
15TH RADIANCE WORKSHOP - Padua

IMAGE COMPOSITING AND VISUALIZATION DATA WITH AN OPEN-SOURCE DATA ANALYSIS AND VISUALIZATION APPLICATION.

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Sometimes the Radiance images are not appreciated by the owner since it appears lose of some architectural detail

IMAGE COMPOSITING

This image shows the 3D model made with Rhinoceros® 3D

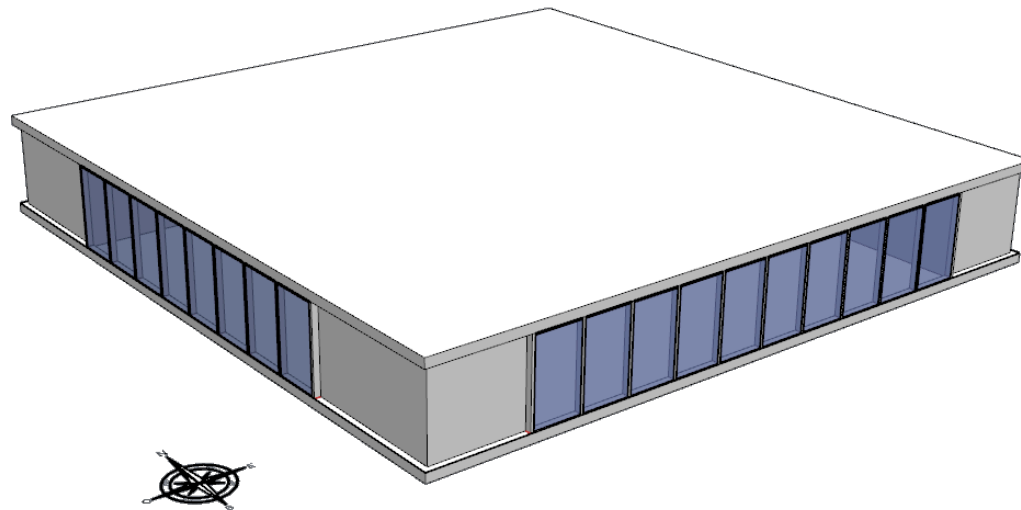


IMAGE COMPOSITING

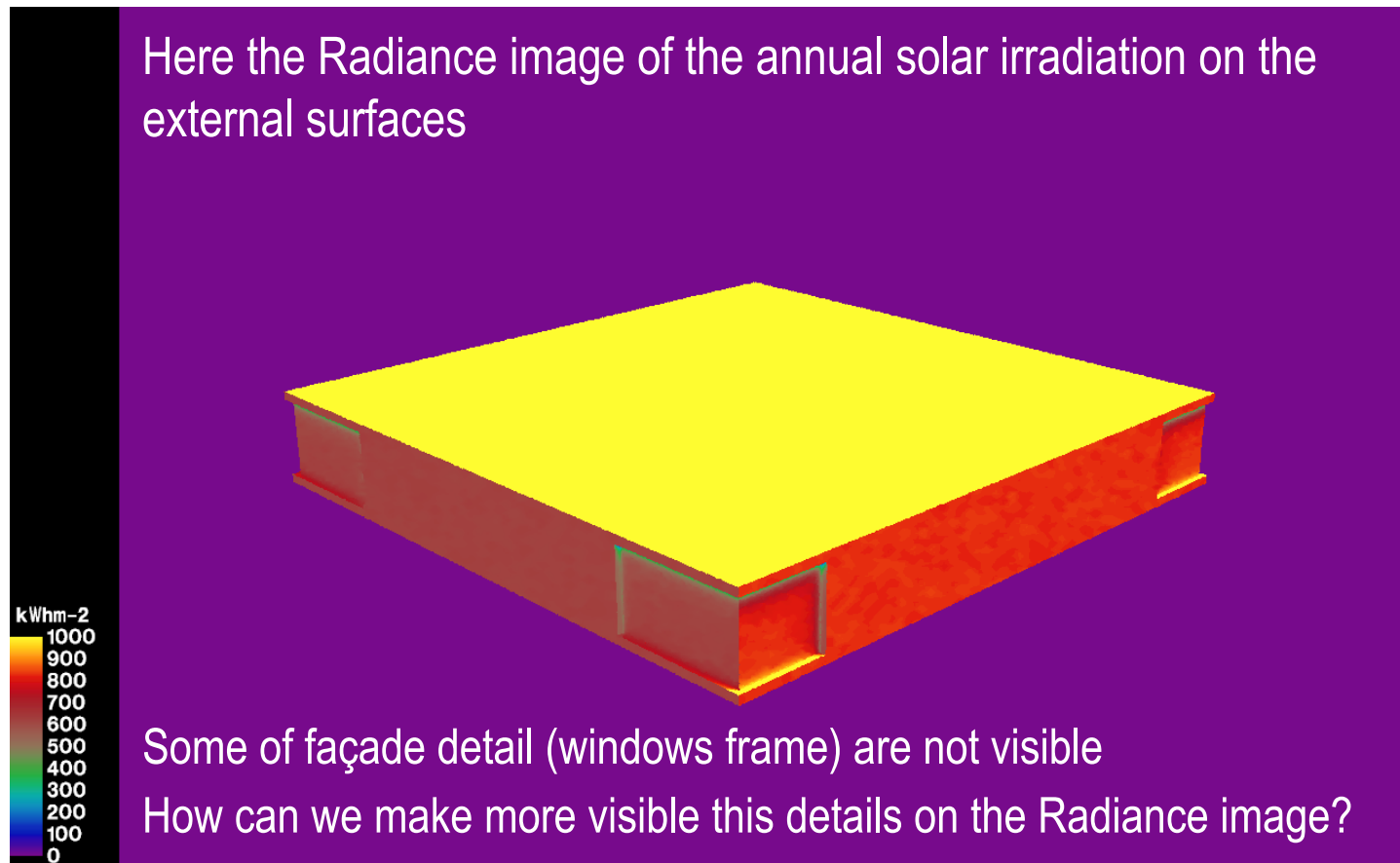


IMAGE COMPOSITING

Step 1
Example with Diva4Rhino

The Rhino viewport Image size must be the same on Diva4Rhino image size.

DIVA Simulation Options

Daylight Images | Daylight Grid-Based | Thermal Single-Zone

Visualization | Timelapse | **Radiation Map** | Point-in-Time Glare | Annual Glare

Select Camera Views: Current Perspective View ?

Start Time: 01:01 ?

End Time: 12:31 ?

Hour Range: 00:24 ?

Advanced Parameters

Radiance Parameters: -ab 4 -ad 1024 -as 256 -ar 512 -i ?

Image Size [x y]: 1484 785 x ?

Hide Dynamic Shading: ☐ ?

Geometric Density: 100 ?

Cleanup Temporary Directory: ☐ ?

Run Simulation | Restore Defaults

Rhino viewport Image size

Viewport	
Title	Perspective
Width	1484
Height	785
Projection	Perspective

Camera

Lens Length	50.0
Rotation	0.0
X Location	-21.383
Y Location	-30.865
Z Location	19.738
Location	Place...

Target

X Target	9.806
Y Target	11.593
Z Target	-0.485
Location	Place...

Wallpaper

Filename	(none)
Show	<input checked="" type="checkbox"/>
Gray	<input checked="" type="checkbox"/>

