

Real Customers, Real-Time Requirements

Executive Summary

This profile of four Joyent customers – Digital Chocolate, ModCloth, Quizlet, and Voxer – shows the important role of a cloud infrastructure provider in a rapidly-growing company's success.

Each of these companies needed outstanding performance. That was a given. But they had unique requirements as well, based on the type of service they were providing and the market they were entering. Important requirements included low latency, analytics capabilities, transparency into the cloud infrastructure, cost control, and responsive support.

In each case, Joyent delivered. All four companies credit their selection of Joyent as a key enabler in their success.

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Inside the Joyent Cloud

Joyent has applied its extensive experience with cloud computing infrastructure and services to its entire stack – from operating system and virtualization technology to infrastructure management capabilities. The result is a highly elastic cloud infrastructure that accommodates traffic bursts that other cloud infrastructures cannot.

Joyent architecture has multiple performance and scaling advantages over traditional cloud computing infrastructures:

Software-enabled virtualization.

Joyent machine images have been designed to provide the best possible performance with limited overhead. The operating system (Linux, Windows, or SmartOS) combines virtualization to eliminate redundancy and maximize available RAM for applications.

Unified caching. Joyent makes use of unused double data rate type three (DDR3) memory in the cloud, providing a large adaptive replacement cache (ARC) pool that delivers unparalleled disk I/O. Content traditionally served from disk is cached in high-speed memory without any customer interaction, greatly improving both read and write operations.

Introduction

People who turn great ideas into successful real-time applications vary greatly. They range from a teenager who turned a better way to do homework into a leading educational web site to a seasoned video game entrepreneur starting over again and becoming a leading provider of social games.

The market conditions these entrepreneurs face vary greatly as well. Some build applications on unique ideas and enter a wide-open market while others launch sites onto already-crowded playing fields.

Cloud not in question, but which cloud?

Whether startups succeed depends on a number of factors, including how quickly the idea can be developed and introduced to the market, how well the app performs once it gets there, and how well costs and revenues are balanced.

It's clear these days that delivering a real-time application from the cloud addresses many of these issues. It speeds development by removing the need to spend time developing infrastructure. It can ensure good application performance, if the provider focuses on that. And the cloud can be a way to keep costs down and make an application profitable.

What's less clear, especially with so many companies now offering these services, is which provider is the right one for any given start-up company and its particular product.

Finding and partnering with the right cloud provider is critical to giving an idea the best possible chance for success. What issues should be considered when choosing a cloud provider? Here are a few real-world examples of innovative thinkers who turned ideas into rapidly-growing successful businesses. Their stories illustrate some of the most important considerations.

Quizlet's cloud needs: rock-solid reliability, fast page loads, great support

In 2005, a 15-year-old high-school student named Andrew Sutherland was studying French vocabulary when he had the idea for what eventually became Quizlet, the world's largest flash cards and study games website. Quizlet, which is free to users and ad-supported, contains more than 7 million flash card sets and 200 million terms and definitions, covering everything from middle-school social studies to university-level Arabic to GRE prep. Quizlet's iPhone app is now the #2 free education app in the U.S. (after Apple's iTunes U). Its web traffic is up to 12 million visitors a month, making it a top-250 website. The company is now reaching a double-digit percentage of all U.S. students.

Inside the Joyent Cloud

CPU bursting. Joyent's implementation of its CPU engine allows on-demand processing cycles from a resource pool of available CPUs. This enables instantaneous vertical scaling, meeting bursts of application demand without costly and time-consuming manual resource provisioning.

Hardware-assisted virtualization. Kernel-based virtual machine (KVM) virtualization technology is an integral component of the Joyent SmartOS hypervisor. Windows and Linux operating systems can also take advantage of SmartOS capabilities such as unified caching to improve performance and increase operational control of the environment.

Cloud-native architecture. Rather than solving application performance issues by adding more and more virtual machines, Joyent has built its architecture with performance and application scaling in mind. Application architecture is supported by several tiers of servers needing low-latency interconnection; Joyent web, app, DB, and cache servers, while completely distributed and fully redundant, are provisioned for the highest possible performance and lowest possible latency. In contrast, traditional cloud solutions merely move physical data-center inefficiencies to virtual, cloud-based inefficiencies.

When Sutherland was building Quizlet, he knew he wanted to go to a cloud platform to eliminate worries about hardware maintenance. His considerations when choosing a cloud provider included:

1. **Data reliability and 100% uptime.** Losing user data that had been painstakingly created would seriously damage Quizlet's reputation.
2. **Fast page loads.** Because this application would be exposed to a diverse set of data delivery and network conditions, the cloud solution needed to include superior analytics for quickly analyzing and troubleshooting latencies and tuning apps for high-speed page delivery. High performance also required premium servers in the data center.
3. **Responsive support.** Because he was building Quizlet on the bleeding edge of web application technology, Sutherland wanted fast support to prevent cascading failures that might affect end users.

