Johnny – Better Multiplication Program

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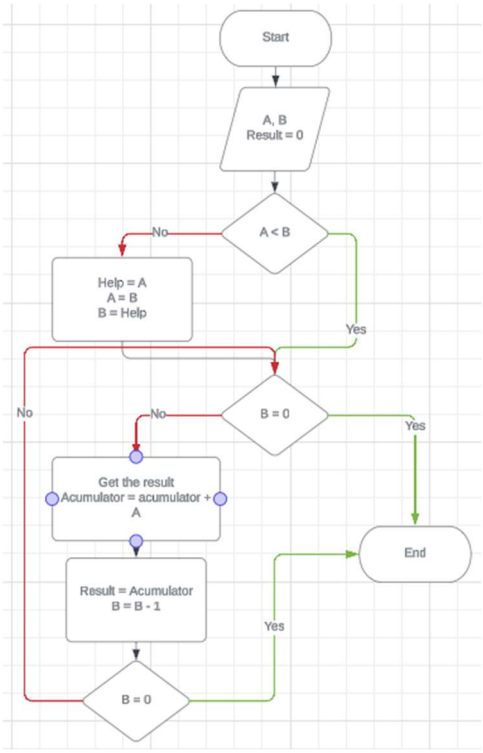
1. **Task:**
   Create a program in Johnny to do optimized multiplication of two numbers.

2. **Flowchart:**



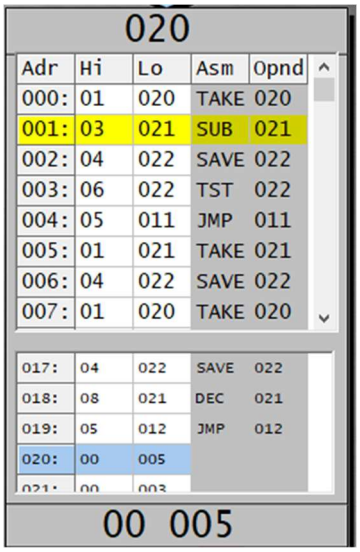
3. **Solution:**

   To begin, we set two operands A and B and initialize the result to 0. We first check if A is smaller than B. If A is smaller, we proceed; otherwise, we swap the values of A and B. Next, we check if B equals 0. If B is 0, the program ends; otherwise, we continue with the following instructions:

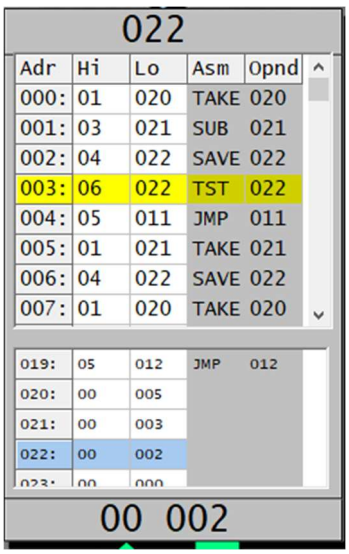
   1. Retrieve the value of A and add it to the accumulator. This marks the beginning of our loop.
   2. Update the result by assigning the value of the accumulator to it and decrease B.

Program:

- Check if B equals 0. If B is not 0, return to the beginning of the loop and repeat the previous instructions. If B equals 0, end the program. We place 4 in address 020 and 5 in address 021, representing the operands for multiplication, while the result is stored in address 022.



- We start by taking the value from address 020, subtracting the value from address 021, and saving the result in address 022. If the result is 0, we swap the values of the two numbers.



- Then we check if the smaller number is 0. If it is, the program ends. If not, we proceed with the multiplication as in the previous task.