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Prolog 2

1 Infinite Turing tape

Devise a finite Prolog representation for the tape and head of a Turing machine. The tape of a Turing machine consists of an infinite string of cells, where each cell is either empty or contains a symbol. The tape contains a finite number of symbols and empty cells are represented as '#'. The head can read and write symbols on the tape and is always positioned above one particular cell.

Assignment

Implement the following predicates, and make sure to represent the tape as **a data structure that supports the above operations in $\mathcal{O}(1)$**:

- The `move/3` predicate moves the head one cell to the right or the left. The first argument denotes the direction represented by the constants 'right' and 'left', the second argument denotes the input tape, and the third argument denotes the output tape.
- The `read_tape/2` predicate reads the symbol in the cell under the head. The first argument denotes the tape and the second argument denotes the symbol in the cell under the head.
- The `write_tape/3` predicate writes a given symbol to the cell under the head. The first argument denotes the symbol, the second argument denotes the input tape, and the third argument denotes the output tape.