



SHADOW DELIVERS HIGH-END PCS VIA THE CLOUD WITH THE POWER OF AMD EPYC™ CPUS

Core density, high frequency and fast memory enable desktop-like remote performance from AMD EPYC processors.

AMD
EPYC

©CAPCOM CO., LTD 2016, 2020
All rights reserved

CUSTOMER

shadow

INDUSTRY

Cloud services

CHALLENGES

Deliver performance like a high-end gaming PC, professional desktop, laptop, or smartphone via streaming from the cloud

SOLUTION

Deploy data center servers powered by AMD EPYC™ processors

RESULTS

About 65 percent faster performance than previous solution, comparable to the target high-end gaming PC

AMD TECHNOLOGY AT A GLANCE

3rd Gen AMD EPYC™ CPUs

TECHNOLOGY PARTNER



Streaming games over the Internet has been a technology industry dream for a couple of decades. But making cloud gaming provide performance comparable to a standalone PC or console has proven complicated. Most mainstream users were skeptical it would ever be possible. Nevertheless, this was the mission France-based Shadow set for itself – to provide a high-end PC experience via the cloud. AMD EPYC™ processors gave Shadow the performance and features it needed to make the dream of “It’s your PC, in the cloud” a reality.

Streaming a full PC

“The concept behind Shadow is to provide a way for everyone to access a high-end computer in the cloud, from any Internet-connected device, whether it’s a desktop, laptop or smartphone,” says Yannis Weinbach, Director of the Consumer Business Unit at Shadow. “The idea started in 2015. We thought about targeting gamers first because if you can convince the most demanding users, you can convince everyone.”

“The key challenge was that even the tech audience believed it wasn’t possible,” continues Weinbach. “All the companies who tried to do cloud gaming before 2015 encountered many issues with the hardware and network not being ready. It was also not possible to get the best image quality due to hardware encoding and decoding capacity.”

“What we started with Shadow was also very ambitious because we didn’t just want to stream any PC, we wanted to stream a full PC,” says Weinbach. “This means providing access to a full Windows desktop where you can do anything you want, beyond gaming.” One of the key requirements was to give each user their own GPU. “We have multiple users at the same time on one server. We offer a full high-end GPU to our users whereas the CPU, RAM and storage are split between the users.” This requires a very specialized

server configuration. “The virtual machines are optimized very carefully,” says Weinbach. “On top of that, you are running Windows for all the users, capturing the video, encoding it, pushing it to the network, and then each user will receive it, decode it, and render it on their own computer. The server performance required is exceptional.” Shadow had been operating its initial service with Intel-based servers but providing a high-end gaming desktop would require a significant increase in capabilities. “Our original servers had four GPUs and two CPUs on the same server, but the two CPUs were a bottleneck for the GPUs.”

**“We now tell our users:
‘Go and try our Shadow PC.
The Power Upgrade is EPYC!’”**

Yannis Weinbach, Director
of the Consumer Business
Unit at Shadow

In 2021, Shadow was purchased by Octave and Miroslaw Klabá, who also owns leading France-based cloud provider OVHcloud. This gave Shadow access to a variety of OVHcloud hardware configurations to consider for its new service. “We tried AMD

Ryzen™ Threadripper™ processors because they have very high frequency, and we know that for some games, you need this,” says Weinbach. Through R&D, Shadow and AMD finally successfully implemented AMD EPYC Processors as the relevant choice for their new cloud service.

Choosing the right server platform

To work out what Shadow would need to deliver from its servers, the company began by specifying the desktop performance it wanted to replicate. “This was a mid-end GPU, the equivalent of AMD’s Radeon™ RX 6700 XT, and a mid-highend CPU, which at the time of testing was an AMD Ryzen™ 7 3700,” says Weinbach. Shadow then had to provide this level of performance on a server. “In terms of GPU, it was easy because there are professional-grade GPUs in the data center offering similar performance to desktop GPUs. For the CPU, it’s much more complicated. “We wanted to have eight users running simultaneously on each server, which means we must separate everything to make sure that the instructions do not overlap. This was the main challenge we faced.

"We ran all our benchmarks," says Weinbach. "This involved a large portfolio of games from publishers like Ubisoft or Square Enix, representative of multiple game engines, such as Unreal Engine 4. Once we had a score for the local machine, we tried to find what kind of machine could bring us the same level of performance in the cloud. After testing, we realized that EPYC processors can sometimes outperform Threadripper on specific workloads."

Shadow specified 32-core 3rd Gen AMD EPYC processors as the optimum balance between frequency and core density. "We did some lower-tier tests with the 7513 and are launching the high-end offer with the 7543P. In the first year, we expect to deploy more than 1,000 single-socket servers, primarily using the 7543P."

