1

Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with epsilon = 0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields?

We had:

$Q_{12} = 1035.81\ W/m^2$

$Q_{12\ N\_shield} = 10.3581\ W/m^2$

Now we calculate N:

$Q_{12\ N\_shield} = 1/ (N+1)\ Q_{12}$

$10.3581 = 1/ (N+1)\ 1035.81$

$10.3581/1035.81 = 1/ (N+1)$

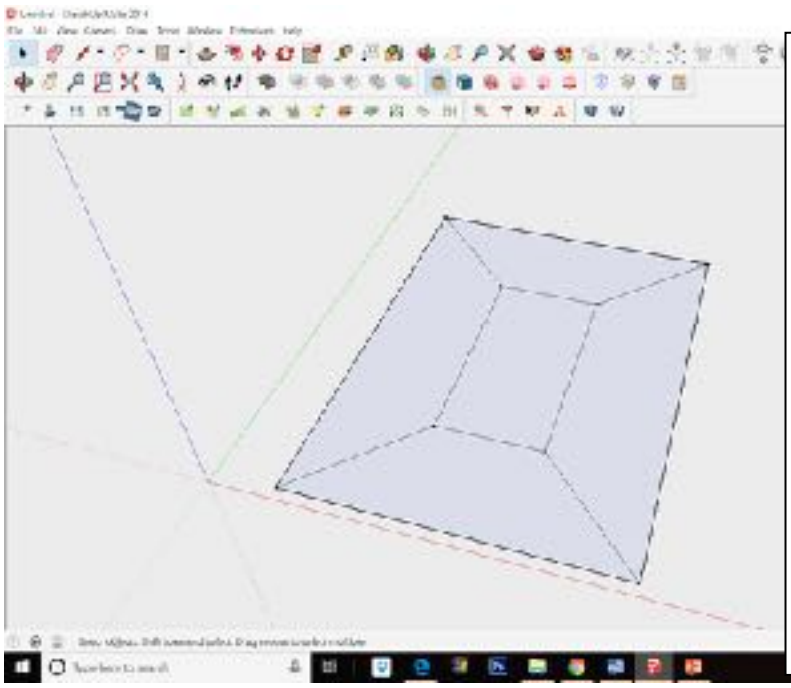
$0.01 = 1/ (N+1)$

$100 = N+1$

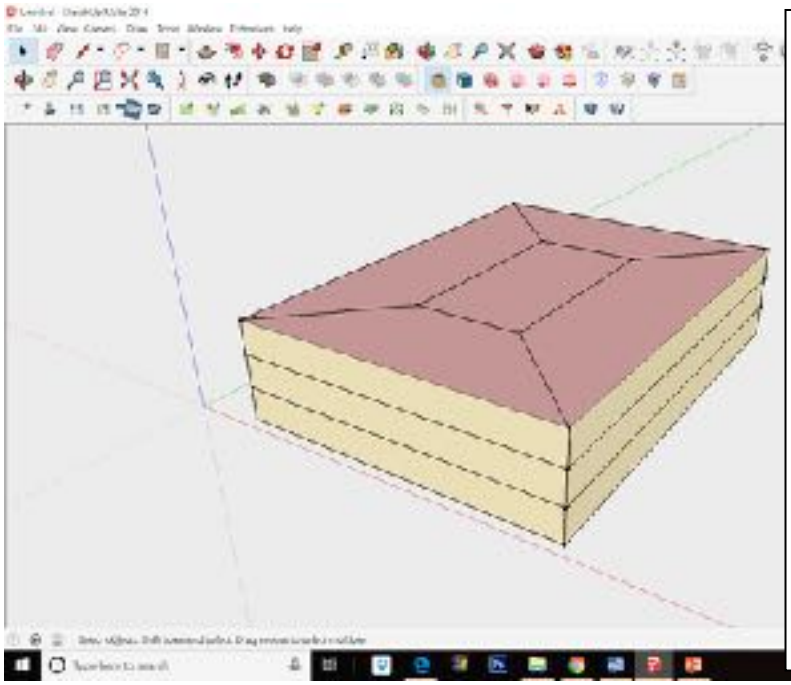
$N = 99$

Hence, we need 99 shields in order to have the new heat transfer to be 1% of the case without shields