IMAGE COMPOSITING

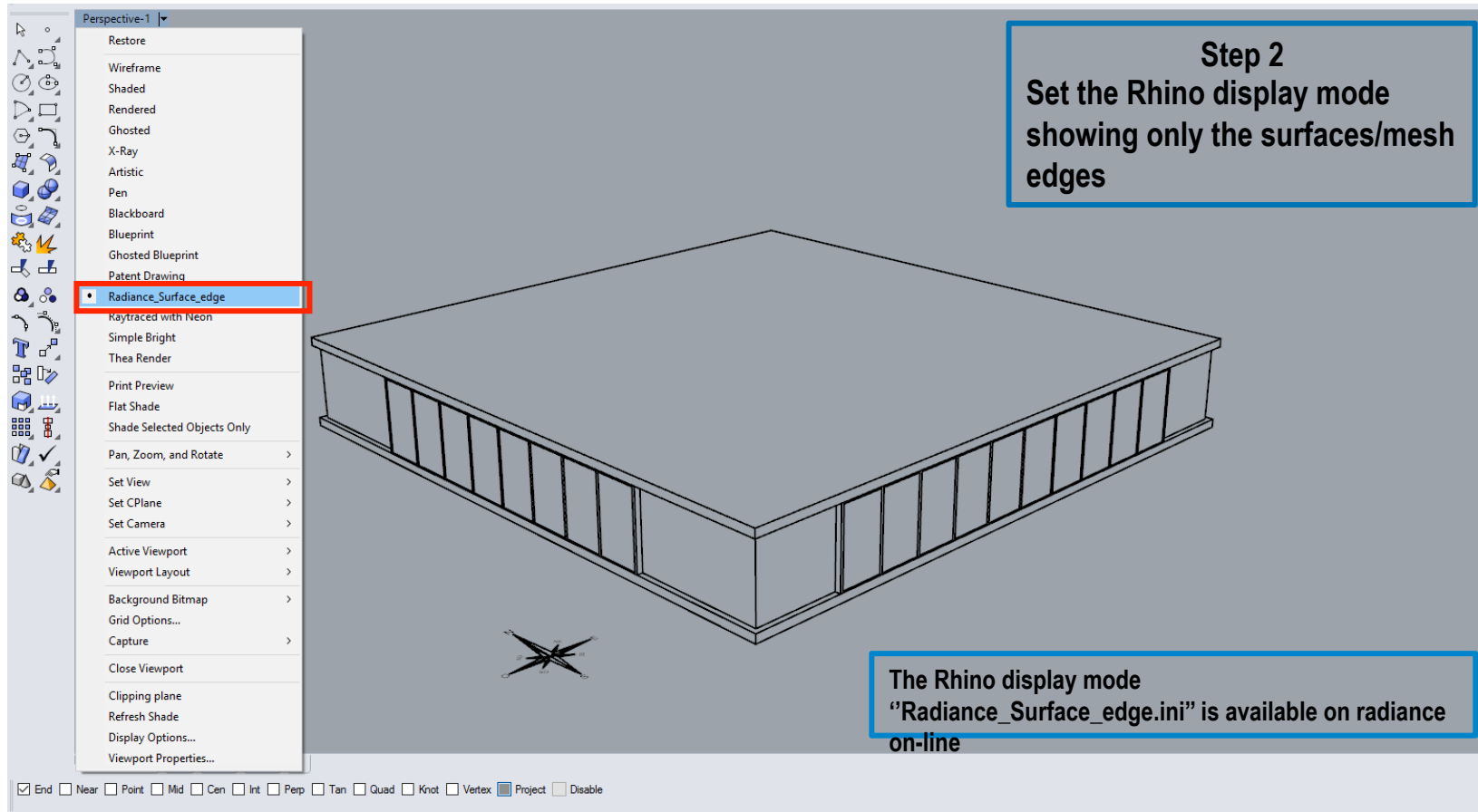


IMAGE COMPOSITING

