

14th Gravitational Wave Data Analysis Workshop (GWDAAW-14)
January 26th to 29th, 2010, in Rome, Italy



Leading-edge, cost-effective solutions
for
HPC & Data Analysis

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E4 makes your life easier

What we receive



What we ship



What you see



COMPUTER
ENGINEERING



E4 Products Portfolio



Workstation (deskside, desktop, TESLA)

Server (nodes, blades)

Storage (parallel, distributed file systems)

SAN

Cluster (with GPGPUs, FPGAs)

Interconnect and switch

(GigE, 10GigE, Infiniband, Myrinet)

Scalable, Reliable, Advanced



E4 Services

Assessment of the requirements

Benchmarking

Analysis of Alternatives

TCO, ROI analysis

Installation and start-up

Predictive and on-fault maintenance

Scalable, Reliable, Advanced



E4 stringent quality standards

- ISO9000 certification [®]
- In-house burn-in test chamber to prevent infant mortality of components
- At least 72h accelerated stress test in a room at 35C
- 24h stress test of each sub-system
- 48h simultaneous test of the system
- OS and Development Tools installation to prevent incompatibilities
- TESLA configuration and checking



Scalable, Reliable, Advanced

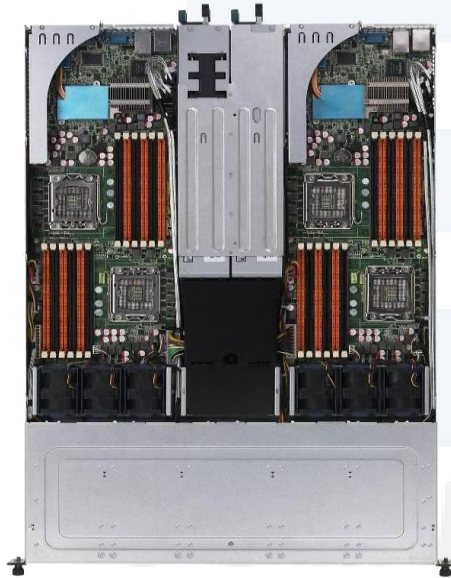


**Servers
for
technical & scientific applications**

*COMPUTER
ENGINEERING*

Server 1U – Twin dual Power

E7126 – 2 x Dual Xeon



Each MOBO:

- 2 x Xeon series 5000
- 12 x Slot DDR3 1333
- 4 x SAS / SATA 2,5" HDD
- 1 x Pci Express Slot x16
- **1 external GPU**
 - Nvidia S1070
 - Nvidia Fermi



Power Consumption:

Idle 308W, Full Load 559W
2 cold-swap power supplies

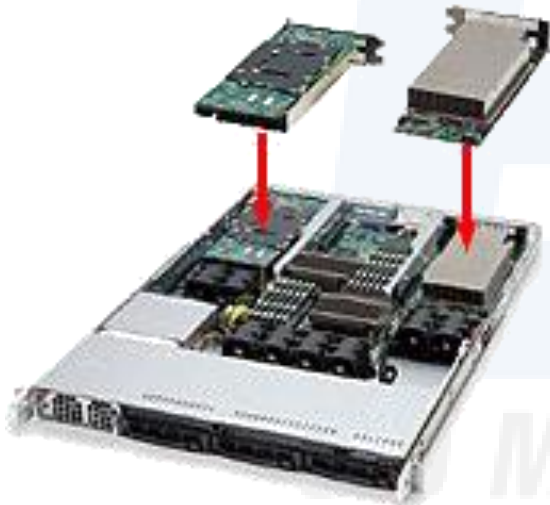
Remote management

IPMI + KVM with dedicated LAN

Server 1U – Dual CPU / Dual – Quad GPU

E7120– Dual Xeon

Each MOBO



- 2 x Xeon series 5000
- 12 x Slot DDR3 1333
- 3 x SAS / SATA HDD
- 1 x optical unit
- 1 x Pci Express Slot x4 Low Profile
- **2 internal GPU**

