



Quantum computing software and services

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QC Ware develops software that runs on quantum computers—for quantitative finance, engineering and data analytics. Its team includes experts in quantum algorithms, computer science, and physics. QC Ware has ongoing collaborations with Fortune 100 companies and its investors include DE Shaw, Airbus, and Alchemist. The company recently won a grant from the National Science Foundation. QC Ware is based in Palo Alto, CA.

Matt Johnson is the CEO of QC Ware and handles business development and strategy. Prior to co-founding QC Ware, Matt was a managing director with Apollo Management and he started out as Air Force officer. Matt received his BS from the US Air Force Academy and his MBA from the Wharton.



Quantum computing for the financial services industry

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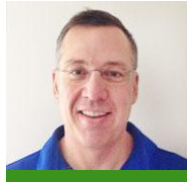
QC Ware Overview

- Mission:** 1,000x speed-up for hard enterprise problems
- Partners/Investors:** DE Shaw, NSF, NASA, Airbus, Google, D-Wave
- Team:** Experts in quantum physics, computer science, quantum algorithms, and machine learning
- Machine access:** IBM, D-Wave, Rigetti (Q3) and Google (Q4)



Team

Quantum algorithms, computer science, physics, machine learning



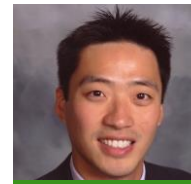
Matt Johnson - CEO

MBA @ Wharton
BS @ USAF Academy



Asier Ozaeta

PhD @ UPV (Spain)
Condensed Matter Physics



Kin-Joe Sham - COO

PhD, MBA @ UMN
BS, MEng @ MIT
Electrical Engineering



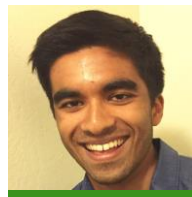
Randall Correll – Sr. Sci.

PhD @ UT Austin
Theoretical Physics



Karthik Choutagunta

PhD candidate @ Stanford
Electrical Engineering



Shreyas Parthasarathy

BS candidate @ Berkeley
Engineering Physics



David Hyde

PhD candidate @ Stanford
Computer Science



Vincent Su

MS, BS candidate @ Stanford
Physics and CS

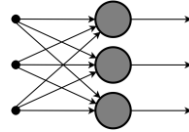


Peter McMahon

Senior Advisor
PhD, MS @ Stanford
Quantum Info Sciences



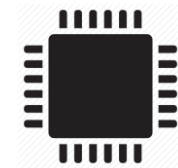
Bringing QC to the Enterprise



Application / SDK layer



Platform / Cloud layer





QC Ware Value Proposition

Hardware-Agnostic Acceleration Platform

- Obtain optimal performance with no manual fine-tuning

Full SDK Suite

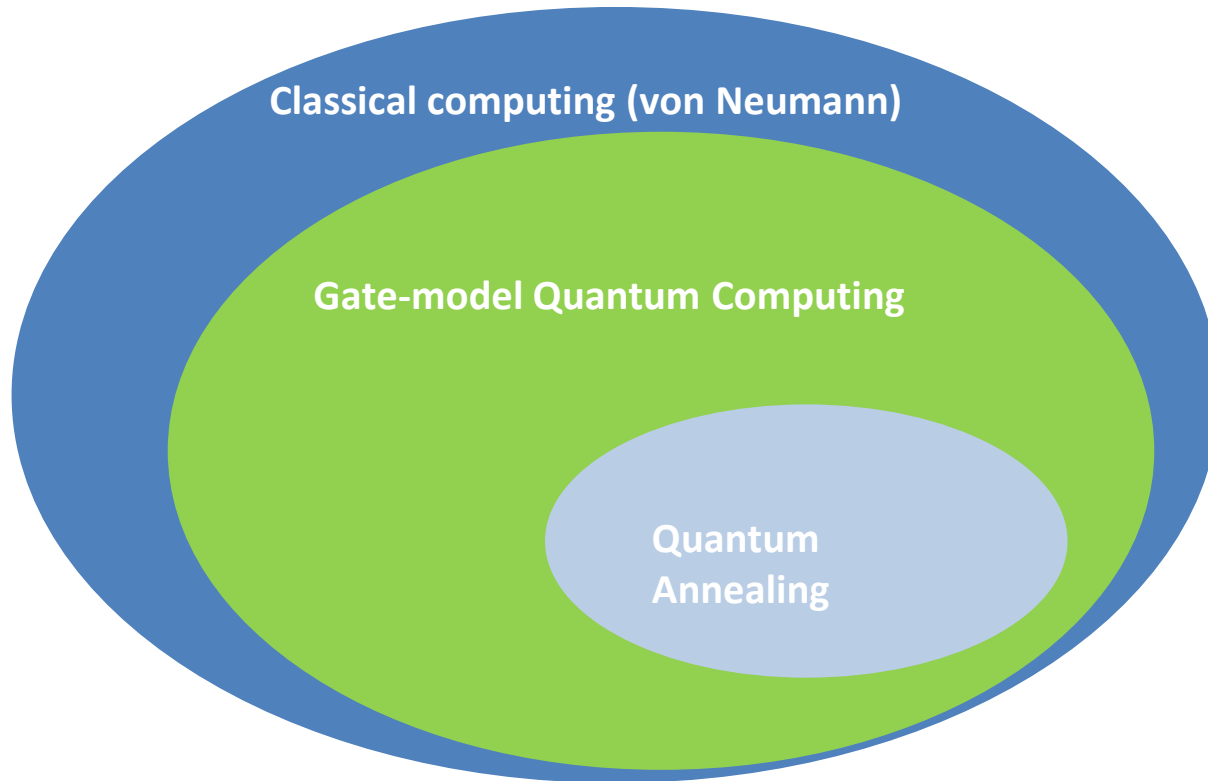
- Simplify programming experience for novice QC users

High-Performance Applications

- Quant finance, engineering, and machine learning



QC State of the World – QC Capabilities



- Classical computing is a universal computing model
- Gate-model QC is also a universal computing model
- Quantum Annealing is a quantum optimization engine



QC's Value to Financial Institutions

- Quantum processing provides a way to calculate more optimal solutions and to accelerate computations
- QC resources can be applied to (NP-hard) problems where existing algos or heuristics are slow, or where no acceptably accurate solution can be found
- QPU's are accelerators and will be integrated into existing compute workflows
- Early use cases for QC-boosted processing: **hedge funds** (quant/algo trading), **banks** (financial hedging), and **insurance companies** (asset-liability management)



QC Use Cases for Financial Institutions

Use Case	Summary
Short-Term Asset/Liability Optimization	<ul style="list-style-type: none">• Optimize balancing of interest rate risk, currency risk, and liquidity risk
Hedging	<ul style="list-style-type: none">• Hedging trading floor risk
Portfolio Compression	<ul style="list-style-type: none">• Reduce number of open positions while retaining desired level of exposure
Expected Shortfall	<ul style="list-style-type: none">• Calculating expected loss in extreme tail events• Determining worst-case loss in crisis scenario possibilities
Multi-Period Portfolio Optimization	<ul style="list-style-type: none">• The decision space grows exponentially with horizon length