

MEGWARE – a “success story”



Dear customers and business partners,

my name is Jürgen Gretzschel. I am in charge of a responsible task: the operative conduct of business of MEGWARE Computer Vertrieb und Service GmbH.

We founded the MEGWARE company more than 20 years ago. In the meantime, there have been ups and downs, and we have at all times been faced with ever new challenges and changes in the IT market. Today, MEGWARE is one of the leading providers of high-performance computers for research and development in the fields of teaching and industry.

Our successful development has always been based on finding solutions to specific customer problems, because we develop and create key technologies for the construction of high-performance computers on the basis of the wishes of our customers and thanks to the ideas of our HPC engineers and technicians. The success story of the MEGWARE brand is reflected in about 500 HPC projects implemented all over Europe up to this point of time.

MEGWARE is not a mere department which deals with super-computing – MEGWARE is more: it is able to focus the potential of 50 highly-motivated collaborators on our core business, i. e. High Performance Computing. The major part of our staff has already been employed in the company for more than 10 years, and exactly these people are very strongly committed to the successful continued existence of the company.

Rely on the MEGWARE brand and convince yourself of our motivation, our knowledge and our excitement for High Performance Computing.

Jürgen Gretzschel



History and Development

The history of MEGWARE Computer Vertrieb und Service GmbH reflects the development of a successful company. From a garage in Chemnitz ... to Germany ... to Europe. Technologies and products have changed in the course of time. What has remained the same are our principles. For more than 20 years, inventive genius, customer reach and flexibility have been part of our strengths. Always, we have explored new developments at an early point of time, taken up trends and transformed them into customer-specific solutions. In this way, it has been possible to be successful over many years.

Building a Brand

Once, the name MEGWARE was synonymous with a small company founded in a garage in Chemnitz shortly after the fall of the Berlin Wall. In those turbulent times, i. e. in February 1990, three engineers joined together and founded a computer firm. Their business idea was based on the development and manufacturing of own PC and server systems.

From that moment, the history of the company has been closely connected with the three founders' families.

The business developed very positively. The demand for computer systems was enormous. The company formed three core activities: retail trade, wholesale trade and system business.

By the end of the 1990s, MEGWARE had created more than 30 branch facilities in Central Germany and had established itself as a provider of complete computer solutions. At that time, our customers included private households, specialized dealers as well as small and medium-sized companies.

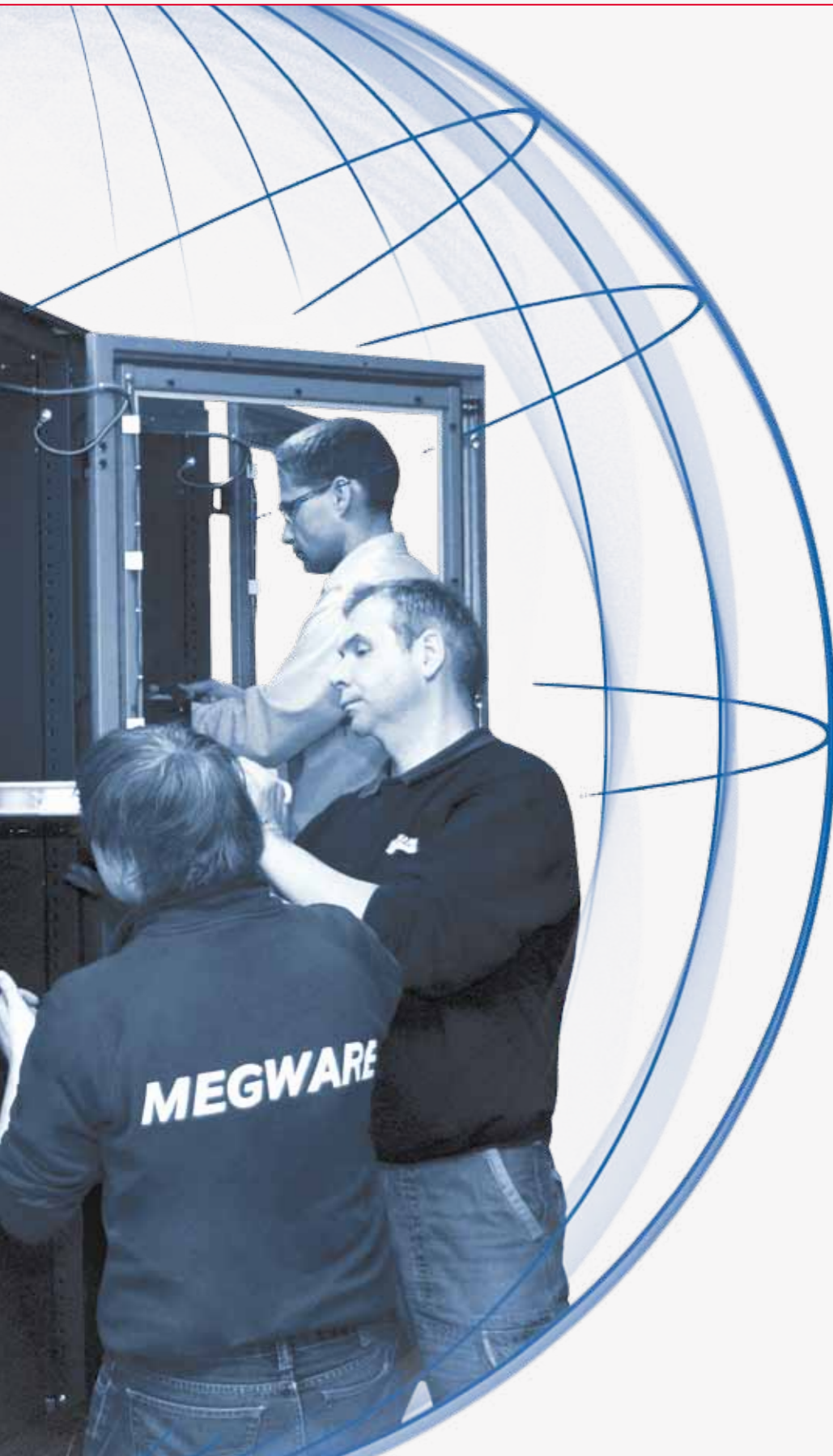
Exploring Opportunities – Using Opportunities

