Metriq:
Community-driven quantum computing benchmarks

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Collaboration with Da Vinci Labs

Unitary Fund to open first European office in Tours (France) in collaboration with Da Vinci Labs

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https://unitary.fund/posts/eu.html

Problem Domain

- Why do we want to benchmark?

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  Answer the question:

  “How does QC Platform X running Software Stack Y perform on Workload Z and how has that changed over time?”

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- What makes a good benchmark?

Problem Domain

- Why do we want to benchmark?

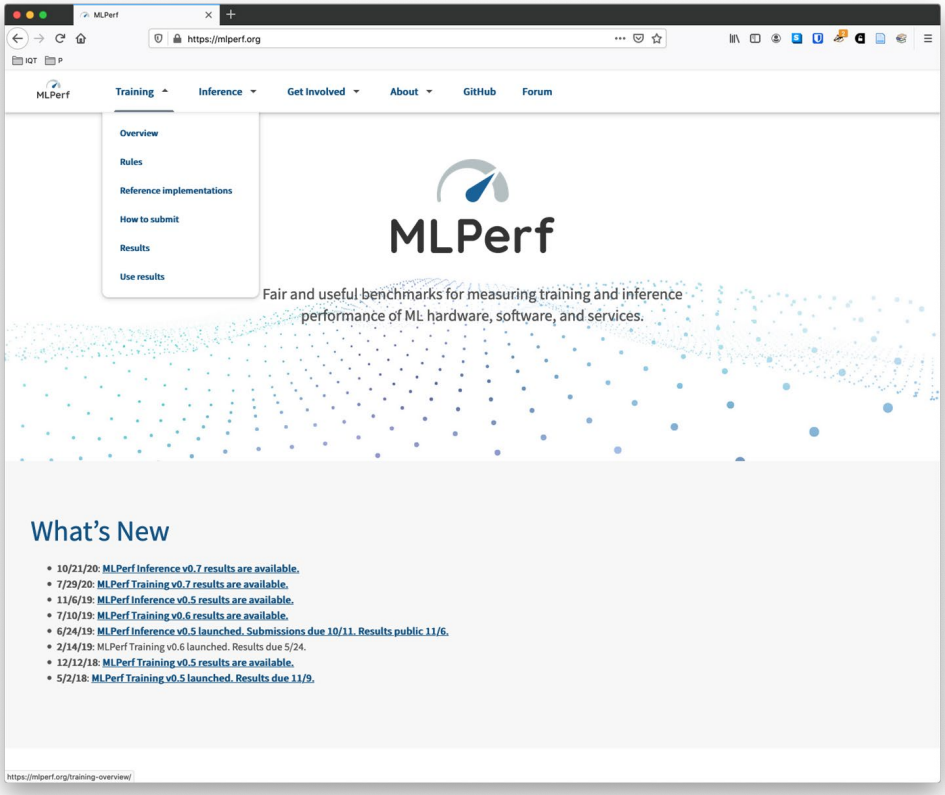
  Answer the question:

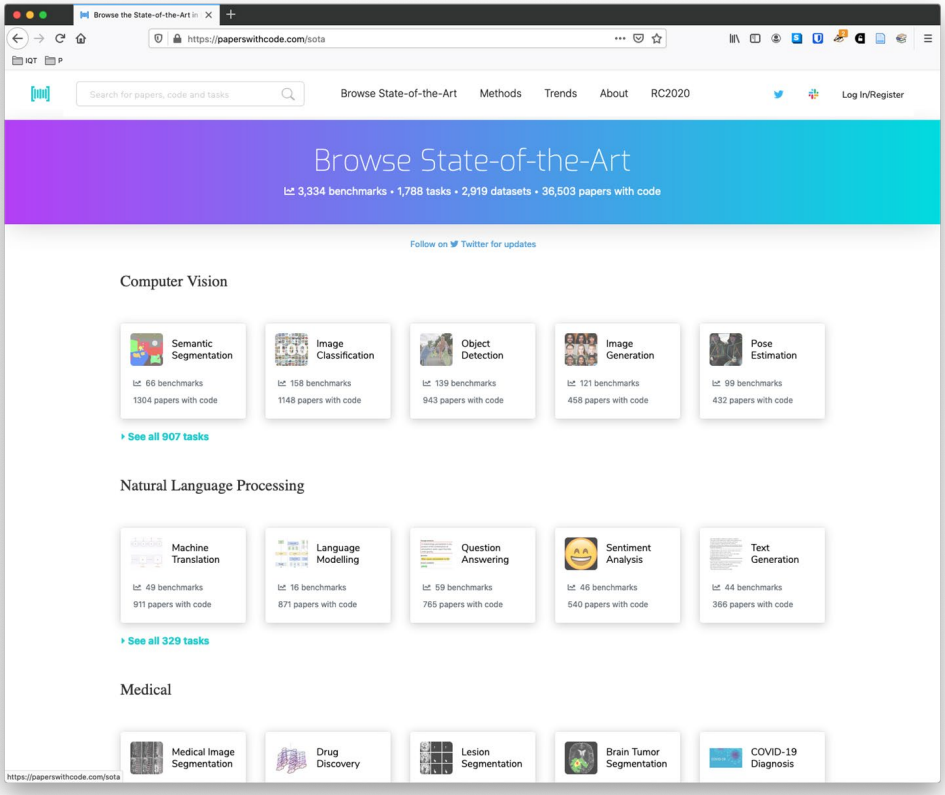
  “How does QC Platform X running Software Stack Y perform on Workload Z and how has that changed over time?”

