The Theory of Computation

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Solution Manual
Chapter 4, Problem 5.4

We will not give the details, because the construction is very similar to the decrement and increment instructions. A register transfer can cause an increase or a decrease (or no change) in the length of the string that encodes the contents of the target register. Thus we will need the left- and right-shift loops developed for the increment and decrement blocks. The easiest way to implement a transfer otherwise is to blank out the target string (replace its characters with some special symbol #), then start copying one bit at a time, encoding in the finite-state control the value of the bit to be copied. Copying is easiest if we have two special symbols, call them z and o to represent 0s and 1s that have been copied. Once the copy is complete (and each bit copy could cause a shift to expand room), we may have to run a shift to reduce the room (if the target string was larger before the copy), then replace the zs and os by 0s and 1s. The time taken is proportional to the square of the input size, since each bit copy could force a nearly complete traversal of the entire tape.