In order to be successful in the long term, changes in the market must be recognized early and reaction must be prompt. The turn of the millenium was a turning point in the history of MEGWARE. We were faced with strong competition and a declining demand. A large-scale project with the Chemnitz University of Technology opened the door into a new market segment. In 2000, we acquired our first order in the field of High Performance Computing. This was an entirely new field of activity for us – a new opportunity. Within a few weeks, the project was planned, organised and implemented. The outcome was the Chemnitz Linux Cluster (CLiC). The system rose to position 126 of the recognized TOP500 list of the most powerful supercomputers around the world. Professor Meuer, the initiator of the ranking, confirmed that the computer system offered "the worldwide best price-performance ratio of the time". This led to a large number of further HPC projects and was our breakthrough as a recognized manufacturer, supplier and service provider for high-performance computer systems.

MEGWARE today

Today, MEGWARE is an efficient medium-sized company with headquarters in Chemnitz. Our core business is High Performance Computing and customers in Germany and Europe rely on our solutions. In addition, we are supplier of IT system solutions for schools, public authorities and enterprises from Saxony. But MEGWARE is more. MEGWARE stands for its employees who shape the face of the company. Every day, 50 employees receive the wishes of our customers and transform them into high-grade systems. Quality, customer orientation and a commitment to face changes – this is our motto.

Welcome to MEGWARE.



5 of 50



Dörte Grapow

Dörte is part of the HPC sales team and has been working for MEGWARE for 15 years. She prepares our offer for you – individually and exactly tailored to your requirements. Our collaborators are also fully prepared to visit you personally on your site in order to present you the latest products and technologies.



André Singer

André is a project manager and has been working for MEGWARE for more than 18 years. With his experienced team of specialists, he ensures a smooth implementation of your project and assists you in all issues as a competent contact person – from placing your order up to the turn-key handing over of the system.



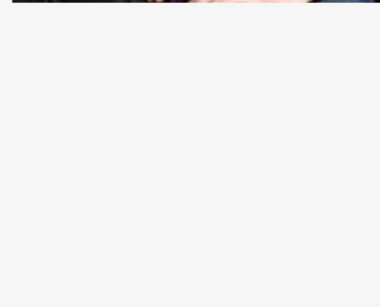
Frank Schneider

Frank has been working for the company as a product manager for 15 years. Together with his colleagues, he develops initial samples and tests them for functional performance and operative capability. Based on the results obtained, the overall system is manufactured in a second step. He transforms new ideas of our HPC engineers into ready-to-use solutions.



Thomas Blum

Thomas has been working for MEGWARE as an HPC engineer for 6 years. Together with his HPC team, he optimises the performance of your applications on our test systems. The results obtained are directly integrated in the offer that will be submitted to you. In the stage of delivery, the team ensures the integration of the systems into your existing network.



Sabine Sieber

Sabine has been managing the service and support department for 14 years. She coordinates the follow up at your site, remote access as well as pick-up service and can rely on a qualified team. They jointly analyse any problems arising and clear them as quickly as possible, in consultation with you.

