Image from Warhammer® Online: Age of Reckoning®

Autodesk® 3ds Max® on Next-Generation Intel® Xeon® Processor-Based Workstations

Solution Brief

Visual Computing

Amping Up Animation: Characters Come Alive in Autodesk® 3ds Max®

The better computer games become, the more computer gamers demand faster action, more realism, and sharper intelligence from the characters inhabiting 3D worlds. These rising demands keep game developers in a continual quest for tools and platforms that make their work easier, lift the performance bar higher, and keep them at the forefront of the pack—competitive and responsive to an endlessly evolving market.

The combination of Autodesk® 3ds Max® software—long a staple of the professional game development realm—and workstations powered by processors with Intel® Core™ microarchitecture satisfy all these requirements, bringing together a powerful slate of animation and character creation capabilities with a finely tuned, blazingly fast platform. Autodesk has won the hearts and minds of a generation of game developers, including the team at Mythic Entertainment. The latest release for the studio—*Warhammer® Online: Age of Reckoning®*—was designed and animated by Mythic using 3ds Max on an Intel® architecture platform. The resulting 33 square-mile fantasy world (which, when underground dungeons, tunnels, and caves are factored in, is likely closer to 40-square miles) represents new heights of technological and artistic achievement, keeping 2,000 servers busy servicing the explorations and battles of online gamers.

To ensure the performance and reliability of new games that are shattering boundaries online, in console play, and on PC platforms, 3ds Max features precision tuning and optimization for Intel architecture capabilities. The history of Intel and Autodesk working together cuts across decades and is marked by milestones that serve as a strong reminder that the best applications are born when trend-setting software is optimized for the unique characteristics of a feature-rich, high-performance processor.

Autodesk 3ds Max: Platform of Choice for Triple-A Game Development

Autodesk 3ds Max has won a devoted following not only for game development, but for film and video production work, as well. In the course of its history, 3ds Max has been used in a long list of innovative and award-winning games, including:

- *Warhammer Online: Age of Reckoning* (Mythic Entertainment, 2008)
- *Race Driver: GRID** (Codemasters Software Company Limited, 2008)
- *Assassin's Creed** (Ubisoft, 2008)
- *Mass Effect** (BioWare Corp., 2008)
- *Amplitude*, *Guitar Hero**, and *Rock Band** (Harmonix Music Systems, 2007–2008)
- *F.E.A.R.** (Warner Brothers Entertainment Inc., 2006)

"...our customers are creative visionaries who are constantly pushing the boundaries. We are investing in their desire to create compelling characters who move and respond to their environment in a believable way. Autodesk looks forward to a future when game characters respond beautifully to their environment so that the story of the game does not have its believability broken by robotic animation."

– Mary Beth Haggerty
Senior Industry Manager
for Video Games, Autodesk

- *Darkwatch** (High Moon Studios, 3ds Max and Autodesk® Maya®, 2006)
- *Lineage II** [MMORPG] (NCsoft, 2003)
- *Too Human** (Silicon Knights, 2007)
- *Rise of Nations*: Rise of Legends** (Big Huge Games, 2007)
- *Gears of War** (Epic Games, 2007)

A combination of features has helped elevate 3ds Max to a premier position among game developers, including the streamlined workflow, production-oriented component design, interoperability, and fluid scalability to contend with extremely complex productions.

Optimization and Tuning for the Workstation of the Future

A number of 3ds Max optimizations, completed in collaboration with Intel application engineers, tailor the software to take maximum advantage of available cores and threads in a single- or dual-processor Intel-based workstation, including those equipped with the latest generation Intel® Xeon® processor. The close working relationship between Intel and Autodesk has resulted in a number of significant advances that let software fully exploit the hardware architecture.

Ken Pimentel, director of 3ds Max product management, noted that Intel has worked directly with the source code of 3ds Max to help identify strong areas for optimization and has also provided next-generation hardware platforms to further the coding efforts. "Having access to the latest Intel technology," Pimentel said, "has greatly accelerated our ability to adapt our product to changing technology trends. This was instrumental in allowing us to be one of the first companies with 64-bit versions of our products."