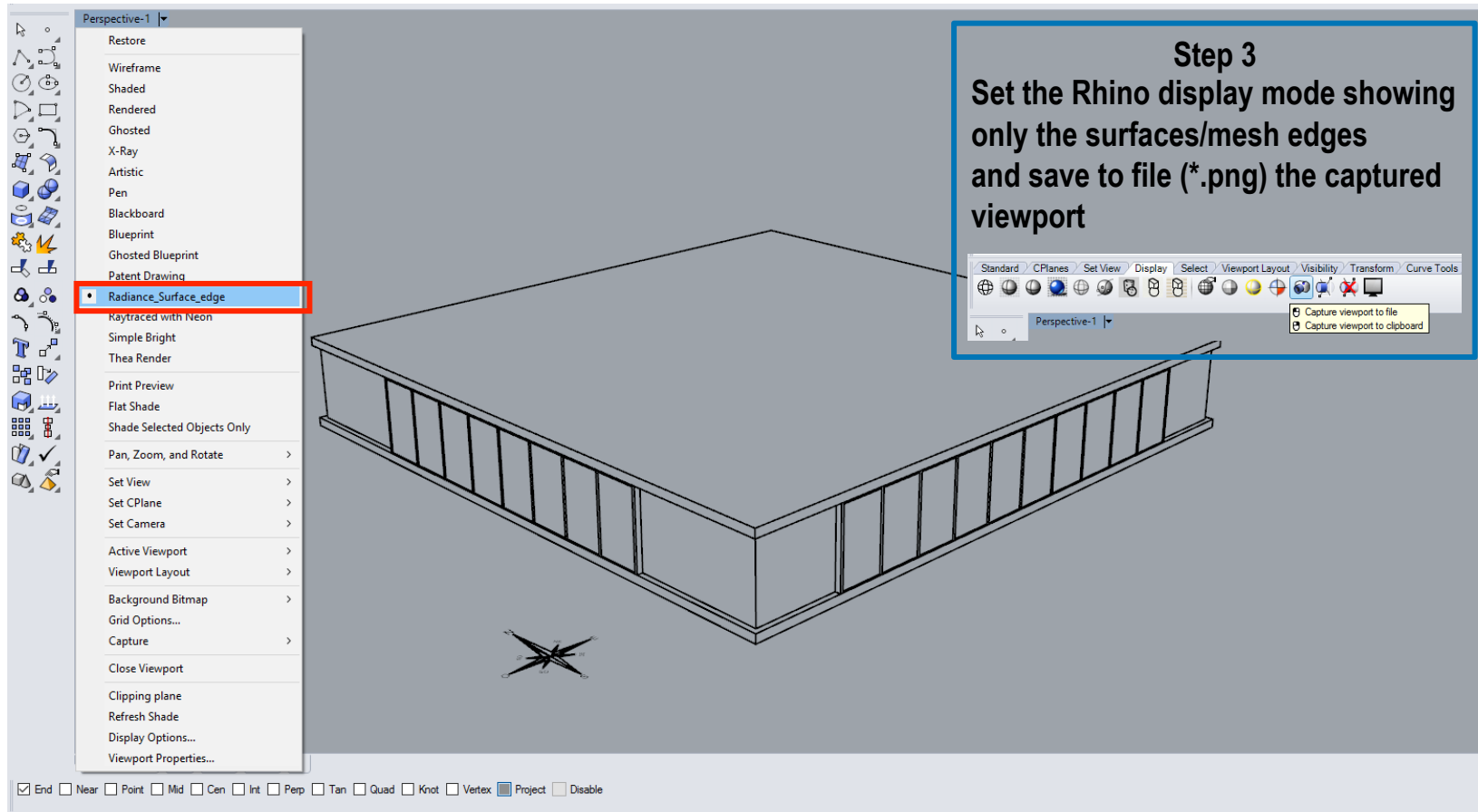
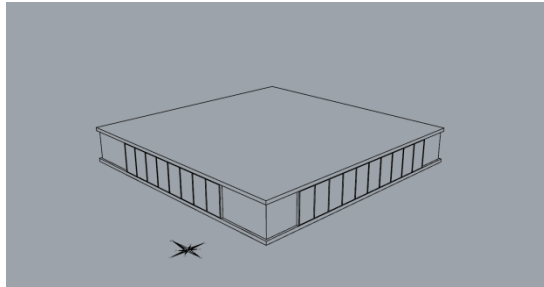


