Implementation of Square of Two Digit Number Based on Vedic Mathematics

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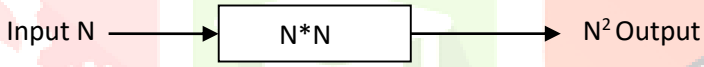
ABSTRACT :. ***This paper describe the implementation of square of two digit number in a very simple way. Functionality of the algorithm is checked by C language. Implementation was done for positive two digits number. There is no limitation on last digit of a number, means that number should be end with a specific digit. First the square of a two digit is calculated then the same approach is applied on three digit number and four digit number. In Vedic mathematics' simplification of a operation is done by Vedic sutra's. It helps to solve complex problems in a easy way by using 16 Vedas of Vedic Maths***.

KEYWORDS – *Vedic Mathematics*

1. INTRODUCTION

Vedic mathematics is the ancient Indian system of mathematics that was rediscovered in the early 20th century from ancient Indian sculptures (Vedas) by Sri B. K. Tirtha (1884-1960) . It mainly deals with Vedic mathematical formulae and their application to various branches of mathematics. The procedure based on general mathematics can be simplified and even optimized with the help of Vedic Sutras. 'Vedic' word is derived from the word 'Veda'. Vedic mathematics is primarily based on 16 Sutras trade with several category of mathematics like arithmetic, algebra, geometry etc. Vedic Sutras are briefly discussed alphabetically. In mathematics a square of a integer number is an integer. Or in other words a number multiply by itself give a square of a number. Notation for a number is represented by n^2. There are many method to find the square of a number. A variable which store the result of multiplication of a number to itself, give a square of a number. Here a implementation of a new proposed method for finding the square of two digits and three and four digits number. Therefore a need of Pascal's triangle to give coefficient of power. Power is 2, we are calculating the square of a number. Then find the ratio in terms of left digit divided by right digit. The part is calculated power of number plus one. The part and coefficient will multiplied. This multiplication may give one digit and two digit. If multiplication result is one bit and save the result, otherwise a carry will transform to the next right digit and check again same condition. Finally passing the digit until last the result is saved. These operations are performed with the help of modulo operator, division operator, addition and subtraction operator.



Basic Block Diagram of Square

2. PROPOSED ALGORITHM:

The implementation of proposed squaring of two, three, four digits number based on Anurupye Shunyamanyat. This Sutra has been traditionally used for the ratio of two numbers in the decimal number system. There is no limitation on last digit of a number, no need it to be end with a specific number e.g 5,6,2,3,4,1,7,

This proposed method use Pascal's triangle that give the coefficients of binomial. Next to find square calculate the ratio left digit by right digit. No of parts will be more than power of numbers means if power is 2 then number of parts will be one more than power. Then calculate the square of right digit. Square of right digit part occupy the right most part. Multiply each preceding part by ratio starting from second part (Anurupyena sutra). Then multiply each part with its Pascal's triangle coefficient. Then save the result, but if multiplication of part and coefficient is more than one digit then carry digit move to left and add to the next right digit till last digit.

2.1 Algorithm for power of number(Square)

According the power of number, part is plus one of the power of number.

1. Input a number
2. Separate left digit and right digit using divide and module operator.
3. Ratio=Left digit / Right digit
4. Calculate right digit square and place in part 3.
5. For part 2 multiply calculated part 3 with ratio of number and put it into part 2.
6. For part 1 multiply calculated part 2 with ratio of number and put it into part 1 and named as ratio.

7. Use Pascal's Triangle to calculate three coefficients which is based on power of number and then multiplies these three coefficient with three ratio and save the result.

8. If multiplication gives a single digit in all three parts then save the result as final result otherwise it will move carry to left part and add them up with part 2 and again check the result after addition , if it is single digit then save otherwise move carry to part1 and add with part 1 and then save the result.

ALGORITHM_SQUARE(N,I,S)

N=XY, I= NUMBER OF POWER ,S= PASCAL'S TRIANGLE INPUT

1. K=N/10, W=N MOD 10
2. PART(I+1)= W*W
3. PART(I)=K/W*PART(I+1)
4. PART(I-1)= K/W*PART(I)
5. CALCULATE PASCAL'S TRIANGLE COFFICIENT ACCORDING TO S
6. MULTIPLY COFFICIENT(I-1), (I), (I+1) WITH PART(I-1), (I), (I+1)
7. SAVE RESULT IF MULTIPLICATION RESULT SINGLE DIGIT, OTHERWISE MOVE TO CARRY LEFT PART AND ADD IT, AND AGAIN CHECK, IF SINGLE THEN SAVE OTHERWISE MOVE TO CARRY LEFT DIGIT AND ADD WITH IT.

Number=42

steps	Part ⟶	1	2	3
1	Ratio(x)	16	8	4
2	Coefficient(Y)	1	2	1
3	X*Y	16	16	4
4		17	6	4

Fig. 1

Square of 42 is =1764

2.2 Theoretical Proof of Complexity:

In programming language complexity represent space complexity and time complexity. The main concern on time complexity, because time complexity give the actual time estimation for executing a program. Time complexity for calculating a square of a number is $O(n^2)$, this is not for exactly to multiply a number to itself, but using modulo operator, divide operator and Pascal's triangle algorithm, that gives the square of a number.

3. RESULT

The square of two digit number (10-99) is easily calculated with Vedic mathematics in a simple manner. Complexity is reduced in terms of multiplication of a number to itself. It is done by divide the problems into sub problem means two digit number into single digit. Then using Vedic mathematics technique square of two digits number is easily calculated. This method is useful in ALU, where square is calculated using multiplication.

4. CONCLUSION

It can be concluded that square of two digit number using Vedic mathematics is calculated in a very simple manner. No need of remember and multiplication to number to itself. Using simple approach based on Vedic mathematics split two digit numbers into single digits; single digit square can be easily calculated. Implementation of proposed algorithm is different from traditional approach. This approach can be used to solve power of third power of forth and so on, of a digit. Using this approach we can compute the square of three, four digit also but the ratio of left digit and right digit is calculated in another way. In future hardware implementation on FPGA will be done.

5. ACKNOWLEDGMENT

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