

# High-Q Club

The highest scaling codes on JUQUEEN



- Promote Exascale with millions of threads
- Showcase codes that scale up to 458,752 cores or 1.8 million threads
- Diverse membership regarding scientific fields and algorithms

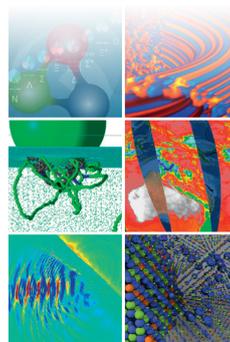
## Aims

To promote the idea of exascale capability computing, we have established a showcase of codes that can utilise the entire 28-rack BlueGene/Q system at the Jülich Supercomputing Centre (JSC). This encourages other developers to invest in tuning and scaling their codes and show that they are capable of using all 458,752 cores, aiming at more than 1 million concurrent threads on JUQUEEN.

High-Q status represents an important milestone in application development towards future HPC systems that envisage even higher core counts.

## Current members

The first members were solicited via the JUQUEEN Porting and Tuning workshop. In the meantime, the High-Q club has attracted 31 members, including codes from fundamental physics, neuroscience, plasma physics, molecular dynamics and climate and earth science.



CIAO	$\mu\phi$ (muPhi)
Code_Saturne	Musubi
CoreNeuron	NEST
dynQCD	OpenTBL
FE2TI	ParFlow+p4est
FEMPAR	pe
Gysela	PEPC
hp-fRG	PMG+PFASST
ICON	PP-Code
IMD	psOpen
JURASSIC	SHOCK
JuSPIC	SLH
KKRnano	Terra-Neo
LAMMPS (DCM)	waLBerla
MPAS-A	ZFS
MP2C	

The programming languages and models are as diverse as the codes themselves. We see Fortran, C and C++ codes with extensions for GPU support, hybrid parallelisations with pthreads or OpenMP and plain MPI codes. A frequent and vital key ingredient was good parallel I/O, e.g. via SIONlib.

The developers range from end-users through computer scientists to the Jülich Simulation Laboratories.

## How to achieve the goal

JSC provides several levels of support helping users to scale their codes: cross-sectional teams for performance analysis and application support as well as Simulation Laboratories. A good start are our Porting and Tuning workshops. Reports from our latest Scaling workshops are also available: [FZJ-JSC-IB-2015-01](#), [FZJ-JSC-IB-2016-01](#), [FZJ-JSC-IB-2017-01](#)

## How to apply

To qualify for High-Q Club status, application developers should submit evidence of scalability up to all available cores on JUQUEEN, preferably including multi-threading capability and providing peak performance numbers or efficiency data.



28 codes



3 codes

