Digital Single Lens Reflex (DSLR) cameras are on the rise whether for hobby or professionally. From a beginner to novice, DSLR's can be overwhelming. Composing a great picture is difficult enough, but to properly put the subject into focus you must first identify a couple of key properties. Distance and Depth of Focus, since there is no one exact point of focus, instead a range of focus where the converging and diverging light cones overlap using the equation of 2 x focal ratio x diameter. The purpose of this system is to provide an on the go, one touch photograph. Less hassle and distraction will produce better and more creative pictures. We will be focusing on calculating Depth of Field and Hyperfocal distance.

Main Method:

The main method is consisted of a series of question that will prompt the user to enter specific basic information. I will be using System.out.prints to ask for the following;

1) Lens Focal Length (located on the lens itself ranging from 17-400mm for most common lenses)
   - I will be creating a variable double f = input.nextDouble();
2) Focusing Distance (how far the subject that you want in focus)
   - I will be creating a variable double d = input.nextDouble();
3) F-Number (is the current f-stop for your aperture setting, typical lenses range from f/1.8 - f/22)
   - I will be creating a variable double a = input.nextDouble();
4) Circle of Confusion Diameter (sensor size of modern day DSLR's not including film are typically 0.02mm in value)
   - I will be creating a variable double c = input.nextDouble();
5) Hyperfocal distance (The distance between the lens and the closest subject)
   - I will be creating an open variable double h
6) Depth of Field (The ultimate equation for calculate the proper DoF)
   - $dOf = d\_F - d\_N = 2 * a * c * d^2 * f^2 / (f^4 - a^2 * c^2 * d^2)$ = Total depth of field

The information from the main method will open up the system to answer the following question or be applied to the following equations. The equations that must be calculated will include the "Ratio of distance behind the focusing distance", "Ratio of distance in front of the focusing distance", "Far distance of acceptable sharpness", "Near distance of acceptable sharpness".

ratioBehindDistance()

The equation to calculate the ratio of distance behind the focusing distance will result from the following equation

$r = (1 + h) / (1 - h)$ Ratio of distance behind the focusing distance (Ex. 1/3)

ratioFrontDistance()

The equation to calculate the ratio of distance in front of the focusing distance will result from the following equation

$p = (r - h) / (h + 1)$ Ratio of distance in front of the focusing distance (Ex. 2/3)

Assuming the outputs resulted in $r = 1/3$ and $p = 2/3$ by rule of thumb we can assume that the lens is focused by the new resulting ratio by adding inner(r) + outer(p) = 1/3 of the hyperfocal distance.

nearDistance()

The method is to calculate the near distance of acceptable sharpness when focused at the hyperfocal distance. When the lens is focused at the hyperfocal distance, everything from midway between the lens and the hyperfocal distance to infinity will be acceptable sharpness.
The equation is as follows :

$d_N = d * f^2 / (f^2 + a * c * d)$near distance of acceptable sharpness

farDistance()

The method is to calculate the far distance of acceptable sharpness when focused at the hyperfocal distance. When the lens is focused at the hyperfocal distance, midway past the hyperfocal distance to infinity will be acceptable sharpness.
The equation is as follows:

$d\_F - D = a * c * d^2 / (f^2 - a * c * d)$ far distance of acceptable sharpness

hyperFocalDistance()

The method is to calculate the distance from the lens and the closest subject. It's a simple calculation but it's a key element of calculating the Depth of Field.
The equation is as follows:

$h = f^2 / (a*c) + f$ (Hyperfocal Distance)

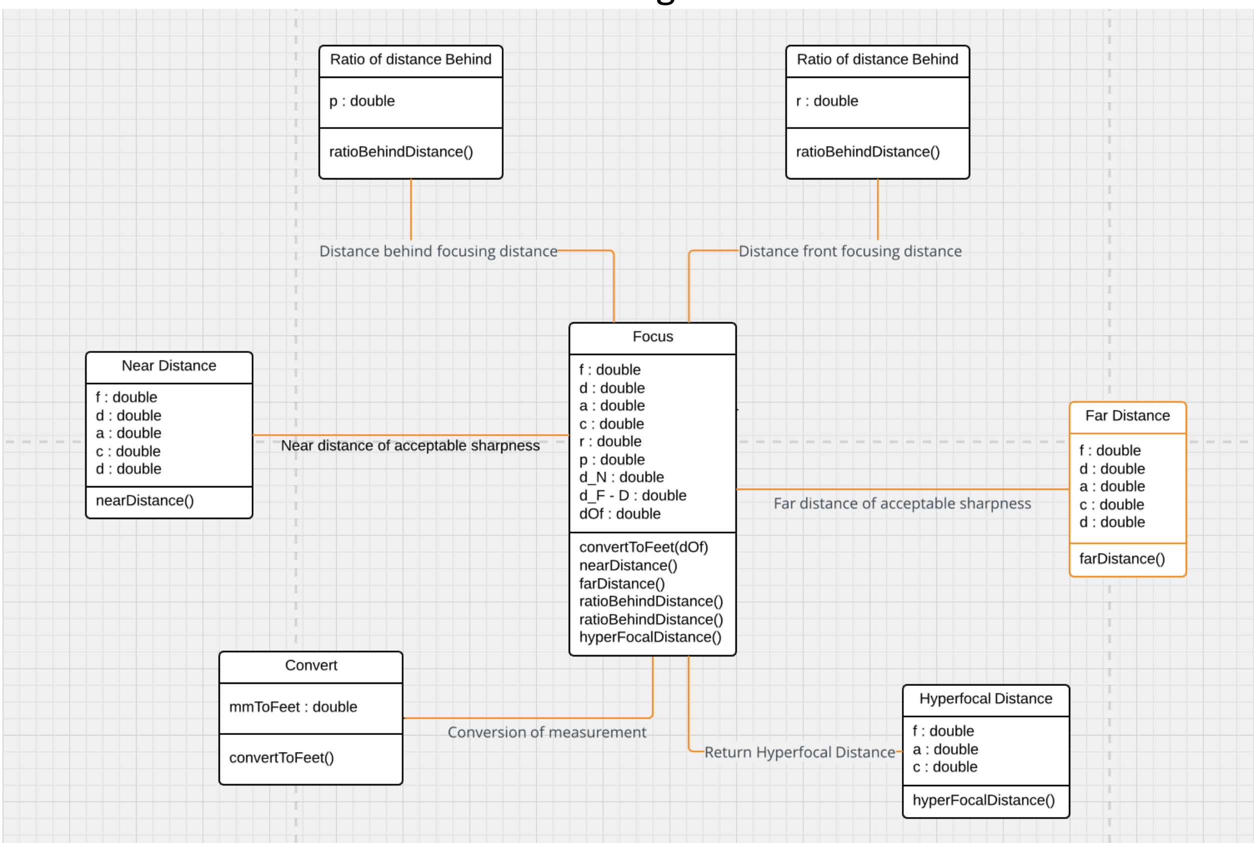
ConvertToFeet()

The method is to convert the any units of measurement to feet. In this case we will be dealing with mm to feet.
The equation is as follows:

mmToFoot = 304.8 mm /foot

Currently I've got all the equations I need to produce a result, the next step for my project is to put everything together and troubleshoot for accuracy.

UML Diagram



Citation:

Allen R. Greenleaf, *Photographic Optics*, The MacMillan Company, New York, 1950.

Alfred A. Blaker, *Applied Depth of Field*, Focal Press, 1985.