

# MEGWARE HPC & Cluster Systems

„Made in Saxony“

Jörg Heydemüller – HPC Representative / Sales Director



# Company Profile

- established in 1990
- private limited company
- authorised capital: 790,000 €
- 60 fully qualified employees
- more than 400 installed clusters systems all over Europe since the year 2000

# Chemnitzer Linux Cluster (CLIC)

- in the year 2000 Prof. Hans-Werner Meuer:  
"the worldwide best price performance ratio"
- position 126 in Top500
- 528 nodes
- performance 143,3 GFlops





# Areas of application worldwide

- **in the area of research and universities**  
astronomy, biology, physics, chemistry, earth science,  
health research, climatology
- **in engineering:**  
automobile construction, aerospace,  
defense armament, oil and gas
- **other areas - data management:**  
financial sector, internet, media



# Available system architectures

- x86 HPC cluster and server with Linux or Windows HPC
- hybrid HPC cluster with x86 and Tesla GPU
- parallel storage cluster

# x86 HPC cluster Linux / Windows

- access to all possible network technologies
- application of different motherboard manufacturers possible
- large choice of different CPU s

# x86 HPC Cluster Linux / Windows

- since 2001 different kinds of high speed networks in use (Myrinet 2000, 10G Ethernet, Infiniband)
- MEGWARE is producer neutral as related to Infiniband - for example:



# x86 HPC Linux cluster

- application of different system software standards
- Open Suse, Suse Linux Enterprise, Redhat, CentOs, Scientific Linux, ...



# x86 HPC Windows cluster

- specialist for configuration, design, administration for Windows HPC Server 2008
- MEGWARE - Microsoft Certified Technology Specialist
- MEGWARE – under the Top 5 Win HPC 2008 resellers in Germany



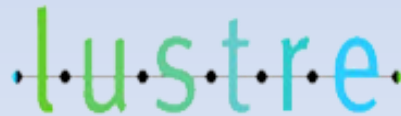
# x86 HPC with Nvidia Tesla GPU

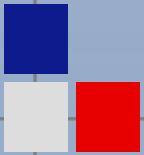
- Tesla increases the parallel performance of clusters
- with the GPU processors it is no more about graphic arts, but about an increase of the performance of the whole system
- the users can perform bigger calculations



# Parallel Storage Cluster

- distributed file systems based on Lustre, FHGFS
- high performance scratch-data files with Lustre
- infiniband storage solution with OCFS2 for special requirements





# MEGWARE developments

- SlashFive<sup>®</sup>
- SlashEight<sup>®</sup>
- ClustRack<sup>®</sup>
- ClustStor<sup>®</sup>
- ClustSafe<sup>®</sup>
- ClustWare<sup>®</sup>
- RackView<sup>®</sup>



# MEGWARE SlashFive®

- service friendly server chassis
- 16 nodes on 8 rack units in one main chassis
- up to 160 Dual or Quad Core CPUs
- compatible with Intel® or AMD® CPU
- intelligent air flow



# MEGWARE SlashEight®

- service friendly server chassis
- 32 nodes on 8 rack units in one main chassis
- up to 320 Dual or Quad Core CPUs
- compatible with Intel® or AMD® CPU
- intelligent air flow



# MEGWARE ClustRack®

- demountable aluminium case
- in 14 variant sizes
- compatible with 19 inch, SlashFive® and SlashEight®
- front and back door up to 70% perforated
- inlying, intelligent cable route



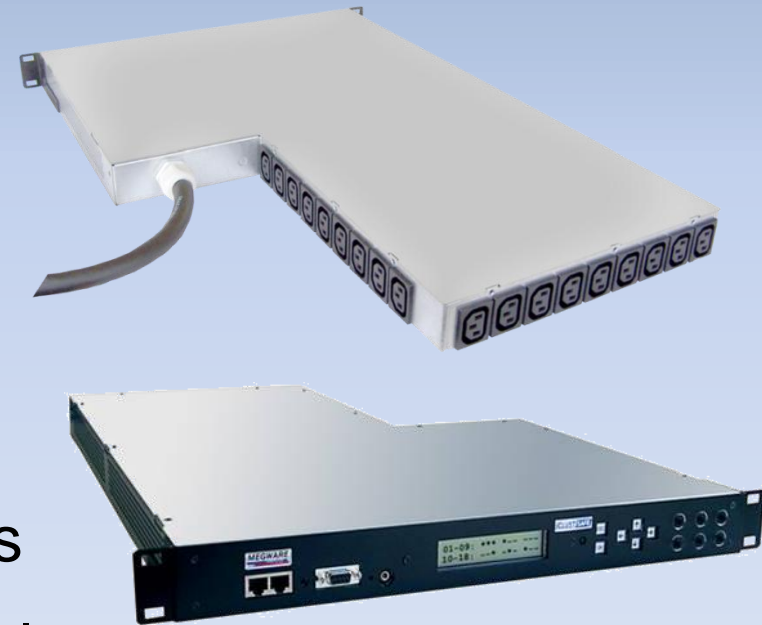
# Experience with water-cooled racks since 2003

