

# naive-ebnf: L<sup>A</sup>T<sub>E</sub>X Package for EBNF in Plain Text\*

Yegor Bugayenko  
yegor256@gmail.com

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## 1 Introduction

This package helps render an [Extended Backus-Naur Form](#) using plain text notation:

$\langle \text{Expr} \rangle \rightarrow \langle \text{Var} \rangle$ $\mid \text{"}\lambda\text{"} \langle \text{Var} \rangle \text{"}. \text{"} \langle \text{Expr} \rangle$ $\mid \text{"}(\text{"} \langle \text{Expr} \rangle \langle \text{Expr} \rangle \text{"})\text{"}$	<pre>1 \documentclass{minimal} 2 \usepackage{naive-ebnf} 3 \usepackage{mathtools} 4 \begin{document} 5 \begin{ebnf} 6 &lt;Expr&gt; := &lt;Var&gt; 7     "\$\lambda\$" &lt;Var&gt; "." &lt;Expr&gt; 8     "\$\lparen\$" &lt;Expr&gt; &lt;Expr&gt; "\$\rparen\$" 9 \end{ebnf} 10 \end{document}</pre>
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**ebnf** The `ebnf` environment *doesn't* add any formatting to the paragraph, but only replaces the plain text symbols, such as “:=” and “<Var>” with proper L<sup>A</sup>T<sub>E</sub>X commands. The following syntax is understood inside the `ebnf` environment:

- `:=` separates the left-hand side from the right-hand side of the production rule;
- `<...>` denotes a non-terminal (variable);
- `"..."` denotes a terminal symbol;
- `(...|...)` denotes a series of options to choose from;
- `[...]` denotes an optional substitution;
- `{...}` denotes a zero or more times repetition;

**Attention:** The usage of some symbols is prohibited inside terminals. Instead, the following substitutions are recommended:

- `\lparen` and `\rparen` instead of “(” and “)” (from the [mathtools](#) package);
- `\langle` and `\rangle` instead of “<” and “>”;

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\*The sources are in GitHub at [yegor256/naive-ebnf](#)

- `\lbrace` and `\rbrace` instead of “{” and “}” (also `mathtools`);
- `\lbrack` and `\rbrack` instead of “[” and “]” (also `mathtools`);
- `\vert` instead of “|”.

`\terminal`      Inside the text, terminals and non-terminals may be formatted using two supplementary commands:

The non-terminal $\langle \text{Var} \rangle$ in $\lambda$ -calculus may be equal to $v_1, v_2, \dots$ . Application starts with “(” and ends with “)”.	<pre> 6 The non-terminal \nonterminal{Var} 7 in \$\lambda\$-calculus may be equal 8 to \$v_1, v_2, \dots\$. Application 9 starts with \terminal{() and ends 10 with \terminal{)}. </pre>
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It’s possible to use them in math-mode too, for example:

If “ $f_1(\text{Var})$ ” is always true, then $f_1$ is a tautology.	<pre> 6 If \$\terminal{() f_1 \nonterminal{Var} 7 \terminal{)}\$ is always true, then 8 \$f_1\$ is a tautology. </pre>
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## 2 Package Options

It’s possible to configure the behavior of the package with the help of a few package options:

`bw`      By default, some colors are used in the rendered grammar. However, the `bw` package option disables any colors and makes sure the grammar is black-and-white:

```
\usepackage[bw]{naive-ebnf}
```

## 3 Implementation

First, we process package options:

```

1 \RequirePackage{pgfopts}
2 \pgfkeys{
3   /ebnf/.cd,
4   bw/.store in=\ebnf@bw,
5 }
6 \ProcessPgfPackageOptions{/ebnf}

```

Then, we include a few packages, mostly to deal with  $\text{\LaTeX}3$  expressions:

```

7 \RequirePackage{filecontentsdef}
8 \RequirePackage{expl3}

```

`\ebnf@color`      Then, we include `xcolor` to colorize the output a bit:

```

9 \makeatletter\ifdefined\ebnf@bw\else
10 \RequirePackage{xcolor}
11 \fi
12 \newcommand\ebnf@color[2]
13   {\ifdefined\ebnf@bw#2\else\textcolor{#1}{#2}\fi}
14 \makeatother

```

`\terminal` Then, we a command to render a single terminal:

```

15 \makeatletter
16 \newcommand\terminal[1]{%
17   \relax\ifmmode\else\ttfamily\fi%
18   \ebnf@color{gray}{\relax\ifmmode\textsf{''}\else\sffamily''\fi}%
19   #1%
20   \ebnf@color{gray}{\relax\ifmmode\textsf{''}\else\sffamily''\fi}}
21 \makeatother

