

# An Overview of E-Science Project

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## T2K Open Supercomputer Alliance

- Primary aiming at design of common specification of new supercomputers.
- Now extending to collaborative work on research, education, grid operation, ..., for inter-disciplinary computational (& computer) science.
- *Open* hardware architecture with commodity devices & technologies.
- *Open* software stack with open-source middleware & tools.
- *Open* to user's needs not only in FP & HPC field but also INT world.

*Kyoto Univ.*

416 nodes (61.2TF) / 13TB  
Linpack Result:  
Rpeak = 61.2TF (416 nodes)  
Rmax = 50.5TF



*Univ. Tokyo*

952 nodes (140.1TF) / 31TB  
Linpack Result:  
Rpeak = 113.1TF (512+256 nodes)  
Rmax = 83.0TF



*Univ. Tsukuba*

648 nodes (95.4TF) / 20TB  
Linpack Result:  
Rpeak = 92.0TF (625 nodes)  
Rmax = 76.5TF



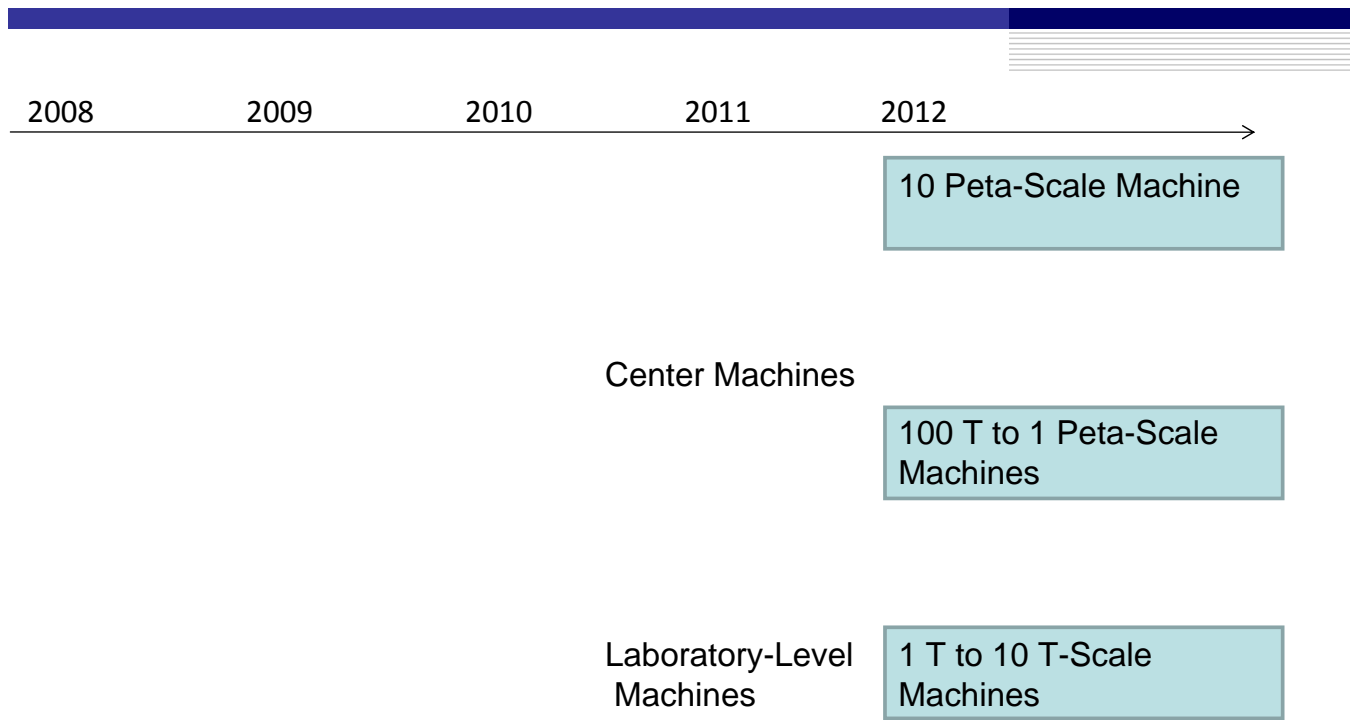
# T 2K Open Supercomputers

31<sup>st</sup> TOP500 List announced in Jun. 2008

Rank	Site	Cores	Rmax	Rpeak
1	DOE/NNSA/LANL United States	122400	1026	1375.8
2	DOE/NNSA/LLNL United States	212992	478	596.38
3	Argonne National Laboratory United States	163840	450	557.06
4	Texas Advanced Computing Center/Univ. of Texas United States	62976	326	503.81
5	DOE/Oak Ridge National Laboratory United States	30976	205	260.2
6	Forschungszentrum Juelich (FZJ) Germany	65536	180	222.82
7	New Mexico Computing Applications Center (NMCAC) United States	14336	133	172.03
8	Computational Research Laboratories, TATA SONS India	14384	133	172.61
9	IDRIS France	40960	113	139.26
10	Total Exploration Production France	10240	106	122.88
11	Government Agency Sweden	13728	103	146.43
12	NNSA/Sandia National Laboratories United States	26569	102	127.53
13	EDF R&D France	32768	93	111.41
14	IBM Thomas J. Watson Research Center United States	40960	91.3	114.69
15	NERSC/LBNL United States	19320	85.4	100.46
16	Information Technology Center, The University of Tokyo Japan	12288	83	113.05
17	Stony Brook/BNL, New York Center for Computational Sciences United States	36864	82.2	103.22
18	ECMWF United Kingdom	8320	80.3	156.42
19	RZG/Max-Planck-Gesellschaft MPI/IPP Germany	6720	80.3	126.34
20	Center for Computational Sciences, University of Tsukuba Japan	10000	76.5	92
