

Developing one of the world's fastest supercomputers with a multinational information and communication technology company

HCLTech owned the end-to-end system software
development for a next-gen vector supercomputer

A Japanese multinational information and communication technology (ICT) and electronics corporation sought to enter the new-age high-performance computing (HPC) market. To do this, the organization planned to introduce a hardware accelerator solution, requiring a new operating system and toolchain. The client approached HCLTech for this complex and ambitious software stack development for its next generation supercomputer – despite having a dedicated offshore software development center of its own. HCLTech worked closely with the organization to identify the requirements and other challenges and was awarded full ownership of the design, implementation and testing of the software stack components.

The Challenge: Reclaiming lost market share

Various disruptions in the technology and competitive landscape had taken a toll on the partner's market share, causing it to lose much of its Europe and U.S. business to its western competitors. It sought to launch the next-generation supercomputer to reclaim this lost market share. However, the new age hardware required an open platform and software stack based on Linux and GNU toolchain – so that the existing software components of the previous generation supercomputing servers could be reused for this new vector-card based architecture.



The Objective: Collaboration for new open source-based software stack development

The ICT company was looking for a partner with sound technical experience in system software development to identify the right software components and engineering expertise to port them. The aim was to deliver a software stack that could enable the new technical trend of Linux-based software development and

deployment, which would help create a platform that could dramatically improve developer and customer experience and allow them to seamlessly reuse or bring the existing software components with minimum effort when, where and how they wanted.

The Solution:

Setting up a modern Linux-like operating system

As the technology partner for the software stack, HCLTech designed the operating system for the partner's vector-based coprocessor, based on POSIX standards, and implemented a full-fledged modern operating system supporting 320 system calls. It supported concepts like multi-threading, virtual memory, synchronization, multi-processing and more.

HCLTech ported some of the most popular industry C-libraries, including glibc and musl-libc, along with the Linux test project (LTP) to test and perform QA for the newly developed operating system. The team ported the OS commands used by the administrator and developer to monitor the runtime and the static status of the system.

These commands were helpful in identifying the real-time workload, network usage, performance and health of the system. Benchmarking of HPC applications to identify performance bottlenecks was carried out to enable appropriate performance tuning for system and application optimization. The team also ported the debugging framework like ptrace to enable debuggers such as GNU GDB and diagnostic tools like strace. These components enabled the developer to develop, debug, execute and monitor the supercomputing ecosystem. The overall size of HCLTech's development efforts for this project were estimated at 93,000 lines of fresh code.



The Impact:

Delivering high performance for one of the world's fastest supercomputers



HCLTech supported the partner in creating a platform that was open, secure, popular and well-supported by the user and the open community. Upon the launch of the HPC product, the partner witnessed over 200 installations across the globe with key customers in academics, weather forecasting and earth sciences. It was chosen by top HPC centers around the world for its energy-saving server technology, high-density mounting technology and high-efficiency cooling technology that help deliver highly sustained performance for AI and HPC applications.

The adoption of this supercomputer will contribute to developing a sustainable socio-economic system that capitalizes on high performance computing infrastructure (HPCI).

This was made possible by HCLTech's niche-skilled, 40-member team that ensured greater system interoperability to allow the existing software components and developers to work on the new software stack. With this new technology, the partner has regained the market position in the high-performance computing space.

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