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...
- ...resulting in large volumes of code that are difficult to read and to document. (typically hundreds of lines of code)

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- As a consequence, processing of options is coded non-systematically...
- ...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.

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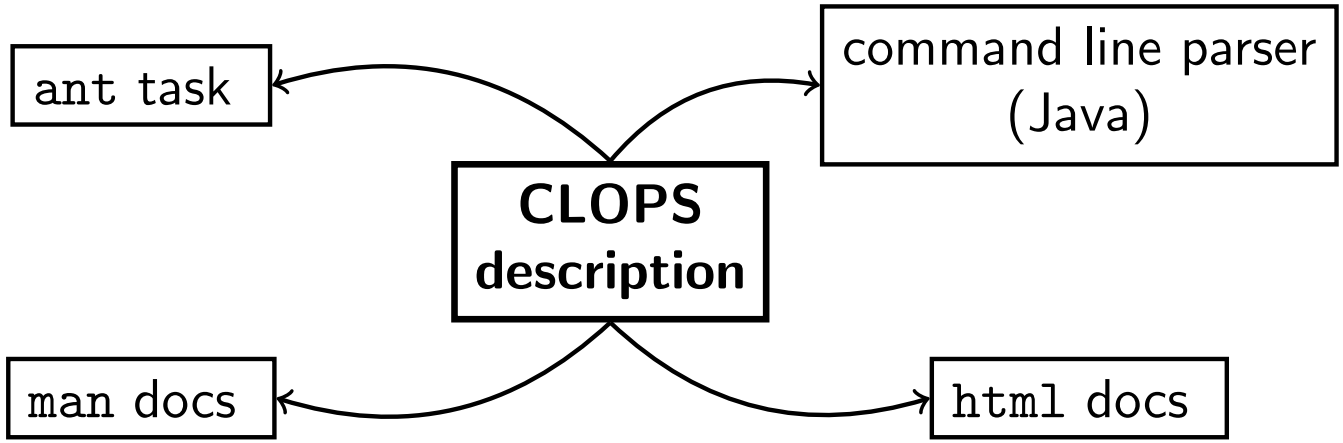

