

Codehigh: Highlight Codes and Demos with I3RegEx and LPeg

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<https://github.com/lvjrr/codehigh>

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Chapter 1

Package Interfaces

1.1 Introduction

Codehigh package uses `l3regex`¹ package in L^AT_EX3 Programming Layer to parse and highlight source codes and demos. It is more powerful than `listings` package, and more easy to use than `minted` package. But it is slower than both of them. Therefore in LuaTeX the package provides another way to highlight code: using L^Peg². L^Peg is much more powerful and faster than `l3regex`.

1.2 Highlighting Code

There are several predefined languages: `latex`, `latex/latex2`, `latex/latex3`, `latex/math` and `latex/table`. The following example is typeset by `codehigh` environment with default option `language=latex`.

```
% -*- coding: utf-8 -*-
\documentclass{article}
\usepackage[a4paper,margin=2cm]{geometry}
\usepackage{codehigh}
\usepackage{hyperref}
\newcommand*{\myversion}{2021C}
\newcommand*{\mydate}{Version \myversion\ (\the\year-\mylpad\month-\mylpad\day)}
\newcommand*{\mylpad}[1]{\ifnum#1<10 0\the#1\else\the#1\fi}
\setlength{\abc}{1}
\begin{document}
% some comment
\section{Section Name}
\subsection*{Suction Name}
Math  $a+b$ .
\end{document}
```

The following example is typeset by `codehigh` environment with option `language=latex/latex2`.

```
\def\abcd#1#2{
% some comment
\unskip
\setlength{\parindent}{Opt}%
\setlength{\parskip}{Opt}%
\setcounter{choice}{0}%
\let\item=\my@item@temp
\settowidth{\my@item@len}{\vbox{\halign{##1\hfil\cr\BODY\cr}}}%
\setcounter{choice}{0}%
}
```

¹<https://www.ctan.org/pkg/l3regex>

²<http://www.inf.puc-rio.br/~roberto/lpeg/>

This language is for highlighting LaTeX2 classes and packages. It highlights private commands and public commands with different colors.

The following example is typeset by `codehigh` environment with option `language=latex/latex3`.

```
\cs_new_protected:Npn \__codehigh_typeset_demo:
{
  \__codehigh_build_code:
  \__codehigh_build_demo:
  \dim_set:Nn \l_tmpa_dim { \box_wd:N \g__codehigh_code_box }
  \dim_set:Nn \l_tmpb_dim { \box_wd:N \g__codehigh_demo_box }
  \par\addvspace{0.5em}\noindent
  % more code
}
```

This language is for highlighting LaTeX3 classes and packages. It highlights private commands/variables and public commands/variables with different colors.

The following example is typeset by `codehigh` environment with option `language=latex/math`.

```
\begin{align}
\pi\left[\frac{13z^3}{\right]}\sin(2x+1)_0^4 = \frac{64}{3}\pi
\end{align}
```

The following example is typeset by `codehigh` environment with option `language=latex/table`.

```
\begin{tabular}[b]{|l|c|r|}
\hline
One & Two & Three \\
%\hline
Four & Five & Six \\
\hline%\hline\hline
Seven & Eight & Nine \\
\hline
\end{tabular}
```

1.3 Highlighting Demo

The followings are typeset by `demohigh` environment with option `language=latex/table`.

```
\begin{tabular}{lccr}
\hline
Alpha & Beta & Gamma & Delta \\
\hline
Epsilon & Zeta & Eta & Theta \\
\hline
Iota & Kappa & Lambda & Mu \\
\hline
\end{tabular}
```

Alpha	Beta	Gamma	Delta
Epsilon	Zeta	Eta	Theta
Iota	Kappa	Lambda	Mu

```
\begin{tabular}{llccrr}
\hline
Alpha & Beta & Gamma & Delta & Epsilon & Zeta \\
\hline
Eta & Theta & Iota & Kappa & Lambda & Mu \\
\hline
\end{tabular}
```

Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Eta	Theta	Iota	Kappa	Lambda	Mu

Note that `demohigh` environment will measure the width of source lines. When it is too large, the result will be put below.

1.4 Highlighting File

Using `\dochighinput` command, you can input and highlight some file. The last chapter of this manual is typeset with the following code line:

```
\dochighinput[language=latex/latex3]{codehigh.sty}
```

In reading an input file, lines starting with `%%` will be omitted, and lines starting with `%%>` will be extracted and typeset as normal text.

