

Introductory Guide to
QuickShaper

QuickShaper (QS) an experimental computer utility for Shape Grammars. It aims to assist designers and students in creating and exploring rule-based designs. This document presents the basic features of QS. For more information about Shape Grammars, please visit www.shapegrammar.org, or for more information about the research project of QS, please visit www.designcoding.net. QS is first presented and published at the 25th eCAADe Conference held at Frankfurt / Germany in September 29th, 2007. For further information about the conference, please visit www.ecaade.org, or cuminCAD.scix.net.

QS is a scripted utility, written in MaxScript. It is developed within Autodesk's 3D Studio MAX version 9. However, it is not tested on earlier versions. You can download educational version of the software at www.autodesk.com. This documentation introduces the core script of QS, labelled as version 1.80.

No other plug-ins and platforms are needed to run QS. Only one script file should be executed within 3D Studio MAX. All testing feedbacks are gladly welcomed. If you encounter a bug, or have an opinion about it's future development, you can e-mail me at tugrul.yazar@gmail.com

FIRST STEP: RUNNING THE UTILITY

QuickShaper (QS) is a scripted utility developed in Autodesk 3D Studio MAX version 9 (*figure 1*), later optimized for 3D Studio MAX 2011. To start QS, use MaxScript/RunScript command browsing and opening the script file. In our case, the file is named qShaper180.mse (*figure 2*).



Figure 1. 3D studio Max 2009

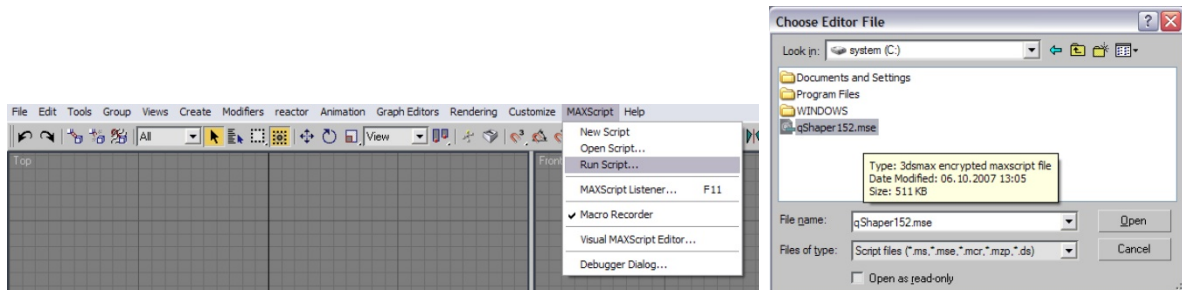


Figure 2. Running QuickShaper



Figure 3. Welcome dialog box

When the script is successfully loaded, a message box appears (*figure 3*). Clicking on this dialog box opens the main panel of QS (*figure 4*).

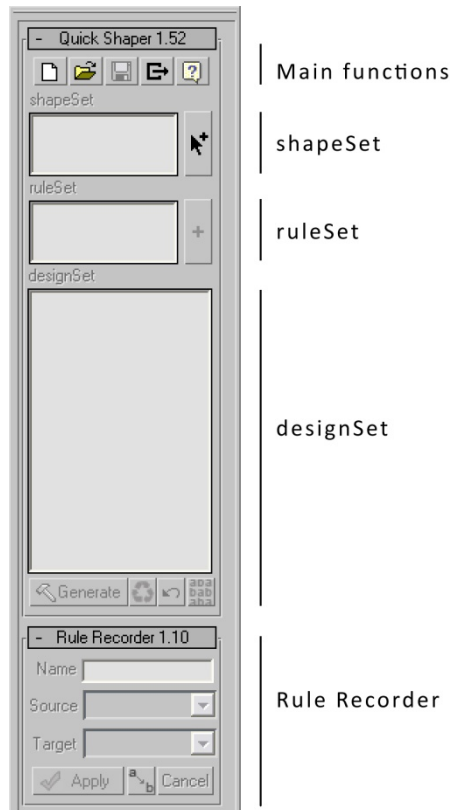







Figure 4. Main panel

-  Resets the QS to it's initial state. It pops up a warning message. If you click yes, all information in the QS scene will be reset.
-  Saves the current scene into a max file, including the shapeSet, ruleSet data and designSet sequences.
-  Restores previously saved max file containing QS data. A message box appears the data is loaded successfully.
-  Exits QS. It pops up a warning message. If you click yes, you have two options. You may erase the design or continue designing the object without QS.
-  Opens the help file. It is currently not working.

