USER STORY

Driving AI Infrastructure Forward: How Mitsui Knowledge Industry Scaled Tokyo-1 with SONiC

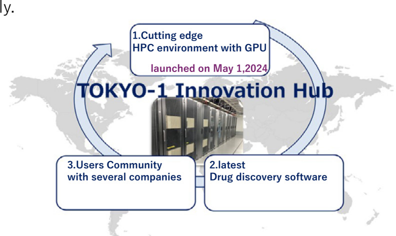
Organization

For more than half a century, Mitsui Knowledge Industry has worked with innovative partners to acquire the cutting-edge technology that enables us to provide continuous, long-term support for IT lifecycles through solutions ranging from IT consulting, IT management services, core systems, networks, voice infrastructure, and security measures, to cloud utilization.

The IT industry is advancing rapidly, with new cloud and hybrid cloud services emerging every day. In order to keep up with the times, we aim to establish and deploy modernized IT infrastructure technologies that enable us to continuously deliver services with reliability, performance, and convenience—despite having limited staff.

Overview

- Provides "**AI-Driven Drug Discovery Solution**" AND "**High performance computing**" by Xeureka Inc.
- Tokyo-1 makes **Innovation Hub** change drug discovery process with ICT.
- Tokyo-1 provides **Computing resources・Software・Community** all inclusively.



We launched Tokyo-1 in collaboration with Xeureka Inc. This service is based on a high-spec GPU supercomputer, cutting-edge digital transformation (DX) solutions, and a collaborative co-creation community.

Our role was to build and operate the AI infrastructure for Tokyo-1 on a private cloud. However, this was the first time we had offered AI infrastructure as a service. While we had skilled engineers on individual technologies, we lacked experience operating the system as an integrated whole. At the time, there was also little reference material on how to provide cutting-edge GPU servers, virtualization platforms, storage, and other technologies securely with multi-tenancy.

To address these challenges, we turned to standardization and open source. Open technologies provided interoperability and transparency, while publicly available information allowed us to validate security practices that can be used in the service. This made SONiC a natural choice.

Why Sonic

- **Embracing Open Source:** This infrastructure includes servers, storage, various types of VMs and containers, as well as operational monitoring. Because many of these components already rely on open source technologies, using SONiC allowed us to extend this open source culture to the network layer.

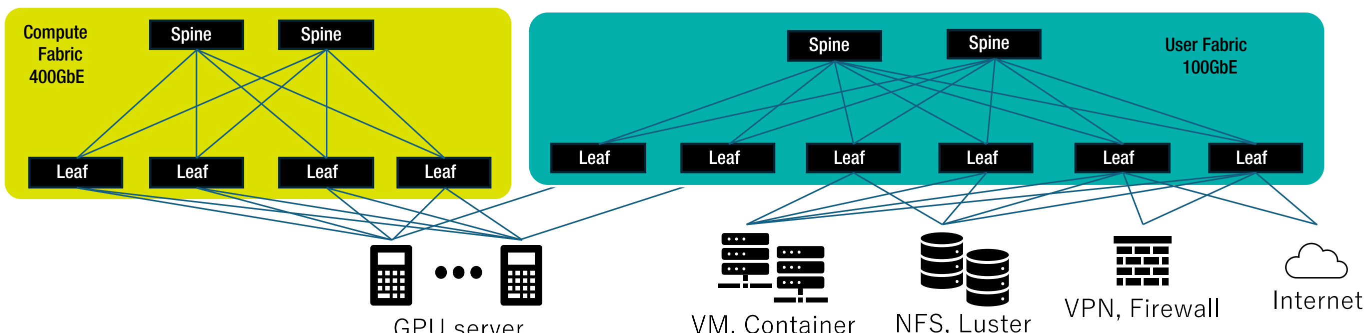
- **Flexibility and Community Support:** Running on a Linux-based platform, SONiC offers strong flexibility for automation and add-ons. Its active community also provides a wealth of information, including integration examples with other open source technologies, which we can leverage to enhance our service.

- **Reducing Costs and Operational Risks:** Network design and usage can vary widely depending on the purpose, but many of these approaches tend to rely heavily on individual experience, human resources, and manual operations. These factors often lead to increased costs and operational risks. By using SONiC, we can adopt standardized technologies and leverage its high flexibility for automation, thereby reducing both human costs and operational risks.