1.5 Customization

The following example changes default background colors with `\CodeHigh` command:

```
\CodeHigh{language=latex/table,style/main=yellow9,style/code=red9,style/demo=azure9}
```

Note that `codehigh` package will load `ninecolors`³ package for proper color contrast.

```
\begin{tabular}{lccr}
\hline
Alpha & & Beta & & Gamma & & Delta & \\\
\hline
Epsilon & & Zeta & & Eta & & Theta & \\\
\hline
Iota & & Kappa & & Lambda & & Mu & \\\
\hline
\end{tabular}
```

Alpha	Beta	Gamma	Delta
Epsilon	Zeta	Eta	Theta
Iota	Kappa	Lambda	Mu

To modify or add languages and themes, please read the source files `codehigh.sty` and `codehigh.lua` for reference.

1.6 Fake Verbatim Command

To ease the pain of writing verbatim commands (such as in `tabularx` and `tabularray` tables), This package provides `\fakeverb` command.

This command will remove the backslashes in the following control symbols before typesetting its content:

Input	Result	Remark
<code>\\</code>	<code>\</code>	Need to be escaped only when typesetting other control symbols in this table
<code>\{</code>	<code>{</code>	Need to be escaped only when left and right curly braces are unmatched
<code>\}</code>	<code>}</code>	Need to be escaped only when left and right curly braces are unmatched
<code>\#</code>	<code>#</code>	Always need to be escaped
<code>\^</code>	<code>^</code>	Need to be escaped only when there are more than one in a row
<code>_</code>	<code>_</code>	Need to be escaped only when more than one in a row or after control words
<code>\%</code>	<code>%</code>	Always need to be escaped

The argument of `\fakeverb` command need to be enclosed with curly braces. Therefore it could be safely used inside `tabularray` tables and other LaTeX commands.

³<https://www.ctan.org/pkg/ninecolors>

Here is an example of using `\fakeverb` commands inside `tabularx` environment:

```

\begin{tabularx}{0.5\textwidth}{lX}
\hline
Alpha & \fakeverb{\abc{}}$&_{\uvw 123} \\
\hline
Beta & \fakeverb{\bfseries\ \#\%} \\
\hline
\end{tabularx}

```

Alpha	<code>\abc{}}\$&_{\uvw 123}</code>
Beta	<code>\bfseries\ \#\%</code>

Here is another example of using `\fakeverb` commands inside `\fbox` command:

```

Hello\fbox{\fakeverb{${\left\{\A\right.}.$\#}}Verb!

```

Hello	<code>\${\left\{\A\right.}.\$\#</code>	Verb!
-------	--	-------

Chapter 2

The Source Code

2.1 Variables and Functions

```
\NeedsTeXFormat{LaTeX2e}
\RequirePackage{expl3}
\ProvidesExplPackage{codehigh}{2025-02-15}{2025B}
  {Highlight codes and demos with l3regex and lpeg}

%\RequirePackage{xparse}
%\RequirePackage{l3benchmark}
\RequirePackage{catchfile}
\RequirePackage{xcolor}
\RequirePackage{ninecolors}
\RequirePackage{varwidth}
\RequirePackage{iftex}
\legacy_if:nT {LuaTeX} {\RequirePackage{luatexbase}}

\int_new:N \l__cdhh_a_int
\int_new:N \l__cdhh_b_int
\tl_new:N \l__cdhh_a_tl
\tl_new:N \l__cdhh_b_tl
\tl_new:N \l__cdhh_c_tl
\tl_new:N \l__cdhh_d_tl
\tl_new:N \l__cdhh_m_tl

\cs_generate_variant:Nn \regex_set:Nn {cn}
\cs_generate_variant:Nn \seq_set_split:Nnn {NVV}
\cs_generate_variant:Nn \str_remove_once:Nn {NV}
\cs_generate_variant:Nn \tl_greplace_all:Nnn {NV}
\cs_generate_variant:Nn \tl_log:n {e}
\cs_generate_variant:Nn \tl_replace_all:Nnn {NV}
\cs_generate_variant:Nn \tl_set:Nn {Ne}
\cs_generate_variant:Nn \tl_set_rescan:Nnn {NnV}

\prg_generate_conditional_variant:Nnn \str_if_eq:nn {en} {T, TF}
\prg_generate_conditional_variant:Nnn \regex_extract_once:NnN {NVN, cVN} {T, TF}
\prg_generate_conditional_variant:Nnn \regex_split:NnN {cVN} {T, TF}

\group_begin:
  \obeylines
  \tl_const:Nn \c__cdhh_e1_tl {\^^M}
\group_end:
\tl_const:Nn \c__cdhh_n1_tl {\^^J}
\tl_const:Nn \c__cdhh_n1_n1_tl {\^^J^^J}
```