SECOND STEP: ASSIGNING OBJECTS TO THE SHAPESET

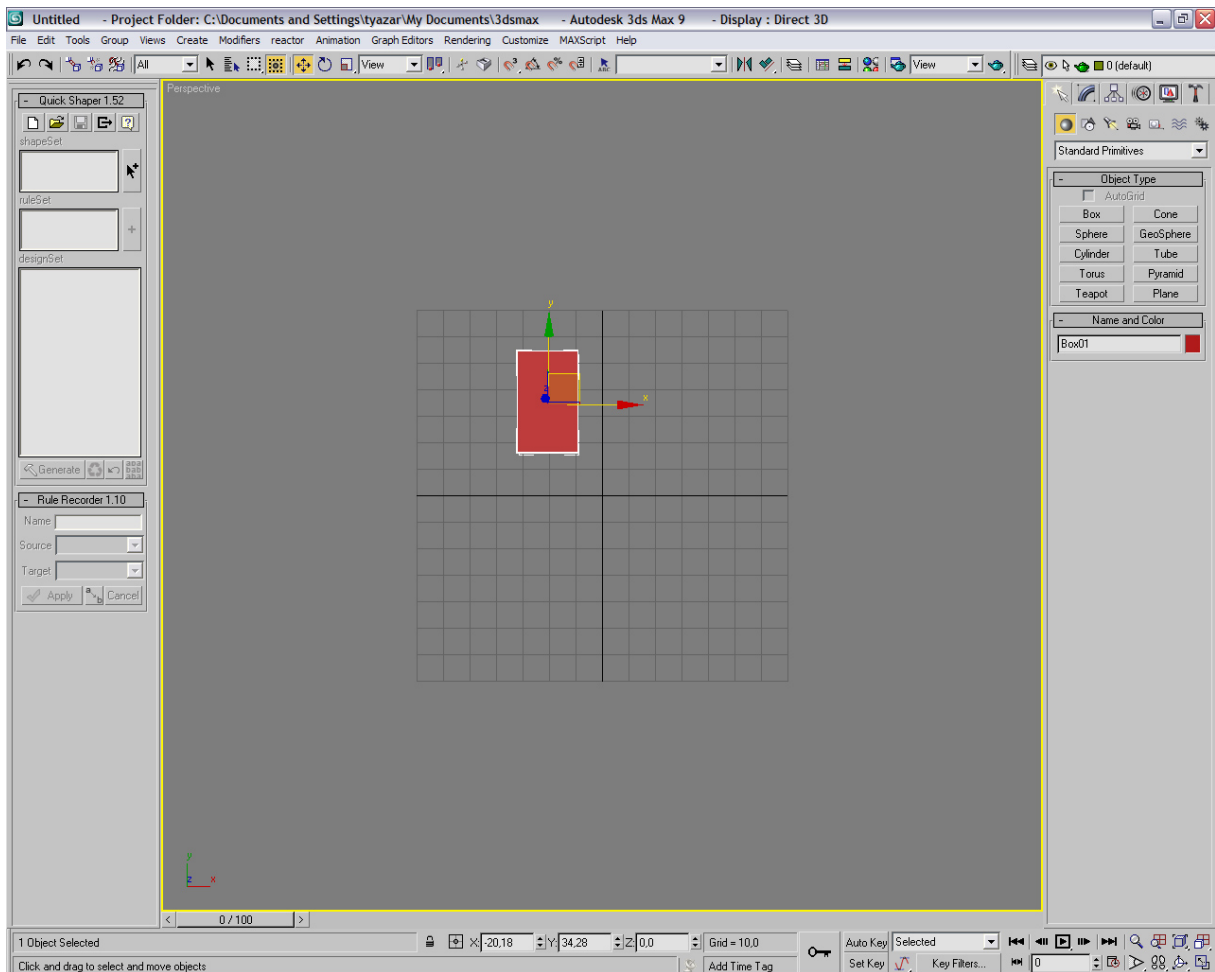


Figure 5. Starting layout. Create objects to pick into the shapeSet

Any object created within the software can be picked into the shapeSet (figure 5). There is no limit on the number of objects in the shapeSet. To pick some objects, first create them using the standard functions or import them into the scene. You can always modify them afterwards, so they don't have to be final objects.



