Success Story
Intel® Software Partner Program
Keen Software House

"Intel's partnership logos give users a sense of security—that we are working with great tools to help in the development of the software"

- Nicholas Miller,
Marketing Director,
Keen Software House

Digging Deeper: *Miner Wars** 2081 Hits Rich Graphics Ore

To expand gameplay to a wider audience and enhance the graphics performance for its latest online game, *Miner Wars 2081, Keen Software House took advantage of a number of Intel® tools and technologies to analyze, multi-thread, and optimize its code.**

CHALLENGE

Success in the gaming arena depends on delivering maximum playability on the widest range of hardware platforms. With mobile gaming gaining momentum, the latest laptops and netbooks need to be considered in the platform mix. For the release of the online game *Miner Wars* 2081*, Keen Software House worked to optimize the graphics performance for responsive gameplay on netbooks through high-end desktop machines. The development team also looked for ways to stretch battery life for mobile gamers.

SOLUTION

Keen Software House used Intel® Power Checker and Intel® Graphics Checker to analyze and enhance battery life and graphics performance. Multi-threading the real-time calculations involved in the persistent destructible environment helps enhance the realism and the unique character of the game.

CUSTOMER BENEFIT

Gamers enjoy a graphically rich experience even on more modest computers and can play longer thanks to battery life enhancements that pause the game during idle states.

More

Learn more: **www.intel.com/partner**

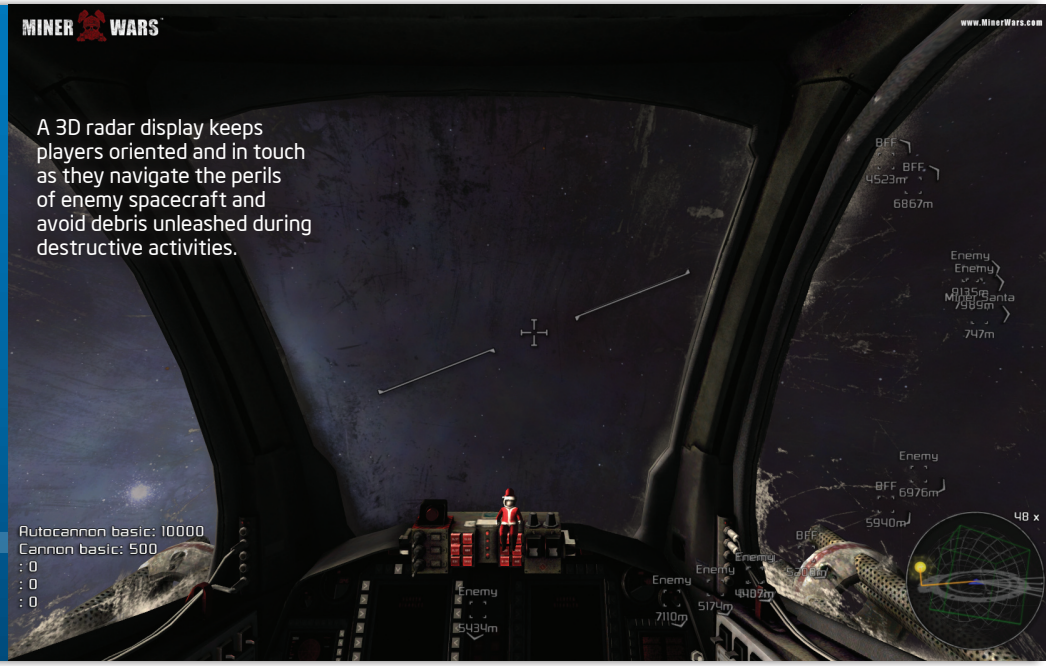
PROOF POINT

Responsive gameplay with netbooks; stellar gameplay beyond

Through the use of Intel tools and technologies, Keen Software House is rapidly reaching the stage where even netbook users with an Intel® Graphics Media Accelerator (Intel® GMA) x4500 chipset can experience the excitement of *Miner Wars*. Analytical tools, including Intel® Graphics Checker, establish a fast, effective way to compare and contrast graphics performance across a span of systems equipped with different graphics hardware. Keen is nearing their target goal of 30 fps rates for baseline systems running *Miner Wars*.