2.2 Set CodeHigh Options

```

\bool_new:N \l__cdhh_lite_bool
\bool_new:N \l__cdhh_long_bool
\bool_new:N \l__cdhh_demo_bool

\NewDocumentCommand \CodeHigh {0{} m}
{
  \keys_set:nm {codehigh} {#2}
}

\keys_define:nm {codehigh}
{
  lite .bool_set:N = \l__cdhh_lite_bool,
  long .bool_set:N = \l__cdhh_long_bool,
  demo .bool_set:N = \l__cdhh_demo_bool,
}

```

2.3 Environments and Commands

%% Since every codehigh environment has an optional argument,
 %% we need to make `^^M` active first to keep the leading spaces in the first line

```

\NewDocumentCommand \NewCodeHighEnv {mm}
{
  \exp_args:Nc \NewDocumentCommand {#1} {}
  {
    %% it is ^^M but not ^^M
    \char_set_catcode_active:N ^^M
    \__cdhh_begin:nw {#2}
  }
  \exp_args:Nc \NewDocumentCommand {end#1} {}
  {
    \__cdhh_end:
  }
}

```

%% Now we need to replace each `^^M` with a space character

```

\NewDocumentCommand \__cdhh_begin:nw {m0{}}
{
  \char_set_catcode_end_line:N ^^M
  \tl_set:Nn \l_tmpa_tl {#1,#2}
  \__cdhh_replace_endlines:N \l_tmpa_tl
  \keys_set:nV {codehigh} \l_tmpa_tl
  \tl_set:Nc \__cdhh_collect_end_tl
  {
    \c_backslash_str end \c_left_brace_str \@currenvir \c_right_brace_str
  }
  \exp_last_unbraced:NNNNo
  \cs_set:Npn \__cdhh_collect:w ##1 \__cdhh_collect_end_tl
  {
    \__cdhh_store:n {##1}
    \exp_args:No \end \@currenvir
  }
  \group_begin:
  \__cdhh_do_specials:
  \__cdhh_collect:w
}

```



```

\cs_new_protected:Npn \__cdhh_end:
{
  \group_end:
  \__cdhh_typeset:
}

\group_begin:
\char_set_catcode_active:N \^^M
\cs_new_protected:Npn \__cdhh_replace_endlines:N #1
{
  \tl_replace_all:Nnn #1 {\^^M} {\~}
}
\group_end:

\cs_new_protected:Npn \__cdhh_do_specials:
{
  \cs_set_eq:NN \do \char_set_catcode_other:N
  \dospecials
  \obeylines
  \obeyspaces
}

\tl_new:N \g__cdhh_code_tl

\cs_new_protected:Npn \__cdhh_store:n #1
{
  \tl_gset:Nn \g__cdhh_code_tl { #1 }
  \tl_greplace_all:NVN \g__cdhh_code_tl \c__cdhh_el_tl {\^^J}
  \__cdhh_tracing:nm {code} {\__cdhh_log:N \g__cdhh_code_tl}
}

\cs_new_protected:Npn \__cdhh_typeset:
{
  \bool_if:NTF \l__cdhh_demo_bool
  {\__cdhh_typeset_demo:} {\__cdhh_typeset_code:}
}

\NewCodeHighEnv {codehigh} {}
\NewCodeHighEnv {demohigh} {demo}

\tl_new:N \l__cdhh_input_tl
\seq_new:N \l__cdhh_input_seq

\NewDocumentCommand \NewCodeHighInput {mm}
{
  \NewDocumentCommand #1 {O{}m}
  {
    \group_begin:
    \keys_set:nn {codehigh} {#2, ##1}
    \CatchFileDef \l__cdhh_input_tl {##2} {\__cdhh_do_specials:}
    \tl_replace_all:NVN \l__cdhh_input_tl \c__cdhh_el_tl {\^^J}
    \setlength \parskip {0pt plus 1pt}
    \__cdhh_typeset_input:N \l__cdhh_input_tl
    \group_end:
  }
}

\cs_new_protected:Npn \__cdhh_typeset_input:N #1

