Intersect360 Research White Paper: SimOps: Automating Engineering Innovation Across Today's Tools

EXECUTIVE SUMMARY

As scientific progress continually pursues new discoveries, engineering perpetually seeks to implement these advanced principles into innovation, creating new or improved products and features across the landscape of our lives. Advanced engineering uses computational modeling and simulation to augment the limitations of physical testing. Today, traditional computing methods can be augmented by advanced analytics and artificial intelligence, widening the aperture of what can be done computationally. Furthermore, companies and research organizations can use cloud computing resources to augment on-premises data centers. These options all increase the possibilities of simulation, as well as the potential complications.

Backed by $20 million in new funding, Simr, formerly known as UberCloud, is addressing these challenges by introducing and automating "simulation operations automation (SimOps)," with its new engineering productivity suite, Simr Platform. The Simr Platform runs in single-tenant cloud environments, using organizations' own client accounts, with high-performance application containers designed over a history of working with engineering modeling and simulation. Simr Platform is already deployed by major companies embracing the flexibility and innovation driven by SimOps.

MARKET DYNAMICS

Innovating Innovation

For decades, the advanced simulations enabled by High Performance Computing (HPC) have fueled scientific discovery and engineering innovation across multiple industries and domains. One of the major industries that has leveraged these techniques to the greatest effect has been manufacturing, for products ranging from cell phones and golf clubs to threshers and jet engines. In 2023,

White paper sponsored by UberCloud. Full neutrality statement at https://www.intersect360.com/features/neutrality-statement.
P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com

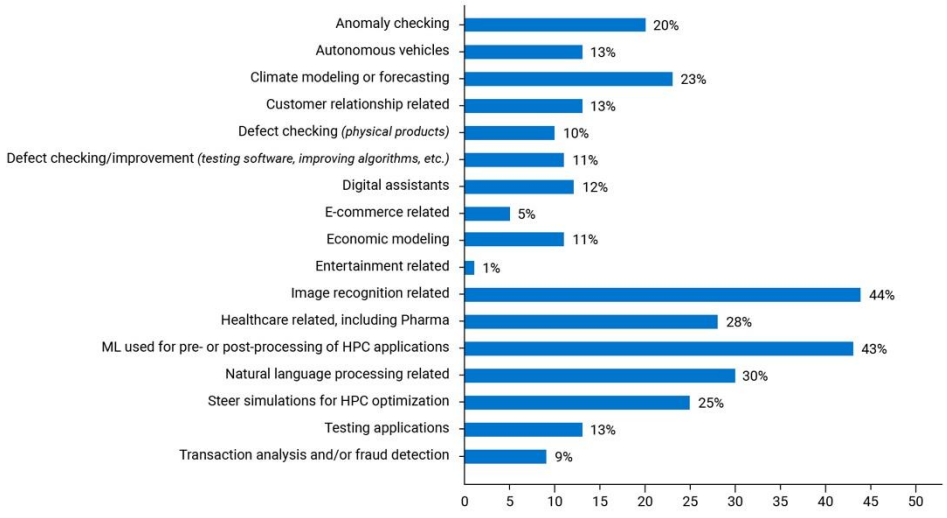
manufacturers spent $6.4 billion on HPC technologies, improving product quality and efficiency in multiple ways.[1]

As the technologies that power HPC have evolved, so have the applications for engineering. Mainstays like computational fluid dynamics and finite element analysis still fuel aerodynamics and crash simulations. The big data revolution brought analytics into the forefront, affecting product lifecycle management and supply chain optimization. Meanwhile, cloud computing became a viable option for elastic, on-demand computing capabilities, without the necessity of a major on-premises data center commitment.

Today, AI is changing the game yet again. Autonomous driving or driver-assist features are one obvious change vector in manufacturing. Beyond self-driving vehicles, AI brings innovation to simulation itself, allowing engineers to explore more design options in less time. Computational steering of HPC applications is one of the most common uses of AI among organizations with HPC experience. (See chart below.) The combination of HPC and AI itself continues to move forward, bringing new generations of innovation to engineering.