- What makes a good benchmark?
  - Reproducible[1]
  - Scalable[2]
  - Application-centric[2]
  - Hardware-agnostic[2]

[1]Dasgupta, Samudra, and Travis S. Humble. "Characterizing the stability of nisq devices." *2020 IEEE International Conference on Quantum Computing and Engineering (QCE)*. IEEE, 2020.
[2]Martiel, Simon, Thomas Ayral, and Cyril Allouche. "Benchmarking quantum co-processors in an application-centric, hardware-agnostic and scalable way." *arXiv preprint arXiv:2102.12973* (2021).

AI/ML community benchmarks





Benchmarking is (almost) non-existent

- No **repository of state-of-the-art benchmarking results** ala “MLPerf” and “Papers with Code” in machine learning.

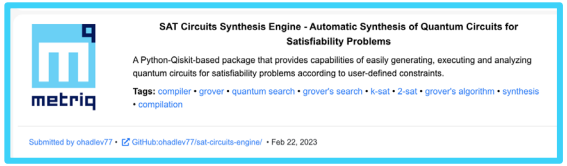
- **QC Benchmarking today does not compare apples to apples**, unlike machine learning
  - No standard benchmarks (except QV and randomized benchmarking)
  - No standard workloads
  - No standard interpretation of results
  - No standard ways of compiling or use of error mitigation
  - …

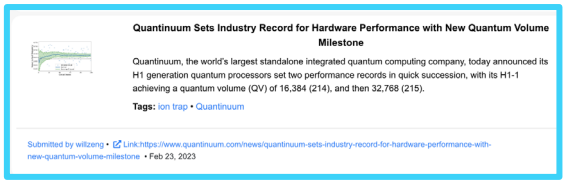
Community-driven quantum computing benchmarks, **metriq.info**

