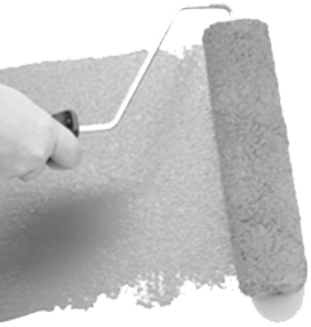
DESIGNA
A Shape Grammar Interpreter

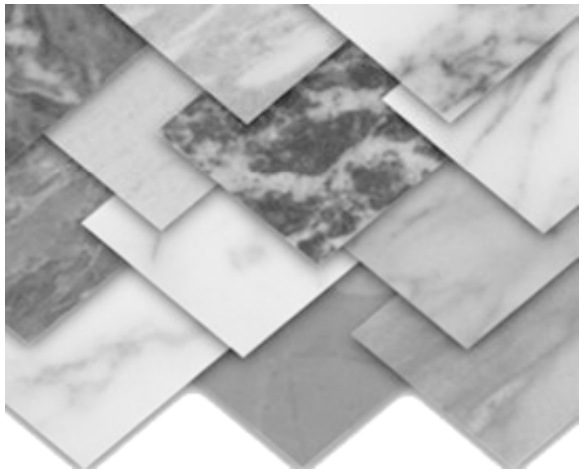
Mestrado em Engenharia Informática e de Computadores

Rodrigo Coutinho Correia

5 Junho 2013

Personalização





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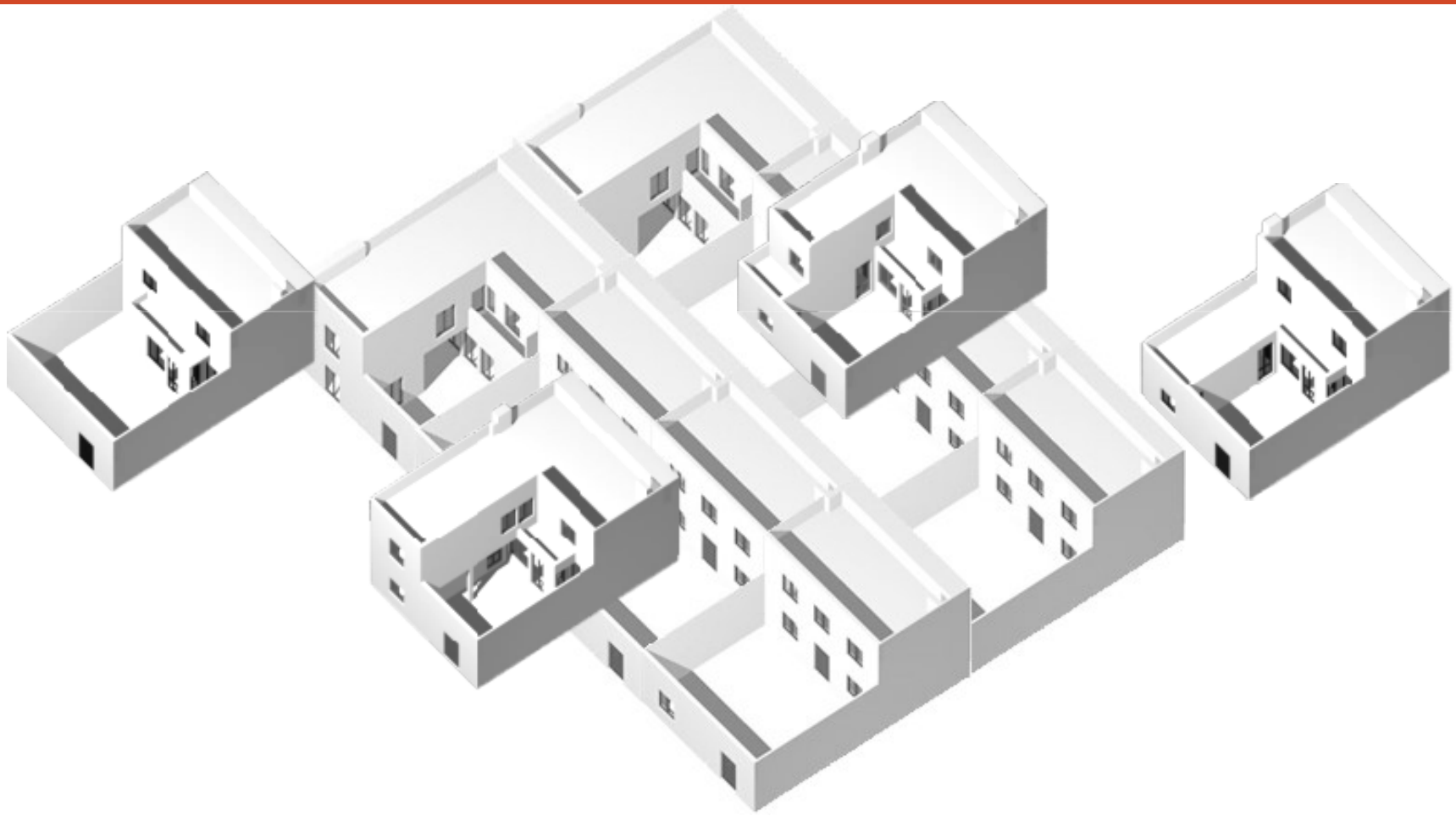
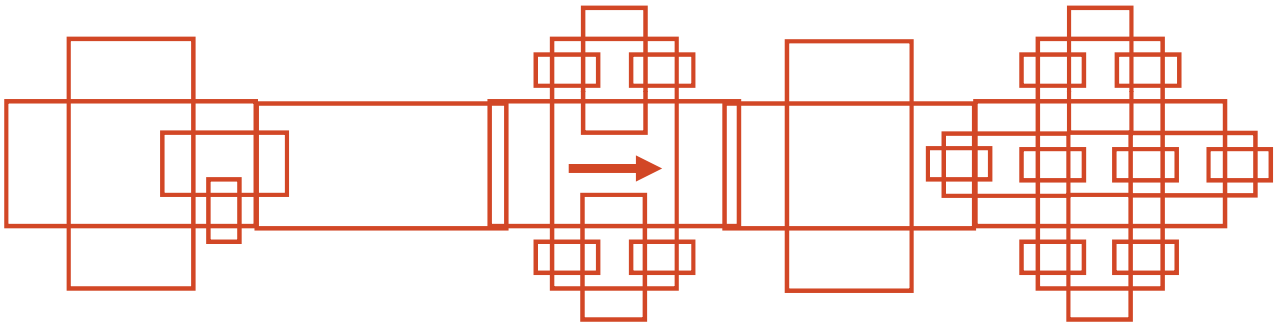