What Machine Learning is Used for at HPC Sites

Intersect360 Research, 2023



Multiple Modalities

Utility computing is the perfect antidote to uncertainty. In 2023, cloud computing had its ninth-straight year of double-digit growth in HPC-AI, with a tenth projected for 2024.

[1] Intersect360 Research, *Worldwide HPC-AI Market 2023 Total Market Size and 2024–2028 Forecast: Vertical Markets*, May 2024.

P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com

For the past 15 years, cloud computing has gained increasing acceptance as part of the high-performance data center environment. Originally adopted primarily for short-term bursting beyond internal capacity, cloud now represents a viable alternative for a wider array of on-premises computing.

While cloud was quickly adopted for general business computing, where individual jobs were inherently more fungible, adoption took longer in HPC, where data sizes are large, jobs are scalable, and security concerns are high. Growth of cloud in HPC started accelerating through the second half of the 2010s, due to the maturation of software licensing models to make them more friendly to utility-based consumption. Cloud uptake then soared in 2020, as the COVID-19 pandemic disrupted normal business cycles, with some projects (and associated acquisitions) getting delayed and others getting pulled in with urgency. Cloud computing helped out either way; utility computing is the perfect antidote to uncertainty. In 2023, cloud computing had its ninth-straight year of double-digit growth in HPC-AI, with a tenth projected for 2024.[2]

This isn't to say that cloud is completely taking over. Most deployments are hybrid, incorporating cloud computing as a part of the overall solution. 69% of HPC-AI users say that cloud computing "serves a different purpose" than on-premises resources, and only 17% say it leads them to buy fewer on-premises HPC-AI systems.[3] Where we do see 100% cloud deployments, they tend to be among newer or entry-level adoptions; larger deployments begin to mix on-premises and cloud, for economic reasons.

Overall, 55% of HPC-AI users say they leverage cloud computing for their HPC-AI workloads at least sometimes. The usage is highest among commercial user organizations, as opposed to public-sector deployments. For-profit organizations now use cloud for 24% of their HPC and AI workloads, and they project this proportion to increase to 31% in five years. (See chart below.)

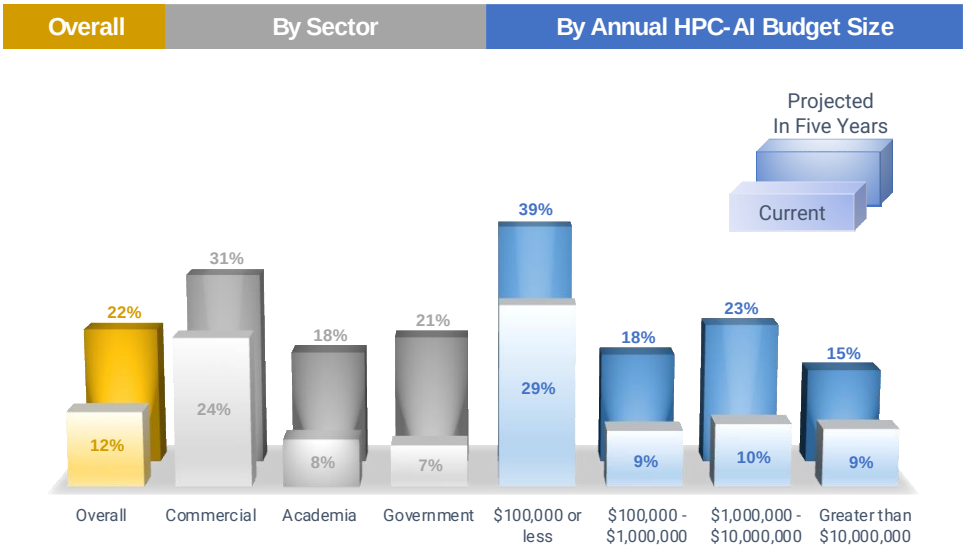
Average Percentage of Total HPC-AI Workload in Public Cloud, Current and Future

Intersect360 Research, 2023

[2] Intersect360 Research, *Worldwide HPC-AI Market 2023 Total Market Size and 2024–2028 Forecast: Products and Services*, April 2024.

