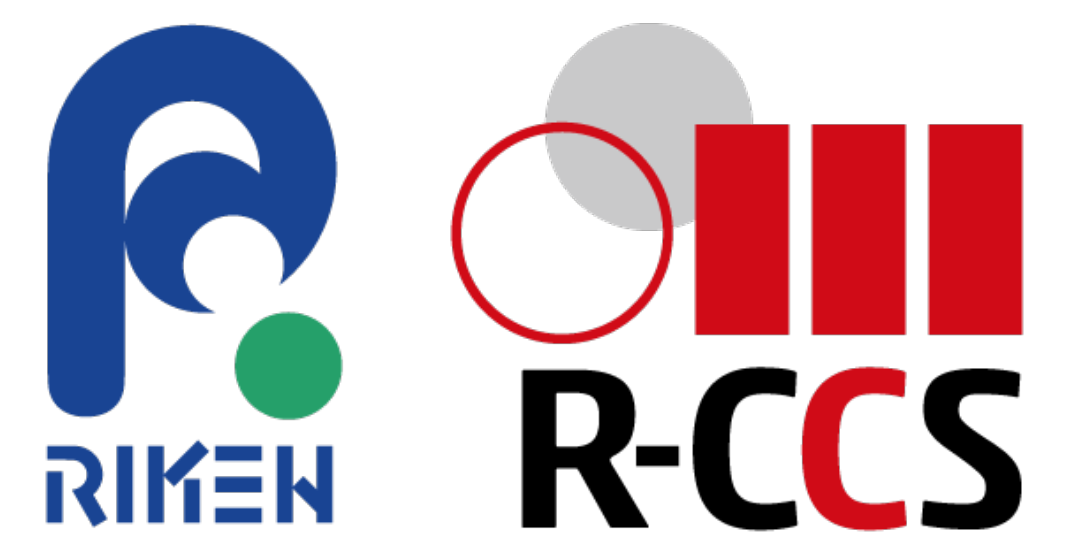# Towards an Easy-to-Use Visualization Environment on the Fugaku

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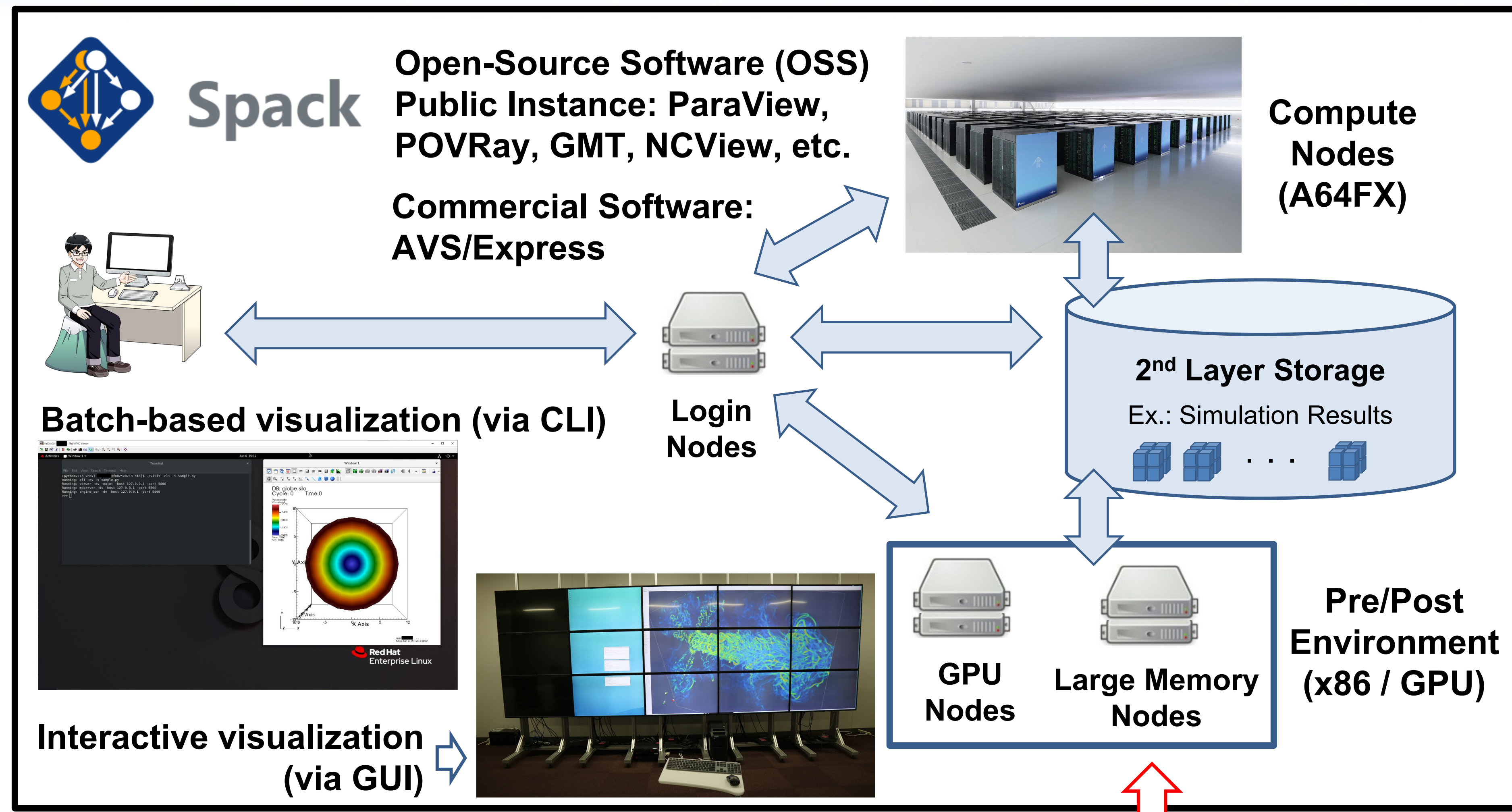Advanced Operation Technologies Unit

