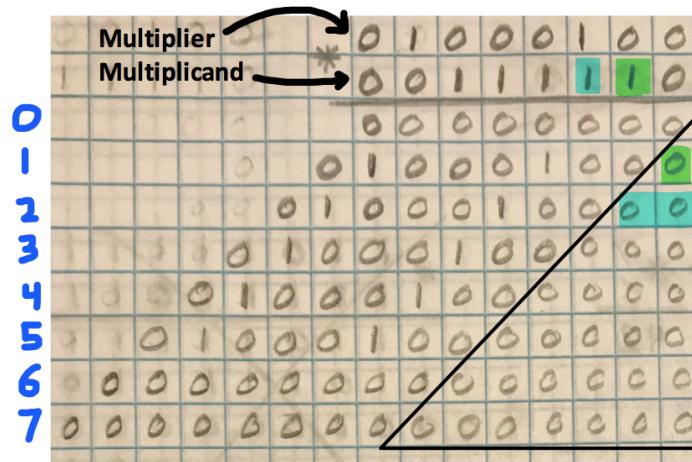


A handwritten binary multiplication diagram on grid paper. The top row has a multiplier of 111 and a multiplicand of 110. An arrow points from 111 to 7, and another arrow points from 110 to 6. Below the rows is a horizontal line. The first row of the multiplication is 111 * 000, resulting in 42 (underlined). The second row is 111 * 10, resulting in 1110. The third row is 111 * 00, resulting in 1110. The bottom row is the sum: 101010. Below the bottom row, powers of 2 are listed: 32, 16, 8, 4, 2, 1. The first three columns of the multiplication grid are highlighted in blue.

The picture above shows a basic example of multiplying a 3-bit binary number with another 3-bit binary number. The highlighted areas in blue show the carried numbers and the powers of 2 represented by the position of a bit within a binary number.



In the above picture, the number of zeros increases as you go down the rows. This is because of the multiplication procedure in itself, which requires that the number of zeros must match the number of place values shifted in the multiplicand. For example, in the green, the multiplier is multiplied to the bit that is located in the first bit that is to the left of the first bit. Because of this, we add one zero to the right of our result. Another example is in the blue, where the multiplier is multiplied to the bit that is located in the second bit that is to the left of the first bit. Because of this, we add two zeros to the right of our result. The number of zeros will only increase as the number of bits to the left of the first bit in the multiplicand increases.

In the picture above, the bits that are carried are highlighted in yellow. The summation of the smaller multiplication operation results within the 8-bit by 8-bit binary equation on the previous page happens in the picture above.

0	1	0	0	0	1	0	0	=	68
128	64	32	16	8	4	2	1		
0	0	1	1	1	1	0	=	62	
128	64	32	16	8	4	2	1		

Above is the binary to decimal conversion of the multiplier and the multiplicand in the 8-bit by 8-bit binary equation. The powers of two represented by a position in a binary number is highlighted in blue below the bit.

$$01000100 * 0011110 = 68 * 62$$

Above is the binary to decimal conversion of the 8-bit by 8-bit binary equation.

A handwritten note on graph paper showing the binary number 001000001111000 and its conversion to decimal. The binary number is written as 0 0 1 0 0 0 0 0 1 1 1 1 0 0 0. To its right, the equation $4096 + 64 + 32 + 16 + 8 = 4216$ is written. Below the binary number, powers of two are listed in blue: 16384, 8192, 4096, 2048, 1024, 512, 256, 128, 64, 32, 16, 8, 4, 2, 1. The powers of two corresponding to the bits 1 in the binary number are highlighted in blue.

$$001000001111000 = 4096 + 64 + 32 + 16 + 8 = 4216$$
$$16384 \ 8192 \ 4096 \ 2048 \ 1024 \ 512 \ 256 \ 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1$$

Above is the binary to decimal conversion of the result of the 8-bit by 8-bit multiplication equation. The powers of two represented by a position in a binary number is highlighted in blue below the bit.

***** This is not the final design but I believe that the information in this document can be used to come up with a final design. *****