- systems based on Knürr<sup>®</sup>, Schäfer<sup>®</sup> and Rittal<sup>®</sup>
- almost independent of room temperature
- cooling capacity up to 35 kW per rack



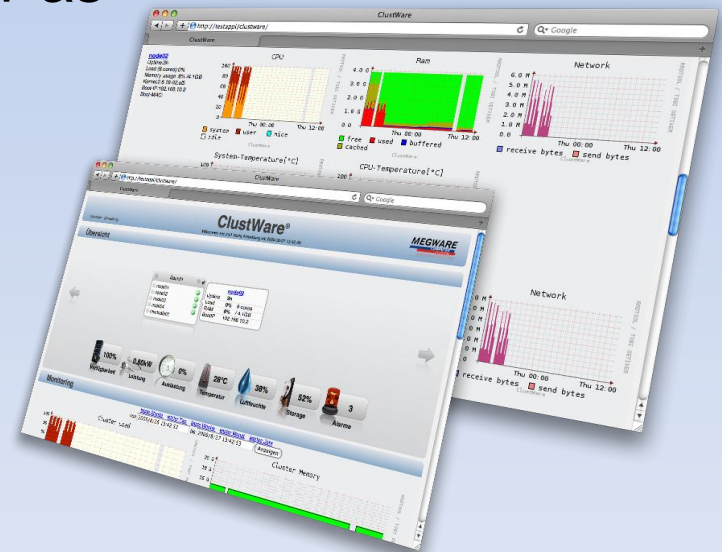
# MEGWARE ClustSafe®

- intelligent power distribution unit for power management
- for up to 18 devices
- on device control panel, display and remote access
- selectable start delay
- connection of different sensors
- up to 1,000 watt per power outlet



# MEGWARE ClustWare®-Appliance

- cluster management software
- management - server - cluster - software
- control of the complete cluster as related to work load
- filing, statistics MP per node, DRC per ClustRack®
- MP read sensors, steers power on/off, reset and serial bracket



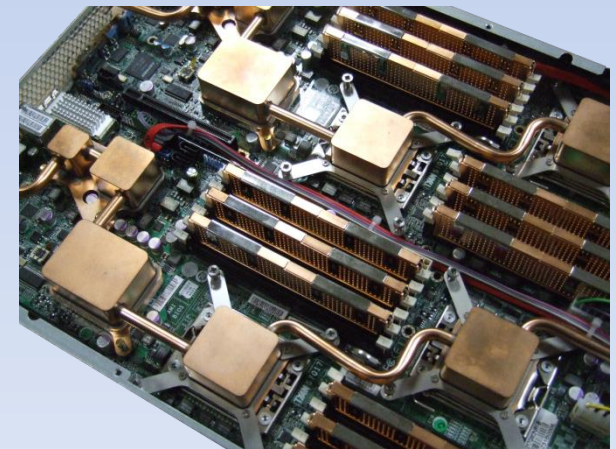
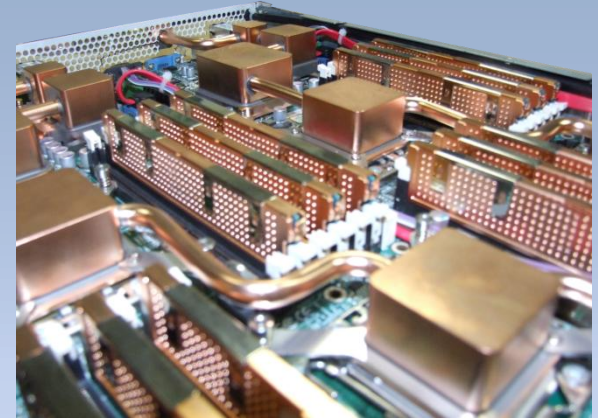
# MEGWARE RackView®

- comfortable control of cluster nodes
- easy operation of power supply unit
- display of power consumption and input
- comprehensive status indications (monitoring)
- energy-efficient management functions
- cost-effective adaptation of energy consumption