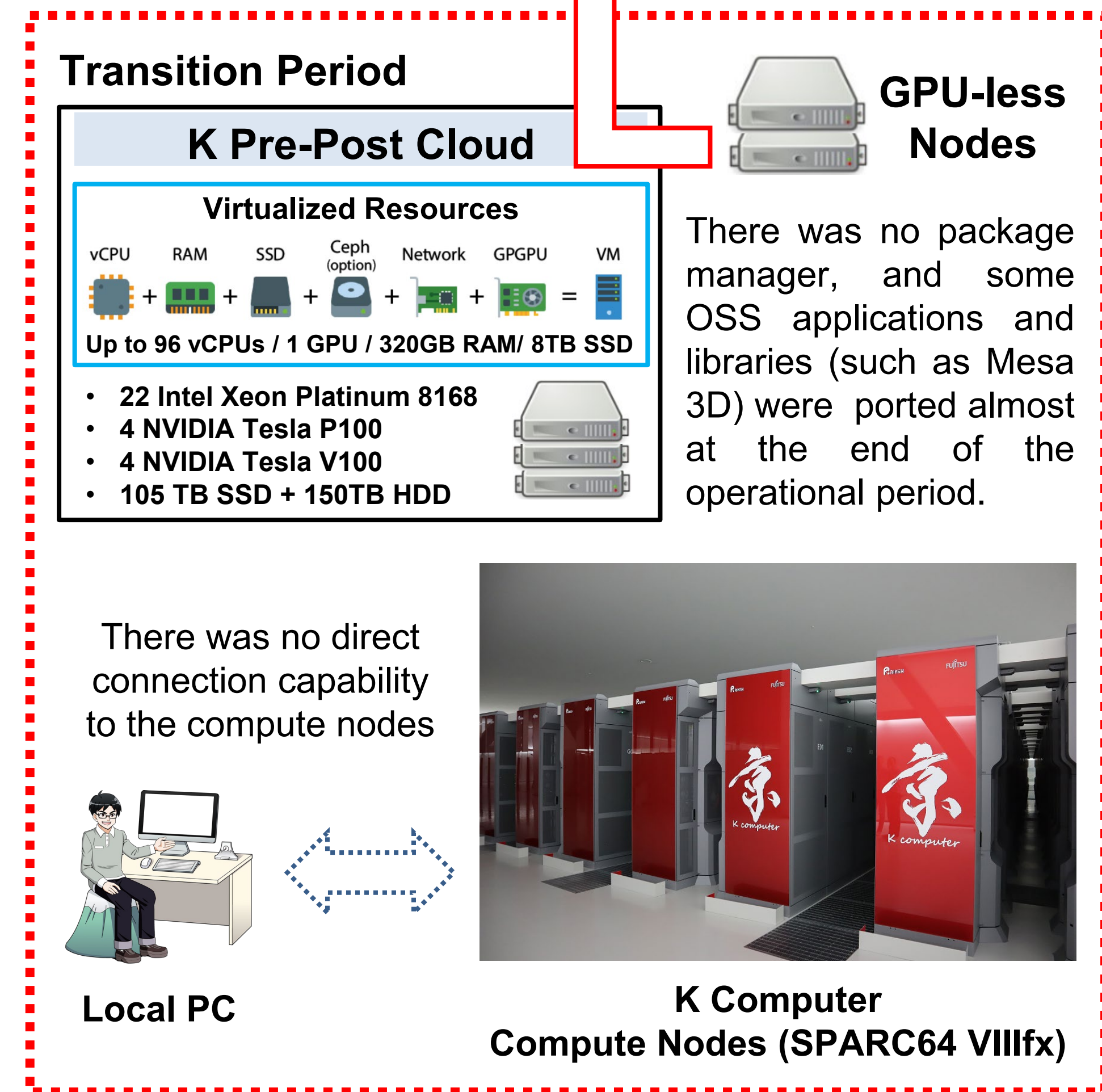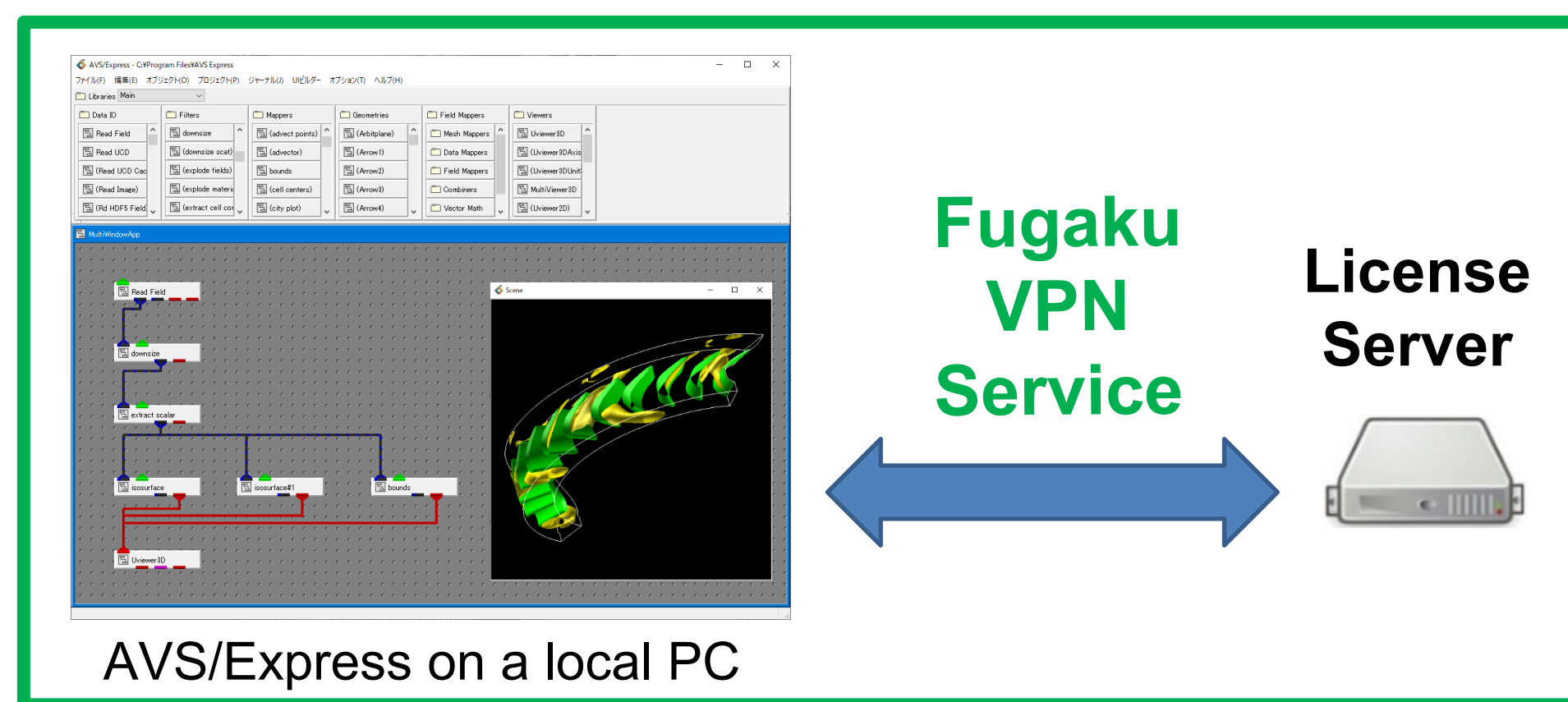