

Material 1

Overview of HOKUSAI BigWaterfall2(HBW2) and operation policy

Information Systems Division
RIKEN Information R&D and Strategy
Headquarters

Today's Overview

1. HOKUSAI BigWaterfall2 (HBW2) Overview and Operation Policy (Material 1)
 - HBW2 resource provision to HPCI
 - Overview of HBW2 system
 - Operation policy of HBW2 system
 - Trial operation, transition from HBW, regular operation, usage fee

2. Overview of HPCI and application process (Material 2)
 - HPCI resources and HPCI project
 - Application process for HPCI project

HBW2 RESOURCE PROVISION TO HPCI

About HPCI

◎High-Performance Computing Infrastructure (HPCI)

- A shared computational environment that connects major supercomputers as well as storages of universities and research institutions in Japan via high speed networks
- HPCI realizes the scientific and technological computing environment where a wide range of users in Japan can access national HPC resources efficiently
- HPCI resources are available to researchers who apply for access to the HPCI management organization and have their proposals reviewed and approved.

◎HPCI Computing resources

◆Tier 1

- Fugaku

◆Tier 2

- Computing resources of universities and research institutes nationwide

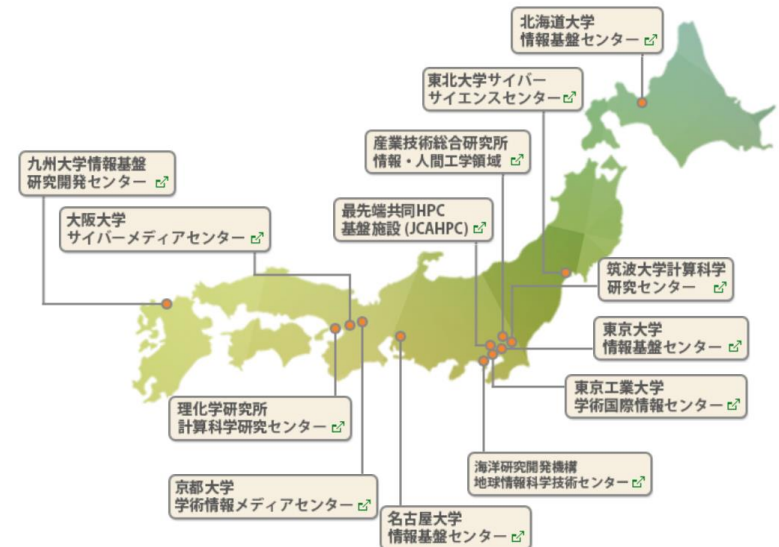


図1：HPCIシステムを構成する計算機資源を提供するシステム構成機関 (2021年度)

Providing HBW2 resources to HPCI

President Gonokami presented the following policy for the start of procurement of HBW2.

- Actively participate in HPCI and promote its use.
- Provide HBW2 resources to the HPCI system.
- While implementing these measures, RIKEN should consider what its computational resources should be in the future.。

Even as we move forward with the **TRIP initiative**, we aim to diversify the computational resources available to RIKEN researchers and to collaborate with a variety of researchers, with the following objectives

- Enable HPCI computational resources to be considered as a choice of computational resources.
- Not only to use them unilaterally, but also to be actively involved in HPCI, including providing resources.

Implementation measures → Details explained in the material 2

1. Providing HBW2 resource to HPCI
 - Provide HBW2 as an HPCI resource from the FY2024 application period.
2. Support for use of Fugaku's paid use
 - Full subsidy for usage fees for paid proposals at Fugaku

OVERVIEW OF HBW2 SYSTEM

Operation schedule of the Shared Use Computers HOKUSAI

- Supercomputer
 - October 2017 – November 2023: HOKUSAI BigWaterfall(HBW)
 - Half of MPC ended operation at the end of July 2023
 - December 2023 – November 2029: HOKUSAI BigWaterfall2 (HBW2)
 - Test operation until the end of March 2024
- Data Science Infrastructure
 - June 2020 – May 2026: HOKUSAI SailingShip(HSS)