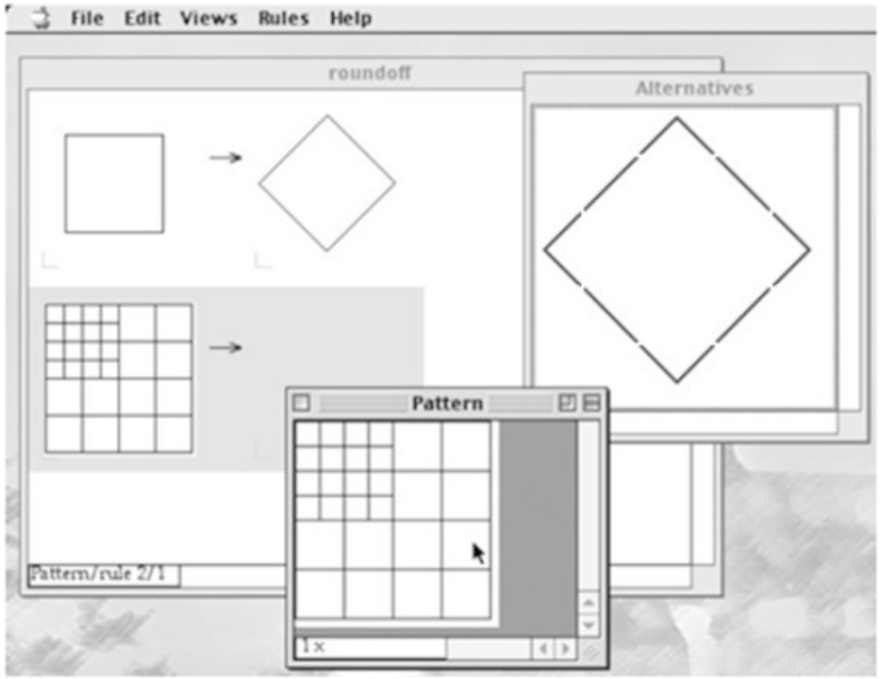
Gramática Discursiva

Gramáticas da Forma



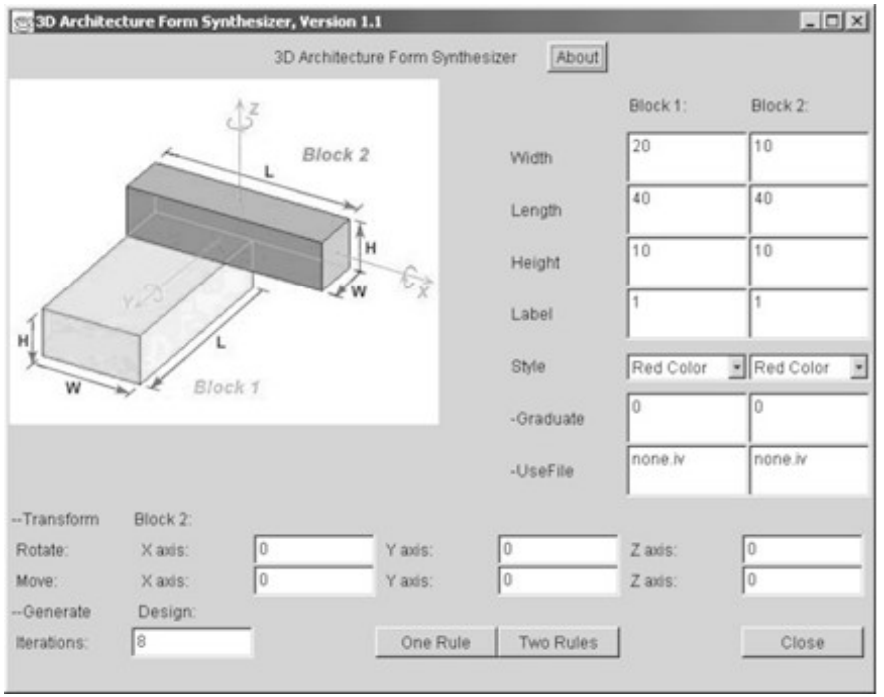
Gramáticas da Forma – Interpretadores

GEdit



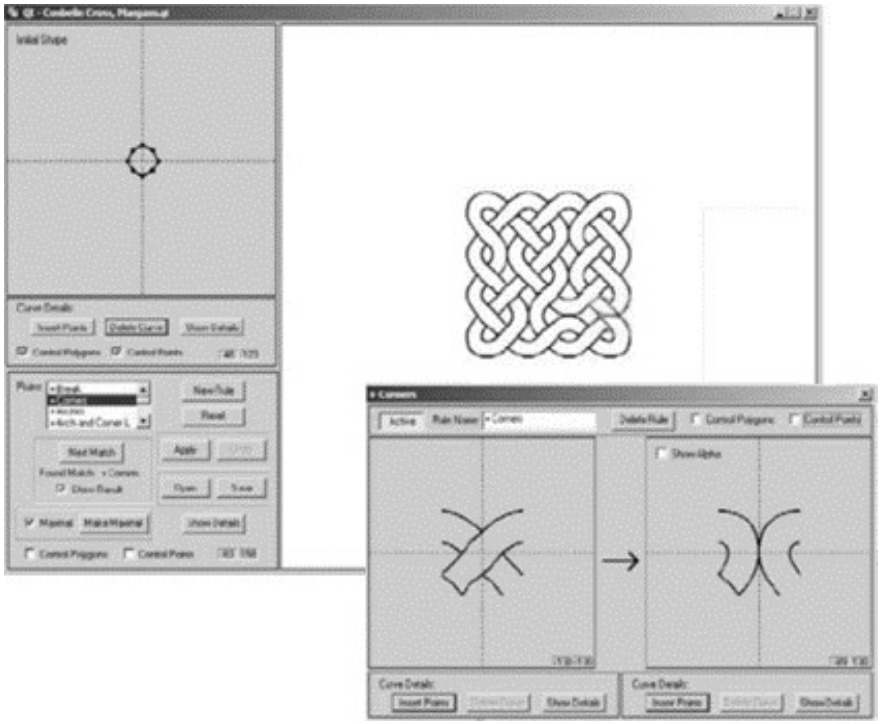
Gramáticas da Forma – Interpretadores

3D Shaper



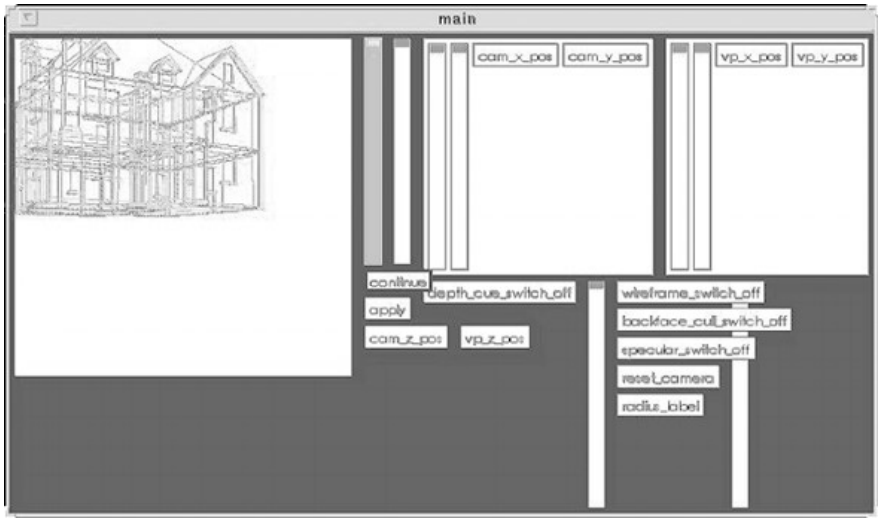
Gramáticas da Forma – Interpretadores

Qi



Gramáticas da Forma – Interpretadores

Genesis

