Simulated case study: 15G Dell PowerEdge AMD processor-based servers

Note: This case study is a fictional document, featuring fictional companies Mathis Analytics and SkyMe Airlines. Principled Technologies (PT) has created this document to give a hypothetical example of the kind of company that might benefit from AMD processor-based Dell PowerEdge servers. While Mathis Analytics is fictional, the infrastructure decisions they tackle are real ones that many organizations face. You can read a PT test report featuring those servers at https://facts.pt/Axmmz8G.

Mathis Analytics: Increasing analytics capabilities for a game-changing client

> "This opportunity challenged us to grow in so many ways. We stretched as a team while making a huge investment into our tech infrastructure, which will set us up for success on a critical project."
> – Amanda Chamberlain, Co-Founder and CEO

Since the founding of Mathis Analytics in 2017, their client base has grown steadily, as have their software development and IT teams. Their high-end analytics software employs proprietary algorithms to reduce the impact of unintended bias in a wide range of industries, including retail, safety and security, and healthcare. Jordan Lee, IT manager at Mathis Analytics, was settling in with his coffee one morning when he received an unexpected email from two of the company's co-founders, Amanda Chamberlain and Frederick "Randy" Randall. The brief email alerted Jordan that Mathis would soon receive an RFP from SkyMe Airlines for a proof-of-concept analytics deployment.

SkyMe Airlines, a growing boutique airline, would be their first client in the travel industry, potentially opening doors to the lucrative hospitality business. This was the single largest sales opportunity in the short history of Mathis Analytics.

The co-founders contacted Jordan because the challenge Mathis Analytics now faced ran deeper than winning a sale. The leadership and IT teams had to decide how to prepare for growth: Would they temporarily move their dev ops and some on-prem analytics processing operations to the public cloud, add new servers to their legacy data center, or completely revise their infrastructure strategy?

About Mathis Analytics

Amanda Chamberlain, Frederick Randall, and Dr. Imani Kanumba started Mathis Analytics to combat unintended bias in algorithms and deliver "better analytics, faster" to their customers.

Since the beginning, each founder has brought their own strengths to the partnership. As the public-facing head of the company, Amanda spearheads strategic business initiatives and focuses on new offerings. With start-up experience, Randy leads all financial and operational functions, advises Amanda, and manages investor relations. And Dr. Kanumba, who started at Stanford at age 16 and graduated with a doctorate in software engineering at 21, oversees all aspects of the company's software development efforts. Not only did she write most of the proprietary code at the core of the company's current products, but she also developed Poof, an internal tool based on a distributed NoSQL query engine (MongoDB) for analyzing data. Dr. Kanumba's dissertation on bias-free analytics caught Amanda's attention and was one of the sparks that led to Mathis Analytics.

Julia MacDonald helped get Mathis Analytics off the ground as the CIO and IT Manager, a title she passed on to Jordan Lee when she decided to focus fully on her role as CIO. Jordan Lee, who joined Mathis Analytics in 2017 as a systems administrator, is now responsible for all IT operations and personnel.

Mathis Analytics has a large software development team and many patented anti-bias algorithms based on mixes of AI and traditional database approaches.

The challenge: Preparing for a critical client

SkyMe Airlines stipulated that Mathis Analytics must perform all data analysis onsite—the large sample data sets in the POC contained sensitive data and the airline couldn't risk a breach. This in itself wasn't anything out of the ordinary, as Mathis Analytics was already juggling many other ongoing projects with and without these types of requirements. They were handling most workloads on-prem already—running open-source MongoDB distributed database workloads across several VMs in an on-premises VMware vSAN™ management cluster consisting of 14 two-socket HPE ProLiant DL380 Gen9 servers, each powered by Intel® Xeon® E5-2699 v4 processors in a VMware® vSAN® environment. They utilized Amazon EKS with c5.12x instances in their hybrid cloud environment.

