

High Performance Cloud Computing  
4th Gen Intel® Xeon® Processors

# Gunpowder Cuts Digital Rendering Time and Cost on New Google Cloud Instances

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Google Cloud C3 instances with 4th Gen Intel® Xeon® CPUs accelerate rendering performance, providing >50% cost improvement over previous instances<sup>1</sup>



**GUNPOWDER®**

Google Cloud

## Executive Summary

To say that digital visual effects (VFX) had an impact on moviemaking would be a tremendous understatement. Digital VFX was a paradigm shift. It introduced entirely new ways to tell stories, and provide viewers new experiences. From Star Wars to the latest Avatar movie, with each new evolution of the technologies behind digital VFX, movies (and television, streaming, gaming, commercials, digital art—all motion media expressions) give the artists behind digital VFX creative ways to take us to new worlds.

Whether at home, in the gallery, or in the theatre, viewers want rich experiences. That means taking the next digital VFX project to a new level. And that requires computing—sometimes enormous amounts of computing. Yet while news headlines often boast how movie budgets have gone sky-high, effects budgets are still tight, competition amongst effects studios to produce them is fierce. The cost and efficiency of the computation behind the effects must follow suit.

[Gunpowder](#), a digital VFX service and technology provider, combines its knowledge of the efficiencies of hyperscale cloud capabilities with its expertise in effects creation and rendering. Gunpowder has provided rendering services for digital artists, such as [Refik Anadol](#) and [Urs Fischer](#), using Google Cloud, leveraging sometimes tens of thousands of servers around the world. The company recently tested new Google Cloud instances with 4th Gen Intel® Xeon® processors. Benchmarks showed both accelerated rendering times and lower cost—as much as 52 percent



*CHAOS #501, work in progress by artist Urs Fischer. Credit: Urs Fischer via Gunpowder.*

better performance/dollar—compared to instances with earlier generations of Intel® Xeon® processors. These are benefits that serve both the artists and the producers.

### Challenge

It's 2020, and the Covid19 pandemic is raging. Studios are shut down; VFX departments are trying to figure out how to work remotely. Tom Taylor, founder of Gunpowder, leverages his technical knowledge of rendering software and systems as well as capabilities of cloud services to create high-performance compute in the cloud, allowing digital artists to work from anywhere. Over the last few years, Gunpowder has continued to grow, using Google Cloud instances to power their rendering services. When it comes to rendering, more is always better.

"There's no such thing as too much firepower in terms of rendering," Taylor states. "When you submit a render, it's going to try and use every resource available. If I spin up a 60-core machine, the moment I hit render, all 60 cores get pinned at 100% until that render completes."

What that means for Gunpowder's clients is that the more computing available for rendering, the faster it will get done. And time is everything in the VFX business.

"In our industry," Taylor adds, "speed—and time—is money. The deadline drives everything. A piece of content from a creative perspective is never finished. The more iterations an artist can complete, the better the end product."

For Taylor and Gunpowder, performance of the cloud instance—and cost of that instance—are essential to provide a competitive service to an industry where timelines are short, budgets are tight, and margins are thin.

Enter—the 4th Gen Intel Xeon processors and [Google Cloud C3 Instances](#).

### Solution

Gunpowder consults with studios that want to build their own rendering system in the cloud or extend or migrate their on-premises solution to the cloud. The company also provides on-demand rendering capacity for customers.

### Performance, Performance, Performance

Currently Gunpowder services run on Google Cloud C2 instances—ultra high-performance configurations for compute-intensive workloads built on 2nd Gen Intel® Xeon® processors—and n1 instances—configurations balanced for price/performance built on earlier version of Intel Xeon processors. But Google Cloud is deploying C3 instances running 4th Gen Intel Xeon processors. These new C3 instances

feature Google Cloud's custom Intel® Infrastructure Processing Engine and Intel® Advanced Matrix Extensions to speed up training and inference.

"We ran a benchmark using our traditional renderers through the C2 and C3 instances," Taylor explained. "We compared the results and immediately saw a 25 to 30 percent quicker render time on C3 instances. Remember that with VFX, the faster the render the more time to perfect the art through more iterations. Essentially, we're giving the artists more time to do their work."

Additionally, in the cloud, everything is billed per second. If a render takes fewer seconds, the customer gets billed less.

"So, it's a win-win—better performance for cheaper," Taylor adds. "Who wouldn't buy that?"

### Better Performance/\$

Google instances are available in different configurations, or shapes. The C2 standard shape has twice the memory of a C3 highcpu shape. It turns out that most renderers tend to run well with the reduced memory of the C3 highcpu shape. The instance shape with less memory helps reduce the price of the instance. Thus, the combination of the C3 highcpu shape and faster render times delivers over 50 percent better performance/\$ compared to C2 instances.

### Numbers Help Tell the Story

When Gunpowder ran their benchmarks, they tested two main render engines on both C2 and C3 instances.

