
Sony Computer Entertainment Inc. (SCEI) Tools & Middleware Licensee Newsletter Vol 11 (English)

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Case Studies

By Christine Arrington and Samantha Staples

VibeForce & Butterfly.net

Game developer Sherman3D is in the process of developing VibeForce, an MMOG for PlayStation®2 and PC. Sherman3D is using Butterfly.net's Butterfly Grid to develop and deploy the online aspect of the game. According to Sherman3D CEO Curt Benefield the benefits of using a third party for online technology are multidimensional.

Several factors drove the company's choice of Butterfly.net including the network control tool, Gama, which Sherman3D has evolved to be much more than just an ordinary administrative device. The company uses the tool to identify problems in the game and as a customer service representative tool to anticipate needs, identify cheating problems and see what is happening within the game by dropping a camera into the action.

Benefield pointed out that people want instant gratification particularly when it comes to in-

game punishment to end problems such as cheating and harassment. With Gama, the company can deal with complaints and problems in 10 to 15 minutes.

According to Benefield there were several claims Butterfly.net made about its capabilities and the company delivered on these claims. One of the main technological factors in Butterfly.net's favor is its grid computing architecture. It insures that any upgrades or maintenance done to the network does not require down time because the resources can be dynamically switched to account for the part of the grid that is down.

The power of the grid system is enabling some innovative game play ideas as well according to Benefield. The VibeForce world will integrate ideas such as traffic cameras that players will be able to use to check on various parts of the game. The company is also taking the community aspect one step further towards real world ideas such as a news show where player feats will be featured, and a newspaper where players will be interviewed and featured will also be developed. Using the resources of the network, Sherman3D says it can reduce CPU usage by 55% on the end user device, increase polygon count by 22% and have up to 124 animations per character. That frees up the console for any number of things the developer can imagine.

Additionally, the team at Sherman3D felt that the Butterfly.net system was more accessible than other options allowing the developers the autonomy to make changes as they see fit. Butterfly.net, for example, provides access to code from one of its own games for developers to reference during the integration process.

On the server side Sherman3D uses both Butterfly.net libraries and does its own coding. Benefield says that the libraries are complete and already set up making them easy to work with. Other tools that Sherman3D uses such as NDL's Gamebryo and Havok's physic engine already have links to Butterfly.net's tools.

As with many developers one of the driving factors for seeking out third party solutions was cost. The numbers become quite dramatic when looking at the amount of time and money using Butterfly.net's services has saved Sherman3D.

Benefield pointed out a key development shift that he believes could evolve out of Butterfly.net's architecture. Currently game titles are developed for the lowest powered machine. This is a problem primarily for the PC market when developers must consider much older machines. However, as the console market matures and upgrades are made, console makers will have to be mindful of developing for the various iterations of consoles on the market. Using the resources of the grid allows the developer to develop for the very top machine and pull elements out to operate on less capable machines.

Benefield believes that this system is capable of enabling a lot of the truly visionary ideas developers and writers have had for a long time. There are twelve grids per server and each grid represents approximately two miles of real estate meaning one server represents 24 miles of virtual land. This means scenes like the battle from The Lord of the Rings: Two Towers could be reenacted within a massively multiplayer environment today.

VibeForce is an anime style adventure title that is set up to play like an episode for each adventure the player embarks upon. It is scheduled to ship for PlayStation®2 in the Fall of 2004. Pricing is expected to be between \$29 and \$39 for the game and approximately \$10 per month for the subscription, although the company hopes to be able to charge less. More information on VibeForce can be found at <http://sherman3d.net/VibeForce/>, while information on Butterfly.net can be found at <http://www.butterfly.net>.

Digital Theater Systems Inc.

Digital Theater Systems Inc.'s audio tool was used by game developer Black Ops Entertainment to provide an interactive audio experience for players of Street Hoops for PlayStation®2. The title was released in September 2002 by publisher Activision.



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Jose Villeta, Vice President of Research and Development at Black Ops, was very satisfied with his first experience using DTS Interactive technology, saying, "DTS is the audio tool that provides a Sony Computer Entertainment Inc. compatible library for real-time discrete 5.1 surround sound encoding."

PlayStation®2 audio options include mono, stereo, Dolby Digital or ProLogic II, and DTS.

