LPdoc
A Documentation Generator for (C)LP Systems

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Introduction / Motivation

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  → automate process as much as possible.
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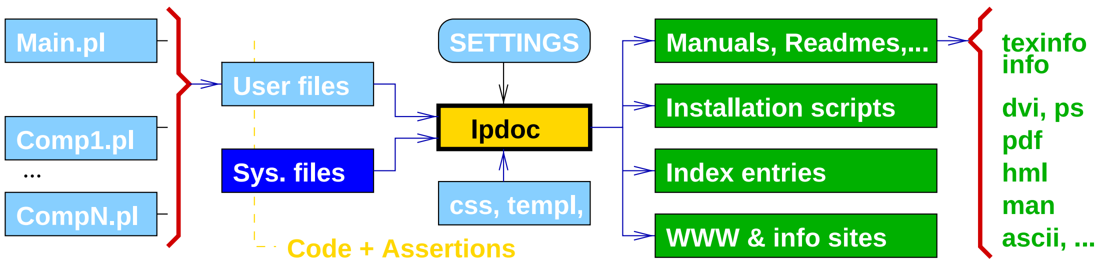
  - Be largely (CLP) platform-independent and modular.

Overall operation



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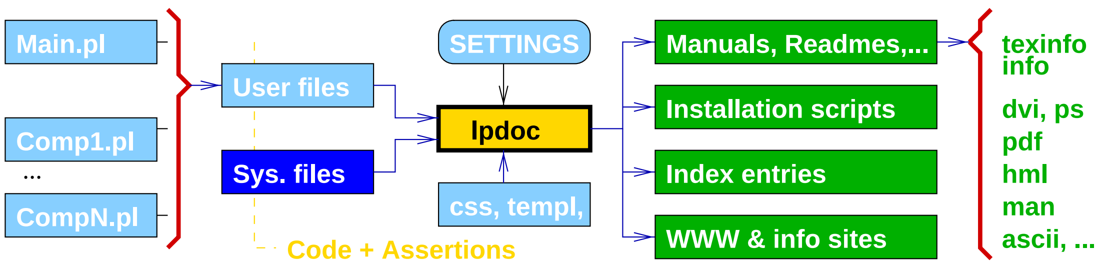

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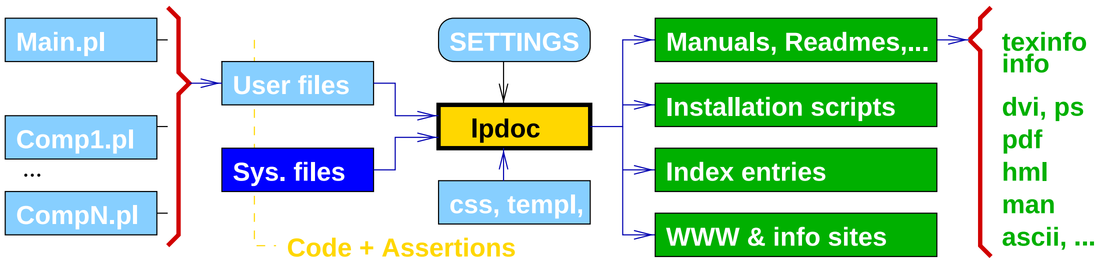

- Can be done via menus from emacs interface.
- Or manually:
  - Creating manual:
    - Edit `SETTINGS` file
    - `lpdoc` *format* (`dvi`, `ps`, `html`, ...)
  - Viewing manual: `lpdoc dviview`, `lpdoc htmlview`, ...
  - Installing manual: `lpdoc install`
  - + cleanup, etc.

Inputs

- Basic types of input files:
  - Files to be documented (possibly including assertions and comments).
  - Used but not documented (library) files
    (e.g., system and user libraries: types, properties, reexports, etc.).
  - `SETTINGS`, template files, HTML style (css files), etc.

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- `SETTINGS`:
  - Determines main file and components.
  - Defines the paths to be used to find files
    (independent of the paths used by the `LPdoc` application itself).
  - Selects indices (predicates, ops, declarations, properties, types, libraries, concepts, authors, ...), options, etc.
  - Defines location of BiBTeX file(s), HTML styles, etc.
  - Defines document installation location, WWW site, etc.

Assertions

- Assertions:
  - ◇ Written in the Ciao assertion language.
  - ◇ Declarations, used to:
    - * state general properties, types, modes, exceptions, ...
    - * of certain program points, predicate usages, ...
  - ◇ Includes standard compiler directives (`dynamic`, `meta_predicate`, etc.).
  - ◇ Have a certain qualifier: check, true, trust, ...
  - ◇ Can include documentation text strings.
- `LPdoc` understands assertions natively and uses them to generate the documentation.

Assertions (Contd.)

- Examples – pred:

```
:- pred qsort(X,Y) : list(X) => sorted(Y)
                   # "@var{Y} is a sorted permutation of @var{X}.".
```

- Examples – prop, regtype:

```
:- prop sorted(X) # "@var{X} is sorted.".
sorted([]).
sorted([_]).
sorted([X,Y|R]) :- X < Y, sorted([Y|R]).

:- regtype list(X) # "@var{X} is a list.".
list([]).
list([_|T]) :- list(T).
```

Comments

- Declarations, typically containing textual comments:
  `:- comment(`*CommentType*`,`*CommentData*`).`
  (also: `:- doc(`*CommentType*`,`*CommentData*`).`)
- Examples:

```
:- comment(title,"Complex numbers library").
:- comment(summary,"Provides an ADT for complex numbers.").
:- comment(ctimes(X,Y,Z),"@var{Z} is @var{Y} times @var{X}.").
```

- Markup language, close to LaTeX/texinfo:
  - ◇ Syntax: `@`*command* (followed by either a space or {}), or `@`*command*{*body*}.
  - ◇ Command set kept small and somewhat generic, to be able to generate documentation in a variety of formats.
  - ◇ Names typically the same as in LaTeX.
  - ◇ Types of commands:
    - * Indexing and referencing commands.
    - * Formatting commands.
    - * Inclusion commands, etc.

