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# Cloud computing: new hope for 3D?

With Autodesk, mental images and Side Effects all working on new cloud-enabled tools, we assess the impact of today's vogue technology on 3D artists

**W**ithin the next two years, tens of thousands of 3D artists will tap into the power of cloud computing to render images on what amounts to a "private supercomputer", leading software developers have claimed.

As well as placing technically ambitious projects within the reach of individuals and small studios, cloud computing may have profound implications for the hardware we use and how we buy software.

While the exact definition of the term remains debatable – Oracle CEO Larry Ellison observed that the IT industry has "redefined cloud computing to include everything we currently do" – the problem of providing access to computing resources as an online service is one that 3D companies are now considering seriously. We spoke to three leading developers to assess the impact cloud computing will have on the day-to-day lives of working artists.

## Rendering in the cloud

The most tangible proof of the industry's commitment to cloud computing comes in the

shape of Side Effects Software's new HQueue toolset, which enables Houdini 10 users to render frames over Amazon's EC2 cloud. Available in public beta since November, the company plans a gold release before the end of the first quarter.

"We developed our cloud tools in anticipation of a growing need for scalable computing resources," says Side Effects' CTO Paul Salvini. "Small studios often encounter heavy workloads around project deadlines and don't want to permanently expand their physical infrastructure. We saw the cloud as a great way to help them get more work done at a reasonable price."

Although online render farms such as ResPower and Render Rocket have offered similar services for years, few support Houdini's Mantra renderer. HQueue is also unique in that frames are submitted to the cloud directly from within Houdini rather than via a separate interface, effectively treating the cloud in the same way as a local render network.

The system also supports Houdini Batch, the command-line version of the software, enabling

users to carry out geometry caching and compositing tasks via the cloud. Side Effects is considering adding distributed fluid simulation in the future.

Dennis Weil, co-founder of animation studio We Can Dance, which used the system on a 30-second teaser for German television, describes the service as "priceless".

"With cloud computing we just pay for the rendering power we need and don't have to worry about cooling, power consumption, hardware upgrades or system failures," he comments. "HQueue played a key role in meeting our deadlines and even enabled us to finish one day early – something that's never happened before."

## From mental ray to reality

Rendering specialist mental images has been working on its own online 3D web services and visualisation platform since 1999 – although as CEO and CTO Rolf Herken points out, it is only with recent advances in network and cloud computing infrastructure that users of RealityServer will be able to tap into its full potential.

The scalable software platform, version 3.0 of which shipped in December, enables developers to build web applications through which multiple users can – even collaboratively – interact with a 3D scene, changing perspective, lighting and materials. The system runs in a GPU-accelerated cloud environment and is accessible via PCs, notebooks and even iPhones.

"RealityServer becomes a viable platform for truly interactive, server-based 3D web applications at the point at which the bandwidth to the device has reached the point of sustaining video, and the processing power per user in the cloud has become affordable for high-end graphics applications," comments Herken.

The platform uses mental images's iray interactive rendering technology – also part of

SUPERCOMPUTER

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mental ray – to deliver physically accurate results. Further interoperability is provided via the MetaSL shading language, which controls mental ray as well as two of RealityServer's three other render modes.

While Herken declined to comment on specific product releases, he pointed out: "Autodesk, for example, is using mental images's software in their products in the shape of mental ray, so the natural extension of this to the user is at some point RealityServer."

Herken added that the option to access RealityServer seamlessly from within mental ray would be made available this year and that

Labs vice president Brian Matthews points out, the company has been experimenting with delivering 3D applications over the web for many years, but has only recently been able to translate the concept into a practical reality.

"The technology just wasn't mature enough to get the user experience we wanted," Matthews says. "This is the first time we can take [desktop software], put it on the web, and deliver it as a service without compromise."

Autodesk's Project Twitch, which Matthews describes as "effectively a thousand-mile-long video cable", enables users to control applications running remotely in the cloud and see the results

Interior of a car using mental ray; mental images' system runs in a GPU-accelerated cloud environment, accessible via PCs, netbooks and iPhones

predicts the system will have other benefits if the service is rolled out commercially.

"Some [studios] are very worried about performing side-by-side installs [during production]," he comments. "With Twitch, we sidestep that: there is no side-by-side install because the trial is running in the cloud – it doesn't muck up your system in any way."

Students and home users could also benefit from being able to run software on a much lower-spec machine than would be required to install the normal desktop version. "You only need a netbook that's good enough to decompress the video," Matthews points out. "So you can have a laptop with better performance than some of the best high-end workstations out there."

### Maya on demand

Although the system does not currently permit users to upload or download their own files, Matthews says that it would not be difficult to add in this functionality. "It's an asterisk, a nuisance," he comments.

