Launch of Joint Demonstration Experiment of Remote Provision of GPU Computing Power
- Utilizing IOWN APN to Safely Analyze Pharmaceutical and Drug Discovery Research Data at Shonan iPark -

Mitsubishi Corporation (Head Office: Chiyoda-ku, Tokyo; President: Katsuya Nakanishi, hereinafter "Mitsubishi"), Nippon Telegraph and Telephone Corporation (Head Office: Chiyoda-ku, Tokyo, President: Akira Shimada, hereinafter "NTT"), NTT Communications Corporation (Head Office: Chiyoda-ku, Tokyo, President and CEO: Katsushige Kojima, hereinafter "NTT Com"), Morgenrot Inc. (Head Office: Chiyoda-ku, Tokyo; President: Ryuei Morimoto), and iPark Institute Co., Ltd. (Head office: Fujisawa City, Kanagawa Prefecture, President: Toshio Fujimoto, hereinafter "iPark Institute") have jointly launched a joint demonstration experiment of remote provision of GPU[*1] computing power at Shonan Health Innovation Park (hereinafter, "Shonan iPark ") and data centers operated by MC Digital Realty, Inc. (Head Office: Minato-ku, Tokyo, President: Kosei Hatakeyama, hereinafter "MC Digital Realty").

In recent years, AI drug discovery, which significantly streamlines the research and development process of new drugs by utilizing AI, has been attracting attention in the pharmaceutical and drug discovery industries. However, to realize AI drug discovery, it is necessary to solve issues such as the cost of infrastructure development and security measures for research data. By utilizing NTT's IOWN[*2] APN[*3] technology and Morgenrot's virtualization technology, we will realize remote provision of GPU computing power that enables multiple tenant companies to simultaneously perform comfortable, flexible, and secure AI analysis. Through this demonstration, we will establish a safe infrastructure construction model for AI analysis that can be used in various industrial clusters such as Shonan iPark and will contribute to strengthening Japan's industrial competitiveness.

1. Background

Until now, many pharmaceuticals have been provided to the public over a very long time and at a great cost, generating candidate compounds through many experiments, repeating experiments with the experience of researchers. In recent years, responding to more difficult diseases and intensifying competition have led to demands for more efficient drug discovery processes, and the use of AI has advanced in various areas such as structural analysis of genes and proteins and structural generation of drug candidate compounds.

In response to the growing demand for AI, the use of cloud computing resources in the pharmaceutical and drug discovery industries is advancing. However, due to the increasing sophistication of AI technology and computational requirements, the scope of AI use has been limited due to issues such as lengthy data uploads and downloads for the transfer of learning and analysis data and security concerns about depositing research data, including privacy information, in the cloud.

In order to help solve these issues, the demonstration experiment will connect the R&D facility and the data center via high-speed, low-latency lines utilizing NTT's IOWN APN technology, enabling the rapid transfer and analysis of large amounts of data from remote locations to NVIDIA's accelerated computing resources deployed in the data center. In addition, by using Morgenrot's virtualization technology to create a private cloud environment within a closed network

that can be accessed only by a limited user, research-related data can be analyzed in a secure state without being stored in public clouds or other public networks.

2. Details of the Demonstration

Mitsubishi, NTT, NTT Com, Morgenrot, and iPark Institute will conduct joint demonstration experiments with the aim of solving AI application issues in various industries in Japan, including the pharmaceutical and drug discovery industries. In this demonstration experiment, Shonan iPark, the largest drug discovery research institute by land size in Japan, and MC Digital Realty's NRT10 data center will be connected via a high-speed, low-latency line utilizing IOWN APN technology to create an environment in which tenant companies in Shonan iPark can remotely use GPU computing power, and the following verifications will be jointly conducted in the future using this as an origination.

· By connecting user bases and remote data centers via a high-speed, low-latency line, verifying that there will be no network performance degradation, such as delay and frame loss, that affects computing such as calculation processing.
· Verifying that the analysis infrastructure to be constructed is suitable for various workloads specific to AI processes used in each industry, such as AI analysis for drug discovery, and that it is effective from the viewpoint of contributing to business and economic efficiency by the participating tenant companies.
· In the experimental environment being constructed, Verifying that confidential computing[*4] using remote GPU computing power utilizing IOWN APN technology is feasible, and that security requirements required by the pharmaceutical and drug discovery industries can be met.

