European HPC and PRACE

PRACE

HPC for Science

European (ESFRI-)

HPC-service

at the top of an HPC provisioning pyramid for the scientific community of Europe.

HPC for Industry

Guaranteeing an European indepen-dent access to

HPC-competence

for science and industry

STRATOS

HPC by Vendors

Helping European (hard- & software) v   ter

ETP on HPC →Tomorrow HALL 3 6 pm

tier-0

tier-1

Scientific Steering Committee

Industry Committee ?

ETP ?

User Forum

Industry

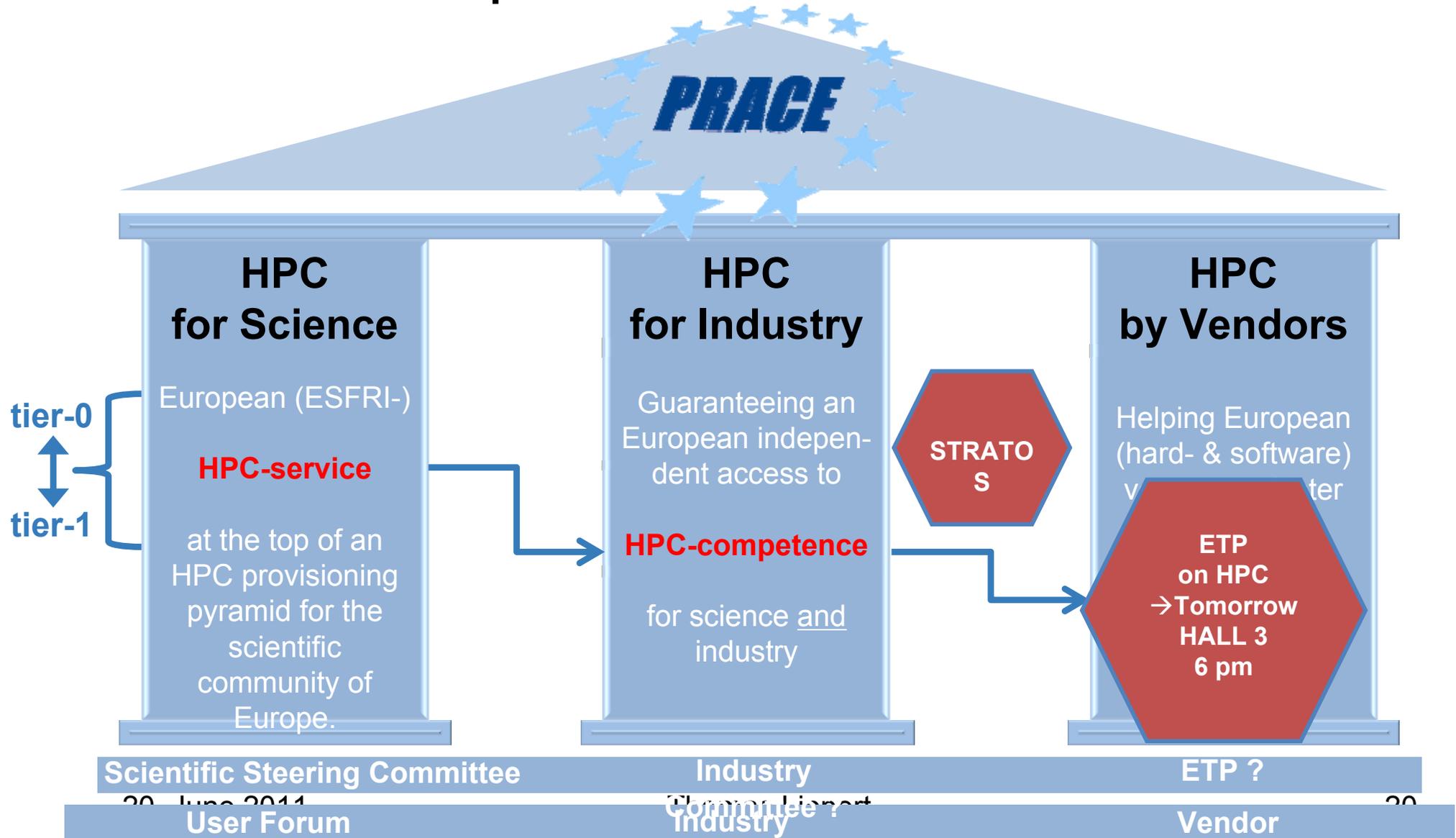**Vendor**

PRACE Tier-0 Systems

- 1st Tier-0 System provides cycles since August 1, 2010
  - Jugene: BlueGene/P in GCS@Juelich
  - 72 Racks, 1 PFlop/s Peak
  - 35% of capacity provided to PRACE