Picks currently selected object to the shapeSet. If the object is already in the set a message box appears that you cannot pick it.

In the shapeSet panel, the objects will be listed (figure 6). The selected object from the shapeSet list will be displayed at the upper-left viewport (shapeSet viewport) (figure 7). You can modify them using this viewport (you can change their parameters, polygonal structure, or add modifiers).

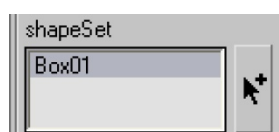


Figure 6. shapeSet panel

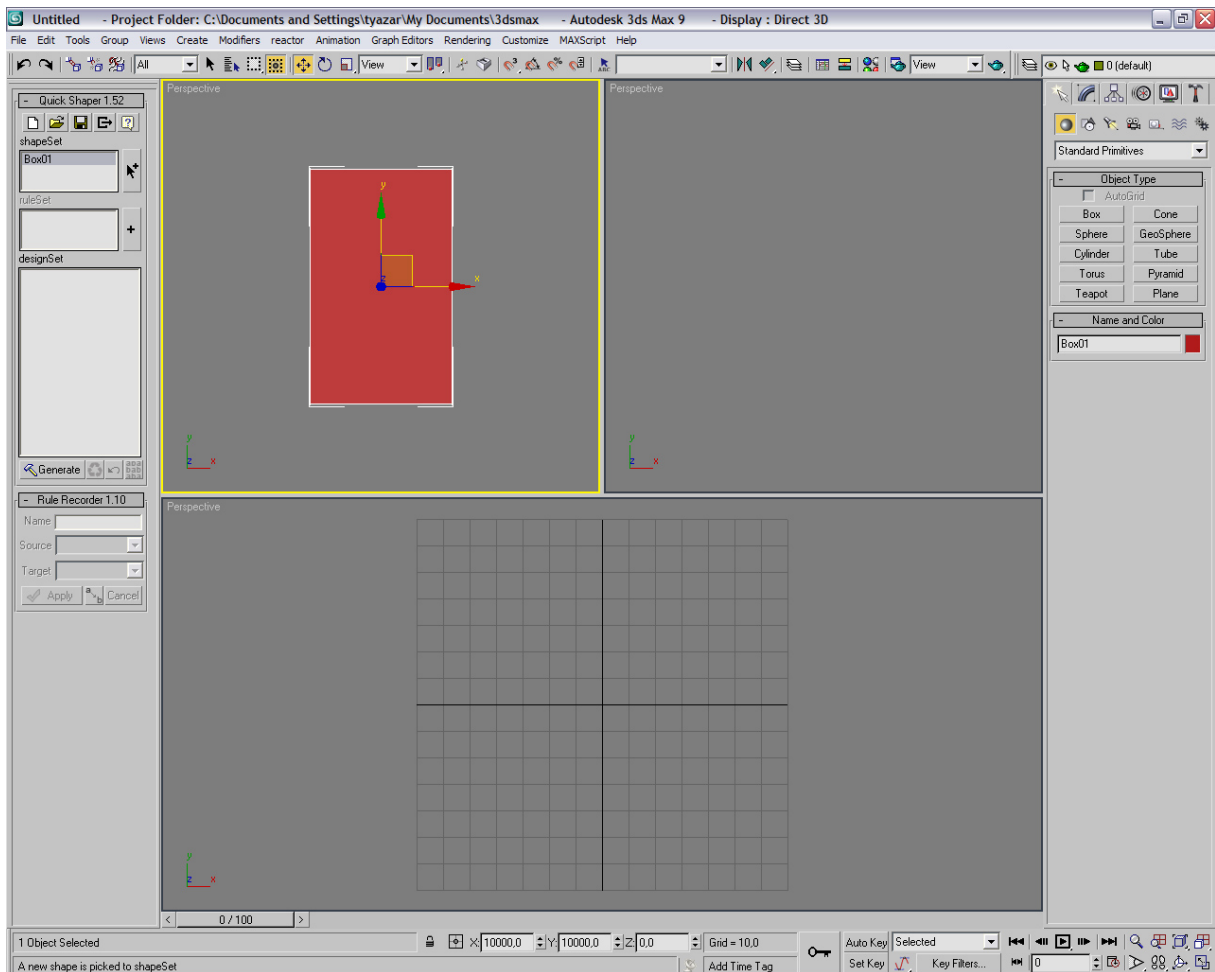


Figure 7. Main QS layout. Upper-left viewport is the shapeSet display.