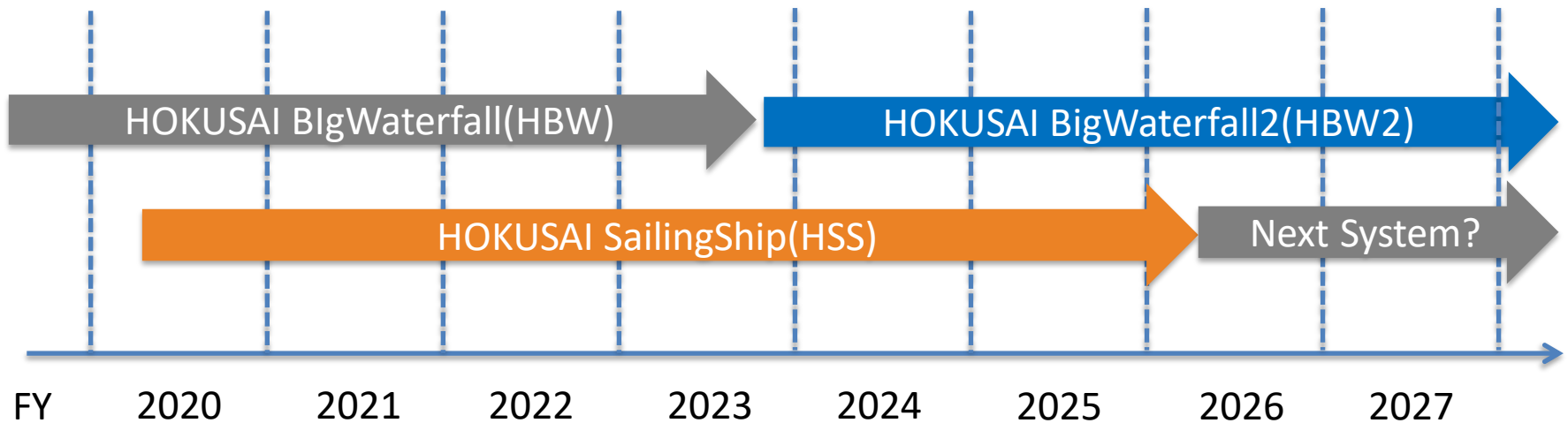


Image of HOKUSAI after introduction of HBW2

Supercomputer

HOKUSAI-BigWaterfall2(BW2)

Data Science Infrastructure

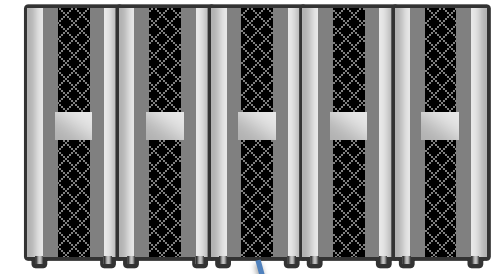
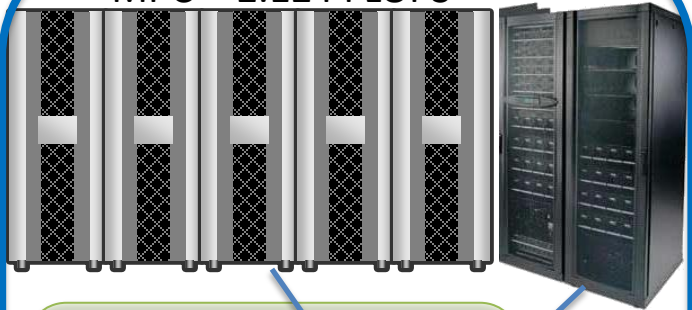
HOKUSAI-SailingShip (SS)



MPC : 2.12 PFLOPS

LM

CPU farm: 1.62 PFLOPS



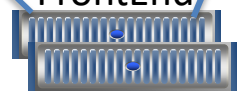
High Performance Network



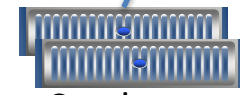
Data Network



FrontEnd

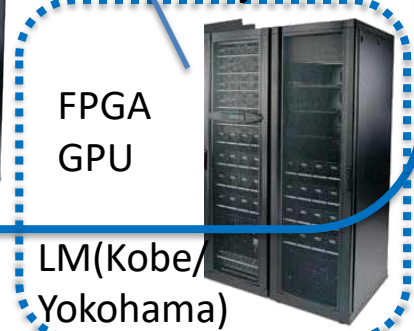


OpenStack Management Server



BW2 subsystem

FPGA
GPU



Cold storage

OFS(9.8 PB)

