Solution Brief

Intel® Media Sofware Development Kit 2.0

Virtual Survival of the Fittest:

Creatures in *Darkspore* Rendered for a Range of Platforms

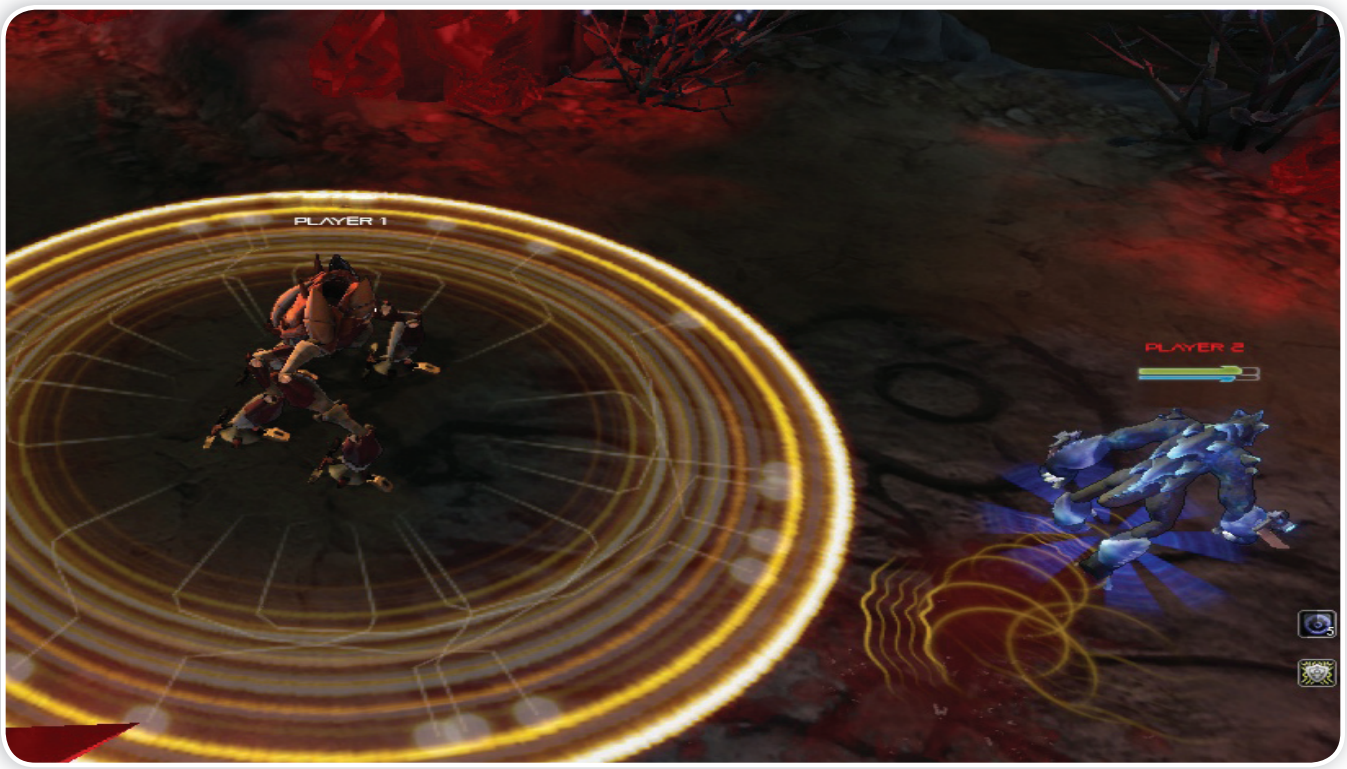
Optimizing for the Broadest Range of Platforms

Many PC and online game developers would quickly go out of business if their games could only be played on tricked-out, high-end gaming machines. Those specialized machines represent just a small percentage of the market. To broaden their audience and expand market potential, developers these days focus a considerable amount of effort in coding games to deliver rich, fulfilling gameplay for the kinds of laptop and desktop machines in most common use. Typically, this includes systems with integrated graphics components. Software development tools that make the process of streamlining and optimizing graphics for the widest possible audience are in high demand among developers. Along that vein, Intel® GPA has won a favored place in the toolkits of developers, including the team at Maxis who took full advantage of Intel GPA as they optimized *Darkspore*, an online role-playing game slated for February 2011 release.

The development processes used by the team that created *Darkspore* put Intel GPA into a vital role, providing a means to enhance graphics performance and improve the visual computing experience for a wide span of platforms. The architecture of the 2nd generation Intel® Core™ processors has elevated expectations for processor graphics capabilities. *Darkspore* delivers exceptional richness, clarity, and responsiveness on systems with these 2nd Generation Intel® Core™ processors. The visual depiction of graphics operations, workloads, and bottlenecks—as provided by Intel GPA—make it a much easier task to streamline code development and the Maxis team took advantage of this during their development work.

"I think the great thing about [Intel®] GPA is that it's one of the few tools on the PC that you can use to actually do live analysis of your game. While it's running we can take a snapshot of the entire render state for a frame and look at it, tweak some settings in the game, and then capture another frame and analyze that. And that's something that previously we could only really do on the console."

