of different workstation configurations.

Windows XP OS Tuning Page

A complex, feature-rich operating system such as Windows XP offers many options for customizing its behavior and features. Not all relevant configuration parameters can be manipulated via the Control Panel however. Many print and on-line articles have been published describing little-documented system parameters and registry settings that can be modified to augment the performance, security, or user-interface features of the operating system.

The HP Performance Tuning Framework contains an OS Tuning Page that enables the system administrator to modify several of these configuration parameters. This page is only available on systems running Windows XP. An instance of this page is shown in the image below. There are checkboxes and other controls on the left-hand side of the screen, and a large description box on the right. To view the description of a parameter, simply position the mouse over the desired control on the left, and the description of the corresponding parameter will be displayed. The descriptions include:

- some background information about the tuning parameter
- several circumstances that may indicate when each possible setting of the parameter would be desired
- an indication of when the parameter change will take effect (for example, immediately, or after Windows Restart)

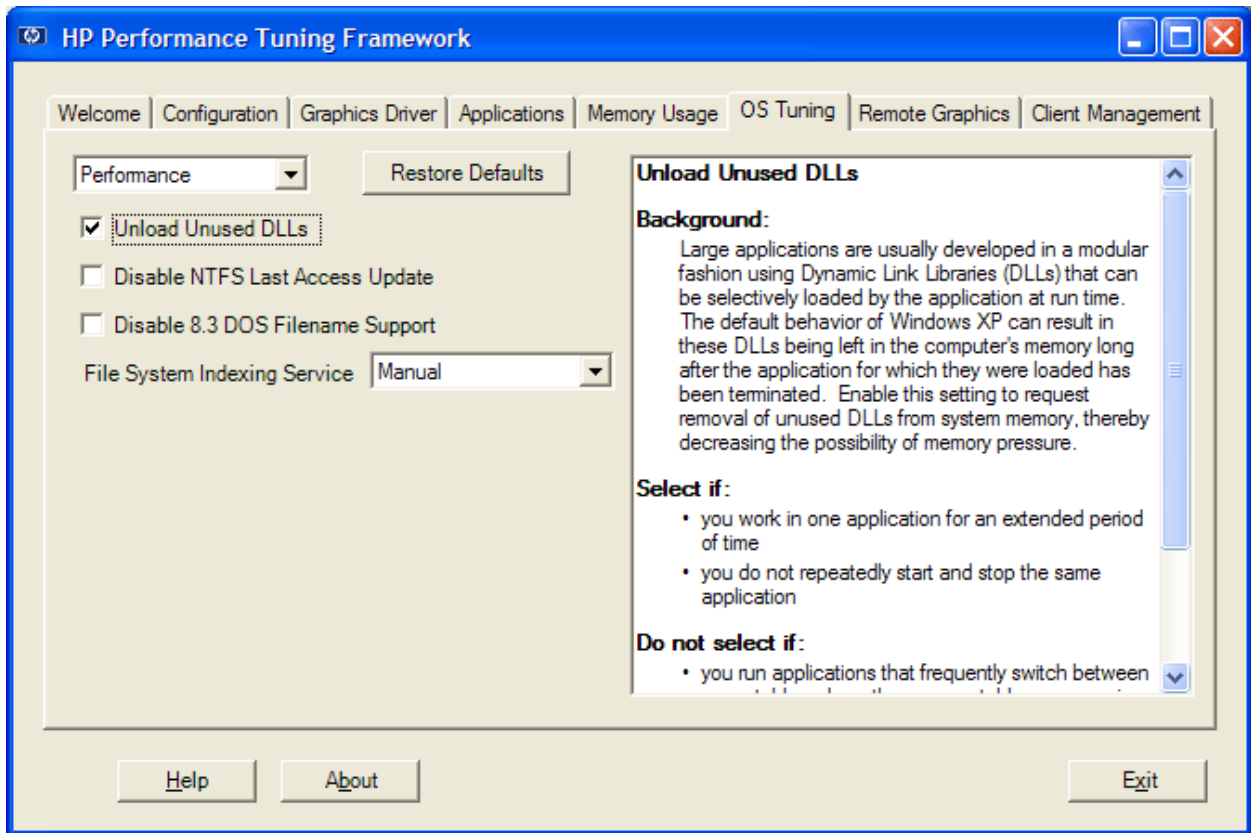


Figure 15 - The Windows XP OS Tuning Page

The currently visible set of tuning parameters is selected with the control in the top-left corner of the page. The Restore Defaults button will return all settings in the currently visible set to their Windows XP default values.

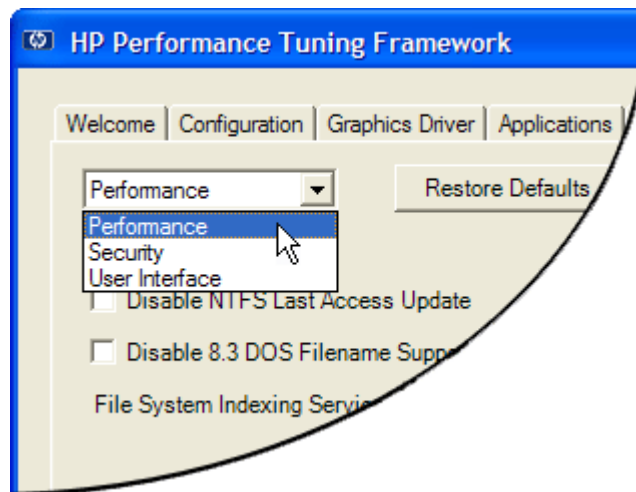


Figure 16 - The Tuning Parameter Set Selection

As Hewlett-Packard investigates and tests other tuning parameters, and determines that they are both operationally safe and potentially beneficial, new options may be added in future releases.

Windows Vista Performance Check-Up Page

The Windows System Assessment Tool (WinSAT) is a core component of the Windows Vista operating system. It is used to evaluate the features, capabilities, and performance of a workstation and generates the Windows Experience Index (WEI), which represents the relative performance measured during the most-recent formal assessment run.

PTF contains an interface to the WinSAT utility that displays the WEI scores, and can be used to launch individual assessments or a complete formal assessment. The first time Vista boots after a new installation, a formal assessment is run before the desktop is displayed to determine the initial WEI scores. The resulting initial assessment log file is maintained by the operating system, along with up to 100 subsequent formal assessment log files. PTF can display the details within any of the stored formal assessment log files.

The image below ([Figure 17](#) - The Windows Vista Performance Check-Up Page) shows an annotated screenshot of the Vista Performance Check-Up page from an 8510w mobile workstation with a Base score of 4.8. The red rectangles and text were added to highlight the controls on the Performance Check-Up page. The drop-down selection box is used to select assessments or view formal assessment log files. More information can be displayed about the assessments by selecting the *About Assessment* button. The selected assessment can be initiated by selecting the *Run Assessment* button. A graph of the base WEI scores or metrics (Processor, Memory, Desktop Graphics, Gaming Graphics, and Hard Disk 0) can be launched by clicking the associated WEI score button.

Whenever a new graphics card is added to a workstation, the system administrator should verify that a correct Windows Display Driver Model-compliant driver is installed, and then run a new formal assessment. Without a 3D device dependent driver, the graphics & gaming assessment will be below expected values (indicated by a yellow button background). This will cause the Base score to rate below expected value as well.

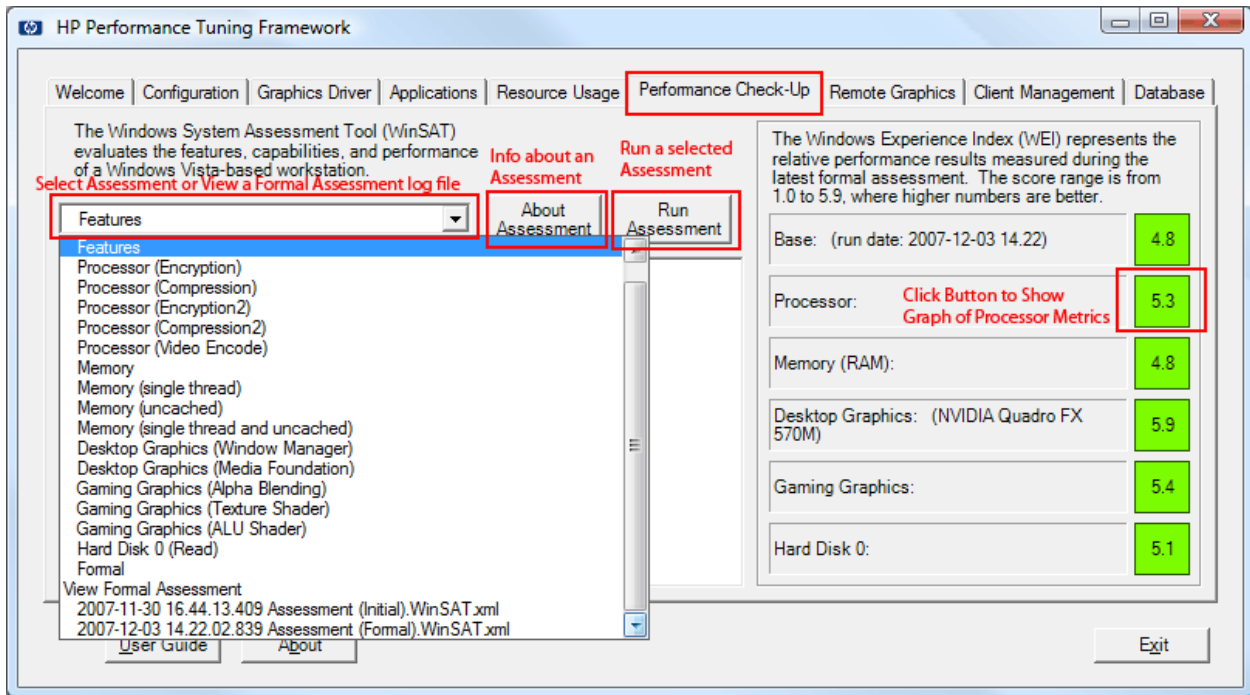


Figure 17 - The Windows Vista Performance Check-Up Page

PTF uses WinSAT during startup to acquire features and capability information on the current workstation configuration, such as the primary graphics adapter memory values which are presented on the Configuration Tab. For more details on the graphics memory values, refer to the [Graphics Memory Reporting through WDDM white paper](#).

The WEI scores are derived from the formal assessment metrics, and are displayed on the associated buttons. A click action on the WEI score button will show a graph of the WEI scores, Processor metrics, Memory metrics, Graphics metrics, Gaming metrics or Hard Disk 0 metrics in a separate form. The image below (see [Figure 18](#) - The Windows Vista Performance Check-Up Graph) is an example of Processor metrics on the running workstation (here an 8510w Mobile Workstation). The *Configuration Types* dropdown list can be used to select a different workstation model for comparison. The *Plot Types* dropdown list can be used to switch to different sets of metrics.

