IDP EE3025

MULTIPLIER

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Problem Statement

- Implementation of multipliers using Verilog HDL
- Implementing different designs of a multiplier.
  - ARRAY MULTIPLIER
  - BOOTH MULTIPLIER
  - WALLACE TREE MULTIPLIER

Introduction

- A binary multiplier is a combinational logic circuit used in digital systems to perform the multiplication of two binary numbers. These are commonly used in the field of digital signal processing to perform the various algorithms.
- A system's performance is generally determined by the performance of the multiplier because the multiplier is generally the slowest clement in the system.

Algorithm use to implement the multipliers

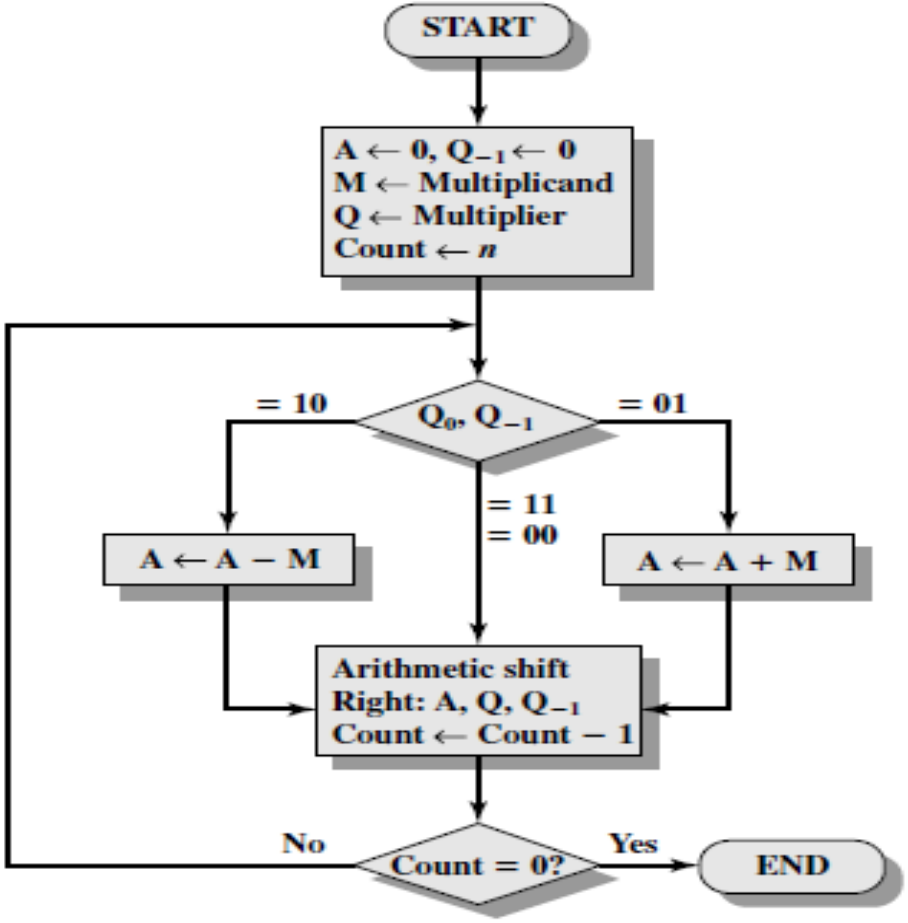
The multiplication of an n-bit multiplicand with an m-bit multiplier, m partial products are generated and product formed is n + m bits long.

- ARRAY MULTIPLIER
  - Based on repeated addition and shifting procedure.
  - Each partial product is generated by the multiplication of the multiplicand with one multiplier digit. The partial product are shifted according to their bit sequences and then added.

$$P(m+n) = A(m)B(n) = \sum_{i=0}^{m-1} \sum_{j=0}^{n-1} a_i b_j 2^{i+j}$$

Algorithm use to implement the multipliers

- BOOTH MULTIPLIER
  Multiplication algorithm that multiplies two signed binary numbers in 2's compliment notation.



Approach

- The input numbers are given to the arduino using a keypad.
- The arduino then communicates with the raspbery pi and sends the information to be processed.
- The ico board is connected to the raspberry pi and it acts as the processing element to compute the solution.
- The solution is then transmitted to the arduino board with the help of Raspberry pi.
- Finally, the solution is displayed on the LCD screen with the help of arduino.