Creating a building with buildingEngine

Gustavo Patow
ViRVIG-UdG
Universitat de Girona (UdG)

http://ggg.udg.edu/skylineEngine/

Go to this web page to know more about the skylineEngine system. buildingEngine is a module part of the main system.

DOWNLOADS
The software

- **buildingEngine** comes as a .otl
- A Houdini library of digital assets
- First thing, you must install the library

- Install Digital Asset Library
• Select **buildingEngine**

![Install Digital Asset Library]

- Digital Asset Library: `L:/dagush/skylineEngine/`
- Install Library To: `Current HIP File Only`
- Digital Assets To Be Installed:
  - Sop/Comp (non-commercial)
  - Sop/CreateBase (non-commercial)
  - Sop/Cutter (non-commercial)
  - Sop/Exception (non-commercial)

- Give preference to assets in this library
- Show Library Contents

• Now, let’s do the outline of our building
• Swap to a “top viewport”
• And create a Curve node

• And draw a (2D) polygon!
  • (try not to make it too big or too small... about 10x20 units would be ok)
• Switch back to a “perspective viewport”

• And rename our object to “building”
Extrude node

• And now add an Extrude (Digital Asset) node

Extrude node

• Extrude is used to generate the mass model from the building lot
• But nothing can be seen!

Filters and Products

• All buildingEngine nodes work with a system of filters and products.
• A filter is used to select the geometry we are going to operate onto
• A product is what this node produces
• They are modeled as Houdini groups

• So, the curve has no label and the Extrude node does not know on what to operate!
• So, let’s create a Group Geometry node, to add a label to the polygon

• Our label will be “lot”
• Now, we can configure our Extrude node
  • Filter: lot
  • product: mass
  • height: 10 (?)

• Now, create a new Comp node
  • And wire the Extrude into it
First, set the filter to mass.

Now, set the number of components...
in our case, 3:
- front → facade
- side → sides
- Top → roof
• Our new model is identical to the previous one...
• Except that no bottom was selected!!!

• Now, let's subdivide the facade into floors
• For that, create a Subdiv node and wire our Comp node into it
Choose

- filter: facade
- Axis: Y (default)
- Divisions: 2
  - Uncheck Approximate
  - Value: 2 (absolute)
  - Product: bottomFloor
  - Check Approximate
  - Value: 1 (approximate)
  - Product: floors

As this node is “tuned” for facade, it will only work on the facade.

It will result in two divisions: one fixed-size for the first floor
And other representing the other floors
Now, let’s divide the floors area into its several “floor” areas.

- For that, create a Repeat op.
Repeat node

- Set
  - filter = floors
  - Product = floor
  - Axis = Y (default)
  - Check Approximate
  - Value = 1.5 (approximate)
Repeat node (II)

- Create another Repeat node
- Wire the first one into this one
- Set
  - Filter = floor
  - Product = window
  - Axis = X
  - Value = 1.5 approximate
Subdiv (II)

- Create a Subdiv for the 1st floor
- Connect Subdiv1 to it

Subdiv (II)

- Set:
  - filter = bottomFloor
  - Axis = X
  - Divisions = 3
    - bottomWindows
      - Value = 1 approximate
    - door
      - Value = 2 absolute
    - bottomWindows
      - Value = 1 approximate
Subdiv (II)

Non-linearity!

- With **building**Engine, we can be non-linear!
- For instance, wire the Subdiv2 into the Repeat2 already created
- Simply add bottomWindows to the Repeat2 *filter*!
Non-linearity!

Insert node

- Now, let’s insert some real geometry!
- For that, let’s create an Insert node
- And wire the Repeat2 to it.
Insert node

- Set
  - filter = window
  - Product = ?
  - Asset File = choose!
  - RotateY = 180 (depends on your asset)
  - Uncheck “relative z”
  - Scale Z = 0.3
Insert node

- Let’s create another Insert node for the door

![Insert node diagram]

Insert node

- Set
  - filter = door
  - Product = ?
  - Asset File = choose!
  - Uncheck “relative z”
  - Scale Z = 0.3
Insert node

Object_merge node

- This is a standard Houdini node
- Useful to visualize several nodes at once
- Like the Merge node, but without the wires!
Object_merge node

- Set number to 2
- And choose the insert nodes!
More non-linearity

More non-linearity
More non-linearity

Visualizing the entire model
Add the roof to the visualization

- At the Object_merge, increase the number to 3
- And add the Comp1 node
- But do not forget to add **only** the roof group!

![Object Merge](image)

The entire model!
HDA

- If wanted, we can create an HDA with the building nodes.
- For instance add
  - Building height (from Extrude)
  - First floor height (from Subdiv1)
  - Floor height (from Repeat1)
  - Door with (from Subdiv2)
  - Window width (from Repeat2)

The entire model as an HDA!