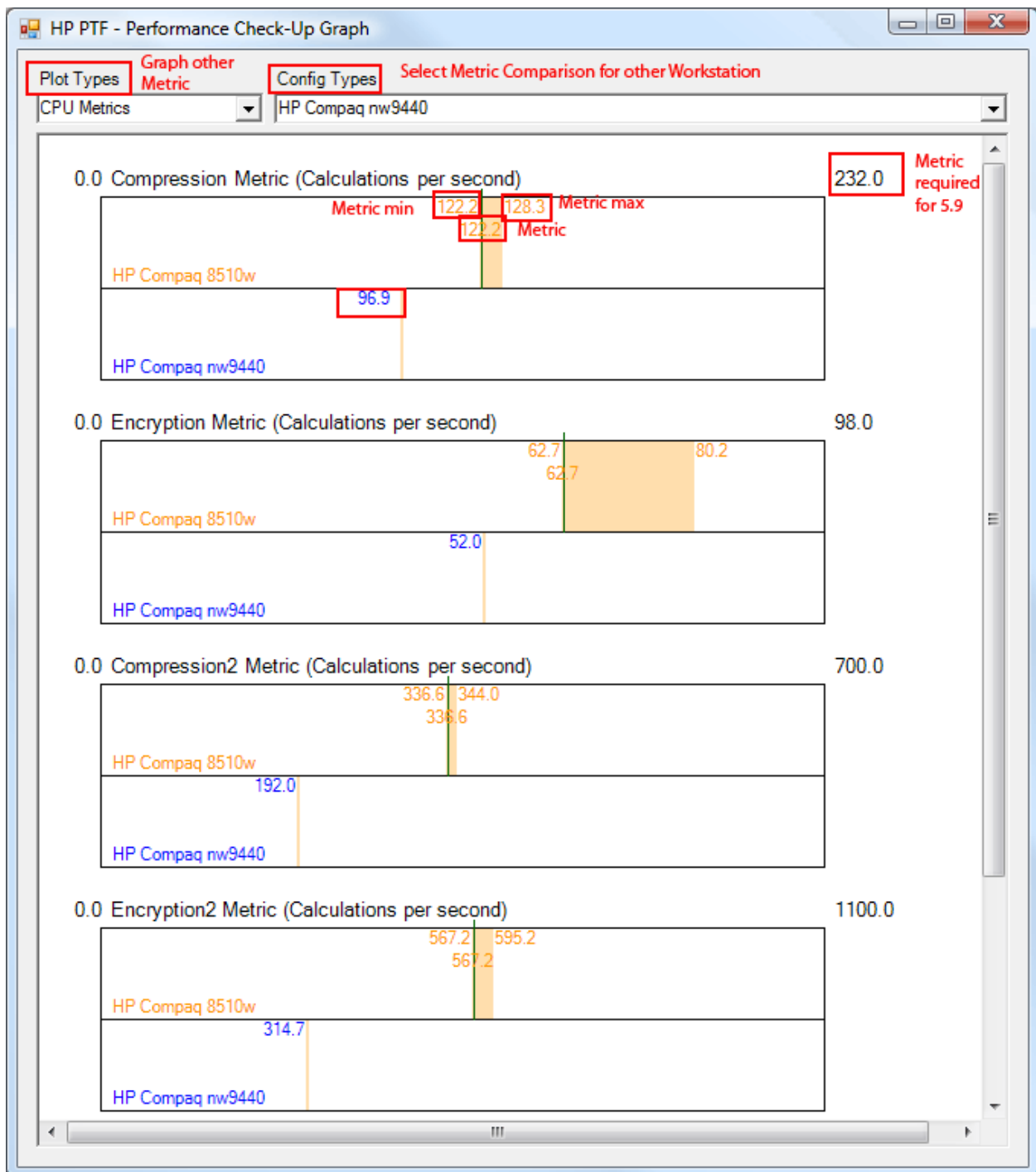


Figure 18 - The Windows Vista Performance Check-Up Graph

PTF maintains an updated database of workstation performance metrics that is checked each time it runs. This data is plotted to represent the expected range of results that HP has measured on various configurations (processor frequency, memory size, graphics card, and hard drive). Performance Check-Up will report the current results, and the expected performance range of the particular system components.

The Remote Graphics Page

Technologies that improve human efficiency and productivity continue to be developed. The computer network is fertile ground for such technologies, and Hewlett-Packard's Remote Graphics Software is a perfect example. It uses the network to deliver flexibility and performance to technical computer professionals, by allowing users to view and control the operation of high-end 3D applications running on remote workstations across a standard network. The Performance Tuning Framework enhances the value of Remote Graphics Software by adding configuration and maintenance capabilities that expose basic and advanced features of the software.

There are two separate components to the Remote Graphics Software solution: the Sender runs on the workstation where the applications and data reside, and the Receiver is run by users wishing to connect to the Sender machine to operate the applications. If neither component is found on a machine, PTF's Remote Graphics page will simply show a diagram depicting how Remote Graphics Software works (see [Figure 19](#) - The Remote Graphics Page, when neither component is installed). There is also a link to HP's Remote Graphics Software Site where users can read more about the product, and even download a free trial edition.

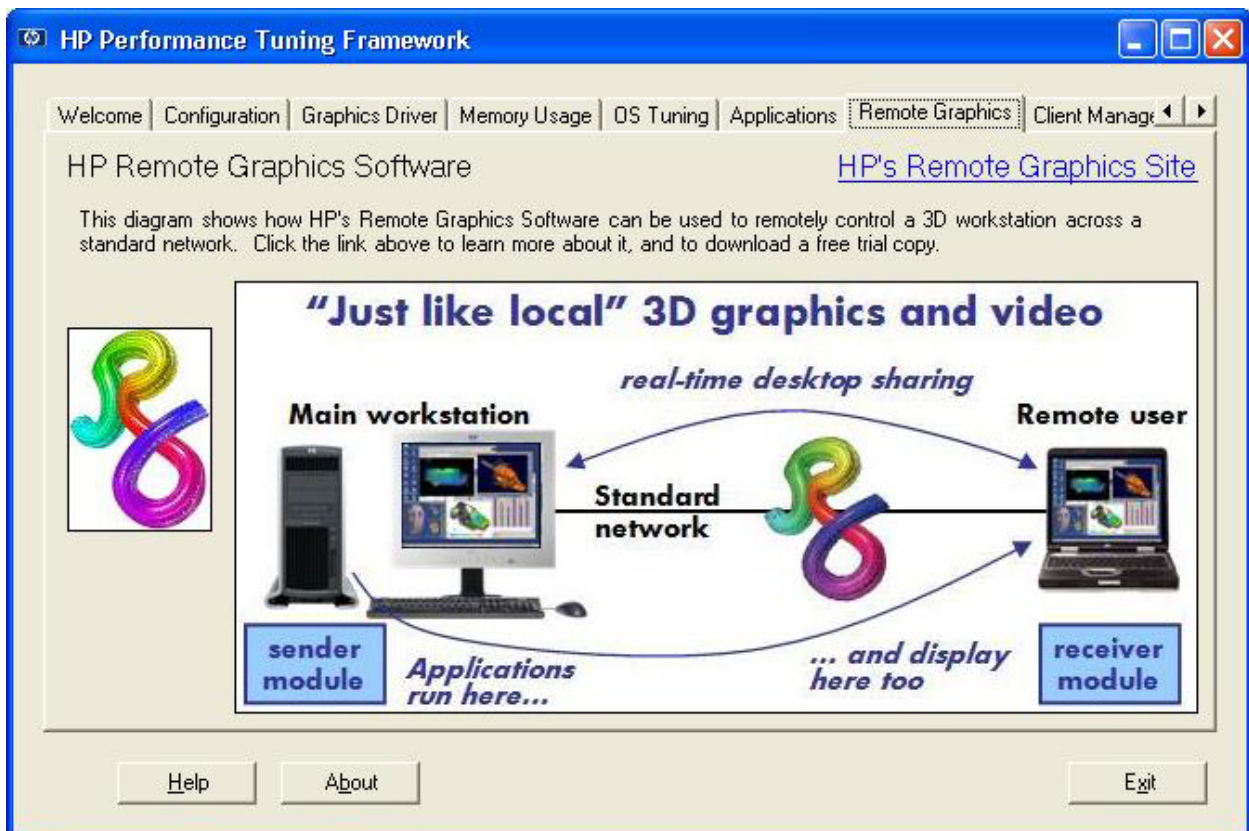


Figure 19 - The Remote Graphics Page, when neither component is installed

The Remote Graphics Sender

When PTF finds the Remote Graphics Sender installed, it will assemble the interface shown in the image below. There are fields for selecting settings to be used when the Sender service is launched at boot time, and controls to manage the insertion of the required OpenGL library into application folders.

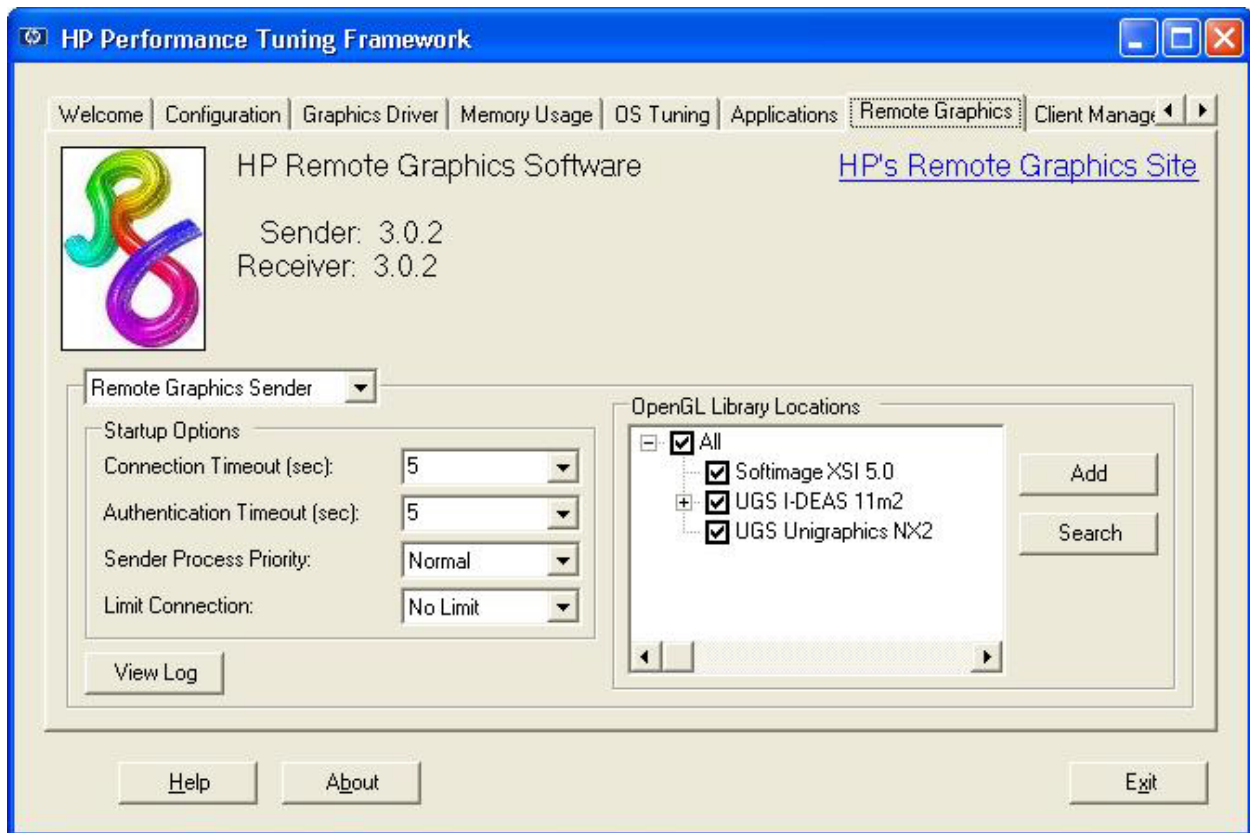


Figure 20 - The Remote Graphics Page; Sender Configuration

The Sender startup options that can be modified are:

Connection Timeout

This is the number of seconds the Sender will wait before assuming a Receiver's connection has been broken. Valid values are integers in the range from 1 to 60 seconds, and the default is 5. This value could be increased when Receivers will be connecting over slow network links.