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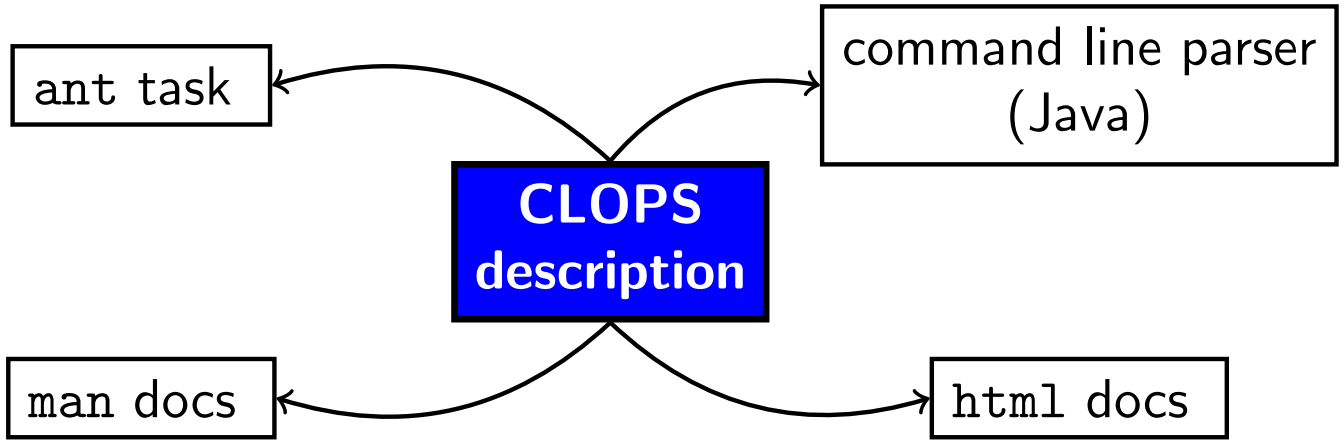

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- Option declarations—the set of supported options
- Dynamic rules—how options interact with each other
- Validity conditions—permitted final value combinations
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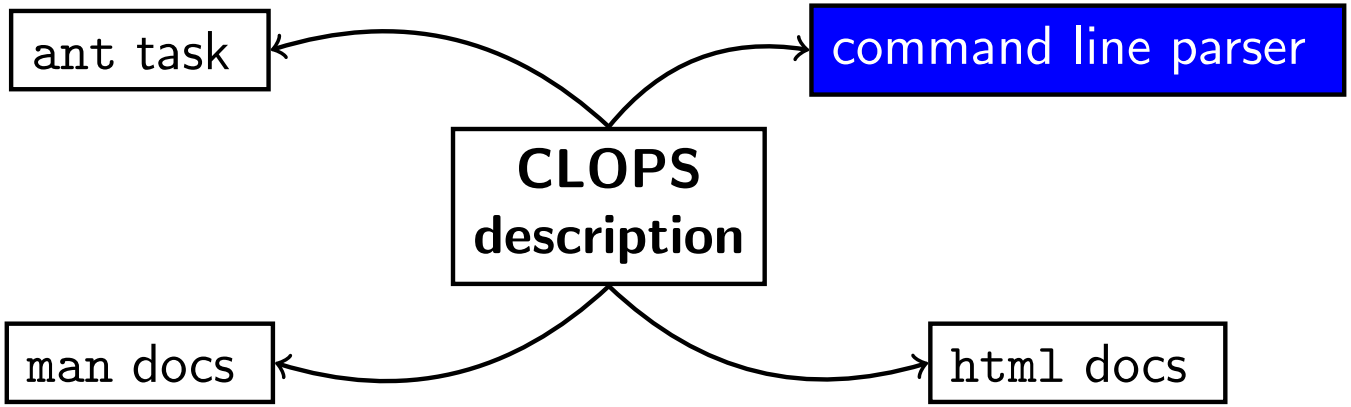