- Nvidia C1060 or Nvidia M1060
- Nvidia Fermi

• 4 external GPU

- Nvidia S1070
- Nvidia Fermi

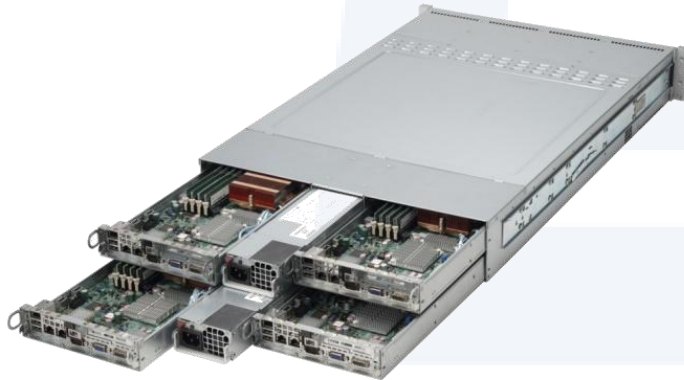




Server 2U – 4 x Dual CPU / Octo GPU

E7228– 4 x Dual Xeon

Each MOBO



- 2 x Xeon 5000 series
- 12 x Slot DDR3 1333
- 3 x SATA 3,5" HDD
- 1 x Infiniband DDR or QDR
- 1 x Pci Express Slot x16:

- I/O to S1070
- SATA RAID 2 port
- Fibre Channel
- Dual or Quad Ethernet

• 2 external GPU

- Nvidia S1070
- Nvidia Fermi





Server 2U

E72xx – Dual Xeon



- 2 x Xeon series 5000[®]
- 12 x Slot DDR3 1333
- 4 x Pci Express Slot x16 (2.0)
- 1 x Pci Express Slot x4
- 7 x I/O Low Profile slots
- Redundant power supply
- Remote management

• 2 external GPU

- Nvidia S1070
- Nvidia Fermi





**Workstations
for
technical & scientific applications**

*COMPUTER
ENGINEERING*



4U – Multi I/O

E7480 – Dual Xeon



- 2 x Xeon series 5000 ®
- 2 x Chipset Intel 5520
- 18 x Slot DDR3 1333
- 2 x Pci Express Slot x16 (2.0)
- 4 x Pci Express Slot x8 (2.0)
- 1 x Pci Express Slot x4
- 8 Bays SAS/SATA 3,5" Tower/ Rackmount
- Redundant power supply
- Remote management
- **2 internal GPU**
 - Nvidia C1060
 - Nvidia Fermi
- **1 external GPU**
 - Nvidia S1070
 - Nvidia Fermi



4U – Multi GPU Workstation – INTEL

E7095 – Dual Xeon



- 2 x Xeon series 5000®
- 2 x Chipset Intel 5520
- 12 x Slot DDR3 1333
- 4 x Pci Express Slot x16 (2.0)
- 2 x Pci Express Slot x4 (2.0) in x16
- 1 x Pci Express Slot x4
- 2 x Pci 32 bit Slot
- 8 Bays SAS/SATA 3,5" Tower/Rackmount
- Redundant power supply
- Remote management
- **4 internal GPU**
 - Nvidia C1060
 - Nvidia Fermi
- **2 external GPU**
 - Nvidia S1070
 - Nvidia Fermi

4U – Multi GPU Workstation - AMD

E8095 – Dual Opteron



- 2 x Opteron six core series 2000
- 2 x Chipset AMD SR5690/SP5100
- 8 x Slot DDR II Reg. ECC 800
- 4 x Pci Express Slot x16 (2.0)
- 2 x Pci Express Slot x4 (2.0) in x 8
- 1 x Pci 32 bit Slot
- 8 Bays SAS/ SATA 3,5" Tower /Rackmount
- Redundant power supply
- Remote management
- **4 internal GPU**
 - Nvidia C1060
 - Nvidia Fermi
- **2 external GPU**
 - Nvidia S1070
 - Nvidia Fermi



4U – Workstation Low Noise

E7080 – Dual Xeon

Super Quiet: 28dB[®]



- 2 x Xeon series 5000
- 2 x Chipset Intel 5520
- 12 x Slot DDR3 1333
- 2 x Pci Express Slot x16 (2.0)
- 1 x Pci Express Slot x4
- 3 x Pci 32 bit Slot
- 8 Bays SAS/SATA 3,5" Tower /Rackmount
- **2 internal GPU**
 - Nvidia C1060
 - Nvidia Fermi
- **1 external GPU**
 - Nvidia S1070
 - Nvidia Fermi

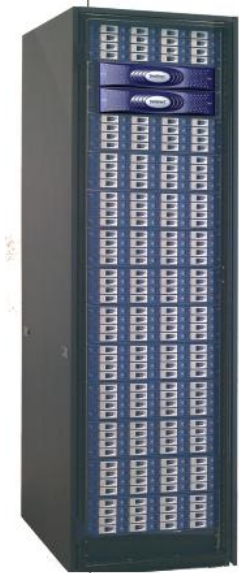


Storage

- SAN
- NAS
- lustre
- PANfs
- GPFS client



DataDirect
NETWORKS
Performance. Capacity. Innovation.