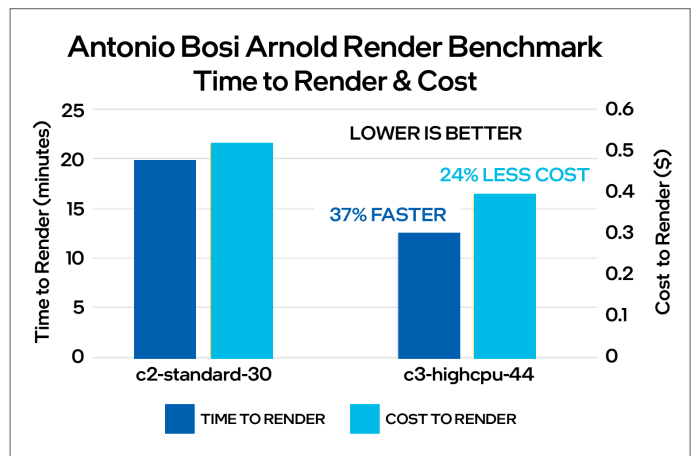


Figure 1. Arnold render tests using Antonio Bosi benchmark comparing results on a C2 instance based on 2nd Gen Intel Xeon processors with a C3 instance based on 4th Gen Intel Xeon processors.<sup>1</sup>

INSTANCE	V-RAY SCORE	SAMPLE/\$	COST IMPROVEMENT/C2 INSTANCE
C2-standard-30	14434	9217.11	
C3-highcpu-44	26630	14058.71	52%

Table 1. V-Ray performance testing with V-Ray benchmark-5.02.01

“The image that consumers see is not directly created by the artists’ interface. Instead, the artists utilize specialized software to design, animate, and illuminate various scenes. These scenes are then sent to a processing center, referred to as the “farm,” where the necessary calculations are performed to produce the final image that will be broadcasted.”

Figure 1 shows the results of rendering with Arnold on Google Cloud instances. Table 1 lists the results of the V-Ray benchmarks. Pricing was based on the Iowa Google Data Center instances.

Gunpowder estimated instance costs on Google Cloud Iowa Data Center as follows:

**C2-standard-30: \$1.566/hr**  
**C3-highcpu-44: \$1.8942/hr**

With both benchmarks, the Google Cloud C3 instances ran faster, due to more cores and the new CPU architecture. They also cost less to complete than the C2 resulting in a better performance/cost.

“When the VFX studios bid a project, they have to work within their estimate,” Taylor said, “which means they need their rendering system to be as efficient and cost-effective as possible. Whatever we can do to help them keep costs down while accelerating rendering is a benefit to them. The C3 instances will help us do that.”

## Results

Rendering is a compute-intensive task. The more complex the imagery and higher the resolution, the more computing is required. Working with Google Cloud, Gunpowder can set up a rendering service tuned for each project, whether all rendering is done on the cloud or leverages the client’s on-premises technology. For example, a recent client needed to [render ocean coral imagery](#) generated by AI using 100 million images of underwater plant and animal life.

“The client approached us with a requirement to connect multiple nodes to their on-premises system and render the

imagery showcased at the World Economic Forum earlier this year. Through our efforts, we were able to set up numerous render nodes, establish connections with their equipment, and make optimal use of their existing licensing resources.” Some render jobs require thousands of nodes, which for a single project is nearly impossible to complete in-house for all but the very largest studios. For such projects, Gunpowder leverages Google Cloud’s presence to set up nodes from around the world. To help keep costs down, spot instances—unused instances in data centers around the world—are sought.

“For a very large project that required 10,000 render nodes, we searched for Google Cloud spot instances around the world,” Taylor explained. “That project used 2,500 3D scans of everyday objects interacting in a moving environment displayed on a 10k screen<sup>1</sup> at the [Gagosian Gallery](#) in New York.”

According to Taylor, these are projects that benefit from the performance and cost benefits of Google Cloud C3 instances.

## Solution Summary

Digital VFX rendering is a compute-intensive operation that can require many nodes running at 100 percent. Since time is of the essence with digital VFX studios, technologies that reduce render time benefit the quality of the project by giving artists more opportunities to perfect their creations. Google Cloud C3 instances built on 4th Gen Intel Xeon processors gives Gunpowder significant performance and cost improvement over C2 instances, helping to accelerate render jobs and reduce costs for its customers.

## Where to Get More Information

Learn more about [Gunpowder](#).

Discover Google Cloud capabilities with 4th Gen Intel Xeon processors at <https://cloud.google.com/intel>.

Explore the capabilities of [4th Gen Intel Xeon processors](#).



<sup>1</sup> 1-instance c2-standard-30: 30 vcpu (Cascade Lake), 120 GB total memory, Arnold render CPU speed benchmark Test - <https://github.com/lvxejay/arnold-benchmarks> by Gunpowder on December 13, 2022

1-instance c3-highcpu-44: 44 vcpu (Sapphire Rapids), 88 GB total memory, Arnold render CPU speed benchmark Test - <https://github.com/lvxejay/arnold-benchmarks> by Gunpowder on December 13, 2022

Performance varies by use, configuration and other factors. Learn more at [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex).

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

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