**1 A Universal Quantum Computational Model**

The model follows the idea of the classical Turing Machine (TM). We are not going to present a formal encoding of the model because one can easily find such a description on the web. We are, however, going to describe its components. It is composed of:

* *A Finite Machine State* *Transition Table*, which can be interpreted into quantum commands, as superposition, tensor, outer, inner products, loops, conditional statements, access to classical TMs/algorithms, addition, multiplication, storing in variables and/or registers.
* Infinite *read-only input tape* and an infinite *write-only output tape*.
* A two-dimensional finite *array of scratch tapes*, each one having its own tape head, and each one are labeled by a distinct index per TM/algorithm. These tapes store all possible TMs/algorithms of bounded length. Therefore, accessing a TM is implemented in O(1) time.
* An infinite *scratch tape for intermediate storage* having a single read/write tape head.

This quantum machine model, as we will see in the following sections, allows to development of quantum algorithms in a unified manner as well as quantifying algorithms of a problem with respect to a number of qubits and quantum running time.

