

“A LinkedIn post on Quantum Computation followed by a Comment and a Reply”

A POST (18/12/2025)

Qubit (Quantum Bit):

Unlike a classical bit that is either 0 or 1, a qubit can represent 0 and 1 at the same time. This is shown in the diagram as a sphere (Bloch sphere), representing many possible states.

Superposition:

The diagram illustrates superposition with two states existing simultaneously (e.g., alive & dead). This means a qubit can hold multiple possibilities at once, allowing quantum computers to process many outcomes in parallel.

Entanglement:

Entangled qubits are linked together, so the state of one instantly affects the other, no matter the distance. In the diagram, this is shown as connected particles, highlighting how qubits work together as a system.

Quantum Gates & Circuits:

The colored blocks (H, X, T, etc.) represent quantum gates, which manipulate qubits. A sequence of these gates forms a quantum circuit, similar to logic gates in classical computers but operating on probabilities and phases.

Quantum Processor:

The processor at the bottom represents the physical machine that runs quantum circuits. It uses quantum effects to perform computations that would be extremely slow or impossible for classical computers.

In summary:

Quantum computing uses qubits, superposition, and entanglement—shown clearly in the diagram—to perform powerful computations through quantum circuits running on specialized quantum processors.

COMMENT

This diagram repeats the same myths that have misled people for decades.

A qubit is not “0 and 1 at the same time” in any computational sense. Superposition is a mathematical description of a wavefunction, not parallel computation or multiple answers being processed simultaneously. When you measure it, you get exactly one classical outcome, every time.

Entanglement does not mean instant influence or magical coordination at a distance. It means correlated measurement statistics, not communication, not speedup by itself, and not scalable coordination across large systems.

Quantum gates do not operate on “probabilities” to magically explore solution space. They are fragile unitary rotations that accumulate noise faster than useful signal as circuits grow.

And no existing “quantum processor” performs computations that are impossible for classical computers in any practical, scalable way. After decades, there are still no stable logical qubits and no real-world advantage.

This diagram explains the marketing story of quantum computing, not the physics or engineering reality.

REPLY BY THE AUTHOR

Thank you so much sir,

Let me respond point-by-point, not to defend the diagram, but to separate myth from reality.

1. “Qubit = 0 and 1 at the same time”

Correct critique.

A qubit is a vector in a complex Hilbert space, not two classical states simultaneously.

Superposition is not parallel classical computation and does not represent “multiple answers.”

Upon measurement, the system always yields one classical outcome, exactly as you said.

The “0 and 1 at the same time” phrase is a pedagogical shortcut that becomes misleading the moment people think it implies computational parallelism.

2. Superposition \neq parallel computation

Absolutely correct.

Superposition is a linear combination of basis states, not a branching tree of computations.

Quantum algorithms work by carefully engineered interference, not by evaluating many solutions independently.

Most superpositions are computationally useless unless interference is structured with extreme precision.

This is why designing quantum algorithms is hard and why only a handful exist.

END