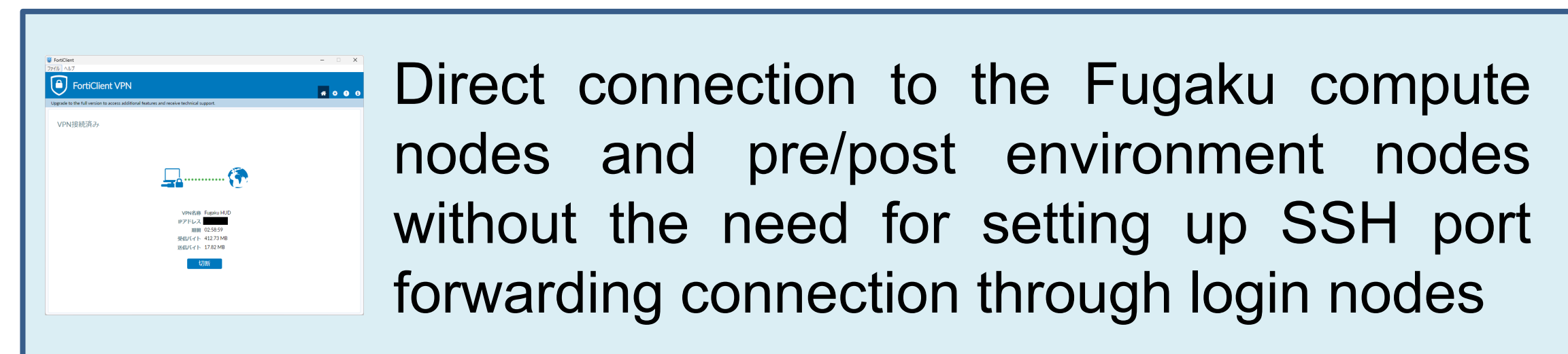**Hitoshi Murai**
Software Development Technology Unit

