



# JUNIQ: HPC-QC integration

Current infrastructure and some thoughts on scheduling implementations

26.6.2026 | Carlos Gonzalez Calaza

# JSC's Quantum Computing Strategy

## Four Pillars

- I. Modeling and emulation (since 2004)
- II. Provision of QC systems (since 2016)
- III. HPC-QC integration (since 2017)
- IV. Creation of a quantum computing user infrastructure (since 2016)



JUNIQ – Jülich UNified Infrastructure for Quantum computing

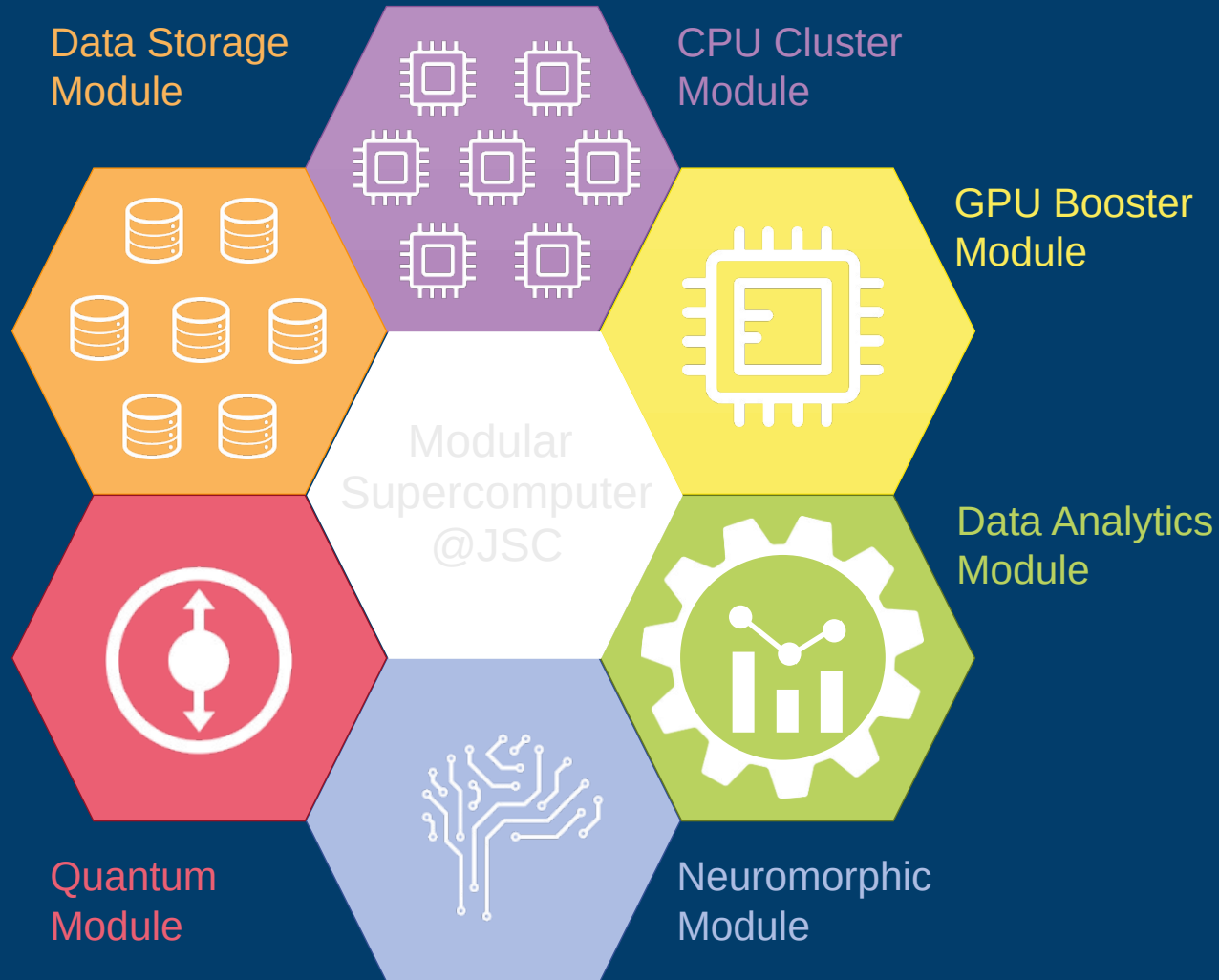


# JSC's Quantum Computing Strategy

Modular HPC and QC integration

HELMHOLTZ  
RESEARCH FOR GRAND CHALLENGES

HELMHOLTZ  
QUANTUM



- ▶ Pushing for the **tightest possible integration** of quantum computers into the HPC environment
- ▶ Modular supercomputing architecture is ideal for integrating quantum computing capabilities into **HPC workflows**