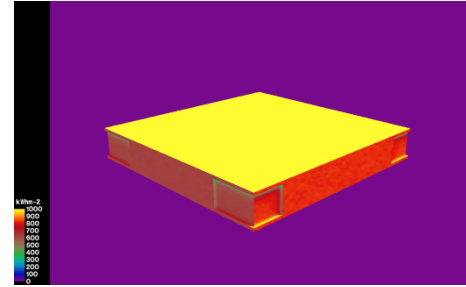
IMAGE COMPOSITING

Step 4

Open GIMP and import both Radiance and Rhino viewport image files by means of "Open as Layers" command



Rhino viewport image



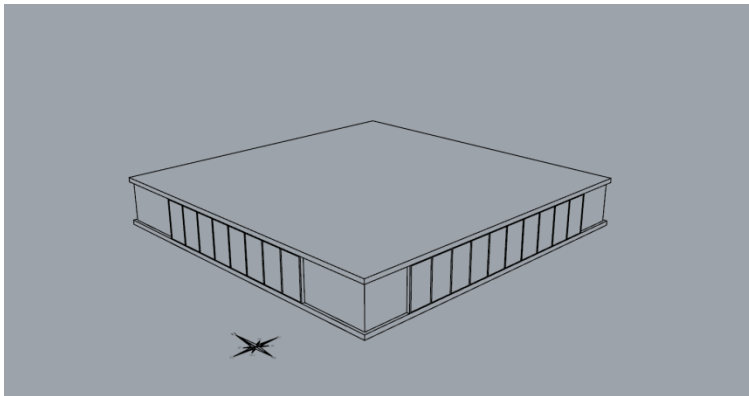
Radiance simulation image



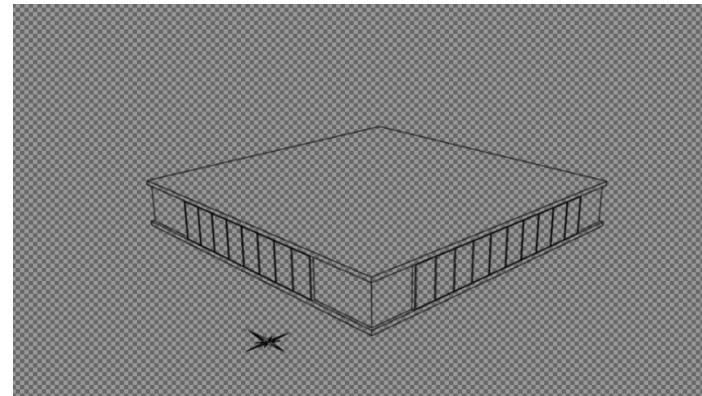
IMAGE COMPOSITING

Step 5

Convert the background gray color of the Rhino viewport file to Alpha channel (transparency)