Fumiyoshi Shoji
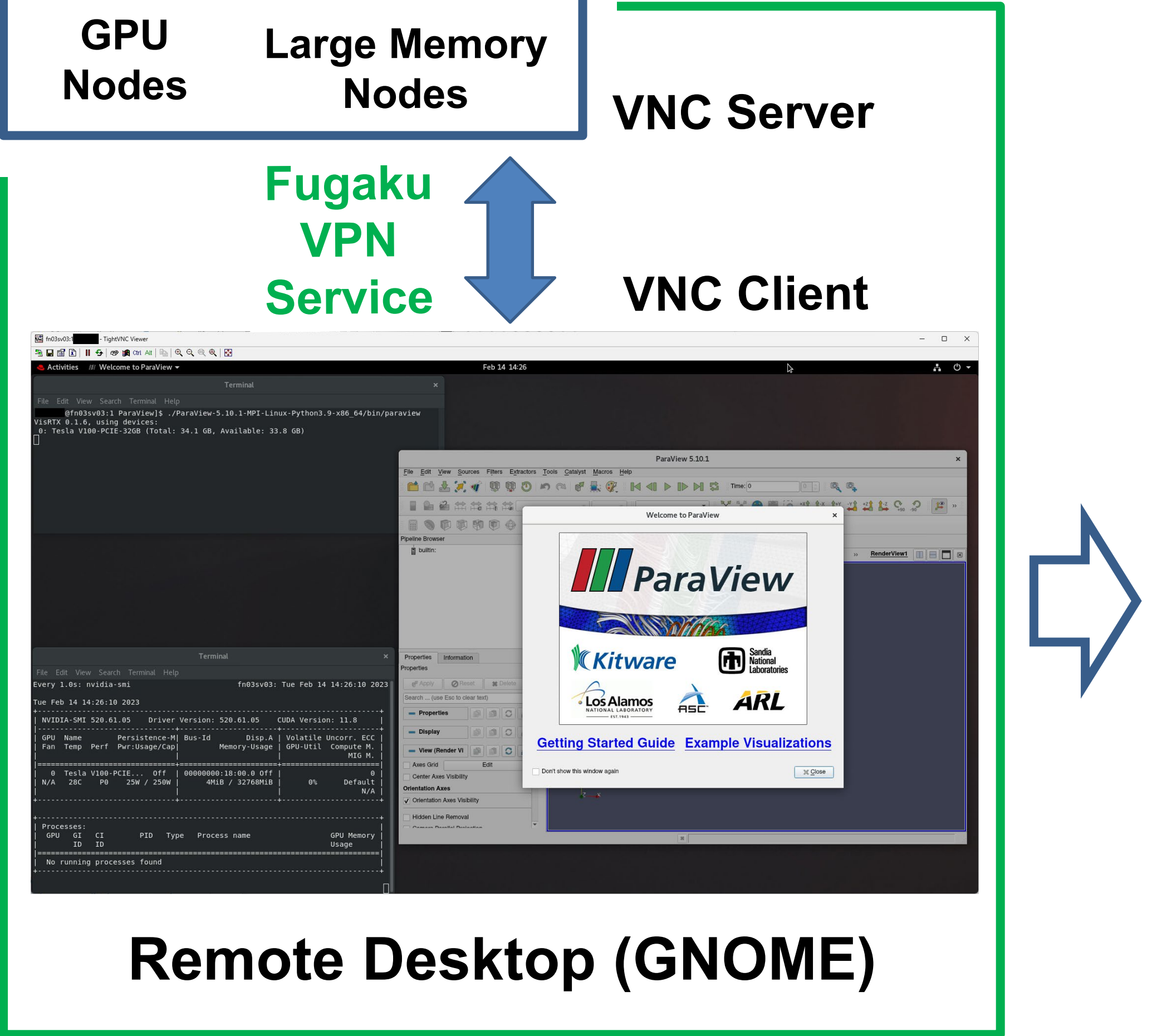