- 2nd Tier-0 System announced by GENCI on October 5, 2010
  - Curie: Bull Cluster with Intel CPUs operated by CEA
  - 1.6 PFlop/s peak in Oct. 2011 (1st step in 2010)
  - Largest fraction of capacity provided to PRACE

- Next Procurements (in alphabetical order)
  - BSC, CINECA, GCS@HLRS, GCS@LRZ
  - Procurement plan based on analysis of user requirements and market

Announced PRACE Tier-0 Systems

- ## Hermit
  - 1 Petaflop/s Cray (HERMIT) at HLRS will be available for European scientists starting in the end of 2011
  - An upgrade to 4-5 Petaflop/s is planned for 2013

- ## SuperMUC
  - 3 Petaflop/s IBM (Super-MUC) at LRZ will be available for European scientists starting in mid 2012

- ## Italy (Cineca) has announced its contribution for 2012
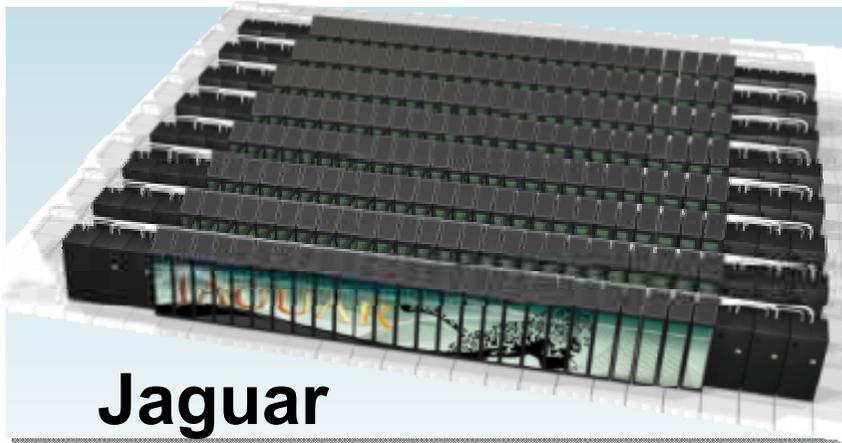
- ## Spain (BSC) will follow 2013
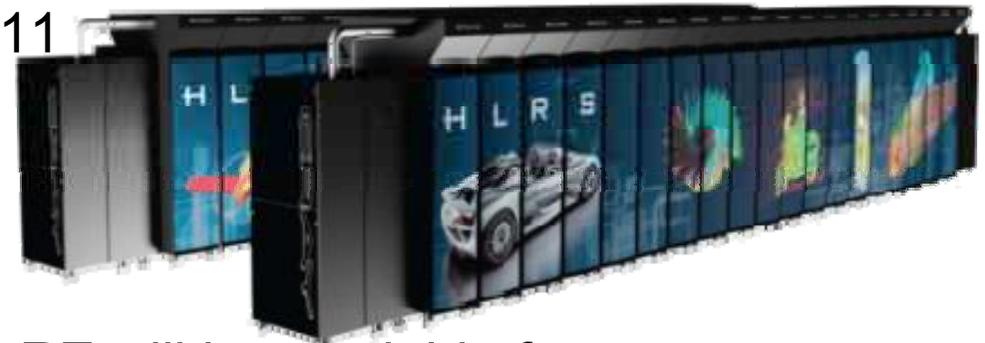
MSU "Lomonosov" supercomputer, 2011

M.V.Lomonosov
1711 – 1765

- Peak: 1.37 Petaflops
- Linpack: 674 Petaflops
- Intel Xeon Processors
- Nvidia X2070 GPU
- Infiniband & 10 GigE