Rhino viewport image exported

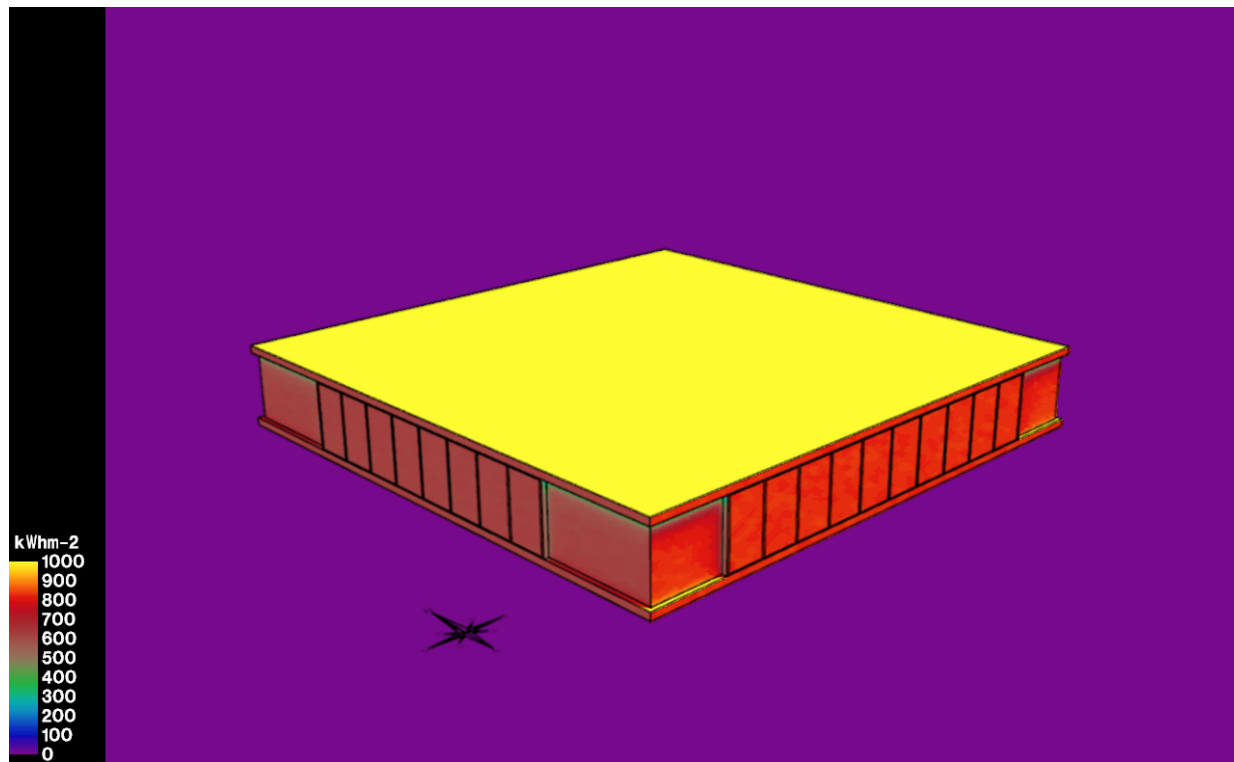


Rhino viewport image with
transparency background

IMAGE COMPOSITING

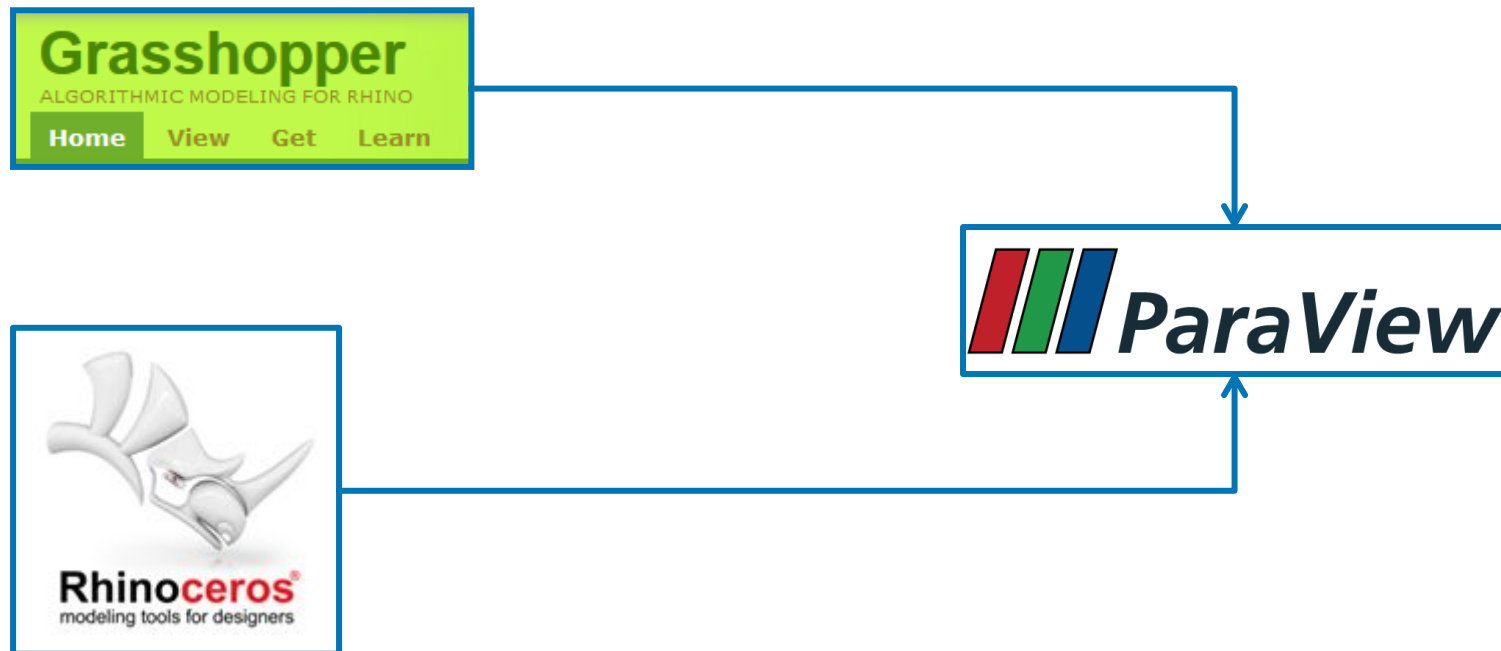
Step 6

Scale (if necessary) and combine the two images with this final result



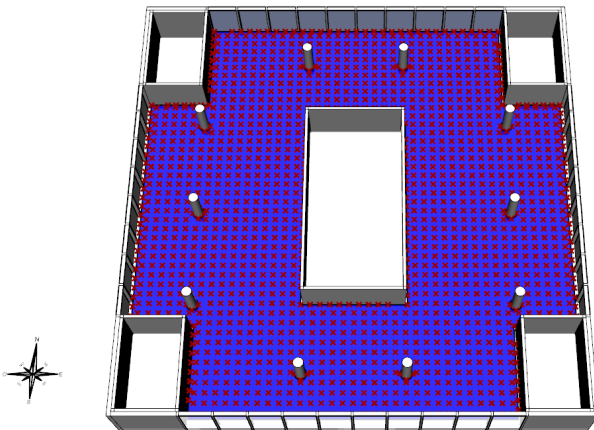
How we can show the data from rtrace with Paraview a scientific visualizer data?