[3] Intersect360 Research, *HPC-AI Technology Survey 2023: Cloud Computing*, March 2024.

P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com



More Possibilities to Manage

The full range of these advancements—new computing capabilities, fueling HPC, analytics, and AI, on-premises and in the cloud—also brings new challenges. Other areas of IT have looked at optimization across multiple tools, profiles, and resources through the concept of operations, or "ops." DevOps, for example, is a well-established concept, for managing projects with overlapping goals across distributed software development teams. Similarly, many enterprises have turned to DataOps to manage data sovereignty while advancing its value for high-performance analytics.

Engineering now faces similar challenges with respect to simulation. Over 90% of HPC users have expanded their environments to include AI, and this has corresponded to an increase in GPU-accelerated computing nodes. All of this represents new capability, but engineering departments have the challenge of optimizing simulations on multiple projects across on-premises, hybrid-cloud, and multi-cloud resources.

INTRODUCING SIMR PRODUCTIVITY SUITE FOR ENGINEERING SIMULATIONS

Bringing Innovation Forward as Simr

UberCloud – now called Simr - was founded in 2012 during the original push toward cloud computing for HPC workloads, offering consulting services and application expertise for HPC cloud migration and optimization. By mid-2014, UberCloud's community

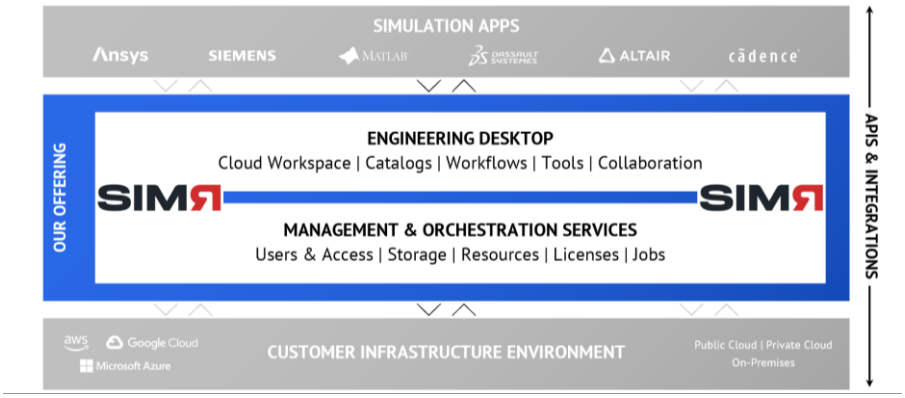
included representation from 72 countries and 2,500 companies, including 60 cloud providers, 80 software companies, and several hundred consulting firms and individual experts.

Today, Simr has secured $20 million in new Series A funding, which it will direct toward Simr Platform, a new engineering productivity suite for product owners and the engineering teams they work with. The Simr Platform is already deployed in three of the world's seven largest companies (combined revenue $310 billion), according to Simr, as well as several other manufacturers, down to small- and medium-size enterprises (SMEs). The Series A funding includes investment from BMW i Ventures, a strategic partner of global automotive manufacturer BMW Group.

Simr is designed to dramatically improve product design and manufacturing by automating SimOps.

Addressing SimOps with the Simr Productivity Suite

Image Source: Simr



Simr aims to dramatically improve product design and manufacturing by automating what it calls "simulation operations automation (SimOps)," thereby greatly reducing operational complexity for engineering and IT. The Simr Platform and the high-performance application containers incorporate best practices compliant with SimOps, drawn from more than 200 Simr customers and partners, representing the varying requirements of a broad spectrum of engineering applications. SimOps also provides maturity models users can employ to assess and intelligently guide their progress.