```

```

{
  \seq_set_split:NVV \l__cdhh_input_seq \c__cdhh_nl_nl_tl #1
  \seq_map_inline:Nn \l__cdhh_input_seq
  {
    \tl_gset:Nn \g__cdhh_code_tl {##1}
    \__cdhh_typeset_comment:N \g__cdhh_code_tl
    \tl_if_blank:VF \g__cdhh_code_tl
    {
      \__cdhh_typeset_code:
      \par
      \medskip
    }
  }
}

\regex_const:Nn \l__cdhh_comment_regex { ^ \% \% ( [\%>] ) ( [^\n]+ ) \n }
\l_new:N \l__cdhh_comment_tl % comment lines that need to be typeset
\bool_new:N \l__cdhh_comment_bool

%% remove lines starting with %%, and typeset lines starting with %>
\cs_new_protected:Npn \__cdhh_typeset_comment:N #1
{
  \tl_set_eq:NN \l_tmpa_tl #1
  \tl_put_right:NV \l_tmpa_tl \c__cdhh_nl_tl
  \tl_clear:N \l__cdhh_comment_tl
  \bool_set_false:N \l__cdhh_comment_bool
  \bool_do_until:Nn \l__cdhh_comment_bool
  {
    %% Unfortunately we need both \regex_extract_once and \regex_replace_once
    \regex_extract_once:NVNTF \l__cdhh_comment_regex \l_tmpa_tl \l_tmpa_seq
    {
      \regex_replace_once:NnN \l__cdhh_comment_regex {} \l_tmpa_tl
      \str_if_eq:enT { \seq_item:Nn \l_tmpa_seq {2} } {>}
      {
        \tl_put_right:Nx \l__cdhh_comment_tl
          { \seq_item:Nn \l_tmpa_seq {3} }
      }
    }
    { \bool_set_true:N \l__cdhh_comment_bool }
  }
  \exp_args:NV \scantokens \l__cdhh_comment_tl
  \tl_gset_eq:NN #1 \l_tmpa_tl
}

\NewCodeHighInput \dochighinput {long}

```

2.4 Typeset CodeHigh Code

```

\dim_new:N \l__cdhh_main_boxsep_dim

\keys_define:nm {codehigh}
{
  boxsep .dim_set:N = \l__cdhh_main_boxsep_dim,
  boxsep .initial:n = 3pt,
}

\box_new:N \g__cdhh_code_box

```

```
\cs_new_protected:Npn \__cdhh_typeset_code:
{
  \par\addvspace{0.5em}\noindent
  \bool_if:NTF \l__cdhh_long_bool
    {\__cdhh_typeset_code_text:} {\__cdhh_typeset_code_box:}
  \par\addvspace{0.5em}
}
```

```
\cs_new_protected:Npn \__cdhh_typeset_code_text:
{
  \__cdhh_prepare_code:N \l_tmpa_tl
  \__cdhh_get_code_text:n \l_tmpa_tl
}
```

```
\cs_new_protected:Npn \__cdhh_typeset_code_box:
{
  \__cdhh_build_code:
  \__cdhh_put_code_box:
}
```

```
\cs_new_protected:Npn \__cdhh_build_code:
{
  \__cdhh_prepare_code:N \l_tmpa_tl
  \__cdhh_get_code_box:nN \l_tmpa_tl \g__cdhh_code_box
}
```

```
\cs_new_protected:Npn \__cdhh_prepare_code:N #1
{
  \tl_set_eq:NN #1 \g__cdhh_code_tl
  \regex_replace_once:nnN {^ \n} {} #1
  \regex_replace_once:nnN {\n $} {} #1
  \__cdhh_tracing:nn {code} {\__cdhh_log:N #1}
}
```

```
\cs_new_protected:Npn \__cdhh_put_code_box:
{
  \setlength \fboxsep {\l__cdhh_main_boxsep_dim}
  \GetCodeHighStyle{main}
  \colorbox{codehigh@bg}
  {
    \hbox_to_wd:nn {\linewidth-2\fboxsep}
    {
      \GetCodeHighStyle{code}
      \colorbox{codehigh@bg}
      {\box_use:N \g__cdhh_code_box}
      \hfill
    }
  }
}
```

```
%% #1: text to parse; #2: resulting box
\cs_new_protected:Npn \__cdhh_get_code_box:nN #1 #2
{
  \hbox_gset:Nn #2
  {
    \begin{varwidth}{\linewidth}
      \__cdhh_get_code_text:n {#1}
    \end{varwidth}
  }
}
```

```

}

\cs_new_protected:Npn \__cdhh_get_code_text:n #1
{
  \group_begin:
  \setlength \parindent {0pt}
  \linespread {1}
  \ttfamily
  \bool_if:NTF \l__cdhh_lite_bool
  {\__cdhh_parse_code_lite:N #1}
  {\__cdhh_parse_code:VN \l__cdhh_language_name_tl #1}
  \group_end:
}

