

## Summary

A Department of Energy Laboratory (“Laboratory”) that hosts a range of cutting-edge experiments and develops and builds technologies that support particle physics research at locations around the world was in need of a new Institutional High-Performance Computing Cluster (“HPC Cluster”) to support its vision and mission.

For this new Institutional HPC Cluster, the Laboratory had specific performance and technical requirements along with other requirements such as on-site installation and support. Koi Computers was able to propose a complete solution meeting all of the performance and technical requirements using the 2nd Gen Intel® Xeon® Scalable Processors and Intel® Omni-Path High Performance Computing Fabric.

## Their Challenge

For this Institutional HPC Cluster, the Laboratory required a minimum aggregate performance of 25TFlops based on their supplied application codes. The Laboratory needed system configurations with dual-socket, powers of 2 core counts preferred, a minimum of 256GB memory or more,

system disk, a high-speed interconnect, IPMI for management, and the associated network rack equipment.

## The Solution

Koi Computers proposed a 1U dual socket configuration using a complete Intel® solution with the 2nd Gen Intel® Xeon® Scalable Processors and Intel® Omni-Path High Performance Computing Fabric. The selected 2nd Gen Intel® Xeon® Scalable Processor’s performance required fewer compute nodes therefore lowering infrastructure expenses.

## The Process

As an experienced Federal Government contractor, Koi Computers is readily familiar with the guidelines, rules, and safety requirements at the Laboratory. As an ISO 9001:2015 certified and audited company with a Supply Chain Risk Management Program in place, Koi Computers only sources components from authorized and trusted suppliers to ensure quality control. Adhering to the company’s core values, there’s no ambiguity in what is being delivered to clients.

Koi Computers was able to build the initial HPC Cluster in three weeks. After a rigorous and successful burn-in at Koi Computers' facility, the HPC Cluster was then shipped and installed on-site since the Laboratory supplied the racks.

As part of Koi Computers' on-site installation, all nodes were racked and all cables labeled based on Koi Computers' proposed rack layout and delivery plan. Koi Computers' Vice President of Engineering Simon Ho performed the integration and installation along with the rest of the Koi Computers engineering team. After the installation, post-sales support was and continues to be handled directly by Koi Computers – there is no need for the Laboratory to contact a 3rd party for support.

## **Their Success**

Koi Computers delivered the HPC Cluster in June 2019. The HPC Cluster was expanded with additional compute nodes that were delivered March 2020.

As with all HPC Clusters that Koi Computers builds and delivers, there is a period where the HPC Cluster undergoes application performance verification and an acceptance test. During this period, Koi Computers is not allowed to have more than 5% downtime for the duration of this acceptance test. Because of Koi Computers' quality control and use of quality components, and a rigorous burn-in and testing process, there was no downtime during this acceptance test.

Koi Computers' Federal Business Development Catherine Ho said, "We make sure that when we integrate the systems and burn them in, we identify and address any possible issues before the technology arrives on-site. We won't deliver anything until we are confident that there are no issues, which is why our uptime averages 99.9% for all clients.

## **About 2nd Gen Intel® Xeon® Scalable-Refresh Processors**

Building on the momentum of the existing 2nd Gen Intel® Xeon® Scalable processors (CLX), these CLX-R processors offer enhanced power and value for high performance, mainstream and entry level applications at a similar or lower price than CLX. They feature:

### **Peak Frequencies for High Performance Use:**

Two new Intel Xeon Gold 6200 processors deliver up to 4.5 GHz Intel Turbo Boost Technology, along with up to 3.9 GHz base frequency, with up to 33% more processor cache.

### **Enhanced Performance for Mainstream Use:**

New Intel Xeon Gold 6200R processors deliver built-in value through a combination of higher base and Intel Turbo Boost Technology frequencies (in addition to increased processor cache), at a similar or lower price than original 2nd generation processors.

## Increased Value and Capability for Entry Use:

New Intel Xeon Gold 6200U, Silver 4200R and Bronze 3200R processors deliver increased value for single-socket, entry, edge, networking and IoT applications.

## About Intel® Omni-Path Architecture

Intel® Omni-Path Architecture (Intel® OPA), an element of Intel® Scalable System Framework (Intel® SSF), delivers the performance for tomorrow's high performance computing (HPC) workloads and the ability to scale to tens of thousands of nodes—and eventually more—at a price competitive with today's fabrics. The Intel® OPA 100 Series product line is an end-to-end solution of PCIe adapters, silicon, switches, cables, and management software. As the successor to Intel® True Scale Fabric, this optimized HPC fabric is built upon a combination of enhanced IP and Intel® technology.

## About Koi Computers

Headquartered in Greater Chicago since 1995, Koi Computers is an Intel® HPC Data Center Specialist and Platinum Partner with demonstrated excellence in deploying HPC Data Center Solutions. The company's world-class engineering team specializes in building custom IT solutions that accommodate today's needs and tomorrow's vision with services that include performance benchmarking and outstanding support.

## DELIVERED SOLUTION

- 185 Compute Nodes:
- 1U Dual Intel® Xeon® Scalable Processor 6248 with 192GB Memory
- 1TB System Disk
- Intel® OPA 100 Adapter
- 4 GPU Nodes
- 1U Dual Intel® Xeon® Scalable Processor 6248 with 192GB Memory
- 1TB System Disk
- Intel OPA 100 Adapter
- 2 NVIDIA Tesla V100 (32GB) GPUs
- 10 Intel® Omni-Path 100 Switches

Koi Computers has a strong track record of developing, building and deploying HPC technology for the U.S. Federal Government with satisfactory ratings in CPARS and Past Performance. The company is a Prime Contract Holder of the NASA SEWP V, GSA IT Schedule 70 and NITAAC CIO-CS contracts.

