6 Summary

(1) Item classification number 14, 71, 27

(2) Goods planned for implementation and their quantities Super computer system (One set)

(3) Procurement method Purchase or Lease or a combination of these

(4) Purpose of this implementation consideration CFD is not the only field that uses the technique of HPC. Rather, the scope of usage of HPC is expanding to fields such as Earth Observation data processing and AI platform data processing. In the wake of these dramatic changes, the super-computers of JAXA will be re-defined as JAXA HPC platform, and the roles will be broadly classified into the following three types.

① Flagship machine specialized in the field of aerospace

② Data center functionality that acts as a large-scale data analysis platform

③ Research and development platform that caters to new needs With this background and future forecast, we are considering upgrading the existing super computer system to establish a JAXA HPC platform that will ensure the implementation of projects planned for the fourth medium-term plan of JAXA.

(5) Planned implementation consideration period From October 2019 onwards

(6) Basic requirements that are considered necessary for procurement The HPC platform planned for implementation is a comprehensive integrated system consisting of an HPC system, general-purpose system (for Capability Computing), general-purpose system (for Capacity Computing), integrated front-end system, data center management system, file system, non-stop operational system, advanced system, an archiver system, operation／management／control system, interconnection network, Storage Area Network, High speed Ethernet backbone, and related software. The basic requirements needed for this system are as stipulated below.

A HPC System

Primary purpose

① A system for performing massive parallel processing, long-duration computation, and data processing.

B General-purpose System (For Capability Computing)

Primary purpose

① A system for resolving large-scale problems (that require parallel processing) in the shortest time possible.

② A system for processing jobs that require large main memory storage capacity for a single process.

C General-purpose System (For Capacity Computing)

Primary purpose

① A system for solving small-scale problems (that do not require parallel processing) by processing large quantities of data per unit time.

② A system for processing jobs that require large main memory storage capacity for a single process.

D Integrated Front End System

Primary purpose

① System that performs activities such as program development, tuning operations, job execution, file management, and satellite data processing workflows.

E Data Center Management System

Primary purpose

① A system that realizes data management functionality of the data stored in the file system and archiver system.

F File System

Primary purpose

① A system that reads and writes the files that are used in computation and data processing in the computer department.

② A system that stores the files used in file management operations (such as move, delete, content checking) that are performed by users through the integrated front-end system.

③ One of the systems that store files used in operations that utilize the functionality of the data center management system. (The other system is the archiver.)

G Non-stop Operational System

Primary purpose

① A system that offers steady realization of rapid response operations (for example, calculation of defects) and continuous operations (for example, earth observation data processing and project support computation) on the HPC platform.

H Advanced System

Primary purpose

① A system for realizing holistic acceleration of all JAXA projects by using futuristic architecture in a pioneering manner.

I Archiver

Primary purpose

① A system for storing and distributing a large number of／large-size files.

② A system for temporary storage／movement of files on file systems.

③ A system for migrating large file assets on the existing J-SPACE.

J Operation／Management／Control System

Primary purpose

① Real-time monitoring, reporting, and control of the entire HPC platform.

② Management and control that includes automatic operation through handshake between existing air conditioning／cooling facilities and the HPC platform.

③ Job scheduling

④ Perform activities related to the HPC platform resources, job operation ／ management ／ statistical information collection, and storage／analysis.

⑤ Action (behavior) checking environment before applying to the actual operational environment.

K Interconnected Network

Primary purpose

① A network that interconnects the nodes and is used to perform activities such as MPI communication and in-situ／in-transit visualization communication.

L Storage Area Network

Primary purpose

① A network that connects nodes and file systems, and performs communications related to file operations (such as read, write, and metadata operations).

M High-speed Ethernet Backbone

Primary purpose

① A network that connects collaborating organizations internal and external to the HPC platform and realizes high-speed Ethernet communication.

N Related Software

Primary purpose

① Group of software applications for realizing all functionalities ranging from HPC platform-based operation management to user job processing

N-1 Operating System (OS)

N-2 Software for connecting with other computers

N-3 Compiler

N-4 Parallel Library such as MPI

N-5 Scientific and Technical computing library

N-6 in-situ／in-transit Visualization Library

N-7 Development assistance tools

N-8 Commercial application

N-9 Open source software

N-10 Job management

N-11 File management

N-12 Operation management

P Non-functional requirements for the integrated system

P-1 Flexibility and consistency of System configuration／Operation

P-2 Reliability, Availability, Maintainability