Authentication Timeout

This is the number of seconds the Sender will wait before assuming the user's account name could not be authenticated. Valid values are integers in the range from 1 to 60 seconds, and the default is 5. This value could be increased when the authentication process requires transmission over slow network links.

Sender Process Priority

All processes on a computer have a priority that is used by the operating systems' scheduler. This setting is the relative priority that should be assigned to the Sender process. The default priority is Normal, which is used by the majority of processes, but it may be raised or lowered by selecting one of the other settings, Below Normal, Above Normal, and High.

Limit Connection

This setting can be used to restrict connections to the Sender. When it is set to No Limit, any number of different, valid accounts may be used to connect. If the Single User option is selected, then multiple remote connections will still be allowed, however they must all use the same user account. The default setting is No Limit.

In order for the Remote Graphics Sender to recognize when an application updates the graphics display, it must watch the operations each application requests of the OpenGL graphics library. This requires that a small library be placed in the folder of each OpenGL application, where it can be loaded every time the program starts. Without this library, the user interface components of the application (for example, the menus and buttons) will be visible to remote Receivers, however the graphics portion of the window will be blank or incomplete.

PTF has knowledge of many 3D applications, and it will automatically add the installed applications it finds to the list of OpenGL Library Locations (see the image above). The checkboxes next to each application name can be used to copy or remove the library needed by the Remote Graphics Sender. Clicking on the checkbox at the top of the list, labeled All, will copy the library to (or remove it from) each folder below it in the list. This makes it very easy to prepare a workstation for remote display of all its applications.

The Add button will present a file selection dialog that can be used to navigate to a specific executable that should be included in the list. The Search button will display a folder selection dialog that can be used to designate a top level folder. PTF will then search all folders below the selected one for executables requiring the OpenGL library. As the search discovers files that depend upon OpenGL, their folders are added to the Library Locations list.

The Remote Graphics Receiver

PTF attempts to help users of the Remote Graphics Receiver by testing connections to workstations running the Remote Graphics Sender component (see the image below). Also, as exposed for the Sender, the Receiver's two timeout values can be adjusted through PTF's interface. This feature can only be applied to the Start menu shortcut created by the Receiver installation process.

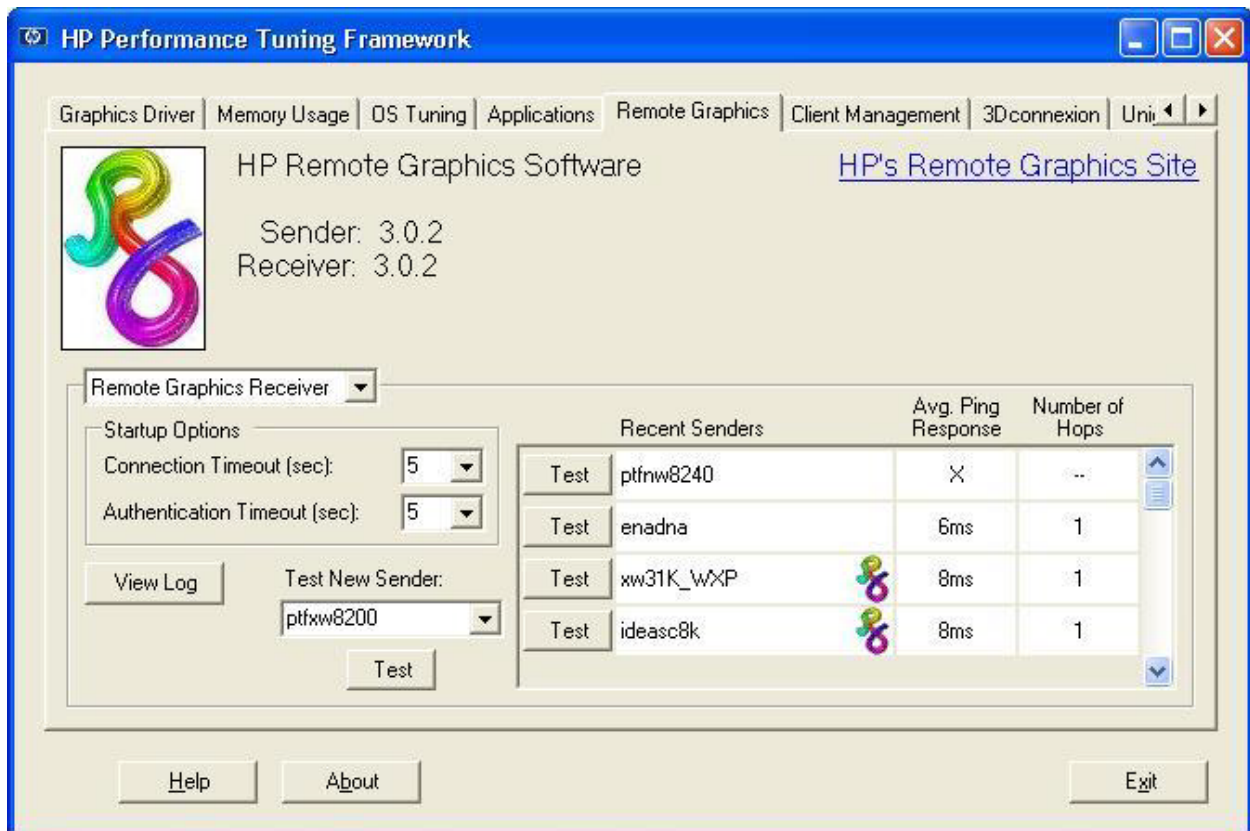


Figure 21 - The Remote Graphics Page; Receiver Configuration

The Remote Graphics Receiver maintains a list of recently connected Sender machines. PTF reads that list and then presents a Test button for each recent Sender workstation. This button performs the following operations for on the Sender:

Sender Socket Test

PTF will attempt to open the socket used by the Remote Graphics Sender on the remote machine. If there is no service watching that dedicated socket, the connection will fail. When the socket connection is successful, the Remote Graphics Software logo will be displayed next to the machine name.

Ping Test

PTF will attempt to gather Internet Control Message Protocol (ICMP) echo responses from the remote machine using the Windows ping utility. Upon a successful response, the average roundtrip time will be reported.

Note: The default Windows network configuration does not respond to echo (ping) requests, however it may be enabled through the advanced firewall settings for the network connection; this is documented in the Microsoft TechNet article [How to Configure Windows Firewall on a Single Computer](#).

Route Trace

If ping was successful, the final step PTF performs uses the Windows tracert command to measure transmission rates between the sub networks connecting the Sender and Receiver workstations. The number of sub networks traversed is reported in the PTF window in the column labeled Number of Hops.

PTF can perform these tests on machines not already in the Recent Senders list by entering the workstation name or network address in the Test New Sender field. The transcript of the tests will be displayed in a new window, as shown in the image below. When the Sender socket test succeeds, an Add button on the output window can be used to insert this new machine into the list of recent Senders.

Note: The Remote Graphics Receiver rewrites its recent Senders list each time it terminates, so new Senders added by PTF will get lost if the Receiver is running at the time of the addition. For this reason, the Add button should not be used if the Receiver is running.



Figure 22 - The Network Connectivity Transcript

Common to both Sender and Receiver interfaces in PTF is the View Log button. Clicking this will display the contents of the respective log file in a window similar to the image below. The log can be presented as either a tree separated by entry date, or a plain text dump. The logging facility can be told to include extra information using the Capture Debug Information check box; this can be helpful when diagnosing connection problems. Changing this setting will not take effect until the Sender or Receiver is restarted. There are also buttons to refresh the log display, and clear the log file.

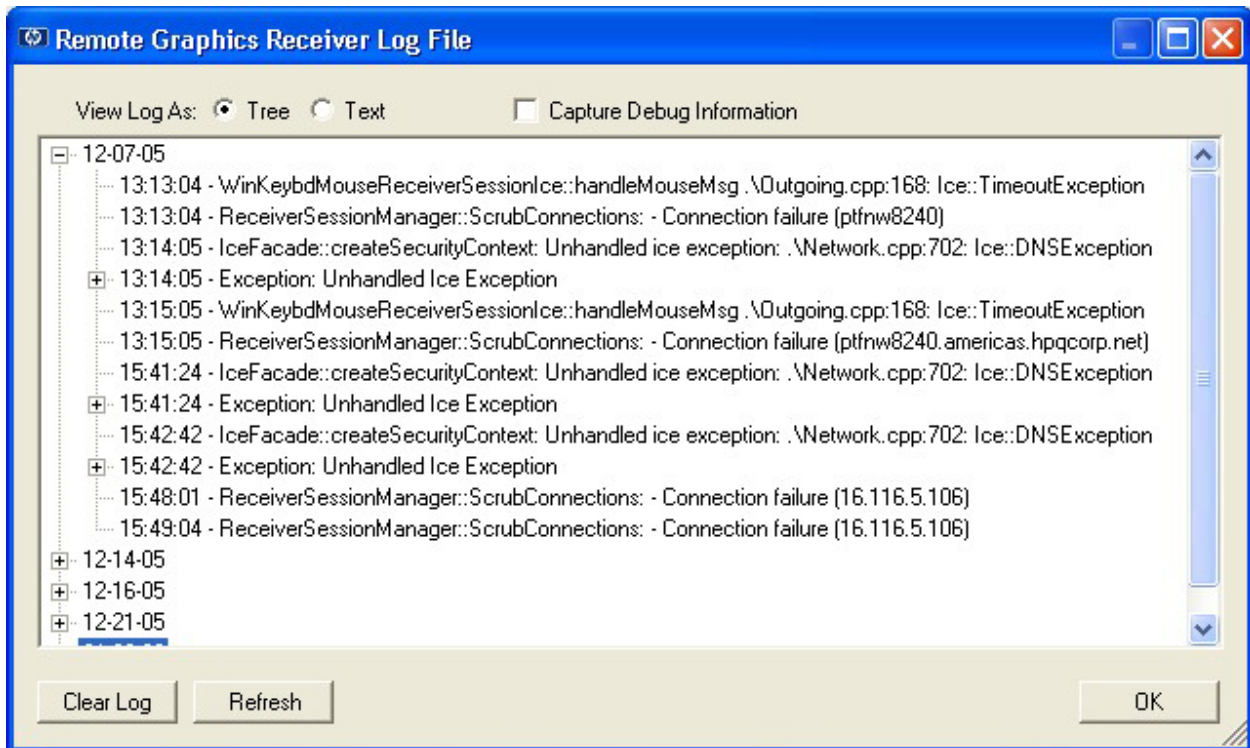


Figure 23 - The Remote Graphics Log Display Window

The Client Management Page

For more than a decade, HP has been a leader in driving industry standards and providing customers with innovative PC management solutions. HP Client Management Solutions continues that leadership tradition by providing a comprehensive portfolio of solutions that reduce the complexity of managing client systems throughout their lifecycle. PTF's Client Management Page provides information, status, and downloads for some of the HP-provided client management utilities.

