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The Quantum Hype

- Quantum Computers are machines that use quantum mechanical phenomena for computations. Consider them magical!

- A lot of **real** quantum computers and **simulators** exist in the wild now!
The result...

Researchers with performance-critical work
Enter ABAQUS

● Main Goal: Create an open-source extensible, scalable platform for running benchmarks on quantum devices.

  - Allow easy contributions from the community.
  - Enable researchers/companies to fully customize it in-house.
  - Utilize compute resources more effectively.
  - Facilitate deployment on clusters.

● Proof-of-concept already implemented during last year’s cohort, but without the scalability desiderata. → Need to rethink the architecture!
The New Architecture

- Highly based on containers

How the system works:
1) User submits desired benchmarks to server.
2) Server adds them to a queue of jobs to run.
3) Workers serve the queue, executing the jobs.
4) Workers store result in database.
5) Server returns results to User when they request them later.
Ways to Use ABAQUS

Least Control over Resources

- Using the worker code to manually benchmark jobs, bypassing the whole architecture
  
  ```
  $ pip install .
  ```

- Activation of the platform using Docker Compose or a similar tool
  
  ```
  $ docker compose build && docker compose up
  ```

Highest Control

- Using a container orchestration tool to configure the system on the lowest level
  
  ```
  $ bash_deploy.sh
  ```

Simplest

Most Sophisticated
Sample UI

Choosing quantum backends

Choosing benchmarking tasks

Summary Section
The Future

What can be done now:

- Add more built-in benchmarking tasks. (Variational Algorithms?)
- Benchmark real quantum hardware. (Only simulators supported now)
- Retrieve some results and compare to literature/public data.
QUESTIONS?

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