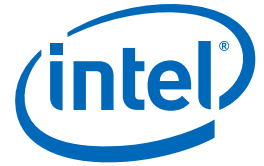


CASE STUDY

Intel® Xeon® processor 5600 series
Enterprise Server
Technologies for Tomorrow's Cloud
Virtualization



Driving the Real-Time Cloud

Fast-growing Joyent delivers performance and profitability with the Intel® Xeon® processor 5600 series

Joyent is a multi-tenant cloud innovator that serves the stars and rising stars of social network gaming, real-time mobile applications, and other dynamic Web segments. It meets their performance and scalability requirements with Intel® Xeon® processors and cloud software that Joyent developed over years of running a public cloud. Company executives say that moving from the Intel® Xeon® processor 5500 series to the 5600 series helps Joyent effectively double its capacity and revenues, and that Joyent's ability to support 400 virtual machines (VMs) on a server is the envy of its competitors.



"Moving from the Intel® Xeon® processor 5500 series to the 5600 series effectively doubles our capacity in the same power footprint, which also doubles our revenue within the same cost footprint. It will have a tremendous effect on revenue and margin."

– Jason Hoffman
Co-founder and Chief Scientist
Joyent

CHALLENGE

- **Low latency, high density.** Joyent needs to support as many tenants as possible on each server without slowing end-user performance or scalability.

SOLUTIONS

- **Innovative cloud software.** Delivering operating system (OS)-level virtualization, Joyent's SmartDataCenter* and SmartOS* software are optimized to extract every ounce of performance from the underlying platform.
- **Intel Xeon processors.** Joyent minimizes latency and maximizes density by standardizing on Dell PowerEdge* R710 2U rack servers powered by the Intel Xeon processors E5620 and E5530.
- **Intel® 10 Gigabit Ethernet Server Adapters.** Joyent uses Intel 10 Gigabit Ethernet Server Adapters to improve throughput while reducing total cost of ownership.

IMPACT

- **Responsiveness and agility.** Joyent says it provides best-in-class application performance plus cloud analytics technology that lets customers track their applications' latency. Customers can draw as-needed capacity from a large pool of available resources, enhancing their flexibility.
- **Density and profits.** Joyent supports 2,000 VMs on five physical servers, increasing margins and achieving profitability with its first installed server.

Future-Facing Cloud

Joyent's customers don't worry about legacy applications. They're pioneers in the rapidly transforming worlds of social media gaming and next-generation mobile apps, as well as in others. They want to bring new ideas to the marketplace quickly, and they need infrastructure that can respond instantly, scale seamlessly, and handle surges and spikes that might overwhelm a less robust platform.

Joyent uses custom cloud software with server and networking technologies from Intel to give those customers just what they need. "We have architected

our solution stack to be extremely efficient and to really drive the Intel® processors," says Bryan Cantrill, Joyent vice president of engineering. "We're able to give people all of that great Intel® performance and have it go right into their app. We're also able to tap into underutilized CPU, memory, and network resources when an application needs a boost. That combination provides best-in-class application performance and avoids customers having to overprovision to ensure they'll have performance when they need it."



With its efficient software and Intel® Xeon® processors, Joyent supports 400 VMs per server

Joyent standardized on the Intel Xeon processor E5530 and added the Intel Xeon processor E5620 when it launched. "The Intel Xeon processor E5620 gives us more cores, memory, and memory bandwidth," Cantrill says. "You add in the Intel 10 Gigabit Ethernet Server Adapters, and you can have the entire hemisphere playing a real-time game on your box."

Joyent supports its global customers through data centers in California, Nevada, Texas, and Massachusetts. It also licenses its cloud software to other service providers and collaborates to advance the cloud as a member of the Intel® Cloud Builders initiative. Joyent customers use the open source Node.js* framework to create real-time Web applications, Joyent's SmartOS to run them efficiently, and cloud analytics based on DTrace* dynamic tracing to monitor performance and resource usage.

Density Equals Dollars

Joyent executives say that besides delivering performance for customers, the Intel Xeon processors let them load their servers with far more tenants than typical cloud service providers. "As an operator, increasing your load factor is how you amortize your fixed investment costs," says Cantrill. "If you have hundreds of tenants on a server rather than eight tenants, that's the difference between a service that's a loss leader and one that's

a real revenue generator. We can have 400 tenants on a box and have all of them highly satisfied with their latency because each one is able to unlock the full power of the Intel® technologies. The servers run like champs and hardly seem to crack a sweat."

Joyent's high loads and density go straight to the company's bottom line.

"Density equals revenue for us," says Jason Hoffman, Joyent's co-founder and chief scientist. "By increasing our core density and memory density, we can put more tenants on a server, which means higher revenues. Moving from the Intel Xeon processor 5500 series to the 5600 series effectively doubles our capacity in the same power footprint, which also doubles our revenue within the same cost footprint. It will have a tremendous effect on revenue and margin."

Data-Intensive, Real-Time

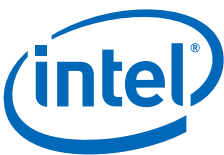
As more enterprises move into the cloud, Joyent's roadmap calls for adding hardware-level virtualization and using the performance and security features of Intel® Virtualization Technology (Intel® VT). "Intel has done terrific work on accelerating hardware-level virtualization," says Cantrill. "We are using it going forward for our hardware-level virtualization solutions to help enterprise customers bring their legacy applications into the cloud."

SPOTLIGHT ON JOYENT

Joyent is a global cloud computing software and services company offering cloud solutions worldwide since 2004. Joyent is the only cloud computing company that has developed a complete software stack, runs a major public cloud on that stack, and offers its cloud data center software to any company that wants to build a cloud. A privately held company, Joyent is based in San Francisco and has offices around the world. Its investors include Intel® Capital.

Joyent expects to see greater emphasis on low-latency cloud computing as a new generation of Web and mobile applications takes off. "If you're playing a real-time interactive game and something is late, at some level, it's wrong," Cantrill says. "We believe the timeliness of the system is increasingly going to be the correctness of the system. We're seeing these real-time, data-intensive applications now, and we're going to see them more frequently and with much more data involved. So latency is very important to our users, and we think it's going to become much, much more so in the coming 18 months to three years."

Find a solution that is right for your organization. Contact your Intel representative or visit the Reference Room at www.intel.com/references.



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