Talk Progress



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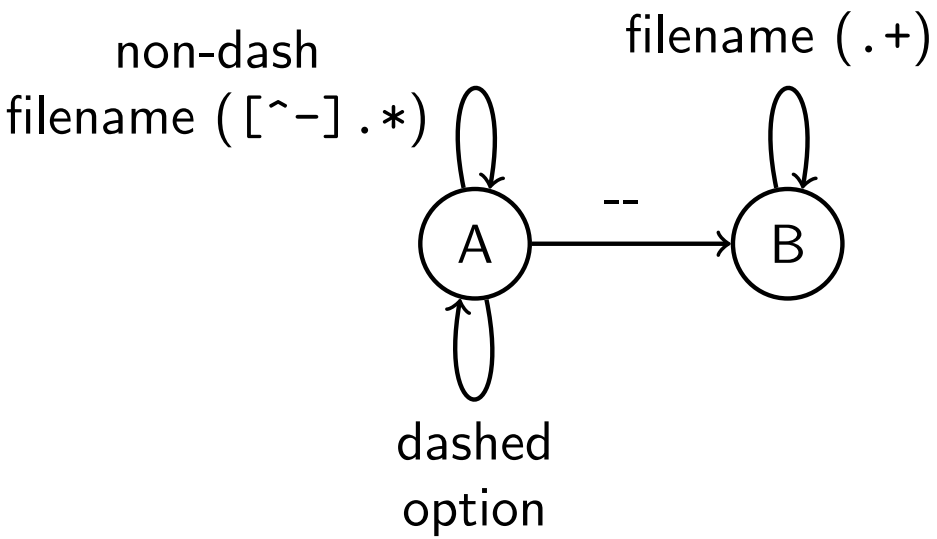
- CLOPS solution

```
(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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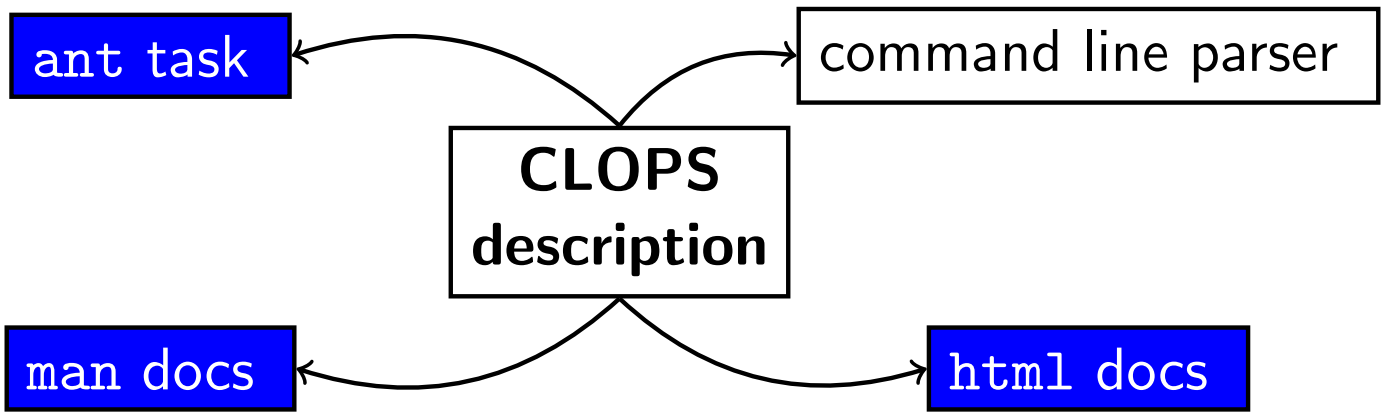
- We don't need to specificy this most of the time.

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

  parses on `add␣`

Talk Progress



Documentation Generation