We appreciate commitment, flexibility, honesty and openness and base ourselves on these values in all we do. Convince yourself. We offer you

Advanced Solutions!

computing
power

cluster

HPC

simulation
visualisation

research



High Performance Computing

High Performance Computing is our core business. For more than eleven years, we have focussed on this activity. In that time, we have implemented almost 500 projects. Systems from MEGWARE are used for computing purposes in enterprises from a wide range of industries as well as in universities and research institutions from Germany and Europe. Many of our projects are mentioned in the TOP500 lists.

We are a full-service provider in the field of supercomputing. Our development engineers create original products tailored to the needs of the customer. From assembling and testing the complete system up to the handing-over on a turn-key basis and any required service

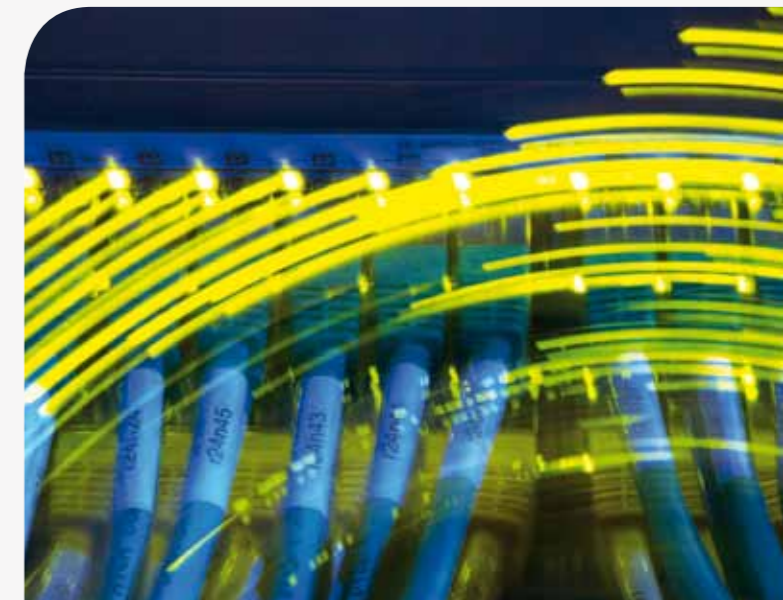
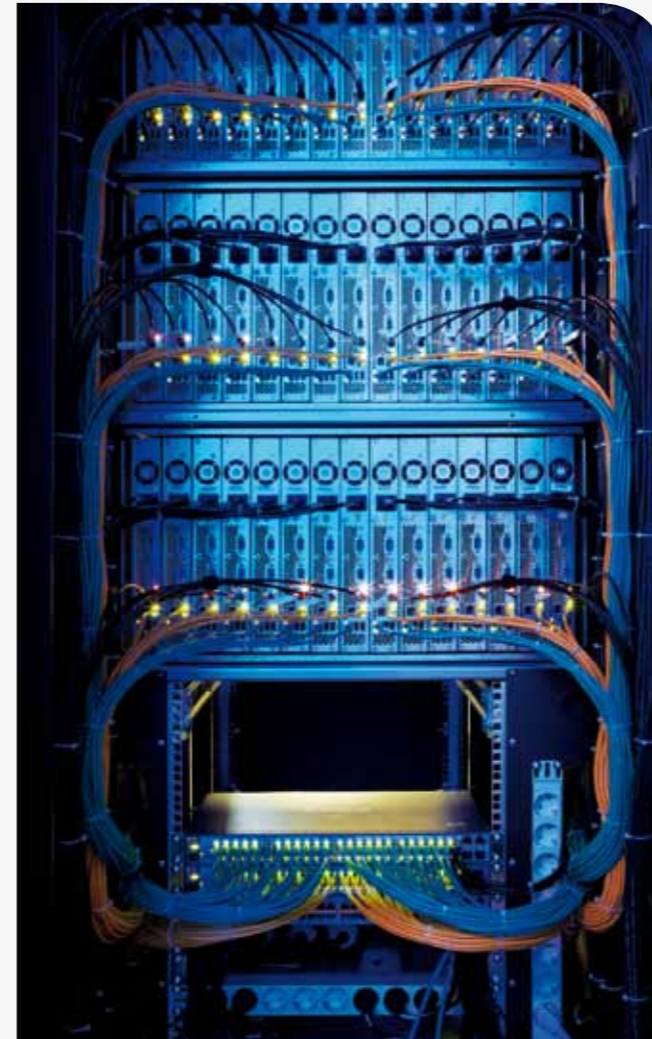
and support work – you receive all you need from one single source. We cooperate with well-known manufacturers in the market and place great importance on long-term and reliable relations.

