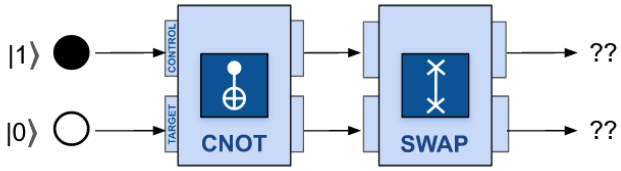
Homework:
The Power of Quantum Computing and Quantum Operations

1. Liz works for a delivery company. She discovered that it takes the computer at her office 0.1 seconds to figure out the best route for a trip with 10 stops. Her boss says that's great because then it will only take 1 second to figure out the best route for a trip with 100 stops. Is Liz's boss correct?
2. Choose all of the problems that quantum computers are expected to be better at solving, compared to classical computers.
    a. Simulating molecular systems
    b. Sorting large sets of numbers
    c. Storing data
    d. Finding the most efficient route for UPS truck deliveries
    e. Cracking modern encryption
    f. Playing digital music
    g. Rendering graphics for video games
3. Classical encryption schemes are based on
    a. Factoring
    b. Addition
    c. Prime numbers
    d. Division
4. For each statement, indicate whether it is true or false.
    a. Quantum computers are expected to replace classical computers for some applications.
    b. The best current quantum technology is the trapped ion.
    c. Quantum computers and classical computers solve problems in the same way.
    d. Quantum computers don't really have any applications, because classical computers are so powerful.
    e. Quantum computers are expected to solve optimization problems relatively easily.
    f. A one-way function is easy to both compute and invert.
    g. Quantum computers are expected to be able to break classical encryption schemes.
    h. The existing types of quantum technology have trade-offs in terms of speed, reliability, and scalability.

For each circuit shown, select all possible outcomes for the circuit at the ??.



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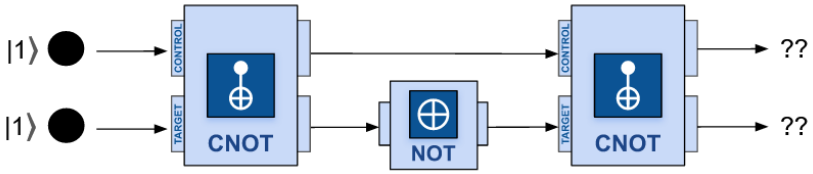

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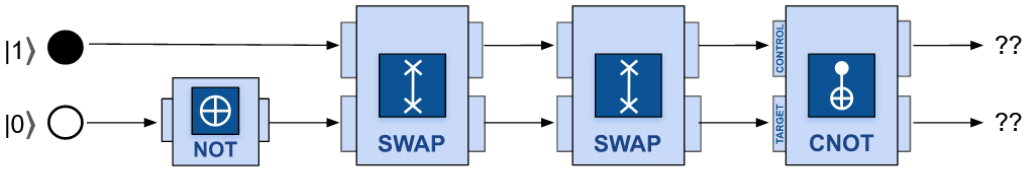

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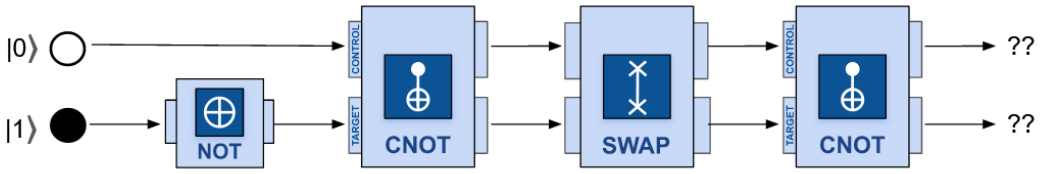

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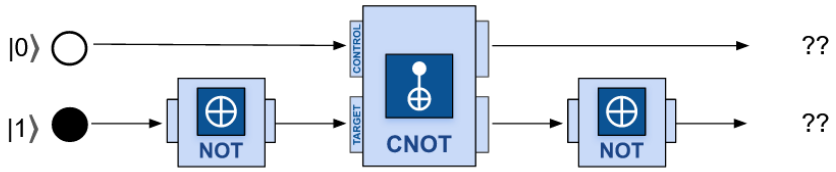

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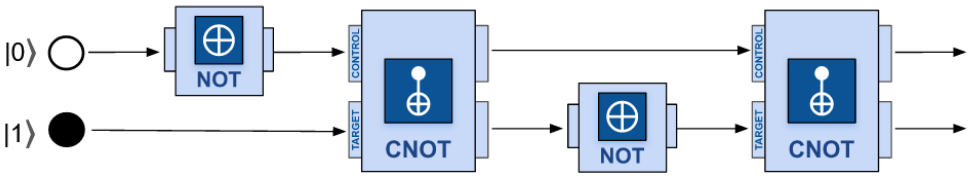

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