Multi-threading in 3ds Max appears in these components:

- Rendering with Autodesk® mental ray™ can expand to use an unlimited number of cores (up to 32 Intel-based cores used simultaneously have been tested to date)
- Viewport mesh caches feature threaded processes to boost performance
- Hair and cloth calculations
- The new xView feature, which analyzes meshes to detect problems and displays the results in the viewport

Another benefit to game developers with 3ds Max is the use of Havok Physics™, which is incorporated into the application's visual effects and game pipeline. Havok, acquired by Intel in 2008, recently celebrated its tenth anniversary as a solution provider for physics simulation and content development to the gaming and film industries.

Complementary Applications for Game Development Productivity

Though 3ds Max capably handles the lion's share of design and animation tasks for an extensive range of animation tasks, game developers can complement the considerable capabilities of 3ds Max with other design and animation applications from Autodesk. Productivity and extensive interoperability are top considerations in each component in the Autodesk solution suite, helping artists push the creativity boundaries with well-designed tools. Among the Autodesk solutions likely to stir the soul of even the most experienced programmer are:

- **Autodesk® Kynapse®:** Provides artificial intelligence capabilities in a middleware solution that can be used for many global tasks, including pathing decisions.
- **Autodesk® Maya®:** Offers a strong complement of design, animation, effects, and rendering capabilities in a package that has proven popular for cinema and broadcast work, as well as game development.
- **Autodesk® Softimage®:** Includes both strong animation tools and an extensive array of customization options through the Interactive Creative Environment (ICE).
- **Autodesk® Mudbox™:** Provides intuitive digital sculpting and texture painting capabilities in a package that appeals to both 3D modelers and traditional sculptors.
- **Autodesk® MotionBuilder®:** Captures physical movements, which can then be applied to character animation.
- **Autodesk® HumanIK®:** Offers a runtime full-body inverse kinematics solver in a middleware package.

Together, these software components leverage the interoperability features that Autodesk has integrated into their asset creation and management tools, enabling game development teams to more efficiently create and animate scenes, characters, and game environments. Intel application engineers have worked in concert with Autodesk to enhance a number of these software components using a proven portfolio of software development products and libraries, backed by decades of processor technology expertise.

"Today the most popular game production and development tool is 3ds Max. Each industry has its own standard. Autodesk Media and Entertainment technology sets the standard for the game industry."

– Geng Wei, Fine Arts Director, Shanda Interactive Entertainment

> *"Autodesk 3ds Max is the integral tool that we use in creating everything. When we need extra information, it comes out of 3ds Max. If we are creating a new tool for our production, we are creating it to work with 3ds Max."*
>
> – Michael Wallin, Senior Animator, Mythic Entertainment

The Key to Success: Keeping Developers Creative and Productive

With the growing complexity and sophistication of video games, tools that help organize and coordinate the production are essential for keeping timelines on track and budgets under control. Digital asset sharing, using interfaces compatible with the COLLADA* schema structure, has become increasingly important as a way to maximize the value of content created with a variety of applications and ported from a wide range of platforms.

Ken Pimentel also vouches for the importance of interoperability in the grand scheme of things. "Autodesk stands strongly behind interoperable workflows," Pimentel said. "We've invested 100s of person-years in solving this problem with our FBX solutions (which include a COLLADA interface). Major game and film customers use FBX as their main interchange format, and we see this as a growing trend due to the openness of FBX and the fact that a large team of Autodesk developers are working hard to improve this backbone every day. We know we have much further to go, but we've recently doubled the size of the team with the Softimage acquisition and that has brought yet more solutions for interoperability into our mix—such as the Crosswalk technology."

Respecting and enhancing the creative vision is also a primary part of successful game development strategy. Mary Beth Haggerty, who is the senior games industry manager at Autodesk, sees excellence in tool design as essential to game developers staying engaged and productive. "Autodesk believes in the creative visionary: our company is focused on giving them—regardless of discipline—the best tools, software, and middleware out there. Preserving a vision can be tough in production where there are many disciplines and people working—but maybe not communicating—with each other. How do we help the visionary? Content teams use 3ds Max, Maya, and Softimage to create beautiful worlds, FX, and characters."