PARAVIEW® VISUALIZE DATA



For more information of Paraview: <http://www.paraview.org>

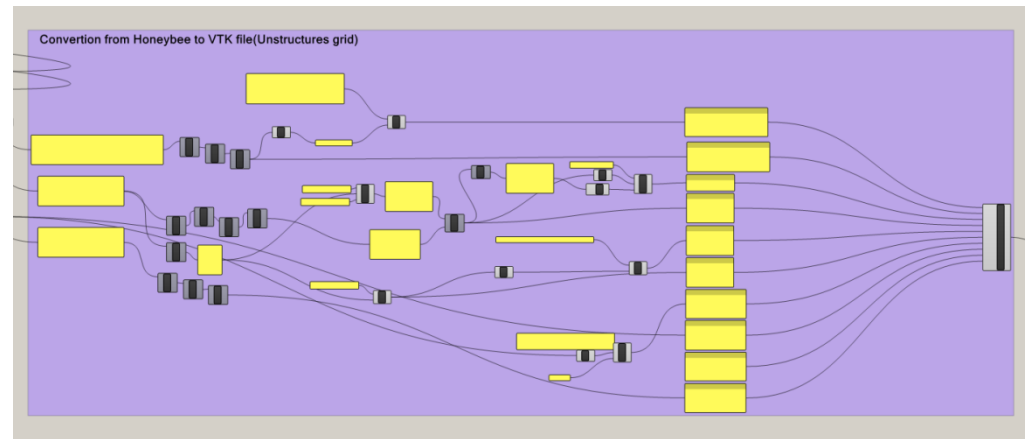
PARAVIEW® VISUALIZE DATA



Rhino -> 3D model

+

Honeybee -> mesh pts



Grasshopper 3D

It is used as interface to prepare vtk file using mesh data informations (vertex, type of face, etc) and radiance data calculation.



