SILICON MECHANICS

Creating an Immersive Virtual Experience and a Greener Real World
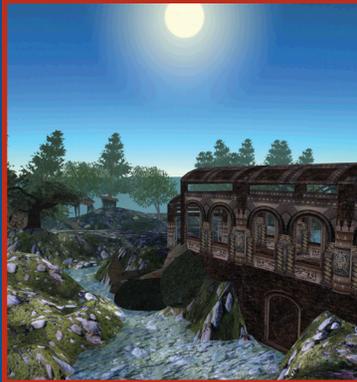
intel Xeon inside™
Powerful. Efficient.

Linden Lab®

SECOND LIFE®

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>
> *Frrank Ambrose*
> *Senior Vice President of*
> *   Global Technology*
> *Linden Lab*

Intel®-based servers from Silicon Mechanics provide Linden Lab with energy-efficient performance for Second Life*

Challenges

- **Deliver outstanding performance.** Maximize processing performance to provide an outstanding 3-D experience for the fast-growing global user base of Linden Lab's Second Life* online virtual world.
- **Reduce power consumption.** Decrease server power use to control costs and meet environmental goal of creating the smallest carbon footprint for each Second Life "Resident."
- **Minimize real estate.** Pack more cores into the same physical footprint.

Solution

- Silicon Mechanics iServ systems with Intel® Xeon® processors. Silicon Mechanics designed streamlined servers equipped with Intel Xeon processors to deliver the processing performance required for Second Life while controlling data center real estate and power consumption.

Impact

- **Excellent performance.** Intel Xeon processors provide greater performance-per-watt than the competing architecture, helping to produce a superior Second Life experience.
- **Low power consumption.** Streamlined servers consume 30 percent less power than similarly configured servers from another vendor, enabling Linden Lab to minimize power use and the environmental impact of running Second Life.
- **More nodes per rack.** Linden Lab now fits 15 percent more nodes into each rack than before, controlling costs and facilitating growth.

With a fast-growing, international user base, Linden Lab's Second Life* is an immense, user-created 3-D virtual world where individuals socialize, create communities, develop content, work, learn, and shop. The IT infrastructure behind Second Life currently supports more than 88,000 concurrent users who spend more than 44 million hours and 43 million dollars in the virtual world every month. To deliver an immersive experience with the lowest real-world carbon footprint for each user, Linden Lab worked with Intel and systems integrator Silicon Mechanics to deploy energy-efficient servers equipped with Intel® Xeon® processors.

Building an expansive virtual world with a small real-world impact

Supporting an immersive virtual landscape that is more than twice the size of New York City requires outstanding processing performance from thousands of cores. "Each Second Life 'region,' or geographic space, has its own dedicated core," explains Frank Ambrose, senior vice president of global technology at Linden Lab. "As the user base and virtual landscape grow, we'll need to add cores and improve performance without dramatically increasing our data center real estate or power requirements."

Linden Lab also needs to be sure that data center expansion will not negatively affect the real world's environment. "Linden Lab was formed not only to create a virtual world but also to make the real world a better place and to advance the human condition," says Amanda Van Nuys, executive director of enterprise marketing and communications at Linden Lab. "By enabling people to attend meetings, conferences, or training sessions in Second Life, we are reducing the carbon emissions and costs associated with travel. We also have a clear opportunity to minimize the environmental impact of running Second Life by building the greenest solution possible with a dense, energy-efficient IT infrastructure."

Spotlight on Linden Lab

Developed and launched by Linden Lab in 2003, Second Life is the world's leading 3-D virtual world environment. Second Life users—known as "Residents"—create content, interact with others, launch businesses, collaborate, and educate. With a thriving "inworld" economy that included more than US$360 million transacted in 2008 and a broad user base that includes everyone from consumers and educators to medical researchers and large enterprises, Second Life has become one of the largest hubs of user-generated content in the world.

Intel Xeon Processors Power a Green Second Life
Silicon Mechanics and Intel deliver a green solution

For more than seven years, the IT group at Linden Lab has worked with Silicon Mechanics to provide the right servers to support the Second Life infrastructure, which currently includes 7,000 servers across three data centers. To enhance the servers' energy efficiency, Silicon Mechanics removes all unnecessary components. "The team at Silicon Mechanics knows what we need, and they can provide streamlined servers to fit our precise requirements," says Mark Ferlatte, Linden Lab's director of systems engineering. "They eliminated the optical media drive, removed one hard drive, and assembled the components to optimize airflow. The result is a server with low heat emissions and power consumption."

Though Linden Lab previously used a different processing architecture, the Silicon Mechanics servers are now equipped with Intel Xeon processors. The Second Life infrastructure includes dual-socket servers based on the Intel Xeon processor 5100 series, as well as single-socket systems based on the Intel Xeon processor 3550 series. All run Second Life's proprietary simulation software on a Linux* operating system. The company also uses database servers equipped with the Intel Xeon processor 5400 series. "We switched to the Intel architecture for our new servers to improve the performance-per-watt," says Ferlatte. "The Intel Xeon processors deliver the processing power we need for Second Life while minimizing power consumption."

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New servers reduce power use by 30 percent and boost density by 15 percent

"With their streamlined design, the Silicon Mechanics servers use about 30 percent less power than similarly configured systems from another vendor," says Ambrose. "We are cutting costs and minimizing the data center's environmental impact."

"Migrating to the Intel architecture has helped us increase core density considerably," says Ferlatte. "We now can fit 41 nodes into each rack—that's nearly a 15 percent increase since moving to the Intel architecture."

Worlds align with Intel and Silicon Mechanics

"We're very excited about some of the new Intel technologies, including the Intel Xeon processor 5500 series and the Intel solid-state drives," says Ferlatte. "The new Intel Xeon architecture should help us increase infrastructure density while the Intel solid-state drives will help database performance and reduce power consumption during inactive periods."

"By working closely with Intel and Silicon Mechanics, we can fully explore new technologies and make educated decisions," says Ambrose. "Linden Lab, Intel, and Silicon Mechanics are closely aligned in our goals for using powerful technology and producing a greener world. We will continue to work together to turn those goals into reality."