

Case Study



HPC in the Cloud
Intel® Xeon® Scalable Processors
Intel® Select Solutions for HPC & AI Converged Clusters
Intel® Deep Learning Boost
Intel® Optane™ SSDs

Cadence Design Systems Uses atNorth's Turnkey HPCaaS Solution for the World's Most Complex CFD Workloads

Intel® Select Solutions for HPC & AI Converged Clusters featuring Intel Xeon® Scalable 9200 processors optimize the performance of Cadence's Next-Generation software running atop atNorth's hosted, cloud-based HPC instances.

"We have built high performance computing as a service from the ground up. We have been working with the best technologies on the market, using Intel Xeon processors to build state-of-the-art HPC. This is ideal for HPC as a Service so that companies like Cadence can focus on customers instead of worrying about the data center aspects."

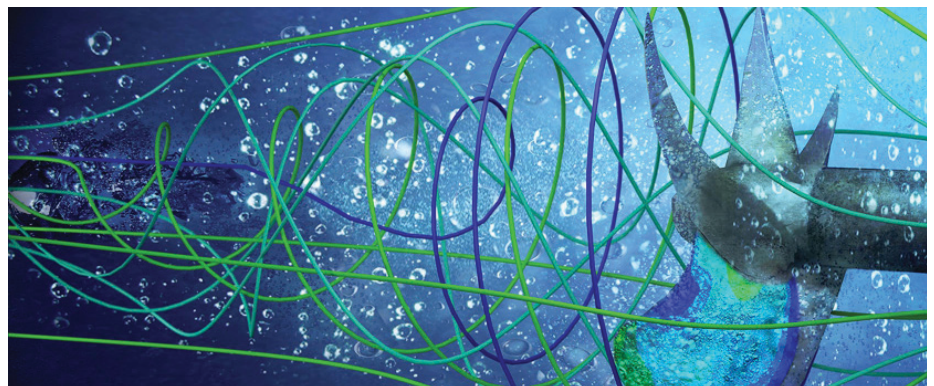
— Guy D'Hauwers, Sales Director —
HPC & AI, atNorth

Executive Summary

A joint effort between [Cadence](#) and [atNorth](#) will deliver with an end-to-end, hosted high performance simulation computing (HPC) solution for Cadence's clients' most challenging simulation and modeling workloads. Cadence's innovative computational fluid dynamics (CFD) solution will help companies and researchers to design next-generation ships, aircraft, and cars that are faster, safer, and more fuel-efficient. The Independent Software Vendor (ISV) chose atNorth's hosted solutions because they offer several benefits that enable Cadence to optimize their CFD applications that require excellent scalability, end-to-end security, and configuration flexibility. atNorth's backend HPC infrastructure includes Hewlett Packard Enterprise's (HPE) Apollo server hardware powered by Intel® Select Solutions for HPC & AI Converged Clusters [Magpie] which features 2nd Generation Intel Xeon® Platinum 9200 processors with Intel Deep Learning Boost (Intel DL Boost) to accelerate CFD workloads.

Challenge

ISVs like Cadence need isolated and fully-configurable HPCaaS clusters to enable their innovative CFD software. The complexity of the application requires an elastic and extremely-performant HPC-in-the-Cloud solution upon which to develop and test their latest solution.



Cadence's FINE/Turbo is a CFD suite that provides an Integrated Environment for rotating and non-rotating flow analysis in external and internal turbomachinery applications.



Cadence provides CFD software for a variety of disciplines, including naval architects and marine engineers.

Once deployed on an atNorth HPCaaS solution, Cadence's next-generation CFD application will offer Cadence's end-customers a holistic and turnkey solution for their workloads.

Solution

atNorth's choice of Intel processors and Apollo HPE server hardware offer the performance characteristics to speed HPCaaS instances. Their CPU choice offers native DDR4 memory bandwidth, twelve memory lanes, and up to 112 cores in a two-socket system. Additional Intel technologies include SSDs and memory with Intel Optane® technology, and Intel Software and Performance Profiling tools. Because atNorth Data Centers' HPCaaS solutions are configurable

Spotlight on atNorth

atNorth is a Nordic data center and HPC services company with data centers in Sweden and Iceland. atNorth specializes in HPCaaS and managed HPC offerings tailored for multiple industries like manufacturing, life sciences, finance, security, and other commercial applications. atNorth's customers rely on HPCaaS and HPC managed services to address their needs for data-intensive workloads like artificial intelligence, machine learning, simulation, blockchain technology, computer-aided engineering, fluid dynamics, and more. atNorth solutions are all powered by 100% renewable energy and atNorth's data center facilities are designed for power efficiency and high density. atNorth solutions are both environmentally responsible and offer lower TCO for HPC and AI systems and allow customers to optimize bottom-line while reducing their carbon footprint. atnorth.com

Spotlight on Cadence International

Cadence is globally recognized today for its Computational Fluid Dynamics (CFD) and multiphysics design, analysis, and optimization solutions that support the world's leading industries. Cadence's application-driven features and interface provide optimal solutions including high quality automatic full hex meshing, accurate and fast CFD solvers, multi-physics and acoustics, robust design, and optimization with uncertainty quantification. With creative teams and offices around the globe, Cadence offers customers exceptional software, R&D, support, and services. cadence.com

down to the bare metal level, Cadence can configure every aspect of its dedicated cluster. In turn, Cadence can optimize that cluster for their proprietary CFD application and ensure their end-customers have a tested solution for workloads in the cloud. According to atNorth and Cadence, the CFD software package runs significantly faster on the Intel Xeon Platinum 9200 HPC platform than on other atNorth instances. The combination of processor speed and multiple memory channels reduce barriers often associated with memory-bound applications on different hardware platforms.

