

CLOPS: A DSL for Command Line Options

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Why are Command Line Options Interesting?

- Many programs start with a small number of options and new ones are added as the project evolves.
- As a consequence, processing of options is coded non-systematically. . .
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- ...resulting in large volumes of code that are **difficult** to **read** and to **document**. (typically hundreds of lines of code)
- Parsing is difficult because options have various names, formats, values, and dependencies between them e.g.,

```
gzip -h
gzip --help
gzip -v -q
gzip -v -v
gzip -3
tar czv --file archive.tar.gz --append
```

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- Writing (sometimes complex) dependencies between options should be straightforward.
- Generating parser and documentation from the same DSL description.

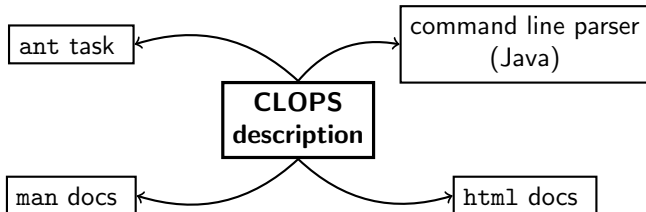
Generating Multiple Artifacts

- Generation is more likely to **ensure consistency**.
- Generation **reduces** the amount of **work** for the user.

CLOPS
description

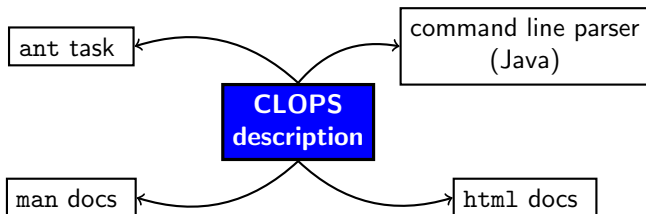
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- Dynamic rules—how options **interact** with each other
- **Validity** conditions—permitted final value combinations
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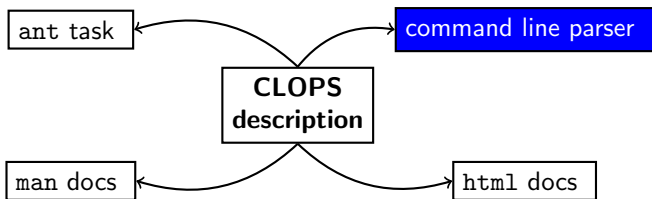
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Talk Progress



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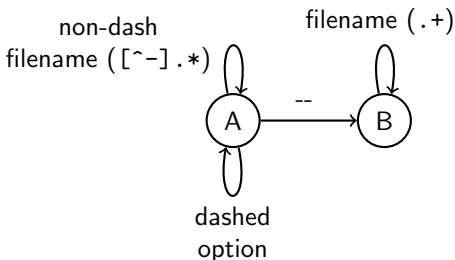
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- CLOPS solution

```
(Option | Files)* (DashDash DashFiles*)?
```

The Command line Format Drives Parsing

- An automaton is constructed according to the format of the command-line, where edges are labeled with options.
- If the automaton finishes in a terminal state then the parse of the command line was valid according to the format.



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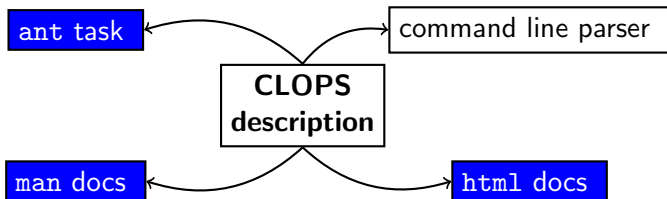
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- We don't need to specify this most of the time.

```
add:{"add"}
```

parses on `add_`

Talk Progress



Documentation Generation

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- High flexibility, but a little crude.
- At the moment we don't have a nice way of rendering argument types and rules.