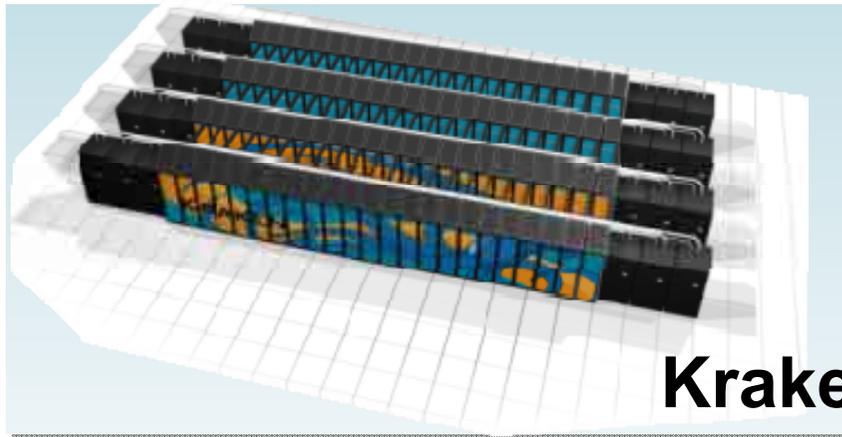# Notable Petascale Systems at ORNL

Jaguar

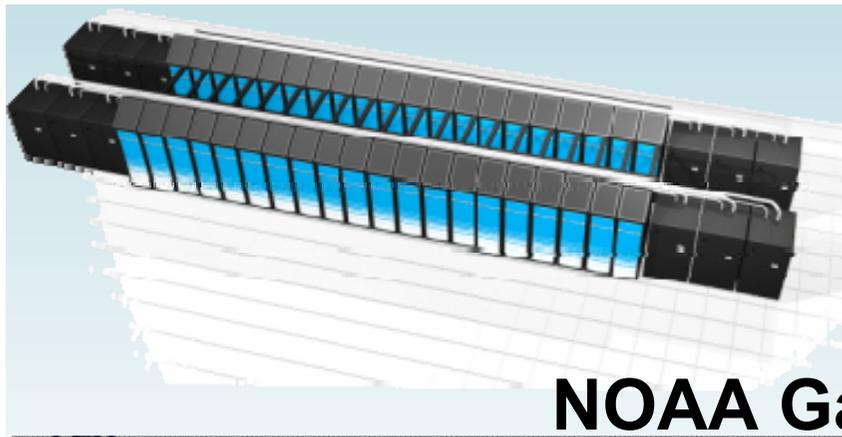| Peak performance	2.33 PF/s
Memory	300 TB
Disk bandwidth	> 240 GB/s
Square feet	5,000
Power	7 MW

#3

Dept. of Energy's most powerful computer

Kraken

Peak performance	1.17 PF/s
Memory	151 TB
Disk bandwidth	> 50 GB/s
Square feet	2,300
Power	3.5 MW

#11

National Science Foundation's most powerful computer

NOAA Gaea

| Peak Performance	1.1 PF/s
Memory	248 TB
Disk Bandwidth	104 GB/s
Square feet	1,600
Power	2.2 MW

#37

National Oceanic and Atmospheric Administration's most powerful computer

Cray Systems

- Cray XK6
  - Cray's Gemini interconnect, AMD's multicore scalar processors, and NVIDIA's GPU processors
  - Scalable up to 50 Pflops of combined performance
  - 70 Tflops per cabinet
    - 16 core AMD Opteron 6200 (96 /cabinet) 1536 cores/cabinet
    - NVIDIA Tesla 2090 (96 per cabinet)
  - OS: Cray Linux Environment

- Cray XE6
  - Cray's Gemini interconnect, AMD's Opteron 6100 processors
  - 20.2 Tflops per cabinet
    - 12 core AMD Opteron 6100 (192/cabinet) 2034 cores/cabinet
  - 3D torus interconnect
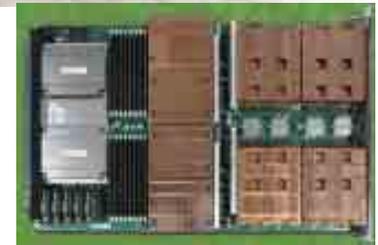
IBM Systems

- BG/P – 1 Pflops system
  - 294,912-processor, 72-rack system
  - High bandwidth optical interconnect
  - Four 850MHz PowerPC 450 processors per BG/P Chip
  - Scaled upto an 884,736-processor, 216-rack cluster 3 Pflops
- BG/Q – Next Generation – 20 Pflops system
  - 2012 time frame
  - 4-way HT PowerPC A2 based chips with 16 cores
  - Sequoia system to be installed at LLNL by 2012
  - Mira system at ANL by 2012
- Blue Waters
  - 2011-12 Time Frame
  - Power 7 Processor
  - Bandwidth Monster, tuned for high efficiency
  - NCSA 10PFlops

SGI Systems

- ## SGI Altix UV

  - 256 sockets (2,048 cores, 4096 threads) with architectural support to 262,144 cores (32,768 sockets) – Nehalem and Westmere EX

  - Up to 16TB of global shared memory in a single system image

  - 5th generation NUMAlink interconnect with upto 120 Gb/s bandwidth and latency <1 microsecond.

  - Paired node 2D torus

  - Based on Intel Xeon 7500 series

  - 18.5 Tflops per cabinet

- ## SGI Altix ICE

  - X86 based, very compact form factor, custom cluster

  - Various topologies based on Infiniband

Altix UV 1000