# JSC's Quantum Computing Strategy

Provision and integration strategy

**HELMHOLTZ**  
RESEARCH FOR GRAND CHALLENGES

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QUANTUM

## Analog quantum computers

**D·WAVE**



**Quantum annealer**

4400+ **superconducting**  
flux qubits  
Hosting since 2021

**Pasqal**



**Quantum simulator**

140+ **neutral atom**  
qubits  
Hosting since 2025

## Digital quantum computers

### CQC Project



5 **superconducting** qubits  
Hosting since 2023

**IQM**



5 **superconducting** qubits  
Hosting since 2023

**eleQtron**



32 **trapped ion** qubits  
Coming 2026

**Further systems:**

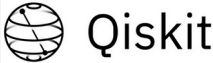



**ARQUE SYSTEMS**

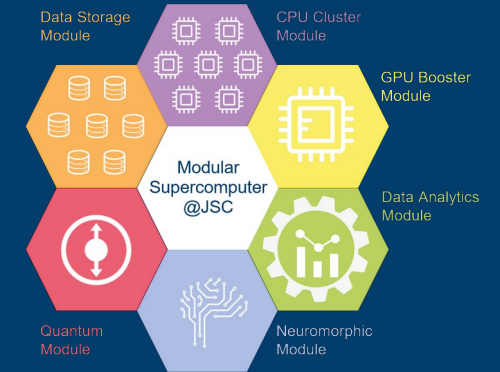
**SOLID**

**JÜLICH** | **JUNIQ**  
Forschungszentrum | QUANTUM USER FACILITY

# HPC-QC integration models

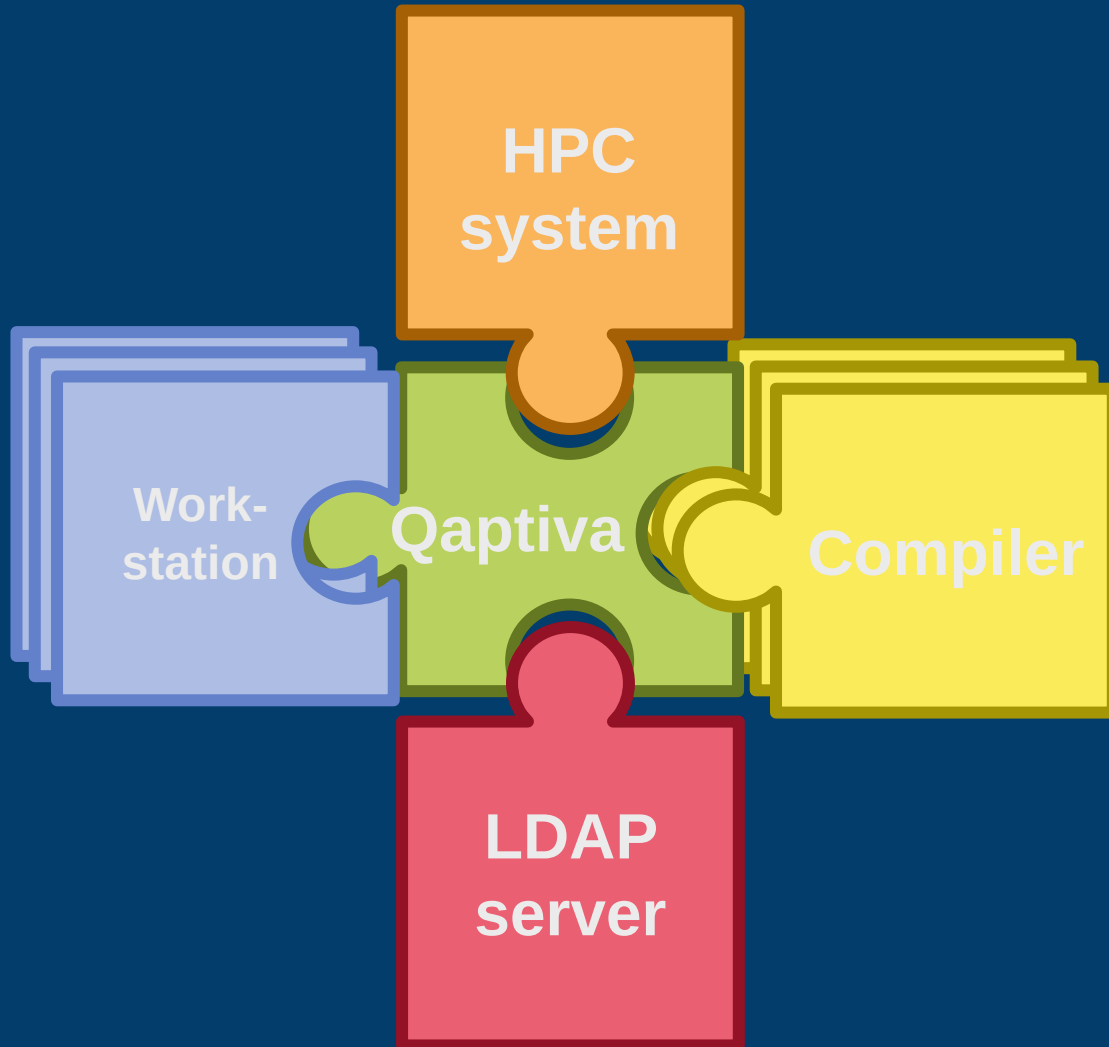
Different QPU access models for different integration levels

QPU access model	Integration mode	QPU scarcity	Advantages	Disadvantages	Example	Compatibility
Cloud access	None	1 QPU / many HPC centers	No integration work required on HPC center.	<b>Scheduler on cloud-side impedes real HPC workloads.</b>	 Qiskit  Leap <sup>2</sup>	N/A.
HPC system-global	“Flexible”	Few (diverse) QPUs / 1 HPC center	Supports HPC workloads. <b>Allows QPU-sharing.</b>	Scheduling is tricky (HPC vs QC job timescales, resource sharing).		Can support cloud access too.
HPC node-local	“Fixed”	Many QPUs / 1 HPC center	<b>Highest performance potential.</b> Delegates scheduling issues.	Assumes QPUs are widely-available resources (like GPUs). No QPU sharing.		None.



# Qaptiva 800s

Qaptiva as central component for integrating QCs in HPC



myQLM provides:

- QC framework for preparing experiments,
- SSL-secured communication with Qaptiva (QLMaaS)

Qaptiva provides interfaces to:

- Analog / digital / annealing QPUs (QPHandler),
- Compilers
- JSC user administration (UAdm) tools (qlm-inotify)
- SLURM/ParaStation Modulo HPC scheduler

# INTERESTED IN FURTHER DISCUSSIONS? COME AND VISIT US!



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