



The first and only quantum computer built for business

Advantage is the first and only quantum system designed for business and is the most powerful and connected commercial quantum computer in the world. With more than 5000 qubits, 15-way connectivity, and powerful hybrid solvers, Advantage gives customers the ability to solve far larger, more complex problems and drive real-world value for their businesses. The all-new Advantage performance update includes a newly fabricated QPU for even better business performance. Now, customers can solve even larger and more complex problems faster, with more precision.

The Advantage™ system is available through the Leap™ quantum cloud service, and can also be installed into private and public clouds, standard data centers, and high-performance computing environments.



Key Benefits of Advantage

Advantage is the most connected and powerful commercial quantum computer in the world, allowing customers to solve larger, more complex real-world problems.

- **Richer topology:** The Advantage quantum processing unit (QPU) has 5000+ qubits with 15-way connectivity. This topology makes Advantage ideal for solving the hard optimization problems encountered in business, such as employee scheduling and transportation routing.
- **Better solutions:** With 2.5x greater connectivity, larger, more complex problems can be more efficiently mapped to Advantage than to previous-generation systems, giving customers higher quality solutions.
- **Much larger problems:** The Leap hybrid solver service (HSS) accepts business-sized problems and solves them on a combination of quantum and classical resources using advanced algorithms. The HSS accepts problems of up to 1 million variables making it suitable for truly enterprise-scale problem solving. In addition to discrete variables the HSS accepts up to 100,000 constraints, giving customers flexibility and the ability to represent problems more natively.
- **Quantum annealing controls:** The Advantage system gives power users fine-grained control over the quantum annealing process, supporting:
 - Per-qubit anneal offsets.
 - Changes to the global anneal schedule, including annealing time, anneal pause and quench, and reverse anneal.
 - Time-dependent gain on linear coefficients.



For more information about the system, contact us at sales@dwavesys.com, or visit us at www.dwavesys.com.

Leap Quantum Cloud Service

Leap brings quantum computing to the real world by providing secure, real-time cloud access to Advantage and other solvers. Code in-place using an online integrated developer environment (IDE) with plenty of examples, and all the programming and visualization tools you need. Sign up here: <https://cloud.dwavesys.com/leap>



Ocean SDK

D-Wave's Python-based software development kit, Ocean, reduces time to application development for D-Wave solvers. Open-sourced on GitHub, Ocean facilitates collaborative projects that can leverage quantum and hybrid quantum/classical resources.

Try it out:

- Ocean SDK: <https://github.com/dwavesystems>
- Ocean docs: <https://docs.ocean.dwavesys.com>

Solver API

Calls to the system go through the Solver API (SAPI), a RESTful interface responsible for user authentication, user interaction, and work scheduling. SAPI connects to back-end servers that send problems to and return results from Advantage and other solvers.

QPU Specifications

Number of qubits	5000+
Number of couplers	35,000+
Graph size	P16 (Pegasus)
Qubit temperature	< 15 mK

Dimensions

Length	3.0 m (10 ft.)
Width	2.1 m (7 ft.)
Height	3.0 m (10 ft.)
Mass	3800 kg (8400 lbs.)

Power

Rated power	25 kW, maximum
Mains voltage	120/208 V, 60 Hz (standard) 230/400 V, 50 Hz (international)
Mains connection	3 Wire + N + PE

Cooling

Coolant	15 kW of cooling (4.3 refrigeration tons)
Max. water pressure	6 bar (88 psi)
Min. temperature	15 °C @ 9.4 L/minute (2.5 gpm @ 50 °F)
Max. temperature	25 °C @ 20.5 L/minute (5.4 gpm @ 77 °F)
HVAC	5 kW (17,000 BTU/h) in normal mode 12.5 kW (43,000 BTU/h) in auxiliary mode

Regulatory Compliance

US	UL 62368-1, FCC Part 15 part B Class A
Canada	CSA C22.2 NO. 62368-1:19, Industry Canada ICES-003, Class A

Environmental Requirements

Temperature	
Operating	20 to 25 °C (68 to 77 °F)
Rate of change	1 °C (1.8 °F) in 15 minutes (maximum allowable)
Shipping/storage	-10 to 40 °C (14 to 104 °F)
Humidity	
Operating	5 to 80% RH (noncondensing)
Shipping/storage	< 85% RH (noncondensing)
Pressure	
Operating	65 to 106 kPa (9.4 to 15.4 psi)
Shipping/storage	65 to 106 kPa (9.4 to 15.4 psi)
Altitude	0 to 2300 m (7500 ft.)
Max. building vibration	50 µm per second
Ambient magnetic field	100 µT (maximum allowable)
Noise level	75 dBA

Consumable Materials

Gases	Nitrogen gas Grade 4.8 (99.998%) Helium gas Grade 5.0 (99.999%) Usage: ~1 T-size cylinder each per year
Cryogenics	Liquid nitrogen Usage: ~6L/day (1.6 U.S. gal./day)

Networking Requirements

L2, L3 requirements	Dedicated L2 block; /27 internal IP addresses
Ethernet speed	E100 (can be capped at 10 Mbps)
IP addresses	IPv4 externally available; assigned
Physical connections	RJ-45 GE (1000BASE-TX)