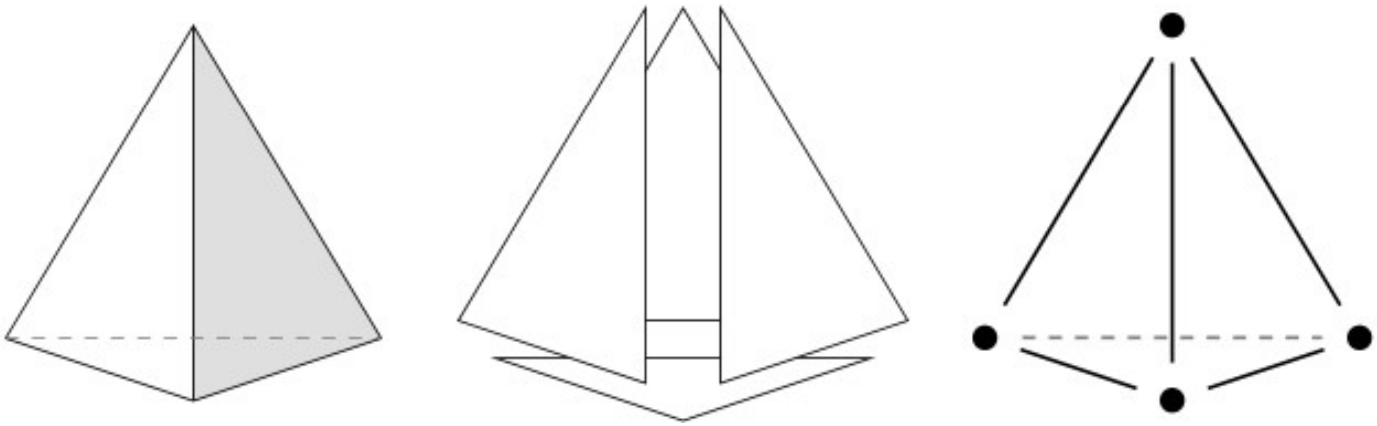


DESIGNA – Interpretador de Gramáticas da Forma

- Formas
- Regras
- Visualização

DESIGNA

- **Formas**
- Regras
- Visualização



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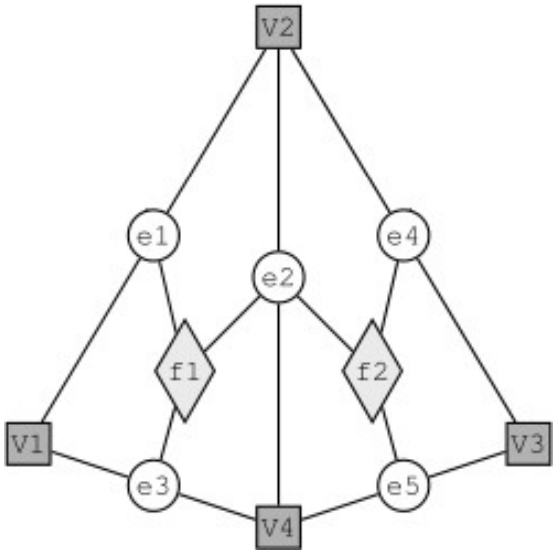
- Visualização



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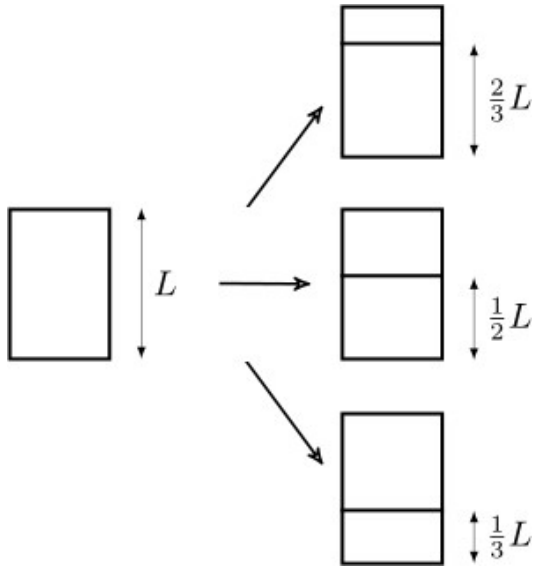
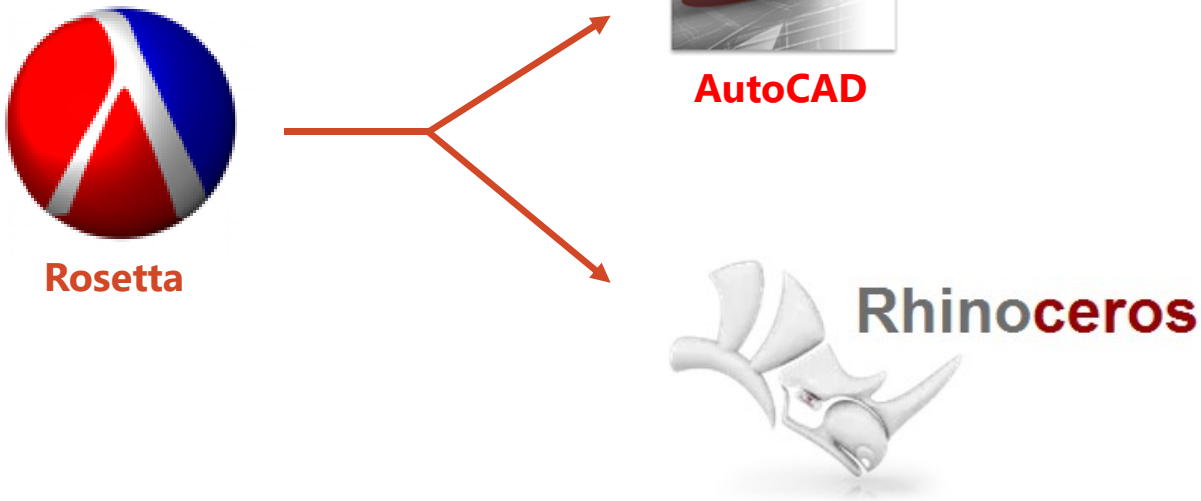
- Visualização



