

Client:	Independent Research Project
Document:	Benchmark Report
User Interface Friction Benchmarks: Windows Vista vs. Windows XP and Mac OS X	
 Pfeiffer Consulting 01001011	



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Overview and Analysis

Benchmark Overview and Methodology

Introduction

When Windows Vista was released in early 2007, a significant amount of attention was given to the new user interface called Aero, that sets out to give Windows a slicker look and feel and promises more fluid operation.

But eye-candy aside, how does the new Aero interface stack up compared to older Windows releases in terms of user interface efficiency? Given the previous lackluster track-record of Windows in terms of User Interface Friction, it seemed important to measure if the new release improved on some of the weak spots of previous releases, such as menu inertia and mouse precision.

- **About this benchmark project**

This benchmark report presents the findings of an independently financed series of benchmarks conducted by Pfeiffer Consulting. The aim of the efficiency measures was to establish if and how the recently released Windows Vista impacts User Interface Friction (UIF) and user efficiency of the Windows operating system.

Background

- **What is User Interface Friction (UIF) ?**

UIF is the resistance imposed upon a user-guided process through the operating system and the way the user interface reacts. In most cases, it has nothing to do with functionality: we use the term User Interface Friction to define the difference in fluidity and productivity that can be observed when running the same program or procedure on different computer systems, or when trying to achieve the goal on two similar digital devices.

UIF is inherent in any modern, menu-driven computer system and any device that sports a graphical user interface, and depends on a number of aspects, ranging from the speed at which the system displays a menu or sub-menu, to the efficiency of the mouse. Just like the smoothness of the paper or the ink-flow of a pen can impact the speed of handwriting, User Interface Friction affects practically any procedure where the user interacts through the user interface with the computer system, and the ripple effects of UIF can be considerable. UIF could also be compared to the reactivity of a car when one presses the accelerator or the breaks.

For a detailed discussion of User Interface Friction and its impact on productivity and efficiency, please refer to the **User Interface Friction Research Report** published by Pfeiffer Consulting in 2006 (http://www.pfeifferreport.com/trends/trend_uif1.html).

If you are interested in UIF analysis or benchmarks of your products or on-line services, please contact Pfeiffer Consulting at **research@pfeifferreport.com**

System Overview

• Hardware

The benchmarks were conducted on the following hardware platforms:

- **Dual 2.8GHz Dell Dimension workstation**
- **3.2GHz Dell XPS workstation**
- **Dual 2GHz iMac workstation**
- **3GHz Mac Pro workstation**

Note: User Interface Friction benchmarks are designed not to be dependent on hardware performance, and usually produce the same results whether they are conducted on low to mid-range hardware or on high-end configurations.

• System software

All operating systems were used in default installations:

- **Windows Vista (with Aero user interface)**
- **Windows XP SP2**
- **Mac OS X 10.4.8**

• System Setup

All tests were performed using the standard system installation and configuration.

All systems were completely reinitialized before tests, using default values.

All hard drives were reformatted using a single partition.

All software was installed from scratch, using default settings.

The Pfeiffer Consulting Methodology for Productivity and Efficiency Measures

• General observations

Productivity and efficiency measures are composed as a number of phases. Every phase of the benchmark is then defined as several sets of clearly defined, repeatable steps. These steps are then executed in a strictly identical way by trained professionals.

After an initial training phase, each set of steps is executed three times; the average of all three results are used in the charts. The total times for each benchmark are obtained by cumulating the average measures obtained for each individual set of step.

Scripting

No scripting is used in the execution of the benchmarks: The main aim of productivity and efficiency measures is to show real-world productivity, and they have to take into account the time necessary for a trained operator to perform all the steps required in a project

User Interface Friction Measures

- **Introduction: What were we looking for?**

These User Interface Friction benchmarks are not intended as a complete, all-encompassing assessment of the new Aero user interface available on Windows Vista on adequately equipped computers: **the key goal of these efficiency measures was to establish how Windows Vista impacts some key areas of User Interface Friction observed in previous releases of the Windows operating system.**

Therefore, the results presented here should not be interpreted as an overall judgement of Windows Vista, but rather as a spotlight on some specific aspects of the user interface that can have an impact on users' efficiency. (See also *User Interface Friction: New Ways of Analyzing Technology* at http://www.pfeifferreport.com/trends/trend_uif1.html)

The benchmarks compared Windows Vista running the new Aero user interface to Windows XP SP2 on one hand, and to Mac OS X 10.4.8 on the other. Some efficiency measures were also conducted with Windows Vista using the Classic User interface that preserves the look and feel of Windows XP.

- **About the benchmarks**

User Interface Friction benchmarks use a subset of the methodology outlined in the previous section, adapted to cover specific user interface aspects. Specifically, these measures rely on repetition patterns for common operations in order to produce significant and reliable data.

The benchmarks conducted for this project covered three distinct aspects of User Interface Friction: Menu latency, common desktop operations, and mouse precision and efficiency.

- **Menu latency measures**

Menu latency was measured by accessing menus and submenus according to varying usage patterns (a single sub-menu, two specific sub-menus situated in different menus, 3 different submenus in three distinct menus). Each operation was executed several times in succession, and each set of operations was clocked several times.

- **Desktop Operations**

Using the same methodology, three different, frequently performed operations were executed repeatedly: creation of a new folder on the desktop, deleting an item using right-click, and opening several folder-windows in succession.

Mouse precision measures

- **Background**

The origin of the mouse precision benchmarks defined by Pfeiffer Consulting dates back to a research project conducted in 1998 collecting data about Macintosh and Windows platforms in design and publishing. At the time, creative professionals familiar with both Macintosh and Windows repeatedly reported issues with the precision of the mouse when using Windows, making it difficult to execute precise tasks. The persistence of these comments undermined the need for an appropriate benchmarking method.

- **Why is mouse precision important?**

Mouse precision is obviously essential for any task where precise positioning of the cursor is essential: this is the case in graphic design, CAD, retouching, page layout and web design, among others.

While many users may not be aware of it, the lack of precision can also affect daily tasks such as menu selection, clicking on icons in an application or targeting hyper-links on a web page. **In fact, poor mouse precision is one of those subliminal factors of user interface friction that may go unnoticed for many users, yet can have a significant ripple effect in terms of efficiency and computer-related stress.**

Over the years, Pfeiffer Consulting has conducted mouse precision measures with a variety of operating systems and releases, ranging from Windows 98 and Mac OS 8.x to Windows 2000 and Windows XP, as well as Mac OS X. Results are always revealing, and underline that it is not a hardware issue, but a problem linked to low-level drivers in the operating system. (See also *Macintosh/Windows: Cost and Productivity Analysis*, Pfeiffer Consulting 2005-2006. <http://pfeifferreport.com/store>)

- **About the benchmarks**

Methodology

To quantify the reality of this problem, Pfeiffer Consulting defined a simple yet efficient benchmark methodology. It exclusively focuses on the ease of executing precise tasks with the mouse, and completely eliminates the user interface of the operating system during the test.

Specifically, the person executing the test is asked to redraw precise shapes in a test document. This task is repeated dozens of times during a test session, and provides not only data on the time necessary to complete the task, but also the number of errors that occurred during the test.

Hardware

All Mouse precision benchmarks in this report were conducted using the same optical two-button mouse and the same mouse-pad.

Results and Analysis

Introduction

- **Background**

It is quite common that significantly re-engineered operating system releases are slower than their predecessors, and require more powerful hardware: this has been the case for practically every major release of mainstream operating systems such as Windows and Mac OS. This inflation in hardware requirements is usually counterbalanced by new and improved functionality, and is generally accepted by the market.

