

[Microsoft.com Home](#)[Site Map](#)

Search Microsoft.com for:

[Sign Out](#)**Microsoft**

OEM Connect Home

[Road Map](#)

## Longhorn's Avalon: The Benefits Are Clearly Visible

By Robert L. Scheier  
May 2004

[E-mail this Article](#) [Print this Article](#) [Letter to the Editors](#)

The Avalon graphics subsystem in [Longhorn](#), the next generation version of the Windows® operating system, will give everyday applications and their users the kind of graphics experience **once reserved only for hard-core gamers** and engineers using CAD/CAM systems. It provides a **unifying architecture for presenting the user interface** as well as documents and media.

Avalon will also give OEMs the opportunity to **up sell everyday customers** on pricier, feature-rich graphics capabilities by enabling a differentiated experience, now relevant to only a small segment of the market. Leading designers of graphics hardware are already working with Microsoft, and with independent software vendors (ISVs) and OEMs, to be sure the applications graphics hardware and systems are there to meet customer demand when Longhorn ships.

---

### A Better Experience

With Longhorn, a customer who chooses to buy higher-end graphics hardware will find it **directly results in a better experience** -- something which in general is only true today if you are a gamer or in niche technical markets like CAD (computer-aided design) and data visualization," says Pablo Fernicola, group program manager for Avalon.

This direct correlation between **better graphics hardware and a better experience** is a departure from the current generation of applications and operating systems where -- for the average user of office productivity applications -- "it makes almost no difference in the experience" whether the user has selected a PC that costs less than \$1,000 USD or one that costs \$2,000 USD, says Fernicola.

"Longhorn will **drive everyone to need 'real 3D'** and that's a huge step for the graphics industry," maintains Dave Orton, president and CEO of ATI Technologies Inc., a leading graphics hardware supplier. That's because Longhorn will drive everything from easier-to-read text to dramatic effects such as 3D animations that illustrate trends in spreadsheets and data visualization applications.

Ned Finkle, vice president of strategic marketing for graphics subsystems vendor NVIDIA Corp., predicts the Longhorn interface will be so compelling it will drive substantially **more customers to buy higher-end graphics cards** -- either as part of their up-front system purchase from an OEM or as an after-market add-on. "I don't see why the increase couldn't be a quarter or a half again the size of the current upgrade market," says Finkle.

---

### Betting Big on Direct3D

Avalon is built on the proven Direct3D architecture as the basis for graphics acceleration. All text, graphics and UI for Avalon applications in Longhorn will be processed through the Direct3D APIs within DirectX. This departs from the current method of processing only 3D graphics through the Direct3D pipeline, and processing 2D graphics (such as text) through the current GDI (Graphics Device Interface). Most graphics hardware vendors have already been **focusing their investment on Direct3D** for the last five years, says Fernicola, so the move to Direct3D will simplify their development by eliminating the need for them to support GDI.

#### Avalon Basics

1. Avalon is the graphics subsystem in Longhorn.
2. Avalon provides a unifying architecture for presenting the user interface as well as documents and media.
3. All text and images (both 2D and 3D) go through the same graphics engine.
4. Longhorn will provide for two tiers of user experience, building on the capabilities provided by Avalon: Aero and Aero Glass.

Source: Microsoft

In addition, he says Longhorn **eliminates context switching between Direct3D and GDI within**

**the GPU,"** which will improve the stability and performance of Longhorn systems.

The Avalon architecture means any text or graphics in any Avalon application will take advantage of high-end graphics hardware installed on the system automatically, **paving the way for a radically improved experience** even for users of everyday office applications. Even the Windows desktop experience in Longhorn, which also builds on Avalon, will benefit from the advances in graphics.

OEMs can support Longhorn with either an Integrated Graphics Controller (IGP) or a more expensive, but much more powerful, dedicated graphics processor on a graphics card. Putting an integrated graphics processor in an IGP on the motherboard may cost only \$5 USD, but that processor **must share the relatively slow main system memory** (333 MHz in many current systems) with other system tasks such as application processing, says Jon Peddie, president of Jon Peddie Research, a multimedia market research firm.