These will enable Shadow to deliver eight cloud PCs from each server. "We're using four cores, eight threads per user. Our benchmarks showed this is sufficient to play any modern games very well. Older games need a higher frame rate, but you can't stream faster than 200 FPS. At a higher resolution such as 4K with a modern game the FPS count is lower, so the experience is very close to a local high-end PC. You can play most games at 60 FPS, just like you would do with the same configuration with many more cores and a higher frequency CPU on a local machine."

"When we had the server full of customers, the AMD EPYC™ CPU was excellent at isolating the instructions."

Yannis Weinbach, Director of the Consumer Business Unit at Shadow

High-end gaming PCs in the cloud

Further enhancing performance, the eight-channel memory of AMD EPYC CPUs was considerably faster than the dual-channel memory of the reference local machine, allowing the Shadow platform to present to the end-user performance completely equivalent to a physical machine. "We have dedicated 16GB of RAM per user," says Weinbach. "We can isolate the different sessions for our users and isolate the cores for them, which works

extremely well with the fast memory. We want them to have the same PC all the time, so that they can predict how it will react, and not have surprises about how it runs."

"With the help of EPYC™ CPUs, we can deliver very high-end performance to the user at a very affordable price."

Yannis Weinbach, Director of the Consumer Business Unit at Shadow

The new AMD EPYC CPU-powered systems were considerably faster than Shadow's previous Intel-based servers, too. "We had 65 percent better performance than our former offering," says Weinbach. The extra PCI Express® lanes provided by AMD EPYC processors enabled more graphics accelerators per server. "We can have eight GPUs in one chassis, because the 128 lanes of PCI Express 4 provide plenty of bandwidth."

There were also cost benefits, beyond just the price-performance of the CPUs themselves. "The more [physical] space you need in the data center, the higher the cost," says Weinbach. "We need the lowest operating cost and best possible performance on par with a local PC. With the help of AMD EPYC CPUs, we can deliver very high-end performance to the user at a very affordable price. The ability to have eight users per CPU makes this possible and helps us use the least [physical] space in the data center."

"AMD is a very good partner for us," says Weinbach. "We were pleased to see that the EPYC processor line could deliver performance comparable to our local machine because we have very intensive single user demand. Yet with one-eighth of a server, using CPUs that are lower frequency than our reference machine, we got exactly the performance we expected. We now tell our users: 'Go and try our Shadow PC. The Power Upgrade is EPYC!'"

WANT TO LEARN HOW AMD EPYC™ PROCESSORS MIGHT WORK FOR YOU?

Sign up to receive
our data center content
amd.com/epycsignup



About Shadow

At SHADOW, we strive to become the definitive cloud platform for gamers, creatives, and businesses, because we believe that cloud innovations have the potential to bring technological freedom to all. SHADOW delivers state-of-the-art cloud-computing experience to consumers, via its original Shadow service, and to professionals via its Shadow Business Solutions. It developed the first ever high-end cloud PC to play, create, and work on any device. Shadow has more than 150 employees based in Europe and North America. Join us at shadow.tech. Check our latest news on shadow.tech/blog. Follow us on [Twitter](https://twitter.com/shadowtech).

About AMD

For more than 50 years AMD has driven innovation in high-performance computing, graphics, and visualization technologies. Billions of people, leading Fortune 500 businesses, and cutting-edge scientific research institutions around the world rely on AMD technology daily to improve how they live, work and play. AMD employees are focused on building leadership high-performance and adaptive products that push the boundaries of what is possible. For more information about how AMD is enabling today and inspiring tomorrow, visit the AMD (NASDAQ: AMD) [website](https://www.amd.com), [blog](https://www.amd.com/blog), [LinkedIn](https://www.amd.com/linkedin), and [Twitter](https://www.amd.com/twitter) pages.

All performance and cost savings claims are provided by Shadow and have not been independently verified by AMD. Performance and cost benefits are impacted by a variety of variables. Results herein are specific to Shadow and may not be typical. GD-181

©2022 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, EPYC, Radeon, Ryzen, and Threadripper and combinations thereof are trademarks of Advanced Micro Devices, Inc. PCI Express is a registered trademark of PCI-SIG Corporation. Ubisoft is a trademark of Ubisoft Entertainment in the U.S. and/or other countries. Unity is a trademark or registered trademark of Unity Technologies or its affiliates in the U.S. and elsewhere. Unreal Engine is a registered trademark of Epic Games, Inc. in the U.S. and elsewhere. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.