- Using the apache template tool `velocity`.

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#foreach($option in $info.getOptionDescriptions())

Name:  $option.Identifier
Description:  $!option.Description
#end
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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.

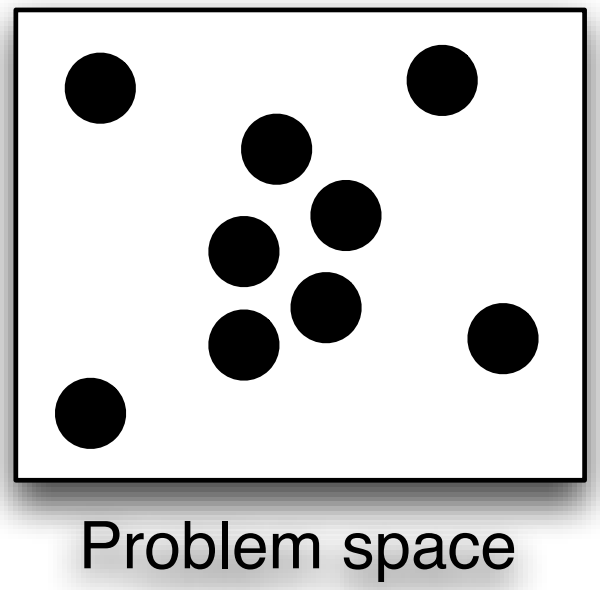
Talk Progress

How-it-all-started story

Variability in Software