The other OEM choice when configuring a system, or up selling a customer, is a dedicated graphics card that may cost \$100 USD or more, but can access today's much faster 533 MHz video memory through the speedy AGP bus, or the newer PCI Express bus. "For power users, the graphics board will ship with as much or more memory, and higher speed memory, than the system memory of the PC," predicts Peddie. Longhorn will drive demand for this higher-priced graphics option because Longhorn will be the first operating system **"to treat everything as a graphical image.** To support those images, you need lots and lots of memory."

Peddie expects these added graphic capabilities to **add as much as several hundred dollars** to the average selling price of a Windows system optimized for Avalon.

---

### User Benefits in Sight

Perhaps the most dramatic **improvement in Longhorn will be the user interface.** Peddie says it will more closely mimic the multitasking nature of modern life than previous graphical user interfaces.

Through the use of special filtering techniques, for example, Longhorn will allow a user to "push documents out of the way" when they're not in use. However, each document window will **remain much easier to read** than windows today in their shrunken state, says Peddie. Avalon's graphics pipeline will support the use of sub-pixel ClearType, which provides better quality text and more pleasing spacing of characters on the screen.

Another benefit of the Avalon pipeline relates to resolution independence. Today, in the mobile computing space (where there is a limit to the dimensions of the display) the only way that OEMs have to increase desktop real estate is to squeeze more pixels into a given space on the screen, thereby going to higher resolutions. But this practice also means **reducing the size of every pixel** and thus of every graphic and character on the screen.

The current Win32 architecture in Windows is ill suited for high resolution displays as the graphical are resolution-dependent and mainly based on bitmap images. However, the new graphics rendering pipeline in Avalon is resolution-independent, meaning that "regardless of the resolution, **applications are always going to show at the correct size** and be usable," says Fernicola.

For existing Win32 applications, Avalon will scale the content through the Desktop Composition Engine. In this way, even users of older applications will enjoy what Fernicola calls an **"improved experience"** when used at higher resolutions than on earlier versions of Windows – giving them an incentive to upgrade their hardware as well.

Direct3D will also put to work much of the video memory that today helps games run faster, but typically goes unused by most productivity applications. In a data visualization application, Avalon will enable developers to **build more powerful animation capabilities** than ever before -- showing, for example, how revenue streams from new products will flow to the bottom line over several quarters.

Avalon will also make it easier for developers to display content in formats that will be **easier for users to read.**

For example, developers can use a feature called panels to break long lines of text in an e-mail editor into columns, making for a more pleasant reading experience and taking full advantage of the extended real estate provided by today's 16 x 9 aspect ratio displays, says Fernicola.

### Top Three OEM Opportunities with Avalon

1. Provides clear business benefits for up selling everyday users (not just gamers) on high-end graphics hardware.
2. Reduces development costs by eliminating support for older GDI graphics drivers.
3. Delivers dramatic readability improvements on smaller notebook screens.

Sources: Microsoft; ATI;

Jon  
Peddie Research

Peddie of Peddie Research expects the 25% of the market that currently buys high-end graphics will buy the more graphics-capable Longhorn PCs almost immediately after launch. Within three years of Longhorn's rollout, he expects 80% of new PC purchasers will opt for the **more expensive dedicated graphics boards** rather than the lower priced and less capable graphics processors.

---

## Paving the Way

The hardware designers who will deliver Avalon graphics are **already working with Microsoft's OS and application development teams**, as well as with other software developers, to ensure that Longhorn-ready applications and systems are on the market when the OS ships.

For example, ATI is working with Microsoft's Office products development team to allow "PowerPoint to do graphics in ways that it cannot do today," says ATI's Orton. **"We need Excel to create new 3D graphics** from spreadsheets in ways it cannot do today, such as new photorealistic textures, fonts, rotations or perspectives."

