C I T Y E N G I N E

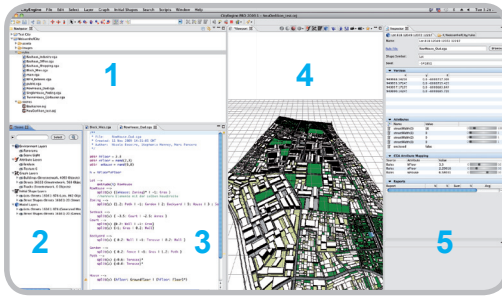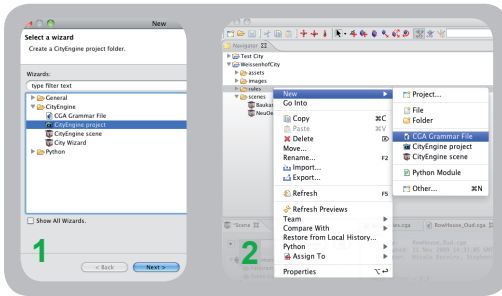## 1. USER INTERFACE

The CityEngine user interface with a scene opend.
1.Navigator: Lists workspace and projects,
2.Scene editor and Layer Manager,
3.CGA grammar editor,
4.Viewport,
5.Inspector: Shows attributes, attribute mapping, reports.

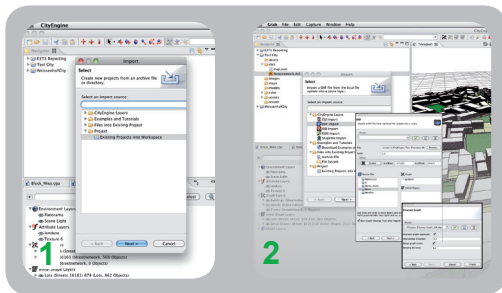Locating the license file open Finder / Explorer

2. DATA STORAGE

CityEngine uses projects for storing data.

1. To create a new project, select from the menubar: "File → New → CityEngine → CityEngineProject → ... ."

2. To create a new scene or rule right-click on:…/scene- or …/rule-folder → RMB (Right-Mouse-Button) → New → CGA grammar file.
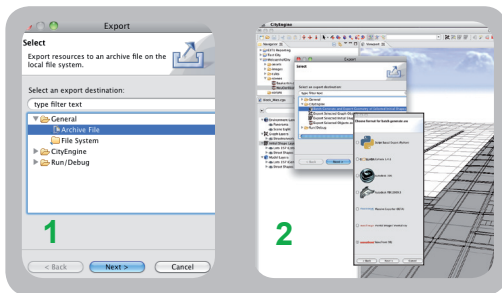
2.1 IMPORT

Importing files and projects.
1. To import a project archive, select from the menubar: "File → Import → Project → Existing project into workspace."
2. To import external data, e.g. Layers from a different project, select from the menubar. File → Import → CityEngineLayer →… .
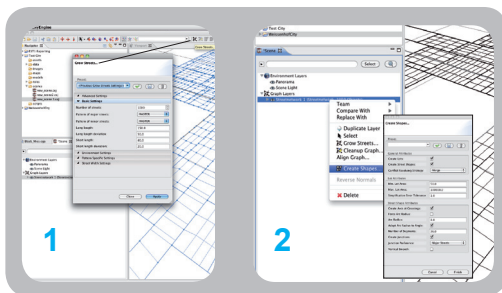3. Alternativly, most files can be importred by 'drag and drop' on to the project folder.

2.2 EXPORT

Exporting files and projects.

1.To export a project select: "File → Export → General → Archive File → Choose Project → Browse → Save as... → Finish."

2. To export data, e.g. 30 geometry: "File → Export → CityEngine → Batch generated → Choose format →… ."

3. NEW STREETS

The 'Growstreet' tool can be used to generate typical networks.

1.Select: "Graph →'Grow Streets' → Individual Settings → Apply."

2. Streetnetwork in Scene Editor → RMB → Create shapes → Individual attributes → Finish.

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3.1 NEW STREETS
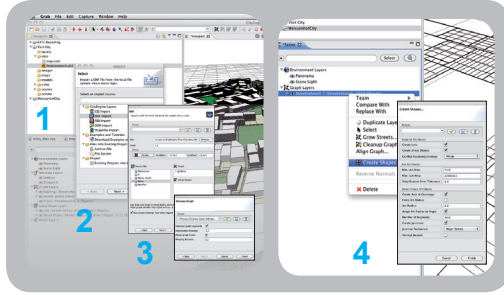
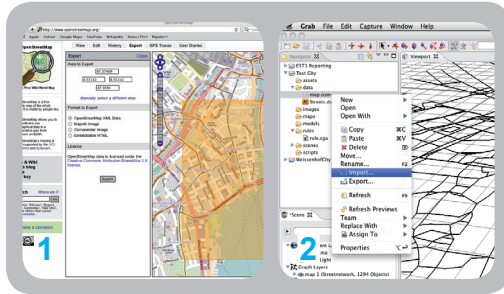Importing a DXF street data file.