"Our goal is to make Miner Wars run great—at 60 fps—on high-end systems, but we're also making it run well on smaller computers so it can be enjoyed by netbook users."

- Marek Rosa, CEO and Founder, Keen Software House



A 3D radar display keeps players oriented and in touch as they navigate the perils of enemy spacecraft and avoid debris unleashed during destructive activities.

Capturing the Gritty Realism of Space Exploration

Less *2001: A Space Odyssey* and more *Battlestar Galactica, Miner Wars* exudes a gritty realism and an unsettling sense of the desolate isolation in deep space. That mood is created from a wealth of small details, from the film of blasted dust that gradually coats the spacecraft viewports to the moody, atmospheric views inside and outside the abundant asteroids, as visually rich graphics unfold to a somber, majestic musical backdrop.

One of the original goals of *Miner Wars*—part of the earliest vision of Keen Software House founder Marek Rosa—was to bring unique and startling realism to the space environment. Maintaining a completely destructible environment was part of this vision. When an asteroid blows up, the pieces continue to float through space where—if you don't navigate skillfully—they might collide with your spacecraft. Modified objects persist from session to session, so the hideout you dig in rock to shield your spacecraft from alien view will always be in the same location that you make it. Realistic physics is also integral to *Miner Wars*. The game employs a unique six degrees of freedom (6DoF) directional feature that uses a physics engine to closely simulate thruster engine behavior and precisely control spacecraft movements through multiple axes.

The ideas for *Miner Wars* have been evolving over more than a decade. "I personally started working on the *Miner Wars* video game about ten years ago," Marek Rosa said. "I was focusing on the destructible environment and at the time I was using C++ and OpenGL*, and also using a lot of Intel® tools, such as [Intel®] VTune Performance Analyzers."

"Then I had to take a break," he continued, "because I just couldn't focus enough on the game for a while: I had other duties. There was a restart on the *Miner Wars* work about two-and-a-half years ago. With a virtual programming team from around the world, we started working at full speed and full power. For these last two-and-a-half years, I've been working on the game full time. From the very beginning, I started writing a new game engine from scratch, using my past experience and some core algorithms that I had developed some ten years ago." That original game engine work has taken shape as the VRAGE engine, which incorporates unique Voxel-rendering technology, support for the fully destructible environment, and fluid transitions between large open-world sectors that can be extended through mods.

"Part of the logic of the Miner Wars game runs on our server. The code that is managing the game isn't ever on the client side. Without the connection to the server, there is no way to play. For us, this works as a good way to fight piracy."

- Marek Rosa, CEO and Founder, Keen Software House

While the virtual team approach worked well to get the game development off the ground, Keen Software House is now taking a more traditional route, bringing a number of team members in-house.

"Right now we are in the process of setting up to do more in-house development, like a normal company," Rosa said. "In January 2011, we will start with a few developers working full time in the office here in Prague. During the year we will be increasing the size of the team."

Among the key features of *Miner Wars*:

- **Destructibility.** Anything in *Miner Wars* is subject to destruction, which persists through the duration of the game. A tunnel bored in an asteroid, for example, will still be there next time a gamer logs on to play. Small details enhance the realism, such as the debris from explosions that coats the spacecraft windows over time, creating a unique visual perspective.
- **Sector Editing.** Gamers tend to become more engaged when they have the ability to create unique environments within a game. The editing features of *Miner Wars* let creators design and build sectors and fill them according to their personal vision.
- **Multiple Gameplay Modes.** Enjoyable in standalone mode, *Miner Wars* also supports co-op gameplay so that missions can be carried out with friends and aliens can be driven off by coordinated efforts. For multiplayer activities, a single server will be able to support up to 100,000 players when the MMO version goes online in 2012.

"Destructibility is one of the most important features in *Miner Wars*," Rosa said. "Basically, it means that we have these landscapes, which in our game are formed into asteroids. They are not just polygons—they have things inside, like real objects. If you drill or make holes in a particular direction, you just dig like in real life. Destructibility happens in real time, which means we need to handle many, many explosions simultaneously. Thanks to calculations performed in parallel, this is not a problem for us."