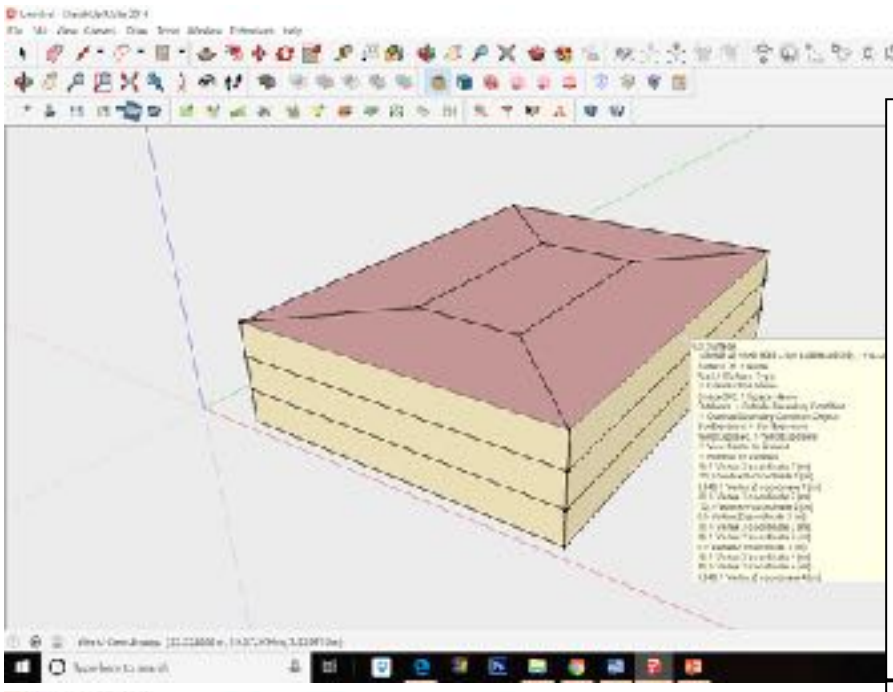
Create a pdf file with screenshots of all of the steps we went through and explain briefly the reason behind the use of each step.



Office plan of 30m x 40m

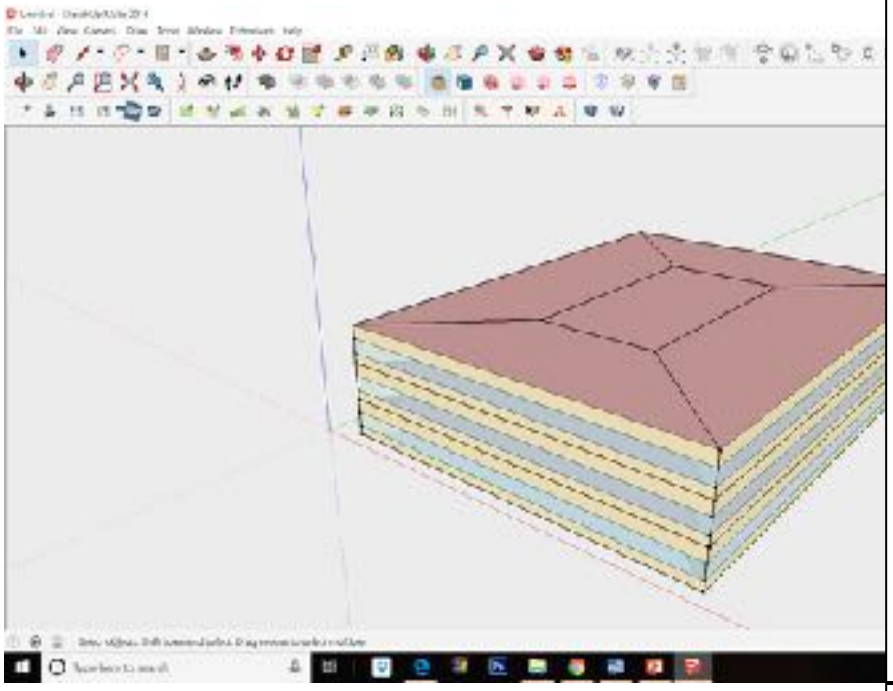


‘create space from diagram’ tool gives height for each floors, and specify the number of floors.