LM(Kobe/
Yokohama)

Data farm (30 PB)

HBW2 System

- MPC
 - Total theoretical FP(64bit) computing performance: **2.12 PFLOPS**
- Node performance
 - Theoretical FP(64bit) computing performance: 6.8 TFLOPS
 - Intel Xeon next-generation CPU(1.9 GHz, 56 cores) x 2
 - Memory
 - HBM2e: 128 GiB、**3260 GB/s**
- High Speed Network (HPN)
 - Infiniband NDR: **50 GB/s**
 - Quarter of full bisection between nodes including MPC
 - Full bisection otherwise
- Shared Storage
 - Lustre file system: **9.8 PB、400 GB/s**
- Large Memory Server (LMC)
 - 2 nodes, 3 TiB/node

Comparison of HBW and HBW2

	HBW	HBW2
FLOPS	2.5 P	<u>2.12 P</u>
Total core number	<u>33,600</u>	<u>34,944</u>
Node number	840	312
Memory	96 GiB、255 GB/s	128 GiB、 <u>3260 GB/s</u>
LMC	2ノード、1.5 TiB/ノード	2ノード、3 TiB/ノード
Communication performance	IB EDR (12.5 GB/s)	IB NDR (50 GB/s)
Shared storage	5 PB	9.8 PB
Job execution by containers	None	Singularity

HBW subsystem is being procured separately

- Wako: GPU servers, FPGA servers
 - 4 GPU servers : A100 x 4
 - 2 FPGA servers : IA-840F x 2
- Kobe/Yokohama: Large memory servers
 - 1 node each: 8 TiB
- Scheduled to start operation in April 2024

OPERATION POLICY OF HBW2 SYSTEM

HBW Trial Operation

- Trial operation will be conducted from December 2023 to March 2024.
 - Usage application for the trial operation is separate from that for HBW.
 - Usage report for HBW will be received from mid-October to early November.
 - No usage report and usage fee for trial operation
- Classification of project
 1. (Internal RIKEN) project
 - **Each proposal can use 5% of the total computing resources of MPC**
 - If computing time is used up, low-priority execution is possible
 - Large memory servers can be added up to 20%
- Storage (same as in regular operation)
 - Home (/home) area is 4TB per account
 - Data (/data) area is allocated on a project basis
- Data transfer from HBW
 - HBW data (home and data area) is being backed up on HSS
 - Users should move data from HSS to HBW2 by themselves during the trial operation period using scp, etc.

HBW2 Regular Operation

- Regular operation will be start from April 2024
- Classification of project
 1. (Internal RIKEN) project
 - **Each project can use 1% of all computing resources of MPC free of charge**
 - Additional computing time can be added for a fee
 - If computing time is used up, low-priority execution is possible
 - Large memory/GPU/FPGA servers can be added up to 20%
 2. HPCI project
 - **Plans to provide about 50% of computing time to HPCI**
 - Each project is up to 10%
 - Users can apply for HPCI projects and use HBW2 if they are accepted
 - No user burden for usage fee (paid by HPCI to RIKEN)

Small-scale users (less than 1%) will still be able to use the system
Above mid-scale users (more than 1%) can use HPCI project, paid use or execution with low priority.