The first step in preparing to make a change was getting more precise about their needs. The IT team temporarily offloaded some workloads to the cloud—a few less critical applications and data analytics projects without stringent security compliance needs—while Daniel, Jordan, and Imani figured out how much overhead they needed for the new SkyMe POC. The IT team worked night and day for two weeks, moving workloads and reassigning hardware. After that, Daniel and Jordan better understood what they needed to set the new project up for success. Even with everything optimized, the old on-prem setup would not be able to do everything they wanted it to do. For the SkyMe POC, Daniel and Jordan agreed that Mathis would need a server cluster that provided throughput of at least 350K operations per second to hit their new performance targets; their current cluster of legacy HPE servers was handling less than 250K. The team knew that they'd have to make a change.

> "Our on-prem HPE ProLiant hardware could handle our current load, but it was six years old and operating at capacity. That's why investing in new hardware for this make-or-break project made sense to me."
> – Daniel Jackson, systems administrator

One of their first decisions was the extent to which they'd use public cloud resources. During the preliminary evaluation phase, Jordan forwarded this McKinsey article excerpt to his leadership group:

> "[The] thousands of applications a large enterprise might have built over the past three decades need remediation or re-architecting to run efficiently, securely, and resiliently in the cloud. In some cases, companies have found existing applications cost more to run in the cloud before remediation. Required investments often result in an unexciting ROI for cloud migration, at least for companies that have already aggressively optimized their on-premises infrastructure environment."[1]

This wasn't the only challenge with the cloud. Mathis had been supporting their old gear with Amazon Web Services (AWS) instances to alleviate performance pressure, but ongoing cloud costs were adding up. Additionally, balancing performance and cost on the cloud was getting increasingly difficult as they needed more and more expensive instances to stay competitive. With the new SkyMe project requiring more on-prem compute power, it was time for Mathis to look into a solution that could solve the need for more on-prem compute power and less reliance on the cloud.

Between these challenges and the requirements of the SkyMe POC, the group decided on a hybrid model, running the majority of their workloads on-prem and bursting to the cloud as necessary. They also planned to occasionally use the cloud for a test/dev environment, but the ultimate goal was to select an on-prem solution that could support all ongoing projects, reducing the need to plan for daily cloud expenditure. With this approach, the IT team would still be able to meet temporary processing capacity needs by bursting workloads to public cloud for short periods.

"On-prem" didn't much narrow down the field, however; there were hundreds of possible solutions to choose from. Though the existing servers were HPE, Daniel and Jordan wanted to take this opportunity to look at switching vendors.

In Daniel's previous role, he'd had good experiences working with Dell™ data center technologies. As part of his research, he found a Principled Technologies (PT) report and forwarded it to Jordan to read before they proposed anything to the co-founders.[2] The PT report tackled the question of where companies should run their applications and contained information about worthwhile Dell solutions for hybrid cloud and private cloud environments. It covered research on a variety of options from Dell, including:

- The Dell APEX portfolio
- APEX Cloud Services with VMware Cloud from Dell
- APEX Private Cloud and APEX Hybrid Cloud
- VMware Cloud Foundation on VxRail™

Each of these options had advantages and disadvantages for Mathis. The monthly pricing of the APEX solutions were interesting to Randy, and those on the team more interested in growing their hybrid cloud approach liked the idea of exploring VMware Cloud Foundation. But given the requirements of the SkyMe POC—specifically the need for all work to occur on-prem—Daniel and Jordan preferred to build a robust on-prem infrastructure they would manage themselves.

The next step, then, was what servers to choose. The paper also included hands-on test results on a PowerEdge™ server cluster consisting of four two-socket Dell PowerEdge R7525 rack servers, each powered by two 3rd Gen AMD EPYC™ 7763 processors using a VMware Advanced NSX® Load Balancer in a VMware vSphere® 7U2 Tanzu™ environment. It was these results that most interested Daniel and Jordan.

Throughput was one critical metric for everyday work at Mathis. Daniel and Jordan agreed that their new performance target would be at least 350K operations per second. Per Principled Technologies testing, a legacy cluster like the one Mathis Analytics was using would see less than 250K operations per second on a containerized MongoDB workload—results that Jordan and Daniel found on par with what they were experiencing—but the PowerEdge R7525 solution delivered over 390K operations per second.[3] This Dell PowerEdge solution could also support twice as many application interface VMs.[4] And while they'd already decided to minimize cloud usage, the PT report also supported that decision: According to PT testing, compared to a cluster of c5.12x AWS instances, the new PowerEdge R7525 servers could complete a machine learning training task faster and deliver more bytes per second.[5]

Daniel and Jordan felt they had found their on-prem match. They presented their argument to switch to Dell PowerEdge servers.