DTS Interactive, according to Villeta, requires only a small memory footprint for its libraries and audio buffers. Developers should expect between 2-6% CPU usage, varying with the quality of sound, game frame rate, and which version of DTS Interactive (4.0 or 5.1) was used.

The main RAM requires double buffers for audio PCM data transfer from IOP to main RAM, and an additional 50K main RAM is required for DTS Lib functions. "Threading issues are very important," said Villeta, "The corruption of VU0 as the DTS callback gets executed forces the application to save and restore all VU0 registers to avoid VU0 corruption. The DTS encoder thread should not be interrupted so it should have the highest VU0 priority."

The DTS Interactive callback routine encodes 4 channels of PCM data into a single buffer using VU0 at 512 samples at a time, sending the output to the SPU2 digital SP/DIF.

DTS Interactive has the added ability to play pre-encoded digital movies from DVD, which will be featured on upcoming titles. In addition to Street Hoops, Black Ops implemented DTS' technology in two as-yet-unreleased PlayStation®2 titles, T3: Rise of the Machines and XFILES: Resist or Serve.



At GDC 2003, DTS announced that PlayStation®2 developers certified prior to GDC 2004 will be able to use DTS Interactive free of charge.

Vicarious Visions

Vicarious Visions of Troy, New York, is developing a new title for PlayStation®2, Crash Nitro Kart. It's scheduled for release in 2003 and will take full advantage of the power of the Intrinsic Alchemy® middleware platform.

After reviewing numerous middleware options, Vicarious Visions switched to Alchemy from its own strong base of internal technology, developed over three years. The team's first experience with Alchemy, on a different title, was so positive that the decision was made to use Alchemy for this upcoming title for PlayStation®2 and purchase outright all rights to the Intrinsic Alchemy technology, originally developed by Intrinsic Graphics.

Vicarious Visions' President, Guha Bala, was instrumental in making the decision to license and subsequently purchase middleware technology. A principal advantage of Intrinsic Alchemy was the efficiency of its tool chain, which allowed the Vicarious team to stick to a very demanding development time frame. The Alchemy support team has also been incredibly responsive to the needs of the developers at every stage of the project.

By exploiting Alchemy's time- and labor-saving features, Vicarious Visions has been able to shorten the release cycle of Crash Nitro Kart, a fast action multiplayer cart racing game based on the hit Crash Bandicoot® franchise from Vivendi Universal Games, by 12 months. Vicarious also takes advantage of physics middleware from Havok.

Bala states, "Middleware can offer a great solution for developers that are just too busy making great games. In our experience with Crash Nitro Kart, Alchemy's cross platform architecture and production tool chain significantly reduced both the development cycle as well as risk. Alchemy allowed our game teams to increase their focus on even more great content."

Vicarious Visions plans to use Alchemy in its upcoming releases and the company will work with international partners such as Silicon Studio in Japan to provide Alchemy's value to game studios worldwide.

Going forward, the company sees great potential in the Alchemy technology to become the middleware solution of choice for blockbuster games. Its powerful software architecture allows for a robust production pipeline and multi-platform development on 128-bit console systems, and has been designed for scalability to future generations of console platforms and mobile devices. Alchemy is currently being used to power hit titles in development at Activision, Konami, Sega, Take-Two Interactive, and other studios worldwide.

"We've brought a core group of people on board with expertise in the development of the Alchemy technology," added Bala. "Combining expertise in multi-platform middleware

solutions with our native game development application and production expertise will allow us to create technology that can have a big impact on the future of game development."

Case Study: Performance Analyzer for PlayStation®2

By Tomohiko Yagisawa

The Performance Analyzer (PA) for PlayStation®2 was recently made available to PlayStation®2 title developers.

'PA' is an evaluation/analysis tool for application software optimization that enables user to view the hardware resources of PlayStation®2 in graphical form, and it is one of the development tools that is drawing a great deal of attention from application developers for PlayStation®2.

In this article, we will present a case study discussing the benefits and impact brought about at a development team that adopted 'PA.'

We were able to hear various comments and opinions from the viewpoint of developers involved in software tuning at Creative Center of Sega Corporation, including: Mr. Takashi Shoji, General Manager of Technology Development, Mr. Takashi Ando, Section Manager, Graphics Section, Mr. Mitou Yoshida, Library Software Engineer, Graphics Section, and Mr. Shinichi Uchida, Software Engineer, Graphics Section.