HBW2 Usage Fee

- From April 2024 when HBW2 main operation starts
 - No change in HSS
- HBW2 computing resources are **720 core hours for 300 JPY**.
 - For internal RIKEN project, 1% of all computing resources and low priority use are free of charge.
 - For HPCI proposals, no burden on the user.
 - Example: 403,200 JPY for 1 additional node (112 cores) for 1 year (approx. 970,000 core hours)
 - $112 \text{ cores} \times 24 \text{ hours} \times 360 \text{ days} / 720 \text{ core-hours} \times 300 \text{ JPY} = 403,200 \text{ JPY}$
- HBW data area is **180 JPY for 1 TB for 1 month**
 - Home area per account (4 TB) is free of charge.
 - Example: 10TB of data area for 1 year is 21,600 JPY
 - $10 \text{ TB} \times 12 \text{ months} \times 180 \text{ JPY} = 21,600 \text{ JPY}$

*Usage fees are set so that usage fees cover about 25% of the total annual payment.

The total annual payment for HBW2 is about 300 million JPY

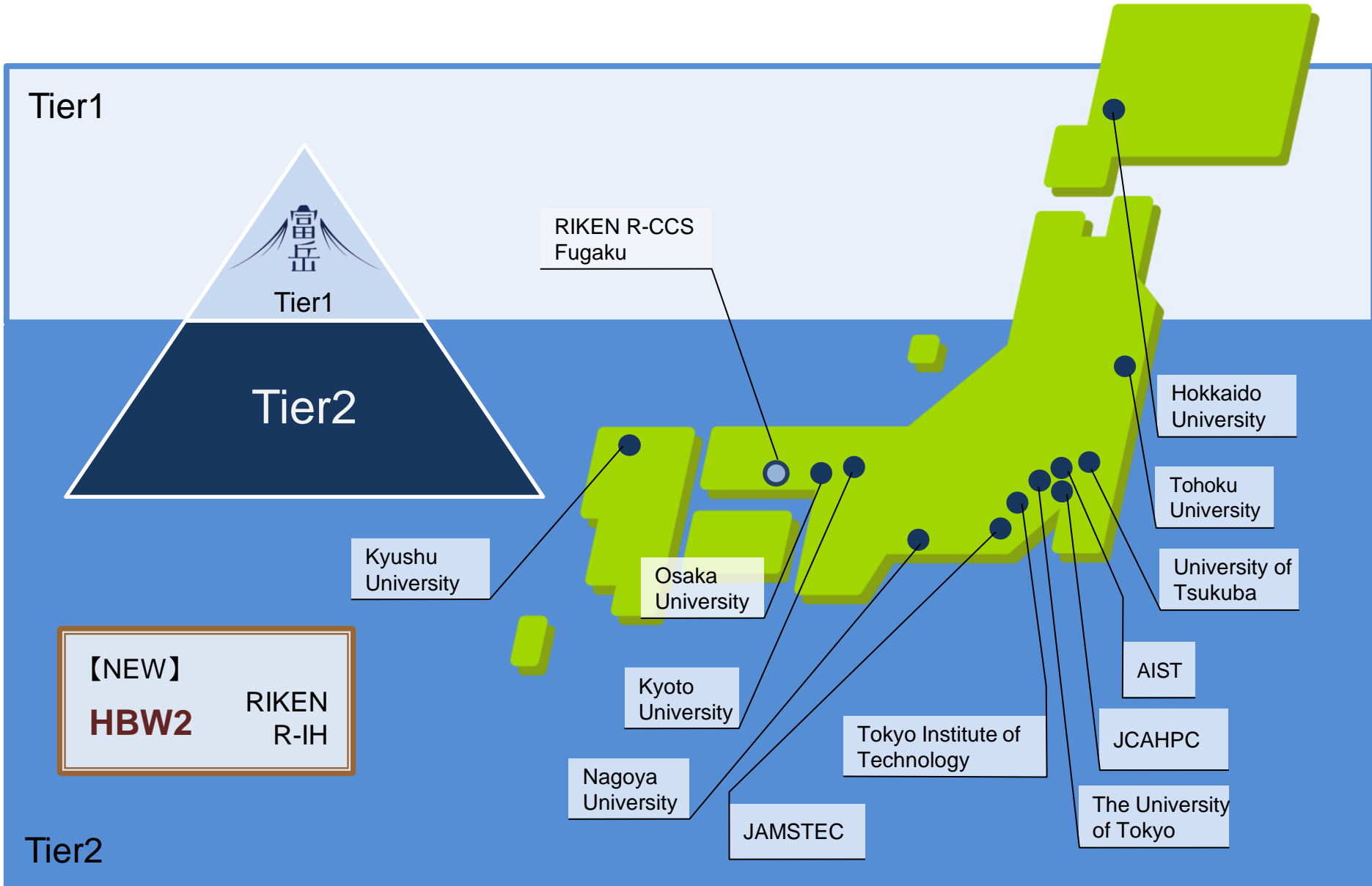
- Hardware leasing, maintenance and support, etc.
- Excluding location and electricity cost

