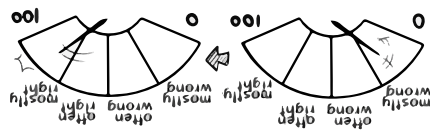




After measurement, any superposition collapses, leaving only measured values



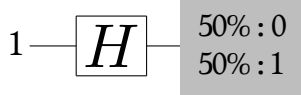
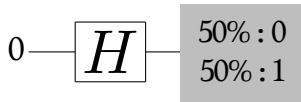
Operations gradually refine values until the correct outcome is likely

Hadamard Gate

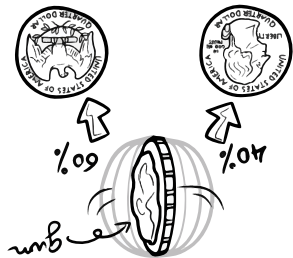
The Coin Flip of Quantum!

When the input is 0, it outputs 0 or 1 with a 50/50 chance.

When the input is 1, it also outputs 0 or 1 with a 50/50 chance.



Quantum operations can:
 - operate on all values at once
 - change the probabilities of each result



Sometimes, you can adjust the probability of a result

Hadamard Gate in Quantum Notation

$$|0\rangle \xrightarrow{H} \frac{|0\rangle + |1\rangle}{\sqrt{2}}$$

$$|1\rangle \xrightarrow{H} \frac{|0\rangle - |1\rangle}{\sqrt{2}}$$

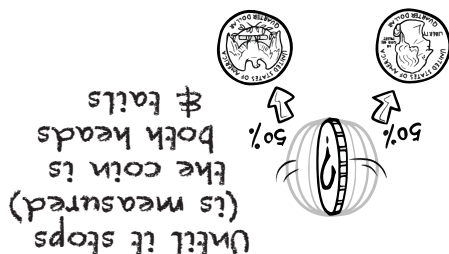
Or, more generally...

$$\alpha|0\rangle + \beta|1\rangle \xrightarrow{H} \frac{\alpha + \beta}{\sqrt{2}}|0\rangle + \frac{\alpha - \beta}{\sqrt{2}}|1\rangle$$

But what exactly is H?

$$H = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

In quantum computing, many values are stored together in superposition



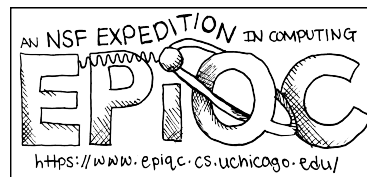
Some things hold two values at once!

Find more Quantum Computing zines here:

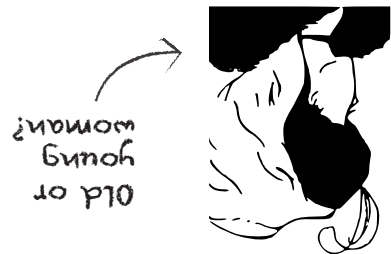
<https://www.epiqc.cs.uchicago.edu/resources/>

September 2019, v3

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I'm a duck and a rabbit... in superposition!



Some pictures hold two images at once!

Quantum Superposition

Quantum Superposition

