AMD accelerates Unreal Engine development workflows with Ryzen™ Threadripper™ CPUs

Epic Games sees dramatic performance increase and enhanced productivity

AMD RYZEN THREADRIPPER | AMD THREADRIPPER PRO

CUSTOMER

EPIC GAMES

INDUSTRY

Media & Entertainment; Games and Software Development; AEC

CHALLENGES

To streamline the code compiling process and achieve faster iteration and shading times. In addition, to enable the engineers to work quickly and effectively from home during the pandemic.

SOLUTION

Epic Games replaced its previous workstation CPUs with AMD Ryzen™ Threadripper™ 3970X/3990X and Lenovo P620 with AMD Ryzen™ Threadripper™ PRO 3995WX.

RESULTS

Using Threadripper in their workstations, Epic was able to compile the engine much faster than before without having to rely on additional cores in the cloud. In addition, the iteration time and the time for compiling shaders was drastically reduced.

TECHNOLOGY AT A GLANCE

AMD Ryzen Threadripper and Ryzen Threadripper PRO CPU

TECHNOLOGY PARTNER

Lenovo

For nearly 30 years, Epic Games has had a proven track record of success in the game development industry. The company's latest platform, Unreal Engine 4, is the world's leading game engine across PC, console, and mobile devices. Epic Games also developed Fortnite, the number one game in the world, which generated $2.4 billion in revenue in 2018 and more than $1.8 billion in 2019.

Staying at the top of the game design industry in this way takes a combination of creative flair and strategic implementation of the latest technology. Epic Games has maintained its lead by giving its development team the very best hardware to work with, allowing the developers to achieve their goals in the fastest time possible. This constant need for speed led the company to AMD Ryzen™ Threadripper™ processors, which promised to take workflow performance to the next level.

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Pat Swanson, IT Engineer

Powering real-time 3D beyond games

Unreal Engine has more than 11 million licensees and is seeing a rapid adoption into industries beyond gaming, including media and entertainment, live events, automotive, architecture, healthcare, and simulation. Since 2016, Unreal Engine 4 has been used in more than 120 film and television productions such as The Mandalorian; Star Wars: Rise of Skywalker; HBO's Game of Thrones; and Westworld.

In the automotive industry, manufacturers use Unreal Engine for everything from design and engineering to final sales and marketing renders. Surveys by industry-leading publication CG Architect show that in architecture, Unreal Engine has been the premier real-time rendering solution since 2016, with world-class firms such as HKS, Foster + Partners, ZAHA Hadid, and Zoan all leveraging it.

But creating an engine flexible enough for all these diverse usage scenarios requires the tightest possible code. Epic Games has historically struggled against a significant challenge during development. "One of the most common workflows is compiling code – a process that can be massively parallelized," explains Nick Penwarden, VP of Engineering at Epic Games. "For us, the ability to quickly compile and iterate code is critical to quality."

"The numbers we were getting were just jaw-dropping. I could show them to any engineer, and their response was, 'Can I have one of those? Please?"

Andrew Grant, Technical Director

The team couldn't find a solution that offered both high clock speed and high parallelism simultaneously. "It's a big challenge when you can save five or 10 minutes on your compiling but then lose five minutes on your linking," says Pat Swanson, an IT Engineer with the End User Team. That was, until they came across the AMD Ryzen Threadripper, which promised a single, desktop solution that solved the need for a distributed build mechanism and enabled the rapid code iteration they longed for.

Changing the game with AMD Ryzen Threadripper CPUs

Epic Games tried AMD Ryzen Threadripper CPUs with a range of its workloads and were absolutely blown away by the performance the processors could deliver. "3rd Gen Threadripper CPUs with 32 and 64 cores were a gamechanger," says Andrew Grant, Technical

Technical Director in Epic Games' Special Products Group. "They offered significantly more processing power than anything we could build ourselves with the hardware we'd previously used. It was nothing short of a watershed moment."