The Highly Anticipated Tuning Tool

At Sega Corporation, the development studios are subsidiary companies, and each studio develops game applications and sells their products under the Sega brand name. When we visited the team at the Creative Center for this interview, they told us, "The Creative Center functions as the corporate R&D headquarters and is designed to provide common program modules to the development studios." In other words, the Center provides things like graphics libraries and technical support for modules such as the network control library, which is not specific to any particular game title.

The team at the Center told us they are trying hard to provide and support each development studio with easy-to-use libraries that offer reduced hardware loads and good performance. But they added that in doing so, there was a technical hurdle to see how the internal hardware was performing, and it had become a challenging issue for them. They also said that since their department had to provide libraries with good performance, they desperately needed a performance analysis tool for tuning purposes.



Left above: Mr. Ando
Right above: Mr. Shoji

And that's when 'PA' appeared.

Now developers can see the internals, see the problem, and anybody can understand

Before, there was no way to check the actual performance of the PlayStation®2 hardware internals during the development process. However, by adopting 'PA,' the situation would be dramatically improved.

First of all, with 'PA,' the users are able to see what is happening inside the hardware; as a result, they start to see in which part of the hardware resources the problems actually exist. According to the Sega team, "After learning what the bottleneck was, it became clear to us that our previous methods were not going to help improve performance much. In addition, we were able to see if our own method of measuring performance prior to the adoption of 'PA' was valid or not."

'PA' aiding in the team members' understanding of PlayStation®2 internals was just the starting point. The benefits to the development team continue to accumulate, eventually having a big effect on the software tuning process.



Left above: Mr. Uchida
Right above: Mr. Yoshida

The team found that visualization of the analysis results was another big benefit.

"It's very easy to identify a problem, since the area that requires attention is displayed in red." This enables the user to easily pinpoint which hardware resource is causing the performance problem.

In addition, using 'PA,' the user can see the drawing state of portions of the image that exceed the buffer range, so that it's easy to check if the redundant drawing process is being performed 'outside the screen area' or not.

Designers and programmers may require some time to share the information about current problems and the solution to them. In such cases, the person in charge of the tuning can use 'PA' to explain the situation to each team member by showing them the actual screens. According to the Sega team members, that was another advantage of using 'PA.'

By analyzing a program under development with 'PA', and showing those polygons that are causing the problem, it's easier to give other development team members advice about correcting the problem--such as breaking large polygons into smaller ones rather than decreasing the number of polygons, or making material settings change less frequently to improve processing speed. Using this approach, users can have smooth communications with team members and improve the efficiency of development. This illustrates how much the developers previously relied on assumptions and experience to identify or isolate problems.

Using 'PA,' the user is able to see exact, detailed data that reflects the performance status of the hardware, including the operation rate and the cache status.

By identifying the cause of the problem based on the exact data itself, the user can decide on the correct approach to solving it--for example, determining if he should be optimizing the library instead of making modifications to the application, or the other way around. In addition, if the user finds that cache misses occur, he is able to narrow the problem area substantially--right down to which point in which process is causing it.



operation and performance, but 'PA' is very useful in this regard, since it can tell the user exactly where the bottleneck is occurring.

Soon after adopting 'PA,' the Sega team members were able to make good use of it without any problems. They added that if they could, they would want to use 'PA' not only in the tuning process, but during application development as well. "We're not saying all the programmers should adopt 'PA,' but we think that if at least one person on the project-- for example, a chief programmer --can start using it for analysis, then the developers can determine the tuning strategy at a relatively early stage of development."

'PA' is expected to extend its high performance to various other stages of application development.

SIGGRAPH 2003

By Christine Arrington and Samantha Staples

The SIGGRAPH 2003 Conference & Exhibition was held in San Diego, California July 27 - 31, 2003. Attendees commented that there was a lot to be excited about in the world of computer graphics at this year's show. Those mentioned included advances in Web3D technology, two OpenGL standard ratifications and presentations that provided insight into some of the special effects used in the leading films of the year.

