

Outline of the IFERC-CSC Activity

IFERC-CSC活動の概要

Yasutomo Ishii
石井康友

Japan Atomic Energy Agency

2-166, Omotedate, Obuchi, Rokkasho-mura, Kamikita-gun, Aomori, 039-3212, Japan
日本原子力研究開発機構 〒039-3212 青森県上北郡六ヶ所村大字尾駒字表館2番166

International Fusion Energy Research Centre (IFERC) project has been started on 1st July 2007. The Computational Simulation Centre (CSC) is the one of three IFERC sub projects. The mission of IFERC-CSC is to exploit large-scale and high performance fusion simulations. For performing such the mission, the supercomputer with a peak performance of 1.3 PF will be installed in IFERC site at Rokkasho, Japan before January 2012. After the lighthouse projects and test runs until 31st March 2012, the normal operation will start from 1st April 2012 to 31st December 2016.

1. Schedule and high performance computing system of the IFERC-CSC

Based on the agreement between JA and EU for the Broader Approach activities in the field of fusion energy research (BA), IFERC project has been started on 1st July 2007. The International Fusion Energy Research Centre (IFERC) project consists of three sub projects; DEMO R&D and design, Remote Experimentation Centre (REC) and Computational Simulation Centre (CSC). Objective of the IFERC-CSC is to provide for JA and EU scientists a high performance computing system for large scale simulation activities on magnetic confinement fusion plasma, prepare scenarios for ITER operation, predict the performance of the ITER facilities and contribute to DEMO design.

The CSC activity is divided into two phases (table I). The first phase is the preparation and procurement phase, which is from 2007 to 2011. The second phase is the operation phase, which is from 2012 to 2016. Until the end of 2011, the high performance computing system (HPC) will be installed for the CSC in the IFERC site at Rokkasho, Japan.

IFERC Project	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Computational Simulation Centre	PHASE ONE									
Procurement Process of CSC HPC	Procurement Installation Operation									
SWGs (Special Working Groups) & StC	SWG-1 SWG-2 Standing Committees									

Table I. Schedule of the IFERC-CSC and related working groups

The HPC and peripheral equipments are procured by F4E (Fusion for Energy), which is the EU implementing agency, and F4E has selected Bull SAS (France) as the computer vendor for the CSC

HPC. The CSC HPC will equip Intel Sandy-Bridge EP (8 cores) and consists of 8820 processors and 70560 cores, and available memory is 256TB. The interconnection network is Infiniband IB QDR, non-blocking. Topology is fat-tree and the connection socket is PCIe gen3, bi-directional. The peak performance of the CSC HPC will be 1.3 Peta flop/s.

The IFERC-CSC will start operation from January 2012. From January to March 2012, the CSC-HPC will be used only for the lighthouse project. The purposes of the lighthouse project are to show both outstanding level of the simulation researches in the magnetic confinement fusion and high performance of IFERC-CSC supercomputer system and to show the possibility that the fusion simulations could exploit a new research field or a frontier research in magnetic confinement fusion by using the CSC HPC. For these purposes, some benchmark codes, which have been used for selecting the HPC for the IFERC-CSC, will be used for the lighthouse projects. From April 1st 2012, the CSC HPC will start normal operation and be used by JA and EU scientists after selecting proposed projects by the standing committee (StC).

2. Scope of simulations in IFERC-CSC

The CSC HPC is optimised for high performance computation. Simulation research in the IFERC CSC will be performed in the field of magnetic confinement fusion, which may include among other subjects core microscopic phenomena, core macroscopic phenomena, integrated modelling, reactor materials, and reactor technology. Therefore, projects shall be relevant to fusion development (ITER & BA) in the field of magnetic confinement and primarily deal with numerical simulations in

the following areas:

- Plasma turbulence,
- Fast particle physics,
- Linear, Nonlinear and/or extended MHD,
- Edge physics,
- Heating and current drive,
- Integrated modelling,
- Reactor materials,
- Reactor technology,

in order to analyze experimental data on fusion plasmas, to prepare scenarios for ITER operation, to predict the performance of the ITER facilities, and to contribute to the DEMO design physics basis and to BA activities.

3. Organization of the IFERC-CSC

JA and EU IAs provide resources such as a supercomputer, professional and technical staff etc. in order to organize and operate the IFERC-CSC. Based on these contributions, the IFERC project team will operate the IFERC-CSC. The CSC HPC and peripheral equipments are operated and maintained by the vendor team under the contract between F4E and Bull. JAEA as the JA implement agency dispatches the user support team including functions of the general user support and the general programming support. These teams are managed by the CSC leader and the CSC sub leader under the supervision of the IFERC project leader. The CSC leader and sub leader have been dispatched from F4E and JAEA respectively and started preparatory works from the summer in 2011 in the IFERC site at Rokkasho, Japan.

4. Selection of proposed projects for using the IFERC-CSC

The computer resource of the CSC HPC will be allocated to selected research projects proposed by JA and EU scientists. Selection rule and procedure for these proposed research projects have been already established by the special working group 2 (SWG-2). According to these rule and procedure, the Standing Committee for the IFERC-CSC (StC), which has been established in October 2011, will select research projects and allocate the computer resource of the CSC HPC to those. Based on the computer resource allocation decided by the StC, the IFERC-CSC will operate the CSC HPC. The StC consists of 5 JA members and 5 EU ones.

The schedule to allocate the computer resource for the 1st operation cycle of the CSC HPC is as follows. Application forms have been already open to the public from October 1st 2011 at the IFERC website (www.iferc.org). The deadline for application forms for the 1st cycle of the CSC HPC

operation is December 1st 2011. After the deadline, the StC will start the international peer review for proposed research projects. Only proposals, which are technically fit for the CSC HPC, requiring exceptional computational resources will be kept while the final selection will be made according to the scientific and technical merit of the proposals taking into account the following criteria:

- (1) Scientific excellence including innovation potential (40%)
- (2) Relevance to fusion development (ITER & BA) (40%)
- (3) EU/JA collaborative aspects (10%)
- (4) Efficient usage of the super computer (10%).

Based on the result of this peer review, the StC will allocate the computer resource of the CSC HPC to selected research projects by the middle of February 2012. In parallel with the selection process by the StC, JA and EU IAs will check eligibility of all applicants from the BA agreement point of view and also from the security point of view. Therefore, any applicant has to get resource allocation by the StC and also be permitted by both IAs in order to access to the CSC HPC.