

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 pdf_latex 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}

Options can be specified either when calling file/[1,2], or by adding an attribute, -erl2latex(Options), in the source code. The attribute will not be included in the latex output. Options given in the function call will shadow options embedded in the source code.

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mode: normal or included. If included; preamble and document begin and end markers are removed if found.

```
-spec file/1 :: (Filename::string()) -> ok.

file(F) ->
    file(F, []).

-type option() :: {documentclass, none | auto | string()}
                | {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}{-}{\n"
    ++ 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 pdflatex 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.

```