To remove an object from the shapeSet: simply double click its name on the list. Don't delete shapeSet objects manually. If you attempt to remove an object that is used in a rule or a design step, a message box appears. First, you must undo the design step or remove the rule to be able to remove the object.

If you have at least one object in the shapeSet, this will enable the ruleSet functions.

THIRD STEP: DEFINING RULES

- + Runs the “Rule Recorder” (*figure 8*) to define a new shape rule.

When Rule Recorder starts, it temporarily disables QS and maximizes a viewport.

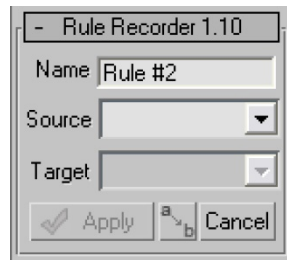


Figure 8. Rule Recorder

A name is generated automatically. You can also enter a custom rule name. You must select a source and a target object. When you choose the objects, use built-in transformations (move, rotate, scale and mirror) to orientate the target object (*figure 9*). To see the shortcuts of transformations, refer to the notes section of this document.

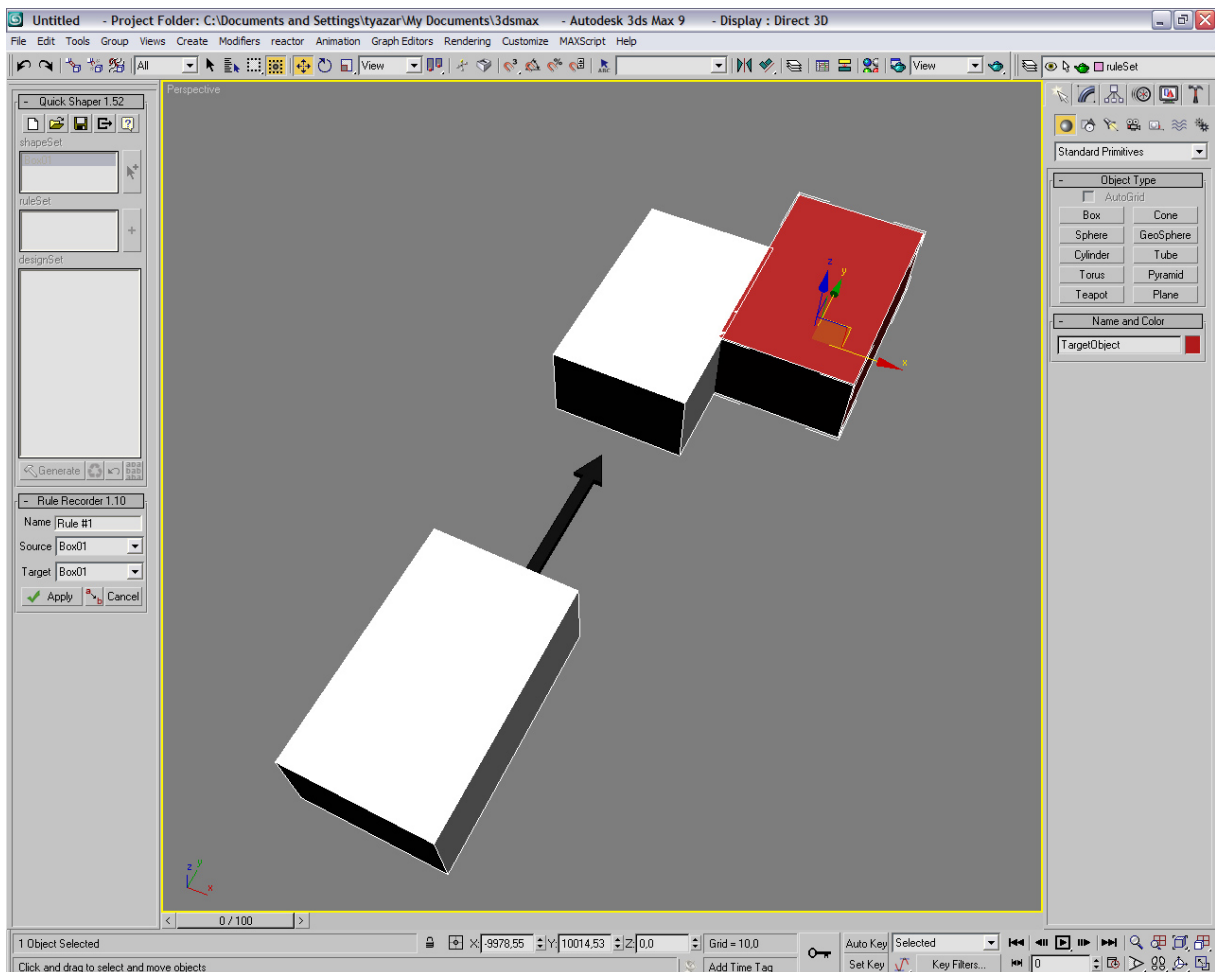





Figure 9. Creating a rule in Rule Recorder

 Toggles shape replacement option. This declares that the rule will replace the source object with the target object. This feature cannot be changed after you apply the rule.

 Closes the Rule Recorder, returning to QS without any change.

 Accepts the current orientation as a shape rule. Disables the Rule Recorder, returning to the QS with a new rule added to the ruleSet.

Defined rules are listed on the ruleSet list (*figure 10*). Also the currently selected rule is displayed at the upper-right viewport (*figure 11*).

