



HPC ALLIANCE FOR APPLICATIONS AND SUPERCOMPUTING INNOVATION: THE EUROPE - JAPAN COLLABORATION



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DELIVERABLE D1.2

Recommendations for a sustainable cross access for the supercomputing facilities



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Glossary of Terms

Item	Description
ABCI	AI Bridging Cloud Infrastructure
AIST	National Institute of Advanced Industrial Science and Technology
AMED	Japan Agency for Medical Research and Development (AMED)
CoEs	European Centres of Excellence
EU	Europe
EuroHPC JU	European High Performance Computing Joint Undertaking
HPC	High Performance Computing
HPCI	High Performance Computing Infrastructure
JHPCN	Joint Usage/Research Center for Interdisciplinary Large-scale Information Infrastructures
JST	Japan Science and Technology Agency
KPIs	Key Performance Indicator
MEXT	Ministry of Education, Culture, Sports, Science and Technology of Japan
PI	Principal Investigator
RIKEN/R-CCS	RIKEN Center for Computational Science
R&I	Research and Innovation
SRG	Supercomputing Resource Group
WP	Work package





Executive Summary

European Union and Japan have signed a Digital Partnership in 2022, covering a wide range of areas including High Performance Computing (HPC). EuroHPC JU implements this Digital Partnership through the HANAMI project, focusing on international collaboration between Europe and Japan around HPC.

DGCONNECT and EuroHPC JU propose to establish cross-access to HPC supercomputers¹. This cross-access consists in opening the access of the EuroHPC supercomputers (pre-exascale and exascale) to the Japanese researchers who contribute to HANAMI and, on the other side, in providing to European researchers access to Japanese supercomputers.

The role of HANAMI, in this context is to investigate the current state of implemented agreements and policies between EU and Japan, which has been extensively described in the deliverable D1.1, and to provide suggestions for the elaboration of a strategy targeting the reciprocal exchange of HPC resources for European and Japanese scientific communities. The current deliverable is focusing on recommendations (towards policy makers and stakeholders owning the target supercomputers) on how to design cross access policies for the supercomputers in Japan and in Europe. The recommendations described in this document are inspired by our experience in setting agreements and Memorandum of Understanding between EU and Japan as well as by our usage of supercomputers in the context of international collaborations.

¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-eurohpc-ju-2022-inco-04-01>





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1.Introduction

The deliverable D1.1, delivered at month 3 of HANAMI, described the EuroHPC JU and Japanese supercomputers respective access policy. This step falls under the Task 1.3 of the Work Package 1, which is dedicated to describe the facilitation of reciprocal access for European and Japanese researchers to advanced Japanese and EuroHPC JU supercomputing resources.

This deliverable suggests recommendations to enable a cross access, should the concerned parties be interested in it. HANAMI provides its expertise and the outcome of experiences regarding cross-access implementations that were set up on a bilateral basis between research organizations members of HANAMI. HANAMI is already benefitting from these agreements that were in place before the project.

The first chapter outlines the current gap regarding a cross usage of supercomputers between European researchers and Japanese researchers. The second chapter gives a short overview of organizations in Europe and Japan that are in charge of supercomputers acquisition and/or allocation of computing resources. The last chapter is giving some recommendations regarding cross-access between supercomputers in Europe and in Japan.

This document is providing recommendation exclusively, and do not engage any entity or organization in implementing them. The recommendations provided in D1.2 are based on the mutual experience of HANAMI members in establishing such cross access within their own organization (not in the context of HANAMI project itself).



2. Using supercomputers in Europe and in Japan, gap analysis

The deliverable D1.1 gave an overview of the different access policies to EuroHPC JU and Japanese supercomputers that are used or targeted by the HANAMI consortium. For these supercomputers, we provided in D1.1 the current-cross access status, and identified the major differences between Europe and Japan related to supercomputers access.

We summarize in the table below these gaps:

Access	Europe	Japan
Eligibility	The EuroHPC JU supercomputers are accessible to a list of countries defined by the partners of either Digital Europe Programme or Horizon Europe. Unfortunately, Japan is not among this list, leading to the impossibility for Japanese researchers to submit as PI for supercomputing resources. However, Japanese researchers can access to the EuroHPC JU supercomputers, as users who contribute to a European PI project. This is restrictive in the context of HANAMI, which promotes Europe/Japan collaboration around HPC	The Japanese supercomputers are eligible for any researchers, including the non-Japanese one. The access eligibility is sufficiently flexible to accept international research academic researchers as PI. The same applies for the users associated to a project.
Schedule	The fiscal year in Europe is from January to December. The computing resources are allocated through regular calls, which are aligned with Europe fiscal year.	The fiscal year in Japan is from April to March. The computing resources are allocated through regular calls, which are not aligned with Europe fiscal year.
Type of access	EuroHPC is proposing several access tracks, adapted for the research and proposing a progressive approach (from benchmark to large scale runs). EuroHPC proposes also several “kind” of access, such as “traditional HPC”, Artificial Intelligence (AI) and Quantum Computing (QC).	Japan is proposing several access tracks, adapted for the research and proposing a progressive approach (from benchmark to large scale runs). HANAMI is not aware of the other “kind of access”, such as Artificial Intelligence (AI) and Quantum Computing (QC)