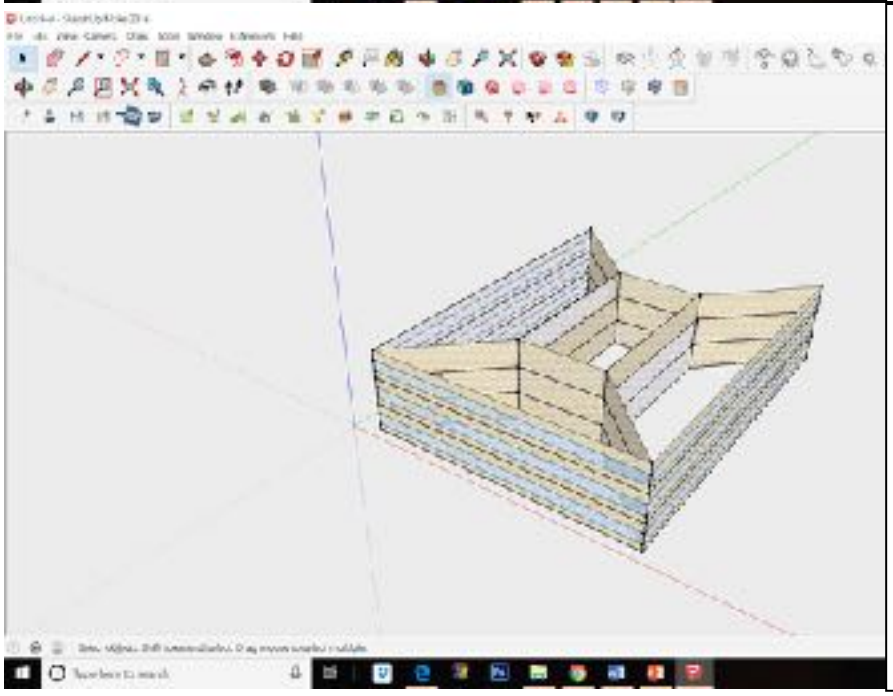
‘info’ tool gives us information about the sun-wind-boundary conditions…

For example placing the cursor on the roof will show us that wind and sun are exposed but if we place the cursor on the base of the building, it will tell us no sun and wind exposed.