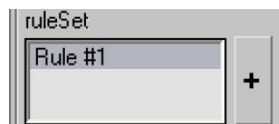


Figure 10. ruleSet panel

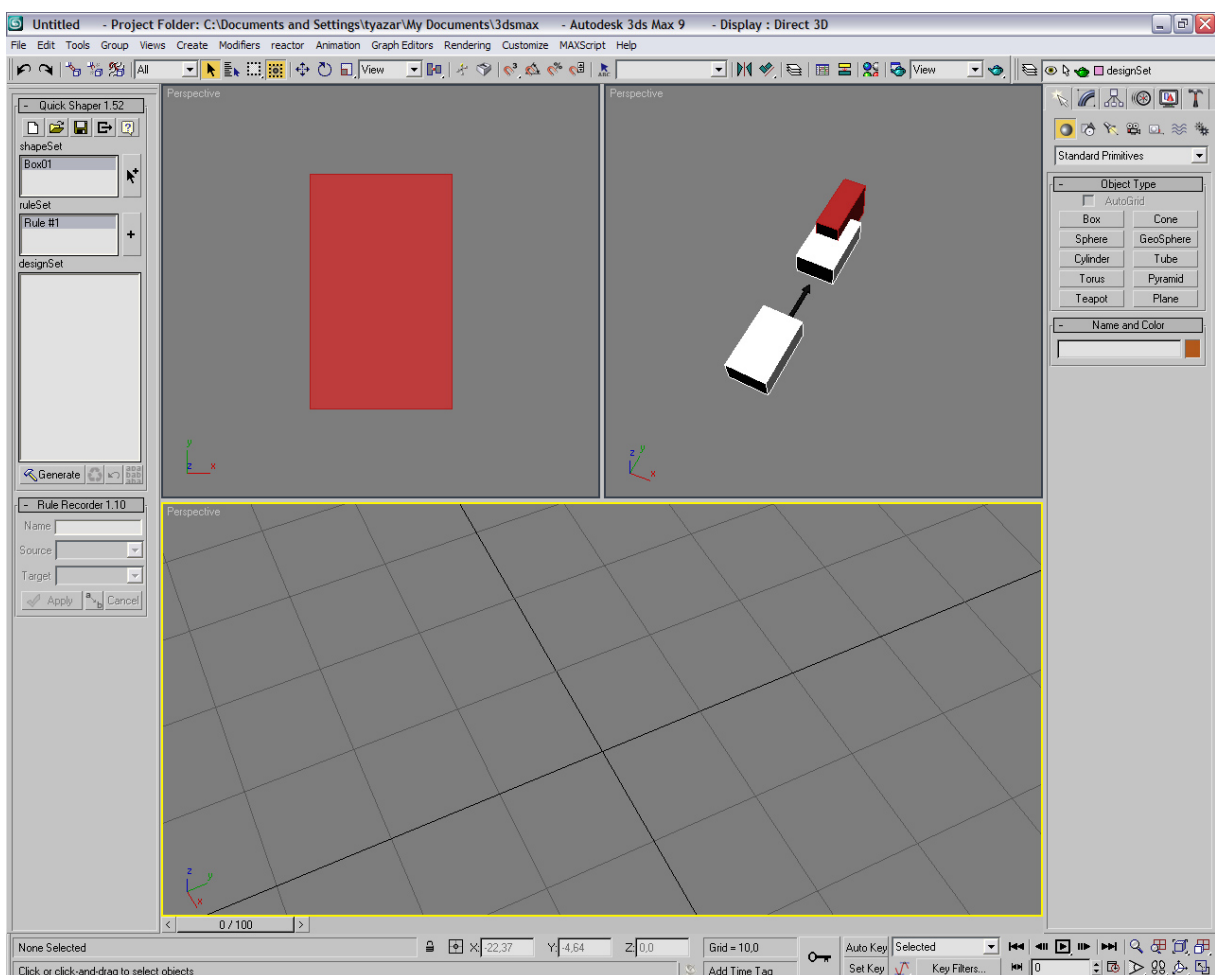



Figure 11. Main QS layout. Upper-right viewport is the ruleSet display.

You can modify the selected rule using this viewport. There is no limit on the number of rules to be defined. If you want to remove a rule from the set, simply double click its name on the list. However, if the rule is used in a design step, you cannot delete it. First you must undo the design step in order to remove the rule.

At least one rule must be defined in order to start the generative process.

FOURTH STEP: GENERATIVE DESIGN

 **Generate** Generates a design step and records it in the designSet. The first step is always the declaration of an initial shape. The object selected in the shapeSet list will be assigned as the initial shape. Afterwards, every click on this button will generate a step using the selected rule from the ruleSet list, creating a list of sequences (*figure 12*).

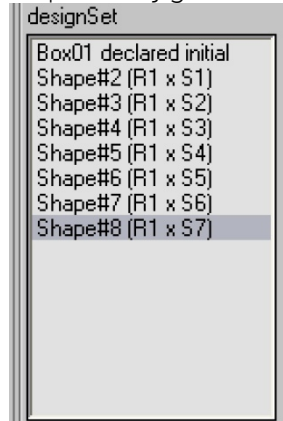


Figure 12. designSet list

There is no limit on the number of steps that can be defined. The designSet list is interactive. If you click on a step from the list, it is displayed at the bottom viewport (designSet viewport). You cannot change objects directly from this viewport. However, you can see the generative process in a perceivable way by clicking the previous steps from the list (*figure 13*). An explanation of the currently selected step is displayed at the bottom of the screen.