Material 2

HPCI Overview and Application Process

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Providers of resources in the HPCI and their Tier



HPCI Project Categories

	Project	Opening of the Call	Usage Fee	User Report	Characteristics
Tier 1	General Access(Fugaku)	2	Free	D	Projects involving general research themes
	Junior Researchers(Fugaku)	2	Free	D	Project for researchers under 39 years old
	Small Scale for General Access	4	Free	D	Projects in need of resources with a small scale
	Small Scale for Junior Researchers	4	Free	D	Projects in need of resources with a small scale
	Trial for General Access	A	Free	D	Projects for code validation and preparation
	Fee-based Access for General Access	A	Charged	D/ U	Projects which can use additional services for a fee Mainly targeting academia
	Fee-based Trial Access for General Access	A	Charged	D/ U	Projects for code validation and preparation
	Industrial Access	2	Free	D	Projects to demonstrate the effectiveness and usefulness of highly parallel simulation
	Small Scale for Industrial Access	A	Free	D	Projects in need of resources with a small scale
	Trial for Industrial Access	A	Free	D	Projects for code validation and preparation
	Fee-based Access for Industrial Access	A	Free	U	Projects which can use additional services for a fee Mainly targeting industry
	Fee-based Trial Access for Industrial Access	A	Free	U	Projects which carry out preparatory work on Fugaku and can use additional services for a fee.
Tier 2	General Access (HPCI)	1	Free	D	Projects involving general research themes
	Junior Researchers (HPCI)	1	Free	D	Project for researchers under 39 years old
	Industrial Access (HPCI)	1	Free	D	Projects to demonstrate the effectiveness and usefulness of highly parallel simulation
	HPCI Trial for Industrial Access	A	Free	D	Projects to solve problems on the HPCI System and to determine its availability
	HPCI Fee-based Access for Industrial Access	A	Charged	U	Projects to solve industrial problems with keeping the confidentiality in return for paying usage fee
Storage	HPCI Shared Storage (Sharing Use)	4	Free	D	Projects to share and analyze data among project members or community members

Tier1

Tier2

LEGEND

Opening of the Call
 A:All year
 1:Periodic(once per year)
 2:Periodic (twice per year)
 4:All year(Screening Quarterly)