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

Domain



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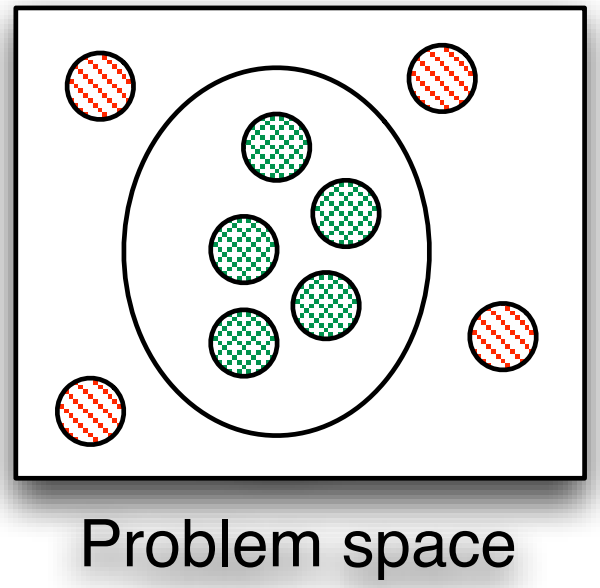
Domain model



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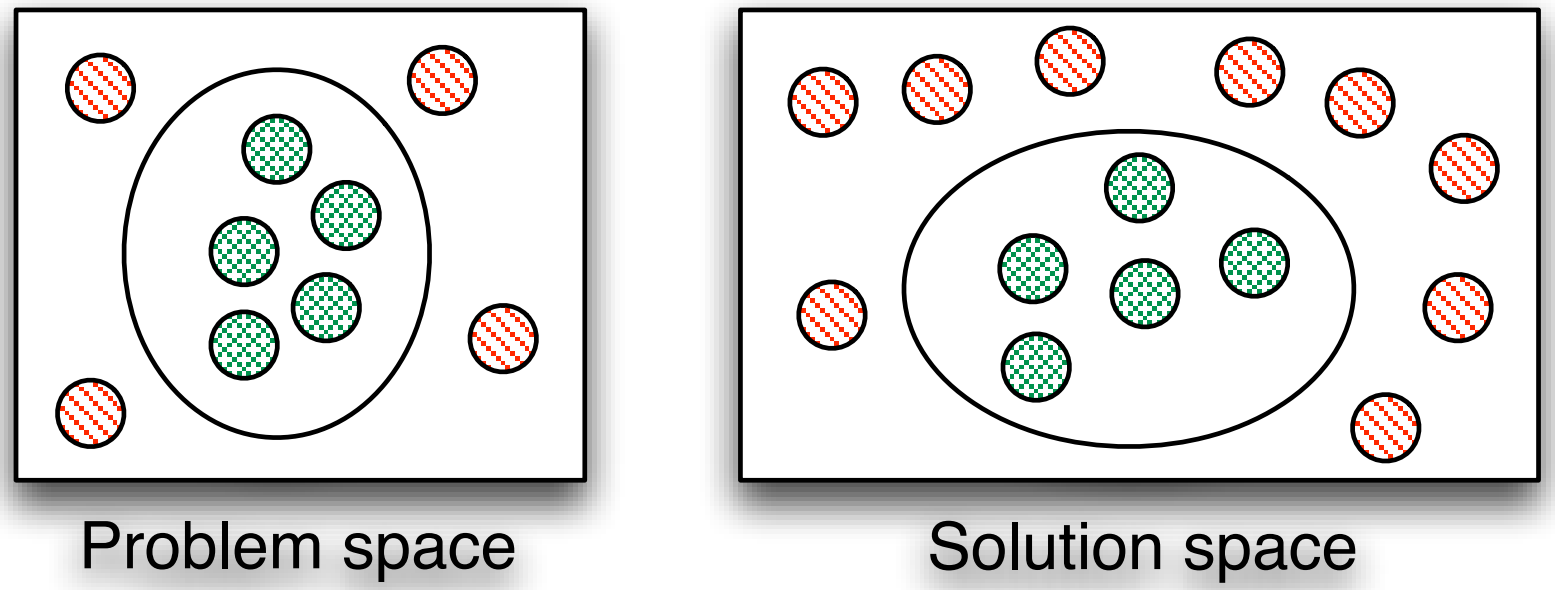
Domain and Solution model



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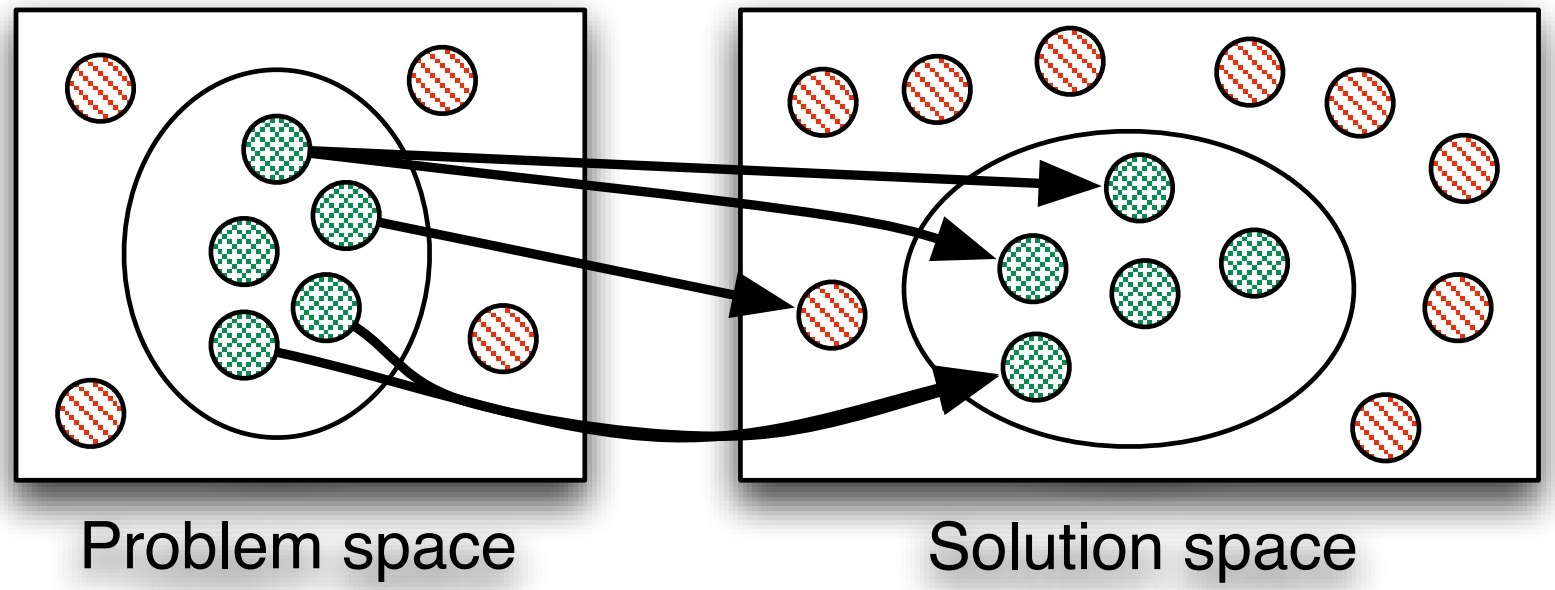
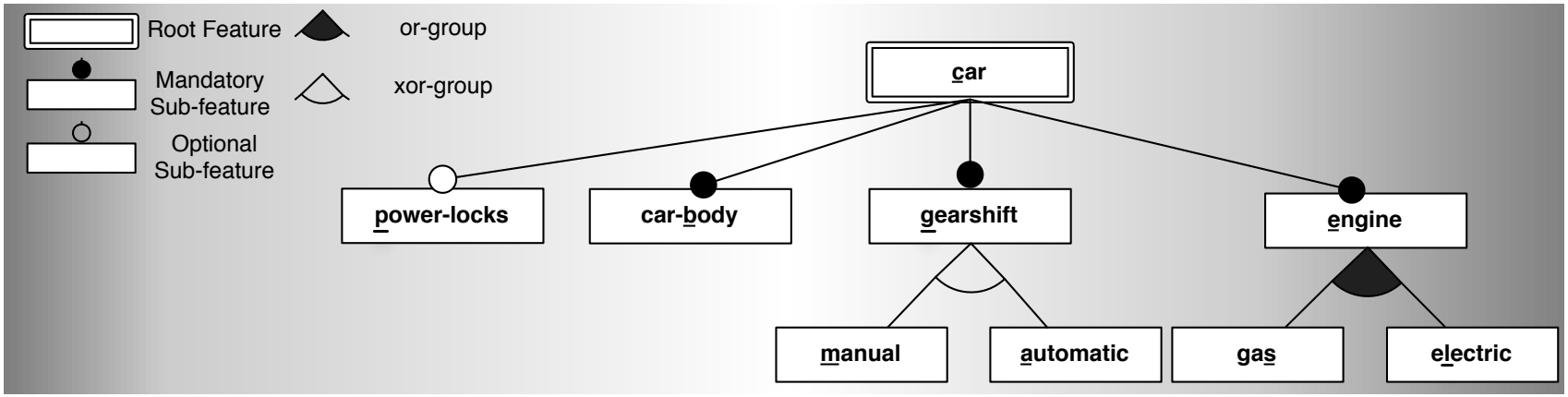
