

Paralelismo Cuántico

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Make possible evaluate a function $f(x)$ for each value of x in a single step of the execution of a quantum algorithm.

Deutsch-Jozsa Problem

We define a $f : \{0, 1\}^n \rightarrow \{0, 1\}$ function that can be one of tow types of functions:

- A constant function in which case all the outputs of evaluating f in some $x \in \{0, 1\}^n$ will be zero.
- a balanced function

Deutsch-Jozsa Algorithm

Originally the Deutsch algorithm was developed with the intention of apply a single function over an “array” of possible states on a quantum computer. In the specific case of the Deutsch-Jozsa algorithm it is used for apply an oracle (f) function over all possible values it can receive. For this case we will represent the module 2 sum (a XOR logic gate) as a \oplus .

Definition f oracle function

Unitary operator for f

We will define an unitary operator \hat{U}_f that will map the state $|x\rangle \otimes |y\rangle$ into the state $|x\rangle \otimes |y + f(x)\rangle$, for our f oracle function.