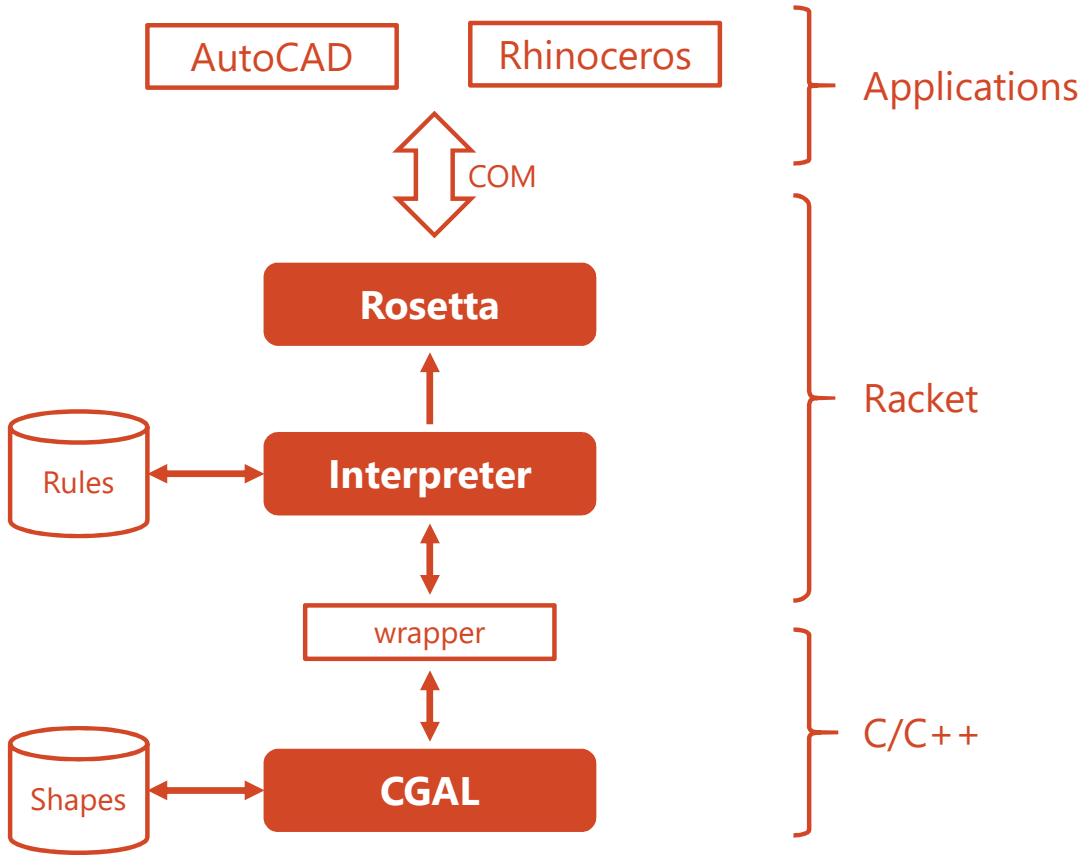
DESIGNA

- Formas
- Regras
- **Visualização**



DESIGNA

- **Arquitectura**



Avaliação

- Ice Ray
- 3D
- Malagueira

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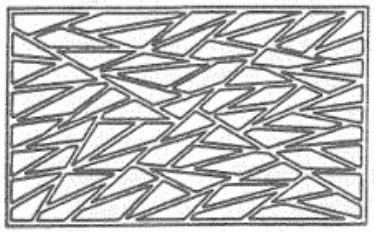
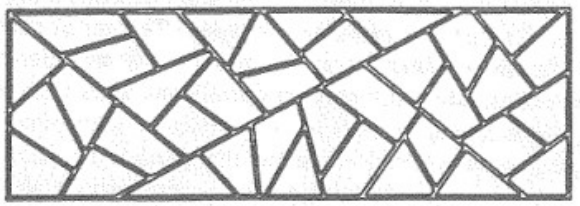
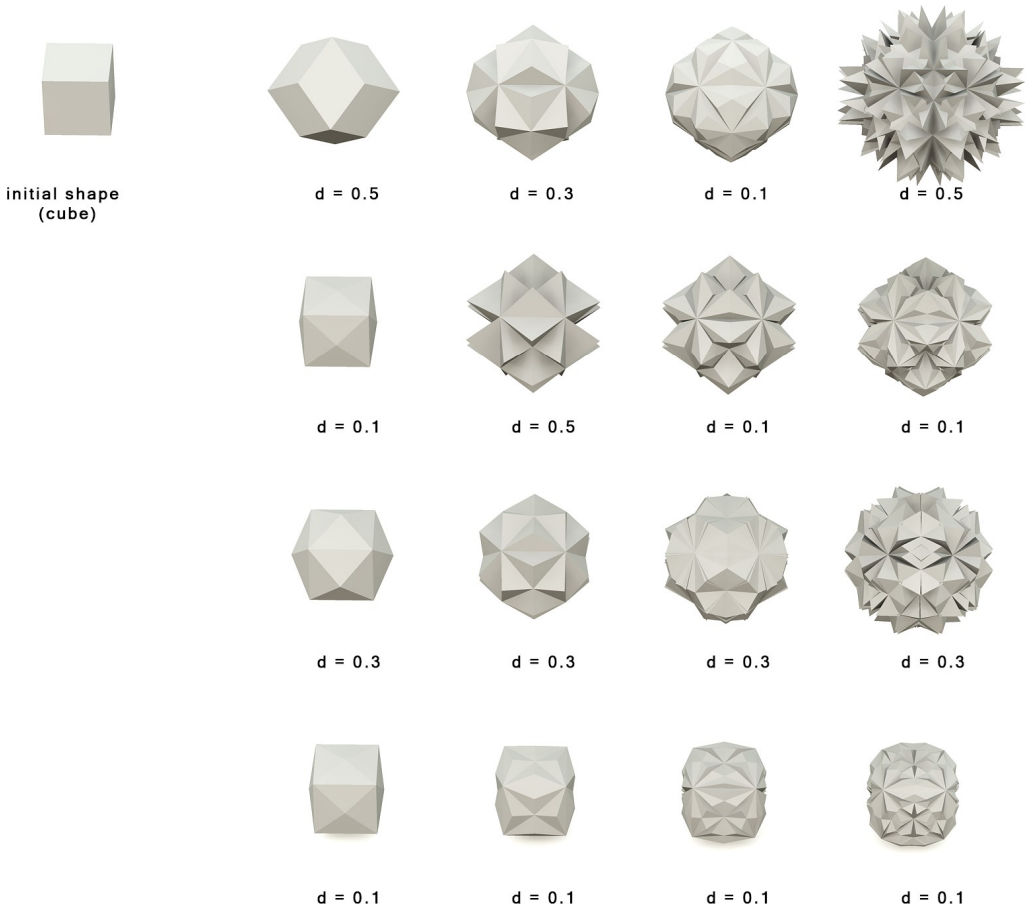