```

2.5 Typeset CodeHigh Demo

```

\box_new:N \g__cdhh_demo_box

\cs_new_protected:Npn \__cdhh_typeset_demo:
{
  \__cdhh_build_code:
  \__cdhh_build_demo:
  \dim_set:Nn \l_tmpa_dim { \box_wd:N \g__cdhh_code_box }
  \dim_set:Nn \l_tmpb_dim { \box_wd:N \g__cdhh_demo_box }
  \__cdhh_tracing:nn {demo}
  { \tl_log:x { \dim_use:N \l_tmpa_dim + \dim_use:N \l_tmpb_dim } }
  \par\addvspace{0.5em}\noindent
  \setlength \fboxsep {\l__cdhh_main_boxsep_dim}
  \GetCodeHighStyle{main}
  \colorbox{codehigh@bg}
  {
    \dim_compare:nNnTF {\l_tmpa_dim + \l_tmpb_dim + 6\fboxsep} > {\linewidth}
    {
      \vbox:n
      {
        \dim_set:Nn \hsize {\linewidth-2\fboxsep}
        \noindent\GetCodeHighStyle{code}
        \colorbox{codehigh@bg}{\box_use:N \g__cdhh_code_box}
        \par
        \noindent\GetCodeHighStyle{demo}
        \colorbox{codehigh@bg}{\box_use:N \g__cdhh_demo_box}
      }
    }
  }
  \hbox_to_wd:nn {\linewidth-2\fboxsep}
  {
    \GetCodeHighStyle{code}
    \colorbox{codehigh@bg}{\box_use:N \g__cdhh_code_box}
    \hfill
    \GetCodeHighStyle{demo}
    \colorbox{codehigh@bg}{\box_use:N \g__cdhh_demo_box}
  }
}
\par\addvspace{0.5em}
}

\cs_new_protected:Npn \__cdhh_build_demo:

```

```

{
  \tl_set_eq:NN \l_tmpb_tl \g__cdhh_code_tl
  \tl_set_rescan:NnV \l_tmpb_tl
  {
    %% \tl_set_rescan has set \newlinechar = \endlinechar
    \newlinechar = `^^J
    \catcode `\< = 14 \relax
    \catcode `^^M = 10 \relax
  }
  \l_tmpb_tl
  \__cdhh_tracing:nn {demo} { \tl_log:N \l_tmpb_tl }
  \__cdhh_get_demo_box:nN \l_tmpb_tl \g__cdhh_demo_box
}

%% #1: text to typeset; #2: resulting box
\cs_new_protected:Npn \__cdhh_get_demo_box:nN #1 #2
{
  \hbox_gset:Nn #2
  {
    \dim_set:Nn \linewidth {\linewidth-4\l__cdhh_main_boxsep_dim}
    \begin{varwidth}{\linewidth}
      \setlength { \parindent } { 0pt }
      \linespread {1}
      \tl_use:N #1
    \end{varwidth}
  }
}

```

2.6 Add CodeHigh Languages

```

\keys_define:nn {codehigh}
{
  language .tl_set:N = \l__cdhh_language_name_tl,
  language .initial:n = latex,
}

%% #1: language name; #2: rule type; #3: rule name; #4: rule regex
\NewDocumentCommand \AddCodeHighRule {0{latex} m m m}
{
  \int_if_exist:cF {l__cdhh_#1_rule_count_int}
  {\int_new:c {l__cdhh_#1_rule_count_int}}
  \int_incr:c {l__cdhh_#1_rule_count_int}
  \tl_set:cn
  {l__cdhh_#1_ \int_use:c {l__cdhh_#1_rule_count_int} _type_tl} {#2}
  \tl_set:cn
  {l__cdhh_#1_ \int_use:c {l__cdhh_#1_rule_count_int} _name_tl} {#3}
  \regex_set:cn
  {l__cdhh_#1_ \int_use:c {l__cdhh_#1_rule_count_int} _regex} {#4}
}

\AddCodeHighRule[latex]{1}{Package} {\(\(documentclass|usepackage)}
\AddCodeHighRule[latex]{6}{NewCommand}{\(\newcommand}
\AddCodeHighRule[latex]{3}{SetCommand}{\(\set[A-Za-z]+}
\AddCodeHighRule[latex]{4}{BeginEnd} {\(\(begin|end)}
\AddCodeHighRule[latex]{5}{Section} {\(\(part|chapter|section|subsection)}
\AddCodeHighRule[latex]{2}{Command} {\(\[A-Za-z]+}
\AddCodeHighRule[latex]{7}{Brace} {\([\{\}]}
\AddCodeHighRule[latex]{8}{MathMode} {\(\$}