Structure of generated documents

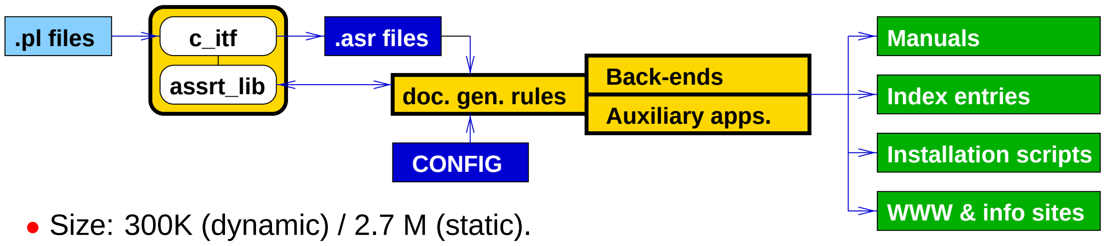
- Overall structure:
  - ◇ Single file → simple manual without chapters.
  - ◇ Multiple files:
    - * Main file gives title, author(s), version, summary, intro, etc.
    - * Other (“component”) files are chapters and appendices.
- Chapters:
  - ◇ If file does not define `main` → assumed *library*, *interface* (API) documented. else → assumed *application*, *usage* documented.
  - ◇ Structure:
    - * Chapter title/subtitle (or file name if unavailable).
    - * Info on authors, version, copyright, ...
    - * Chapter intro.
    - * Interface (usage, exports, reexports, decls, ops, modules used, ...).
    - * Documentation for decls, preds, props, regtypes, multifiles, modedefs,...
    - * Bugs, changelog, appendices, ...

Documentation of predicates, props, etc.

- If no declarations or comments:
  - ◇ One line stating predicate name and arity (useful: goes to index → automatic location, automatic completion).
  - ◇ If property or regtype: source code (often best description).
- Comments for the predicate/property/regtype...
- All assertions, described in textual form (unless stated otherwise).
- `pred` assertions documented as "usages".
- Comments associated with `pred` assertions used to describe the usages.
- Syntactic sugar (e.g., modes) can be documented as is or expanded.
- The text in properties is *reflected* into the predicates which use such properties (also if property is imported from another module).

Architecture and Implementation

- Standalone application (Ciao standalone executable).
- Uses the Ciao generic modular program processing library (see the paper on the Ciao module system):
  - ◇ We want to be fully modular and incremental.
  - ◇ To support syntax extensions (ops, expansions, ...) the task requires a full reader, precise module visibility, etc.
- System is indeed quite incremental (vital for, e.g., the Ciao manual).



- Size: 300K (dynamic) / 2.7 M (static).
- 11K lines Prolog + 12K lines from Ciao libraries + 1K misc (html/css, BiBTeX, ...).

Comparison with other systems

- We are not aware of other systems with the capabilities of `LPdoc`.
- Some systems for pure “literate programming” in LP.
  - ◇ Quite useful, but almost all text must be written manually.
  - ◇ `LPdoc` goes much further and is much more automatic (“knows at least as much as the compiler”).
- Some automatic documenters with more limited capability (e.g., Icon, Perl, ...).
- Closest system is `javadoc` (developed in parallel with `LPdoc`):
  - ◇ Nicely formatted HTML manuals.
  - ◇ Also uses information typically available to the compiler.
  - ◇ Allows inclusion of textual comments in HTML format.

  Disadvantages:

  - ◇ Assrt. lang., treatment of props, markup, output formats, etc. richer in `LPdoc`.
  - ◇ Perhaps too tied to HTML.
  - ◇ Cannot show source code, as `LPdoc`.
  - ◇ (+ the obvious one: tied to Java).

Conclusions

- In use at CLIP since late 1996 (and elsewhere) $\rightarrow$ some user experience.
- Very good for reference manuals in general. Also for “internals” manuals.
- Most satisfactory for libraries (highest quality documentation with least effort).
- Somewhat stilted for user’s manuals, but still useful.
- Much easier to maintain documentation up to date.
- With practice, one can with moderate effort write assertions and comments that:
  - ◇ document the program code,
  - ◇ produce a manual documenting the use of the code,
  - ◇ greatly improve the debugging and maintenance cycles (verification).

  Writing assertions/comments more likely if effort pays off in several ways!
- All CLIP software manuals, web sites, etc. currently produced using `LPdoc`.
- Can be downloaded freely from `http://www.clip.dia.fi.upm.es/Software`.
- Can be adapted to other (C)LP systems and output formats.

System Demo

- `LPdoc`
- The Ciao preprocessor – Ciaopp
  - ◇ No assertions or comments.
  - ◇ Add assertions, comments.
  - ◇ Generate dvi, view
  - ◇ Add citations.
  - ◇ Generate html, view; info, view
  - ◇ Add a figure. View in several formats.
  - ◇ Manual cleanup for distribution/installation.
  - ◇ Visit Ciao manual, show help on current symbol.
  - ◇ Visit WWW site, collection of manuals.
  - ◇ Style sheets.

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