The situation is somewhat different concerning User Interface Friction: **UIF is not based on hardware performance, but on intelligent coding and user interface design. Therefore, a more modern release should by rights reduce UIF rather than increase it.**

We were particularly eager to analyze Windows Vista in this respect: after all, Vista was accompanied by the promise of a more modern, more fluid user interface environment, compared by many reviewers to Apple's Mac OS X.

Key Results

- **Overview**

There is no doubt that the Aero user interface (which is installed by default with Windows Vista on any computer that offers the required hardware), provides a much slicker user interface than previous releases of Windows: Vista includes a much more sophisticated rendering engine that can scale both text and images in a much more aesthetic way than, for instance, Windows XP. In addition, some functionality provided by Windows Vista can make a user more efficient, since the operating system provides better feedback when several documents are open, and can speed up the process of switching between open windows.

But while the graphics of the new user interface are more sophisticated, Vista does not correct the User Interface Friction issues that plagued Windows XP. **Windows Vista, and particularly the new Aero user interface design, fared less well in than Windows XP. Mac OS X came out as the clear overall winner in these benchmarks.**

Problem Areas

- **Menu Latency**

Menu Latency remains one of the key culprits of User Interface Friction on Windows: the slight lag that Windows imposes when displaying menus and submenus may seem minimal, but these delays can add up, and they certainly can make working with Windows Vista less fluid than with Windows XP.

On average, **Windows Vista was 20% slower than Windows XP in the menu latency benchmarks** conducted for the project. This lag is clearly linked to the Aero Interface: Menu latency running Vista with Classic user interface was similar to Windows XP.

- **Desktop Operations**

Benchmarks of common desktop operations (opening folders, deleting elements, etc) also show Windows Vista/Aero at a clear disadvantage over Windows XP. Some of these issues are linked to questionable user interface design decisions. As an example, Windows Vista does not simply display the new window when a folder is opened, but uses a fade-in effect. Amusing at first, the additional lag obviously adds to the perceived (and measurable) User Interface Friction, and can become annoying over time.

Windows Vista with Aero was the slowest in these tests, scoring an average of 2.73 seconds per operation, compared to 2.34 seconds for Windows XP, and 1.50 seconds for Mac OS X. Windows Vista using the Classic user interface scored slightly better, at an average of 2.52 seconds per operation.

- **Mouse Precision Measures**

The most preoccupying results of these benchmarks concerned mouse precision and efficiency: in these benchmarks (which measure both the time necessary to complete a series of precision tasks and the number of errors), Windows Vista scored significantly worse than Windows XP.

With a total of 33 errors, Windows Vista scored a Mouse Precision Error Coefficient of 0.52, compared with 0.40 for Windows XP, and 0.08 for Mac OS X.

This could be problematic for certain professionals relying on Microsoft's operating system: Windows has always lagged behind the Macintosh platform in this respect, but Windows XP had managed to improve over older versions of the operating system. **Creative professionals in particular should take note that Windows Vista is a clear step backwards in terms of mouse precision, and it is likely that this problem contributed to the poor results in the other User Interface Friction benchmarks.**

Recommendations

How important is UIF?

Next to key technology preoccupations such as security, User Interface Friction may seem a comparatively trivial aspect of an operating system. **Yet UIF can result in a significant cumulative productivity loss; taking in account this factor can lead to better understanding and control of the efficiency of equipment and workflows.**

During the research interviews for Pfeiffer Consulting's *Macintosh/Windows Cost and Productivity Research Project*, for instance, several decision makers in publishing houses said they would not envisage deploying Windows computers as design and layout workstations because of efficiency issues linked to user interface friction. (See also *Macintosh/Windows: Cost and Productivity Analysis*, Pfeiffer Consulting 2005-2006. For more information please visit <http://pfeifferreport.com/store>)

- **Implications**

As far as Windows Vista was concerned, it was important to conduct the necessary benchmarks to compare the new release with currently installed versions of Windows. **In the light of the results, the core recommendation coming out of this research is simple: before deciding on an upgrade to Windows Vista, it seems wise to conduct thorough productivity analysis in a concrete workflow situation to see if User Interface Friction here would negatively impact overall efficiency.** This is particularly true in creative industries such as design, publishing and photo retouching, where mouse precision is a major concern. Overall, Mac OS X remains the most fluid environment of the three systems tested.

Likewise, the viability of the Aero user interface in production environments has to be assessed in a concrete situation, to see if the proposed usability features it brings compensate for the slower user interface, or if the Classic user interface would offer higher productivity. (User input is essential here: for some users, user interface friction is barely noticeable, while others are highly susceptible to it.)

Further Research

User Interface Friction is a new concept in technology assessment, defined by Pfeiffer Consulting, and applicable to a wide range of technology products or on-line services. Experience shows that UIF can strongly impact the overall user experience: **UIF benchmarks can help spot weak spots of products and contribute to increase their competitive edge.**

To find out how we can help you make your products more competitive, please contact us at **research@pfeifferreport.com, or visit <http://pfeifferreport.com>**

