



Amadeus Improves Performance/Price by up to 47% with Ampere

SNAPSHOT

Organization: Amadeus is a leading global travel IT company powering the travel and tourism industry with technology solutions that connect travelers to hotels, travel agencies, airlines, airports, and more.

Challenge: Amadeus began evaluating Arm-based processors as part of the company's newly formed partnership with Microsoft and a mutual goal of innovating the travel IT industry. The need for a sustainable, scalable platform that would lower cost and provide better performance per rack led the company to begin a multi-year journey to migrate part of its on-prem resources to Ampere Azure platforms.

Solution: Porting to Ampere Cloud Native Processors will allow Amadeus to realize its goals for improving performance without increasing cost, delivering fast and predictable response times, improving scalability, and aiding in efforts to reduce carbon emissions and energy consumption.

Results: Amadeus's internal benchmarking against x86 processors returned significant results, including a 47% better performance/price ratio over Intel Ice Lake and 37% improvement over AMD Milan—while maintaining transaction response time in a defined range.

As a leading global travel IT company, Amadeus provides online experiences for every step of a traveler's journey—from inspiration to shopping and booking to departure control. Their solutions include shopping services to search and price flights for travel agencies and online travel booking companies such as Kayak and Expedia.

Searching for suitable flights with available seats across many airlines is surprisingly difficult, and delivering the optimal experience requires large scale distributed systems that require massive processing power.

Until now, Amadeus has been operating thousands of machines in multiple on-prem facilities worldwide and running workloads with multiple cloud providers. The partnership with Azure and the deployment of Azure Ampere platforms have allowed Amadeus to consolidate its operations, improve performance/price, and support the company's mission to make travel a force for social and environmental good.

“We have some very computationally expensive processes to support our shopping services. We are always looking for ways to optimize the cost of running this service, while providing good performance and low latency for processing thousands of complex transactions per second,” stated Didier Spezia, Cloud Architect at Amadeus. “The Azure Ampere platform gave us the performance we needed while reducing our costs through lower power consumption and higher performance per rack.”

Amadeus's deployment of Ampere Azure platforms is—to date—considered one of the most ambitious migration projects to Azure in Europe.

OPTIMUM PERFORMANCE/PRICE RATIO WITH 20% HIGHER THROUGHPUT

The Amadeus shopping application must process thousands of transactions per second—and each transaction is complex and computationally expensive. Initially, deploying on-prem gave Amadeus the ability to optimize hardware and infrastructure specifically for compute intensive workloads—a capability they lost when data moved to the cloud.

As they began to outgrow their on-prem and distributed cloud ecosystem, the team at Amadeus sought to identify general computing VMs optimized for throughput-oriented workloads.

“We were interested in optimizing the performance and lowering the costs of our solution in the cloud while still maintaining good latencies and acceptable response times,” Spezia said. “We were also considering the impact on our carbon footprint and wanted to find a solution that would improve both performance and efficiency.”

In 2021, Amadeus embarked on a multi-year journey to migrate most of its on-prem resources to Microsoft Azure. When they had to choose between Azure platforms powered by x86 or Cloud Native Processors, the company outlined its priorities—they needed to maintain good latencies while processing many concurrent transactions in a cost-effective manner.

While Arm-based machines appeared to be a good match, they needed to validate with benchmarks of their own. They started by running a number of synthetic benchmarks and even developed their own benchmarks using real application code.

The results were positive—up to 47% better performance/price and up to 20% higher throughput. Given these benchmarks, Amadeus realized they could meet all their performance, cost, and efficiency goals by migrating to Azure with the Dp series of VMs offering Ampere Altra CPUs.

A NEW ARCHITECTURE OPENS DOORS FOR DEVELOPMENT

When the team at Amadeus started looking for a cloud computing solution, they weren't looking to change CPU architecture, they just wanted to deliver the best possible end-user experience for their customers.

“We introduced a different architecture because of the benefits we anticipated from Cloud Native Processors.” Spezia said. “We were very interested in the performance to price ratio we could get from this new architecture and the ability to run workloads on the CPUs best suited for that workload.”