"We have two specialized tools," Haggerty continued. "Mudbox is for high-poly modeling, and MotionBuilder is real-time, animation software. We opened a new Games Technology Group with the Kynogon acquisition in May 2008 to focus on middleware; our first products are Kynapse and HumanIK. Autodesk is continually looking to the future where creatives are no longer bound by expensive pipelines, and do not have to re-create the same tech for each game. We love game developers and want to give them the freedom to focus on what makes their game fun and unique."
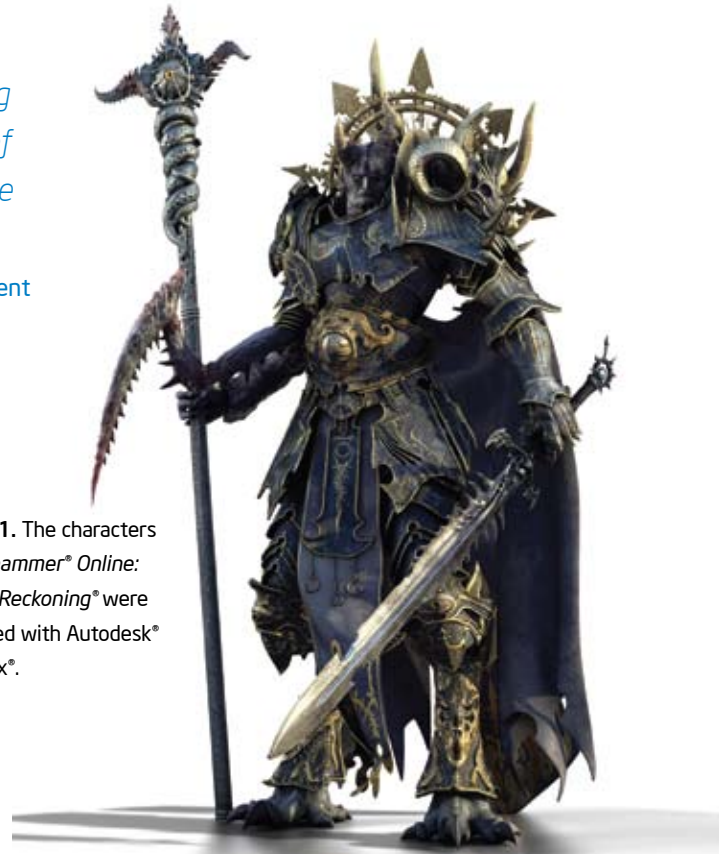
Figure 1. The characters in *Warhammer® Online: Age of Reckoning®* were animated with Autodesk® 3ds Max®.
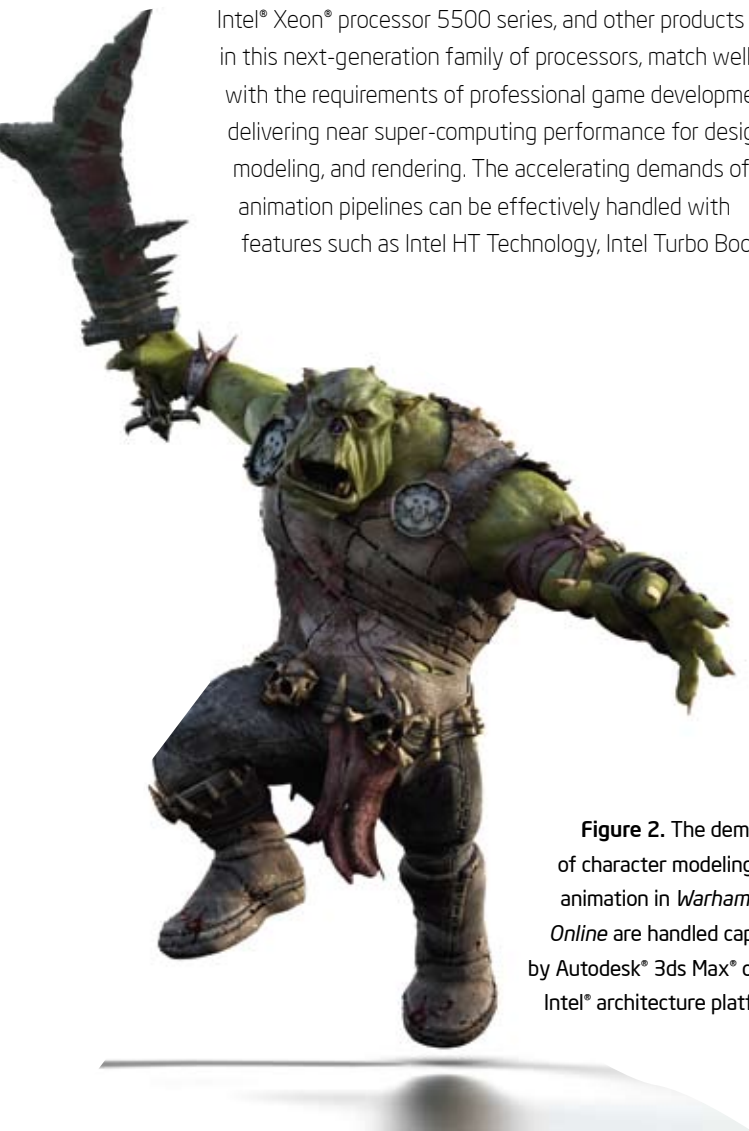
Built-in Processing Intelligence