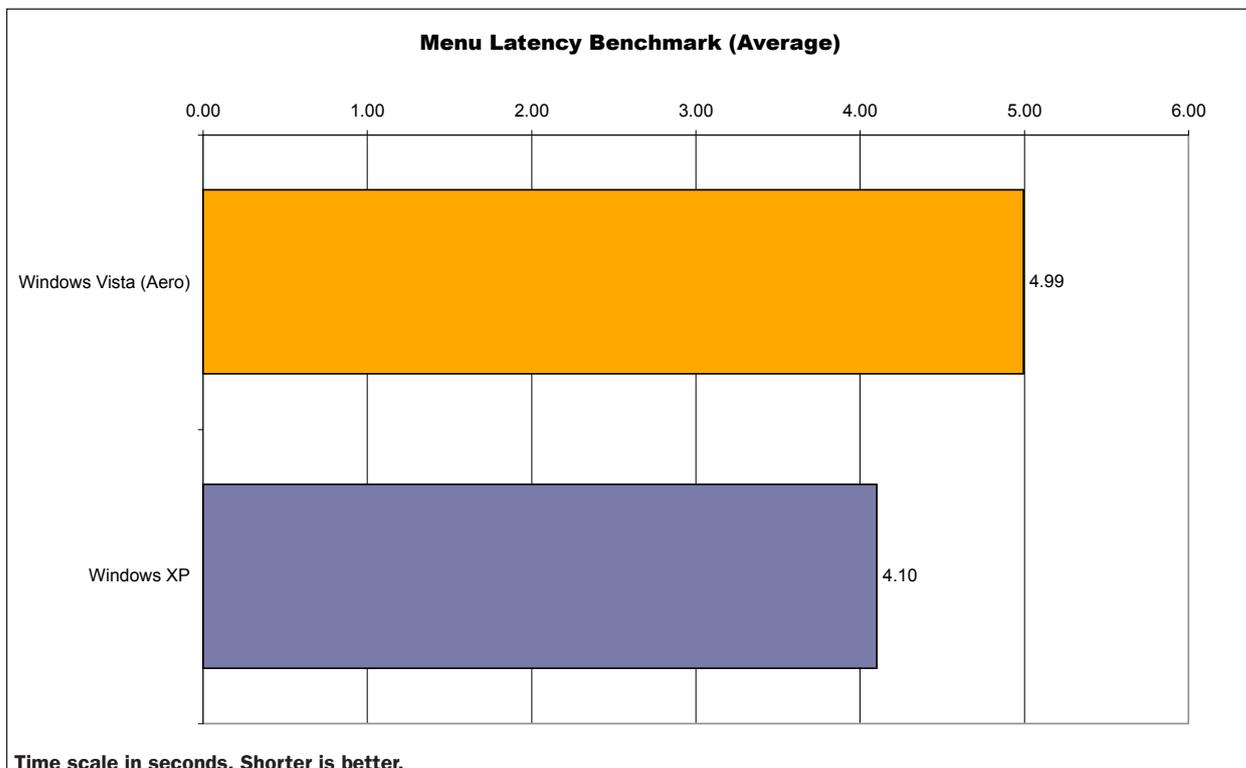
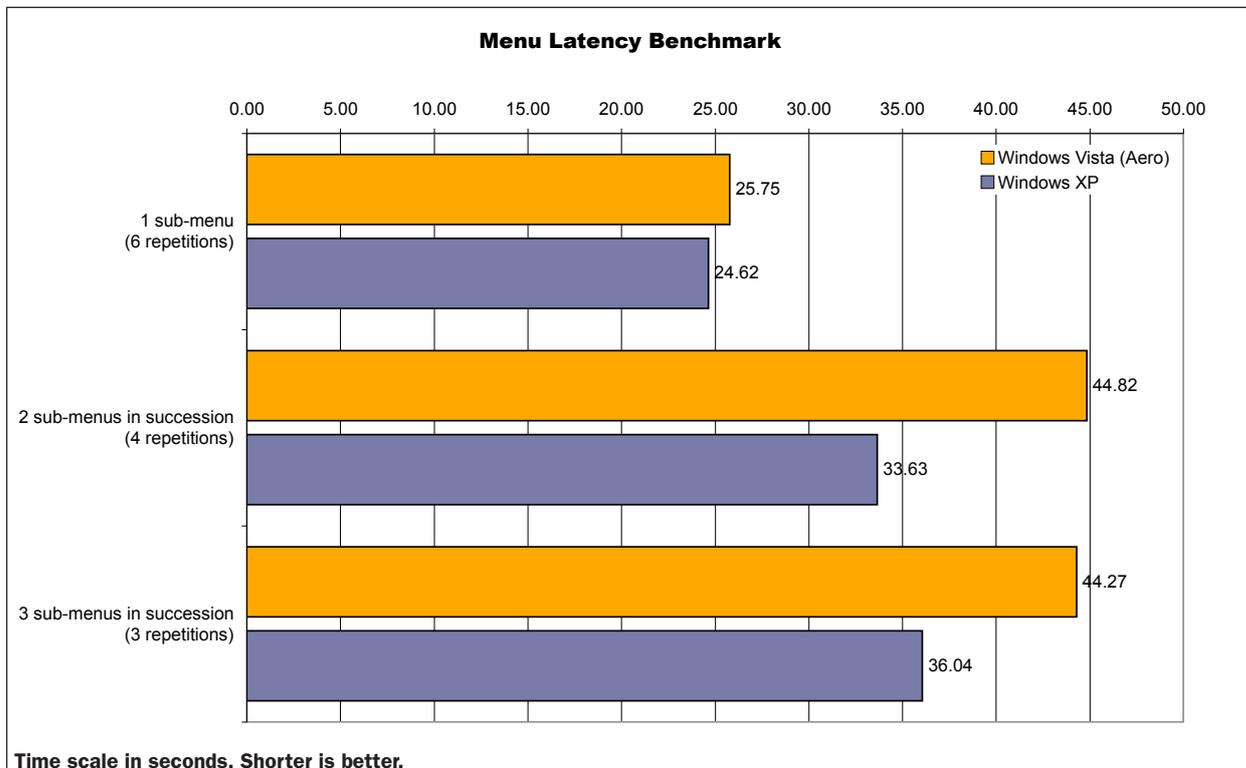
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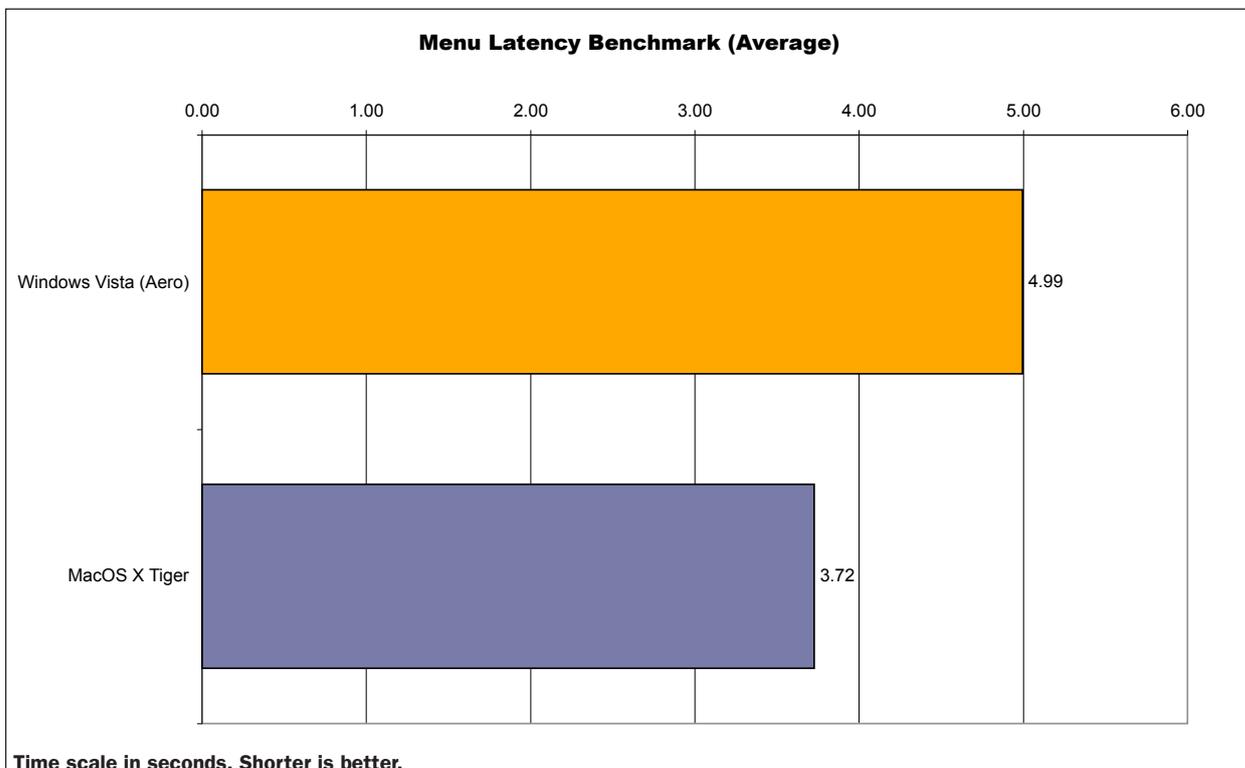
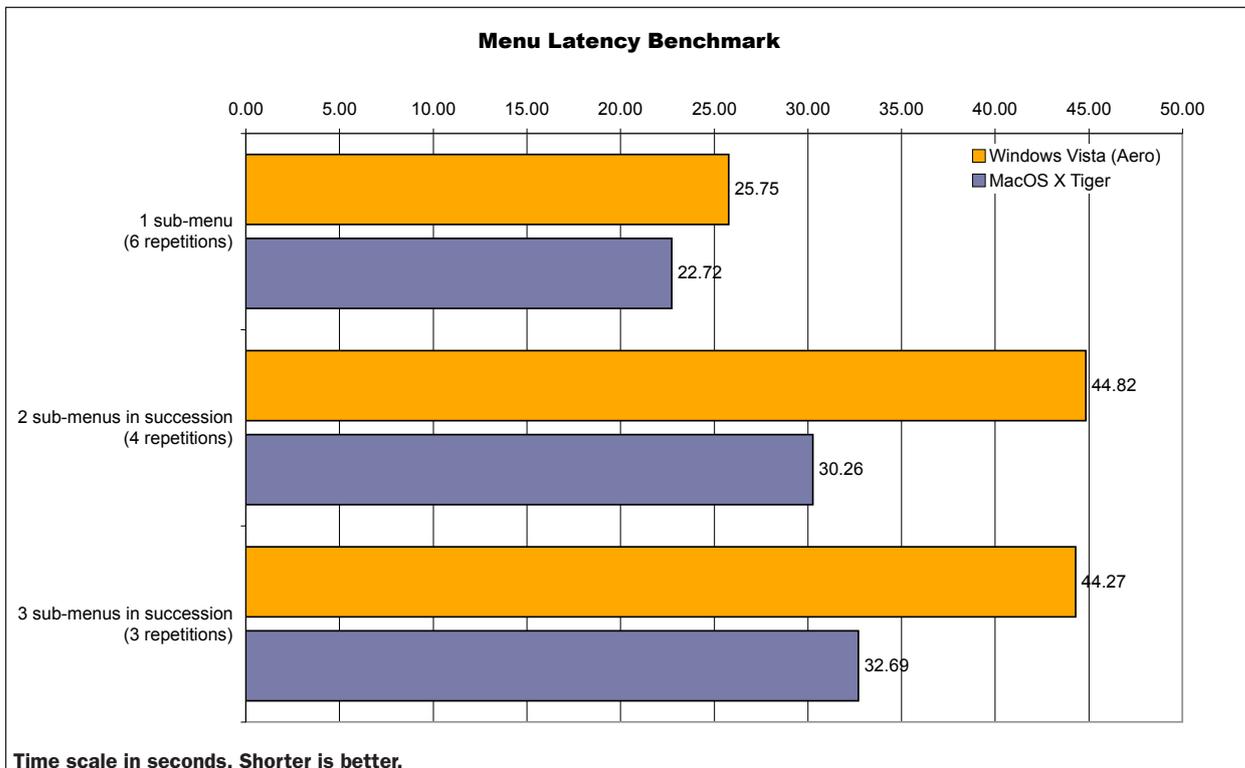
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Recommendations