Results

atNorth is the first cloud provider to offer its customers like Cadence AI-ready HPC instances based upon the Intel Select Solutions for HPC & AI Converged Clusters [Magpie] featuring 2nd Generation Intel Xeon Platinum 9200 processors. The processors powering Apollo HPE server hardware offer features like unprecedented native DDR4 memory bandwidth, twelve memory lanes, and up to 112 cores in a two-socket system.

Proven underlying technologies provide reliable and fast HPC infrastructure with numerous benefits:

- A flexible cloud-based platform on which to test and optimize Cadence solutions
- A solution capable of hosting future Cadence CFD solutions, creating joint business opportunities
- Extreme performance and scalability for Cadence's memory-intensive CFD applications
- A turnkey platform for CFD on HPCaaS, enabling a complete solution for end-customers, and new revenue streams for both Cadence and atNorth
- Built-in security with encryption
- Energy-efficient hardware supports a green data center powered by Iceland's fully-renewable energy sources.
- 24/7 support in the unlikely event of component failure

HPCaaS Enables Breakthroughs in Science and Industry

atNorth supports a broad user base. While their customer use cases vary widely, typical workloads include machine learning, deep learning, simulation, modeling, and more. In combination with Cadence software systems, those corporations creating next-generation ships, aircraft, and cars will have a cutting-edge CFD solution to help create more fuel-efficient, safer, and faster designs.

Ingredients for atNorth's HPCaaS Solution

- Hewlett Packard Enterprise (HPE) Apollo Servers
- Intel Select Solutions for HPC & AI Converged Clusters [Magpie]
- Intel Xeon Platinum 9242 Processor (71.5 M Cache, 2.30 GHz)
- Intel Omni-Path Host Fabric Interface Adapter 100 Series 1 Port PCIe x16
- Intel Ethernet Network Adapter XXV710-DA2
- Intel Server System S9248WK2HAC Compute Module
- Intel SSD D3-S4510 Series (240GB, M.2 80mm SATA 6Gb/s, 3D2, TLC)
- Intel Optane SSD DC P4800X Series (750GB, M.2 110MM PCIe x4)

Lessons Learned

Key takeaways from Cadence's CFD software deployment on the atNorth HPCaaS platform:

- atNorth seeks to differentiate itself by providing both on demand, elastic HPC clusters and tailored infrastructure based on customer needs. atNorth offers its user base fully-isolated systems.
- The bare metal HPC solution provides Cadence a scalable and performant foundation upon which to build their CFD application and host their end-customers' CFD workloads.
- From atNorth's data centers in Sweden and Iceland, where there is abundance of renewable energy and the climate and engineering allows the atNorth-Cadence CFD solution to run on 100% renewable energy to maximize solution sustainability.

Intel Xeon Platinum 9200 processors are architected to deliver performance leadership across a broad range of demanding workloads. 2nd Generation Xeon Scalable processors are the only data center CPU with AI acceleration built-in. They also offer unprecedented native DDR4 memory bandwidth and more memory channels than any other Intel Xeon processor. The Intel Xeon Platinum 9200 processor delivers exceptional performance scaling up to 112 cores in a two-socket system with 24 channels of memory representing approximately 400GB/sec of memory bandwidth.¹

Intel Select Solutions for HPC & AI Converged Clusters [Magpie]

[Intel Select Solutions for high performance computing \(HPC\)](#) offer validated and quick-to-deploy infrastructure optimized for analytics clusters and HPC applications to help accelerate time to breakthrough, actionable insight, and new product design. [Intel Select Solutions for HPC & AI Converged Clusters](#) efficiently run AI workloads within an HPC environment. The architecture enables partners to build upon existing HPC investments, supporting HPC batch schedulers to run workloads like simulation and modeling, big data analytics, and AI on common HPC infrastructure.

Learn More

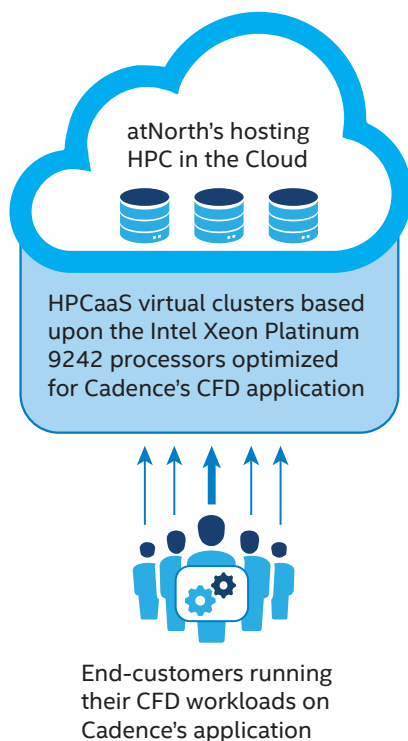
Gain more insight about [Intel Select Solutions for HPC & AI Converged Clusters \[Magpie\]](#)

Find out more about the [Intel Xeon Scalable processor family](#)

Learn more about [atNorth's HPCaaS solutions](#)

Read additional information about [Cadence solutions](#)

Find the HPCaaS solution that is right for your organization. Contact your Intel representative or visit www.intel.com.





¹ <https://www.intel.com/content/www/us/en/benchmarks/server/xeon-scalable/platinum-9200-performance.html>

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