# Industry-Ready
# MultiQuantum Optimization Platform

Irontec has developed a hybrid quantum–classical optimization platform designed to tackle discrete optimization problems arising in **real industrial** scenarios such as **mobility, logistics, and healthcare**.

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# Quantum Leap in Optimization

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Discrete optimization lies at the heart of many industrial challenges across these domains. Classical methods are widely used today, but many discrete optimization problems — such as the famous Traveling Salesman Problem (TSP) — are NP-hard, which makes them difficult to solve efficiently on classical computers. Typical issues include:

**A)** the classical solver fails to find a global optimum;
**B)** the time required to obtain a high-quality solution is too long;
**C)** the problem size does not fit into the available computational resources.

**Quantum Computing (QC)** [see the celebrated book], by fundamentally changing the computing paradigm, promises to address these limitations more effectively. QC originated by Richard P. Feynman idea of employing quantum phenomena to simulate physics. Later, several algorithms have been proposed in several areas, ranging from cryptography (the famous Shor's algorithm) to optimization, with Quantum Approximate Optimization Algorithm (QAOA) and Quantum Annealing (QA). Recent advances in quantum hardware are bringing QC from research lab to industry. At Irontec,

- on the one hand, we are gradually adopting Post-Quantum Cryptography (PQC) to neutralize the possible treats coming from the application of Shor's algorithm;
- on the other hand, we offer our customers new opportunities in discrete optimization by our novel MultiQuantum platform.

The key idea in quantum optimization is to embed discrete optimization problems into large quantum search spaces, enabling:

**Higher-quality solutions**

**Shorter time-to-solution**

# The Irontec MultiQuantum platform

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Given a discrete optimization problem, the MultiQuantum platform combines a portfolio of classical and quantum optimization algorithms to get the best of both worlds. Several quantum technologies are supported, including the Quantum Approximate Optimization Algorithm (QAOA) [originally proposed in A Quantum Approximate Optimization Algorithm] and Quantum Annealing (QA) [originally introduced in Quantum Computation by Adiabatic Evolution]. QAOA runs on gate-based quantum computers, while QA runs on analog quantum processors tailored for optimization.

The growing need for standardization and benchmarking — highlighted in initiatives such as the Workshop on Quantum Technologies: European Standardization and Ecosystems — inspired Irontec to simultaneously leverage multiple quantum and classical solvers, compare their performance on concrete problems, and deliver to the end user solutions that are at least as good as state-of-the-art classical methods. The platform is ready to integrate new quantum solvers from the broader quantum ecosystem, including both industrial and academic providers. Problem embedding into quantum spaces is handled automatically by the platform, so no quantum expertise is required from the user. The platform automatically interlaces classical and quantum solvers to deliver a ready-to-use value to customers. Our MultiQuantum platform has already been successfully applied to several use cases, including GPU capacity planning. This has allowed us to offer customers hardware configurations with:

- lower cost;
- optimized GPU utilization;
- reduced carbon footprint.

**In summary, Irontec has developed an industry-ready hybrid quantum–classical optimization platform tailored to real-world discrete optimization use cases.**

# References

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**Do you think you have a use case where this platform could be applicable?**

**Tell us about it an we will analyse it together.**

**Contact us**

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