Such a move would make a software-on-demand service for Autodesk products a very real possibility. While such services are unpopular with some commentators – one interview with free software activist Richard Stallman describes them as "a trap designed to force people into locked, proprietary systems that cost them more and more over time" – Matthews argues that it is simply a matter of customer choice.

"If you look at the music industry, you have the ability to subscribe to a service like Rhapsody where you pay a subscription to access a library of music, but that doesn't mean that people don't buy CDs," he comments. "We think [the 3D market] ▶

***"It used to be that only Lawrence Livermore labs could afford a supercomputer. Now you can, too, but only for the four seconds you need it"***  
**Brian Matthews, vice president, Autodesk Labs**

he can envisage "10,000 professionals using it on a day-to-day basis" within 24 months.

### Autodesk tests the cloud

Autodesk itself is also exploring cloud computing in the shape of Project Showroom, a mental ray-powered home visualisation tool, and Project Twitch, which enables users to test the company's products, including AutoCAD, Inventor, Revit and Maya, over the internet.

Both proofs of concept rather than commercial platforms, the two trials are being run by Autodesk's development arm, Autodesk Labs. As

on their desktop, rather than having to install the software on their own PC.

"People have done remote-desktop-type solutions before, but generally they didn't work well with 3D applications where a lot of the pixels on the screen are changing continuously," he says. "To get higher framerates, they would make visual compromises [like reducing color depth]. This is a completely different approach."

While the most obvious advantage of Project Twitch is being able to test complex 3D applications instantly without having to order trial DVDs or wait for multi-gigabyte downloads, Matthews

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is analogous. It isn't really up to Autodesk [how people choose to licence the software]. It's up to us to provide options and to let the market decide."

Although Autodesk's views on this subject have proven controversial – in issue 124, we reported on a recent court case arising from the company's view that it only ever licences each copy of its software to the end user, rather than selling it outright – Rolf Herken also thinks the issue of ownership is a red herring. "Your bank account is in the clouds, but you still own the money," he points out.

### Levelling the playing field

With possible consequences ranging from the way we render images to our choice of desktop hardware and software, what impact will cloud computing have on the 3D industry as a whole?

Herken believes that one important effect will be to increase the mobility of the workforce. "The vision goes to the point where you can be a design professional and work anywhere in the world with a laptop," he says. "The ability to work on projects collaboratively without being in the same building will be greatly enhanced."

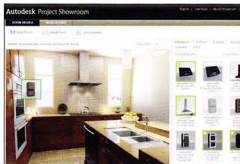
Although Herken concedes that this may reduce job security for individual artists, he claims that the overall effect will be to empower smaller players, particularly in the visualisation market.

"It will change the ranking order, the perceived power of a small firm or individual," he says. "Say you have to do a photorealistic walkthrough of a building in three days. Today, a small firm has no chance to offer that, but if they know they [can rent] 128 processors for a day, they can bid."

☑ The option to link directly to RealityServer seamlessly from within mental ray will be made available this year – a boon for small firms

Brian Matthews also believes that equal access to resources is critical. "I can have one CPU run for a thousand hours or I can rent a thousand CPUs in a data centre for one hour, for exactly the same cost. And that changes everything," he says. "No longer is there any price penalty for getting things done sooner."

This phenomenon, which promises an end to the stress and cost of supporting internal applications, Matthews terms 'infinite computing'. "It used to be that only Lawrence Livermore labs



☑ Autodesk is trialling cloud computing in the shape of Project Showroom: a proof-of-concept online interior visualisation service

***"With cloud computing, we just pay for the rendering power we need and don't have to worry about cooling, upgrades or system failures. It's priceless"***

***Dennis Weil, HQueue beta tester***

could afford a supercomputer," he says. "Now you can, too, but only for the four seconds [you need it]."

### Evolution or revolution?

Of course, the size of the render farm is not the only advantage a large facility has over its smaller rivals: manpower and financial clout also play their part. And while the concept of the virtual studio has been around for years, most companies still see a benefit of situating all of their staff in the same building.

So is cloud computing just part of the continuing evolution of digital technology – or a genuinely revolutionary change in the way we work?

"I think what you have here is a revolution in the innovation phase, not a revolution in the invention phase," says Matthews. "From an invention point of view, it's totally evolutionary. The innovation is about taking things that have already been invented and putting them together in new ways."

"What's revolutionary here is not computing in the cloud [in itself] but making supercomputers affordable," he continues. "Using hundreds of thousands of computers in parallel, we can get away from merely acceptable solutions to get to the best solution possible. And that to my mind is what cloud computing – what the real change for the future – is all about." ■