The theoremref package

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1 Introduction

So, you are writting up your math paper or thesis. There is the all-important Lemma 3.14 referenced from a dozen places throughout the paper, but you have just realized that its proof requires another lemma which should go before Lemma 3.14, hence all the references to Lemma 3.14 have to shift to Lemma 3.15. Now that's quite simple to do: you just insert the new lemma, and LaTeX relabels the references for you behind the scenes. Good.

Then you decide that Lemma 3.15 is, in fact, so important that you better call it a Theorem rather than just a Lemma, hence all the references to Lemma 3.15 should change to Theorem 3.15. Now that's quite simple to do: you just replace the name of the theorem environment of 3.15, and LaTeX relabels the references for you behind the scenes... uhhh, except that it does not, actually. You have to go through the paper and manually change every occurrence of `Lemma~\ref{main}` to `Theorem~\ref{main}`. Your editor software may help with automatic text replacement, but that's no good by itself, you unfortunately still have to watch out for cases like `Lemmas \ref{baz-quux} and~\ref{main}`. Needless to say, the whole business is rather error-prone, and very annoying, especially if you later decide that 3.15 is, after all, a Lemma, with the prospect of changing all those references back again.

The theoremref package is designed to fill this gap in the LaTeX automatic reference system. It provides variants of the `\label` and `\ref` commands which automatically supply the correct theorem environment name into a reference, thus avoiding all the hassle described above.

2 Basic usage

(1) Put `\usepackage{theoremref}` anywhere in the document preamble.

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(2) For each theorem which you intend to use in the new system, declare its label by `\thlabel{`⟨*foobar*⟩`}`. For example,

```
\begin{Lem}\thlabel{exact}
  Every projective formula is exact.
\end{Lem}
```

(3) There are three commands available for producing references to your theorems: `\ref{`⟨*foo*⟩`}` gives the number, as usual; `\thref{`⟨*foo*⟩`}` gives the theorem name followed by number; and `\thnameref{`⟨*foo*⟩`}` gives just the theorem name. Example:

```
\ref{exact}       → 5.7.7
\thref{exact}     → Lemma~5.7.7
\thnameref{exact} → Lemma
```

The `\thref` command can handle an arbitrary number of arguments, separated by commas:

```
\thref{exact,zorn,main} → Lemmas 5.7.7 and~2.1.5 and Theorem~6.6.4
```

3 Options

- `\usepackage[lowercase]{theoremref}` will set your theorem references in lowercase, e. g., "lemma 5.7.7". Note that there is no provision for capitalization at the beginning of a sentence.
- `\usepackage[reftex]{theoremref}` provides an alternative interface to the main commands: you can say `\th\label{`⟨*foo*⟩`}` and `\th\ref{`⟨*foo*⟩`}` instead of `\thlabel{`⟨*foo*⟩`}` and `\thref{`⟨*foo*⟩`}`. The effect is that the labelling and referencing commands are correctly recognized as such by the Emacs reftex package (and, presumably, other similar editing tools).

4 Caveats

- The `\thlabel` command reuses the slot for page number in the `.aux` file. This should do no harm, as the latter is generally useless, I've never seen anybody refer to a numbered theorem by its page number. But to be on the safe side, here's an explicit warning: if you declare ⟨*foo*⟩ by `\thlabel{`⟨*foo*⟩`}`, you cannot use `\pageref{`⟨*foo*⟩`}` to get its page number (it will actually give the theorem name). If you absolutely need both, you can declare two labels for the same theorem: `\label{`⟨*foo-page*⟩`}\thlabel{`⟨*foo-name*⟩`}`.
- If `\thref{`⟨*bar*⟩`}` gives you a cryptic result like "12 3.15" instead of the theorem name, you probably forgot to use `\thlabel` instead of `\label` (see the previous point for explanation). Note that after you switch from one to the other, you may need to TEX the file twice in order for the change to propagate to the `.aux` file and back.

- The new referencing commands only work for theorem environments declared using the `\newtheorem` command. You *cannot* use them for e. g. tables, figures, equations, sections, and other environments.
- The implementation depends on some internals of the theorem typesetting macros. It is compatible with the theorem and amsthm packages, as well as the default theorem system in base LaTeX. It may fail for other theorem-like packages.

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