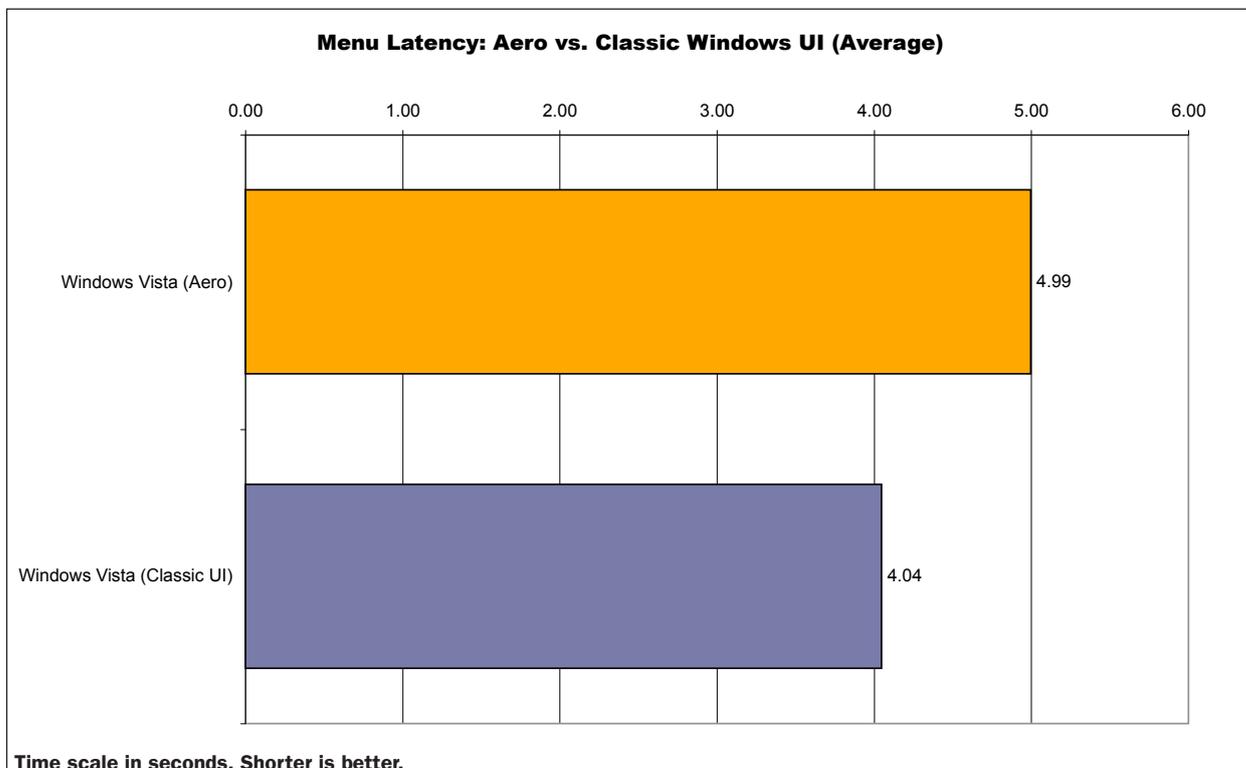
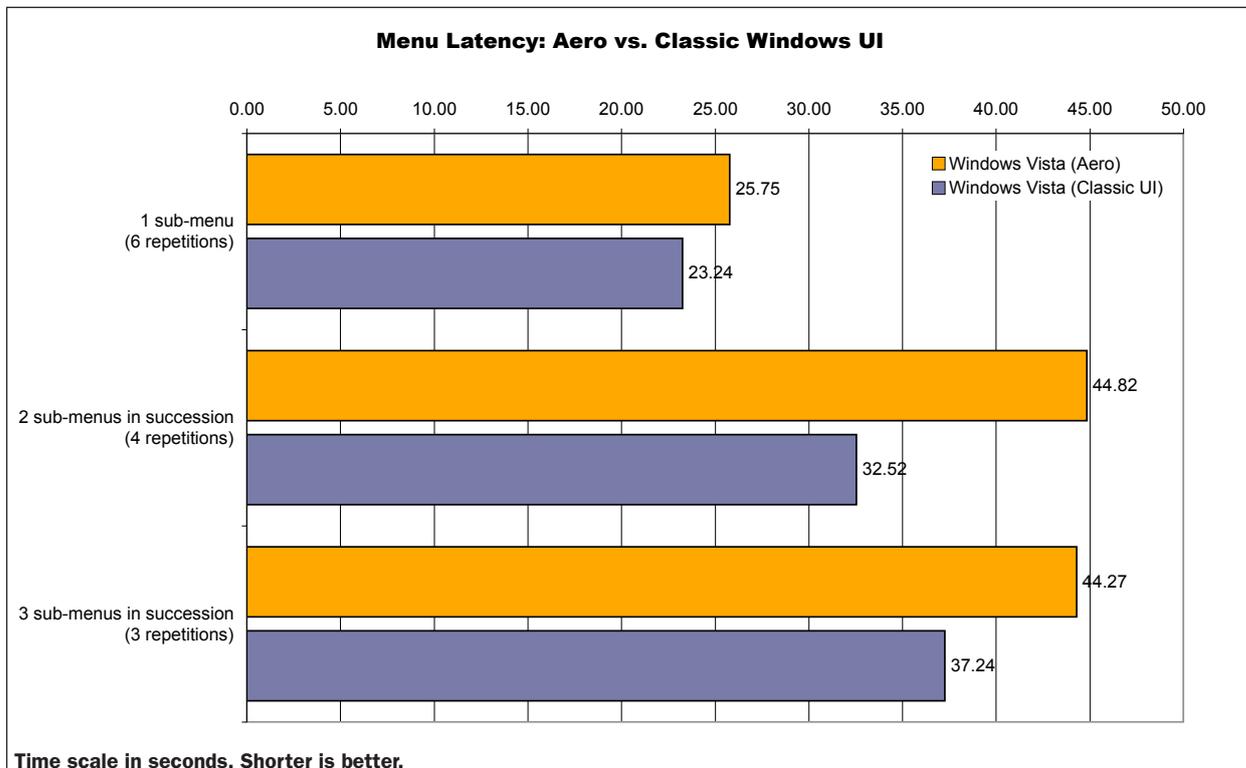
Results: Menu Latency Benchmarks