While this year's show was heavily film focused some attendees pointed out that the techniques being employed have huge implications for the game industry. For example in motion capture, systems are being used much more efficiently to make sure the assets created for a film can be repurposed for a game. At a time when the biggest summer game titles are closely tied to film properties, creating cost saving techniques that satisfy needs on both sides of the equation were generating interest at the show.

Sony Computer Entertainment America was on hand to demonstrate EyeToy™ to attendees in the Emerging Technologies hall. While the demonstration at E3 consisted of a short game of Martial Arts with small animated characters, the SIGGRAPH demonstration had become more sophisticated with full body action with motion similar to downhill skiing.

Trends in computer graphics

Siggraph provided an opportunity for industry experts to gather and discuss trends in the computer graphics industry. Bob Bennett, General Manager, Product Development Group at Alias, noted that every day we're exposed to computer graphics in many different media and many times the general public doesn't even realize they're viewing computer-generated images. Bennett said larger numbers of students are clamoring to learn how to produce CG, and that with software pricing and graphics card performance, they're getting more for their dollar than ever before.

discreet's Paul Perreault, Games Tools Product Manager, sees a trend towards increased specialization in the tools space, saying, "The technology is very daunting and no one vendor will be able to provide leading solutions for all the demands of creating compelling content." Dave Campbell, discreet's 3D Industry Marketing Manager, sees real-time becoming more important both in education and entertainment media. He noted that some of the real-time capabilities being developed for government, automotive and design projects will have significant impact on the graphics used for entertainment.



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Trends specific to console games

The computer games industry is of special concern to these experts, who feel that the games industry is expanding far beyond male teenagers playing action titles. "Large publishers are no longer just catering to the market, but driving it," said Bob Bennett, "and game title sales will likely become less seasonal as the market continues to mature." Paul Perreault believes there will be consolidation among developers and publishers, followed by less diversity of titles and within genres, while Dave Campbell added that mobile gaming will be extremely significant. "I'm already seeing people playing phone-to-phone games in the streets," he said. Campbell also pointed out that we can expect to see less experimentation in the industry as cost-to-market continues to rise.

"Graphics in the AAA titles are good and getting better all the time," says Bennett. "Next on the horizon," he said, "will be richer, more dense worlds and characters that stand up to closer scrutiny in all kinds of lighting conditions."

"There is no doubt we are on the cusp of another revolution in visual fidelity," added Perreault, "but render quality is no substitute for engaging story line, well-developed characters and the like." Campbell agreed that gameplay and content cannot be replaced by simply awesome graphics, unless the "application is purely artistic." He conceded that this is a possibility considering the increased accessibility of game graphics technology.

Game graphics: leading the way?

"Game graphics are far less flexible than those for film," said Campbell, because they are implemented in real time. This has led to more emphasis being placed on textures and the need to create increased detail through bitmaps and shaders. The result has been the creation of advanced editors for texture coordinates, which ultimately has an impact across all markets. Another example of how innovations in game graphics might affect other media, said Campbell, include shading languages for real time which will support existing standards such RenderMan. On the flipside, game graphics are more parametric in nature; being real-time gives them the added flexibility of being able to change details on the fly, whereas film textures are committed to the pixel the moment the render is complete.

"Many game graphics continue to achieve their realism by a variety of techniques that are specific to the situation," says Bennett. "What I mean is that lights are baked, textures are substituted for geometry etc. in an attempt to balance realism with computational intensity. Some of these techniques are actually directly applicable to non-game applications, particularly in the area of web-based graphics. The quality of 3D rendering in hardware is now to the point where it is suitable for some broadcast applications and also pre-visualization for film projects."

Bennett's desire for future game graphics would include a richer set of tools for creating environments and populating them with characters. He thinks there's a serious need for more seamless use of mocap data and an increased ability to repurpose assets from production to production. Perreault's wish list for game graphics includes real-time lighting and shadow casting, while Campbell emphasizes the need for more texture memory, parallel processing GPUs, real-time cinematic creation tools, simplified art to engine workflow, and hardware-based processing of geometry.