```

```

\AddCodeHighRule[latex]{9}{Comment}    {\%.*?\n}

\AddCodeHighRule[latex/math]{6}{LeftRight}  {\(left|right)}
\AddCodeHighRule[latex/math]{2}{Command}    {\[A-Za-z]+}
\AddCodeHighRule[latex/math]{8}{MathMode}   {\$}
\AddCodeHighRule[latex/math]{4}{Script}     {[\_ \^]}
\AddCodeHighRule[latex/math]{5}{Number}     {\d+}
\AddCodeHighRule[latex/math]{1}{Brace}      {[{\}]}
\AddCodeHighRule[latex/math]{7}{Bracket}    {[[\]}]
\AddCodeHighRule[latex/math]{3}{Parenthesis}{[\(\)}]
\AddCodeHighRule[latex/math]{9}{Comment}    {\%.*?\n}

\AddCodeHighRule[latex/table]{8}{Newline}   {\\}
\AddCodeHighRule[latex/table]{1}{Alignment}{&}
\AddCodeHighRule[latex/table]{6}{BeginEnd}  {\(begin|end)}
\AddCodeHighRule[latex/table]{4}{Command}   {\[A-Za-z]+}
\AddCodeHighRule[latex/table]{2}{Brace}     {[{\}]}
\AddCodeHighRule[latex/table]{3}{Bracket}   {[[\]}]
\AddCodeHighRule[latex/table]{9}{Comment}   {\%.*?\n}

\AddCodeHighRule[latex/latex2]{1}{Argument} {\#+\d}
\AddCodeHighRule[latex/latex2]{6}{NewCommand}{\(|e|g|x)def}
\AddCodeHighRule[latex/latex2]{5}{SetCommand}{\set[A-Za-z]+}
\AddCodeHighRule[latex/latex2]{4}{PrivateCmd}{\[A-Za-z@]*@[A-Za-z@]*}
\AddCodeHighRule[latex/latex2]{3}{Command}  {\[A-Za-z]+}
\AddCodeHighRule[latex/latex2]{2}{Brace}    {[{\}]}
\AddCodeHighRule[latex/latex2]{7}{Bracket}  {[[\]}]
\AddCodeHighRule[latex/latex2]{9}{Comment}  {\%.*?\n}

\AddCodeHighRule[latex/latex3]{1}{Argument} {\#+\d}
\AddCodeHighRule[latex/latex3]{2}{PrivateVar}{\[cgl]__[A-Za-z_:@]+}
\AddCodeHighRule[latex/latex3]{5}{PrivateFun}{\__[A-Za-z_:@]+}
\AddCodeHighRule[latex/latex3]{4}{PublicVar} {\[cgl]_[A-Za-z_:@]+}
\AddCodeHighRule[latex/latex3]{6}{PublicFun} {\[A-Za-z_:@]+}
\AddCodeHighRule[latex/latex3]{8}{Brace}    {[{\}]}
\AddCodeHighRule[latex/latex3]{3}{Bracket}  {[[\]}]
\AddCodeHighRule[latex/latex3]{9}{Comment}  {\%.*?\n}

```

2.7 Add CodeHigh Themes

```

\keys_define:nm {codehigh}
{
  theme .tl_set:n = \l__cdhh_theme_name_tl,
  theme .initial:n = default,
  style/main .code:n = \SetCodeHighStyle{main}{#1},
  style/code .code:n = \SetCodeHighStyle{code}{#1},
  style/demo .code:n = \SetCodeHighStyle{demo}{#1},
}

%% #1: theme name; #2: rule type; #3: styles
\NewDocumentCommand \SetCodeHighStyle {0{default} m m}
{
  \tl_set:cn {l__cdhh_style_#1_#2_tl} {#3}
}

\NewDocumentCommand \GetCodeHighStyle {0{default} m}
{

```

```

\colorlet{codehigh@bg}{\tl_use:c {l__cdhh_style_#1_#2_tl}}
}

\SetCodeHighStyle[default]{main}{gray9}
\SetCodeHighStyle[default]{code}{gray9}
\SetCodeHighStyle[default]{demo}{white}

\SetCodeHighStyle[default]{0}{black}
\SetCodeHighStyle[default]{1}{brown3}
\SetCodeHighStyle[default]{2}{yellow3}
\SetCodeHighStyle[default]{3}{olive3}
\SetCodeHighStyle[default]{4}{teal3}
\SetCodeHighStyle[default]{5}{azure3}
\SetCodeHighStyle[default]{6}{blue3}
\SetCodeHighStyle[default]{7}{violet3}
\SetCodeHighStyle[default]{8}{purple3}
\SetCodeHighStyle[default]{9}{gray3}