HP System Software Manager (SSM)

SSM is a free utility that helps streamline the mass deployment of software updates to client workstations. Its capabilities include:

- deploying system software updates (HP's SoftPaqs for drivers and BIOSes, for example) from a centralized file store to multiple client workstations - simultaneously and automatically
- deploying customer-created update packages
- enforcing BIOS configurations and passwords
- logging the changes made to each workstation

If SSM is not currently present on the workstation, its installation SoftPaq can be downloaded and launched from PTF. Once installed, SSM can be run from the Client Management Page, and its read-me file and User Guide can be viewed by clicking the appropriate Framework buttons, as show in [Figure 24](#) - HP System Software Manager Configuration.

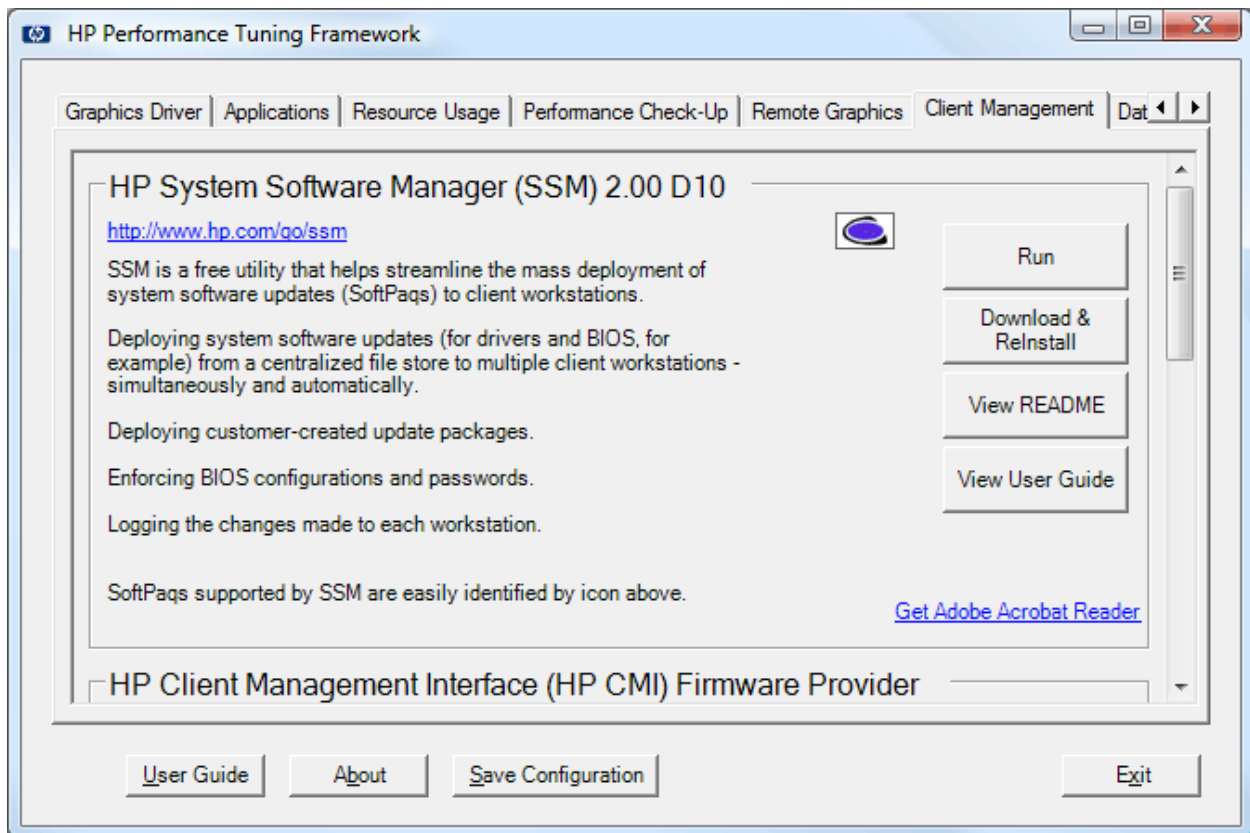


Figure 24 - HP System Software Manager Configuration

The image below is a screen capture of the System Software Manager Wizard being run.

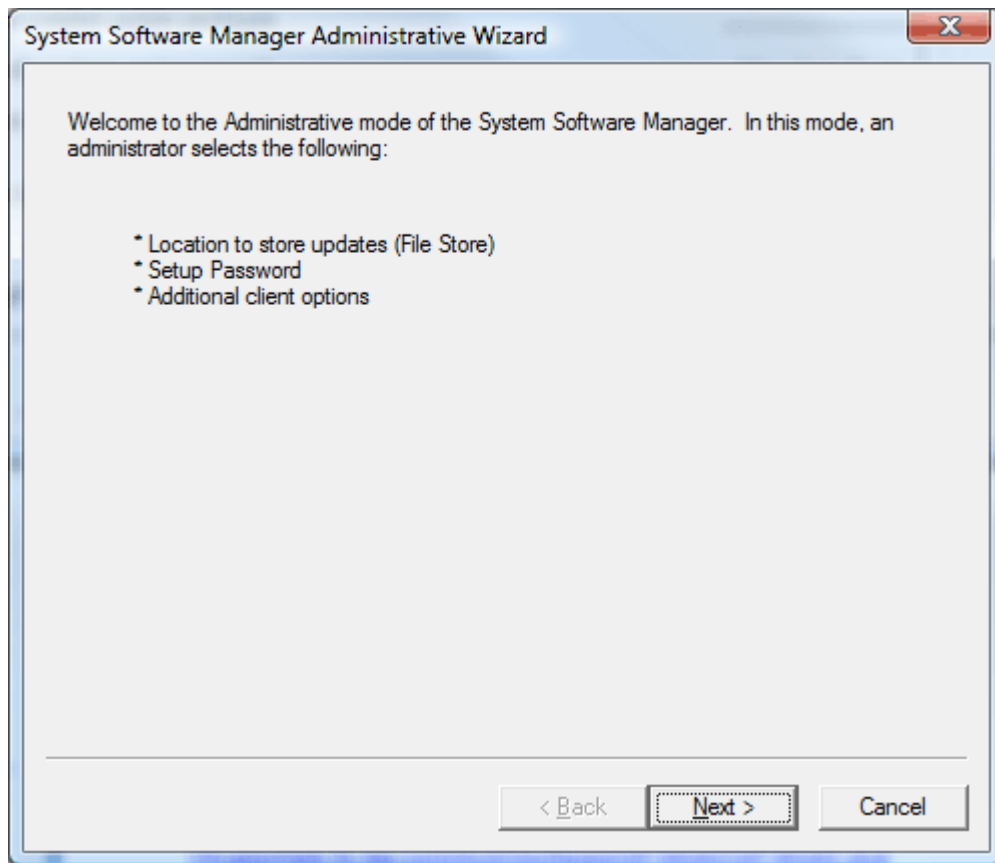


Figure 25 - System Software Manager

HP Client Management Interface (HP CMI)

HP CMI is an open architecture for gathering client computer inventory, monitoring health events, and managing BIOS configuration settings on HP business class client computers. This interface is included standard on new workstation models beginning with the HP xw4300 workstation. The HP CMI Software Provider is available for Windows XP workstations without the built-in hardware support. At this time, there is no HP CMI Software Provider available for Windows XP x64.

If HP CMI is available, the Run button will display the HP CMI classes installed and also enumerate all of the system BIOS settings. The readme file and HP CMI White Paper can each be viewed with one button click. If HP CMI is not present, the Software Provider may be downloaded and installed using the PTF interface.

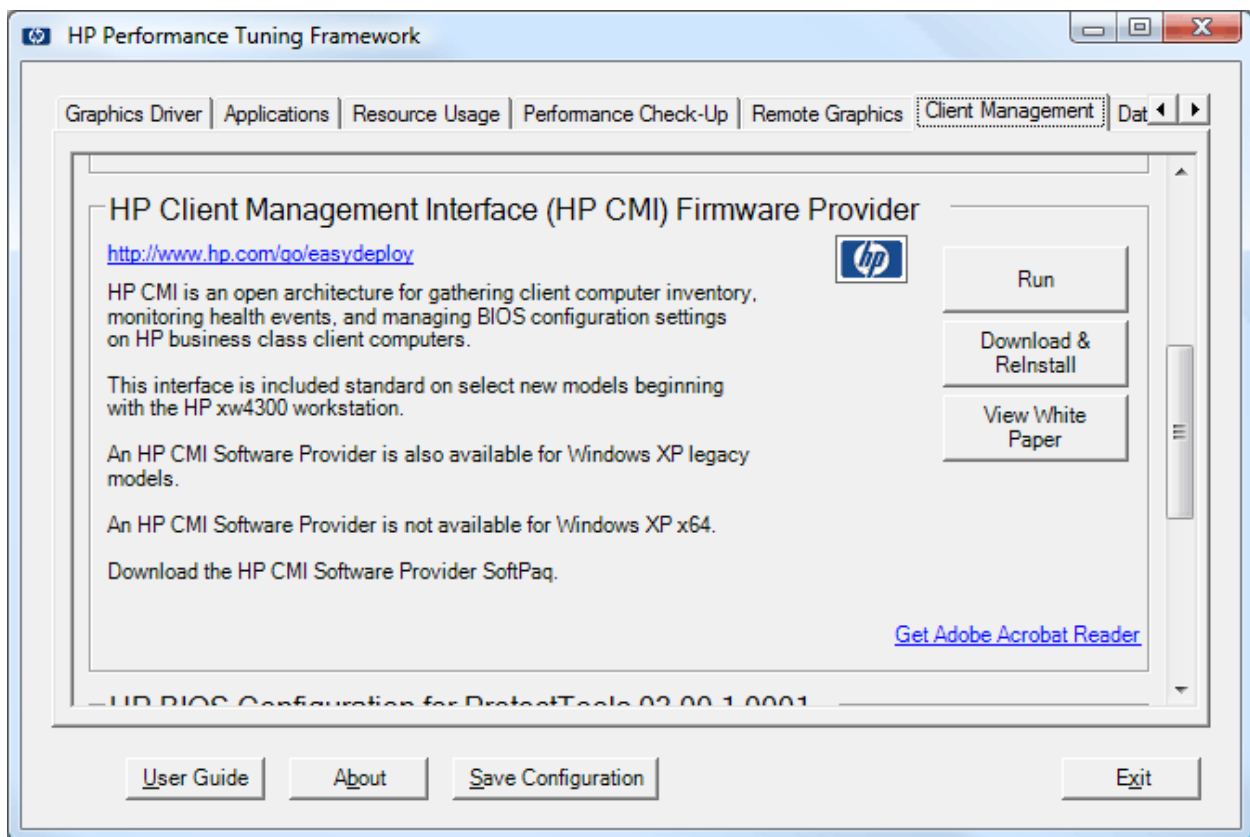


Figure 26 - HP Client Management Interface Configuration

The image below is a screen capture of the output displayed with the Run button.