The Simr Platform runs in a single-tenant cloud environment in the engineer's own cloud account. To address HPC-AI users' nonnegotiable need for secure computing, the Simr Platform's software layer adds additional security components to the

numerous features already provided by major cloud infrastructure providers. The Simr high-performance container VM encapsulates simulation workflow and data to isolate it from other workloads and resources.

Intersect360 Research Analysis

Sending HPC and AI workloads to external cloud environments is an increasingly popular choice for companies and other organizations that rely on design engineering, as figures cited earlier show. These organizations typically employ a hybrid combination of on-premises and external cloud resources, but a growing numbers of engineering organizations now rely entirely on cloud services providers. SMEs might have no on-premises HPC-AI data center resources and are especially likely to begin their HPC-AI journey directly in external clouds.

For organizations new to HPC-AI cloud computing, learning to use these resources time- and cost-efficiently can be a challenging, trial-and-error process. As noted above, many engineering applications may have their own computing and resource requirements. This is why, soon after its founding, Simr began calling its engagements with customers and technology partners "experiments." The company still uses this term, even though Simr reports that 100 percent of its engagements are now successful. Clearly these "experiments" are expandable in many cases to full production.

UberCloud, now Simr, was founded with the purpose of easing cloud adoption for HPC workloads. With the Simr Platform, Simr is taking another step in innovation, easing the challenges in a hybrid world: both HPC and AI, heterogeneous processing elements, on-premises and cloud.

By painstakingly characterizing and automating a large array of real-world applications from more than 200 customers and strategic partners, Simr has removed most of the need for experimentation for both experienced and new users of HPC-AI cloud computing. Cataloguing and automating a wide range of engineering applications via the Simr Platform productivity solution has also made it easier for product owners and design engineers to decide which workloads to run on premises and which to send to the cloud.

P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com

The proportion of design workloads clouds can handle efficiently has greatly expanded. Today, a large proportion of HPC-AI workloads can be run effectively in cloud environments. Major cloud providers offer instances specifically tailored to high-performance workloads, with tools for managing data ingress and egress and dashboards for optimizing performance. Furthermore, Simr continues to offer expertise in cloud adoption and management.

The choice between running on-premises and in the cloud can often be economic, with variables that depends on the workload, the instance type, and the time to solution. Direct cost comparisons can be misleading; for example, on-premises evaluations need to take CAPEX as well as OPEX into consideration, along with aging equipment and waiting time in on-premises queues. On the other hand, cloud computing needs to consider data transfer times, performance penalties in cases where virtualization applies, and in-cloud processor and networking capabilities. Major cloud service providers and their partners now provide a range of options for monitoring and controlling costs.

With so many variables, the best determinations rarely come down to simple heuristics, like "GPUs are faster" or "cloud is cheaper." Rather, the individual user needs to consider the value for each application and each simulation, and how each solution fits into a product workflow, both in the short term and in the long term. This complicated, burgeoning arena is the target market opportunity for Simr.

With AI on the rise, competing processing elements in development, and cloud projected to be an enduring component of the HPC-AI landscape, the need to optimize engineering simulation workloads isn't going away soon. In fact, Simr is on the early end of the wave, just as it was during the introduction of cloud. With its Series A funding and resulting launch, Simr has a strong opportunity for market success that could move it to its next stage of company growth.

For more information on the Simr Productivity Suite, visit www.simr.com.

P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com

White paper sponsored by UberCloud. Full neutrality statement at https://www.intersect360.com/features/neutrality-statement.
P.O. Box 60296 | Sunnyvale, CA 94088 | Tel. [888] 256-0124
www.Intersect360.com | info@Intersect360.com