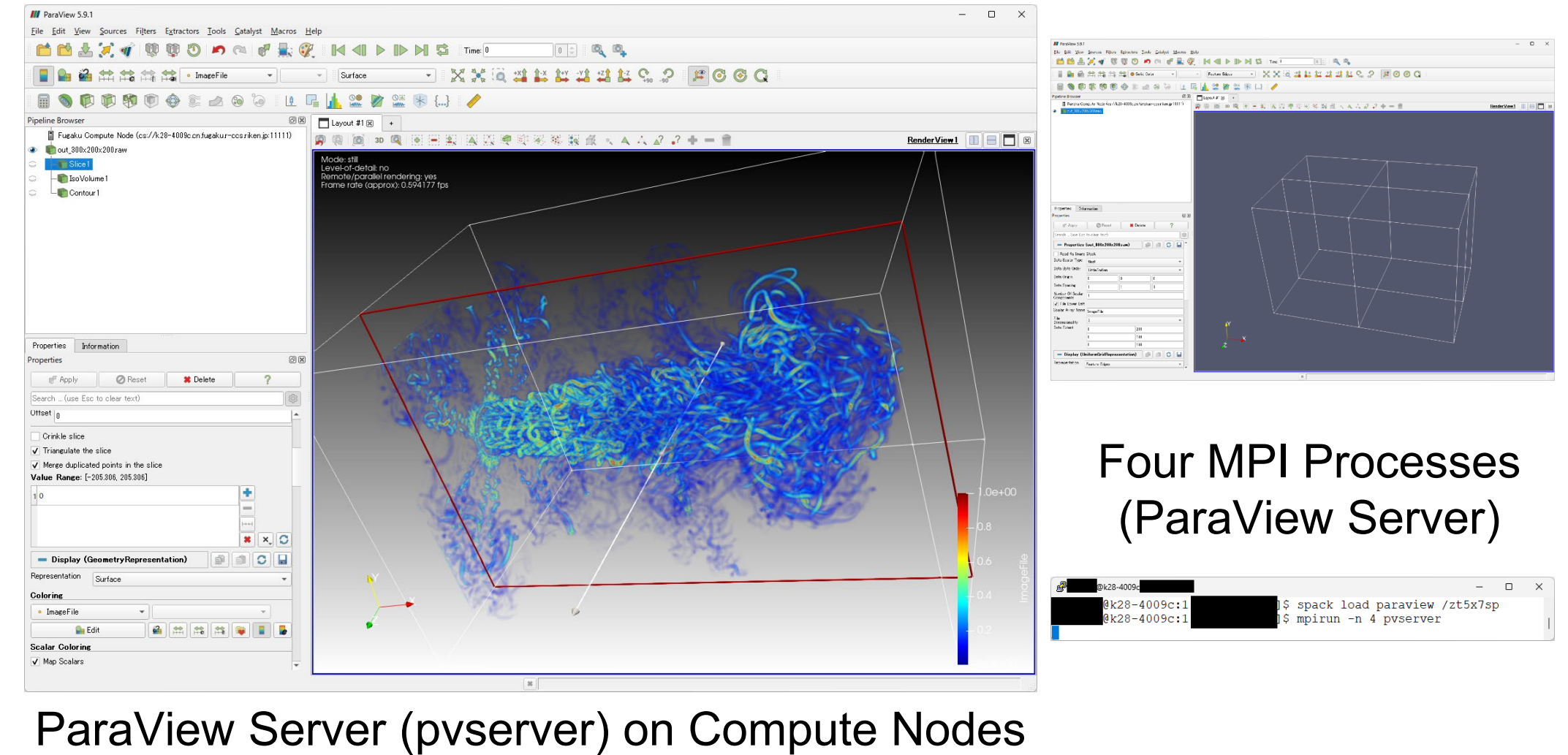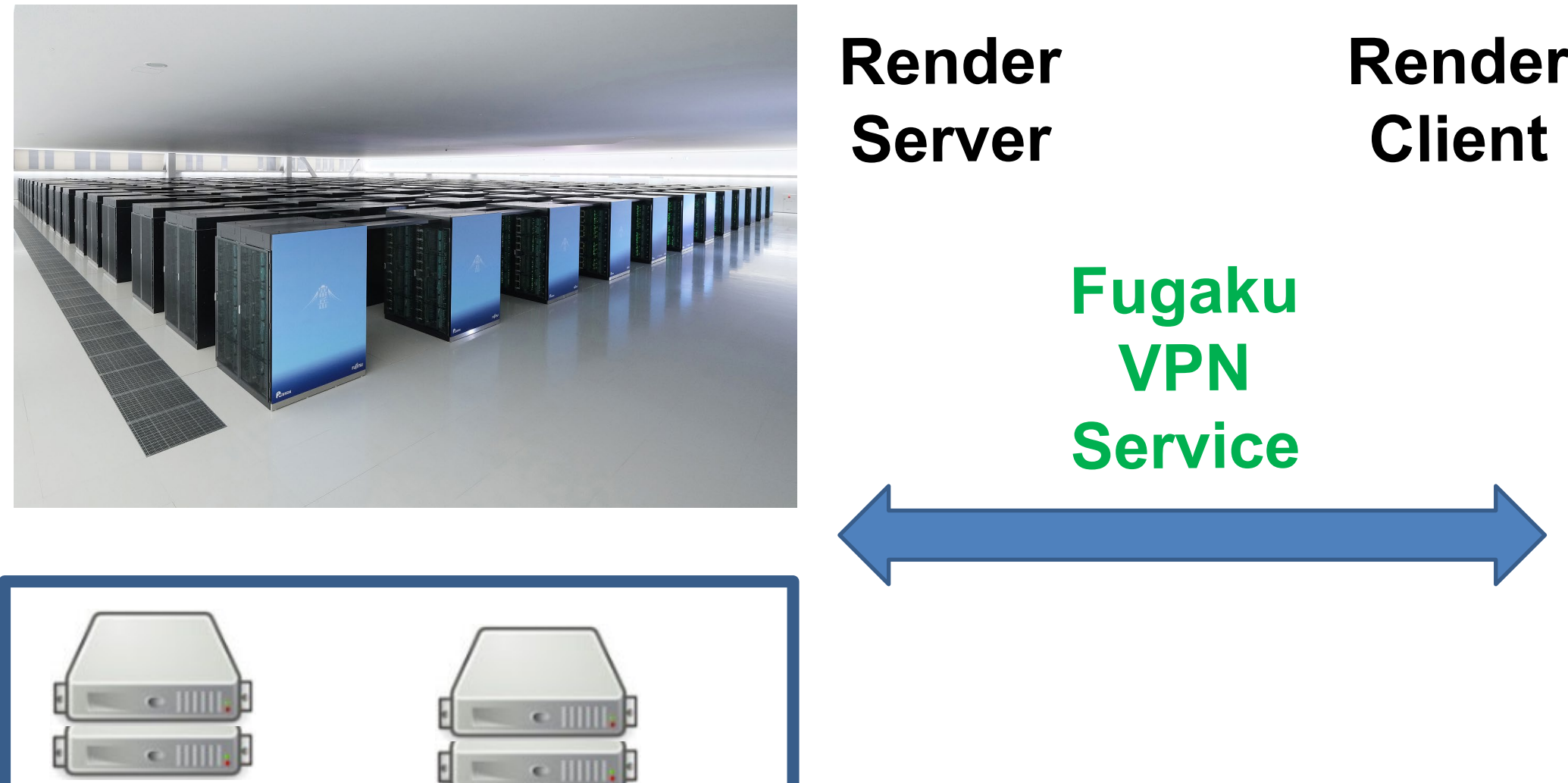Operations and Computer Technologies Division

