

JURECA

First modular supercomputer worldwide

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- 1 Curiosities
- 2 Architecture
- 3 Classifications
- 4 Other resources

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- 1 Curiosities
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- Forschungszentrum Jülich is a interdisciplinary research centre in Germany;
- Institute for Advanced Simulation (IAS);
- Jülich Supercomputing Centre (JSC);
 - Supercomputing centre since 1987;

Managed supercomputers

- JUSUF;
- JUWELS (position 31¹);
 - Helped Google demonstrate the quantum supremacy (source);
 - Quantum computer: 200 seconds;
 - Fastest supercomputer: 10.000 years;
- JURECA (position 56¹);
 - The name is short for Jülich Research on Exascale Cluster Architectures;

¹November 2019 ranking.

- 2015-04: begins to operate the cluster;
- 2017-11: included a buster module;
- First modular supercomputer worldwide (source);

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JURECA Cluster



- 1872 compute nodes²
 - 2 Intel Xeon E5-2680 v3 Haswell CPUs per node
 - 2 × 12 cores, 2.5 GHz
 - 75 compute nodes with 2 NVIDIA K80 GPUs
 - 2 × 4992 CUDA cores
 - 2 × 24 GiB GDDR5 memory
 - DDR4 memory (2133 MHz)
 - 1605 compute nodes with 128 GiB memory
 - 128 compute nodes with 256 GiB memory
 - 64 compute nodes with 512 GiB memory

²You can see the details here.

- 12 visualization nodes
 - 2 Intel Xeon E5-2680 v3 Haswell CPUs per node
 - 2 NVIDIA K40 GPUs per node
 - 2 × 12 GiB GDDR5 memory
 - 10 nodes with 512 GiB memory
 - 2 nodes with 1024 GiB memory

Summary - JURECA Cluster

- 1872 compute nodes
- 12 visualization nodes
- 45.216 CPU cores
- 1.8 (CPU) + 0.44 (GPU) Petaflop per second
- 100 GiB per second storage connection

JURECA Buster



Summary - JURECA Buster

- 1640 compute nodes³
 - 1 Intel Xeon Phi 7250-F Knights Landing CPUs per node
 - 68 cores, 1.4 GHz
 - 96 GiB memory plus 16 GiB MCDRAM high-bandwidth memory
- 111.520 CPU cores
- 5 Petaflop per second
- 100+ GiB per second storage connection

³You can see the details here.

- CentOS 7 Linux distribution
- Intel MPI and ParTec MPI
- OpenMP
- ...

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Based on the instruction stream and the data stream.

- SISD
- SIMD
- MISD
- **MIMD**

They use MPI to communicate between nodes.

- Multiprocessor
- **Multicomputer**

Type of memory access

- UMA
- NUMA
- COMA
- **NORMA**

Construction trends

- PVP
- SMP
- MPP
- NOW
- **COW**

Flynn

instruction stream and data stream

memory sharing

memory access

construction trends

MIMD

Multiprocessor

UMA

NUMA

COMA

SMP

PVP

Multicomputer

NORMA

MPP

COW

NOW

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- Time lapse video of the installation
- Jülich Supercomputing Centre