Results: Menu Latency Benchmarks : Vista Compared To Windows XP



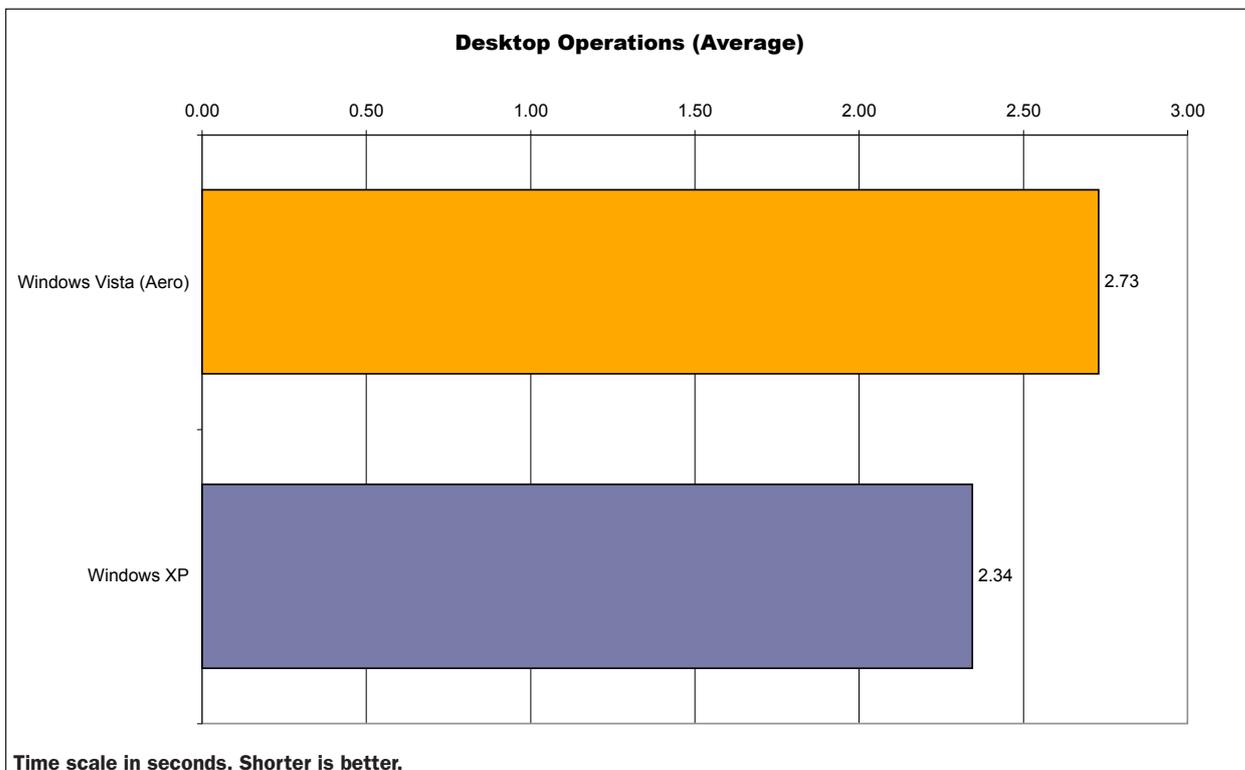
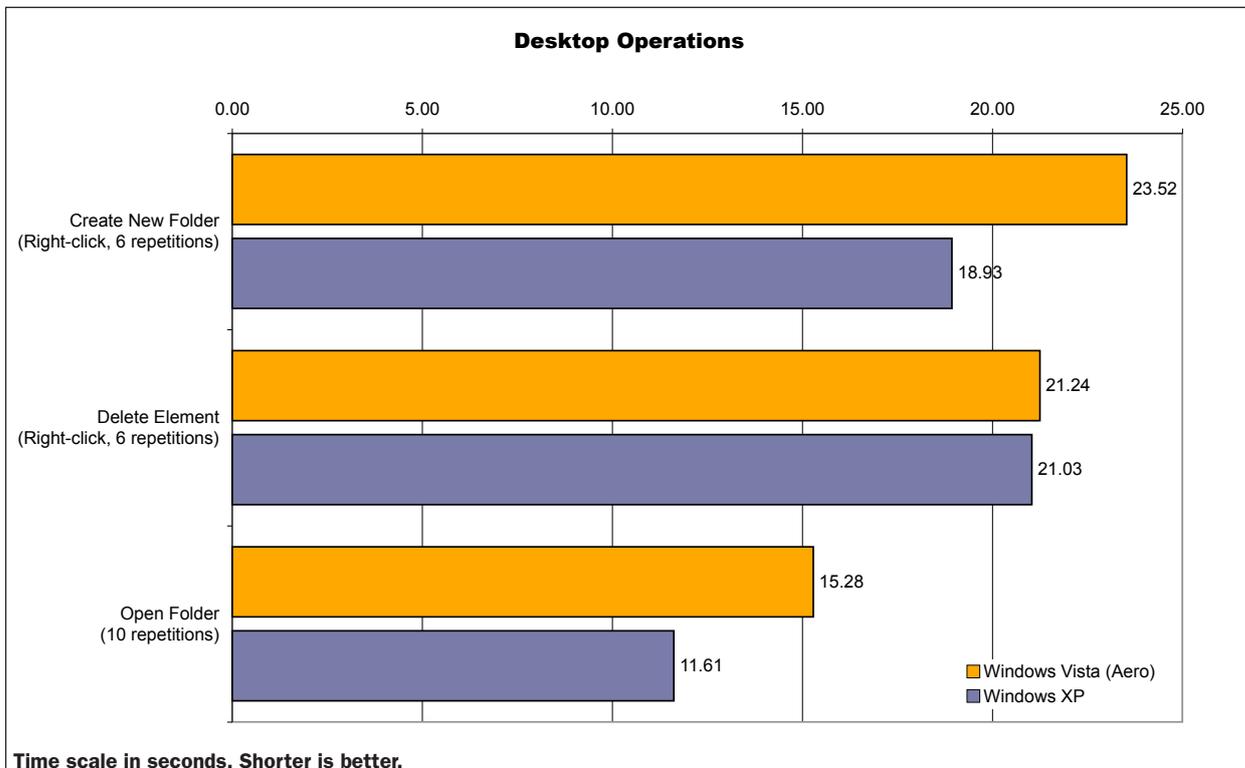
Results: Menu Latency Benchmarks : Vista Compared To Mac OS X



