CprE 492 - sdmay20-08
Cirq: A Python Framework for Creating, Editing, and Invoking Quantum Circuits
Week 4 Report
2/28/2020 - 3/12/2020

AJ Hanus - Researcher, Developer
Andrew Hancock - Researcher, Developer
Austin Garcia - Researcher, Developer
Calista Carey - Researcher, Developer
Jake Shedenhelm - Researcher, Developer
Jordan Cowen - Researcher, Developer

Client: Victory Omele
Faculty Advisor: Akhilesh Tyagi

Weekly Summary:

These past two weeks could be classified as coding weeks. Everyone in the group was working diligently on their respective pull requests and getting ready for an initial push of code prior to Spring break. We also completed our presentation for the video and spent time working on that. We have contacted our sponsor recently about a couple different issues and questions we had about the code. We've also continued to meet weekly both in small groups and as a large group.

Past week accomplishments:
 ● Got tests running and called the quil functions of a gate.
 ● Confirmed with Victory that another issue would be required for the completion of PR1.

Pending Issues:
 ● The current issues we are working on are the three pull requests we have in the Cirq repository.
 ● EC2 instance doesn't have much RAM, so it crashes when testing is attempted.
 ● Our group has been recently assigned a new issue: https://github.com/quantumlib/Cirq/pull/2591 . Completing this pull request is crucial to the project as three of the standard QUIL gates that need to be implemented rely on the TwoQubitDiagonalGate.

Individual Contributions:

Name	Individual Contributions	Hours this week	Hours Cumulative
Calista Carey	Spent a lot of time going through all of the APIs and ensuring that all of my gates have a proper translation to QUIL. A lot of them rely on having the exponent equal to one. The PHASE	6 (2/28-3/5) 7 (3/6-3/12)	40

	gates in QUIL are the ones I spent the most time looking at as three of these gates all rely on one gate. In order to do this, the program needs to consider the state of each qubit, which I attempted to figure out. As I was working on this, Victory sent our group an email stating we need to also finish implementing the TwoQubitDiagonalGate, which is what is used for the phase gates. Naturally, it makes sense that Jake and I take on this issue, too, since our pull request depends on it. We met up to discuss how we will complete this issue, and finished up our first implementation of the '_quil_' functions of the other standard QUIL gates. We are hoping this first implementation can help AJ test the parser he and Austin are writing. As I was looking through the Cirq and QUIL API's I realized a lot of the standard gates I am implementing rely on the Non standard gates group 2 is working on. I further discussed with Jordan and Andrew how to handle these cases while they are still working on their implementations.		
Jordan Cowen	Over the last two weeks I've met with Andrew twice and with the group as a whole once. Andrew and I reviewed some of the non-standard gates and removed and added some gates to our assignments. We have decided to decompose some of the gates and use QUIL defines for some new gates. We have spent some time working on these various gates as general coding time. We also met as a group to make and record the presentation for Peer Reviews.	5 (2/28-3/5) 6 (3/6-3/12)	31
AJ Hanus	Began work with the "quil_output.py" file. This file will be used for the control flow of outputting the actual strings and calling the "_quil_" functions for each of the gates.	5 (2/28-3/5) 7 (3/6-3/12)	41

	Created a basic "quil.py" file for extracting the "_quil_" functions from a gate. Also returns an error if the gate does not have a QUIL output function. Worked with Austin to have him work on the control gates (like the Measurement gate) while I worked on the other control flow portions. Met with the team to go over the presentation and record for our team		
Austin Garcia	I met with Calista, Jacob, and Jordan to make the slides for our video presentation. I met with AJ where we compiled a list of the initialization variables that we need for Quil implementation and started working on the control gates.	7 (2/28-3/5) 5 (3/6-3/12)	34
Andrew Hancock	I've met with Jordan twice to discuss the implementation and revise the list of non standard gates we have. We also began coding the XPowGate and committed some changes for that. I also added some slides to our peer review powerpoint as well as voicing over some of them in our video and submitting the discussion post.	5 (2/28-3/5) 6.5 (3/6-3/12)	37
Jacob Shedenhelm	These past weeks I spent a lot of time working through my work required. We had some slight confusion with overlapping gates and who was supposed to work on them that we settled. Calista and I met and worked on coding our PR. This was really beneficial and it helped working together in case of any confusion. As well, our group met and completed the peer review video. We had to make slides for this presentation and voice recorded over them.	6 (2/28-3/5) 6 (3/6-3/12)	39.5

Plans for Coming Weeks:
- Calista: After Spring Break, work on the newly assigned issues and finish the Implementations for the PHASE00, PHASE 01, and the PHASE10 gates that depend on the TwoQubitDiagonalGate. Further test the gates that I have already implemented

- AJ: Pull in the initial pull requests from the other groups to more thoroughly test my control flow files. Hopefully, the increase of gates with "_quil_" functions will enable me to work out the kinks in my classes.
- Jordan: Write the code for the _quil_ functions in XPowGate, YPowGate, and ZPowGate. Write the code for the _decompose_ functions for XXPowGate, YYPowGate, and ZZPowGate
- Jacob: After spring break, work on T, CZ, CSWAP gates. As well, finish up work on the X, Y, H gates.
- Andrew: Along with Jordan, write the _quil_ functions for X, Y, and ZPowGate as well solidify changes that will be made to XX, YY, and ZZPowGate.