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# Asian HPC Update (Japan, China, India)

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**10 slides**

# Outline

- Describe (very briefly) key HPC developments in Japan, China, India
- For each country we note (using ←) what we think the most important

# Japan

- Next Generation Supercomputer (NGSC) Project
  - FY2006-2011 (5+2 yrs) Total budget 115,447 mil. JPY (\$1.1B)
  - Project Director Dr. Tadashi Watanabe (ex NEC SX architect)
  - Target:
    1. 10PF Linpack
    2. Develop & Promote Application Software
      - Grand Challenge Problems
      - Next-Gen Integrated Living Matter Simulation Project (RIKEN)
      - Nano Integrated Simulation (Inst. Molecular Sci. Okazaki)
      - Also: traditional apps: Earth science, aerospace, RSS21, Industry
    3. COE for Supercomputing (Kobe) ←
  - Partial Completion March 2011, Final Completion March 2012
  - Scalar (F, 172M\$[multicore?]) + Vector(N+H, 282M\$) + Interconnect(59M\$)
    - + additional funds [originally allocated to Grape-like subsystem]
    - Accelerator in scalar &/or vector subsystem
    - Possible: Vector-optical, Scalar-non optical
  - Total Electric Power Target: 30 MW
  - Partial Funding by F, N, H (added to totals above)



# Japan

- National Security Aspects: nothing public
- (Prof. MIURA may know aspects)
- FY08 Funding (mil.JPY)
  - Hardware System Design 6,500
  - Grand Challenge 2,154
  - Facility Construction 5,846
  - Total 14,500 (\$150M)
  - Additional FY07 fund 4,214
- Detailed Hardware Design will be completed in early FY10
- Product and Prototype Evaluation in FY10
- Partial Operation starts in FY10
- MEXT seeks guidelines for management
  - Specialist Working Group organized
- Nothing between x00TF & NGSC
- Little discussion about NNGSC but NGSC is not one off



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# Japan

## Other Activities

### Major Centers at 100 TF level

T2K Project:

Service starts Jun '08

Univ. Tokyo 141 TF Hitachi

Univ. Tsukuba 94.5 TF Sumisho/Cray Japan/Appro

Kyoto Univ. 61.2 TF + 9 TF(SMP) Fujitsu

Commodity HW/SW:AMD Opteron Barcellona quad-core, Infiniband or multistage Xbar

Tohoku Univ. 26.2 TF NEC SX9

Mar '08

JAXA 135 TF Fujitsu FX-1(quad-core SPARC64 VII, Infiniband) Apr '09

RIKEN \* 100+TF Scalar + Vector + Special (MDGRAPE like) Apr '09

JAMSTEC \* (Earth Simulator-II) 100+ TF Mar '09

JAEA \* 300 TF Apr '09

\* RFP

Presently #1 : Tokyo Tech TSUBAME 85 TF (SunFire+Clearspeed) Apr '06



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# China

- **Skip: Discussion of existing HPC academic centers, national networking**
- **High Performance Computer Standardization Committee (HPCSC) of China** ←
  - Founded Mar. 2007, 30+ members
  - To set up comprehensive standards covering all major areas: blade server, security, cluster OS, personal HPC, application, infrastructure, IP, energy-saving... ..
  - Two specifications, “Requirement for Cluster Operating System Remote Monitoring” (SN: S07018-T) and “Requirement for Blade Server Management Module” (SN: S07019-T) are expected to be adopted as industry recommended standards during 2008
- **KD-50-I:**
  - Jointly developed by University of Science and Technology of China (USTC) and Institute of Computing Technology (ICT), Chinese Academy of Sciences (CAS) in Dec.2007
  - Consists of 336 750MHz homegrown Loongson-2F CPUs
  - Peak performance 1 TFlop
  - Mainly used for research and teaching of parallel algorithms
- **Supercomputer Centers Being Planned for Cities**
  - Guangzhou
  - Shenzhen
  - Fujian



# 863 Program- High Productivity Computer

- **Supported by Ministry of Science and Technology, Launched in 2006**
- **Goals:** Build two 100 TF computers, one 1 PF computer, and build out China's CNGrid with developed grid software and grid applications
- **Two users of 100 Tetaflops computers**
  - Shanghai Supercomputer Center: selects ICT/Dawning
  - Computer Network Information Center (CNIC) of CAS: selects Lenovo/Beijing University of Aeronautics & Astronautics
- **HPP (Hyper Parallel Processing) architecture towards Petaflops**
  - Developing by ICT
  - Main features: global address space, hyper node, separation of the CPU and interconnection network
  - HPP verification by Dawning 5000B in 2010



# Overall Applications Picture

- **Application areas of HPC in China have become more widespread, number of both users and practitioners have increased**
  - HPC is now recognized as significantly contributing to China's oil, gas, and weather sectors
  - HPC is being used in Chinese manufacturing via computer-aided design/computer-aided engineering (CAD/CAE) in the aviation, automotive, injection molding, and other related design fields
  - New application areas include gaming and urban planning
- **HPC Targeting Life Science Applications**
  - To meet requirements of national "Protein Big Science" project
  - Build a specific 100-TFlop HPC, along with the associated parallel algorithms and parallel software packages (2008-2010)
  - Collaboration efforts of Shanghai Institute of Biological Sciences, Institute of Biophysics, Institute of Software, ICT, and CNIC





# India

- Tata's Comp Res Lab (CRL) in Pune ←
  - #4 on Top 500 (Nov 07) (170TF peak, 120TF Linpk)
  - HP commercial Blade system, EKA
  - Primary interest is not system but business model – sell services to foreign clients (Boeing, Yahoo, etc)?
- CDAC – focusing on grid development
- Karmarker diminished credibility
- India is far behind China in HPC infrastructure, capacity, & research
- Apps research tilted toward knowledge discovery



# Sincere Thanks For Your Interest!



Questions/Comments - Contact Anytime: **Dr. David K. Kahaner**

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