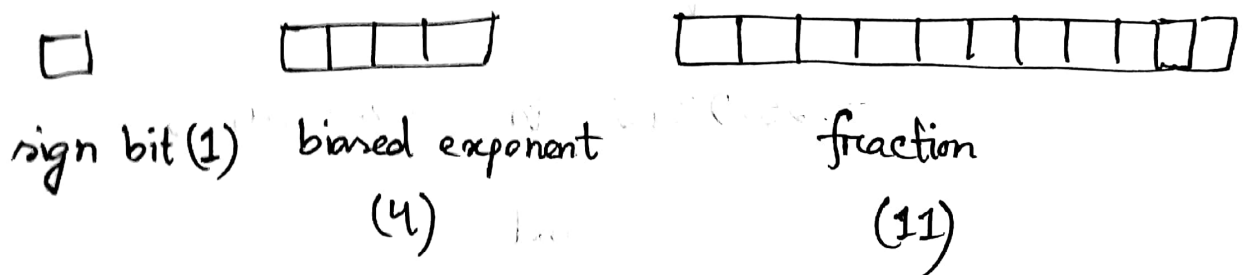


For 16-bit FP numbers, bias = 7. So the range of biased exponent is 1-14. For unbiased exponent, the range is -6 to 7.

In IEEE 754 standard, the fraction of negative numbers are not stored in 2's complement form. So the range for positive and negative FP numbers is same, just sign inverts.



In IEEE 754 standard, an implicit 1 is assumed to the left of the radix. And biased exponent 0 means underflow, 15 means overflow.

So, the lowest positive 16-bit FP number —

0 0001 0000... (11 zeros)

$$1 \times 2^{1-7} = 2^{-6} = 0.015625$$

And highest positive 16-bit FP number —

0 1110 1111 1111 111

$$\begin{aligned} & 2^{14-7} \times (2^0 + 2^{-1} + 2^{-2} + \dots + 2^{-11}) \\ &= 2^7 \times \frac{1 \times (0.5)^{12} - 1}{0.5 - 1} \\ &= 255.9375 \end{aligned}$$

So, the range is —

-255.9375 to -0.015625

and

0.015625 to 255.9375