Our compute clusters are mainly used for applications requiring high computing capacities. The bandwidth of applications is enormous and includes the exploration of remote galaxies, the simulation of conditions of matter shortly after the big bang, the simulation of the properties of new materials, the modeling and visualisation of complex geophysical processes and even the simulation of crashes in vehicle construction.

Highlight of the Year

Since 2007, we have invited HPC experts from the fields of research and industry to our company headquarters in Chemnitz once a year.

The MEGWARE HPC User Meeting offers an occasion for exchanging information on the latest developments and experiences gathered in the special branch of supercomputers. Eminent speakers, fascinating lectures on topical subjects, intensive discussions and regional specialities make this event a highlight again and again.



10 good reasons for choosing MEGWARE

... more than 11 years of High Performance Computing

For more than eleven years, High Performance Computing has been our core business. Take advantage from our long-standing experience in the planning and implementation of HPC projects and from our competence as a problem solver.

... customised solution concepts

Individual solutions need intensive advice and communication. Together with you, we elaborate a solution concept on the basis of your requirements and optimise our offer in the planning stage. As a result, you acquire a system which fully satisfies your needs.

... everything under one roof

We are a medium-sized company where you will find all departments under one roof. Short paths and a fast and uncomplicated communication are benefits you should take advantage of in the implementation of your project.

... maximum performance

All solutions we offer you are based on proven products. We closely cooperate with technology leaders from industry, but are independent of any manufacturers. We place current test hardware (Remote) at your disposal which you may use to determine an optimal platform for your application.

... DIN EN ISO 9001:2008

We are certified according to DIN EN ISO 9001:2008 and fulfill the high quality requirements of this standard. For us, the satisfaction of our customers is of utmost importance.

... comprehensive support services

You will be assisted by a personal contact person from our company who accompanies you throughout the entire project and helps you with great competence in case of questions or problems. This allows you to fully concentrate on your own tasks.

... 7-day burn-in test

Our solutions are safe and reliable. We check all systems for functional performance in a 7-day burn-in test prior to delivery.

... turn-key – ready for use

With us, you do not lose any valuable time. The ordered system is handed over to you on a turn-key basis – it is immediately ready for use. Besides a competent introduction into the hardware and software, you may also use the individual training opportunities offered by us.

... MEGWARE in-house developments

New ideas and their implementation are essential for the success of a company. Together with our customers, our HPC engineers develop new concepts and transform them into ready-for-use solutions. Increase your competitiveness with innovative in-house developments from MEGWARE.

... focus on energy consumption

We wish to prove our sense of responsibility by focussing on the development of energy-efficient products. In this way, you will be able to reduce costs and protect the environment.



Advanced Cluster Solutions

Performance and energy efficiency are criteria that are of decisive importance in the development of cluster systems. Basically, they are influenced by five aspects: CPU performance, interconnect, storage, software and infrastructure. The right combination of these aspects is a precondition for an optimal performance of the HPC system.

CPU performance

Users' applications make different and multiple demands on the hardware. Thanks to the use of current processors made by AMD and Intel, each user will find an optimal system for his purposes. Benchmarks are used in order to determine the optimal type of processor. In addition, customers have the possibility of testing themselves new technologies in our benchmark center via remote login.

By choosing an optimal configuration of CPUs and GPUs for the user's applications, an HPC system can be significantly improved in terms of computing capacity as well as energy efficiency. Our systems are specially assembled according to customers' requirements and/or applications. We are able to provide single-socket systems up to larger-scale SMP systems.

Interconnect

Different network techniques can be used for the communication between the nodes. Depending on the bandwidth and latency needed, communication takes place via Infiniband, Ethernet or other special high-performance networks. As a rule, the high-speed network Infiniband is used.

Storage

General criteria for choosing a storage system are performance, failure safety, scalability and fast rebuild times in case of fault. Thanks to a close partnership with leading manufacturers in the field of storage as well as close relations with developers of file system software, we can offer a wide range of possibilities for optimally adapting storage to all your requirements.

System Performance

Infrastructure

The optimal cooling of HPC systems is an essential precondition for a high performance and a long service life. Modern cooling systems must be able to remove much heat from the system in a very short time. For this purpose, we offer you various solutions from air-cooled systems up to systems based on direct water cooling.

We have developed in-house solutions for the management of clusters, e. g. ClustWare-Appliance, ClustSafe or RackView. These tools facilitate the administration considerably.

Software

Besides hardware properties, the provision of an appropriate software is decisive for an optimal operation of an HPC system as it allows for a user-friendly and low-interruption operation by permanently monitoring important system parameters and by informing administrators in case of fault.

We will assist you in choosing the suitable software tools for your applications. Large MPI libraries are available for the communication between parallel applications. Often, the selection of the compiler is also decisive for the performance of the application used. In many cases, commercially available compilers provide better results. When choosing the operating system, we orientate ourselves to the wishes of our customers.



