

# erl2latex: Literal Erlang Programming

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## 1 Introduction

This module converts an Erlang source file to latex. The latex file can then be converted to e.g. PDF, using `pdflatex` or similar tool.

The idea of ‘literal Erlang programming’ is that the source and comments should read as a good paper. Unlike XML markup, Latex markup is also fairly unobtrusive when reading the source directly.

```
-module(erl2latex).  
  
-export([file/1, file/2]).
```

## 2 file/[1,2]

The interface is:

`file(Filename [ Options]) -> ok | {error, Reason}`

```
-spec file/1 :: (Filename::string()) -> ok.  
  
file(F) ->  
    file(F, []).  
  
-type option() :: {documentclass, none | auto | string()}
```

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<sup>1</sup>The MIT License

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```

      | {mode, normal | included}
      | {source_listing, auto | string()}.

-spec file/2 :: (Filename::string(), [option()]) -> ok.

file(F, Options) ->
  case file:read_file(F) of
    {ok, Bin} ->
      output(convert_to_latex(Bin, Options), latex_target(F,Options));
    Err ->
      Err
  end.

```

### 3 Conversion to Latex

Below is the actual conversion function. We separate comments from code, and convert each block to latex separately. We then insert a preamble, if not already present, or insert a small formatting macro for the source code (if not already defined).

```

convert_to_latex(Bin, Options0) ->
  Parts0 = split_input(binary_to_list(Bin)),
  {Parts, Embedded_options} = embedded_options(Parts0),
  Options = Options0 ++ Embedded_options,
  Mode = proplists:get_value(mode, Options, normal),
  case lists:flatten([convert_part(P) || P <- Parts]) of
    "\\document" ++ _ = Latex0 ->
      {Preamble,Doc} = get_preamble(Latex0),
      [[Preamble,
        source_listing_setup(Preamble),
        "\\begin{document}\\n" || Mode == normal],
        Doc,
        end_doc(Mode)];
    Latex0 ->
      [[default_preamble(Options),
        "\\begin{document}\\n" || Mode == normal],
        Latex0,
        end_doc(Mode)]
  end.

```

If a preamble is present, the `\begin{document}` entry must also be present. This is how we know where the preamble ends.

```

get_preamble(Str) ->
  get_preamble(Str, []).

get_preamble("\\begin{document}" ++ Rest, Acc) ->
  {lists:reverse("\\n" ++ Acc), Rest};
get_preamble([H|T], Acc) ->
  get_preamble(T, [H|Acc]).

```

The following functions output the default latex preamble and document end marker.

```

default_preamble(Options) ->
  [Doc_class,Src_listing] =
    [proplists:get_value(P,Options) ||
     P <- [documentclass, source_listing]],
  document_class(Doc_class) ++ source_listing_setup(Src_listing,"").

document_class(Opt) ->
  if Opt==auto; Opt==undefined ->
    "\\documentclass[a4paper,12pt]{article}\n";
  Opt==none -> "";
  is_list(Opt) -> Opt
  end.

source_listing_setup(Opt,Preamble) ->
  case regexp:first_match(Preamble, "begin{mylisting}") of
    {match,_,_} ->
      [];
    nomatch ->
      source_listing_setup(Opt)
  end.

source_listing_setup(undefined) ->
  source_listing_setup
    ("\\setlength{\\leftmargin}{1em}"
     "\\item\\scriptsize\\bfseries");
source_listing_setup(Str) when is_list(Str) ->
  ("\\newenvironment{mylisting}\n"
   "{\\begin{list}{\\{\"
   ++ Str
   ++ (\"}\n"
   "{\\end{list}}\n"
   "\\n").

end_doc() ->
  "\\n\\end{document}\\n".

end_doc(included) ->
  "";
end_doc(normal) ->
  end_doc().

```

In this function, we wrap the different ‘source’ and ‘comment’ blocks appropriately. The weird-looking split between string parts is to keep pdf<sub>l</sub>atex from tripping on what looks like the end of the verbatim block.

```

convert_part({code,[]}) -> [];
convert_part({code,Lines}) ->
  ["\\begin{mylisting}\n"
   "\\begin{verbatim}\n",
   [expand(L) || L <- normalize(Lines)],
   "\\\" "end{verbatim}\n"
   "\\end{mylisting}\n\n"];
convert_part({comment,Lines}) ->
  Lines.

normalize(["\n","\n"|T]) -> normalize(["\n"|T]);
normalize([H|T]) -> [H|normalize(T)];
normalize([]) -> [].

```

The `expand(Line)` function expands tabs for better formatting.