- E4 provides
 - Support in selecting the interconnects
 - Support in sizing of the solution
 - Performance tests and characterization



CERN-co-designed Storage Server

- Design goals:
 - high flexibility
 - low power consumption
 - high bandwidth
 - reliable
- Solution:
 - COTS-based (2 socket INTEL Nehalem)
 - 144 GBytes DDR3 RAM (configurable)
 - **Controller SAS/SATA** multi lane
 - **48 TBytes in 4U**
 - 1 GbE (N via trunking), 10GbE, Infiniband
DDR/QDR



374 units installed at
CERN (Geneva), 70 in
other customers



HPC Cluster

- X86/64 (multi-socket, many core)
 - Tesla/Fermi
 - Infiniband (DDR, QDR)
 - GigE, 10GigE, Myrinet
- RHEL, SLES, Scientific Linux, MS
 - Cluster Management System
- Development Suite
 - PGI, Intel, GNU, CUDA, OpenCL
- Ideal solution for
 - Technical and scientific applications





Hybrid systems

server E7118+Tesla™

The new supercomputing technology



workstation E7095

PERSONAL SUPERCOMPUTER
NVIDIA® TESLA™



server E7228+Tesla™

The new supercomputing technology



CRAY CX1

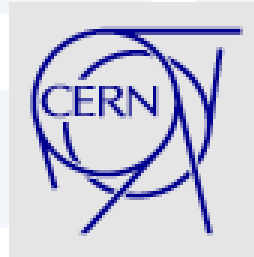
We Take Supercomputing Personally

TERA ERIM





Customer References



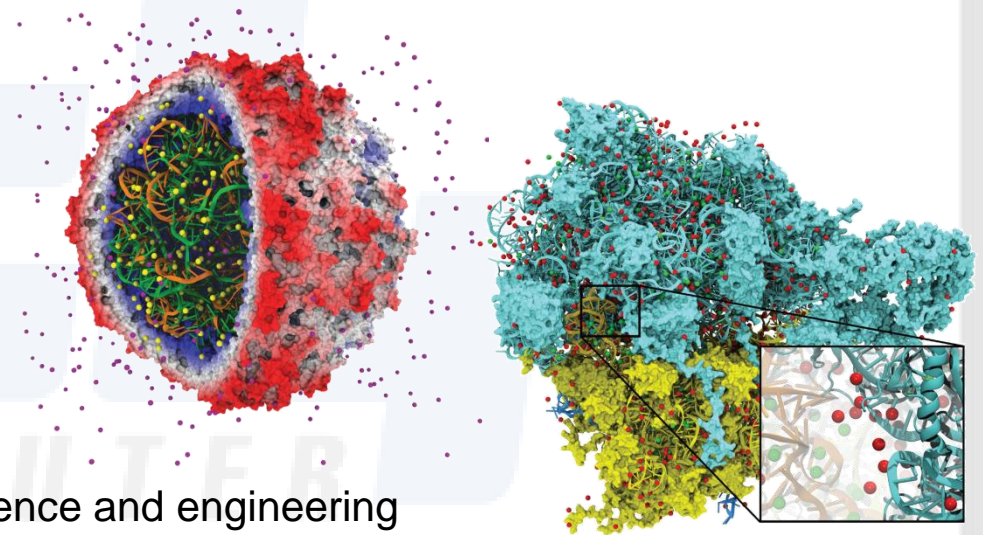
A successful deployment: EPFL



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Laboratory of Multiscale Modeling of Materials (LMMM)