User Report
 D:Disclosed
 U:Undisclosed

Yellow shading:
 Project Called for in HBW2

Application for HPCI project

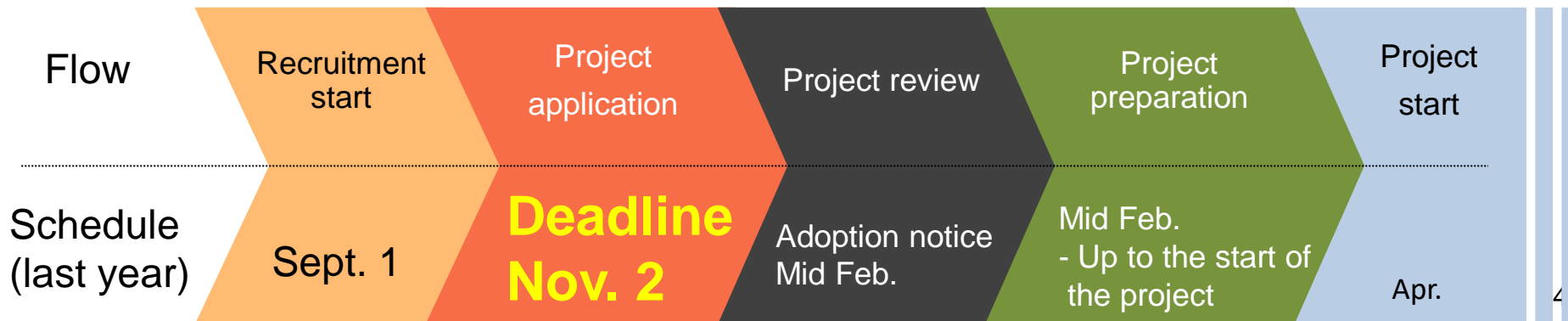
◎Type of project

- Periodic: General/Young(under 39 years old)/Industrial access
Twice a year for Fugaku, once a year for other than Fugaku
- All year: Trial and fee-based accesses, etc.

◎Features

- Simultaneous application to multiple computing resources is possible.
- Peer review by experts
- No user fees (paid by HPCI to each institution)
- Reports will be disclosed to the public (can be undisclosed for fee-based project)

Schedule for the first call (the second call is only Fugaku and after six months later)



HBW2 HPCI project

Form of provision : Provided as second tier shared computing resources

Provided resources : Approximately 50% (1,350,000 node-hours) of the total

HBW2 (MPC is 2,695,680 node-hours per year) will be provided.

Offering Period : Periodic (once per year, offering period from September to October)

Start of provision : From the fiscal 2024 subscription period

Usage fees : No cost to the user (computing resources + storage)

Usage report : Disclosed

©HBW2 Application Projects

Projects	Available resources per project (node-hours(NHs))	Storage	Characteristics
General Access (HPCI)	S:105,000 NHs (4% of total HBW2) L:270,000 NHs (10% of total HBW2)	Home area 4TB + Data area Max. 50TB	Projects involving general research themes Each classes, S & L, reviewed separately
Junior Researchers (HPCI)	S:81,000 NHs(3% of total HBW2)		Project for researchers under 39 years old S class only
Industrial Access (HPCI)	S:105,000 NHs (4% of total HBW2) L:270,000 NHs (10% of total HBW2)		Projects to demonstrate the effectiveness and usefulness of highly parallel simulation Each classes, S & L, reviewed separately

[Reference] Flow chart up to the start of the project

Project application

(1) Preparation of proposals

- Each member has to acquire the HPCI-ID and project representative prepares the proposal application by entering the HPCI-IDs.

(2) Submission of proposals

- Project representative submits the proposal application form on the web
 - application form ... Provide a summary of the research and resources used
 - Program Information ... Calculation of required computing resources

Project review

(1) Identity vetting

- Complete face-to-face identity vetting at Nearby Identity Vetting Center or remote identity proofing using the web conferencing system.

Project preparation

(2) Creation of HPCI account and Local account

(For HBW2, existing users will use their existing accounts as local accounts.)

◎Accounts required for HPCI projects

HPCI-ID : Unique ID that is assigned specifically to each HPCI user

HPCI Account : For to access to HPCI's web service

Local Account : Account in each computing resources

HPCI Related Information

The second Call for Proposals for Support for use of Fugaku Fee-based Access and Fee-based Trial Access for General Access proposals

Applications are now being accepted for the fee-based Fugaku Proposals, which subsidizes all usage fees.

***Proposals that were not selected for the "Fugaku" General Access B-term application are also welcome.**

Acceptance Period	From August 14 to August 31,13:00
Subject	“Fugaku” Fee-based Access for General Access proposals, Fee-based Trial Access for General Access proposals (Full subsidy)
Application documents	<ul style="list-style-type: none">• Application Form (Additional Sheet 1) Please obtain the respective documents from the “Call for proposals of Fugaku Fee-based Access Projects / Fee-based Trial Access Project”.• Utilization Support Review Confirmation Form Utilization Support Review Confirmation Form

[Reference]

- HPCI Portal Project Categories(Overview of Project Categories)

https://www.hpci-office.jp/en/using_hpci/project_categories_overview

- HPCI Quick Start Guide

https://www.hpci-office.jp/materials/hpci-startguide_e.pdf

- The second support for use of Fugaku

<https://rbs-i-intra.riken.jp/en/research/ext-res/supportfugaku2/>