Table 1: Summary of European and Japanese differences regarding supercomputers access

Supercomputers cross-access is key in the context of an international collaboration:

Collaborations on scientific applications (whether we refer to co-development, portability and/or optimization of codes on specific architectures) require that the researchers access the



same or at least very similar supercomputers platform. The researchers need to have access to similar hardware and software environment. With such a complex architectures, software really matters and a slight change in the configuration settings may impact the application performance.

Having a cross access of supercomputers from both EU and Japan regions would ensure that scientists are working together within the same hardware and software environment.



3. An overview of the European and Japanese ecosystems for the HPC supercomputers

3.1 European ecosystem

In Europe, several supercomputers (tackling HPC and/or Artificial Intelligence (AI) frameworks) are procured by the EuroHPC Joint Undertaking (EuroHPC JU), which is a legal and funding organization.

EuroHPC JU is publishing calls for procurement to host and operate a supercomputer, to which eligible countries can apply. These supercomputers are then hosted and managed by a one of the countries associated to the EuroHPC JU, and part of the computing resources (the one under EuroHPC JU supervision) are allocated through the EuroHPC JU Access calls².

The public members of EuroHPC JU are listed below:

- The European Union (represented by the Commission),
- Member States and Associated Countries that have chosen to become members of the Joint Undertaking: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Türkiye and United Kingdom.

Establishing a cross-access between an entity (other than EuroHPC JU) with EuroHPC JU supercomputers would require an agreement with the EuroHPC JU members. The EuroHPC JU members gather regularly through governing board meetings, where decision are voted and later, implemented. Decisions and meeting summaries are accessible online through the EuroHPC JU website³.

3.1 Japanese ecosystem

In Japan, several supercomputers are hosted and operated by research organizations. Two Japanese ministries are investing in supercomputers resources:

- The Ministry of Economy, Trade and Industry (METI)⁴
- The Ministry of Education, Culture, Sports, Science and Technology Japan (MEXT)⁵

The supercomputers of interest for HANAMI were listed within D1.1. Among these supercomputers we can quote:

- METI: as an illustration the National Institute of Advanced Industrial Science and Technology (AIST) has developed a supercomputer intended for generative AI

² https://eurohpc-ju.europa.eu/access-our-supercomputers/eurohpc-access-calls_en

³ https://eurohpc-ju.europa.eu/documents_en?f%5B0%5D=document_category_document_category%3A9

⁴ <https://www.meti.go.jp/english/>

⁵ <https://www.mext.go.jp/en/>



development. Under the supervision of METI, this supercomputer will be available through a cloud service to domestic companies tackling Generative AI development.

- MEXT: Fugaku is one of the most powerful supercomputers in the world. Fugaku is hosted and operated by RIKEN RCCS. Since 2020, the MEXT has implemented a “Program for Promoting Research on the Supercomputer Fugaku”, allowing winners to compute and exploit the Fugaku performances.

Accessing to high end supercomputers in Japan requires to submit to calls for proposal, either handled by the MEXT (through Fugaku’s specific program, or other programs such as HPCI or JHPCN, see D1.1).

On the other hand, targeting specifically the AIST’s supercomputer resources might require to go through METI calls for proposals.



4. Recommendations and best practices

4.1 Identify the targets

In the HANAMI's vision supercomputers must be identified so that both geographical regions can complement each other. As an illustrative example, Fugaku supercomputer has a very different architecture compared to the EuroHPC supercomputers, with the exception of Deucalion (though the hardware is not exactly the same).

Fugaku proposes a very large partition with A64FX CPUs. The A64FX CPU is an Arm architecture, and its design is closed to the future European Processor (designed by the European Processor Initiative – EPI).

EuroHPC proposes a large panel of different architectures within its petascale, pre-exascale and exascale supercomputers. On the other hand, the Japanese ecosystem is proposing architectures different from the EuroHPC supercomputers.

