rescale

Sumitomo Electric Industries Redefines R&D Innovation with AI on Rescale

Case Study

Headquarters:
Osaka, Japan
Industry: Manufacturing
Founded: 1897

Accelerated AI Application Performance by 10x

Reduced Material Development Time by 50%

Centralized HPC Resource and Application Management

INTRODUCTION

Sumitomo Electric Industries is a long-established metals manufacturer that owns the world's largest market share for products like electronics circuitry and industrial cutting tools. When the Japanese Government announced the Green Transformation "GX" clean energy policy in 2022, Sumitomo Electric immediately began overhauling their compute-driven R&D efficiency. For that, they turned to Rescale.

Founded in 1897 to produce copper wire for electrical uses, Sumitomo Electric now operates globally in five segments: automotive, telecommunications, electronics, green energy, and industrial materials. With more than 280,000 employees working across 40 countries around the world, Sumitomo Electric is the creator of many products commonly used today.

With a strong inclination toward innovation that began in the era of the horse and buggy, Sumitomo Electric has continued to increase efficiency and improve product design through taking advantage of the latest R&D technologies. They saw the new GX initiative as an opportunity to improve their R&D processes in this way, and soon created new teams focused on Materials Informatics (MI) and Process Informatics (PI) to do exactly that.

In taking advantage of emerging techniques aimed at improving efficiency of materials development by embracing information science, Sumitomo Electric's new MI/PI groups found that the Rescale platform best sped up and streamlined their R&D of next-gen materials through AI/ML and scientific computing.

TECHNOLOGY CHALLENGES

Previously, Sumitomo Electric ran many of its simulations on an in-house on-premises system. But the new MI/PI approach commonly demanded a large amount of computational resources at one time – specifically when undergoing simulation for material exploration as well as candidate material generation screening using the latest AI technologies such as Generative Adversarial Networks (GAN) – a machine learning technique in which two neural networks compete with each other to maximize prediction accuracy.

With GAN considered to be one of the most powerful AI algorithms to date, it became difficult to deploy an environment that could support the rapid load increase during screening calculations using their on-premises HPC system.

"In material development, we sometimes perform a brute force simulation of more than 100,000 material candidates. Our on-premises environment could not handle such a high computational load. However, now that we have an HPC environment on Rescale that specializes in MI, we are able to perform a huge number of brute force simulations," said Tatsuya Takakuwa, Group Manager, MI/PI Promotion Group, AI Promotion Department, IoT R&D Center at Sumitomo Electric.

"Rescale's services have become something we can no longer afford to be without."

- Tatsuya Takakuwa, Group Manager, MI/PI Promotion Group, AI Promotion Department, IoT R&D Center at Sumitomo Electric

After adopting Rescale, the MI/PI teams were now able to assemble all MI-related components in a single cloud environment, and then share and collaborate across designated team members and partners in real time.

And because Rescale provided an instantly-available simulation environment, Sumitomo Electric was able to hit the ground running faster than they had ever been able to previously.

"If we were to build our own physical computing cluster with a large amount of memory and the latest GPUs, it could take a year or more of internal coordination," said Takakuwa. "But our project had already started and we needed to deliver concrete results in a few months. For this reason, the cloud was the only realistic choice for building that environment, and Rescale was the fastest path to cloud."

HOW RESCALE HELPED

After evaluating various computing platforms, Sumitomo Electric selected Rescale based on the following criteria:

Ability to run a variety of software including open-source and custom in-house
Scalable storage capacity
Strict security and compliance
Regional availability in Japan

"We decided that the Rescale platform, with its intuitive usability, virtually unlimited capacity, and collaborative capabilities, was the best choice for us," said Takakuwa.

High security and compliance was also a critical factor in the choice to use Rescale.

"Rescale is a cloud HPC SaaS with numerous security certifications, so there was no need for us to maintain all that security on our end," said Takakuwa. "This was a key advantage. We also appreciated the fact that we could set up multi-factor authentication and device authentication."

