

2.5 LOOPING,COUNTING AND INDEXING

LOOPING:

The programming technique used to instruct the microprocessor to repeat tasks is called looping. This task is accomplished by using jump instructions.

Classification Of Loops:

- 1.continuous loop
- 2.Unconditional loop

Continuous Loop:

Repeats a task continuously. A continuous loop is set up by using the unconditional jump instruction. A program with a continuous loop does not stop repeating the tasks until the system is reset.

Conditional Loop:

A conditional loop is set up by a conditional jump instructions. These instructions check flags(Z,CY,P,S) and repeat the tasks if the conditions are satisfied. These loops include counting and indexing.

Conditional Loop And Counter:

- A counter is a typical application of the conditional loop.
- A microprocessor needs a counter,flag to accomplish the looping task.
- Counter is set up by loading an appropriate count in a register.
- Counting is performed by either increment or decrement the counter.
- Loop is set up by a conditional jump instruction.
- End of counting is indicated by a flag.

Conditional Loop,Counter And Indexing:

Another type of loop which includes counter and indexing .

Indexing:

Pointing of referencing objects with sequential numbers. Data bytes are stored in memory locations and those data bytes are referred to by their memory locations.

Example:

Steps to add ten bytes of data stored in memory locations starting at a given location and display the sum.

The microprocessor needs

- A counter to count 10 data bytes.
- An index or a memory pointer to locate where data bytes are stored.
- To transfer data from a memory location to the microprocessor(ALU)
- To perform addition
- Registers for temporary storage of partial answers
- A flag to indicate the completion of the stack
- To store or output the result.

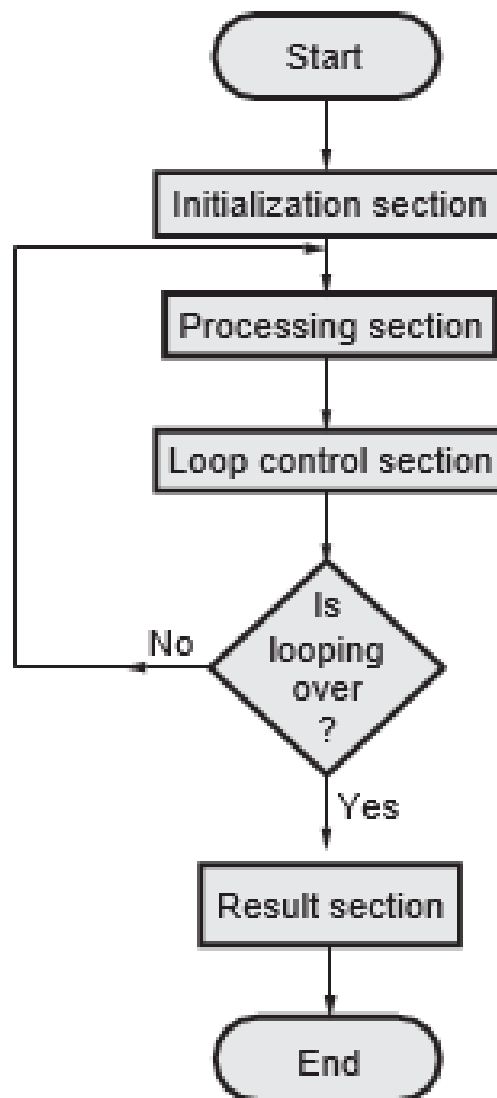


Figure 2.5.1 Looping flow chart

[Source: "Microprocessor Architecture Programming and Application" by R.S. Gaonkar, page-190]

1. The initialization section establishes the starting values of loop counters for counting how many times loop is executed, Address registers for indexing which give pointers to memory locations and other variables.

2. The actual data manipulation occurs in the processing section. This is the section which does the work.
3. The loop control section updates counters, indices (pointers) for the next iteration.
4. The result section analyzes and stores the results.

The processor executes initialization section and result section only once, while it may execute processing section and loop control section many times. Thus, the execution time of the loop will be mainly dependent on the execution time of the processing section and loop control section. The flowchart 1 shows typical program loop. The processing section in this flowchart is always executed at least once. If you position of the processing and loop control section then it is possible that the processing section may not be executed at all, if necessary.