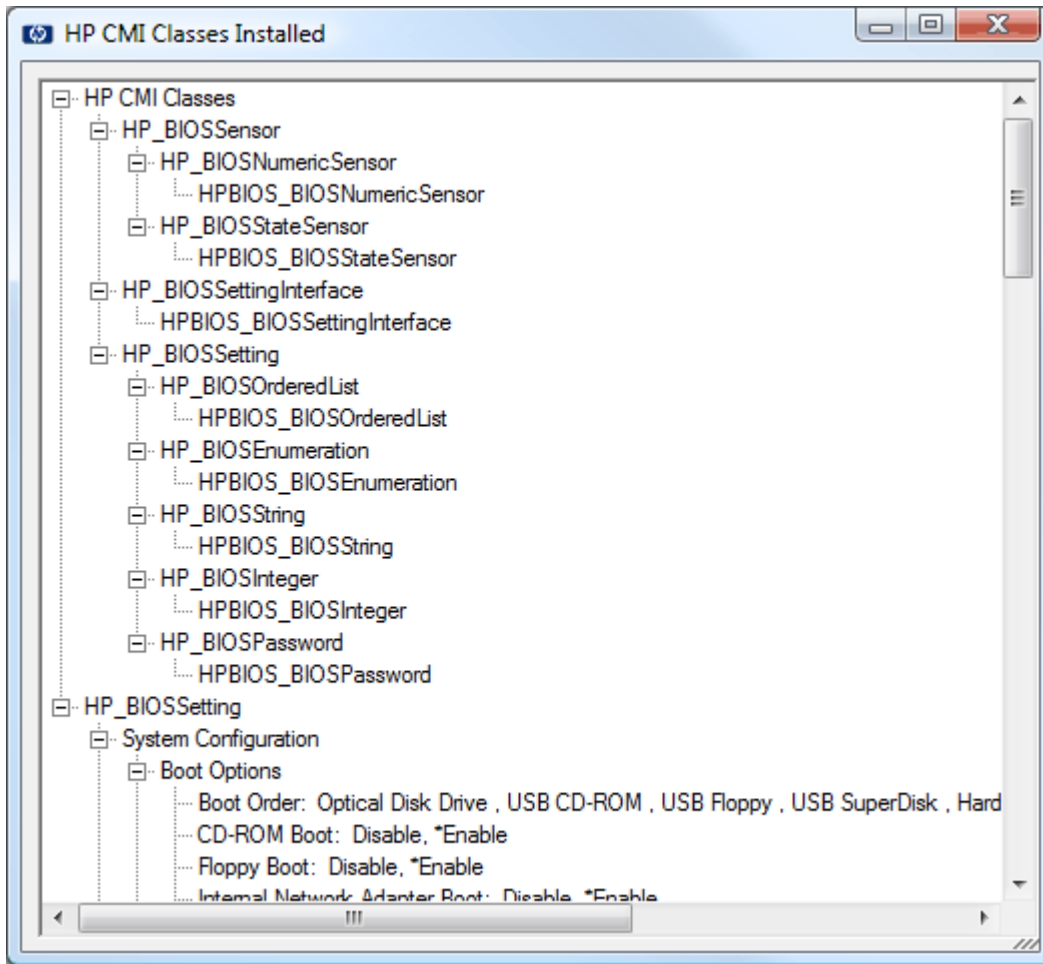


Figure 27 - HP CMI Output Window

The information displayed on the HP CMI Output Window can be saved to a file by simply clicking the right mouse button or depressing the context menu key on the keyboard when the mouse cursor is over the CMI data.

BIOS Configuration for HP ProtectTools

The BIOS Configuration for HP ProtectTools utility is used to locally set BIOS options (such as modifying the boot order, disabling serial ports, etc.) using the new Microsoft Windows Management Instrumentation (WMI) Specification for the Client Management Interface. This package also includes HP Protect Tools Security Manager which provides an interface for the HP BIOS Configuration.

If BIOS Configuration for HP ProtectTools utility is not installed, its SoftPaq can be downloaded from the Download button. When PTF recognizes that it is installed, the utility can be launched from the Run button, and the User Guide can be displayed by clicking on the View User Guide button.

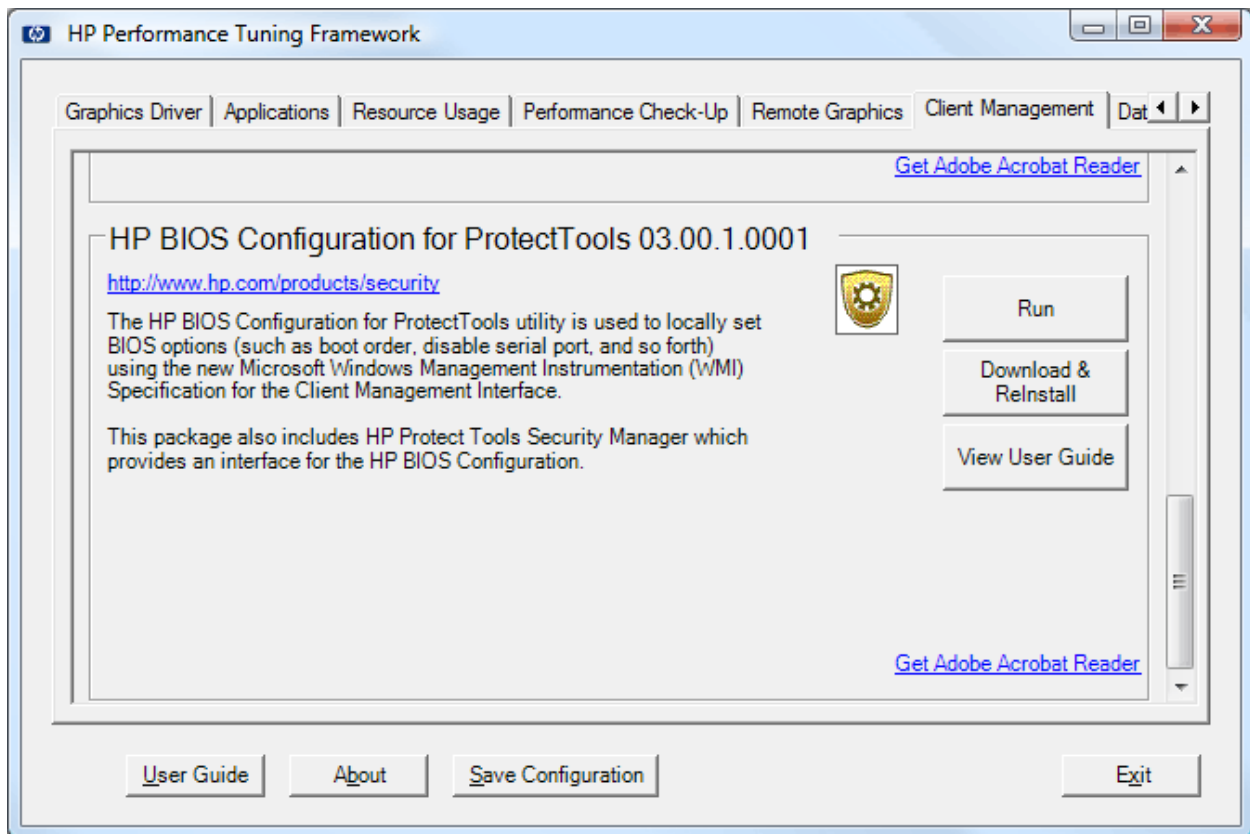


Figure 28 - HP BIOS Configuration for ProtectTools Configuration

The image below is a screen capture of the HP ProtectTools Security Manager and the BIOS Configuration selected.

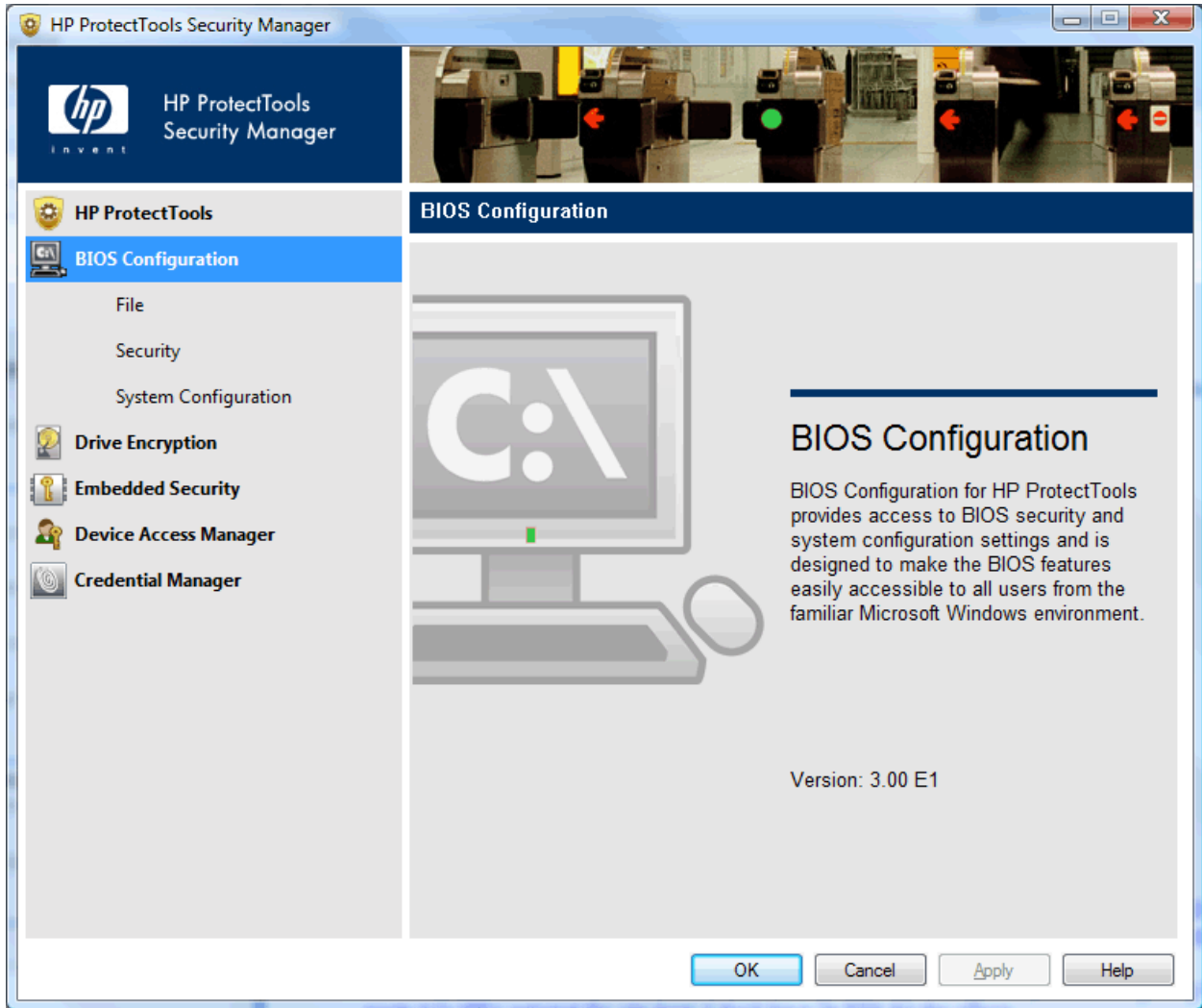


Figure 29 - HP ProtectTools Security Manager Window

The 3Dconnexion Motion Controller Page

The 3Dconnexion motion controller configuration is reported on the 3Dconnexion page. The types of information reported include:

- the motion controller installation detected in the Windows's Registry
- the USB Plug-and-Play motion controller currently connected on workstation
- the 3Dxware software driver version installed on the workstation
- the list of 3Dconnexion Add-in and Plug-in application software installed on the workstation
- hyperlinks to the motion controller product information
- hyperlinks to the motion controller software download site

There are buttons to Run/Stop the motion controller driver on this page. There is a View button to display the motion controller product specifications.

This screen image shows the 3Dconnexion Page for a machine with the USB SpacePilot installed.

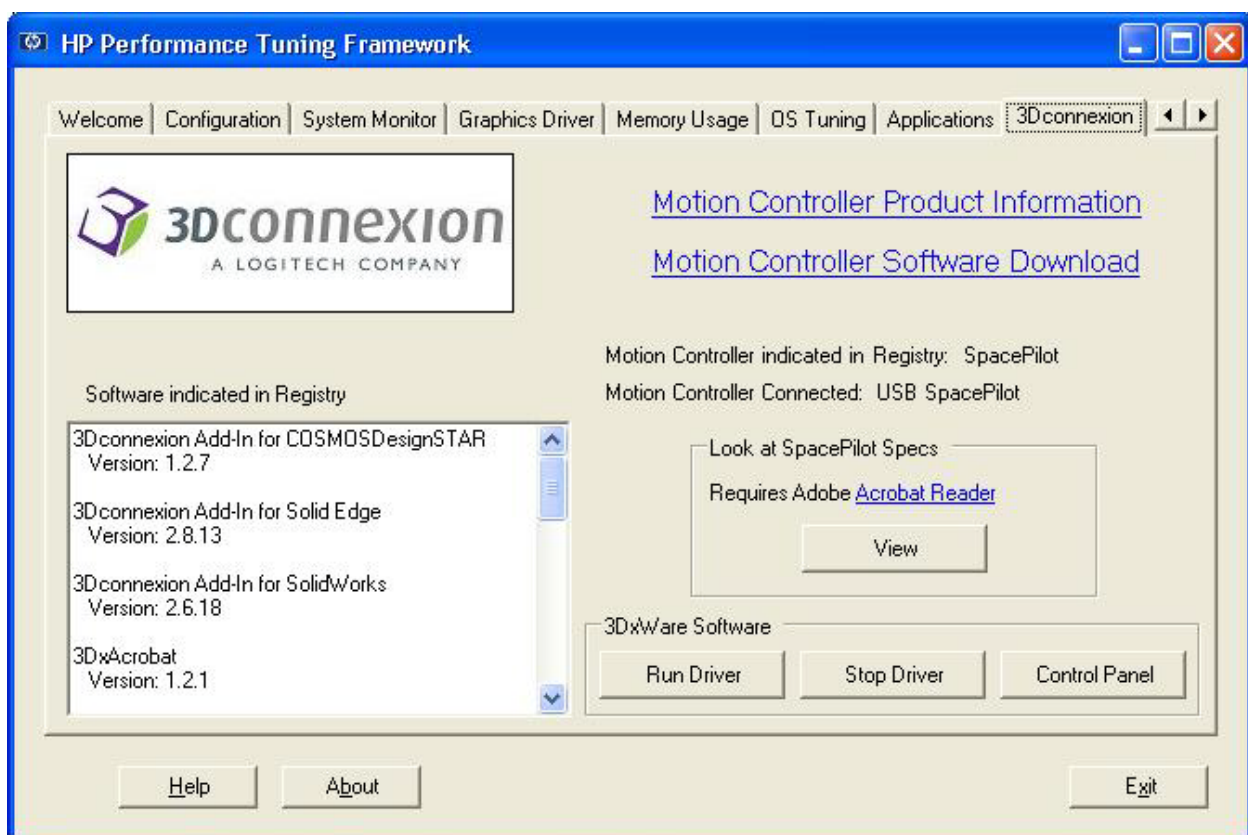


Figure 30 - The 3Dconnexion Motion Controller Page

Supported Applications

The foundational support PTF provides for an application is the recognition of a valid installation (shown on the [Applications Page](#)), and the presentation of graphics driver certification information for the current platform configuration (shown on the [Graphics Driver Page](#)). Beyond that, the HP consultants working with the application providers may have implemented tuning utilities unique to the supported application versions. These tuning opportunities are presented to the user on tuning and information forms created for each installed application.

A common additional tuning feature PTF provides is the enablement of large memory usage, which is supported by several applications. However, the most exciting feature is the graphics performance enhancement capability of HP HyperTune technology for certain applications.

With HP HyperTune, users can really benefit from the deep technical knowledge HP has gained through long, cooperative relationships with the application providers. HP engineers have discovered ways to improve the graphics performance of Siemens PLM Software NX, and have written a HyperTune module to expose this capability to the workstation user. The HyperTune for NX module employs a rich user interface that allows fine control over the types of graphics operations it measures (see the HyperTune screen image).

This table lists the currently supported Framework applications for which installation recognition and graphics driver certification information are provided, and also identifies the applications for which additional tuning features are available:

Application	Versions	Large Memory	Other Tuning
Adobe Photoshop CS2	9		
Adobe Creative Suite	4		
ANSYS ANSYS	9, 10, 11, 11 x64	X	
ANSYS Workbench	9, 10, 11, 11 x64	X	
Autodesk 3ds Max	2008, 2009, 2009 x64		X
Autodesk AliasStudio	2008, 2009		
Autodesk AutoCAD	2005, 2006, 2007, 2008, 2009		X
Autodesk AutoCAD Mechanical	2007, 2008, 2009		

Application	Versions	Large Memory	Other Tuning
Autodesk Architectural Desktop	2007, 2008		
Autodesk AutoCAD MEP	2008, 2009		
Autodesk Building Systems	2006, 2007		X
Autodesk Mechanical Desktop	2007, 2008		
Autodesk Inventor	6, 7, 8, 9, 10, 11, 2008, 2009	X	X
Autodesk Maya	2009, 2009 x64		
Autodesk Revit Architecture	2008, 2009		
Autodesk Revit Building	9, 9.1		
Autodesk Revit MEP	2008, 2009		
Autodesk Revit Structure	3, 4, 2008, 2009		
Alias Studiotools	11.x, 12.x, 13.0, 13.5		
Bentley InRoads	XM		
Bentley MicroStation	V8, V8 XM, V8i	X	
Bentley ProjectWise Navigator	V8 XM		
Dassault Systèmes CATIA V5, V5 x64	Releases 10 and beyond	X	
Dassault Systemes SolidWorks	2003, 2004, 2005, 2006, 2006 x64, 2007, 2007 x64, 2008, 2008 x64, 2009, 2009 x64	X	
Dassault Systemes eDrawings	2003, 2004, 2005, 2006, 2007, 2008, 2009		
Dassault Systemes SolidWorks Simulation	2003, 2004, 2005, 2006, 2007, 2008, 2009		
Google Earth	3.0		
Graphisoft ArchiCAD	11		
HSMWorks ApS HSMWorks	2009, 2009 x64		
Macromedia Flash	8		
PTC CoCreate OneSpace	2004, 2005, 2006, 2006 x64, 2007, 2007 x64, 2008, 2008 x64	X	
PTC Mathcad	13, 14		
PTC Pro/ENGINEER	2001, Wildfire, Wildfire 2, Wildfire 2 x64, Wildfire 3, Wildfire 3 x64, Wildfire 4, Wildfire 4 x64	X	

Application	Versions	Large Memory	Other Tuning
PTC Pro/ENGINEER CAE	Wildfire 2, Wildfire 2 x64, Wildfire 3, Wildfire 3 x64	X	
Siemens PLM Software I-DEAS	9, 10, 11, 12, 5, 6	12m1	
Siemens PLM Software Solid Edge	14, 15, 16, 17, 18, 19, 19 x64, ST, ST x64	X	X
Siemens PLM Software NX	NX1, NX2, NX3, NX4, NX4 x64, NX5, NX5 x64, NX6, NX6 x64	X	X
Softimage XSI	3.5, 4.0, 5.0, 6.0		
U.S. Army America's Army	2.6		

Applications with Additional Tuning Features

Autodesk 3ds Max

3ds Max is capable of utilizing several different graphics technologies, including a custom display driver delivered by the graphics hardware vendors. To facilitate selection of a graphics driver, the 3D Studio Max application page contains a button to launch the application's Graphics Driver Setup dialog.