The tests Grant performed with Unreal Engine workloads were a revelation. In an internal engine build test of software executables, an Intel® Core™ i9-9900X with 10 cores (used for event demos) took 46 minutes and 43 seconds, whereas a Threadripper 3970X with 32 cores took a mere 15 minutes and 12 seconds – less than a third of the time. In the same test, an Intel® Core™ I9-10900X with 10 cores (again, used for event demos) took 40 minutes and 34 seconds, whereas a Threadripper 3990X with 64 cores took only 12 minutes. In a cook test, where content is integrated into the engine, the Intel® Core™ i9-9900X and 10900X took around 60 percent longer than the Threadripper 3970X and 3990X. And with other scenarios such as tasks with fewer cores or backed by the IncrediBuild distributed compute platform, the team still saw notable increases almost across the board.

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Nick Penwarden, VP of Engineering at Epic Games

Overall, the 3rd Gen Threadripper CPUs achieved a 60 to 100 percent increase in performance on tasks that could utilize all cores versus the dual 12-core Xeon systems the team was using, for a fraction of the price. Threadripper was so fast, Swanson had to run the benchmarks several times before he realized the results weren't incorrect. "The numbers we were getting were just jaw-dropping," enthuses Grant. "Every engineer I showed them to asked, 'Can I have one of those? Please?'"

Enhanced performance for developers working at home

Putting a single Threadripper on an engineer's desk provided such enhanced performance that Epic Games decided to equip its key engineering team members with Threadripper CPU-based workstations.

"The dream would be for every one of our engineers to have a Threadripper under their desk and maybe a second one to access as a building system," says Grant.

The new Threadripper CPUs have so many cores and offer so much speed, the team's engineers and developers have been able to work on multiple projects at once – unlike before. "Using Threadripper, we're able to compile the engine much more quickly than we could previously," says Penwarden. "That's a huge efficiency boost for all the engineers on the team. The less time they're spending compiling code, the more time they can spend actually developing features, testing the functionality, and working on improving Unreal Engine."

Thanks to Threadripper, iterations now take a fraction of the time they used to. Compiling and rebuilding shaders have also become much faster. The team's engineers and developers can now touch anything and rebuild the entire engine in less than 10 minutes versus the 30-40 minutes it used to take.

Increased productivity

As Epic started to deploy Threadripper workstations to key engineers working from home it proved to be a huge win. "While users at the office were saving 10 to 15 minutes," Swanson said. "Users at home were saving hours. After that, many users were so excited about the numbers their peers were getting, they went out and bought their own Threadripper CPUs for their setups at home."

The Epic team reports that switching to Threadripper CPUs has generated a lot of excitement within the organization. "There's nothing else that can compare to what the Threadripper 3990X CPU does in any price range," says Swanson. "I could ask another manufacturer to send me a $20,000 chip, and the Threadripper is still going to match it or beat it. It's not that money is a barrier here, but the price-performance ratio is lopsided. It's a no-brainer."

About Epic Games

Founded in 1991, Epic Games is an American company founded by CEO Tim Sweeney. The company is headquartered in Cary, North Carolina and has more than 40 offices worldwide. Today Epic is a leading interactive entertainment company and provider of 3D engine technology. Epic operates Fortnite, one of the world's largest games with over 350 million accounts and 2.5 billion friend connections. Epic also develops Unreal Engine, which powers the world's leading games and is also adopted across industries such as film and television, architecture, automotive, manufacturing, and simulation. Through Unreal Engine, Epic Games Store, and Epic Online Services, Epic provides an end-to-end digital ecosystem for developers and creators to build, distribute, and operate games and other content. For more information, visit epicgames.com.

About AMD

For more than 50 years, AMD has driven innovation in high-performance computing, graphics, and visualization technologies—the building blocks for gaming, immersive platforms, and the datacenter. Hundreds of millions of consumers, leading Fortune 500 businesses, and cutting-edge scientific research facilities around the world rely on AMD technology daily to improve how they live, work, and play. AMD employees around the world are focused on building great products that push the boundaries of what is possible. More information about how AMD is enabling today and inspiring tomorrow is available at these links: AMD Ryzen Threadripper PRO | AMD Ryzen Threadripper.

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