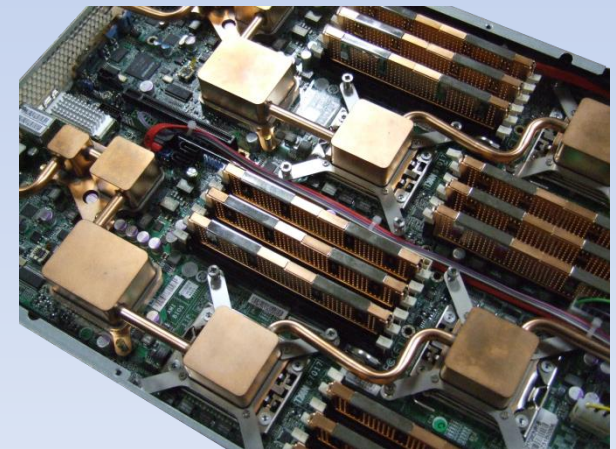
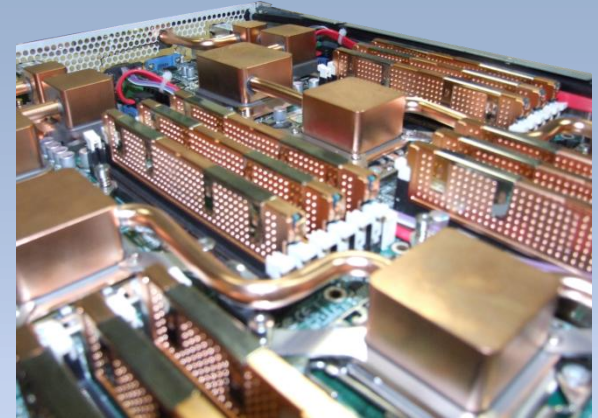
# MEGWARE ClustCool

- in development
- direct watercooling with up to 35 degrees warm water
- copper pipelines connected with all important chips



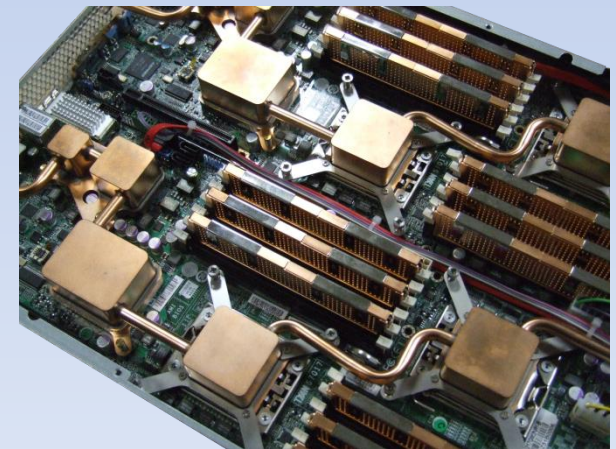
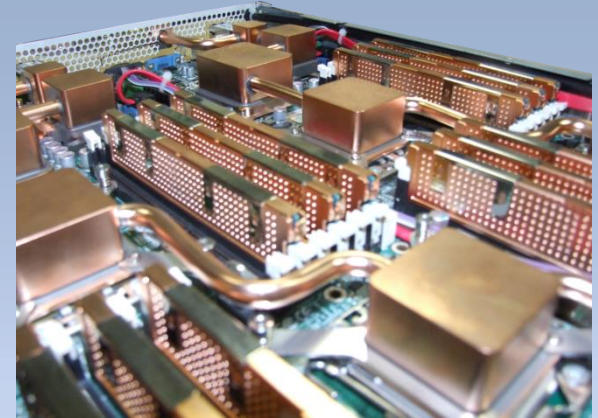
# MEGWARE ClustCool

- two instead of six cooling fans
- four saved cooling fans in 16 nodes (32 servers) = 128 fans
- 128 fans multiplied with 12 watts = 1,536 watts = 1.5 kW/h
- 1.5 kW/h multiplied with 24 hours = 36 kW/h per day
- 1,080 kW/h per month
- 12,960 kW/h per year



# MEGWARE ClustCool

- 12,960 kW/h per year
- 38,880 kW/h for three years multiplied with 0.15 € per kW/h = 5,832.00 € for 16 nodes (32 servers)
- 52,588.00 € for 128 nodes (256 servers) in three years



# Beginning of a partnership

- benchmark center
- remote or directly in Chemnitz
- remote access to one server node or to a whole cluster
- ... or we do the tests for you!
- support by our own HPC Engineers
- access to partner resources (Intel, AMD)



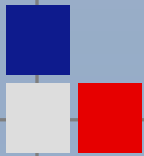
## Long-term partnership

- project manager for customer support
- adapted, individual service level with different periods of warranty
- pick up & return with various response time
- qualified service hotline
- compensation hardware near to cluster