The selection of distinct architectures is a major point to guarantee that scientific applications can take advantage of key processors and/or graphic process units and, in doing so, ensure the portability of the application software.

4.2 Identify the parties

In order to set up an agreement between the parties, these must be identified properly.

The European ecosystem:

- **Agreement with multiple European Research Organization:** In that case the rules of engagement requires the subscription (by legal signature) by each organization. Such agreements are possible but imply that the research organization themselves get engaged, and only a limited number of supercomputers would be involved.
 - A first level of complexity is due to the multiplicity of signatures;
 - A secondary level of difficulty emerges from the fact that supercomputers accesses would be driven by the national regulations, which may be more restrictive than the EuroHPC JU ones (see D1.1).
- Agreement with European offices: Within this hypothesis, the concerned offices may be the EuroHPC JU and the Directorate-General for Communications Networks, Content and Technology (DGCONNECT).
 - Within this hypothesis, an agreement would involve the EuroHPC JU supercomputing resources and therefore the accesses would be under the rules and regulation of EuroHPC JU. The cross access could (if desirable) then embed all EuroHPC JU supercomputers.

The Japanese ecosystem

- In the hypothesis that the agreement would target a group of supercomputers (such as supercomputers within HPCI umbrella, see D1.1), then the access is provided by the MEXT. The rules and regulation of the MEXT would apply. In that case, the MEXT would be involved in the signature agreement.



- In the hypothesis that the agreement would target one specific supercomputer, then several possibilities apply
 - If the access is provided by the research organization, then the rules and regulation of the research organization would apply and would be involved in the signature agreement.
 - If the access is provided by the relevant ministry, then the rules and agreement should be under the supervision of the relevant ministry.

4.3 Identify the purpose

Access

HANAMI is proposing to facilitate a reciprocal access of supercomputers between Europe and Japan⁶.

The cross-access could be designed in the framework of HANAMI, therefore embedding the HANAMI parties only, or possibly tackle a larger framework (beyond HANAMI). In the second case, the target would be more ambitious, and the agreement more complex.

Such agreement would open the possibility (or enlarge it, see D1.1) to have Japanese researchers as Project Investigators (PI) within EuroHPC JU computing resources allocation (as well as the opposite).

Computing hours

It is preferable to provide, additionally to the access as mentioned above, a provision of supercomputing hours (for all supercomputers that would be involved within the cross access agreement). The supercomputing hours resources would be dedicated to target projects, such as HANAMI for example, or any further project of this kind.

This would prevent the researchers' teams (in Europe and in Japan) to apply to many calls for projects (regular calls for project to obtain computing hours on the target supercomputers), leading to a multiple cascade funding that would not be aligned with the initial HANAMI project.

In the context of HANAMI, the supercomputing resources required to complete the scientific work program are detailed. In the context of a larger framework, beyond HANAMI, this could be a generalized cross-access with its own call for proposal for computing hours.

Duration

Providing such cross-access must be limited in time. As a return of experience, bilateral cross-access agreements between European and Japanese research organizations are about 3 to 5 years long. Considering that most of the supercomputers lifetime is about 5 years, proposing a cross-access beyond 5 years would not necessarily make sense.

⁶ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-eurohpc-ju-2022-inco-04-01>



5. Conclusion

HANAMI is paving the way for EuroHPC JU international collaborations around HPC, as this is the first of its kind. One of HANAMI mission is to facilitate the reciprocal access to supercomputing facilities across both regions, namely Europe and Japan.

To this end, HANAMI has provided a survey of supercomputers within European Union and Japan and described the differences between in accessing the supercomputing platforms, awarding the computing hours, and proposed a gap analysis in D1.1.

To fulfil its mission, HANAMI completed D1.1 with more in-depth gap analysis regarding the supercomputers rules and regulations, and some advices if both EU and Japan would like to implement a cross access policy.

In the past, initiatives (in the context of EUROfusion) succeeded to implement cross- accesses. Researchers from Europe and Japan could compute on both supercomputers, and the EUROfusion initiative even conducted in the past a mutual acquisition of a supercomputer (namely Helios).

Since 2024, the European Union and Japan reached a milestone in their cooperation as formal negotiations have been launched on Japan's association to Horizon Europe, the EU's research and innovation program⁷. If the negotiations succeed, then implementing supercomputers cross access would be eased. HANAMI can help both geographical regions to discuss, provide feedback, and offer the outcome of experience accumulated regarding the benefits of a Europe-Japan collaboration.

⁷ https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/eu-and-japan-launch-formal-talks-association-horizon-europe-2024-11-29_en