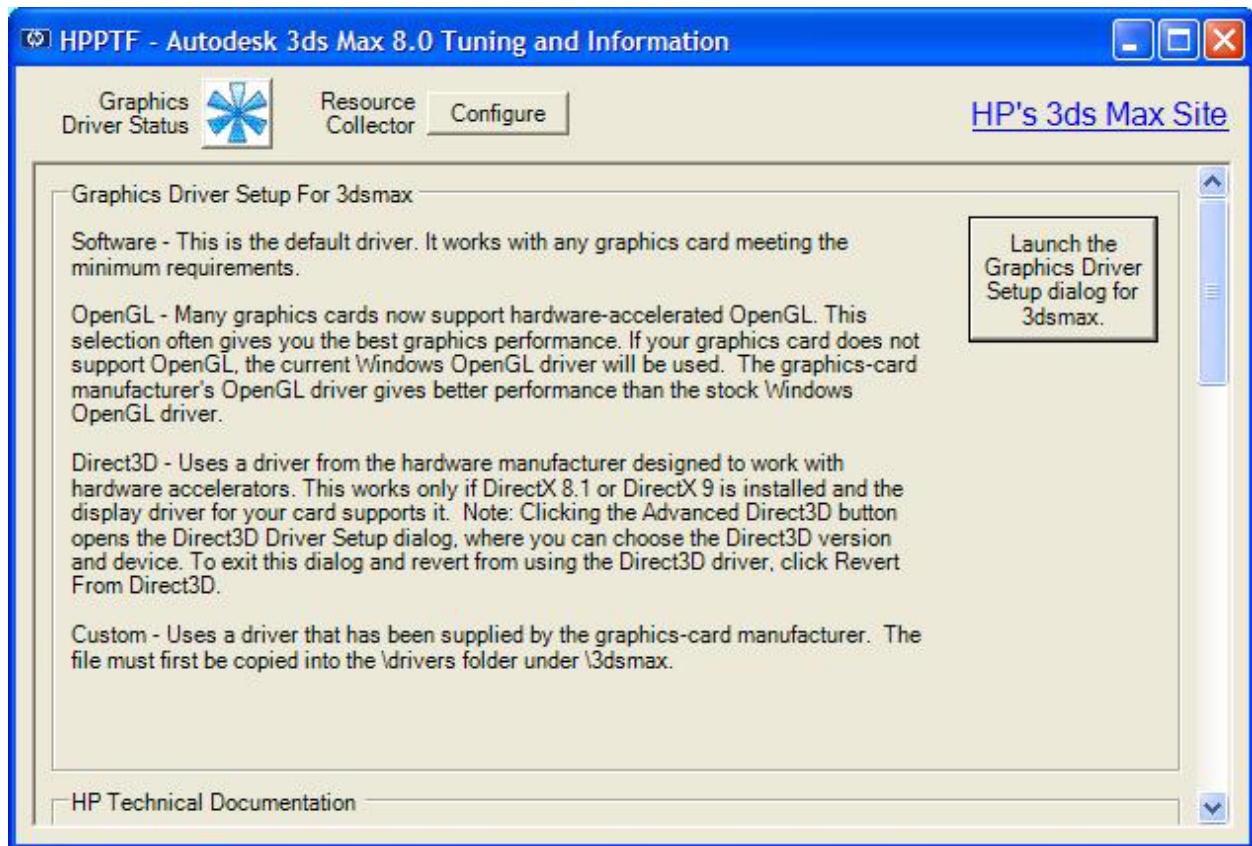


Figure 31 - The 3ds Max Application Form

Autodesk AutoCAD

Starting with AutoCAD 2007, an AutoCAD Hardware Certification Database file contains the latest data that AutoCAD uses for optimizing the performance of graphics hardware. PTF offers the ability to download and install the latest hardware certification data from the Autodesk web site to keep workstations current. The Update Database button to initiate the download and installation of the updated AutoCAD Hardware Certification Database is shown here.

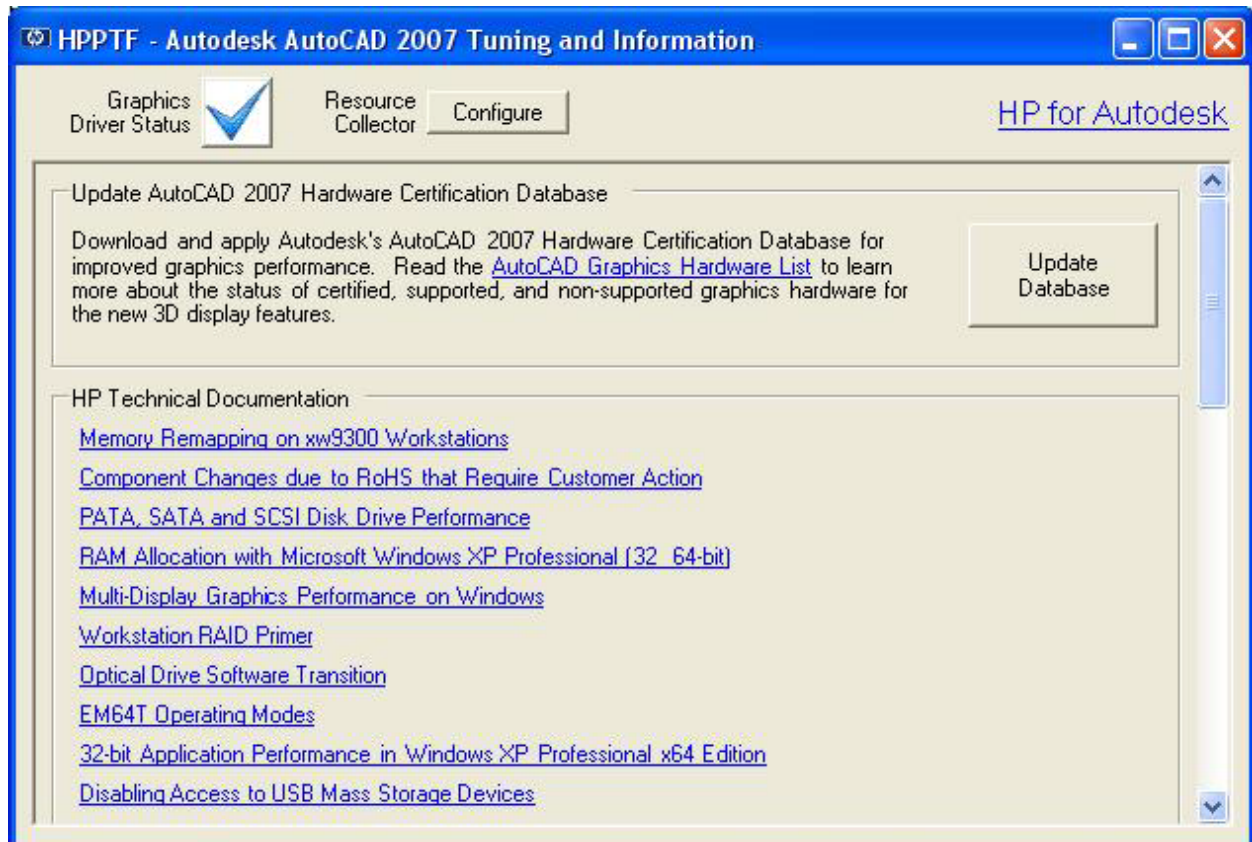


Figure 32 - The AutoCAD Application Form

Autodesk Inventor

Autodesk Inventor versions 6.0 through 10.0 maintain data about supported graphics cards and drivers in the Windows registry. Starting with Inventor 11.0, this data is kept in the Inventor Graphics Database. PTF offers the ability to download and install the latest graphics support information from the Autodesk web site to keep workstations current. To download and install the updated database, use the *Update Database* button on the Inventor application form as shown in [Figure 33](#) - The Inventor 11 Application Form.

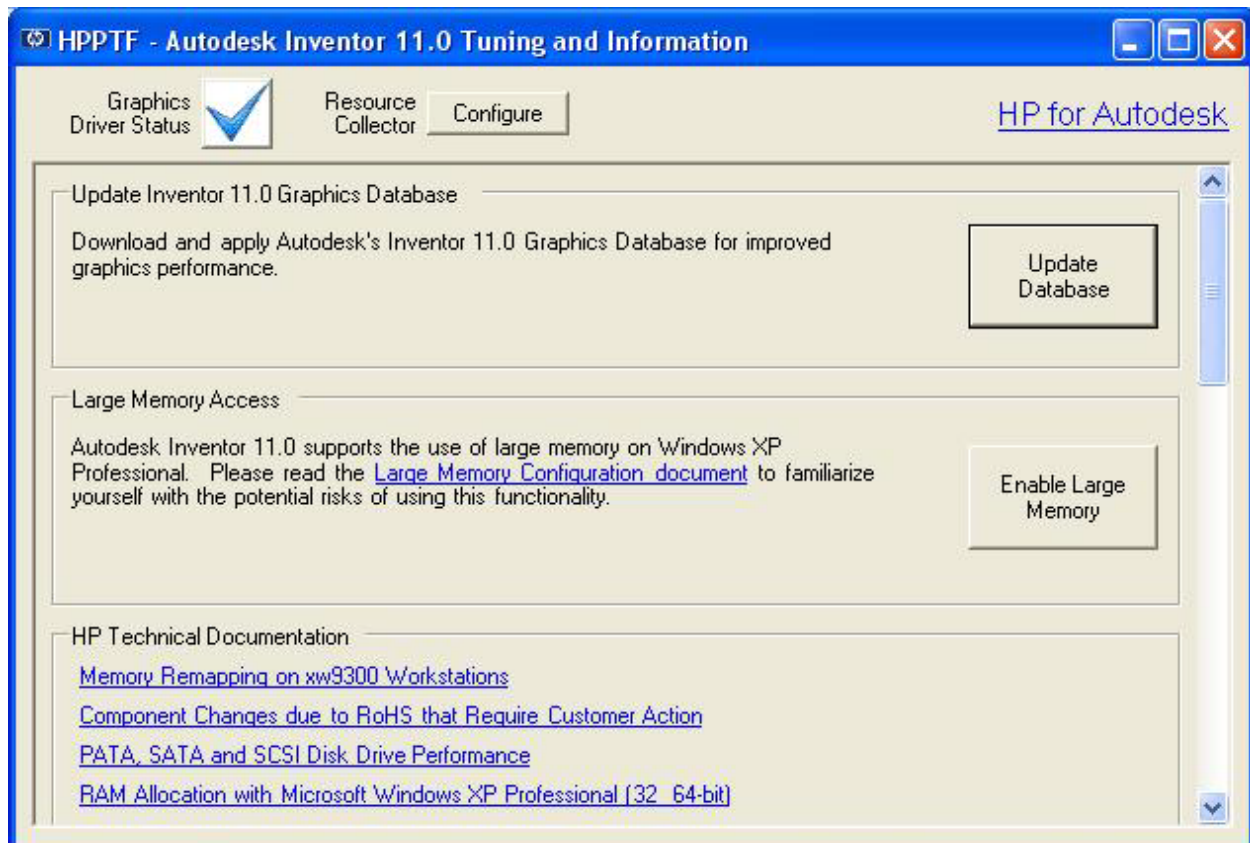


Figure 33 - The Inventor 11 Application Form

Siemens PLM Software NX

PTF can launch the HyperTune for NX utility. This tool has the ability to measure the graphics performance of NX, and configure the graphics card and application settings for optimal performance. The screen image below shows the user interface of this utility. For more detailed information on HyperTune, read its Users Guide.