Takakuwa's teams primarily use the Rescale platform to run simulations for materials development, such as simulating the properties of electrolyte used in batteries, and the viscosity and density of polymers.

Much of the software Takakuwa's teams rely on are open source, so it was especially important to find a cloud platform compatible with a range of such softwares. Frequent open-source software utilized by Sumitomo Electric include LAMMPS and Quantum ESPRESSO for material simulation, PyTorch for AI/ML, and Singularity as a container for in-house developed software - all among the over a thousand preinstalled and optimized applications available instantly on the Rescale platform.

BENEFITS

And with the move to a scalable cloud environment, R&D at Sumitomo Electric has sped up dramatically, with Rescale reducing computation time by at least 90 percent across all simulation activities over the last year.

Collaboration and sharing data and insights between research laboratories within the company has also increased, resulting in a number of new innovative material discoveries, and five new patents in a single year, when it was previously typical to produce just one.

"In the past, we had been working with limited resources when it came to obtaining patents," said Takakuwa. "Today, by using Rescale, we are able to conduct a large-scale random sample simulation, select the most promising candidates, prepare a patent application, and file it immediately after the experiment confirms its validity."

Now, Takakuwa's teams take a "sky is the limit" approach to R&D.

"With Rescale's HPC environment, we now have scalable computational resources instantly available to us. This has allowed us to say to each of our research labs, 'Let's accelerate R&D together,' without worrying about computational resources. As a result, it is now possible for each laboratory to perform simulations concurrently and collaborate seamlessly, which expedites deployments all around. The overall development time for new materials, which used to take about 10 months, has been reduced by half, to about 4 to 5 months."

More than 20 development projects are currently simultaneously in progress under Takakuwa, and the number of AI models templated by Takakuwa's team and the number of collaborative programs have also increased.

Access to high memory, state-of-the-art GPU environments is another benefit Sumitomo Electric found by using Rescale.

"The simulations that used to take a week on our own servers can now be completed in about half a day on Rescale's high-memory, state-of-the-art GPU environment, making them more than 10 times more efficient," said Takakuwa. "We can now simulate every conceivable product from start-to-finish, whereas before we could only test a few dozen different products over the course of a year."

GAN initiatives, as well as certain open source libraries like Hugging Face Transformers require an enormous amount of computing resources, which had traditionally limited implementation.

"The availability of vast resources on the Rescale platform has changed our mindset to be more proactive, now saying,

'If something is out there, let's try it.' We have already created models for generating GANs and identification models using Transformers, and they have become widely adopted in the company."

According to Takakuwa, using Rescale has been good for ROI. "For example, when a project reaches a critical stage, Rescale allows us to put our budget toward immediately increasing computing resources," he said. "Whereas conversely, if we were to invest in physical servers, it could take a year or more from the time the budget is spent for the needed computing resources to actually become available. For the same amount of money, the Rescale platform allows us to use a lot of it in a variable amount of time and get the results rapidly. That's a very meaningful investment for us, so it makes it easy to include it in our budget."

Overall, Takakuwa and his team are very pleased they went with the Rescale platform.

"Rescale is an excellent platform for research and development," said Takakuwa. "The platform is attractive because it provides all the necessary tools for computational engineering, all in one place. Rescale's services have become something we can no longer afford to be without."

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About Rescale
Rescale provides high performance computing built for the cloud to empower engineers while giving IT security and control. The Rescale platform makes it simple for engineers and scientists to harness the most advanced software and computing architectures for cutting-edge simulation and AI-driven innovation. For IT, the Rescale platform provides full-stack security and support, and delivers policy-based financial and architectural controls to maximize performance and efficiency. Rescale powers the world's leading companies to accelerate innovation across industries including life sciences, automotive, energy, semiconductor, aerospace, and manufacturing.