```

`\nonterminal` Then, we a command to render a single non-terminal:

```

22 \makeatletter
23 \newcommand\nonterminal[1]{%
24   \ebnf@color{gray}{\relax\ifmmode\langle\else\(\langle\)\fi}%
25   \relax\ifmmode\textsf{#1}\else\sffamily#1\fi%
26   \ebnf@color{gray}{\relax\ifmmode\rangle\else\(\rangle\)\fi}}
27 \makeatother

```

Then, we define supplementary commands:

```

28 \makeatletter
29 \newcommand\ebnf@optional[1]
30   {\ebnf@color{gray}{[]#1\ebnf@color{gray}{}}}
31 \newcommand\ebnf@repetition[1]
32   {\ebnf@color{gray}{\{}#1\ebnf@color{gray}{\}}}
33 \newcommand\ebnf@grouping[1]
34   {\ebnf@color{gray}{\{}#1\ebnf@color{gray}{\}}}
35 \ExplSyntaxOn
36 \newcommand\ebnf@terminal[1]{
37   \tl_set:Nn \l_ebnf_tl { }
38   \tl_set_rescan:Nno \l_ebnf_tl { } { #1 }
39   \terminal{\l_ebnf_tl}
40 }
41 \ExplSyntaxOff
42 \newcommand\ebnf@to
43   {\ebnf@color{gray}{\(\to\)}}
44 \newcommand\ebnf@alternation
45   {\ebnf@color{gray}{\(\vert\)}}
46 \newcommand\ebnf@eol{\}
47 \makeatother

```

`ebnf` Then, we define the ebnf environment:

```

48 \ExplSyntaxOn
49 \cs_generate_variant:Nn \tl_replace_all:Nnn {Nx}
50 \NewDocumentEnvironment{ebnf}{}{\filecontentsdefmacro\l__ebnf_tmp_tl}{
51   \endfilecontentsdefmacro
52   \str_set:NV \l__ebnf_tmp_tl \l__ebnf_tmp_tl
53   \str_set:Nx \l__ebnf_tmp_tl {\str_range:Nnn \l__ebnf_tmp_tl {1} {-2}}
54   \regex_replace_all:nnN { \{(.+)\} }
55     {\c{ebnf@repetition}{\1}} \l__ebnf_tmp_tl
56   \regex_replace_all:nnN { \{([~\])+?\} }
57     {\c{ebnf@grouping}{\1}} \l__ebnf_tmp_tl
58   \regex_replace_all:nnN { \{([~\])+?\} }
59     {\c{ebnf@optional}{\1}} \l__ebnf_tmp_tl
60   \regex_replace_all:nnN { <([A-Za-z][a-z-]+)> }
61     {\c{nonterminal}{\1}} \l__ebnf_tmp_tl

```

```

62 \regex_replace_all:nnN { "([~"]+)" }
63   {\c{ebnf@terminal}}{\1}} \l__ebnf_tmp_tl
64 \regex_replace_all:nnN { \^M\s*\| }
65   {\^M :=} \l__ebnf_tmp_tl
66 \regex_replace_all:nnN { \| }
67   {\c{ebnf@alternation}}{\1}} \l__ebnf_tmp_tl
68 \regex_replace_all:nnN { \^M\s*:= }
69   {\^M \c{-}\c{hspace}{3em}\c{ebnf@alternation}}{\1}} \l__ebnf_tmp_tl
70 \regex_replace_all:nnN { := }
71   {\c{ebnf@to}}{\1}} \l__ebnf_tmp_tl
72 \regex_replace_all:nnN { \^M }
73   {\c{ebnf@eol}}{\1}} \l__ebnf_tmp_tl
74 \tl_put_left:Nn \l__ebnf_tmp_tl {}
75 \tl_put_right:Nn \l__ebnf_tmp_tl {}
76 \l__ebnf_tmp_tl
77 }
78 \ExplSyntaxOff

79 \endinput

```

# Change History

0.0.1		outside of the <code>ebnf</code> environment. . 3
	General: First draft. . . . . 2	<code>\terminal</code> : New command
0.0.2		<code>\terminal</code> added, to enable
	General: Proper parsing of grouping. . 2	rendering terminal symbols
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	<code>\nonterminal</code> : New command	0.0.3
	<code>\nonterminal</code> added, to enable	<code>\terminal</code> : Quotes fixed in both text
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