Avaliação

- Ice Ray
- **3D**
- Malagueira



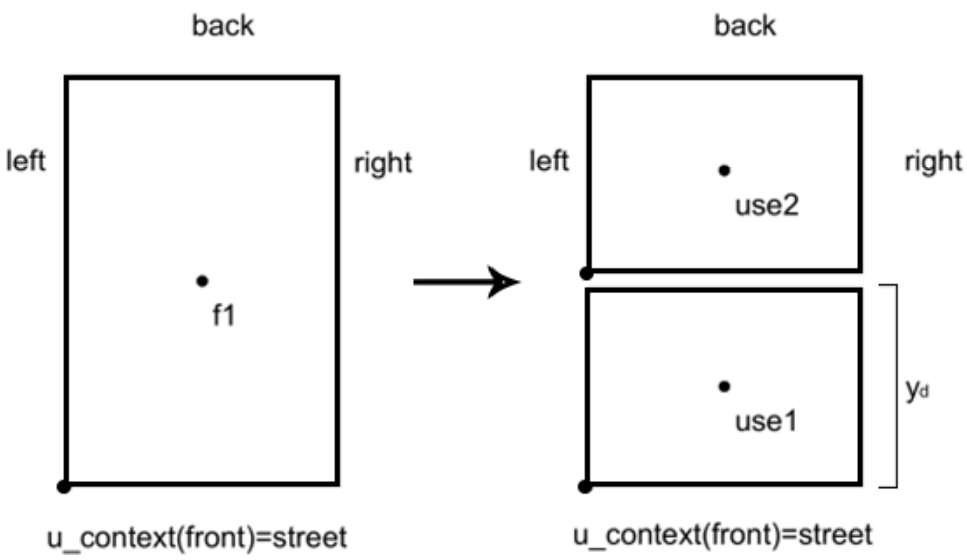
Avaliação

- Ice Ray
- 3D
- **Malagueira**

Malagueira

Malagueira

R5: Locate inside/outside zones on the first floor



$\alpha_1 \leftarrow \alpha_1$

$\alpha_8 \leftarrow \alpha_8$

$\alpha_9 \leftarrow \alpha_9$, $\forall\ \alpha_1$, α_8 = frontyard $\wedge$ α_9 = true

$\Rightarrow$ use1 = outside1 $\wedge$ use2 = inside1 $\wedge$ $y_d = 6.00 \wedge a_{in} = a_{use2} \wedge a_{ou} = a_{use1}$

$\forall\ \alpha_1$, α_8 = frontyard $\wedge$ α_9 = false

$\Rightarrow$ use1 = outside1 $\wedge$ use2 = inside1 $\wedge$ $y_d = 7.00 \wedge a_{in} = a_{use2} \wedge a_{ou} = a_{use1}$

α_1 = < street, ?use, street, ?use > , $\forall$?use $\wedge$ α_8 = backyard , $\forall\ \alpha_9$

$\Rightarrow$ use1 = inside1 $\wedge$ use2 = outside1 $\wedge$ $y_d = 7.00 \wedge a_{in} = a_{use1} \wedge a_{ou} = a_{use2}$

α_1 = < street, ?use, street, ?use > , $\forall$?use $\wedge$ α_8 = backyard , α_9 = true

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$\delta_{13} \leftarrow \delta_{13}$ - < [(f1, id_{f1}, $\varnothing$, ((x_{f1}, y_{f1}, z_{f1}) , dx_{f1}, dy_{f1}, dz_{f1}, a_{f1}] >

+ < [(use1, id_{f1}, $\varnothing$, ((x_{f1}, y_{f1}, z_{f1}) , dx_{f1}, dy_{f1} - (dx_{f1} - y_d + 2 · 0.10), dz_{f1}, dx_{f1} · dy_{f1} - ($f1_{dy}$ - y_d + 2 · 0.10)],

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$\delta_{15} \leftarrow \delta_{15}$ + < available, ($f1_{dx}$ · 0.20, a_{in}, - (a_{in} + $f1_{dx}$ · 0.20), - $f1_{dx}$ · 0.20), - A_u / A_g + A_u - $f1_{dx}$ · 0.20 / A_g >

$\delta_{17} \leftarrow \delta_{17}$ - < [id_{f1}, $id_{?space}$, adjacent] , ?space $\in$ {front, left, back, right}

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[$id_{inside1}$, $id_{?right}$, adjacent],

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α_8 = frontyard $\Rightarrow$ $?space_1$ = back $\wedge$ $?space_2$ = front

α_8 = backyard $\Rightarrow$ $?space_1$ = front $\wedge$ $?space_2$ = back

$\delta_{20} \leftarrow \delta_{20}$ + < [wall, max(id) + 1, (inside, outside), ((x_{f1}, y_d - 0.10, z_{f1}), dx_{f1}, 0.20, dz_{f1}, dx_{f1} · dz_{f1})] >

$\delta_{24} \leftarrow \delta_{24}$ + wall_cost (dx_{f1} · dz_{f1}, unit_cost (wall, 0.20, material))

