DocuSign®

The Global Standard for Digital Transaction Management®

CASE STUDY

DocuSign® and SanDisk®: Eliminating Paper—One Digital Signature at a Time

Solution Focus

- Online transaction processing (OLTP) database
- Information on demand
- Consistent Quality of Service (QoS)

Summary of Benefits

- 47% improvement in system performance
- Replaced seven SANs with 20 Fusion ioMemory PCIe cards
- 2X improvement in latency
- 4X improvement in system availability

"We are huge fans of Fusion ioMemory PCIe application accelerators. The product has transformed our lives and we're excited to tell the story because it's allowed us to do something for our customers that has really grown our business."

Grant Peterson,
Chief Technology Officer, DocuSign

Summary

Experiencing three-fold growth each year is a great story for any company. For DocuSign—whose mission is to empower anyone to transact anything, anytime, anywhere, on any device, securely—this growth is both exciting and challenging. With hundreds of thousands of users hitting its web-based application daily, the company's SAN architecture was slowing the I/O to a crawl. However, by deploying Fusion ioMemory™ PCIe application accelerators from SanDisk, DocuSign was able to deliver thousands of IOPS, improve system performance by 47%, and continue to delight their customers.

Background

DocuSign has emerged as the global standard for Digital Transaction Management (DTM), a category of Software-as-a-Service designed to help organizations securely manage document-based transactions 100 percent digitally. DocuSign helps companies go fully digital to achieve dramatic ROI, increased security and compliance, and better end-user experiences.

DocuSign boasts more than 100,000 customers and 50 million users in 188 countries—with 50,000 new unique users joining The DocuSign Global Trust Network everyday. Ten of the top 15 U.S. financial companies and 13 of the top 15 U.S. insurance companies use DocuSign as their trusted Digital Transaction Management (DTM) provider.

"Our business has tripled every year in terms of transaction volumes and has expanded into the Fortune 500," said Grant Peterson, Chief Technology Officer at DocuSign. "Hundreds of thousands of unique visitors are coming to the site, for the first time, every day. The Company is now executing more than 13 billion pages per day. However, this rapid growth is both an asset and a challenge."

DocuSign has an ambitious mission: to eliminate paper. Across the world, people have traditionally solved problems of all sorts by signing paper or executing a paper-based transaction. DocuSign would like to make all of that paper electronic.

DocuSign's business transaction volume is tripling every year, while its customer base more than doubles every year. In addition, the Company has expanded into a number of industries, including real estate, financial services, government, healthcare, and pharmaceuticals. "I've been with DocuSign since 2007 and it is a really exciting company," commented Peterson. "Every business is looking for ways to eliminate their paper problem, to complete transactions quickly, to eliminate errors, and ultimately, to accelerate their business processes, while also improving their customers' satisfaction. Happier customers and faster business processes have resulted in huge growth for DocuSign."

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"Fusion ioMemory PCIe application accelerators have made our customers more successful. This product has made our service more reliable and allowed us to be up—always. That has made the difference that's allowed me to win the 500 biggest companies in the world, and to be a global business that really delights customers."

Grant Peterson,
Chief Technology Officer, DocuSign

"Fusion ioMemory delivered on the capacity front, moving us from a tens-of-thousands-of-IOPS world to a hundreds-of-thousands-of-IOPS world. Where it really surprised us was the performance front. Overall our entire application got 47% faster due to the move to Fusion ioMemory PCIe application accelerators."

Eric Fleischman, Chief Architect and VP, Platform Engineering, DocuSign

As DocuSign has erupted from being a largely U.S.-based business to being ubiquitous across the globe, keeping up with the scalability and the demands of 24x7 services has become more difficult. "By 2012, the business had actually gotten pretty big. Our transactions were hundreds of thousands per day," explained Peterson. "We now have tens of thousands of companies across the globe that trust us with their business, and that means that the site needs to perform. It needs to be available, because our customers count on us to make their customers' experience delightful. Although we have had the good fortune to grow really fast, tripling our transaction volume and our customer base is also a giant challenge."

The Challenge

In 2012, during peak times, transaction speeds were five or six times slower than what was typical. "That really got our attention," said Peterson. "We had a reasonably small transaction database—around ten terabytes. And we needed this kind of I/O. And our SAN just was unable to give us that."

At the beginning of 2013, the technology team at DocuSign acknowledged the trend of transaction growth that was happening as the business tripled, year over year. Looking at their systems holistically through that lens of tremendous growth, the team assessed the ability of the existing system to keep up with the transaction growth that the business was experiencing. "We were looking at a system that could do tens of thousands of IOPS, but we knew that to really thrive over the next couple of years, we needed to transition the conversation from tens of thousands of IOPS to hundreds-of-thousands of IOPS," said Eric Fleischman, Chief Architect and VP of Platform Engineering at DocuSign.

"We were running slow on I/O," added Peterson. "We were very aware that in order to scale we had to create horizontal growth, in terms of additional instances of DocuSign, as well as grow vertically. We had gotten to a point where we were looking for 50,000 IOPS potential for any given instance." Although DocuSign needed to change the way they replicated data and the way they stored data in Microsoft® SQL server, the immediate need was to deliver the needed IOPS to the application.

The team went on an extensive search for an alternative to the traditional, active/passive database and the traditional SAN-based fiber infrastructure. They discovered that there were very few products or approaches they could deploy to directly address the problem. They considered expanding their SAN footprint significantly by adding hard disk drives (HDDs), and they looked at other options, such as scale-up SAN or scale-out storage infrastructure. However, such solutions would have required a huge data center expansion with a large number of HDDs spread across many racks. "As we looked at cubing that infrastructure, year over year, and continuing to triple our system, that math just looked prohibitive to us," explained Fleischman. "It looked very challenging, and it looked environmentally unfriendly. It was both expensive and operationally not feasible. We looked at a variety of different products and approaches to get there, and ultimately, they fell short in pushing the system forward and delivering these large numbers of IOPS that we needed to feed the application, and to keep our business growth happening. That's when we came across Fusion ioMemory PCIe application accelerators."

"As a global company, we want to earn and deserve the most valuable and important transactions that our customers need to process," added Peterson. "And to do that, we need to always be up; we have to be available. We need to be able to do that transaction when they need it done. There is never a good time to take a site offline. Ultimately, our new architecture and Fusion ioMemory PCIe cards play the role of allowing us never to take a site offline, while keeping everything very secure and efficient."

"A single Fusion ioMemory PCIe card could deliver more IOPS than our entire SAN infrastructure put together. We had an incredible scalability story. We have the ability to plug more and more cards into more and more servers to scale this infrastructure out, and continue to deliver incredible numbers of IOPS and incredible performance to our users."

Eric Fleischman, Chief Architect and VP, Platform Engineering, DocuSign

"I know everybody probably says they love a product. This product saved my job. This product made our customers substantially happier. This product made it possible for me to scale our business to be always on, and to give our customers a better overall performing experience. To do that, while also taking a much more responsible environmental position and saving money, is amazing."

Grant Peterson,
Chief Technology Officer, DocuSign

The Solution

The DocuSign team chose Fusion ioMemory™ SX300 PCIe application accelerators because of the potential for additional IOPS. However, what surprised them was the application performance improvement—as much as 47% faster. "We looked at and selected Fusion ioMemory SX300 PCIe cards because of the throughput—this ability to have hundreds of thousands of IOPS both for reading and for writing data," said Fleischman. "We knew that the bet was a big one, that we needed to holistically move our OLTP databases on to this product. We wanted all of the IOPS that we could get for our application. Where it really exceeded our expectations was in the phenomenal performance. We experienced a 47% improvement in our application's end-to-end experience."

The team was also impressed with the density of the Fusion ioMemory PCIe cards. "A single Fusion ioMemory PCIe card could deliver more IOPS than our entire SAN infrastructure put together," said Fleischman. "We had an incredible scalability story. We have the ability to plug more and more cards into more and more servers to scale this infrastructure out, and continue to deliver incredible numbers of IOPS and incredible performance to our users."

"We really care about the environment," emphasized Peterson. "We could've grown our SAN to meet our needs, but our data center footprint would have been outrageous. We're a company that's trying to eliminate paper—that's our mission. Having tons of SAN HDDs replicated across our environments— burning power, rack space, and physical resources—was a nonstarter for us. Besides the fact that it would've been very difficult to scale more than a few years on those kinds of media, we really love the improvements that we've realized, in terms of our overall environmental approach."

DocuSign replaced seven production SANs with 20 Fusion ioMemory PCIe cards and moved their OLTP storage infrastructure onto the 20 cards. The team is now able to deliver more IOPS from two Fusion ioMemory PCIe cards than could be delivered by the entire SAN infrastructure, with the remaining cards delivering additional capacity and performance for their users. "We went from having one out of four of our database resources available to all of them available," said Peterson. "We went from having a daily challenge to get 50,000 IOPS out of a site to an infinite amount of I/O just based on how many cards we might like to put in. Ultimately, it made it possible to shift our focus away from scaling our product and on to delighting our customers."

The Result

Although DocuSign attempted to migrate to the new Fusion ioMemory PCIe card architecture undetected, customers noticed immediately. "When we did the cut over from our old, HDD-based infrastructure onto the Fusion ioMemory PCIe application accelerators, we had customers contact us, unsolicited, to understand what exactly we changed that made the system so much faster," said Fleischman. "Their customers were getting through the signing experience in half the time they used to, and they wanted to understand what changes we had made to the system to deliver this incredible performance win for them. It was a phenomenal experience for our users who are signing documents on a day-to-day basis."

The team no longer has to fight every day to keep transactions under two seconds. Beginning on the day that DocuSign implemented the new architecture with Fusion ioMemory PCIe cards, transaction times dropped from more than two seconds to under one second. "Our customers were delighted. We tried awfully hard to do this in a way that they wouldn't notice anything. But I was delighted that what they noticed was that things were twice as fast," commented Peterson.

Now that the team no longer needs to continuously focus on IOPS, they can spend more time on infrastructure strategy and application functionality. "IOPS was what we thought about when making significant database changes, when scaling the site. We don't even do the math on IOPS anymore," said Fleischman. "We are thinking about how to scale our application holistically around this incredible capability that Fusion ioMemory PCIe cards provide. We're also thinking about other ways that we can use it."

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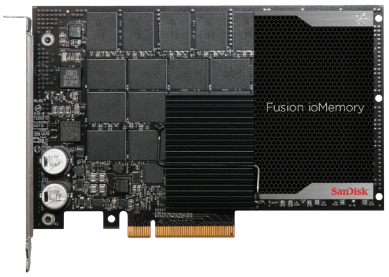

Fusion ioMemory™ SX300 6.4TB* Application Accelerator

"The amount of trust that our customers have in us has gone up substantially under the new architecture," added Peterson. "Before Fusion ioMemory SX300 PCIe cards, it was a daily focus to make sure that the site was available, that the site was performing, and that our customers basically came to it with confidence. After implementing the new architecture, it's automatic and our customers don't even think about it, and that is a huge win."

Fundamentally, the deployment of Fusion ioMemory PCIe application accelerators has transformed the DocuSign system. It has enabled the company to reliably perform transactions 24x7, 365 days per year. The team credits this transformation with winning the largest companies in the world, and their customers and users.

"I really wanted the opportunity to tell the story about the Fusion ioMemory SX300 PCIe application accelerator," said Peterson. "We are so excited about this product, not just because it solved a big challenge for us, but also because it allowed us to give our customers a much better experience. And it allows us to tell the story about becoming an always-on global company—a company that can scale with, and be available to, our customers into the future."

Outlook

DocuSign perceives its future to be one where every transaction that can be done digitally, is indeed executed digitally. The company's mission is to eliminate paper, a medium that everyone worldwide interacts with at some point. "The opportunity is immense, and the change that it can drive in the world is also immense," said Peterson. "It seems a simple thing, but being able to accelerate, and make more accurate, and make more efficient the process of doing transactions globally is world-changing. Our future really is eliminating the pen and replacing it with something far more reliable, far more efficient, and far more trustworthy."

"Fusion ioMemory PCIe cards have provided us with another tool in our toolbox that we can use to apply to I/O-intensive challenges. We can apply this approach, this methodology, and this specific technology to a broader array of problems in our infrastructure to scale them, much in the same way that our database has been scaled," explained Fleischman. "We have complete confidence that SanDisk's Fusion ioMemory PCIe products will continue to scale with us and grow with us going forward. When we first selected the Fusion ioMemory PCIe products, we were using 3TB cards. Since then, the product line has expanded. We now use the 6.4TB cards, and the cards continue to grow with us. As we grow, these cards continue to get larger, delivering increasing amounts of performance and scalability for our environment."

Partnership

DocuSign understands that having solid partnerships, such as the one with SanDisk, is critical to achieving their stated mission. "It's absolutely critical to that mission that we have amazing partners like SanDisk, and incredible technology like Fusion ioMemory PCIe cards," added Peterson. "I sleep a lot better at night knowing that I can scale to meet the challenge."

The partnership between SanDisk and DocuSign has been a positive experience for both companies. "Working with SanDisk has been a really great experience," said Peterson. "We had a huge challenge, with a lot of concern and fear going into that challenge. Having an amazing partner and an amazing product to work with, and having the level of support necessary to really get through that kind of a major change has been critical to DocuSign's successful future."

"DocuSign has done a great job of taking customer feedback and implementing an increasingly better product," said Shannon Heward, Senior Contracts Specialist at SanDisk. "We are excited for the partnership we have developed with DocuSign and, as we continue to expand use cases, we are grateful for their steadfast support."

"We're excited to conquer that world and get the pen out of everyone's hand, and have them use DocuSign instead," concluded Peterson. "It is incredible to have partners like SanDisk and products like Fusion ioMemory PCIe application accelerators to help the world go fully digital. We really need this kind of technology."

* 1 GB = 1,000,000,000 bytes. Actual user capacity less.

The performance results discussed herein are based on internal DocuSign testing and use of Fusion ioMemory products. Results and performance may vary according to configurations and systems, including drive capacity, system architecture and applications.

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