MEET AUTODESK

Taking a fluid approach

For Marcus Nordenstam, better also means easier with new Bifrost technology in Autodesk® Maya® 2015 software

Marcus Nordenstam, Autodesk Media and Entertainment Product Manager for Effects, has made his name in the CG industry by getting the details right. Those details might take the form of splashing water, realistically swirling whirlpools, long flowing hair, or waving cloth fabric—essentially all the fine embellishments that elevate animated sequences to higher levels of realism and visual excitement. A software engineer as well as a CG artist, Nordenstam has been instrumental in the development and forthcoming rollout of the Bifrost Procedural Effects Platform, a new technology that enables Autodesk® Maya® software artists to create fluid animation effects with ease and power. We recently caught up with Nordenstam to get some insight on Bifrost, and the opportunities it creates for the worldwide CG animation community.

So what is Bifrost, and what does it provide to CG artists?

Bifrost is a new procedural effects platform that we're developing. You can think of it as the next generation of effects in Autodesk Maya. For the rollout we focused on fluid simulation effects. For example, if you want to flood a city with a big tsunami and you're using Maya to create the effect, then Bifrost would be the tool of choice to help make that simulation happen. Everything from the wave colliding against buildings to the actual surface of the water that you can light and render in Maya could be created using Bifrost. Not only will the effects look more near realistic than ever before, but they'll be much easier to create and modify too.

You say easier to create and modify?

Yes. We felt that fluid simulation shouldn't be harder to do than other kinds of animation. At its core, Bifrost uses a procedural graph that defines the actual simulation or effect. We've built a user-friendly interface on top of that in the first version of Bifrost in Maya 2015 so artists don't need to get into the graph at all. Creating a fluid effect can be as easy as clicking "Make Lighter" or "Make Emitter" and clicking "Play" to see the effect run. Under the hood Maya is actually building the procedural Bifrost graph representing those elements and their relationships for you. Even though what's going on under the hood is very complex, from an artist's point of view it's very simple. That's the kind of user-friendly workflow we want to nurture through Bifrost.

Before joining Autodesk you were Founder and CEO of a software startup in Sweden called Exotic Matter. One of your products there was a technology called Naiad, which was the precursor of Bifrost. Why did you decide to partner with Autodesk for Bifrost?

I think the biggest reason was actually Maya itself. The collaboration with Autodesk through Maya enabled us to reach far more people far more easily. My co-developer, Robert Bridson, who at the time was a professor at the University of British Colombia and a very famous scientist in the field of fluid simulation graphics, and I had taken Naiad pretty far, probably farther that we imagined we could on our own. So when we began to speak to Autodesk it was clear that with their resources, and with Maya as the host software, we could really bring our technology to a wide market, essentially all the Maya artists in the world. And because Maya has such great workflows that are really easy to use, it played perfectly into my theory that we should make effects animation easy. So since Maya was one of the most popular and easiest to use tools in its space without compromising on quality or scalability, it was the dream place for us to go.

Bifrost uses a technique called "adaptive data structure." What's special and beneficial about this technique for designers and animators?

The concept of an adaptive data structure addresses the problem of scalability within an animated graphic. Suppose you have a scene where a ship is moving across the open sea: around the ship's bow there's a lot of splashing water, which you want to see in very high resolution—say one-millimeter resolution—but it's not necessary to render all the waves in the background in such high resolution to look good—maybe one-meter resolution would be fine. Before Bifrost, you chose a resolution for the entire scene and that was it. Doing a wide ocean shot with a lot of motion at a high resolution would create an enormous amount of data, really too much to handle with any kind of efficiency; ten square miles at one-millimeter resolution is a bigger computing problem than you could even solve with the most advanced super computers in the world right now, so it basically becomes impossible to do. Our solution to this problem is adaptivity: we adapt the scene to different detail levels in different places. As another example, suppose you wanted to do a camera move through smoke or fire. Let's say you have a burning village with a camera fly-through and you want really high resolution of fire and smoke near the camera, but lower resolution far away from the camera. As the camera moves we're actually changing the places in that fire and smoke simulation where we need high resolution, all based on where the camera is. This sort of sequence used to be a difficult scalability problem, but through an adaptive data structure we're able to solve the problem effectively.

How is Bifrost integrated into Maya? Is it a plug-in or something deeper?

Bifrost is integrated deeply in the sense that it is a core part of Maya, rather than a plug-in. We've integrated it through the viewports, with point-and-click interaction, that kind of thing. Integrating Bifrost technology simply and powerfully into Maya will put very cool fluid simulation capabilities into the hands of a lot more artists. ■

Learn about what's new in **Maya 2015** software.