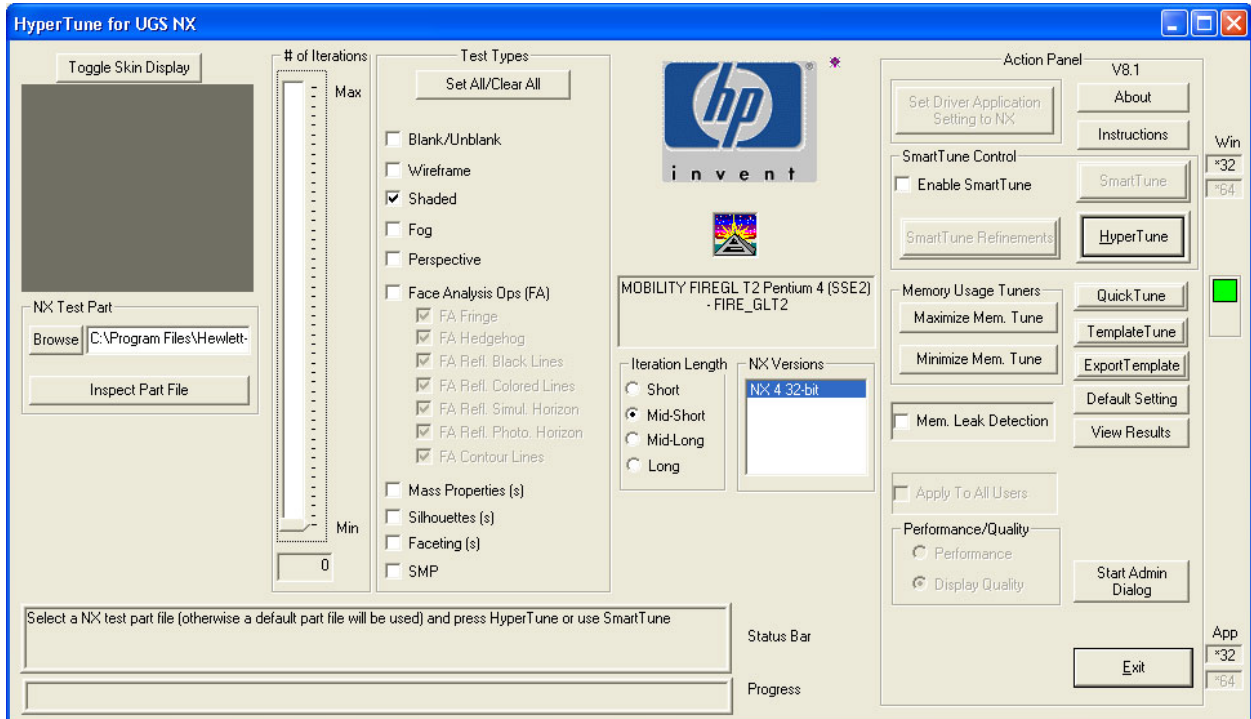


Figure 34 - The HyperTune for NX User Interface

Dynamic Updates

To get the most out of the HP Performance Tuning Framework, a network connection is required. Hewlett-Packard will update PTF periodically to add new configuration features and application support, and the certification data must be updated regularly as new workstations, graphics cards, and drivers are released and certified. These updates can only occur via the internet.

Certification Database

Each time PTF is started, it compares its local version of the database with the one on the PTF server. If it finds the local copy is not up to date, it will replace it with the latest.

Performance Tuning Framework

The database contains information about the latest available version of PTF, which is also checked each time PTF is run. If PTF finds that its version is not the latest, it will prompt for permission to update itself. If accepted, the newer version will be downloaded, installed, and launched.

As new features are added to PTF, or if critical issues have been found and corrected, it may become necessary to force an update. In these situations, a prompt will be displayed notifying that an update is required before PTF can run. If the update is declined, PTF will terminate, and will not run again until the update is accepted.

Large Memory Configuration

Microsoft Windows XP Professional, Vista Business, Vista Enterprise, and Vista Ultimate include the ability to give applications access to a larger virtual address space than was previously available. For example, if a CAD designer using Siemens PLMS NX4 was running out of memory while loading a large assembly, this operating system feature could be enabled to give her the extra storage necessary to bring the entire assembly up on the screen. This document provides some background information about this new feature, and describes what the HP Performance Tuning Framework can do to help enable it.

The following Microsoft documents discuss various aspects of this feature, which Microsoft refers to as 4 Gigabyte Memory Tuning or 4GT:

[Memory Support and Windows Operating Systems](#)

[Information on Application Use of 4GT RAM Tuning](#)

[Troubleshooting the Startup Process](#)

[Windows XP SP1 May Not Start with the /3GB or /USERVA Switch](#)

[Windows Virtual Address Space](#)

[Windows 4-Gigabyte Tuning](#)

Overview

The default configuration of the Windows XP Professional and Vista (all 32-Bit varieties; Business, Enterprise, Ultimate) operating systems reserves the upper 2 gigabytes (GB) of the 32-bit virtual address space for itself, and allows applications to use the remaining 2GB at the low end of the address range. This is far more space than most applications need. For the few technical workstation users who require more than 2GB, Windows XP and Vista can be set to reserve only 1GB for itself, thereby opening up an additional 1GB for applications to use. To enable an application to access this additional memory, both the operating system and the application must be configured appropriately.

Configuring the operating system

Windows must be started with a boot option that restricts its memory use to only the top 1GB of the 32-bit address range. Boot options are stored in the boot initialization (boot.ini) file in Windows XP, which is a hidden system file containing the boot entries that get presented when a system is turned on, as shown here:

```
Please select the operating system to start:

Microsoft Windows XP Professional <3GB Enabled>
Microsoft Windows XP Professional
Microsoft Windows 2000 Professional

Use the up and down arrow keys to move the highlight to you choice.
Press ENTER to choose.
Seconds until the highlighted choice will be started automatically: 20

For troubleshooting and advanced startup options for Windows, press F8.
```

Figure 35 - Windows XP Boot Options

This screen shot was taken on a machine that has three boot entries in its boot.ini file: two for a disk that contains Windows XP, and one for another disk with Windows 2000. Each selectable boot entry can pass different boot options to Windows. So, aside from the different labels for the Windows XP entries, what really differentiates them are the options they pass to the Windows boot loader. Here, "(3GB Enabled)" indicates that the first boot entry includes the options necessary to enable large memory usage.

Boot options are stored in the Boot Configuration Database (BCD) on Windows Vista. The BCD is a binary file and managed via the system command 'bcdedit.exe'. Similar to previous version of Windows, the user must select the boot manager entry that contains the increase user virtual address space option. The screen shot below is a typical boot manager setup.

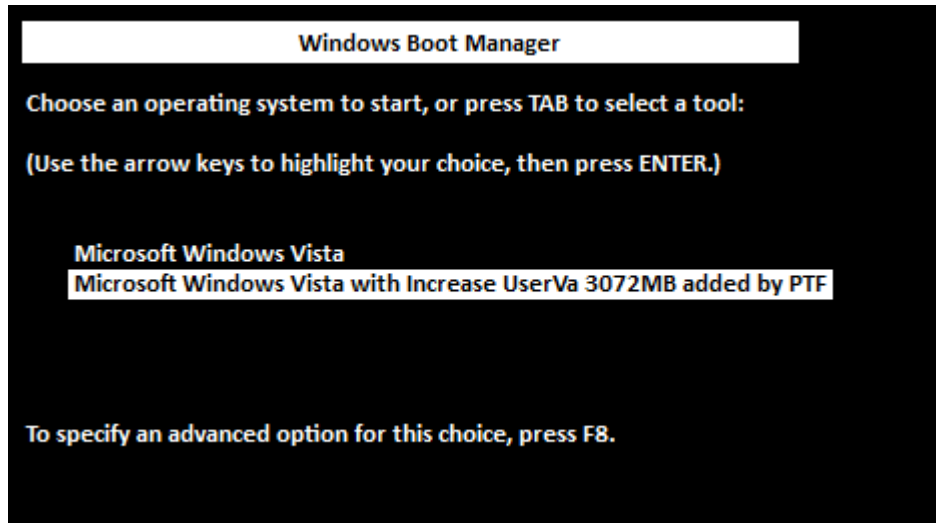


Figure 36 - Windows Vista Boot Options

The second boot manager entry was added by HP PTF. The boot manager entry includes the option to increase the per-process virtual memory size to 3072 MB.

Configuring the application

The application's executable file must be set to notify Windows that it may request more than the typical maximum of 2GB. This can be done by the software vendor while the application is being developed, or it can be accomplished after release with a tool that knows how to modify the program's header.

Enabling Large Memory with the Performance Tuning Framework

The HP Performance Tuning Framework simplifies the process of enabling large memory usage for several technical applications. Currently the list includes:

- ANSYS 9
- ANSYS 10
- ANSYS 11
- ANSYS Workbench 9
- ANSYS Workbench 10
- ANSYS Workbench 11
- CATIA V5
- Inventor 7
- Inventor 8
- Inventor 9
- Inventor 10
- Inventor 11
- Inventor 2008
- Inventor 2009
- MicroStation V8
- MicroStation V8 XM
- MicroStation V8i
- OneSpace Designer 2004
- OneSpace Designer 2005
- OneSpace Designer 2006
- OneSpace 2007
- Modeling 2008
- Pro/ENGINEER 2001
- Pro/ENGINEER Wildfire
- Pro/ENGINEER Wildfire 2.0
- Pro/ENGINEER Wildfire 3.0
- Pro/ENGINEER Wildfire 4.0
- SolidWorks 2004
- SolidWorks 2005
- SolidWorks 2006
- SolidWorks 2007
- SolidWorks 2008
- SolidWorks 2009
- I-DEAS 12m1
- Solid Edge 14
- Solid Edge 15
- Solid Edge 16

- Solid Edge 17
- Solid Edge 18
- SolidEdge 19
- SolidEdge ST
- Unigraphics NX1
- Unigraphics NX2
- Unigraphics NX3
- Unigraphics NX4
- Unigraphics NX5
- Unigraphics NX6

When the Enable Large Memory button is clicked on one of the tunable application pages in PTF or on the Resource Usage tab, several checks are made of the workstation to decide if it is safe to continue. The most important thing examined is the presence of a specific Microsoft Hotfix on systems running Windows XP Service Pack 1 or 1a. Microsoft has granted HP permission to redistribute this hotfix, and PTF will download and install it if necessary. The process for requesting this HotFix from Microsoft is outlined in their Knowledge Base Article [328269](#).

The next thing PTF does on Windows XP is make a back-up copy of the system boot.ini file before making any edits. If there is only one boot entry in the file, it is duplicated and the large memory options are added to the new copy. If there is more than one boot entry that applies to the current OS image, then the user is given the chance to select which one should be used as the basis for the large memory entry. In either case, the new entry is made the default for the next time the system is rebooted.

On Windows Vista, PTF examines each of the boot manager entries in the BCD and determines if the 'increaseuserva' OS boot option should be added. If necessary, PTF will copy the boot manager entry for the current OS and append 'increaseuserva=3072' OS boot option to that new boot manager entry. The user should reboot and select that boot manager entry when presented.

Finally, PTF will make sure the application executable files are set to utilize the additional memory. The next time the system is rebooted, and the large memory boot entry is selected, the application will have access to the increased address space. Operating in large memory mode will have no effect on applications that are not enabled for large memory usage.

Additional Notes

The benefits of large memory mode come with some potential risk. The following bullets describe the issues that should be understood before enabling large memory mode.

Reducing the amount of memory Windows retains for itself could have adverse effects on system or application performance. All the applications for which PTF will enable large memory mode have been proven to run correctly in this configuration by their respective companies.

With diminished memory available, the Windows kernel might not be able to allocate a large enough block of memory to satisfy requests from the software drivers of system components, such as high-end graphics cards. The /USERVA option can be used in boot entries for greater control over the amounts of memory partitioned between applications and the Windows kernel.