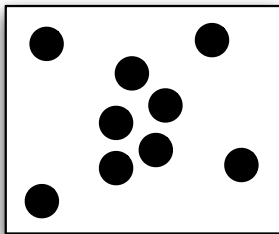
Talk Progress

How-it-all-started story

Variability in Software

- Believe it or not, this work has been inspired by *Software Product Lines*

Domain

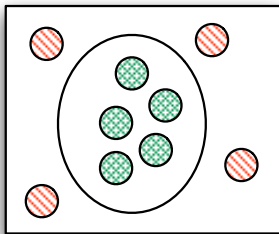


Problem space

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Domain model

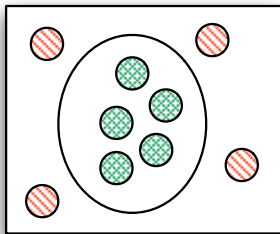


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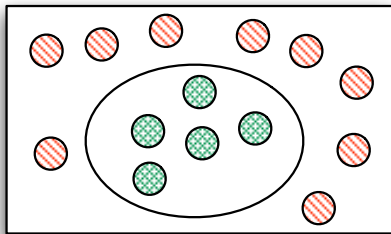
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Domain and Solution model



Problem space

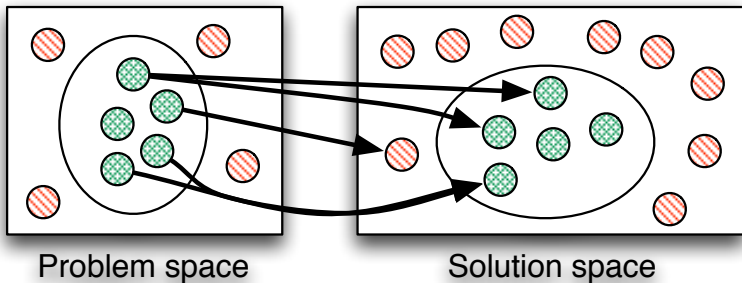


Solution space

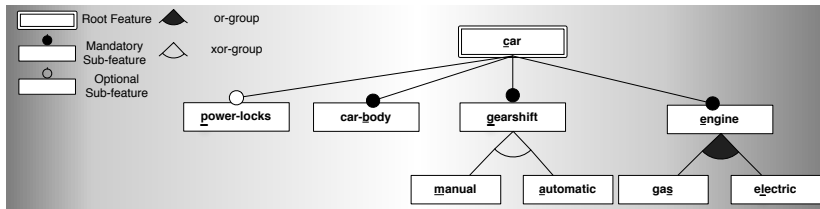
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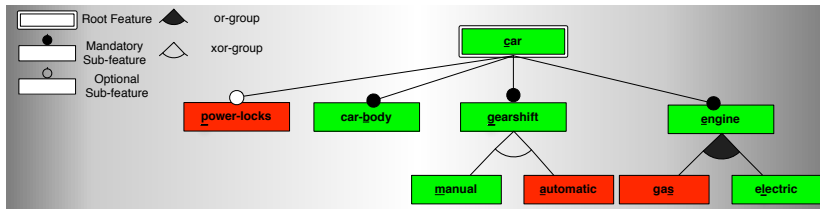
Domain and Solution model combined



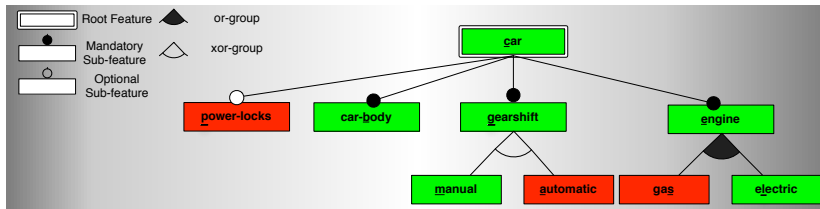
Variability Modeling



Variability Modeling



Variability Modeling



- Writing command line options can be seen as a product derivation.

```
alias ll='ls -l'
```

Usage

- Carried out several experiments (svn, gzip, ls, ...)
- Released on source forge
`http://clops.sourceforge.net/`
- At least one commercial user
- Used inside our group for a number of open-source projects

Future Work and Challenges

- Tab-completion
- GUI generation
- More static checking
- Improve documentation
- Port to other languages — a general rule engine would be desirable

<http://clops.sourceforge.net/>