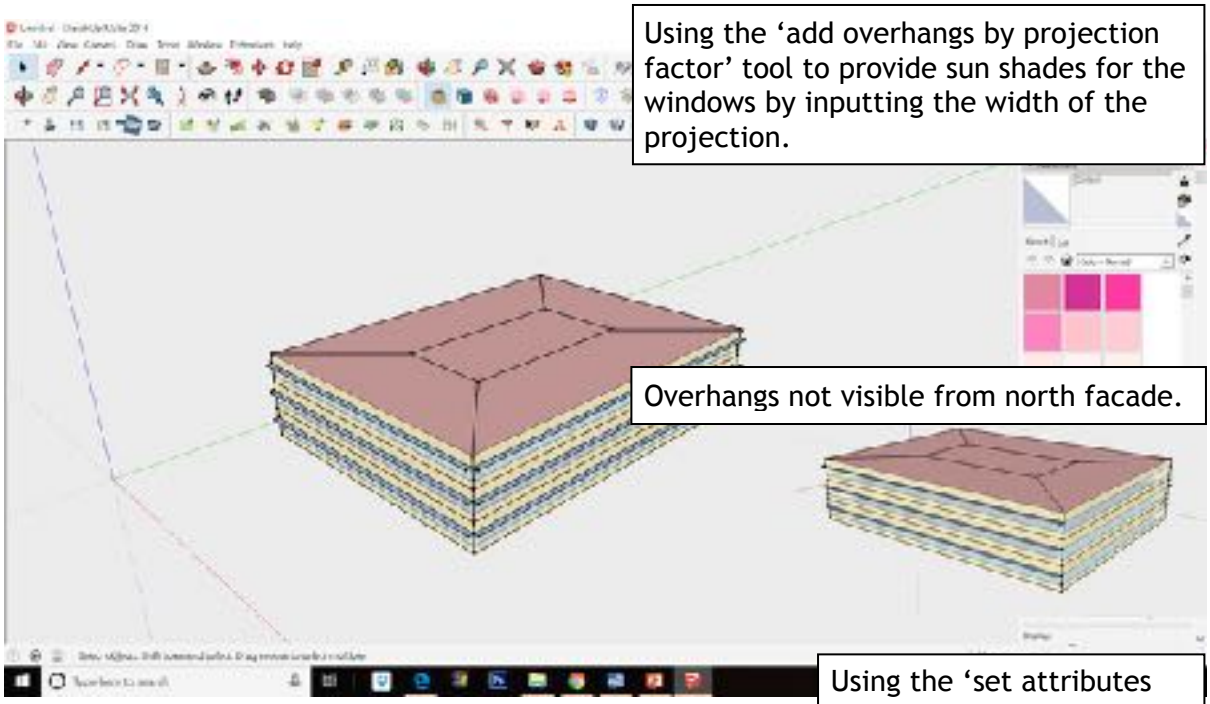


Using the ‘surface matching’ tool to match the surfaces so it is easier to create windows.

Creating windows using the ‘set window to wall ratio’ tool by giving the window height and sill height.

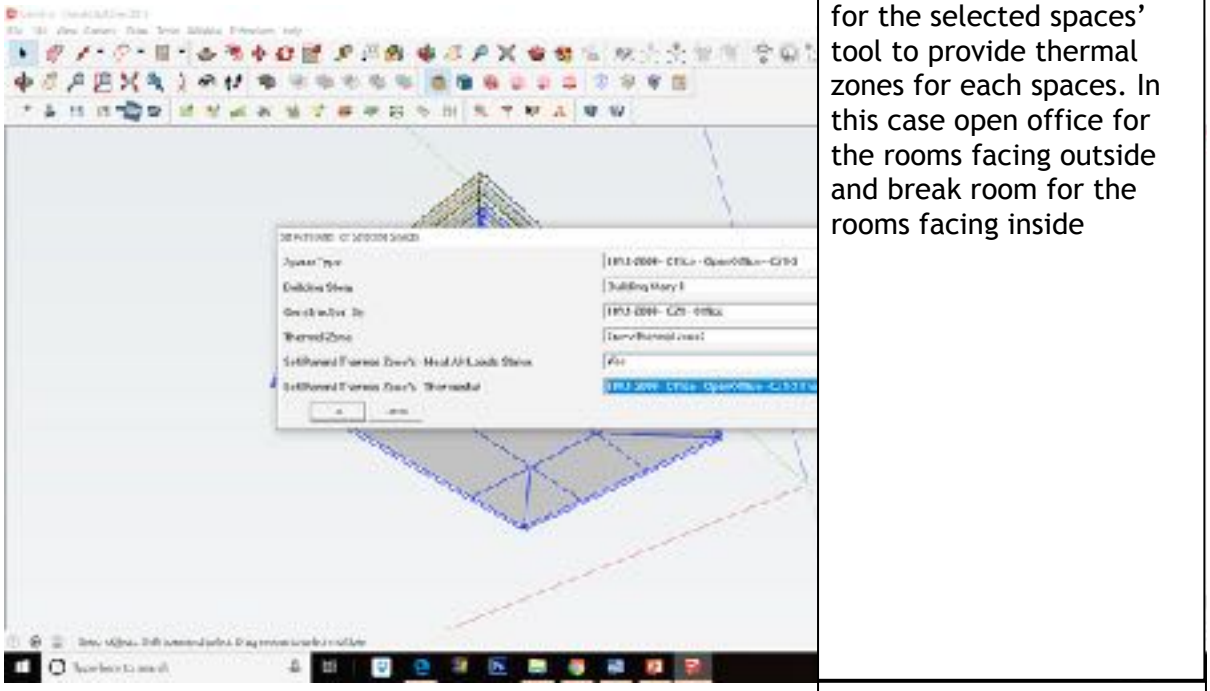


Using the ‘search surfaces’ tool to filter out the surface we need to provide shading (in this exercise). Assuming there is no harsh sun in the North façade, we exclude that by typing 90° to 360° in the dialog box