```

2.8 Parse and Highlight Code

```

\int_new:N \l__cdhh_item_count_int
\tl_new:N \l__cdhh_code_to_parse_tl
\tl_new:N \l__cdhh_regex_match_type_tl
\tl_new:N \l__cdhh_regex_match_text_tl
\tl_new:N \l__cdhh_regex_before_text_tl

\cs_new_protected:Npn \__cdhh_parse_code:nN #1 #2
{
  \legacy_if:nTF {LuaTeX}
    { \__cdhh_parse_code luatex:nN {#1} #2 }
    { \__cdhh_parse_code_normal:nN {#1} #2 }
}

\cs_generate_variant:Nn \__cdhh_parse_code:nN {VN}

\cs_new_protected:Npn \__cdhh_parse_code_normal:nN #1 #2
{
  \tl_set_eq:NN \l__cdhh_code_to_parse_tl #2
  \bool_do_until:nn {\tl_if_empty_p:N \l__cdhh_code_to_parse_tl}
  {
    \__cdhh_parse_code_once:nN {#1} \l__cdhh_code_to_parse_tl
    \int_compare:nNnTF {\l__cdhh_item_count_int} = {-1}
    {
      \__cdhh_typeset_text:nN {0} \l__cdhh_code_to_parse_tl
      \tl_clear:N \l__cdhh_code_to_parse_tl
    }
    {
      \tl_concat:NNN \l__cdhh_a_tl
        \l__cdhh_regex_before_text_tl \l__cdhh_regex_match_text_tl
      \str_remove_once:NV \l__cdhh_code_to_parse_tl \l__cdhh_a_tl
      \__cdhh_tracing:nn {parser}
        {\tl_log:N \l__cdhh_code_to_parse_tl}
      \__cdhh_typeset_text:nN {0}
        \l__cdhh_regex_before_text_tl
      \__cdhh_typeset_text:VN \l__cdhh_regex_match_type_tl
        \l__cdhh_regex_match_text_tl
    }
  }
}
}

```

```

\cs_new_protected:Npn \__cdhh_parse_code_once:nN #1 #2
{
  \int_set:Nn \l__cdhh_item_count_int { -1 }
  \tl_clear:N \l__cdhh_regex_match_text_tl
  \tl_clear:N \l__cdhh_regex_before_text_tl
  \int_step_inline:nn {\cs:w l__cdhh_#1_rule_count_int \cs_end:}
  {
    \regex_extract_once:cVNT {l__cdhh_#1_##1_regex} #2 \l_tmpa_seq
    {
      \seq_get:NN \l_tmpa_seq \l__cdhh_m_tl
      \regex_split:cVNT { l__cdhh_#1_##1_regex } #2 \l_tmpb_seq
      {
        \seq_get:NN \l_tmpb_seq \l__cdhh_b_tl
        \tl_set:Nx \l__cdhh_c_tl {\str_count:N \l__cdhh_b_tl}
        \bool_lazy_or:nnT
        { \int_compare_p:nNn {\l__cdhh_item_count_int} = {-1} }
        {
          \int_compare_p:nNn
            {\l__cdhh_item_count_int} > {\l__cdhh_c_tl}
        }
        {
          \int_set:Nn \l__cdhh_item_count_int {\l__cdhh_c_tl}
          \tl_set_eq:NN \l__cdhh_regex_before_text_tl
            \l__cdhh_b_tl
          \tl_set_eq:NN \l__cdhh_regex_match_text_tl
            \l__cdhh_m_tl
          \tl_set_eq:Nc \l__cdhh_regex_match_type_tl
            {l__cdhh_#1_##1_type_tl}
        }
      }
    }
  }
}

\legacy_if:nT {LuaTeX} { \directlua{require("codehigh.lua")} }

\cs_new_protected:Npn \__cdhh_parse_code luatex:nN #1 #2
{
  \directlua{ParseCode(token.scan_argument(), token.scan_argument())}{#1}{#2}
  \__cdhh_tracing:nn {parser}
  {\tl_log:N \l__cdhh_parse_code_count_tl}
  \int_step_inline:nn {\l__cdhh_parse_code_count_tl}
  {
    \__cdhh_typeset_text:vc
    {l__cdhh_parse_style_##1_tl} {l__cdhh_parse_code_##1_tl}
  }
}

%% Split tl #3 into items separated by tl #2, and store the result in seq #1.
%% Spaces on both side of each item and outer braces around each item are kept.
%% We insert \prg_do_nothing: before each item to avoid losing outermost braces.
\cs_new_protected:Npn \__cdhh_seq_set_split:Nnn #1 #2 #3
{
  \seq_clear:N #1
  \cs_set_protected:Npn \__cdhh_seq_set_split_aux:Nw ##1 ##2 #2
  {
    \tl_if_eq:nnF { \prg_do_nothing: \c_novalue_tl } { ##2 }
    {
      \seq_put_right:No ##1 { ##2 }
      \__cdhh_seq_set_split_aux:Nw ##1 \prg_do_nothing:
    }
  }
}