1. Save the DXF file in data folder using drag & drop.
2. RMB on DXF in data folder → Import → CityEngine Layer DXF Import → Next.
3. Choose offset, center offset source file and activate Run Graph Cleanup → Next → Finish with defaults.
4. Streetnetwork in scene editor → RMB → Create shapes → Individual Attributes → Finish.

3.2 NEW STREETS

Create and import street data from OpenStreetMaps (OSM).

1. www.openstreetmap.org → Export → Manually select different area → OpenstreetMap XML Data → Export.

2. Locate OSM file in data folder using drag & drop (and delete .xml Extension if necessary).
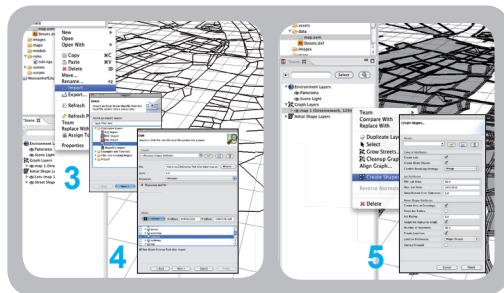
3. RMB on OSM in data folder → Import → CityEngine Layer → OSM Import → Next.
4. Press center button to calculate offset, choose Highway and activate Run Graph Clean Up → Next → Clean Up Graph (activate all to 20) → Finish.
5. Streetnetwork in Scene Editor → RMB → Create Shapes → Individual Attributes → Finish.

4. SUBDIVIDING
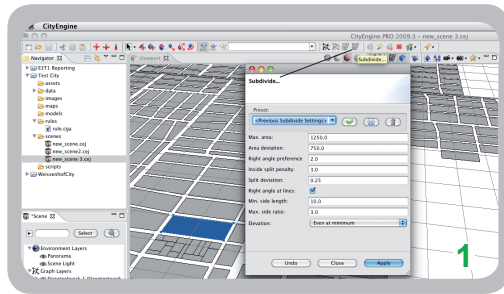
Subdividing initial shapes (Lots).

The subdivision is performed independently for each face of each initial shape.
1. Choose Lots → Subdivide.

5. MODELING
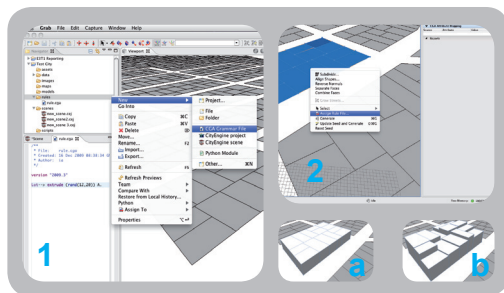
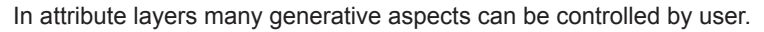Buildings are described by using the CGA grammar rules.
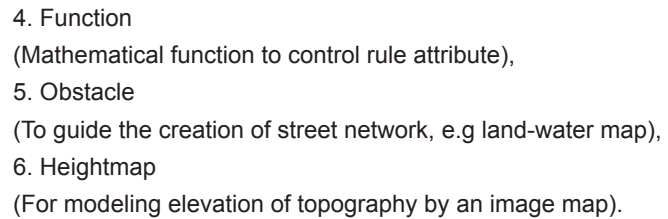1. New Rule: Rule folder → RMB → New → CGA grammar grammar file.
Rule Examples:
  Lot → extrude (12) A.
  Lot → extrude (rand(10,20)) A.
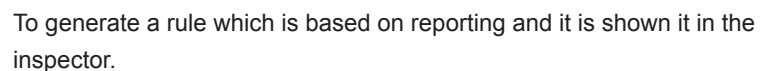2. RMB on selected lots → assign rule file → open rule → generate.

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6. ATTRIBUTE LAYER

In attribute layers many generative aspects can be controlled by user.

1. To create an attribute layer: Layer → New Attribute Layer → … ,
2. Mapping
(to control the CGA shape grammar, e.g. to devide the landuse by color),
3. Texture
(Manual interpretation of Texture, e.g. satelite background picture).

6.1 ATTRIBUTE LAYER

4. Function
(Mathematical function to control rule attribute),
5. Obstacle
(To guide the creation of street network, e.g land-water map),
6. Heightmap
(For modeling elevation of topography by an image map).

7. FACADE MODELING

Using a component split to create a facade from a mass model.

Rule Example:
1. Lot   → extrude (12) Building
   Building → comp(f) { front : FrontFacade }
   FrontFacade → split (y) {1.5: Socket | 4.5: GroundFloor
                          | {~3: Floor}* | 1: Roof}

8. FACADE MODELING

To generate a rule which is based on reporting and it is shown it in the inspector.

Rule Example:
1. BuildingReport → report ("Area.GroundCoverage", geometry.area).
2. Each split with "BuildingReport" is shown in the inspector.

9. NOTICE

Further reading:

www.ia.arch.ethz.ch (publications, Lectures on procedural modelling)
www.procedural.com (publications, tutorials, software downloads for procedural modelling)
www.mit.edu/~tknight/IJDC (publications on shapegrammar and procedural modelling)

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