SlashFive® SlashEight®

SlashFive and SlashEight are housing systems developed by MEGWARE which provide high packaging densities in small space. They are an optimal solution for applications which require maximum computing capacity in a limited floor space. A cabinet of the SlashFive version is able to accommodate up to 80 nodes. The SlashEight version houses up to 160 nodes in a floor space of less than one square metre.

Both housings can be combined at will with components based on industrial standards. The installation of usual PCI cards is possible. Therefore, the interprocess network is freely selectable.

Highlights

- high packaging density with up to 160 nodes in one rack
- flexible use with IT components based on industrial standards
- optimised airflow over all components in the housing
- extremely efficient direct water cooling by means of a ClustCool solution is possible

ClustRack® RackSecure®

ClustRack is a network cabinet of modular design that is available in different sizes. In the integrated power sub-distribution system, automatic circuit breakers protect the system reliably against overload. In addition, the safety module RackSecure provides supervision of the temperature inside the cabinet and disconnects all appliances automatically in case of failure of the air conditioning system.

In connection with the intelligent current switch ClustSafe, you will receive an optimal system for power distribution and an extended rack monitoring system. In combination with systems of 19" design or with MEGWARE housings of types SlashFive and SlashEight, this cabinet is extremely suitable for applications in HPC solutions.

Highlights

- rack available in different sizes
- protection by means of integrated automatic circuit breakers
- safety module RackSecure for a reliable disconnection of the system in case of impending overheating
- high packaging density through a combination with SlashFive and/or SlashEight housings



water cooling circuit highly effective
secure valuable

ColdCon®

In HPC systems installed at this point of time, a major part of energy available is used for providing the air conditioning required and for producing cold. This is no must. Large-scale saving of energy can be achieved by means of free recooling and even by reusing the waste-heat produced.

For this purpose, we have developed ColdCon.

ColdCon is an innovative hot water direct cooling system for the simultaneous and efficient cooling of computer systems with high packaging densities. The system is able to run at flow temperatures of 26 °C and more. As a result, recooling to lower

temperatures becomes superfluous. Runback temperatures above 35 °C allow the use of free cooling. Very high runback temperatures of more than 60 °C even allow for the reuse of the waste-heat produced, e. g. for heating and cooling rooms and buildings. Thus, valuable energy is no longer lost. Reduce your CO₂ emissions in a sustainable manner and save costs at the same time.

ColdCon can be used not only in the field of high-performance computers but also for Web and rendering farms or in systems for server virtualisation.

Highlights

- direct water cooling of compute nodes by means of highly effective heat exchangers
- system can be flexibly combined with the latest technologies
- use of high-grade materials based on industrial standards
- very high flow temperatures of up to 60 °C are possible
- runback temperatures of up to 66 °C can be obtained
- considerable reduction of energy consumption and a wide range of reuses of the waste-heat
- maximum safety thanks to the use of leak-free connections
- uncomplicated and safe dismantling of plug-in systems in case of servicing work
- easy maintenance