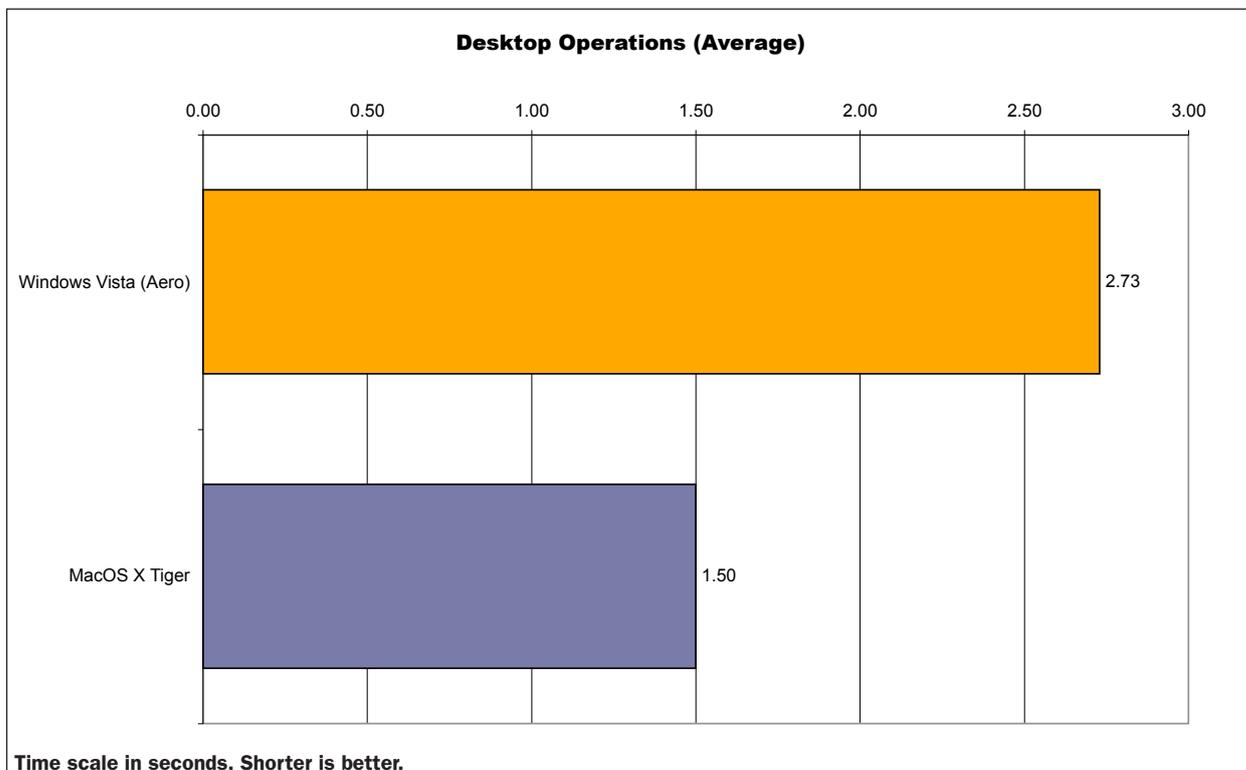
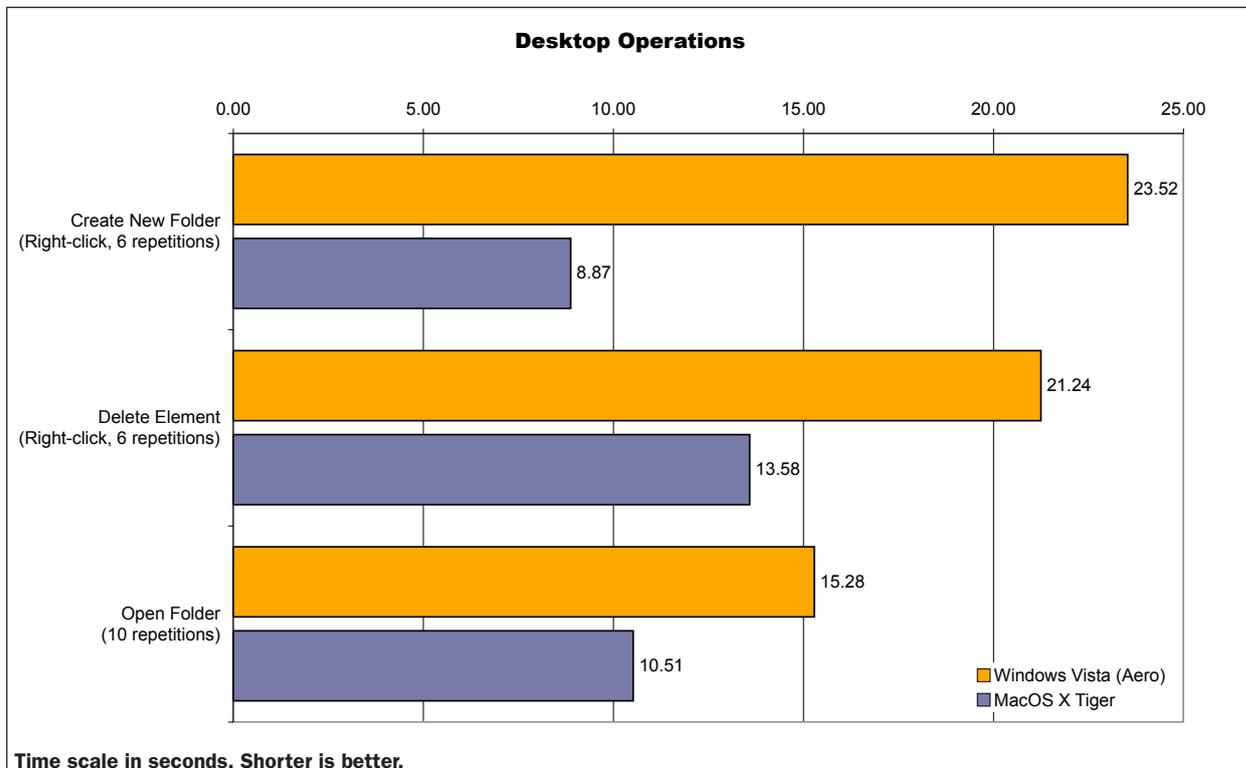
Results: Menu Latency Benchmarks : Aero Compared To Classic UI



