

Open Command-oriented Geometric Graphics Generator

OpenCG³ Spec Version 0.2.3

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Perspective Projection

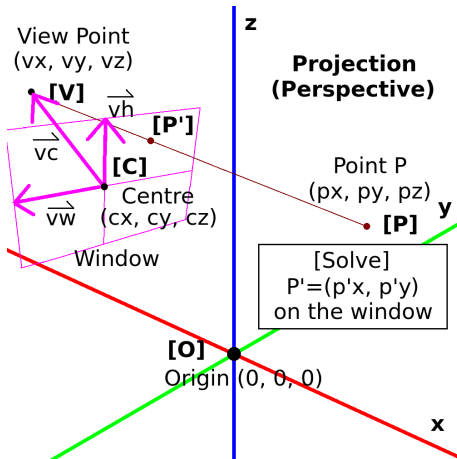


Figure: Projection in Euclidean \mathbb{R}^3 Space

Command Tokens

Regular Expressions

$$\mathbb{N} := \{ \alpha \mid \alpha \in [0-9]^+ \}$$

$$\mathbb{R} := \{ \alpha \mid \alpha \in [+|-]?([0-9]*[.]?)?[0-9]^+ \}$$

$$\Rightarrow \mathbb{R} \supset \mathbb{N}$$

$$\mathbb{S} := \{ \alpha \mid \alpha \in '(. * ?)' \mid [.0-9A-Za-z+|-]^+ \}$$

$$\Rightarrow \mathbb{S} \supset \mathbb{R}$$

$$\mathbb{W} := \{ \alpha \mid \alpha \in [\backslash t] \}$$

$$\text{whitespace}$$

Descriptions

- The matching mechanism abides by the maximal munch rule.
- Each command is whitespace-insensitive except being quoted by a pair of single quotation marks (').

Command Grammars

Context-Free Expansions

$C \rightarrow AC \mid ; \mid \text{EOL}$

$A \rightarrow T(A) \mid V(A) \mid S(A) \mid L(A) \mid L(A, A, \dots, A) \mid N \mid R \mid S$

$T(\Pi) \equiv \Pi : n \rangle \rightarrow (\Sigma(\Pi, n)) \quad \left\| \quad \Sigma(\Pi, n) \rightarrow \underbrace{\Pi \cdots \Pi}_{n \text{ items}} \quad (\text{identical})$

$V(\Pi) \equiv \Pi : n \rangle \rightarrow < \Sigma(\Pi, n) >$

$S(\Pi) \equiv \Pi : n \} \rightarrow \{ \Sigma(\Pi, n) \} \quad \left\| \quad L(\Pi) \equiv L [\Pi : n] \rightarrow [\Sigma(\Pi, n)]$

$L(\Pi_1, \Pi_2, \dots, \Pi_{n-1}, \Pi_n) \equiv L [\Pi_1 \Pi_2 \cdots \Pi_{n-1} \Pi_n] \rightarrow [\Pi_1 \cdots \Pi_n]$

Descriptions

- Each command starts from C and ends with a $;$ or an EOL.
- Non-terminal symbol expansions are prior than function expansions except that it is used in the form of describing types of a command.

Create a Window

Command

```
create window S title  $\mathbb{R} : 3$  coord  $\mathbb{R} : 3$  : 3 direct (0)
```

Parametres

- title: the unique name of the window
- coord: the coordinate (c_x, c_y, c_z) of the window centre
- direct: the width v_w , height v_h , and the view point v_c

Examples

```
create window main (0 0 1) (<1 0 0> <0 1 0> <0 0 1>)
```

Delete a Window

Command

```
delete window $ message (1)
```

Parametres

- message: the text string printed right after exit

Examples

```
delete window  
delete window 'Have a nice day.'
```

Create Points

Command

```
create point  S label : }  R : 3) coord                (2)
create point  S label : n)  R : 3) coord : n)            (3)
```

Parametres

- label: the name of the point
- coord: the coordinate (p_x, p_y, p_z) of the point

Examples

```
create point 'origin'    (0 0 0)
create point {X-1 X-2}   (1 0 0)
create point (Y-1 Z-1) ((0 1 0)(0 0 1))
```

Delete Points

Command

```
delete point  $ label : } (4)
```

Parametres

- label: the name of the point

Examples

```
delete point  origin  
delete point {origin 'random-point'}
```


Create Attributes

Command

`create attrib S palette : } L [S type S key A value]` (5)

`create attrib S palette : n) L [L [S type S key A value] : $\geq n$]` (6)

Parametres

- palette: the name of the attribute
- type: the type of the object
- key: the property of the object
- value: the value of the property

Examples

```
create attrib (magenta dashed-and-traslucent-green) \
[[point fill-hsv (300 1.0 1.0)] \
[line style dashed] [line fill-rgba [(0 255 0) .5]]]
```

Attach Attributes

Command

```
attach attrib $ palette : ) $ label : } (7)
```

```
attach attrib $ palette : n ) $ label : n ) (8)
```

Parametres

- palette: the name of the attribute
- label: the name of the object

Examples

```
attach attrib red point-0
attach attrib (red large) point-1
attach attrib blue {point-2 rect-0}
attach attrib (gray tiny) {point-3 rect-1}
attach attrib (blue thin) (point-4 line-0)
```

Assign an Operation Name

Command

`assign opname $ action $ type N repeat [= ∞]` (9)

Parametres

- action: the name of the action
- type: the type of the object applying the action
- repeat: the amount of the commands emitting operation names

Examples

```
assign instr create point 2
x-axis (1 0 0); y-axis (0 1 0)
// Back To Normal
```

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