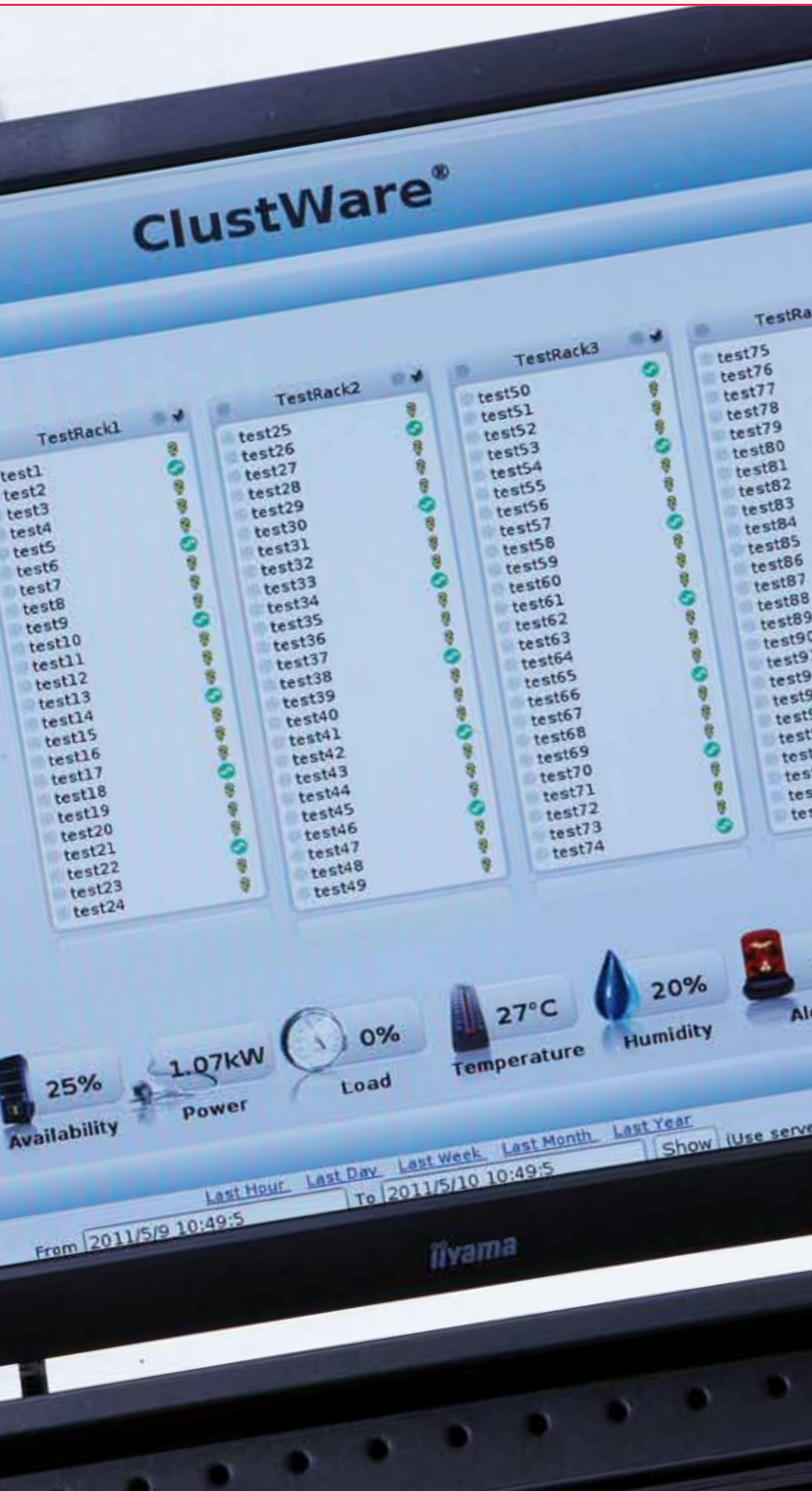
ColdCon is used in the following way:

In each server module frame, a heat sensor of copper is directly integrated. This component of the ColdCon solution is called ClustCool®. The heat produced is directly taken up from the processors and from the chip set by means of warm cooling water and removed from the nodes. In this way, the heat hot-spots are cooled very effectively. The use of different housing systems, main boards and CPU technologies is no problem – ClustCool can be flexibly adapted to new developments. The

exchange of individual components is easy and above all secure. All connections are leak-free.

Each plug-in within the computer system is connected to a central water conduit which removes the heat to the on-site water cooling circuit, by means of a heat exchanger. The secondary circuit is a closed cooling circuit and is therefore independent of the water quality on site.





ClustWare® - Appliance

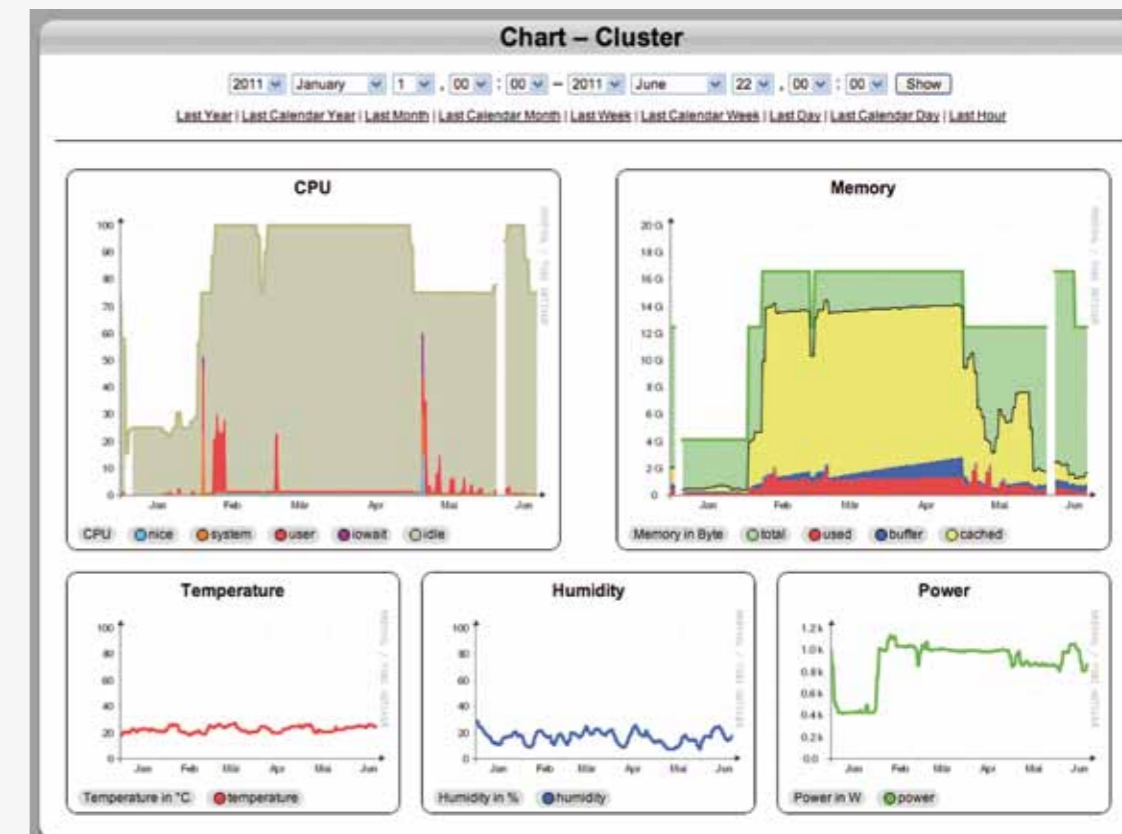
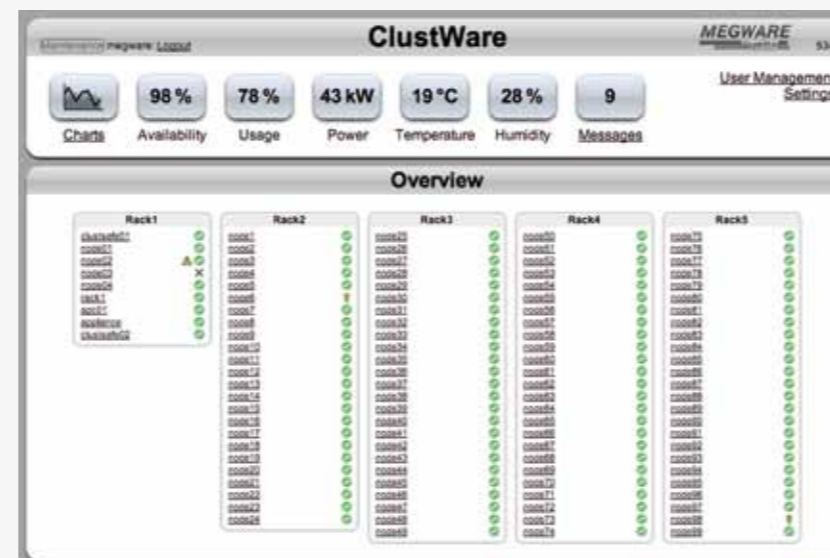
ClustWare-Appliance is a system of hardware and software components for an easy administration and supervision of clusters. Together with ClustSafe and RackView, it provides a perfect environment for checking and controlling all important parameters and processes easily and quickly. This enables users, administrators and technicians to work in a time and cost efficient manner. In addition, ClustWare offers modern functions assisting you in saving power when you are not using

your cluster or if you are using only part of it. In this case, any compute nodes not used can be switched off automatically.

ClustWare is installed on a separate computer called Appliance. Therefore, no computing capacity is lost even if a lot of management jobs have to be performed. The Appliance holds all important values and displays them in neat time history graphics.

Highlights

- easy administration thanks to a web-based user surface
- comprehensive monitoring of a large number of hardware and software parameters
- neat presentation and archival of all important values
- detailed indication of energy consumption
- energy saving functions by means of job supervision
- control of a large number of devices such as PDUs and IPMI cards
- fully automatic installation and software distribution
- messages and alarms via e-mail
- flexible adaptation to your individual requirements



temperature
power consumption
clearly **control**
designed display power

ClustSafe®

The intelligent multiple switch ClustSafe has been developed for distributing the current to the individual computers within a cluster system and for supervising these computers. Each of the 18 outputs can be switched individually. In addition, the power input of each output can be measured and displayed. Moreover, a associated sensor monitors the temperature and the air humidity and thus protects the system against any

damage. The entire configuration and control of ClustSafe is possible either via the menu or via the network, using the integrated Web or SNMP server.

When using ClustSafe together with the ClustWare-Appliance and RackView, you will have a highly comfortable Management system.

Highlights

- available in 19" 1 HU or 0 HU design, rack mountable
- up to 18 consumers can be connected and controlled
- freely selectable turn-on delay
- current load of up to 6.3 A per output
- separate power measurement and power indication for each output
- illuminated display with intuitive and neat menu mode
- configuration and control via network using the integrated Web and SNMP server
- protection thanks to highly effective internal line filters and an easily accessible overload protection device provided at the front of the appliance
- including air humidity sensor and temperature sensor; smoke sensor and other sensors available optionally



RackView®

RackView is a touchscreen display which is to be fixed to the outside of the rack. It allows you in your work as an administrator to supervise and control the most important operation parameters. In doing so, the cooling circuit does not need to be interrupted.

A neat design including symbols and an intuitive menu mode make operation particularly easy for you. At a glance, you can at any time observe the current values for power input, rate

of utilisation, availability, temperature, humidity and air conditioning. In addition, the course of parameters over the last 24 hours is shown graphically. The integrated electric meter displays the cumulative power consumption of the entire rack and provides information on possible savings. The display also serves as a central operating station for the individual cluster nodes, especially for starting, run-down and restarting.

Highlights

- colour TFT display with touchscreen and LED illumination
- designed with text and symbols
- intuitive operation
- mounting to outside of rack
- important parameters are always visible at a glance
- integrated virtual electric meter
- alarm indication
- central operation of cluster nodes and ClustSafe



VSC-2 – Austria's fastest scientific Supercomputer

More than 1,300 nodes, 30 cabinets, 16,000 metres of cable, 32,000 bolts, more than 21,000 computer cores, 180 R_{peak} and a total weight of 16.5 tons – this is Austria's fastest high-performance computer.

In a joint project of the Vienna University of Technology, the University of Vienna and the Vienna University for Soil Management, a call for tenders was launched for the procurement of a cluster system for „numerically intensive computing“. The intended amount of investment was to be 4.2 million EUR.

Required was a „first-class energy efficiency of the entire system and an enormously high raw data throughput“ said Professor Herbert Störi from the Vienna University of Technology in his capacity as project manager. Following a Europe-wide call for tenders, the contract was awarded. „The offer by MEGWARE has fully convinced us. The new VSC-2 is able to compute applications in water-cooled cabinets with a flow temperature

of 18 degrees. As a result, the energy costs incurred for the cooling of the system are significantly reduced.“

„All work was done as planned. Within seven weeks, the nodes were produced, integrated in the cabinets, all cabled and tested, and subsequently dismantled and delivered to Vienna. The integration of the system into the existing network and the commissioning took place without any problems“ says André Singer, project manager at MEGWARE.

„This order was a real challenge on account of its size. However, thanks to our experienced collaborators, an excellent planning of the logistics and reliable partners, we were able to implement the project successfully and to the fullest satisfaction of our customers. And with our place in the TOP500 list – it's great!“

Dual use of energy – LRZ treads new paths with MEGWARE

This cluster with its innovative cooling concept ColdCon® is a unique development and a world première in its present form.

The cluster is located at the Leibniz-Rechenzentrum (LRZ) in Garching near Munich and is one of the leading centres for supercomputing in Europe.

The pioneering feature of the cluster is the fact that its processors and its chip set are directly cooled with warm water within the compute nodes. At the final installation site in the new LRZ building, the cluster is no longer cooled with about 12 °C as is usually done in computing centres, but the new concept is able to handle flow temperatures of 45 °C. As a result, high runback temperatures open up the possibility of free cooling or of reusing the waste-heat produced. The LRZ uses the runback temperatures of 55 °C to 60 °C for running an adsorption

refrigerating machine which produces 11 kW of cold that is used for cooling conventional IT equipment. Thanks to the dual use of energy, the new LRZ cluster is unbelievably efficient.

Each system is submitted to a 7-day burn-in test at our end. Because of the particularities of this project – i. e. the combination of IT and direct water cooling – we have extended the test stage to a total of two weeks. During this test stage, critical situations were simulated and the safety concept was perfected.

„We are delighted that the LRZ has again taken a decision in our favour. With this project, we have jointly made a great step towards an energy-efficient future“ underlines Jürgen Gretzschel, Managing Director of MEGWARE.





sense of responsibility

certified **soft skills**
apprenticeship

Professional Training

We are very strongly committed to the training of qualified young people. Experienced trainers support the youngsters in a comprehensive manner and provide them not only with professional knowledge but also with important soft skills. In this connection, responsibility, teamwork skills and absolute customer orientation are of utmost importance.

DIN EN ISO 9001:2008

We do not wish to rest on our laurels. On the contrary, our aim is to bring about consistent improvements. The satisfaction of our customers is always in the centre of our action. We place special importance on a high quality of all our products and business processes. This is proven by our certification according to the quality management system DIN EN ISO 9001:2008.

