

Automated Theorem Proving in Isabelle/HOL LVA 703861

1 Isabelle: Finding Theorems

When you are trying to prove a theorem with Isabelle, you will frequently be looking for previously proved lemmas that may help you prove your goal, or that will even solve it outright.

There are several ways to find the lemma or theorem that you are looking for.

- You can browse the on-line document of the HOL logic at <http://isabelle.in.tum.de/dist/library/HOL>.
- You can use commands provided by your operating system (in particular 'find' and 'grep', executed in the `isabelle/HOL` directory) to find patterns in theory files.
- Perhaps the most powerful solution is the command `find.theorems` provided by Isabelle itself. Here is a short description, taken from the NEWS file of Isabelle 2005:

* Command 'find.theorems' searches for a list of criteria instead of a list of constants. Known criteria are: `intro`, `elim`, `dest`, `name:string`, `simp:term`, and any term. Criteria can be preceded by '-' to select theorems that do not match. `intro`, `elim`, `dest` select theorems that match the current goal, `name:s` selects theorems whose fully qualified name contain `s`, and `simp:term` selects all simplification rules whose lhs match `term`. Any other term is interpreted as pattern and selects all theorems matching the pattern. Available in ProofGeneral under 'ProofGeneral → Find Theorems' or C-c C-f. Example:

```
C-c C-f (100) "(::nat) + _ + _" intro -name: "HOL."
```

prints the last 100 theorems matching the pattern `"(::nat) + _ + _"`, matching the current goal as introduction rule and not having "HOL." in their name (i.e. not being defined in theory HOL).

▷ Make yourself familiar with the `find.theorems` command. Experiment with different combinations of options, and use the command with different goal states.