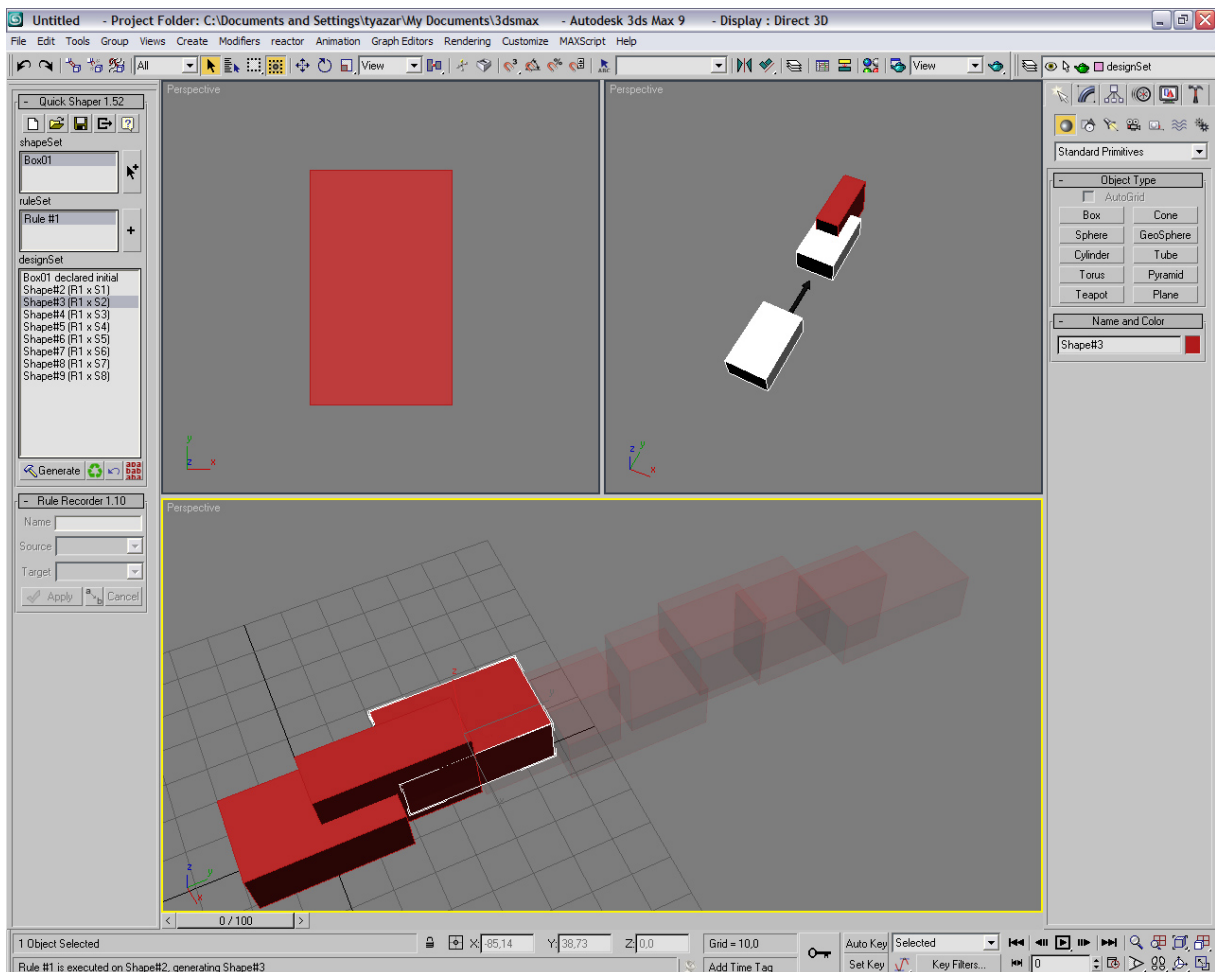


Figure 13. Selecting a step in the designSet

Shape#2 (R1 x S1) means, the design step created an object named Shape#2, firing the first rule in the ruleSet to the Shape#1. Although the designSet records design steps sequentially, this doesn't mean that the design should be sequential (like a chain of objects). Any rule can be fired within any step of the designSet (*figure 14*). To do this, there is a three-click operation:

First click: select a rule to be fired from the list.

Second click: select a step (shape) from the designSet list.

