

$G = (V_N, V_T, P, S)$

V_N - finite set of non-terminal symbols.

V_T - finite set of terminal symbols.

P - finite production rules.

S - start symbol.

$S = \{ \langle \text{program} \rangle \}$

$V_N = \{ \langle \text{program} \rangle, \langle \text{statement} \rangle, \langle \text{size_statement} \rangle, \langle \text{color_statement} \rangle, \langle \text{angle_statement} \rangle, \langle \text{iterations_statement} \rangle, \langle \text{shape_statement} \rangle, \langle \text{move_statement} \rangle, \langle \text{scale_statement} \rangle, \langle \text{rotate_statement} \rangle, \langle \text{mirror_statement} \rangle, \langle \text{axis} \rangle, \langle \text{draw_statement} \rangle, \langle \text{save_statement} \rangle, \langle \text{filename} \rangle \}$

$V_T = \{ \text{repeat, times, start, with, shape, circle, square, triangle, polygon, color, background, scale, rotate, save, as, PNG, JPG, [A-Z], [a-z], [0-9], =, ., ,, [,]} \}$

$P = \{ \begin{aligned} &\langle \text{program} \rangle \rightarrow \langle \text{statement} \rangle \mid \langle \text{statement} \rangle \langle \text{program} \rangle \\ &\langle \text{statement} \rangle \rightarrow \langle \text{size_statement} \rangle \mid \langle \text{color_statement} \rangle \mid \langle \text{angle_statement} \rangle \mid \\ &\quad \langle \text{iterations_statement} \rangle \mid \langle \text{shape_statement} \rangle \mid \langle \text{move_statement} \rangle \mid \langle \text{scale_statement} \rangle \mid \\ &\quad \langle \text{rotate_statement} \rangle \mid \langle \text{mirror_statement} \rangle \mid \langle \text{draw_statement} \rangle \mid \langle \text{save_statement} \rangle \\ &\langle \text{size_statement} \rangle \rightarrow \text{size} \langle \text{value} \rangle \\ &\langle \text{color_statement} \rangle \rightarrow \text{color} \langle \text{value} \rangle \\ &\langle \text{angle_statement} \rangle \rightarrow \text{angle} \langle \text{value} \rangle \\ &\langle \text{iterations_statement} \rangle \rightarrow \text{iterations} \langle \text{value} \rangle \\ &\langle \text{shape_statement} \rangle \rightarrow \text{shape} \langle \text{shape} \rangle \\ &\langle \text{move_statement} \rangle \rightarrow \text{move} \langle \text{value} \rangle \langle \text{value} \rangle \\ &\langle \text{scale_statement} \rangle \rightarrow \text{scale} \langle \text{value} \rangle \\ &\langle \text{rotate_statement} \rangle \rightarrow \text{rotate} \langle \text{value} \rangle \\ &\langle \text{mirror_statement} \rangle \rightarrow \text{mirror} \langle \text{axis} \rangle \\ &\langle \text{axis} \rangle \rightarrow \text{x} \mid \text{y} \\ &\langle \text{draw_statement} \rangle \rightarrow \text{draw} \\ &\langle \text{save_statement} \rangle \rightarrow \text{save} \langle \text{filename} \rangle \\ &\langle \text{filename} \rangle \rightarrow \langle \text{string} \rangle \\ &\langle \text{shape} \rangle \rightarrow \text{circle} \mid \text{square} \mid \text{triangle} \mid \text{polygon} \\ &\langle \text{value} \rangle \rightarrow \langle \text{digit} \rangle \mid \langle \text{digit} \rangle \langle \text{value} \rangle \mid \langle \text{string} \rangle \\ &\langle \text{digit} \rangle \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9 \\ &\langle \text{string} \rangle \rightarrow \langle \text{char} \rangle \mid \langle \text{char} \rangle \langle \text{string} \rangle \\ &\langle \text{char} \rangle \rightarrow [\text{A-Z}] \mid [\text{a-z}] \mid [0-9] \mid = \mid . \mid , \mid [\mid] \mid ' \mid ' \mid _ \end{aligned} \}$