The flexibility of the Ampere Altra family of processors allowed the team at Amadeus to put a couple of machines on prem and continue to implement Continuous Integration/Continuous Delivery (CI/CD) development to build their code using an Arm compatible compiler.

The capability to run Ampere CPUs on prem was instrumental to focus on the application migration itself, rather than the setup of complicated CI/CD pipelines in the cloud. This way, Amadeus was in position to test with relevant software as soon as the Azure Ampere VMs were available. The on-prem machines continue to run Amadeus CI/CD development efforts today.

“Since we are in the middle of a migration to the public cloud and very much in the hybrid model with a complex ecosystem, we appreciated the flexibility to deploy some machines on-prem, with the same CPU architecture as the VM delivered in Azure by Microsoft,” said Spezia. “Although running a CI/CD based only on cross-compilation is possible, it's faster and safer to use machines running the target architecture.”

A SMOOTH PORTING JOURNEY

The journey to migrate from on-premises and hybrid computing to Azure is a major undertaking for the team at Amadeus. Although they began the shift by porting shopping services workloads onto Ampere Azure, the company has plans to migrate all Amadeus workloads to Azure in the coming months and years.

“We’ve had a strong collaboration in general across Azure and Amadeus,” Spezia said. “This collaboration has resulted in the adoption of an important piece of infrastructure and the ability to design in efficiencies, optimize performance/price for our workload, and limit our carbon footprint.”

In just one year, Amadeus has ported enough components to move beyond benchmarking to run the full application in a controlled environment. Once they have completed integration tests and validation, the ramp-up to the production environment in multiple Azure regions will begin.

“Porting the C++ source code itself went well, with very few problems in practice,” according to Spezia. “The open-source 3rd party dependencies were already supported. The good integration with Red-Hat OpenShift and the capability to mix different CPU architectures in the same Kubernetes cluster allowed for an incremental deployment.”

BEST PERFORMANCE/PRICE AND SUSTAINABILITY FOR AMADEUS

Amadeus internal testing results concluded that Azure VMs with Ampere CPUs sustain more throughput with acceptable latencies in compute intensive environments and deliver the best performance to price ratio. As a bonus, Amadeus reports that the adoption of Cloud Native Processors has proven to be more energy efficient than Intel and AMD x86 processors for their use case—helping Amadeus in its ongoing efforts to make a lower carbon footprint a reality.

“The Ampere Altra CPU offers a high number of full cores per CPU (no SMT), which are directly mapped to Azure VM vCPUs. Provided all those cores are kept busy, it contributes to the stability of the latency at high throughput.” stated Spezia.

Synthetic benchmarking delivered significant throughput and performance to price ratio results when compared to Intel and AMD x86 processors:

- 13% to 20% better raw throughput
- 27% to 50% better performance/price ratio (Numbers based on public prices, March 2022, West-Europe region, RI on 3 years)

Real application benchmarking resulted in even greater 37% to 47% performance/price ratio improvements over the x86 processors.

“For multi-threaded/multi-process workloads, Azure VMs with Ampere CPUs can sustain more throughput while keeping acceptable latencies. The CPU can be used more intensively before the response time degrades significantly,” concluded Spezia.

About Ampere

Built for sustainable cloud computing, Ampere Computing’s Cloud Native Processors feature a single-threaded, multiple core design that’s scalable, powerful, and efficient.

[Learn more](#)

See our solutions for a variety of demanding workloads:
<https://amperecomputing.com/solutions>

Visit our Developer Center:
<https://amperecomputing.com/developers>

Disclaimer

All data and information contained in or disclosed by this document are for informational purposes only and are subject to change.

This document is not to be used, copied, or reproduced in its entirety, or presented to others without the express written permission of Ampere®.

© 2023 Ampere® Computing LLC. All rights reserved. Ampere®, Ampere® Computing, Altra and the Ampere® logo are all trademarks of Ampere® Computing LLC or its affiliates. Other company or product names used in this publication are for identification purposes only and may be trademarks of their respective companies.