Survey: Quantum Computing Algorithms and Programming Model

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I want to present a survey on *Quantum Computing* algorithm and programming model as a course project. I will work on this project by myself, so there is no need of work distribution. In this proposal, I will give you the motivation and goal of the survey. And also the time plan of the project.

1 Motivation

Quantum computing is now one of the most popular and growing sectors in modern science. The main reason behind this is the performance capability of the quantum computer. For example, Shor's [1] algorithm to find the prime factors of integer N, it can give you output in polynomial($logN$) time. This kind of example boosts up the confidence of computing on the quantum computer. But it is not so straight forward like a traditional computer. Different algorithms need different insight to accommodate into the quantum computer. On the other hand, the programming language of quantum computing is not that much matured as traditional language. The main purpose of the survey is to discuss the different quantum algorithms [1] [2] [3] and their performance against existing traditional algorithms. And also analyze the different quantum programming languages [4] [5] [6] [7] [8] that one can get a clear concept of quantum algorithm what kind of languages best for them.

2 Goal

1. Write a survey on different quantum computing algorithms and compare them with the traditional algorithm.

2. Discuss different quantum programming languages.

3. Try to find out a clear concept that what kind of algorithm suitable for quantum computing and what kind of programming language one should choose.

4. Make a presentation on the survey to present in the class.

3 Shcedule of the Project

Here is the task and their schedule of the project,

Table 1: Time Sheet

Date	Task	Overall Percentage
02/19/2019	Project Proposal	10%
03/19/2019	Mid-Term Report	50%
04/16/2019	Slides of Survey	90%
04/30/2019	Final Report	100%

References

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[2] Daniel R Simon. On the power of quantum computation. *SIAM journal on computing*, 26(5):1474–1483, 1997.

[3] François Le Gall. Improved quantum algorithm for triangle finding via combinatorial arguments. *arXiv preprint arXiv:1407.0085*, 2014.

[4] Emmanuel Knill. Conventions for quantum pseudocode. Technical report, Citeseer, 1996.

[5] Peter Selinger. Towards a quantum programming language. *Mathematical Structures in Computer Science*, 14(4):527–586, 2004.

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