$\alpha_{25} \leftarrow \alpha_{25}$ + < [R4, 0] >

Malagueira

Introduzir laje

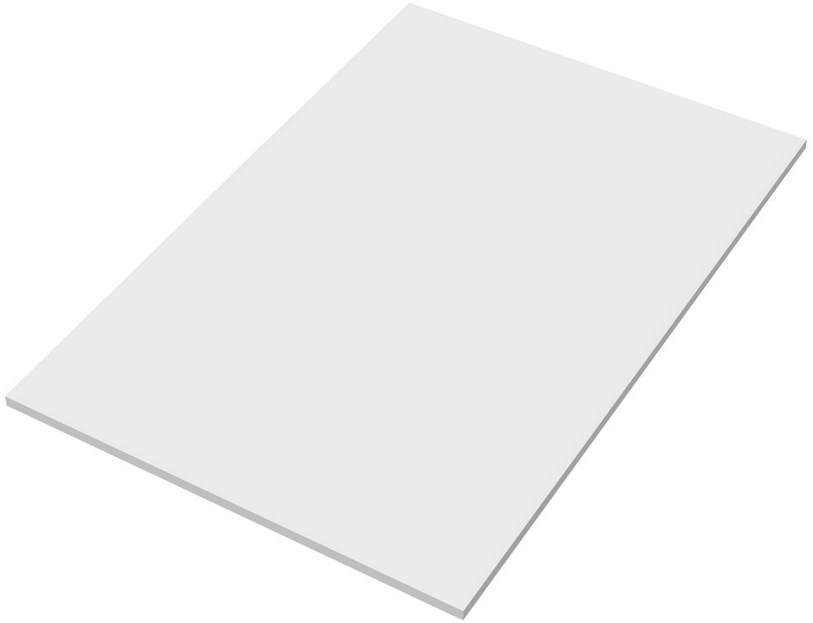
Dividir interior/exterior

Localizar corredor

Localizar zonas funcionais

Localizar espaços

Introduzir detalhes



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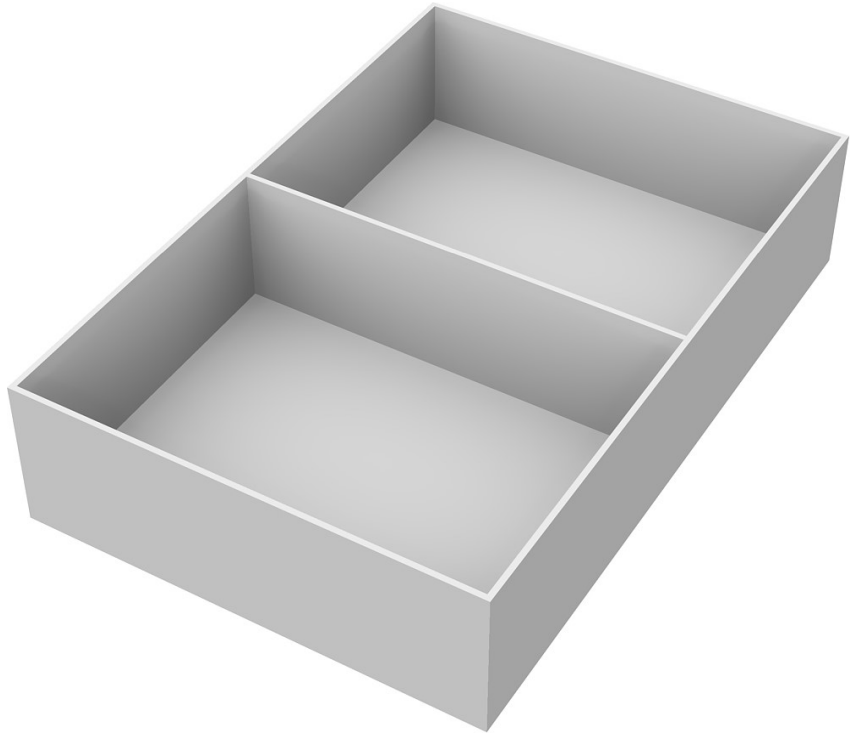

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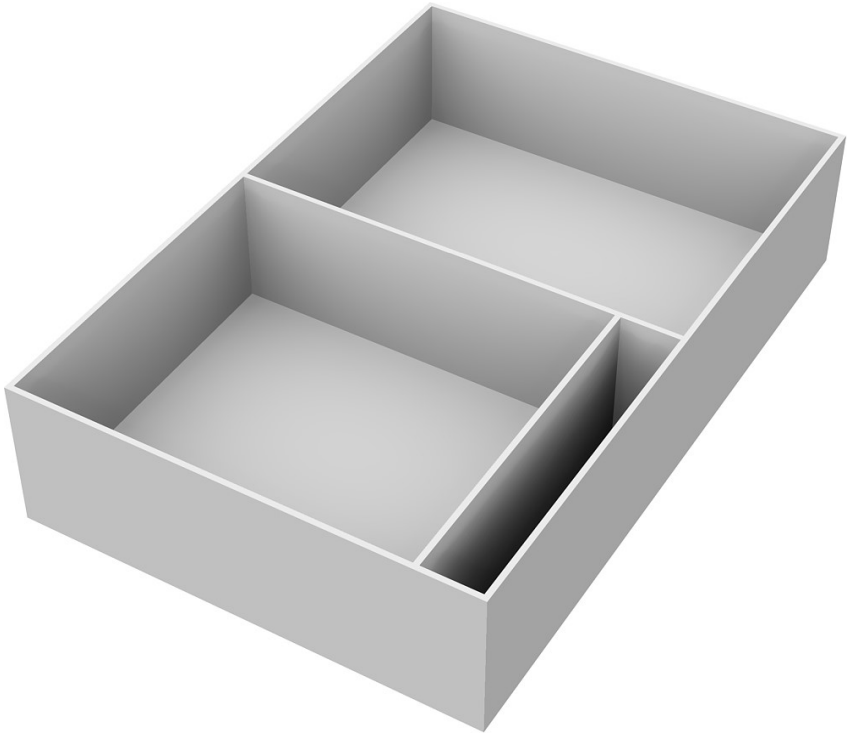