— Alec Miller
Graphics Engineer, Maxis



An Innovative Twist on an Earlier Theme

Not too much of *Darkspore's* predecessor, Spore, remains in today's game, except for the mad laboratory environment where a bizarre assortment of organisms spring forth from computer-generated DNA. The online version of *Darkspore* brings an element of co-operative competition into play, giving the collection of engineered creatures (constructed using an enhanced version of the Spore Creature Editor) an online stage to cavort, collide, and conquer. Due to the myriad of system configurations the developer expects players to use, they made it a priority to optimize performance for the entire spectrum; supporting mainstream and enthusiast configurations. What they needed was a single, comprehensive toolset which would allow for such optimization across game platform configurations in a single setting.

Behind the mayhem and machinations, the graphics for *Darkspore* have been finally tuned with assistance from Intel® Graphics Performance Analyzers (Intel® GPA) for optimal performance on a wide range of platforms. As a result, *Darkspore* gameplay is brisk and responsive, elevating the level of graphics realism and performance available to gamers on laptops and mainstream desktop machines.

Graphics engineers Alec Miller and David Lee Swenson have been at the heart of the development work on *Darkspore* since the earliest stages of the project. "One thing we discovered with [Intel] GPA," said Miller, "is that we had a lot of high-polygon creatures and we realized that the entire scene took about the same time as it did to render just a few characters. That inspired us to do some polygon level of detail work and to reduce the polygon count on the creatures to work better on low-end systems."

"Actually, we discovered a lot of different things using Intel GPA," Swenson said. "We have a force level called Verdant. And Verdant is an especially a bad performer, because it's slow—the place is just littered with trees and plants. And, not surprisingly, the trees and plants showed up in our Intel GPA analysis as a graphics bottleneck."

"Interestingly enough," Swenson continued, "you'd think that it would all be fill and it wasn't. The wind shift and calculations were actually a problem, as well. These plants are actually quite expensive, graphics wise. We're running some content full deferred, but for this level it looks as though it would be a win to run the plants full deferred. And so we might be doing that as a direct result of the [Intel] GPA feedback."

The graphics analysis also showed other areas where optimizations were possible, including scaling back the global lighting to trim back cloud shadows and parallel lights, making changes to the Z-range calculations for the shaders, and similar kinds of optimizations.

With the majority of the engineering work complete, Miller and Swenson have been impressed with how well the optimization work has gone and the degree of graphics performance that is available on the 2nd Generation Intel Core processors. "If you have a [codename] Sandy Bridge machine, *Darkspore* will run beautifully. There is no reason to go out and buy anything else."

About the game, Miller commented, "My favorite feature is the creatures, because I think that's been one of the strong points in Spore; the multi-legged, multi-armed creatures. And to think that the same technology that was in Spore is now in *Darkspore* and our creatures look so incredible now. I think that's going to be really exciting for people."

Intel GPA Capabilities Advance Platform Proficiency

"What makes Intel GPA most compelling in today's rapidly changing game-development landscape," states Aaron Davies, Intel GPA product manager, "is that it allows users to visualize and optimize their game code in real-time, irrespective of their PC configuration. Recent title successes on emerging game 'systems' have proven, among other things, that mass-market customer volume is an increasingly important ingredient. Exponential growth in Intel® Core™ and Intel® Atom™ processors, coupled with truly compelling game performance on the 2nd Generation Intel Core processors, are two key (and exciting) indicators that mainstream laptop gaming is poised for substantial growth. One of our goals with Intel GPA is to ensure that game developers can quickly and easily tap into the full performance of the newest gaming architectures, and realize how compelling the performance really is."

The current version of Intel GPA, 3.0, includes powerful features that let developers expand their ability to survey graphics factors related to graphics-processing unit activity. Experimentation is strongly encouraged with many features that show the before and after effects of code changes. The Platform View visually depicts the workload levels of the CPU and GPU at different points in the game, making it possible to re-engineer and streamline code execution for balanced operation.

One of the key advantages of Intel GPA is the emphasis on illustrating graphics-processing operations visually, whether through frame-by-frame analysis or system-level view that examines relative processing workloads. The ease with which problems can be identified and resolved is greatly improved by this method of analysis, giving developers a tangible and effective means to see the effect of changes to the graphics models, make code changes rapidly, and assess the impact of changes on game responsiveness. Frame rates can be systematically improved in this manner using a combination of the low-level and high-level analysis tools in Intel GPA.

Yannis Minadakis, a senior graphics engineer at Intel, noted, "The wonderful thing about [Intel] Graphics Performance Analyzers 3.0 is that it works on all the PC platforms, so whether you are optimizing for Intel® architecture and Intel® graphics or you are optimizing for Intel architecture and other graphics solutions, this information is valuable for you and helps you optimize for all the platforms you are targeting for your game."

A new version, Intel GPA 4.0, is in the works and will be released at the Game Developer's Conference in early 2011. For news about current and upcoming releases, visit http://software.intel.com/en-us/articles/intel-gpa/.

For More Information

Visual Adrenaline developer program members can obtain Intel® Graphics Performance Analyzers for free. To register and download your copy, go to: **https://ssl.software.intel.com/en-us/register/visual-adrenaline/**

For the latest news about *Darkspore*, visit **www.darkspore.com**

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