The Renaissance

Kyle, Lewis, Gabi, Raqeem

Quantum Computing

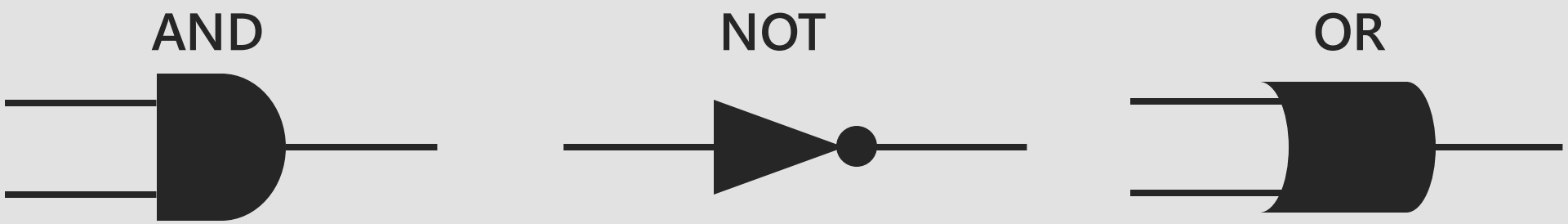
Objectives

- Classical Computing
- Quantum Computing
- Applications
- Challenges

Classical Computing

Information is stored in **bits**, represented logically by **0**s (no current) and **1**s (current).

Classical computers carry out operations using circuitry logic gates:



Quantum Computing

Three main processes:

> Quantum Entanglement
>
> Superposition
>
> Quantum Tunnelling

Quantum Computing – Data Representation

Rather than using bits, quantum computers use **qubits** to represent data.

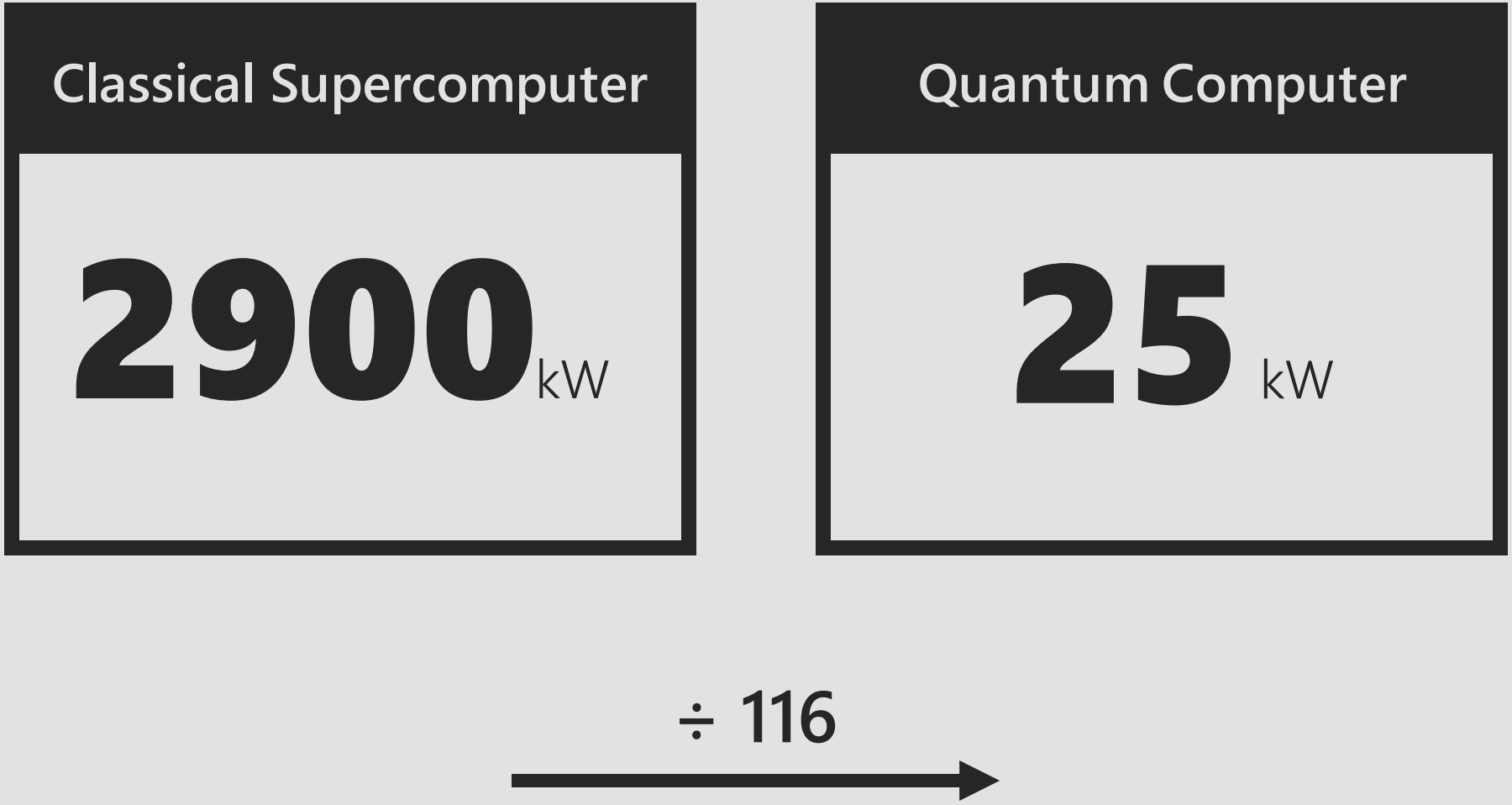
A qubit's state can be a superposition of both 0 and 1.