File Formats

for VTK Version 4.2

(Taken from The VTK User's Guide
Contact Kitware www.kitware.com to purchase)

Unstructured Grid is the type of VTK format preferred to show the Radiance grid calculation on Paraview

Unstructured Grid

The unstructured grid dataset consists of arbitrary combinations of any possible cell type. Unstructured grids are defined by points, cells, and cell types. The `CELLS` keyword requires two parameters: the number of cells n and the size of the cell list $size$. The cell list size is the total number of integer values required to represent the list (i.e., sum of $numPoints$ and connectivity indices over each cell). The `CELL_TYPES` keyword requires a single parameter: the number of cells n . This value should match the value specified by the `CELLS` keyword. The cell types data is a single integer value per cell that specified cell type (see `vtkCell.h` or **Figure 2**).

`DATASET UNSTRUCTURED_GRID`

`POINTS n dataType`

$P_{0x} P_{0y} P_{0z}$

$P_{1x} P_{1y} P_{1z}$

...

$P_{(n-1)x} P_{(n-1)y} P_{(n-1)z}$

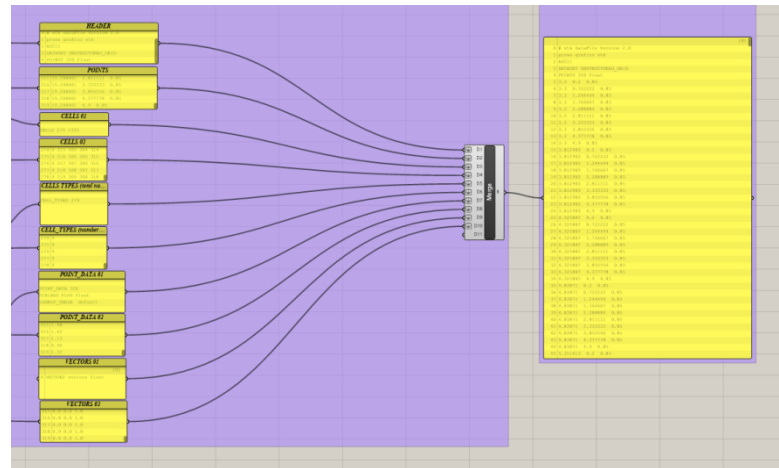
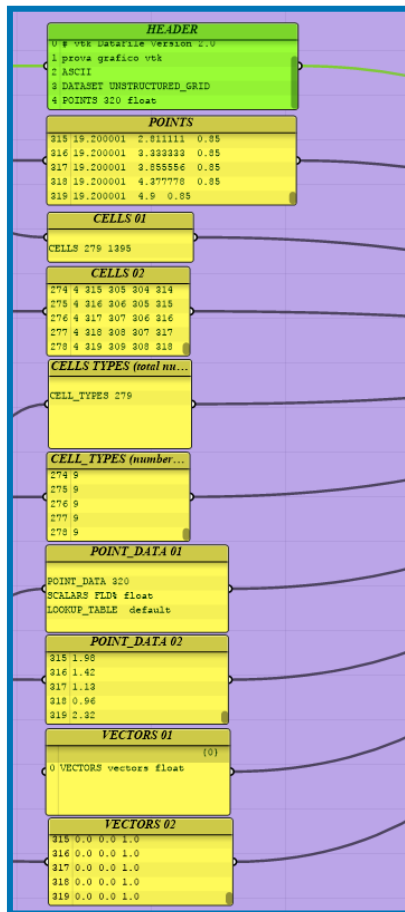
For more information of VTK file format: <http://www.vtk.org/VTK/img/file-formats.pdf>

PARAVIEW® VISUALIZE DATA

A detail of the Grasshopper 3D file

<- Left image shows the construction of each steps of unstructured VTK file format

Right image shows the final VTK text to be save -> manually with *.vtk file extension