The latest generation of Intel Xeon processors, based on Intel Core microarchitecture, delivers intelligent performance and the benefits of extended parallelism to workstations and servers used in game development and as host servers for massively multiplayer online role-playing games (MMORPG). At the heart of the architectural redesign, Intel® Hyper-Threading Technology expands threading options, an integrated memory controller provides scalable shared memory using Intel® QuickPath Technology, and Intel® Turbo Boost Technology offers performance increases on demand. This new microarchitecture exploits hafnium-based Intel® 45nm hi-k metal gate silicon technology, combining energy efficiency with unprecedented processor performance and dynamic scalability.

- Four processing cores with support for up to eight individual threads through Intel® Hyper-Threading Technology (Intel® HT Technology)
- Intel® Turbo Boost Technology to increase performance of multi-threaded and single-threaded workloads
- Intel® QuickPath Technology, featuring individual memory distribution to each processor and integrated memory controllers
- 8 MB shared Intel® Smart Cache
- Up to 3.2 GHz clock frequency
- 45nm manufacturing process

Highly threaded applications, such as 3ds Max, experience outstanding levels of performance gain, both from the benefits of optimization and the inherent capability of the Intel Core microarchitecture to direct available processing power to where it is most needed and to take maximum advantage of all available cores and threads. The certification process at the workstation level—to ensure that 3ds Max performs reliably and consistently on Intel-based platforms—gives developers the assurance that their creative projects are in safe hands. Advances built into the Intel® Xeon® processor 5500 series, and other products in this next-generation family of processors, match well with the requirements of professional game development, delivering near super-computing performance for design, modeling, and rendering. The accelerating demands of animation pipelines can be effectively handled with features such as Intel HT Technology, Intel Turbo Boost

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Technology, and Intel QuickPath Technology. Intel® Intelligent Power Technology delivers performance on demand while minimizing power consumption, a critical requirement for keeping server rooms and development lab operations cool and cost effective.

Summary

Intel and Autodesk have hit the sweet spot with the latest platform-tuned release of 3ds Max, putting threads and cores to work in service of the imaginative and creative goals of game developers.

Learn More

For more information on Autodesk® 3ds Max®, visit:
www.autodesk.com/3dsmax

To download a 30-day trial version of Autodesk 3ds Max, complete a one-page form located here:
http://usa.autodesk.com/adsk/servlet/ mform?id=10083915&siteID=123112

For more about Autodesk game development solutions, go to:
http://images.autodesk.com/adsk/files/ad_games_brochure_us.pdf

For details on the performance capabilities of next-generation Intel® Xeon® processors, visit: **www.intel.com/performance**

For a short video on how the Turbo Mode, a feature of next-generation Intel Xeon processors, works, check out this YouTube* link:
www.youtube.com/watch?v=llOXMPXH2VA&eurl=

Figure 2. The demands of character modeling and animation in *Warhammer® Online* are handled capably by Autodesk® 3ds Max® on an Intel® architecture platform.

Solution provided by: