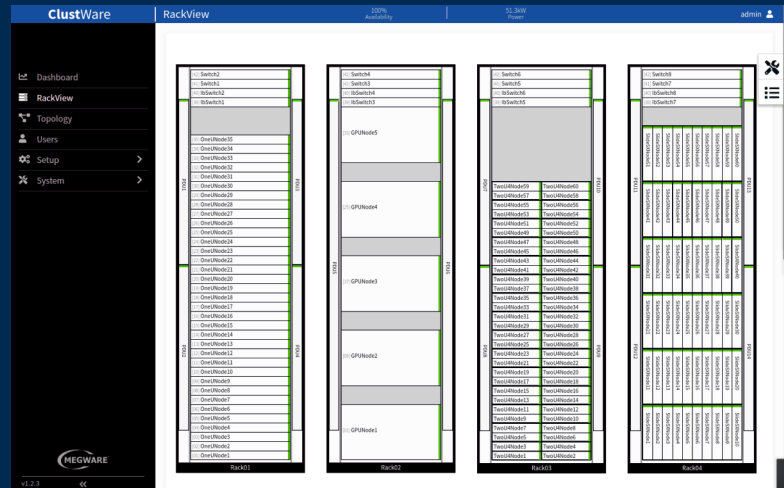


# Cluster Management and Monitoring

## ClustWare®

- easy administration
- web-based user interface
- clearly arranged history graphics
- detailed indication of energy consumption
- own system daemon, IPMI, SNMP etc.
- messages and alarms via e-mail
- predefined thresholds and alerts
- maintenance and defect management
- hardware and software inventorying



## Important Functions

Monitoring
<ul style="list-style-type: none"> <li>• read-out, indication, archival of all hardware parameters such as CPU use, memory, network and temperatures</li> <li>• time-series of nodes and other appliances in neat configurable diagrams</li> <li>• energy consumption for cluster &amp; nodes</li> <li>• supervision of external influences in the rack and in the computer room, such as temperature, humidity and smoke</li> <li>• logging of all operating data</li> <li>• messages and alerts via e-mail</li> <li>• visual representation of cluster</li> </ul>

Management
<ul style="list-style-type: none"> <li>• remotely controlled switching on and off, restart and reset for each node</li> <li>• control of management cards such as IPMI</li> <li>• control of appliances such as power distribution units (PDUs) and air conditioning equipment</li> <li>• configuration and parameter changes at all nodes</li> <li>• energy saving function in connection with a supported batch system</li> <li>• platform-independent web interface</li> <li>• REST-API access</li> </ul>

Administration
<ul style="list-style-type: none"> <li>• easy install via rpm and deb packages</li> <li>• extended alert management over command line scripts</li> <li>• remote control of the appliance</li> <li>• control of jobs in connection with a supported batch system</li> <li>• configuration of energy saving function with a supported batch system</li> <li>• easy detection of appliance faults and exchange of nodes</li> <li>• easy return to service after maintenance or emergency shutdown</li> </ul>

## Essential Advantages

for Users
<ul style="list-style-type: none"> <li>• central information on all nodes</li> <li>• presentation and indication of progress of all hardware and performance data</li> <li>• supervision of current and upcoming jobs with a supported batch system</li> <li>• little administrative work and thus less personnel costs</li> </ul>

for Administrators
<ul style="list-style-type: none"> <li>• many fully automatic processes</li> <li>• central configuration database</li> <li>• uniform supervision of all systems</li> <li>• improved stability of supervision</li> <li>• command-line programs for the automation of tasks</li> <li>• job and process supervision</li> </ul>

for Technicians
<ul style="list-style-type: none"> <li>• easy identification of defects</li> <li>• remote access, especially for installation, maintenance and support</li> <li>• easy removal or insertion of nodes from or into the system</li> </ul>

## Highlights

### Webfrontend

Thanks to its simple and intuitive design, the Webfrontend of ClustWare® provides an overview of the entire cluster at the first glance. In addition to the status of each individual node, it also indicates outline values such as the overall current consumption of the cluster or the rate of utilisation of the nodes.

Detailed information concerning individual nodes and other appliances such as PDUs are easily accessible and neatly illustrated. All archive values are indicated in easily understandable time history graphics. This gives you the possibility of retracing the rate of utilisation of your cluster or controlling energy consumption at a later point of time.

The execution of instructions is designed in a way that operator errors are practically excluded. This allows you to work in a safe and targeted manner.

### PDUs, IPMI Cards, ...

ClustWare® is able to supervise and control many other appliances such as PDUs, switches or air conditioning equipment of a wide range of manufacturers. In order to switch the nodes, ClustWare® can transmit instructions to IPMI cards. In addition, sensor and log data can be read out in order to support the diagnosis of faulty systems. With this, you are given the possibility of a complete and comprehensive supervision of all cluster components.

### Queueing

The connection to queueing systems offers new possibilities for the job controlling. For example, all jobs and the assignment of jobs to the individual nodes are indicated in the Webfrontend in a clear-cut manner.

There, it is also possible to activate nodes for the queueing system or to deactivate nodes or to erase jobs. ClustWare® also evaluates information with regard to occupied and free slots, and it is able to switch off any nodes when they are not needed. This saves energy and reduces your operating costs. If computing requirements are rising again, ClustWare® will activate as many nodes as are additionally needed.

### Extended Management Possibilities

With a shell instruction, all data concerning the cluster system can be extracted and instructions can be transmitted. For more modern access ClustWare® provides an REST-API. This allows you to create additional automation processes which can be triggered from other systems.

### Immediately Ready for Use

ClustWare® is fully adapted to and configured for the cluster system. Thanks to this, you are provided with a system which is immediately ready for use.

