Homework 2

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1 Problem

"There are a number of details to work out, such as dealing with boundaries between states, making sure that our initial tile goes first in the match, and so on, but this shows the general idea of how a static tile puzzle can simulate a Turing machine computation."

Explain how to deal with these two details, that is, how to deal with boundaries between states, and how to make sure that the initial tile goes first. List any other details that you think need to be dealt with, and explain how they can be dealt with.

1.1 Solution

1.1.1 Detail 1

"Dealing with boundaries between states"

The boundaries between states may be arbitrary, so long as they are not included in the states themselves. For the purpose of this assignment the '#' symbol is used, as seen in section **??**. Choosing where to separate the states may seem arbitrary, however there is an importance as to where the '#' symbol is placed in each tile. For the top of each tile, the '#' symbol goes after the state, and for the bottom it goes before. This will lead to details covered in the following sections.

1.1.2 Detail 2

"Making sure that our initial tile goes first in the match"

To ensure the initial tile (which contains the starting state of the TM) is the first in the match, there must be a way to have that tile be the only valid first tile. The first symbol must match, but for only this tile. Assume an example configuration history as follows:

#q0101#1q101#11qA1#

Thus, the first tile will be [# / #q0101#] while the remaining tiles will be [q0101# / #1q101] and so on, until the accept tiles [11qA1# / #11qA1] and [11qA1# / #]. With these tile designations, there is only one tile which is a valid start tile: [# / #q0101#].

1.1.3 Detail 3

Other considerations

As the initial tile must go first, the final tile must go last. To ensure this, the same concept as in section **??** can be applied. The final tile must be the only valid tile to end with, which means the last symbols of the tile must match. Where the '#' symbol was used to start the initial tile, the '#' symbol can be used as the final bottom state, such as [11qA1# / #].