Abstract

We have worked on a large data visualization and analysis environment for the Fugaku taking into consideration some lessons learned from the K computer [1]. The adoption of Spack package manager for the building and installation of open-source software (OSS) has greatly facilitated the deployment of visualization-oriented applications and libraries for different types of users, despite the existence of non-successfully built packages [2]. The Fugaku VPN Service has facilitated the use of Client/Server based distributed visualization by eliminating the need for setting up SSH port forwarding connection through the login nodes. It also facilitated the use of VNC-based remote desktop (GNOME) which also required SSH port forwarding setup for connecting to the VNC server on the pre/post environment. Regarding the remote desktop, although it is still in beta test mode, the Fugaku Open OnDemand service is expected to provide an even easy-to-use remote desktop (Xfce) environment for carrying out visualization and analysis tasks on the Fugaku.

Fugaku VPN Service

Direct connection to the Fugaku compute nodes and pre/post environment nodes without the need for setting up SSH port forwarding connection through login nodes

Client / Server Distributed Visualization

AVS/Express on a local PC

ParaView Server (pvserver) on Compute Nodes

Four MPI Processes (ParaView Server)

Transition Period

K Pre-Post Cloud

Virtualized Resources

Up to 96 vCPUs / 1 GPU / 320GB RAM / 8TB SSD
- 22 Intel Xeon Platinum 8168
- 4 NVIDIA Tesla P100
- 4 NVIDIA Tesla V100
- 105 TB SSD + 150TB HDD

GPU-less Nodes
There was no package manager, and some OSS applications and libraries (such as Mesa 3D) were ported almost at the end of the operational period.

There was no direct connection capability to the compute nodes

Local PC

K Computer Compute Nodes (SPARC64 VIIIfx)

Remote Desktop (GNOME)

Fugaku Open OnDemand

Easy-to-use Web browser based remote desktop

Using VisIt, AVS/Express, ParaView, Evince, and EoG on a GPU Node

4K2K-resolution Xfce Remote Desktop

References

[1] Jorji Nonaka and Naohisa Sakamoto "Lessons Learned from Large Data Visualization Software Development for the K computer", VisGap 2020 Workshop held in conjunction with EuroVis 2020, pp. 77–81, 2020.
[2] RIKEN R-CCS "List of Open Source Software which can be built on Fugaku", https://spack-mirror.r-ccs.riken.jp/oss/public

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Acknowledgements