To help make those capabilities real, ATI has offered ISV engineering resources to the Office team, and has made more than **1,000 of its latest graphics cards** available to the Microsoft Office Test and Development Labs. ATI has delivered source code for its Radeon 8500 card to serve as the reference driver for the Longhorn Device Driver Kit, as well as source code for the Radeon 9700 to serve as the test bed for the new Longhorn Display Driver Model.

ATI software architects meet bi-weekly with their counterparts at Microsoft to help develop the Longhorn Display Driver Model, which will serve as the APIs for Avalon. The teams are also working together on issues such as **how to schedule video using the new driver model**, and to assure proper support of copy protection and Digital Rights Management.

Meanwhile, NVIDIA's Finkle says his team's joint development work on Longhorn help ensure that customers will get the ultimate in reliability, compatibility and stability in their graphics experience. **"We're going further than ever before** to make sure that everything we do is thought through so the Windows user doesn't experience a problem," he says.

To be Avalon-compliant, systems will need to support Dx9, **Prepping for Avalon**

and support resolution of at least 1024 x 768 at a minimum resolution of 32 bits per pixel (which will rise to 1280 x 600 for wide ratio displays). New hardware will also require **at least 64 megabytes of graphics memory** as well as support for at least the AGP 8X or PCI Express physical bus interfaces.

1. Review the Longhorn hardware requirements document.
2. Review the presentations from the WinHEC conference.
3. Evaluate the Longhorn Developer Release to learn its requirements and performance on different hardware.
4. Get ready to educate consumers about the new look and feel, and benefits, of Avalon.

Source: Microsoft

While some corporate customers may choose to deploy the Classic UI experience to reduce configuration and training needs, Microsoft expects all Longhorn systems will ship with the **capability to run the more advanced**

**Aero user experience**. Systems with higher end graphics components will support the Aero Glass user experience (see OEM Connect, "[Longhorn Technologies](#)").

The new capabilities provided by Longhorn are so revolutionary that "it takes some time for the concept to be assimilated by the majority of users," says Peddie. "A lot of them **won't get it until they see someone else with it**." One challenge OEMs and their suppliers face, then, is educating the market about the new capabilities made possible by Avalon versus today's PCs.

At least after Longhorn ships, the differences will be plainly obvious to see. 

---

## For More Information

[MSDN site page describing Avalon and its role in Longhorn](#)

[Information about graphics hardware and drivers for Longhorn](#)

[Newsgroups discussing Avalon development](#)

[Talks about Avalon at the Microsoft Professional Developers Conference](#)

[MSDN Magazine article about developing Avalon applications](#)

### About Jon Peddie Research

Jon Peddie Research ([www.jonpeddie.com](http://www.jonpeddie.com)) is a technically-oriented marketing and management consulting firm with more than 30 years experience in the graphics and multimedia fields. Based in Tiburon, Calif., JPR provides specialized services to companies in high tech fields including graphics hardware development, multimedia for professional applications and consumer electronics, high end computing, and Internet access product development.

### About the Author

Robert L. Scheier is a freelance writer based in Boylston, Mass. He is the former technology editor at *Computerworld*, and previously was a senior editor at *VARBusiness* and *PC Week*. In addition, he was an analyst for The Hurwitz Group specializing in databases and middleware.

Have a question? Want more information? Contact the writers and editors at [oemedit@microsoft.com](mailto:oemedit@microsoft.com).

© 2004 Microsoft Corporation. All rights reserved. This document is for informational purposes only and subject to change without notice. MICROSOFT MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AS TO THE INFORMATION IN THIS DOCUMENT. The entire risk of the use or the results of the use of this document remains with the user.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

Last Updated: May 24, 2004

---

[Manage Your Profile](#) | [Contact Us](#) | [All Rights Reserved](#) | [Terms of Use](#) | [Newsletter](#) | [Site Map](#)

©2004 Microsoft Corporation. All rights reserved. [Terms of Use](#) | [Trademarks](#) | [Privacy Statement](#)