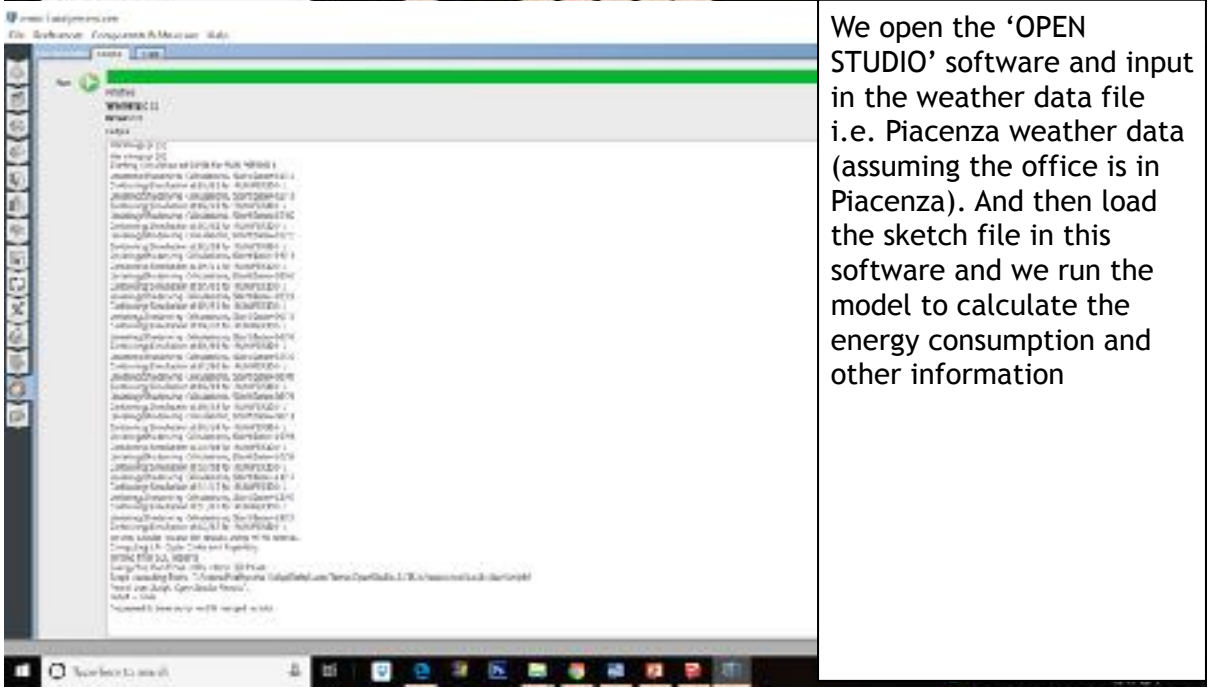


Using the ‘add overhangs by projection factor’ tool to provide sun shades for the windows by inputting the width of the projection.

Overhangs not visible from north facade.



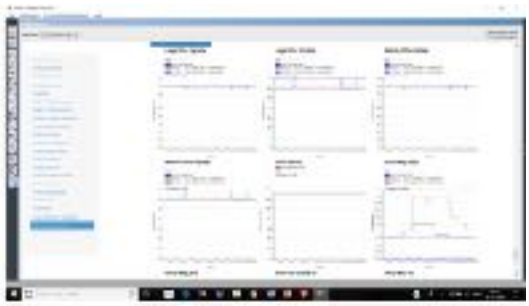
Using the ‘set attributes for the selected spaces’ tool to provide thermal zones for each spaces. In this case open office for the rooms facing outside and break room for the rooms facing inside



We open the ‘OPEN STUDIO’ software and input in the weather data file i.e. Piacenza weather data (assuming the office is in Piacenza). And then load the sketch file in this software and we run the model to calculate the energy consumption and other information





After that we run the data, we have arrived at the result of the energy consumption like annual overview of the monthly bills, lighting consumptions, monthly overview, plug point consumption, exterior lighting, equipment consumption(if we have loaded any), water consumption, and so on