In order to ensure high security and maximize server performance, NRT10 data center (in Inzai City, Chiba Prefecture) operated by MC Digital Realty was adopted and Mitsubishi has installed a server equipped with NVIDIA H100 GPU. In addition, as a member of Shonan iPark, Nvidia provides expertise in the pharmaceutical and drug discovery industries and support for tenant companies in updating the latest industry trends in AI drug discovery and considering service use cases.
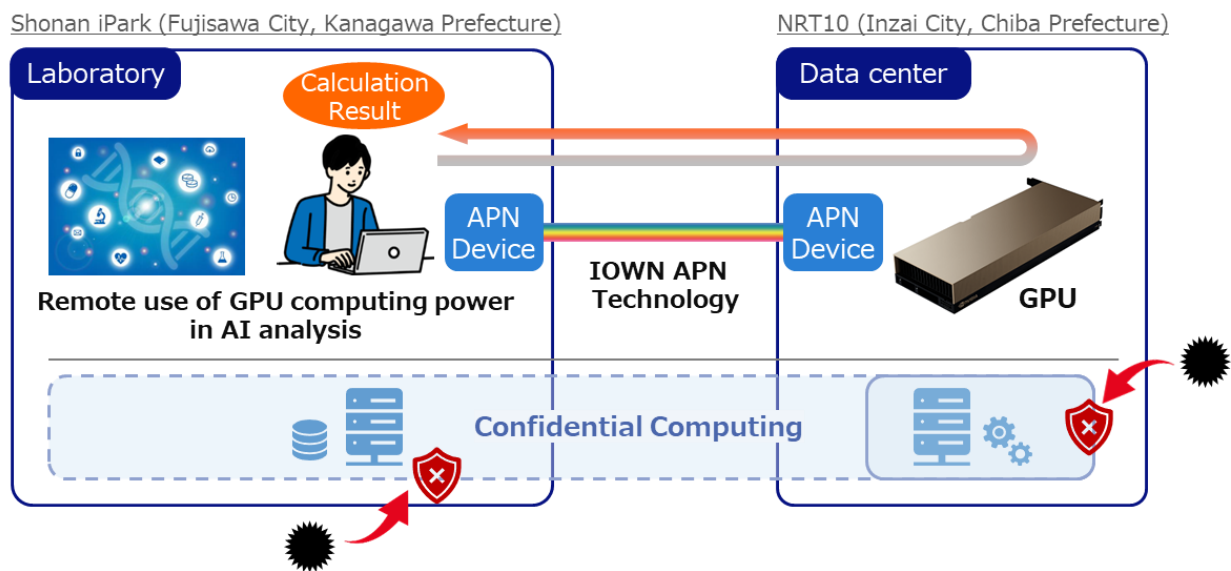
< Image of Joint Demonstration Experiment >

3. Roles of Participating Companies

(1)Mitsubishi

Mitsubishi is strengthening the AI value chain encompassing a series of areas ranging from computing resources such as semiconductors, AI infrastructure consisting of data centers and power solutions, and providing GPU computing power to AI solutions. In this demonstration, Mitsubishi introduced servers equipped with high-performance NVIDIA H100 GPUs for Shonan iPark tenant companies. In addition, Mitsubishi introduced NVIDIA BioNeMo, which accelerates the creation, customization, and deployment of AI models for drug discovery and molecular design and also introduced NVIDIA NIM, an inference microservice for deploying AI models that is part of the NVIDIA AI Enterprise software platform. This enables

the assessment of the actual state of computing power needs in the pharmaceutical drug discovery industry and the evaluation of the economics of providing computing power.

(2)NTT

NTT is promoting the IOWN concept, including the IOWN APN, which connects sites with end-to-end optical paths with high speed and low latency. In this demonstration, it will build on NTT's APN technology and post-quantum secure transport technology[*5] developed by NTT R&D to validate the feasibility of confidential computing technology for remote use of computing resources, which NTT Social Informatics Laboratories is conducting research and development. Using this technology, the computing and communication environments, including GPUs, will be protected at the servers at each site connected by an APN to realize a secure AI execution environment. This will establish secure computing and processing technologies even in the quantum computing era, and will contribute to ensuring the high-level security required by the pharmaceutical and drug discovery industries.