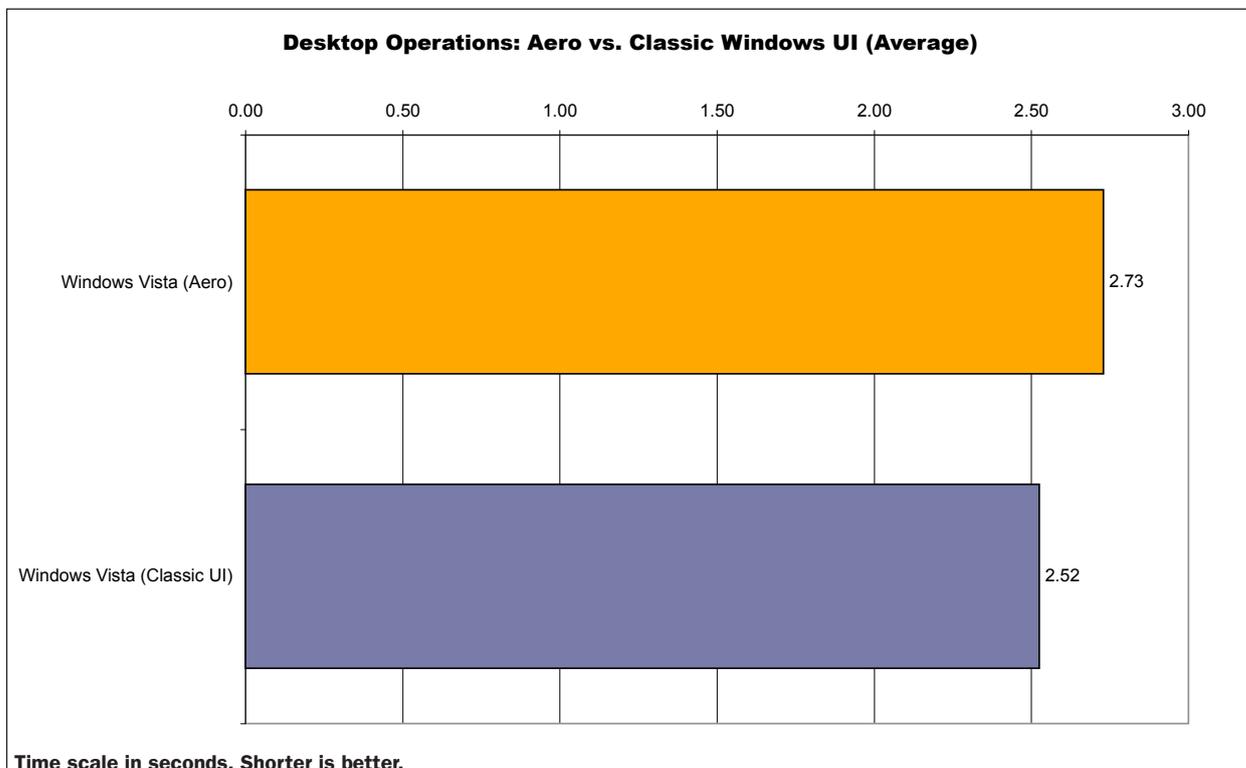
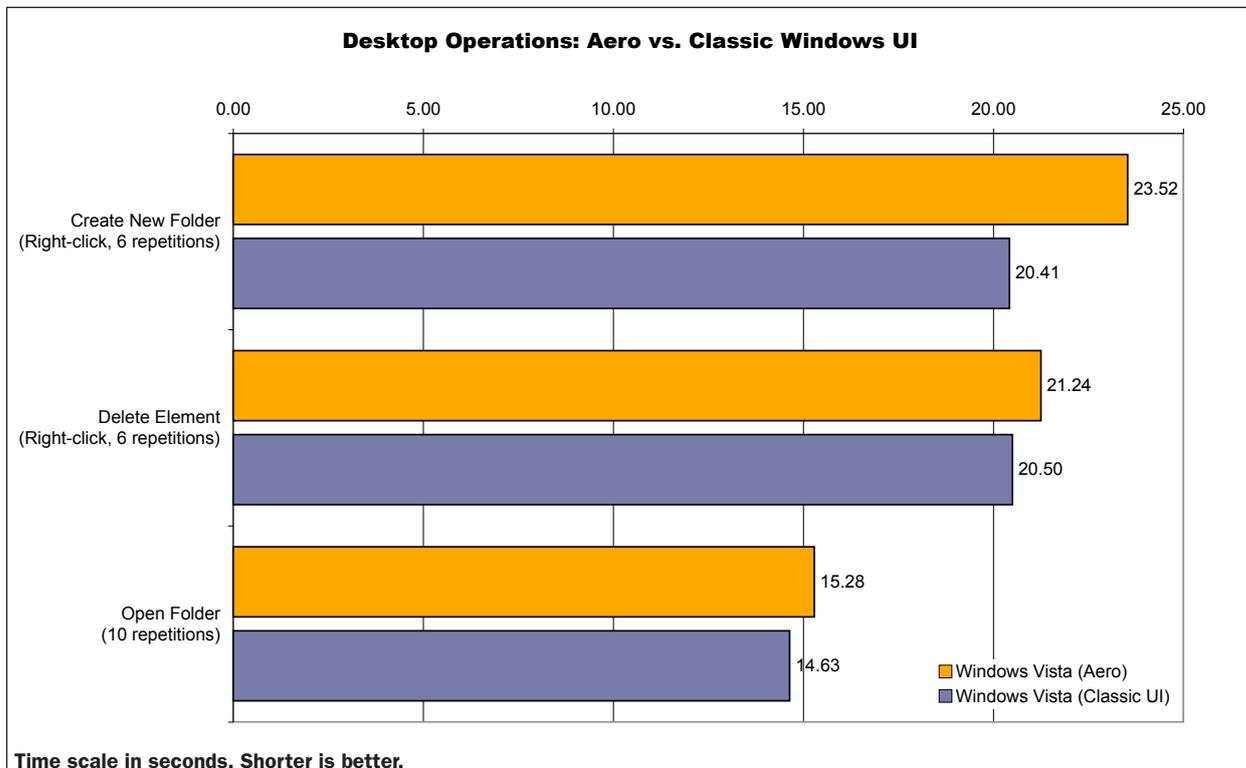
Results: Common Desktop Operations