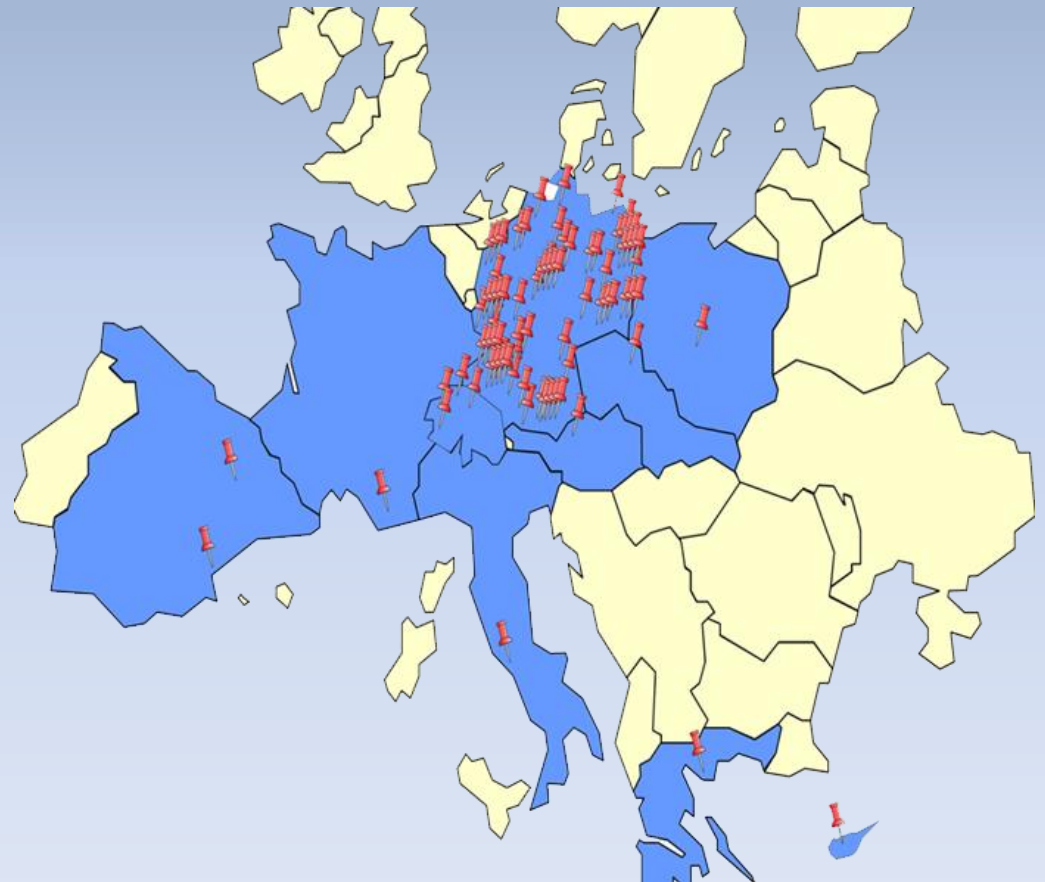
# The purpose is a well-balanced HPC system

- perfect integration in data center infrastructure
- application performance runs to 100%
- initial cost and TCO
- optimum in service by MEGWARE



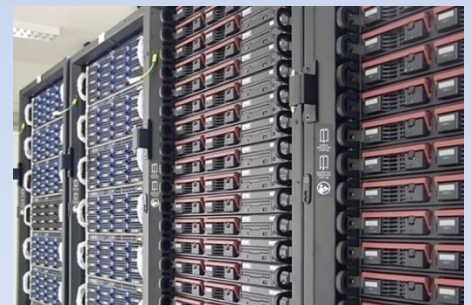
# 400 installed systems in Europe

- France
- Abu Dhabi
- Greece
- Poland
- Czech
- Cyprus
- Switzerland ...



# Leibniz Rechenzentrum Munich

- supercomputer for participation in the international ATLAS experiment at CERN
- delivery and installation of four HPC cluster systems
- number of processor cores: 1,964
- interconnect: 10 G Ethernet
- storage system: 110 TB



# MPI für Eisenforschung Düsseldorf

- Max-Planck-Institut für Eisenforschung GmbH  
(Germany)  
supercomputer for the development of simulation  
tools for the prediction of material properties
- position 355 in the Top500 – June 2009
- number of nodes: 235
- number of processor cores: 1,880  
Intel Xeon® E5472
- interconnect: infiniband DDR



# MEGWARE partnerships





# Thank you for your attention.

[www.megware.com](http://www.megware.com)

[joerg.heydemueller@megware.com](mailto:joerg.heydemueller@megware.com)