Shubham Makar (21307R012)

Ronak Gupta (21307R010)

Tanmaya Shrivastav (21307R016)

8x8 Bit Dadda Multiplier

Introduction

Dadda introduced an innovative reduction technique that efficiently minimizes the number of reduction stages required to obtain reduced two-row partial products. This achievement was made possible by strategically placing [3,2] and [2,2] counters along the critical path to optimize the process. In the context of an N-bit multiplier and multiplicand, the multiplication operation generates an N by N matrix of partial products. Dadda's approach involves arranging these partial products in matrix form. Through a series of reduction stages, Dadda was able to effectively reduce the height of this matrix to a more compact two-row format.

Algorithm:

1. Initial Matrix Height: The process begins with a two-rowed matrix height d1 = 2.
2. .Successive Matrix Heights: The following matrix heights are derived using the formula dj+1 = 1.5 * dj, where j ranges from 1 onwards. Rounding down is performed on the fractional values to obtain integer heights. The sequence will be as follows:

   d2 = 1.5 * d1 = 1.5 * 2 = 3 (rounded down from 3.0)

   d3 = 1.5 * d2 = 1.5 * 3 = 4 (rounded down from 4.5)

   d4 = 1.5 * d3 = 1.5 * 4 = 6 (rounded down from 6.75)

   d5 = 1.5 * d4 = 1.5 * 6 = 9 (rounded down from 9.0)

   d6 = 1.5 * d5 = 1.5 * 9 = 13 (rounded down from 13.5)

   ... and so on.

3. Maximum Allowed Matrix Height: The goal is to obtain the largest matrix height dj such that it doesn't exceed the overall height of the matrix. In each reduction stage, the column compression is carried out using [3,2] and [2,2] counters. During compression:

   The sum is passed to the same column in the next reduction stage.

   The carry is passed to the next column.
4. Repeating the Process: The two steps described above are iterated until a final two-rowed reduced matrix is obtained. The process involves applying the column compression and carrying out the sum and carry operations across each reduction stage. The final reduced matrix will have only two rows.

5. By following this method, Dadda's approach ensures an efficient reduction of the matrix height while maintaining the integrity of the computation. It effectively utilizes the [3,2] and [2,2] counters to achieve this reduction in a systematic manner.

Output