```

expand(Line) ->
  expand_tabs(Line).

expand_tabs(Xs) ->
  expand_tabs(0,Xs).

expand_tabs(_N,[]) ->
  [];
expand_tabs(N,[$\t|Xs]) ->
  N1 = 8*(N div 8) + 8,
  [$\s || _ <- lists:seq(N,N1)] ++ expand_tabs(N1,Xs);
expand_tabs(N,[X|Xs]) ->
  [X|expand_tabs(N+1,Xs)].

```

Following edoc convention, comments are excluded if the first non-space character following the leading string of % is another %, for example:  
 %% % This comment will be excluded.

```

strip_comment(C) ->
  C1 = strip_percents(C),
  case string:strip(C1, left) of
    "%" ++ _ -> "";
    Stripped ->
      Stripped
  end.

strip_percents("%" ++ C) -> strip_percents(C);
strip_percents(C) -> C.

```

## 4 Utility Functions

```

split_input(Txt) ->
  [{T1,Ls} ||
    {T1,Ls} <-
      [{T,strip_empty(L1)} || {T,L1} <-
        group([wrap(L) || L <- lines(Txt)])],
    Ls /= []].

lines(Str) ->
  lines(Str, []).

lines("\n" ++ Str, Acc) ->
  [lists:reverse([$ \n|Acc]) | lines(Str,[])];
lines([H|T], Acc) ->
  lines(T, [H|Acc]);
lines([], Acc) ->
  [lists:reverse(Acc)].

wrap("%" ++ S) ->
  {comment, strip_comment(S)};
wrap(S) ->
  {code, S}.

strip_empty(Ls) ->
  Strip = fun(Ls1) ->
    lists:dropwhile(fun(L) -> strip_space(L) == [] end, Ls1)
  end,
  lists:reverse(Strip(lists:reverse(Strip(Ls)))).

```

Remove leading empty lines, even if they contain whitespace.

```
strip_space(L) ->
  lists:dropwhile(fun(C) when C==$\s; C==$\t; C==$\n -> true;
    (_) -> false
  end, L).

group([T,C|Tail]) ->
  {More,Rest} = lists:splitwith(fun({T1,_C1}) -> T1 == T end, Tail),
  [{T,[C|[C1 || {_,_C1} <- More]]} | group(Rest)];
group([]) ->
  [].

latex_target(F, Options) ->
  Target_base = filename:basename(F, ".erl") ++ ".tex",
  Outdir = proplists:get_value(outdir, Options, filename:dirname(F)),
  filename:join(Outdir, Target_base).

output(Data, F) ->
  file:write_file(F, list_to_binary(Data)).

embedded_options(Parts) ->
  lists:mapfoldl(
    fun({code,Ls}=Part,Acc) ->
      case scan_for_opts(Ls) of
        none -> {Part,Acc};
        {Opts,Ls1} -> {{code,Ls1}, Acc ++ Opts}
      end;
    (Other, Acc) ->
      {Other, Acc}
  end, [], Parts).

scan_for_opts(Ls) ->
  scan_forms(Ls, [], []).

scan_forms(Ls, Opts0, Acc) ->
  case scan_tokens(Ls) of
    {{ok,[_{'-',_},{atom,_},erl2latex},{'(',L}|Ts], _}, Used, Rest} ->
      case erl_parse:parse_term([{'(',L}|Ts]) of
        {ok, Opts} -> scan_forms(Rest, Opts0++Opts, Acc);
        {error,_} -> scan_forms(Rest, Opts0, Acc ++ Used)
      end;
    {{eof,_}, Used, []} ->
      case Opts0 of
        [_|_] -> {Opts0, Acc ++ Used};
        [] -> none
      end;
    {_, Used, Rest} ->
      scan_forms(Rest, Opts0, Acc ++ Used)
  end.

scan_tokens([L|Ls]) ->
  scan_tokens(erl_scan:tokens([],L,1), Ls, [L]).

scan_tokens({done,Result,Leftover_chars},Rest,Used) ->
  {Result, lists:reverse(Used), [Leftover_chars|Rest]};
scan_tokens({more, Cont}, Ls, Used) ->
  case Ls of
    [] ->
      {{eof,1}, lists:reverse(Used), []};
    [L|Rest] ->
      scan_tokens(erl_scan:tokens(Cont, L, 1), Rest, [L|Used])
  end.
```

end.