Digital Chocolate's cloud needs: cost control, high performance

Digital Chocolate, a leading provider of social games, was founded in 2003 by Trip Hawkins, founder of video game giant, Electronic Arts. Digital Chocolate was the number-one software company in App Store downloads in 2009, and one of the fastest-growing publishers of Facebook social games with virtual goods in 2010. The company has achieved more than 15 million downloads.

At first, supporting the explosive daily active user (DAU) growth was the company's primary focus. But as DAU grew, so did infrastructure costs, even though the company was already working with a cloud provider. In an effort to find a more suitable cloud solution, Digital Chocolate's management looked for:

1. **Cost control.** With Digital Chocolate's incumbent cloud infrastructure provider, sudden bursts of bandwidth usage often drove up costs, jeopardizing the profitability of some games.
2. **Maximum performance.** With new users discovering Digital Chocolate each day and games' constantly changing user base, the company needed instant scalability.
3. **Adaptability to the company's needs.** Due to the unpredictable and fragmented nature of its user base, Digital Chocolate wanted a cost-effective way to perform iterative load testing. They asked vendors to present pricing scenarios for various service level agreements (SLAs) – but most bidders weren't flexible enough to accommodate the company's wishes.

“We know our application on Joyent Cloud runs super fast – across 100 million requests per week, our average response time is 40ms. That's partly because of Joyent's awesome hardware. We can run the entire site on just three (virtual) Web servers which I don't think would be the case on other cloud platforms.”

- Andrew Sutherland
CTO and Founder, Quizlet

Inside the Joyent Cloud

Joyent's infrastructure provides additional performance and scalability enhancements. Network provisioning includes automatic caching of distributed file systems and load balancing of network traffic, allowing the network to dynamically conform to application demands with no administrator input required – often reducing or eliminating the need for additional physical or virtual resources.

Voxer's cloud needs: transparency into all critical processes

Voxer's social networking application, Voxer, turns a phone into a walkie-talkie. This application soared in the charts in a matter of weeks to become the most popular app in its category on both the Apple App Store and the Android Market.

When Voxer's user base grew 10X over the course of a month, their Linux-based storage system could not handle the load. At peak times, users had to wait for their messages to be downloaded. Voxer wanted to improve performance but felt that they could not easily do this with standard cloud computing offerings or managed hardware hosting. Their cloud requirements included:

1. **Performance.** It was important to minimize user wait times as the application read voice messages stored in the Riak database and transmitted them to the handset.
2. **Complete transparency into all critical processes.** Voxer's back-end software is written entirely in Node.js, which can be challenging to understand and operate in production and at scale. The company wanted visibility into everything from low-level CPU and disk processes to database queries to web application servers and HTTP operations.

ModCloth's cloud needs: Performance, visibility, ability to make fast changes

Founded in 2002 by high school sweethearts Eric Koger and Susan Gregg Koger, ModCloth.com is an online retailer specializing in vintage-inspired women's fashion and decor. Stellar performance of this ecommerce website has always been a business imperative since the ecommerce market is so saturated that customers can easily make their purchases elsewhere.

Although performance was the primary consideration in choosing the cloud provider, others included:

1. **Visibility into the infrastructure.** The Kogers wanted this as a way of solving performance issues that might severely impact the business as well as for making sure they were building applications in the best way to deliver performance.
2. **Extreme agility.** ModCloth needed to be able to make changes quickly, both to take advantage of new opportunities and to respond to customers' changing behaviors.

The Joyent advantage

Each of the companies profiled here found Joyent to be the best cloud solution for their needs. Here's why:

"In Social Games, you either manage your infrastructure or it will manage you, and no other provider did more to truly roll up their sleeves and understand our needs than Joyent."

- Jason Loia
COO, Digital Chocolate

Outstanding performance

Performance was a consideration for all four companies. Several, in fact, knew their business model would be doomed if their sites didn't perform rapidly and reliably. In each company's case, Joyent is delivering the high-level performance they need, in part due to Joyent's commitment to deploying top-notch hardware (all Nehalem / Westmere Xeon processors, 15k rpm hard disks).

Sutherland, of Quizlet, appreciates that his site is running on fresh hardware. "We are on much faster hardware [compared to previous provider, Slicehost] and we think that's awesome," he said. His other performance-related concern, 100% reliability, is also assured with Joyent.

According to Sutherland, his site has not experienced any significant outages or downtime to date on the Joyent Cloud. He also loves the ZFS file system, deployed exclusively on the Joyent Cloud. It provides real-time copy-on-write protection and pervasive and consistent checksums to guard against data degradation and "bit rot." "It makes us more confident that we are never going to lose data," he added.

ModCloth has seen excellent I/O performance and no degradation of application performance since shifting from bare metal infrastructure to Joyent Cloud. "I don't think we've ever run into an I/O bottleneck with Joyent," said Blake Irvin, the company's Systems Engineering Manager.

Jason Loia, COO at Digital Chocolate, appreciates that the Joyent cloud extends performance by allowing applications to instantly and automatically burst into large CPU pools at no charge. Each Joyent SmartMachine can burst up to 400% instantly to handle large spikes in usage or traffic.

Superior analytics tools

This was a key consideration for Quizlet because its operations and development teams wanted to be able to troubleshoot latencies and tune apps for high-speed page delivery.

The company uses Joyent Cloud Analytics to quickly identify sources of latency buried deep in the compute stack. For example, Sutherland's team discovered that the application was performing too many PHP calls because of an obscure code problem related to resolving paths in "require once." Explained Sutherland, "We refactored our code and noticeably sped up our site."

Transparency into the cloud infrastructure

"One of the unexpected advantages of going with Joyent is that Joyent is totally transparent with us as an engineering group. It's easy to talk directly to engineers if that's necessary," said Irvin, of ModCloth. "That means solving performance issues quickly,

“Our big reason for running on Joyent Cloud is the availability of Cloud Analytics and DTrace. Why are the disk drives slow? Why is our performance bad? Where is the memory leak in our Node.js program? You use DTrace to answer these questions. The end result is the app runs faster, we need to spend less time debugging weird problems, and ultimately we need to buy fewer machines.”

- Matt Ranney
CTO, Voxer

“Every additional second of latency can translate into a 10% or 20% hit to your conversion rate... milliseconds really, really matter.”

- Blake Irvin
Systems Engineering Manager,
ModCloth

because Irvin’s team knows where to look. “Joyent’s support team is very good about letting us know what is the root cause of an issue,” he added.

Voxer uses the dynamic tracing framework, DTrace, to achieve CPU profiling for Node.js applications to view the entire application stack to spot “hot” functions. This affords Voxer critical insights on where the CPU is allocating compute resources and, by extension, what parts of an application stack are impacting performance and user experience. The company also gains granular insights into lower-level processes that greatly impact application performance such as disk I/O, file system latency, and network I/O. Because Voxer can run DTrace and Joyent Cloud Analytics, the company gleans extremely detailed application activity information and gains transparency into how much compute resources each process is using.

Trusted partnership and responsive support

Joyent’s “white-glove” support sometimes surprises smaller startup customers such as Quizlet. “The support team is fast to respond and they know what they are talking about. With Joyent, there have been many times where we’ve been on the phone with support teams who have been able to help us figure out the main steps we need to do to scale our applications,” said Sutherland.

Larger companies value Joyent’s support as well. “We have unique needs in almost every aspect of our business – from pricing to SLAs to environments to inter-team communications – but Joyent stood by its commitments and responded to our needs every step of the way,” said Loia of Digital Chocolate. “They truly want to understand our business, and they’re always willing to try a new approach if it looks like it will benefit both sides.”

Agility and ease of use

ModCloth finds it fast and easy to change up infrastructure in Joyent Cloud, adding new SmartMachines and new disk or memory resources as its business requires. “Because SmartOS is not running on a hypervisor, the provisioning time is ridiculously fast. It’s well under a minute, which is about 10 times faster than I’m used to,” Irvin said.

Joyent Cloud also manages SSH keys in a straightforward way that makes it simple for administrators to securely sign in and make changes to their environment, including provisioning new hosts to meet rising workloads or dialing down unneeded resources to save money. “It’s the best of any vendor I’ve seen. You upload your public key to the account and your key is just there for the admin and users,” Irvin said. “It’s a much simpler way of managing key-based authentication.”

Cost savings of up to 50%

ModCloth was able to save money on Joyent Cloud by running resources at high utilization rates – up to 80% – without resource contention or performance slowdowns.

Joyent's cost-effectiveness has completely changed Digital Chocolate's cost structure. The company has experienced a 50% reduction in infrastructure costs since switching to Joyent, dramatically improving the profitability of each of the company's games. With lower overhead and the ability to project its infrastructure costs each month, the company is now in a much healthier position for sustainable growth.

Takeaway

Joyent is a modern high-performance cloud infrastructure company for today's real-time web and mobile applications. As these companies' examples show, our infrastructure-as-a-service (IaaS) offering delivers the superior performance and scaling that enable developers, architects, and business owners to create real-time online and mobile applications that exceed customers' expectations.

To learn more about how Joyent helps innovative companies increase performance, deliver exceptional customer experiences, and reduce costs, visit us at

www.joyent.com.