URL arXiv

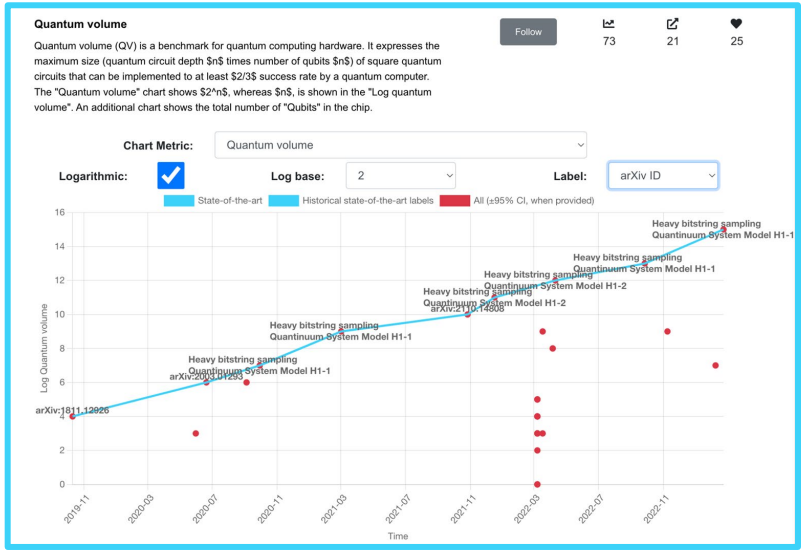
submission

Web UI

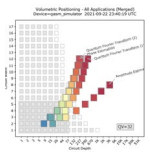




result



Automatic API



QED-C benchmarks

result

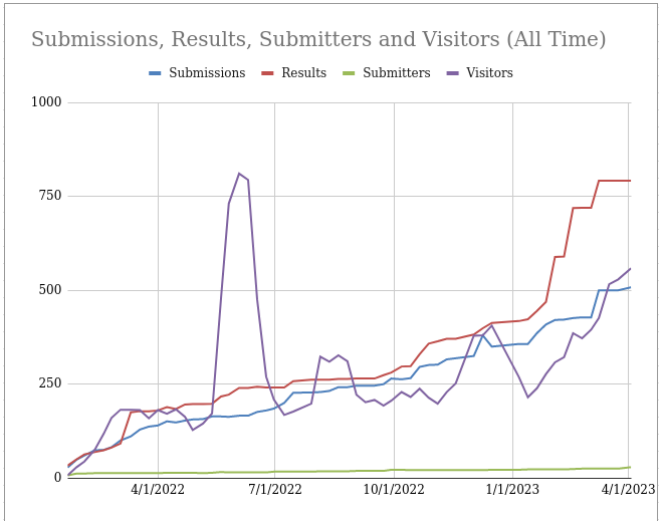
metriq

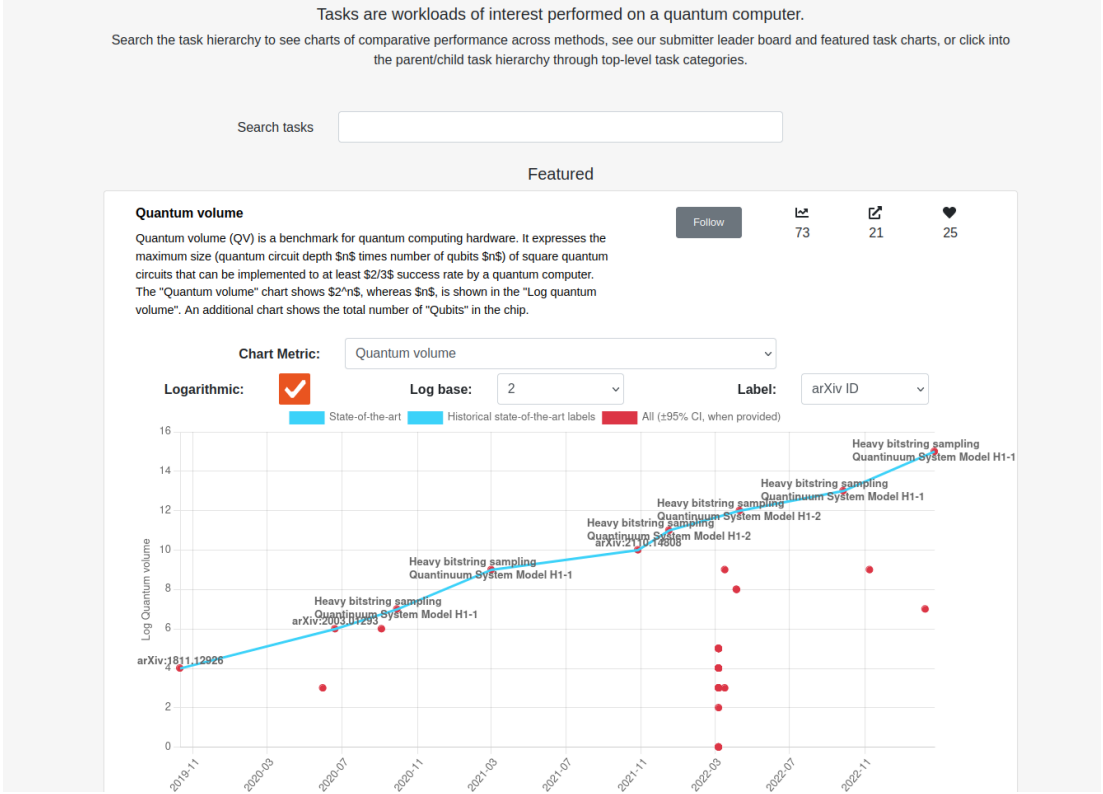
github.com/unitaryfund/metriq-api

github.com/unitaryfund/metriq-client

Metriq updates: Community development, benchmark pipeline

- Latest Release: [v.0.7.1]
- First Metriq Hackathon was on March 24, 25, 2023: 23 new account sign-ups!
- Added a pipeline for Metriq to run and provide cloud benchmarks, (under active development as a 2023 priority)





Walk-through

Metriq: https://metriq.info/

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metriq

Thank you!

Contact: vincent@unitary.fund

Metriq's purpose: A platform to enable QC benchmarking

- We can answer the question: *How does QC Platform X running Software Stack Y perform on Workload Z, and how has that changed over time?*
- Developers and users can submit benchmarking results frictionlessly, via web form or Python client, which wrap our REST API.
- Metriq will become a focal point for a large number of short-term and long-term **benchmarking** efforts sprouting up in the quantum ecosystem.
- **Reproducibility** of benchmarking results in the space will become a habit.
- The long-term cost of deploying quantum computing will go down.

Dasgupta, Samudra, and Travis S. Humble. "Characterizing the stability of nisq devices." *2020 IEEE International Conference on Quantum Computing and Engineering (QCE)*. IEEE, 2020.
Martiel, Simon, Thomas Ayral, and Cyril Allouche. "Benchmarking quantum co-processors in an application-centric, hardware-agnostic and scalable way." *arXiv preprint arXiv:2102.12973* (2021).
Application-Oriented Performance Benchmarks for Quantum Computing https://github.com/SRI-International/QC-App-Oriented-Benchmarks