24	GSIC Center, Tokyo Institute of Technology Japan	12344	67.7	109.73
34	Kyoto University Japan	6656	50.5	61.24
49	The Earth Simulator Center Japan	5120	35.9	40.96

3

# Supercomputers in Japan



4

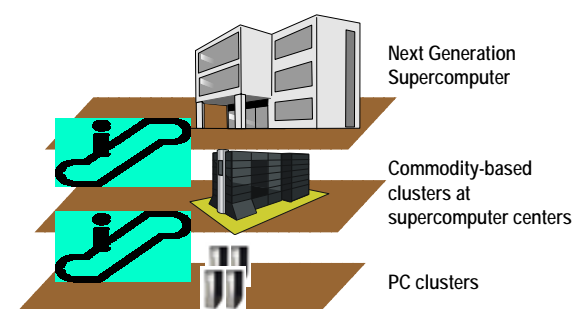
# What is (so-called) E-science project

- Precise Project Name
  - Research and Development of Software for System Integration and Collaboration to Realize the E-Science Environment
    - e-サイエンス実現のためのシステム統合・連携ソフトウェアの研究開発
- September 2008 to March 2012 (Three and half years)
- Two Subprojects
  - Seamless and Highly-Productive Parallel Programming Environment Project
    - Univ. of Tokyo, Univ. of Tsukuba, and Kyoto Univ.
  - Research on resource sharing technologies to form research community (研究コミュニティ形成のための資源連携技術に関する研究)
    - NII, AIST, Osaka Univ., TITECH, Univ. of Tsukuba, Tamagawa Univ, KEK, and Fujitsu

5

## Overview

- Objectives
  - Providing a new seamless programming environment from small PC clusters to supercomputers, e.g., massively commodity-based clusters and the next generation supercomputer in Japan
    - New parallel programming language
    - New parallel script language
    - Portable numerical libraries with automatic tuning
    - Single runtime environment
- Research Periods
  - Sept. 2008 – Mar. 2012
  - Funded by Ministry of Education, Culture, Sports, Science and Technology, Japan



- Organization
  - University of Tokyo
    - Portable numerical libraries with automatic tuning
    - Single runtime environment
  - University of Tsukuba
    - New parallel programming language
  - Kyoto University
    - New parallel script language

6

# Overview

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- Expected Products

- Xcalable MP specification & compiler

- First draft of the specification will be published at Q1 of 2009

- Portable numerical libraries with automatic tuning

- Alpha version will be distributed at Q4 of 2009

- Single runtime environment

- Alpha version will be distributed at Q2 of 2009

with SCore 7.0 distribution distributed by the PC cluster consortium Japan whose members include Fujitsu, NEC, Hitachi, AMD Japan, HP Japan, Allenia software in England, and other companies.

<http://www.pccluster.org/>

- All products will be integrated into the SCore distribution