(3)NTT Com

NTT Com is promoting the development and provision of network services utilizing IOWN APN technology. In this demonstration, it will establish and operate a high-speed, low-latency line between Shonan iPark and MC Digital Realty's data center, and verify the effective use of IOWN APN technology in business clusters.

(4)Morgenrot

Morgenrot is promoting the construction of an efficient operating environment for GPU servers and other HPC systems[*6] in order to create a world where computing power is accessible whenever needed. In this demonstration, it will use the virtualization technology of "MORGENROT® Cloud Bouquet" to divide GPU server and provide an environment that can be used simultaneously by multiple tenant companies.

(5)iPark Institute

As the operator of Shonan iPark, iPark Institute promotes building and revitalizing the life science ecosystem[*7]. This joint demonstration will provide an opportunity to solve the challenges of Shonan iPark tenants and to build a more efficient research environment.

(6)MC Digital Realty

As a leading data center operator, and in consideration of the growing importance of data centers as social infrastructure and the increase in data communication volume caused by the progress of IT and cloud services, MC Digital Realty provides its customers with world-class data center services consisting of high robustness and security, stable power and air conditioning, and top class network services. In this demonstration, MC Digital Realty provides colocation service at the NRT10 data center, which has been certified as an NVIDIA DGX-ready Data Center[*8], equipped with facilities such as power and air conditioning that enable efficient operation of GPU servers. In addition, since the power of this data hall is supplied by 100% real renewable energy, it will contribute to achieving 0 carbon net in research and development.

4. Future Development

Through this demonstration, we will confirm the feasibility and creation value of new AI analysis platforms and the feasibility of quantum-proof security, and contribute to solving social issues such as the expansion of efficient and safe use of AI in more industries.

[*1]: A GPU (Graphics Processing Unit) is a semiconductor that specializes in image processing inside a computer. It was developed for 3D graphics drawing, but is now used in a wide range of applications such as AI-related and simulation.

[*2]: IOWN (Innovative Optical and Wireless Network) is a future communication platform that utilizes cutting-edge optical-related and information processing technologies to realize a smart world.
 https://www.rd.ntt/e/iown/

[*3]: The All-Photonics Network (APN) is a network in which photonics-based technologies are introduced into everything from the network to the terminals to realize overwhelmingly low power consumption, high quality, high capacity, and low latency transmission, which is difficult with current electronics-based technologies. The APN leased line plan powered by IOWN provided by NTT Com was installed this time.

[*4]: Confidential computing is a method to protect data in use in AI learning and other computational processes by using a hardware-

based technology called Trusted Execution Environment (TEE) to realize an isolated and verifiable computing environment. As part of IOWN PETs (IOWN Privacy Enhancing Technologies), NTT Social Informatics Laboratories is engaged in research and development using TEE, which aims to realize consistent data sovereignty from generation to extinction.
https://www.rd.ntt/e/sil/project/iown-pets/iown-pets.html

*5: Post-quantum secure transport is a technology that enables rapid transition to quantum safe encrypted communication by combining different cryptographic methods quickly and safely, switching cryptographic methods without interrupting communication. This technology is being developed by NTT Social Informatics Laboratories, NTT Network Innovation Laboratories, and the NTT Network Innovation Center.
https://group.ntt/en/newsrelease/2024/10/30/241030a.html

*6: HPC (High Performance Computing) systems are computer systems that perform complex arithmetic processing on large amounts of data at high speed, and are used in the fields of AI, machine learning, simulation, and big data analysis.

*7: Life Science Ecosystem refers to the network and community formed by the collaboration of stakeholders such as academia, startups, companies, local governments, and hospitals to promote R & D and innovation in the life science field.

*8: Based on the NVIDIA DGX-Ready Data Center Program, NVIDIA certifies data centers capable of supporting high-density computing systems such as the NVIDIA DGX platform and supercomputer clusters such as the NVIDIA DGX SuperPOD.

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