The reality of the future

Perreault feels that shading languages are going to play a key role in the future of game graphics. He said, "the next few years will see many competing techniques coupled with the associated pain and learning curve for developers and tool vendors." Other experts agree that graphics will improve and, as Bennett points out, with less reliance on production tricks. He also noted, "Pipelines will evolve to handle the greater demands placed on them, subsets of games teams will become more specialized, and the need for smooth flow of data and more importantly asset 'intelligence' (scripts, plug-ins, expressions, etc.) will increase. Instead of a web of applications, games pipelines will be anchored by a common architecture across the programming and art teams. Extensibility and performance will be as important as this or that 'feature' in selecting the 3D tool for this backbone role."

Sony Computer Entertainment, Inc. Tools & Middleware Licensees at SIGGRAPH 2003

By Christine Arrington and Samantha Staples

Alias

Alias debuted its new corporate identity at the show. The week before SIGGRAPH the company announced it had changed its name from Alias|Wavefront to Alias, with a new logo and look. While the company was on hand to announce news about its StudioTools industrial design products, the booth was packed with artists eager to learn the company's premier content creation tool, Maya. Alias noted some significant milestones over the past 7 months including two new releases with features such as Maya Fluid Effects and the addition of the mental ray renderer from mental images. The company also said that six out of the top 10 selling console games used Maya.



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Kaydara

Kaydara was at the show demonstrating the new features of Motion Builder 5 which it announced on June 30, 2003. Kaydara says that the product's features at a low price point mean that a new level of quality is available to a larger number of animators. Motion Builder 5 features include the new story time line, enhanced character animation, photorealistic real-time rendering, natural usability and workflow, built-in clipart library, and what it says is unmatched file format support.



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discreet

discreet announced major product initiatives at the show, including the release of the latest version of its modeling and animation tool, 3ds max 6. This latest version will be available in fall 2003. discreet worked closely with game developers and other content creators to improve the features in 3ds max 6, including layer-based vertex paint tools, an integrated event-driven particle system, unsurpassed polygon and patch modeling, UV unwrap, and radiosity/texture baking for photorealistic environments. 3ds max was



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used in the creation of Tom Clancy's Splinter Cell and Unreal Tournament for PlayStation®2 and discreet continues to focus on improving the tool pipeline for game developers.

Newtek

Siggraph 2003 provided the venue for the preview of LightWave [8] by NewTek. The company plans to release version 8 in the fourth quarter of 2003 but took advantage of the crowds at Siggraph to generate some advance excitement about new features. LightWave already includes world-class rendering, a versatile modeler, particle effects and many other features, but [8] will include many new features. These include an improved workflow in Layout and Modeler, improved soft body dynamics, rigid body and bone dynamics, improvements to IK and FK, new particle system tools, and other technology advances.



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Softimage

At Siggraph, Softimage Co. announced that Capcom is using SOFTIMAGE|XSI software as the focal point of its production pipeline for Onimusha 3 for PlayStation®2. This highly successful series has sold more than 4.8 million copies so far and the third title will feature seven times more characters than the previous version, including about 50 high-quality characters slated to appear in the battle scene. The Onimusha 3 team credits XSI's rich development environment and automation tools as key to their ability to create and move around those 50 characters at once.



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Softimage also announced that Konami Entertainment Japan selected its industry leading nonlinear 3D production environment, SOFTIMAGE|XSI, as the main tool for creating Metal Gear Solid 3 for PlayStation®2. Metal Gear Solid 3 is the latest entry to the company's leading game franchise with over 13 million copies sold to date

Other game titles for PlayStation®2 on view at Softimage's booth were Ubi Soft's Prince of Persia: The Sands of Time and Half-Life by Valve Software.

Softimage provided in-depth viewings of the recently released version 3.5 of SOFTIMAGE|XSI, the latest release of the industry's leading nonlinear 3D production environment as well as SOFTIMAGE|BEHAVIOR v.1.1, the company's behavioral animation

system. In addition, Softimage hosted a series of Advanced Technical Seminars that focused on ways to solve complex production problems in order to prepare digital artists to participate in the industry-wide migration to more efficient pipelines. Additionally, during the annual Siggraph Softimage user group meeting, the company provided a sneak preview of technologies currently in development for future releases.

Virtools

Paris-based Virtools announced the release of version 3.0 of its Virtools Dev software, with new functionality such as vertex and pixel shader handling, user interface customization and, most importantly to game developers, compatibility with NXN Software's NXN alienbrain digital asset management tools.



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