Measurement of a qubit will disturb its superposition state and destroy its coherence.

The quantum state of a qubit can be represented by a vector:

$$|0\rangle = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \qquad |1\rangle = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

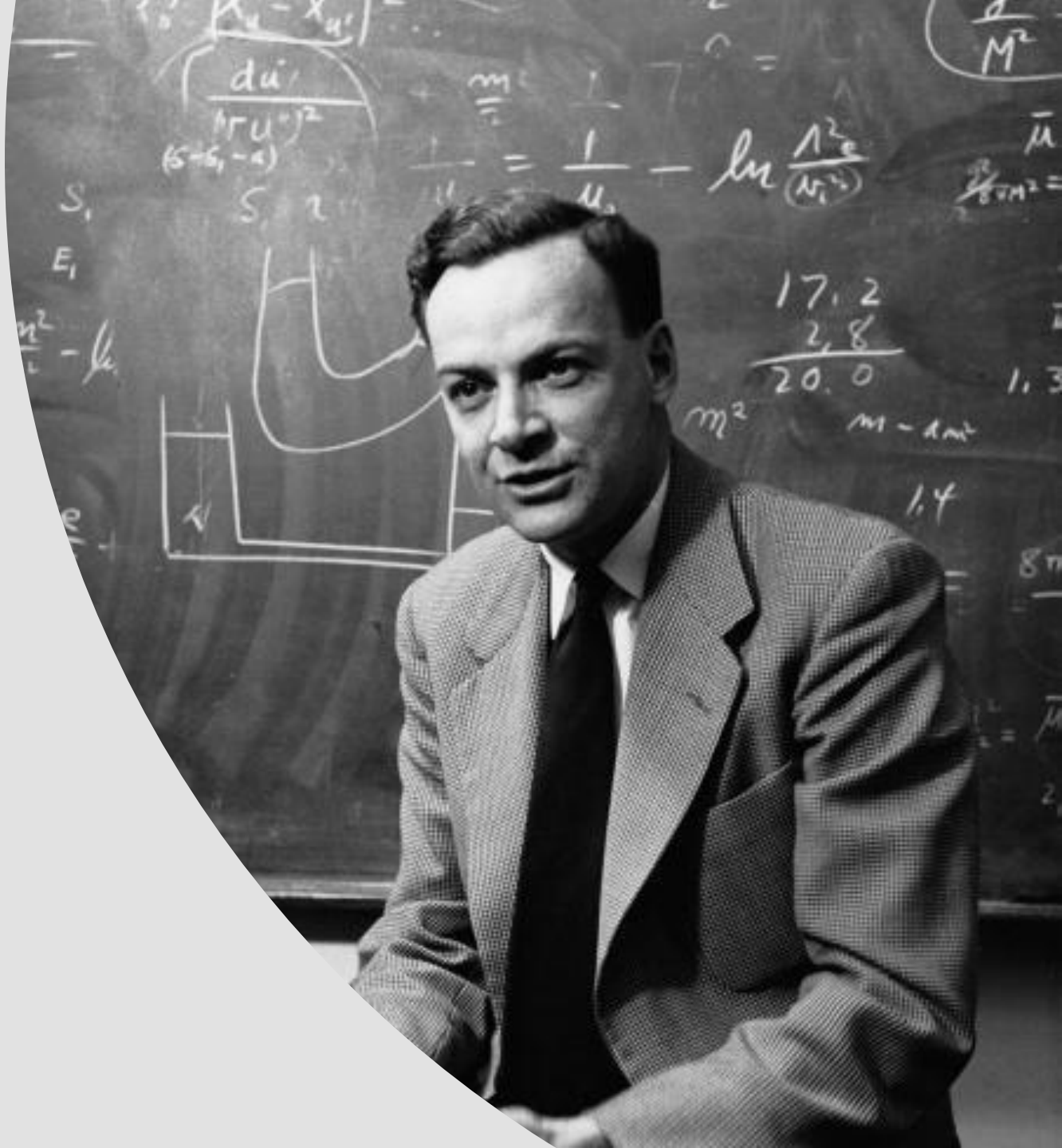
How much power do Quantum Computers consume compared to Classic Computers?


Classical Supercomputer
2900 kW
Quantum Computer
25 kW
÷ 116

How long has the idea of Quantum Computing been around?

Almost 40 years!

Richard Feynman, a famous physicist, produced the idea of a quantum computer in 1982.



Applications

- Quantum Transactions
- Quantum Risk Analysis

Challenges

- Classical Algorithm Transfers
- Qubit Sensitivity
- Temperature

There are no limits to what you can accomplish, except the limits you place on your own thinking.

Brian Tracy

Questions?