```



```

    }
  }
  \__cdhh_seq_set_split_aux:Nw #1 \prg_do_nothing: #3 #2 \c_novalue_tl #2
}
\cs_generate_variant:Nn \__cdhh_seq_set_split:Nnn { NnV }

\seq_new:N \l__cdhh_typeset_text_seq

%% #1: rule type, #2: text
\cs_new_protected:Npn \__cdhh_typeset_text:nN #1 #2
{
  \__cdhh_tracing:nm {parser} { \tl_log:e { type: #1; ~ text: #2 } }
  \sys_if_engine luatex:T
  { \tl_replace_all:Nnn #2 { ~ } { \leavevmode \space } }
  \__cdhh_seq_set_split:NnV \l__cdhh_typeset_text_seq {^^J} #2
  \seq_map_indexed_inline:Nn \l__cdhh_typeset_text_seq
  {
    \int_compare:nNnT {##1} > {1} { \par \leavevmode }
    \textcolor
    { \tl_use:c { l__cdhh_style_ \l__cdhh_theme_name_tl _#1_tl } }
    { ##2 }
  }
}
\cs_generate_variant:Nn \__cdhh_typeset_text:nN { VN, vc }

```

2.9 Don't Highlight Code

```

\cs_new_protected:Npn \__cdhh_parse_code_lite:N #1
{
  \regex_replace_all:nnN { \n } { \c{par} \c{leavevmode} } #1
  \regex_replace_all:nnN { \ } { \c{relax} \c{space} } #1
  \tl_use:N #1
}

```

2.10 Fake Verbatim Command

```

\tl_const:Nn \c__cdhh_fake_escape_tl { \\{\}\#\^\\\% }

\NewDocumentCommand \fakeverb { +m }
{
  \group_begin:
  \group_align_safe_begin:
  \ttfamily \frenchspacing
  \tl_analysis_map_inline:nm {#1}
  {
    \int_compare:nNnTF {##2} = { -1 }
    {
      \exp_args:NNo \tl_if_in:NnTF \c__cdhh_fake_escape_tl {##1}
      { \exp_after:wN \cs_to_str:N ##1 }
      { \exp_after:wN \token_to_str:N ##1 }
    }
    { \exp_after:wN \token_to_str:N ##1 }
  }
  \ / % disable ligatures (#17)
}
\group_align_safe_end:
\group_end:
}

```

2.11 Tracing CodeHigh

```

\NewDocumentCommand \SetCodeHighTracing { m }
{
  \keys_set:nn { codehigh-set-tracing } {#1}
}

\bool_new:N \g__cdhh_tracing_code_bool
\bool_new:N \g__cdhh_tracing_demo_bool
\bool_new:N \g__cdhh_tracing_parser_bool

\keys_define:mn { codehigh-set-tracing }
{
  +code .code:n = \bool_gset_true:N \g__cdhh_tracing_code_bool,
  -code .code:n = \bool_gset_false:N \g__cdhh_tracing_code_bool,
  +demo .code:n = \bool_gset_true:N \g__cdhh_tracing_demo_bool,
  -demo .code:n = \bool_gset_false:N \g__cdhh_tracing_demo_bool,
  +parser .code:n = \bool_gset_true:N \g__cdhh_tracing_parser_bool,
  -parser .code:n = \bool_gset_false:N \g__cdhh_tracing_parser_bool,
  all .code:n = \__cdhh_enable_all_tracings:,
  none .code:n = \__cdhh_disable_all_tracings:,
}

\cs_new_protected_nopar:Npn \__cdhh_enable_all_tracings:
{
  \bool_gset_true:N \g__cdhh_tracing_code_bool
  \bool_gset_true:N \g__cdhh_tracing_demo_bool
  \bool_gset_true:N \g__cdhh_tracing_parser_bool
}

\cs_new_protected_nopar:Npn \__cdhh_disable_all_tracings:
{
  \bool_gset_false:N \g__cdhh_tracing_code_bool
  \bool_gset_false:N \g__cdhh_tracing_demo_bool
  \bool_gset_false:N \g__cdhh_tracing_parser_bool
}

\cs_new_protected:Npn \__cdhh_tracing:nn #1 #2
{
  \bool_if:cT { g__cdhh_tracing_ #1 _bool } {#2}
}

\cs_new_protected:Npn \__cdhh_log:N #1
{
  \tl_log:N #1
}

```