Results: Common Desktop Operations : Vista Compared To Windows XP



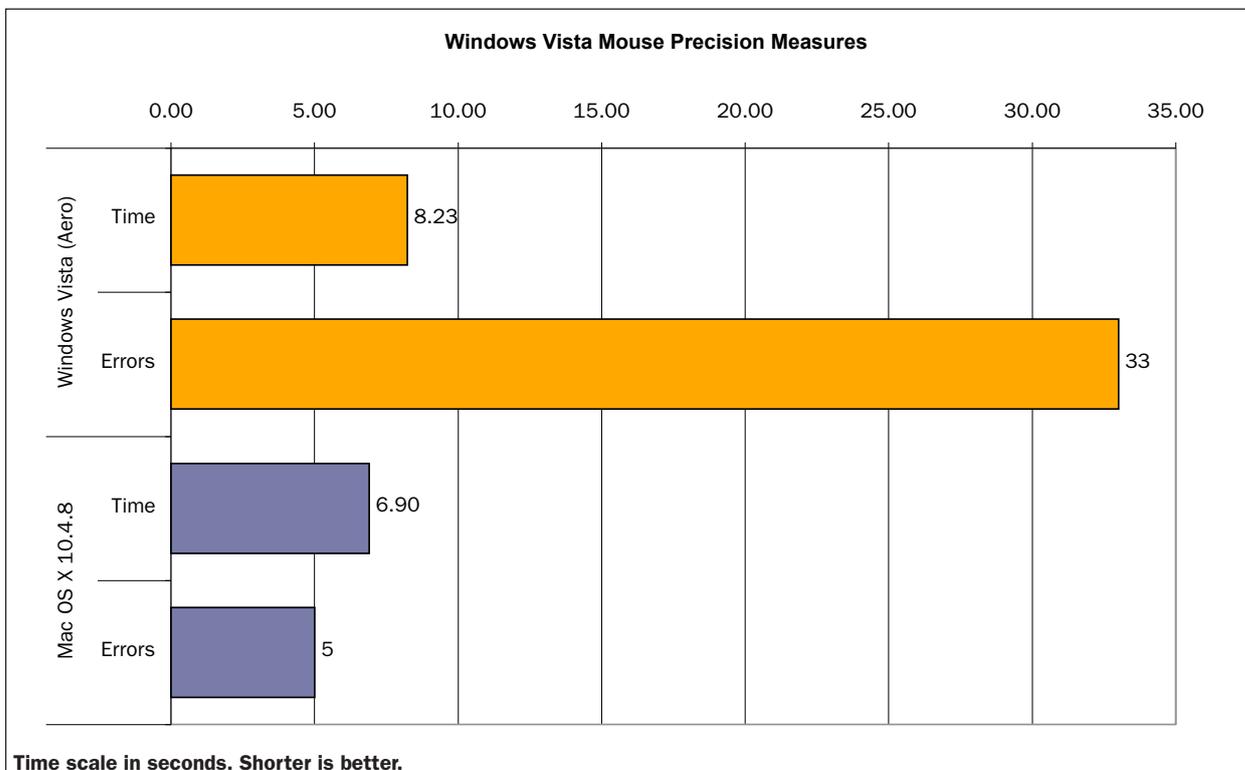
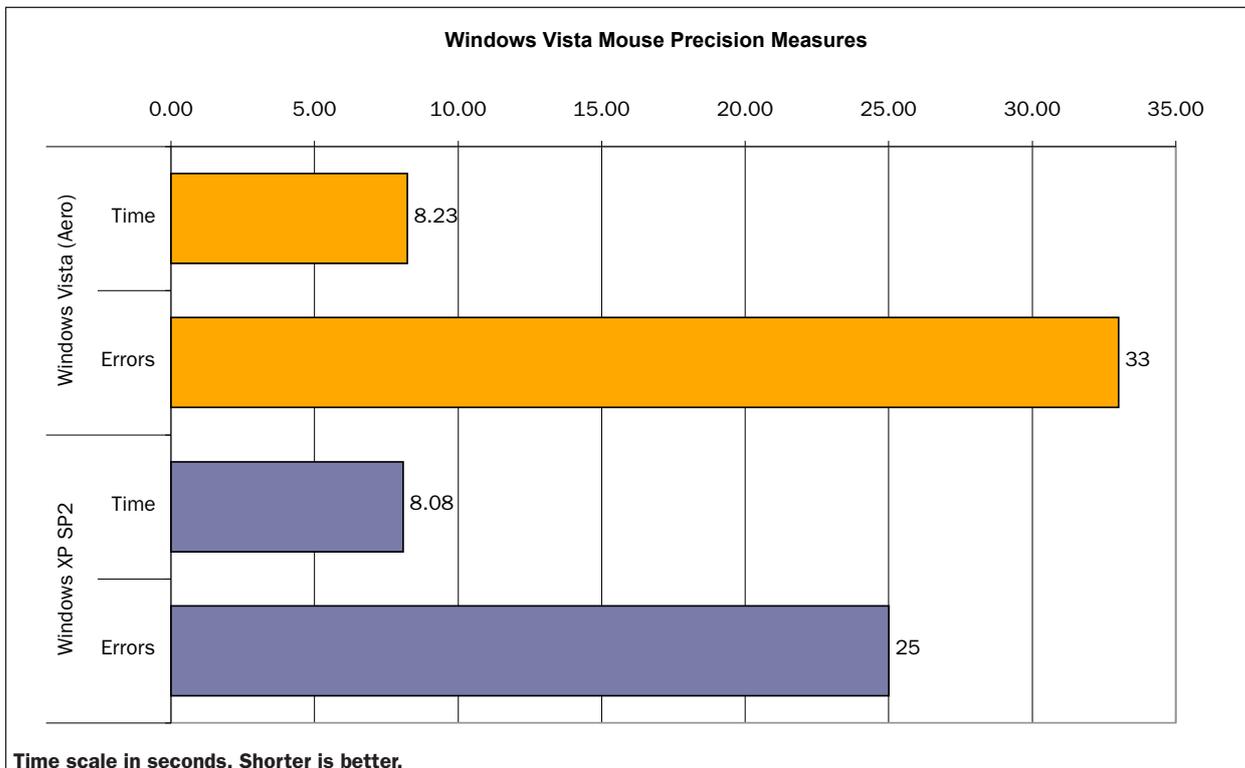
Results: Common Desktop Operations : Vista Compared To Mac OS X



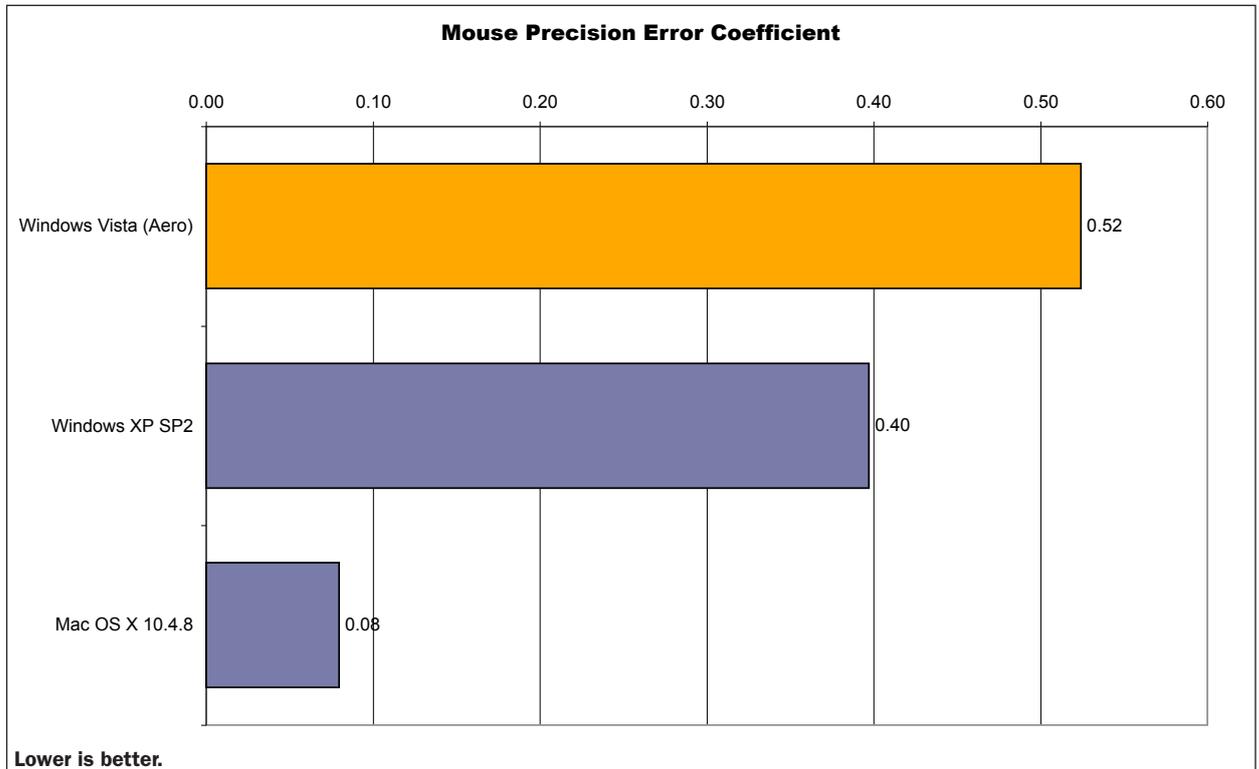
Results: Common Desktop Operations : Aero Compared To Classic UI



Results: Mouse Precision Measures



Results: Mouse Precision Measures : Vista Compared To Windows XP And Mac OS X



The mouse precision error coefficient is calculated by dividing the number of errors that occurred during a test session by the total number of elements completed.

Results: Mouse Precision Measures : Mouse Precision Error Coefficient