Agenda

- Software Side Updates
    - Feasibility update using Qiskit
    - Quantum OS update and qualms
- Hardware Side Updates
    - Colin's Solidworks Pictures
    - Nick's PowerPoint update

Summary

- Include the Project title and Team information, including attendance. (Include a reason if there is an absence)
    - sdMay23-24 Quantum Computing
    - Goal: Create a kilo-qubit scale (KQB) **design** for a quantum computer
    - Team Members (all present):
        - Nicholas Greenwood
        - Jacob Frieden
        - Emile Albert Kum Chi
        - Colin Gorgen
        - Arvid Gusatfson
        - Sam Degnan
    - Advisors (all present):
        - Gavin Nop (PhD student)
        - Dr. Jonathan Smith
        - Dr. Durga Paudyal
- Summary of the main points discussed
    - Software side:
        - Sam showed that we can simulate quantum circuits using Qiskit, that we can see the state vectors of ions during each step of the circuit, and can set our own custom state vectors
            - Also spoke about the creation of a digital twin for the actual KQC (kilo-qubit computer)
                - Theoretically, we can transfer state vector representations of qubits between the Qiskit backends of different ion traps
        - Arvid spoke at length about the quasi-crystal clock cycle requirement (fibonacci numbers) and how to implement that in the quantum OS
        - We discussed that even representing 66 qubits using quantum interconnects is probably not feasible using a digital twin (would require something on the order of 1000 TB+)
            - Limit is about 20 right now
    - Hardware Side:
        - Colin presented his images of the HOA trap simplified design
            - The measurements he used weren't very accurate, but gave a rough idea of what this would look like

            - Colin will be receiving updated measurements to adjust for a more accurate HOA trap design
        - Nick presented his updated PPT measurements
            - Again, the measurements proposed in the PPT are based on the HOA trap, which we are moving away from
            - Nick discussed any potential issues with laser interference causing an issue with ion hand off / laser to laser contact. There will be no issue
- List of any decisions made
    - We will be moving away from the widely-publicized HOA measurements, and will attempt to find the Honeywell trap's measurements
    - We will use multiple Qiskit backends for the digital twin, one per ion trap
- Next steps for the project
    - Update Solidworks Model
    - Read the "Nature" QC papers + Ytterbium Ion papers recommended to us to try and find the Honeywell trap's measurements
    - Continue to look for th ancillary hardware needed for each ion trap, and figure out how the lasers are split for the various purposes (Doppler cooling, Barium, etc)
    - "Can we bring two specific qubits together at a given time" - Main question for the software team