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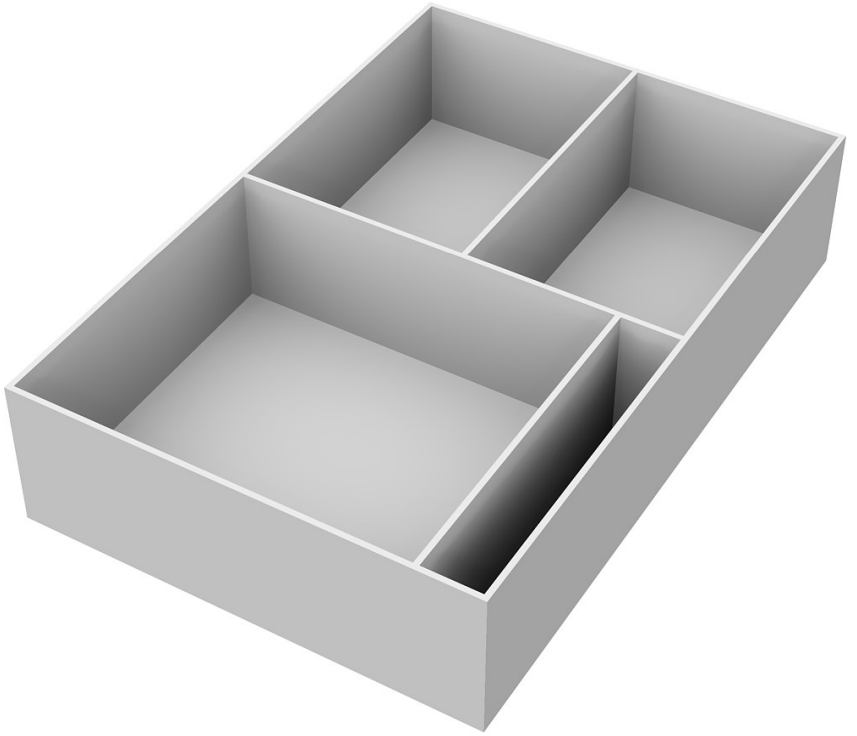

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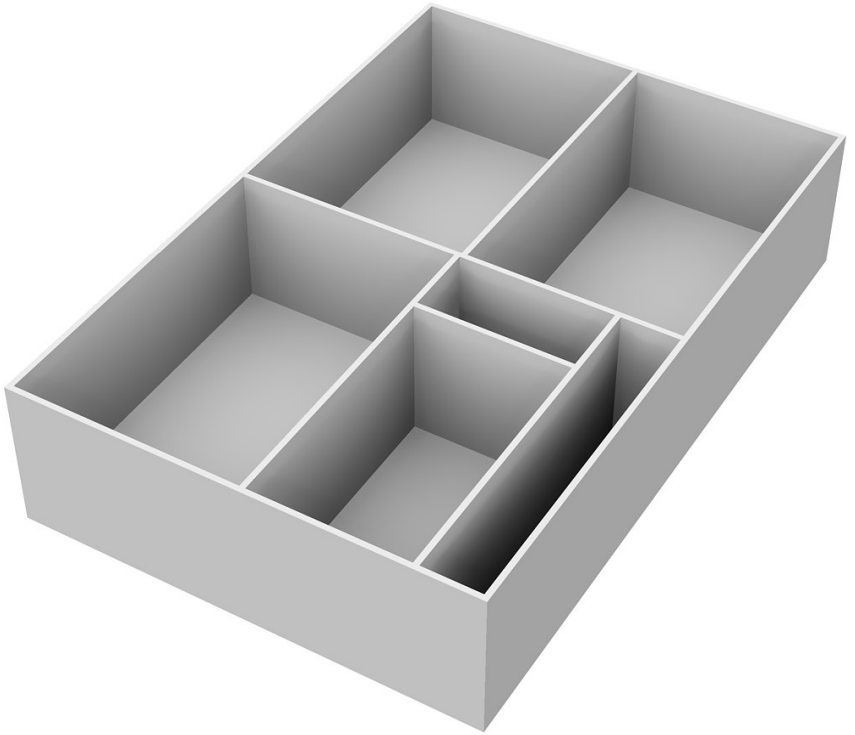

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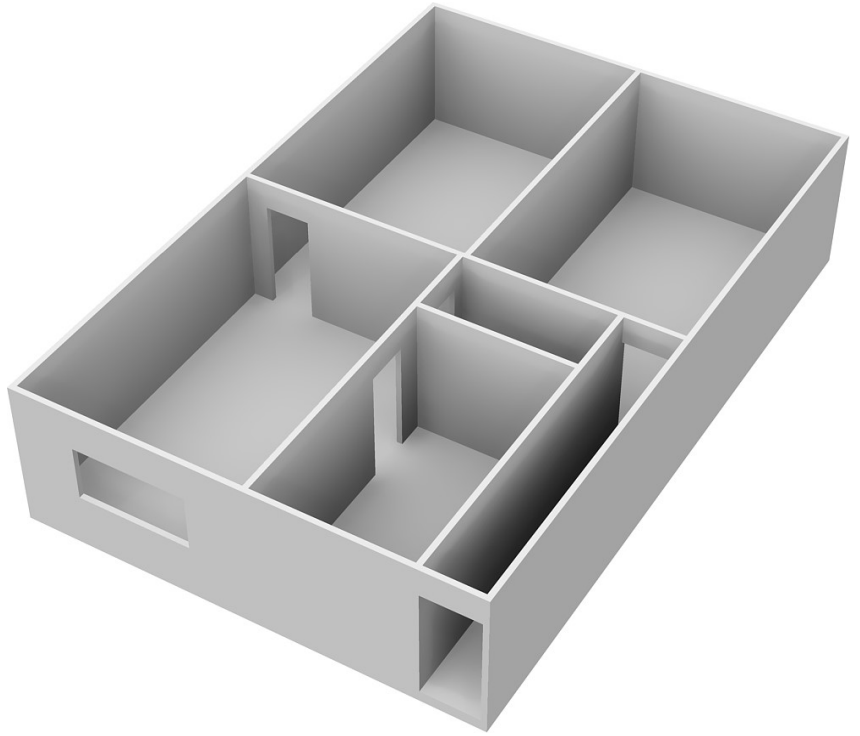