Third click: press  **Generate**

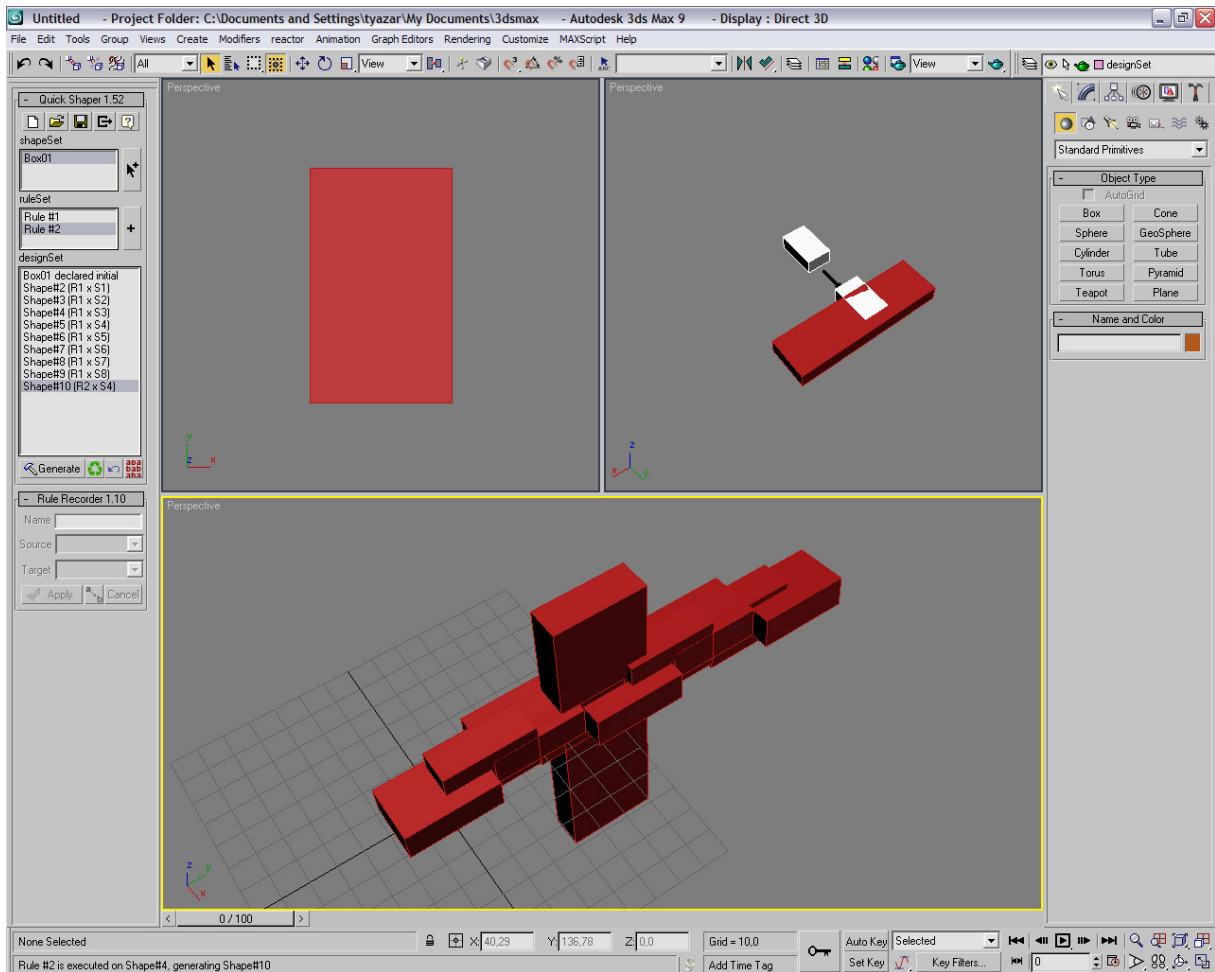



Figure 14. A rule can be fired at any shape of the design.

Warning: In order to create a design step, the source object of the selected rule must be the same type with the selected design shape.

 Undo the last design step. Design steps can only be removed with this button.

 Regenerate. This button regenerates the designSet. Any change in the objects of shapeSet and the rules in the ruleSet are updated in the design. This makes it possible to explore different variations quickly.

NOTES:

Further researches on this utility includes an automation module, an improved interaction (use of right mouse click), and different features of the domain theory (parametric grammars, symmetry numbers, emergent shape recognition, color grammars, etc...)

Some MAX shortcuts:

- Middle mouse button : Pan
- Middle mouse button + ALT : Orbit
- Middle mouse wheel : Zoom
- w : Move
- e : Rotate
- r : Scale

Help Features:

- All functions have small explanations if you stop the mouse over buttons.
- In the text bar at the bottom of the 3D Studio MAX window, you'll be informed about the current state of the utility (for example, explanation of the currently selected design step.)
- For an error testing, list of object sets from MaxScript Listener window may be called with these array names: arrShapeSet, arrRuleSet and arrDesignSet.
- You can check the objects and the algorithm of QS from layers panel.
- You can resize the viewports or maximize one of them. They will not affect QS.

Known Bugs & Warnings:

- Currently QS does not control some user behaviours that may crash its algorithm. For example, you should not delete shaperset, ruleset or designset objects manually. This causes a runtime error and stops QS in an unstable state (basically it does not work anymore). In such cases, 3D Studio MAX should be closed and restarted to run QS again. Don't use the delete button of keyboard at any time running QS. Use double clicking on the lists to delete shapeSet and ruleSet objects, and use the undo button for designSet objects.
- QS may not run twice at the same time. If a message box containing "Another session of QuickShaper is already running" appears, that means you are trying to run the script but it is already loaded in the memory, maybe the rollout floater is accidentally closed. You should restart 3D Studio MAX in order to run QS again.
- If you want your QS data (rules and design sequences) to be saved and loaded later, use the save and load functions provided within the script. Otherwise, only the polygonal data could be saved and loaded.
- Don't delete or rename the layers created by QS. Also don't rename the QS objects.
- If you have problems with viewport display, please check that your zoom buttons are at "zoom extends selected" and "zoom extends all selected" mode.
- If you define lots of (say 50) design steps, this may cause computer to slow down while regenerating the designSet.
- Automation module (first external module to be added to QS) is currently under development.
- 3D Studio MAX 2012 cannot display bitmap images on buttons. (Fixed on v1.80)