- **Control Over Hardware Procurement and Lifecycle:** SONiC is not tied to any single vendor or product, which allowed us to choose hardware based on market availability and price. This gave us greater control over both cost and deliver timelines. Furthermore, because SONiC has minimal dependency on specific hardware, we can manage lifecycle more effectively and utilize generic components such as optical cables

Deployment

In the Tokyo-1 project, SONiC corresponds to the Spine and Leaf components shown in the diagram, and it accommodates all key elements including GPU servers, storage, virtualization platforms, firewalls, and more.



Key features

Sacalability : 8-GPU server 16 nodes and 10 tenants are maximum size as per POD.

Performance : 100/400G, RDMA(RoCEv2), GPU Direct Strage, Multinode GPU.

Security : Networks logical isotation(VRF, L3VNI), Encrypted Storage per tenant.

User Fabric

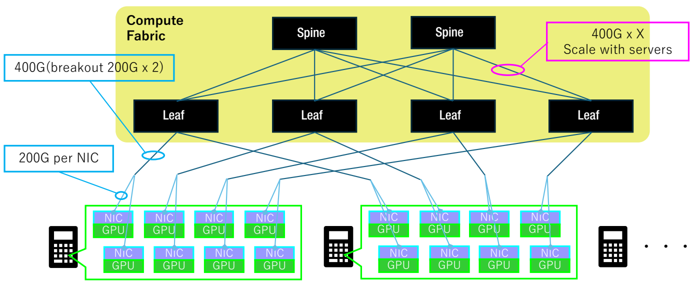
In this fabric, users connect via the internet to access services such as storage and GPU operations. To ensure security, we utilize VRF and L3VNI in conjunction with firewalls to logically segment the network. Additionally, EVPN Multihoming is employed to provide redundant downlink connections to other devices.

Compute Fabric

This fabric is designed specifically for multinode GPU environments. The number of uplinks is adjusted according to the number of GPU servers using multinode GPU, and RoCEv2 is configured to prevent network bottlenecks.

Each GPU server operates with one 400G interface and two logical 200GbE interfaces. To support this, SONiC is configured with interface breakout, and third-party AOC (Active Optical Cable) is used for connectivity.

Benefits



We identified three major benefits from deploying SONiC:

- **Cost-effectiveness:** By using SONiC, we can significantly reduce initial costs such as license and support fees. Since there are no restrictions on using generic optical components and cables, costs can be reduced not only during the initial setup but also in operations such as expansion and failure recovery. Furthermore, by leveraging ZTP and the flexibility of Linux to implement automation, operational costs can be minimized. This also reduces human resource demands, since operations can be carried out without specialized skills.

- **Lifecycle Control:** With white box switches and SONiC, we can choose the optimal switch based on market availability and price. Because SONiC has minimal dependency on specific hardware, we can respond flexibly to hardware EoS and EoL. Being able to add or update devices at the optimal timing that suits both the user and us is a major advantage.

- **Operational Efficiency:** Leveraging the flexibility of Linux makes it easy to implement automation, enabling in-house operation and management. Automation also delivers consistent results even for repetitive tasks, making failure response and system improvements more efficient. Additionally, because SONiC's architecture and technical information are openly available, we have the freedom to choose from a wide range of open source tools for monitoring and operational tasks, or to develop custom scripts tailored to specific needs.

Lessons Learned and Future

Plans

Adopting SONiC was a challenging but rewarding project for us. Using open source technologies meant that we had to develop our own solutions and support frameworks. As this was our first time operating an AI infrastructure service, knowledge gaps were a hurdle.

The SONiC community played a key role in overcoming these challenges. Its open architecture and active community allowed us to gather information, validate it, and make informed decisions. As a result, we were able to build and operate a network that delivered the performance we envisioned, while the benefits we gained became part of our accumulated expertise.

Tokyo-1 has been a great success. We are now moving forward with testing even faster networks and storage technologies. Based on this new testing and the knowledge gained from Tokyo-1, we have also begun efforts to apply SONiC to enterprise networks.

Join SONiC

Become a SONiC member to collaborate, learn and shape the future of the Open Network Operating System.

sonicfoundation.dev/join-sonic