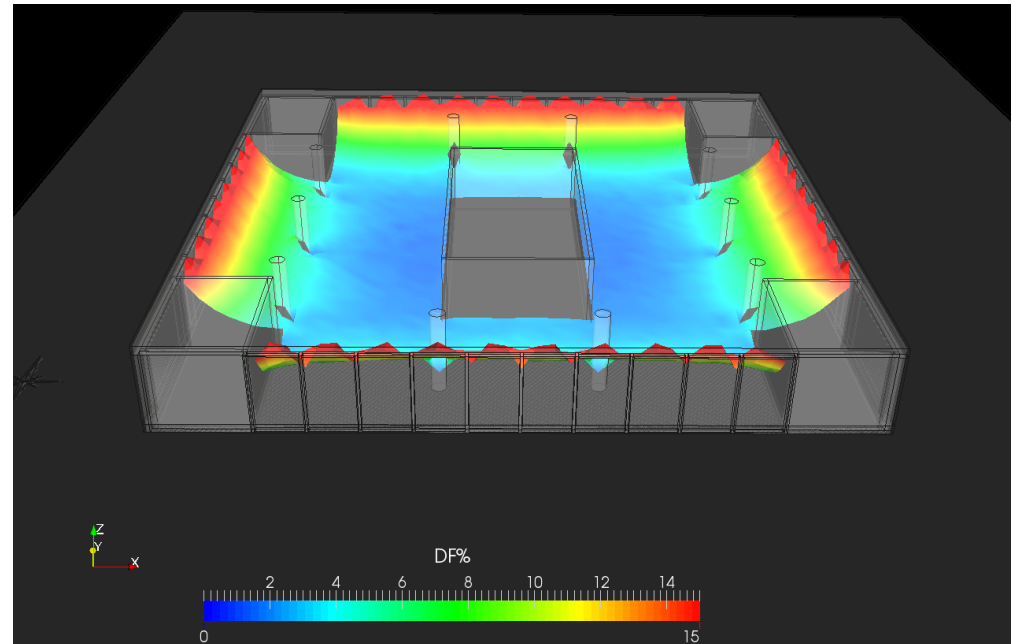
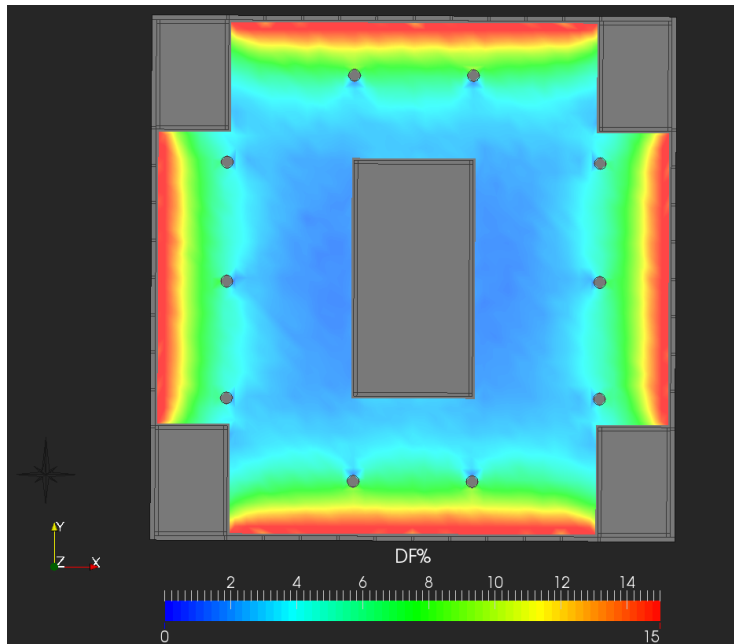


```
0 # vtk DataFile Version 2.0
1 prova grafico vtk
2 ASCII
3 DATASET UNSTRUCTURED_GRID
4 POINTS 320 float
5 3.3 0.2 0.85
6 3.3 0.722222 0.85
7 3.3 1.244444 0.85
8 3.3 1.766667 0.85
9 3.3 2.288889 0.85
10 3.3 2.811111 0.85
11 3.3 3.333333 0.85
12 3.3 3.855556 0.85
13 3.3 4.377778 0.85
14 3.3 4.9 0.85
15 3.812903 0.2 0.85
16 3.812903 0.722222 0.85
17 3.812903 1.244444 0.85
18 3.812903 1.766667 0.85
19 3.812903 2.288889 0.85
20 3.812903 2.811111 0.85
21 3.812903 3.333333 0.85
22 3.812903 3.855556 0.85
23 3.812903 4.377778 0.85
24 3.812903 4.9 0.85
25 4.325807 0.2 0.85
26 4.325807 0.722222 0.85
27 4.325807 1.244444 0.85
28 4.325807 1.766667 0.85
29 4.325807 2.288889 0.85
30 4.325807 2.811111 0.85
31 4.325807 3.333333 0.85
32 4.325807 3.855556 0.85
33 4.325807 4.377778 0.85
34 4.325807 4.9 0.85
35 4.83871 0.2 0.85
36 4.83871 0.722222 0.85
37 4.83871 1.244444 0.85
38 4.83871 1.766667 0.85
39 4.83871 2.288889 0.85
40 4.83871 2.811111 0.85
41 4.83871 3.333333 0.85
42 4.83871 3.855556 0.85
43 4.83871 4.377778 0.85
44 4.83871 4.9 0.85
45 5.351613 0.2 0.85
46 5.351613 0.722222 0.85
47 5.351613 1.244444 0.85
48 5.351613 1.766667 0.85
49 5.351613 2.288889 0.85
```


Final step:

- *Use Rhino to export all the 3D model as *.wrml or *.obj file format*
- Open Paraview
 - Import .vtk file saved from Grasshopper 3D
 - Import 3d building model

Paraview final Images



For further information:

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