Slated for release in the third quarter of 2011, *Miner Wars* has already gained a Web following with thousands of preorders for the software and hundreds of thousands of views of the video demos. Learn more about the latest activities at www.minerwars.com.

Behind-the-Scenes: The Development of *Miner Wars*

Miner Wars scales very effectively to use the maximum number of cores available on a given system, thanks to the multi-threading work that has been accomplished. "We use multi-threading in several places," Rosa said. "One that is very important for us is the moment when you shoot a rocket into an object composed of Voxels and it explodes. We need to rapidly recalculate all the polygons when this happens. We do this in parallel and call it "full accommodation," and we do it on multiple cores—as many as you have available on your system. That is really a great thing for us."

Plans are underway to include *Miner Wars* in upcoming netbooks powered by Intel® Atom™ processors as a special promotion. Nicholas Miller, marketing director for Keen Software House, has been involved with the testing and benchmarking using Intel Graphics Checker to track progress and using the Intel GMA x4500 chip for comparisons. Each iteration of *Miner Wars* shows improved playback on netbooks powered by the Intel Atom processor, putting the magic number of 30 fps within reach. Miller noted, "Right now we are targeting the upcoming [Intel] Atom processors for 2011. The current generation—the 1.8 GHz units with dual cores—are, I believe, plenty fast enough. My netbook with the dual-core 330 [Intel] Atom [processor] already runs the benchmarks at about 28 fps, which is pretty impressive for what is essentially a previous-generation netbook."

Intel® Power Checker also played a role in the development effort, making it possible for Keen Software House to take advantage of idle states in an application to improve power efficiency. Intel Power Checker evaluates applications running on Intel® processors to determine how power-aware they are. The idle behavior in the application can then be modified to minimize energy requirements. For gamers running *Miner Wars* on notebooks or netbooks, this will result in longer mobile gaming times and enhanced battery life.

Rosa recently contributed a chapter to a trade computer book, GPU Pro: Advanced Rendering Techniques, edited by Wolfgang Engel. This book, written for professional programmers, presents best-practice techniques for coding to the graphics processing unit. Rosa uses examples from the development work on *Miner Wars* to highlight the coding techniques in the chapter "Destructible Volumetric Terrain."

As an example, one section explains how to manage Level of Detail (LOD) to render large terrains efficiently without overburdening the system hardware. A typical asteroid in *Miner Wars* consists of about 300,000 triangles, and scenes often contain more than one asteroid, making LOD a critical factor when considering frame rates. Rosa explains the specific techniques for maintaining the visual richness of a scene while minimizing the details that must be processed.

The Power of Association

Membership in the Intel Software Partner Program opens a number of opportunities and resources to Keen Software House, and the company is actively exploring some of the available tools, programs, and resources to further optimize the game for top performance on Intel® architecture platforms and to fully take advantage of sales and marketing opportunities to increase their visibility in the marketplace.

Keen Software House has been using the Intel Software Partner Program logo in marketing materials and collateral. From all indications users are responding very positively to the association with Intel.

"Intel's partnership logos give users a sense of security," Nicholas Miller said, "and lets them know that we are working with great tools to help in the development of the software."

The affiliation with the Intel Software Partner Program brings Keen Software House a measure of credibility and enhanced access to the worldwide marketplace and software ecosystem. In turn, Intel gains a positive association with a dynamic, innovative game developer and through feedback about tools and programs gains insights into how to better support the efforts of ISVs and the development community.

A wireframe render shows the typical level of detail composing an asteroid.

About the Intel® Software Partner Program

The Intel® Software Partner Program provides a framework for collaborative solution development around Intel® architecture. From business planning and product development to marketing and sales, the program helps to drive increased business success and market opportunities.
Learn more at **www.intel.com/partner.**

Success Story by:

Learn more about Keen Software House:
www.keenswh.com

Visit the Intel® Software Network Parallel Programming Community:
software.intel.com/en-us/parallel

 0111/BM/MESH/PDF 324804-001US