What Mathis Analytics can expect from upgrading to Dell PowerEdge R7525 rack servers

After long hours of research and talks with the leadership team, Daniel and Jordan landed on the Dell PowerEdge R7525 server as a POC of their own. If the Dell PowerEdge R7525 cluster performed as well as it did in the Principled Technologies study, Mathis would be investing in more of the servers for the second stage of the on-prem infrastructure overhaul. Here's the excerpt from the Principled Technologies report that convinced them:

> "The on-premises Tanzu cluster of Dell PowerEdge R7525 rack servers powered by 3rd Gen AMD EPYC 7763 processors…achieved 63.2% greater throughput + supported twice as many application interface VMs vs. on-premises cluster of 6-year-old HPE ProLiant DL380 Gen9 servers on a MongoDB workload. [It also] completed a machine learning training task in 30% less time + Delivered 43% more bytes per second vs. a cluster of c5.12x Amazon Web Services (AWS) public cloud instances."

Click here to read the report yourself: https://facts.pt/Axmmz8G

About Dell PowerEdge R7525 rack servers

The Dell PowerEdge R7525 Principled Technologies tested featured two AMD EPYC 7763 processors that contained 32 cores each. According to Dell Technologies, this server also boasts the following:

- Up to 24 NVMe direct connections
- 32 DDR4 RDIMM or LRDIMM memory module slots
- Automated server life cycle management
- Security features such as AMD Secure Memory Encryption (SME) and Secure Encrypted Virtualization (SEV)

To learn more, visit https://www.dell.com/en-us/work/shop/povw/poweredge-r7525.

What's next for Mathis Analytics?

At the time of this publication, Mathis Analytics still needed to deliver insights on the sample data SkyMe Airlines provided. The Mathis Analytics leadership team was aware the company might lose money on this project but proceeded in hopes of securing a reference account that would open the door to lucrative future projects.

> "I'm excited about the advantages the PowerEdge servers and VMware NSX Advanced Load Balancer have brought to this project." – Jordan Lee, IT Manager

Now that the SkyMe Airlines POC is in full swing, and the Dell PowerEdge R7525 cluster is performing as well as the Principled Technologies report suggested it would, Mathis Analytics is putting in an order for more Dell PowerEdge R7525 rack servers powered by AMD EPYC 7763 processors. It's the first step in implementing a hybrid dev/test environment that is both efficient and secure, keeping sensitive data safe both in flight and at rest. In preparation for future new offerings and the anticipated boom in new business, Jordan will, among other things, check the Principled Technologies website regularly for relevant studies. He will also keep in touch with their team's Dell representative to stay on top of all the new and evolving technologies that can help Mathis Analytics meet and surpass their business goals.

---

1. "How CIOs and CTOs can accelerate digital transformations through cloud platforms," accessed March 28, 2022, https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/how-cios-and-ctos-can-accelerate-digital-transformations-through-cloud-platforms.
2. Principled Technologies, "Enjoy the convenience and flexibility of cloud without sacrificing security or latency by using hybrid on-premises solutions based on Dell servers," accessed April 25, 2022, https://www.principledtechnologies.com/Dell/On-prem-PowerEdge-R7525-vs-cloud-and-legacy-0422.pdf.
3. Principled Technologies, "Enjoy the convenience and flexibility of cloud without sacrificing security or latency by using hybrid on-premises solutions based on Dell servers."
4. Principled Technologies, "Enjoy the convenience and flexibility of cloud without sacrificing security or latency by using hybrid on-premises solutions based on Dell servers."
5. Principled Technologies, "Enjoy the convenience and flexibility of cloud without sacrificing security or latency by using hybrid on-premises solutions based on Dell servers."

This project was commissioned by Dell Technologies.

PT Principled Technologies®

Facts matter.®