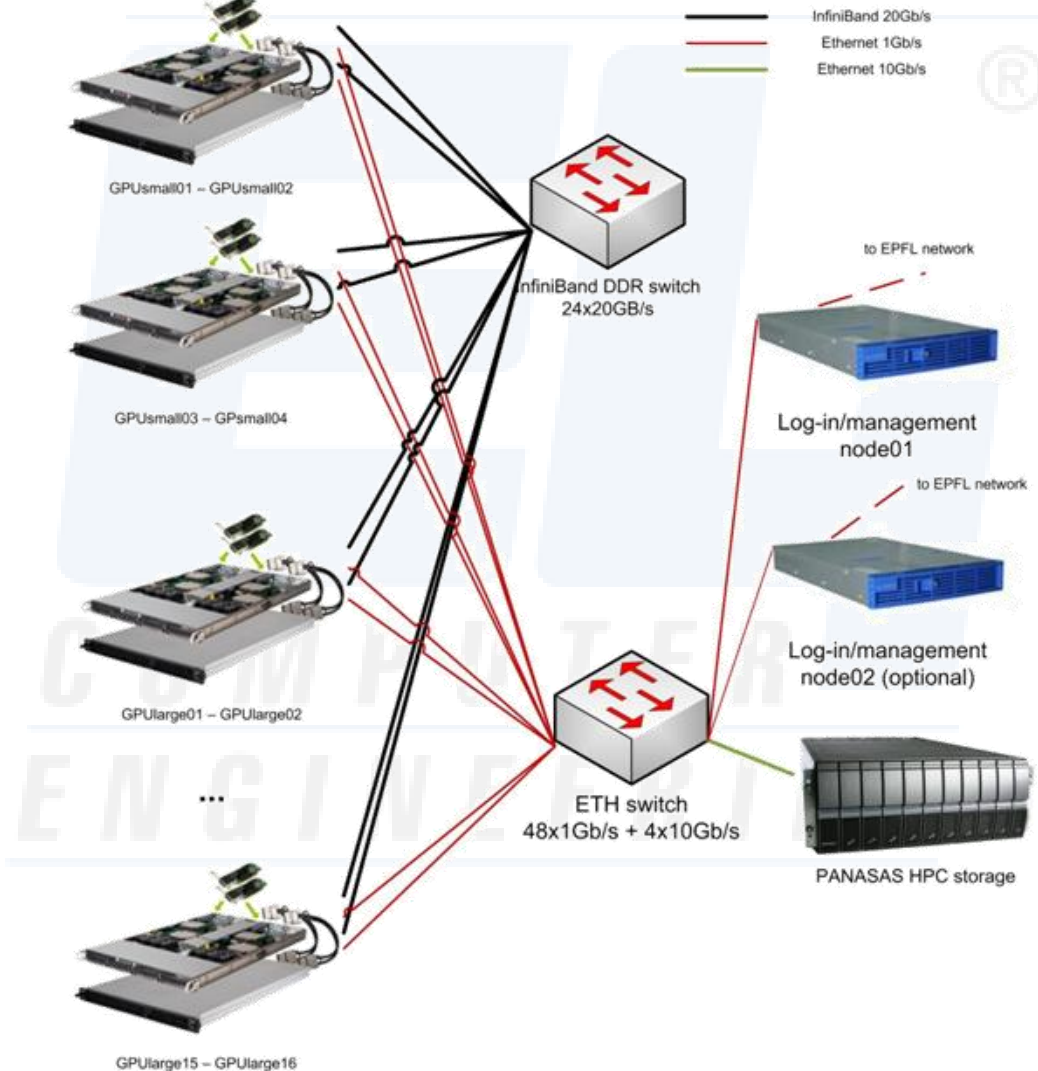
Prof. Efthimios Kaxiras



Major applications:

- digital simulation for materials science and engineering
- electronic properties of crystalline and amorphous solids
- growth and catalytic behavior of nanostructured surfaces and interfaces
- nature of electronic states in biomolecules and enzyme function
- effect of a large external charge on the structure of a solid
- the physics of dislocations in solids and their interaction in chemical impurities.

A successful deployment: HW integration





Conclusions

- E4's experienced technical staff has in-depth knowledge of how to exploit the features of TESLA and FERMI
- E4 listens to prospects and customers to tailor the system to their needs
- E4 delivers state-of-the-art, fully tested solutions
- E4 is a reliable partner for leading-edge, cost-effective HPC solutions
- E4 is located in the EU and is an EU company



By the way: what E4 stands for?



E4 = Excellence
4 (for)
Computer Engineering

E4 builds innovative solutions to accomplish the users' requirements



E4 Computer Engineering:



The perfect partner for HPC and Grid



COM
ENG

VG

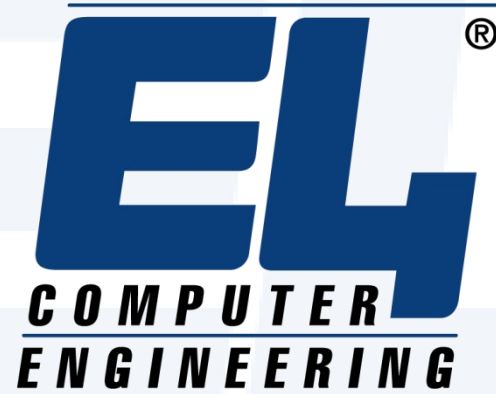


E4 Computer Engineering Award

- E4 and GWDAW are pleased to introduce the **E4 Computer Engineering Award** to the best graduate student poster
- The winner will get a whopping 300 EUR (*or something like that...*)
- The award will be presented on Jan 29th, 2010 during the session **E4 Computer Engineering Award Ceremony**



Thank you



E4 Computer Engineering SpA

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