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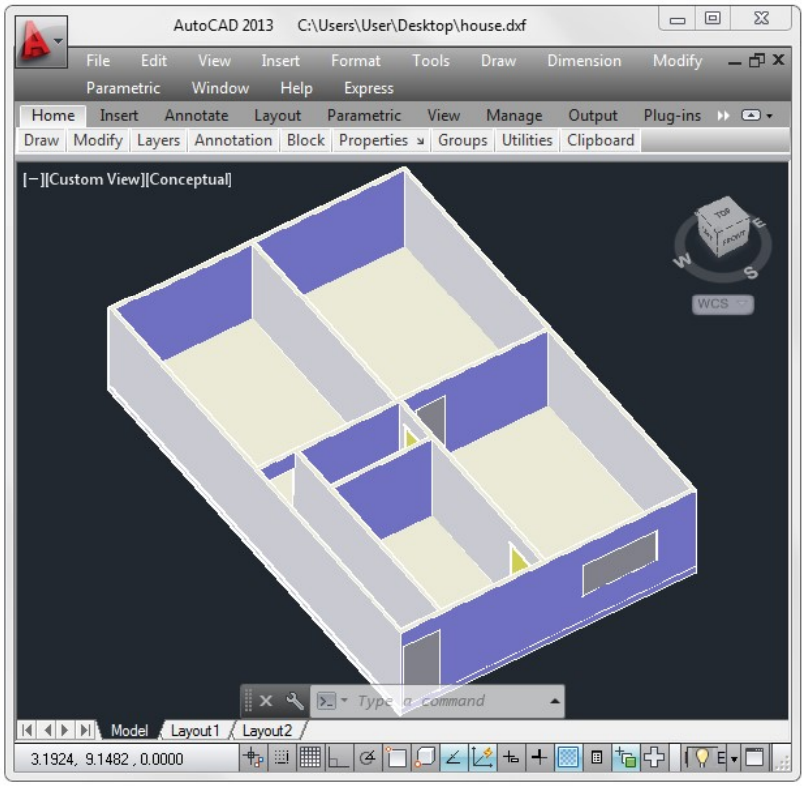
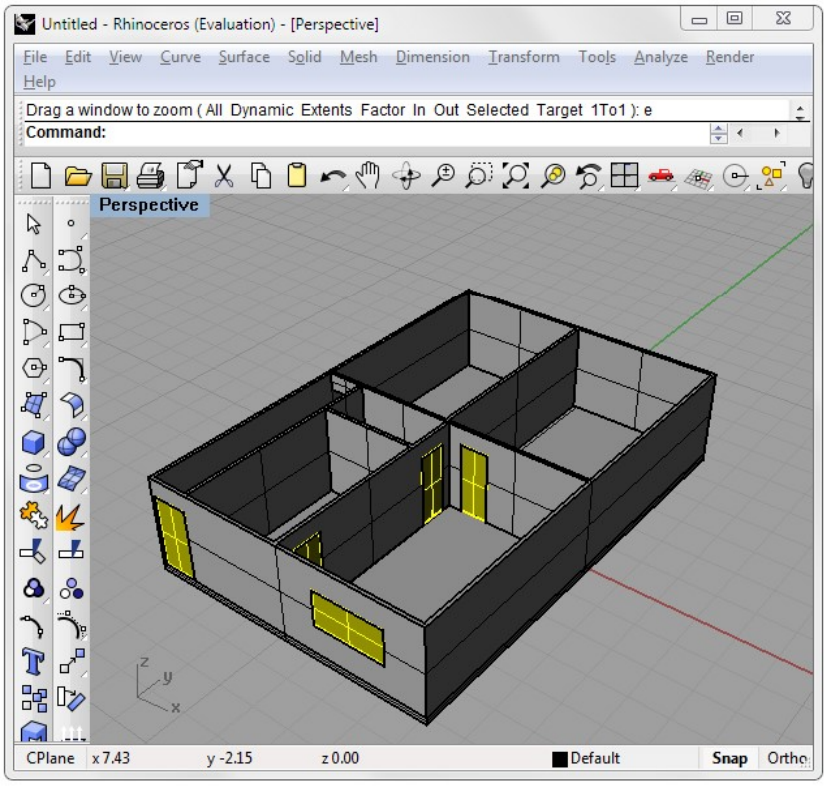
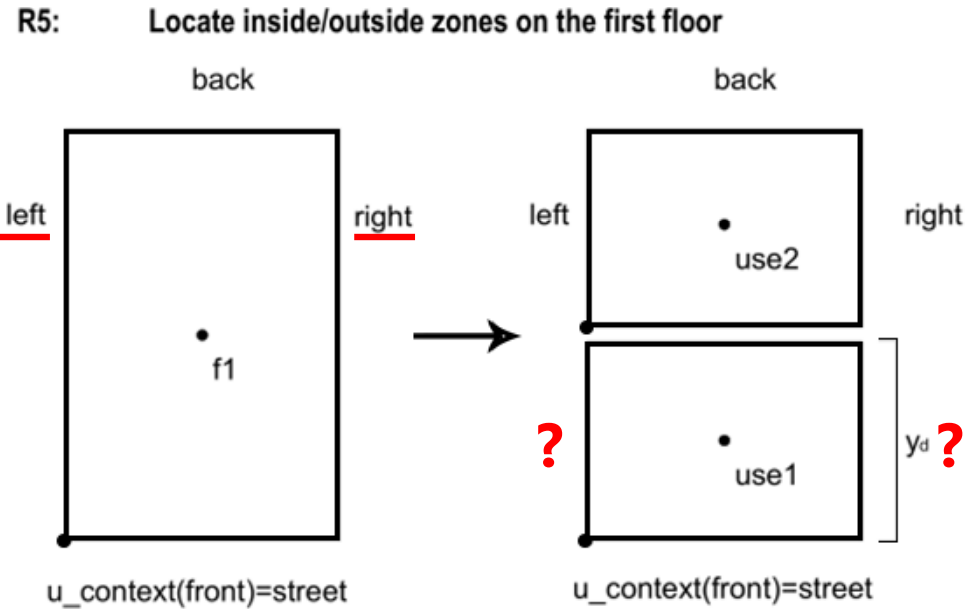

AutoCAD 2013 C:\Users\User\Desktop\house.dxf
File Edit View Insert Format Tools Draw Dimension Modify
Parametric Window Help Express
Home Insert Annotate Layout Parametric View Manage Output Plug-ins
Draw Modify Layers Annotation Block Properties Groups Utilities Clipboard
[−][Custom View][Conceptual]
WCS
Type a command
Model Layout1 Layout2
3.1924, 9.1482 , 0.0000


Untitled - Rhinoceros (Evaluation) - [Perspective]
File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render
Help
Drag a window to zoom (All Dynamic Extents Factor In Out Selected Target 1To1): e
Command:
Perspective
CPlane x 7.43 y -2.15 z 0.00 Default Snap Ortho

Discussão



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Conclusões

- Interpretador de Gramáticas da Forma (GF)
- Modelador 3D Exacto + Procura
- Portabilidade das GF
- **GF são difíceis de implementar**

Trabalho Futuro

- Graph Systems
- Implementar outras GF
- Continuar a implementar GF Malagueira

Contribuições

MALAG: a discursive grammar interpreter for the online generation of mass customized housing

DCC10: "Shape Grammar Implementation: From Theory to Useable Software"

DESIGNA: A General 3D Shape Grammar Interpreter Targeting the Mass Customization of Housing

eCAADe12: "Shape Studies 2"

Obrigado

Questões?