Domain and Solution model combined



Variability Modeling



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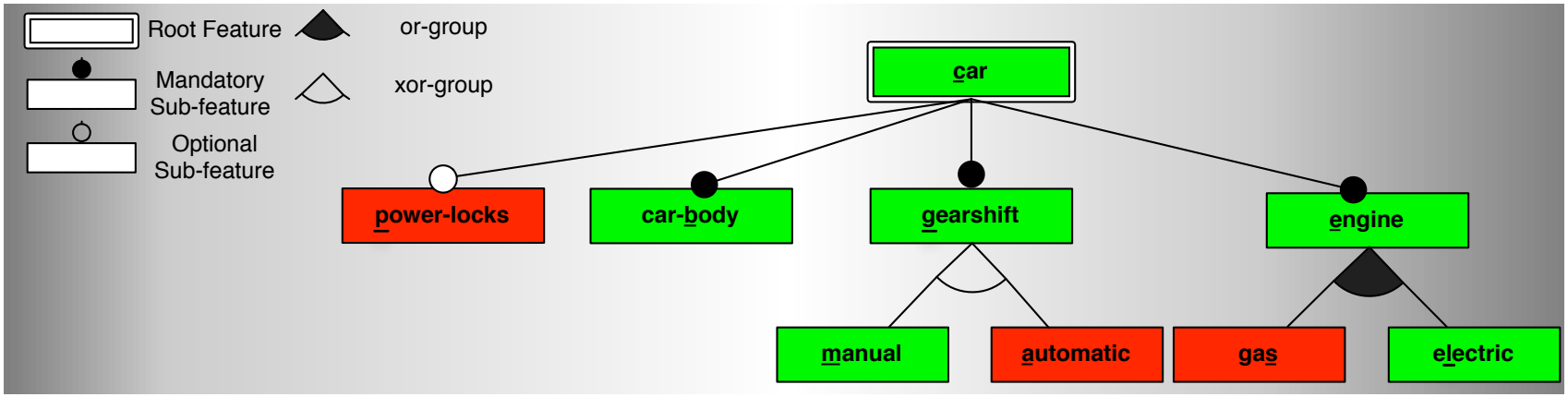

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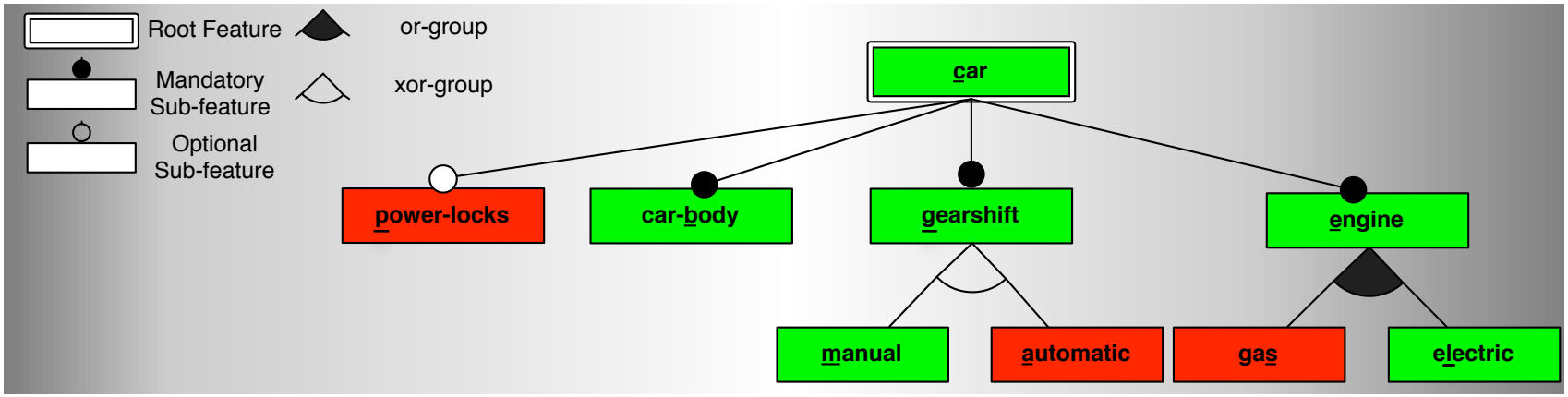

- Writing command line options can be seen as a product derivation.

```
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

```
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