

D-Wave's Gate-Model Quantum Simulator

D-Wave's gate-model quantum simulator is designed to prototype, test, and validate novel error-aware applications and error correction routines before execution on quantum hardware. Error awareness is a unique capability enabled by D-Wave's dual-rail architecture, combining error detection and real-time control to give users new tools and data for achieving fault tolerance and exploring advanced use cases.

Built on D-Wave's dual-rail qubit approach, our simulator will provide a rich quantum programming toolkit with error-aware capabilities and distinct tools for modeling quantum processor behavior, including error detection and real-time control. This is expected to expand the range of advanced quantum workflows developers can test as they prepare applications for future execution on D-Wave™ gate-model quantum systems.

With availability through D-Wave's Leap™ cloud platform scheduled to begin in September 2026, D-Wave's simulator will seamlessly integrate into the D-Wave software ecosystem, making access simple and fast.

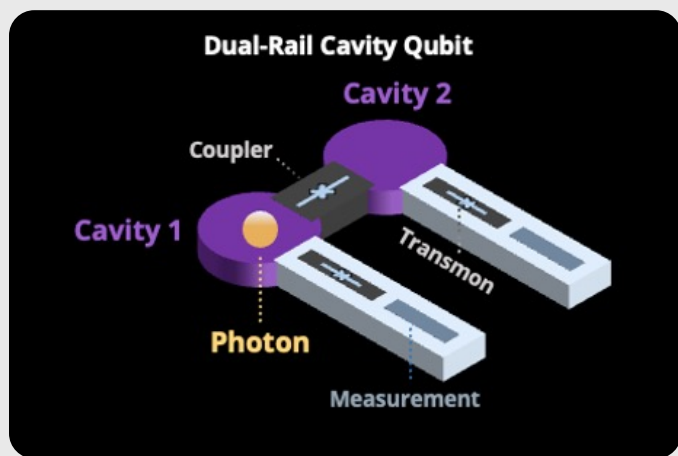


Figure 1: A rendering of the dual-rail qubit.

Error-Aware by Design

The dual-rail cavity qubit (DRQ) (Fig. 1) is the core hardware component of D-Wave's gate-model quantum computing architecture. Built entirely from superconducting components, it supports high-performance operations and fast execution.

Its unique design enables built-in error detection at the single-qubit level, reducing hardware overhead and accelerating the path to fault-tolerant quantum computing.

Features

- Simulation of up to 21 qubits
- Error-aware programming support with error detection and real-time control flow
- Two modes of operation: Ideal and hardware emulation with error model
- Monte Carlo simulation of stochastic real-time quantum system dynamics for advanced control flow applications

Platform and Cloud Integration

- Forthcoming availability through D-Wave's Leap quantum cloud platform
- Programmable via D-Wave's Ocean™ SDK
- Compatible with D-Wave's QCDL API and Qiskit integration

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Accelerate Error-Aware Development

Using D-Wave's simulator, we expect users will be able to:

- Develop error-aware applications quickly using feature-rich tools and familiar interfaces
- Save time and resources by prototyping algorithms before QPU execution
- Simplify development workflows with quick algorithm construction, validation, and implementation in ideal mode
- Gain realistic performance insights into future QPU execution with hardware emulation mode
- Run the simulator in the Leap quantum cloud platform for highly available, integrated quantum development workflows
- Leverage robust documentation and support for programming error-aware systems



Ready to Get Started?

Whether you're exploring, prototyping, or testing error awareness in quantum algorithms, we believe D-Wave's simulator will provide a pragmatic way to prepare for when gate-model quantum computing will be production-ready.

[Request future access today.](#)

Explore New Error-Aware Capabilities

With access to error-detection data and real-time control capabilities, we expect users will be able to investigate new application approaches that extend beyond conventional gate-model quantum programming.

- Access high-quality error-detection data to explore use cases in chemistry, materials science, and AI/ML
- Combine real-time classical logic with quantum operations to investigate new application approaches
- Use flexible error-handling tools to process error data and help improve solution quality
- Expand the conventional gate-model programming toolbox with error-aware capabilities

