

Ph3 LaTeX Week 7: BibTeX

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1 Introduction

We have seen previously how to make a bibliography at the end of a document. That's fine for short bibliographies and one-off papers, but once you get into real research (beyond a simple term paper for a class, for example) you are going to want something that can handle a larger list of references, and you are going to want some way of accessing those references over and over again from multiple documents. Latex has a companion program called BibTeX that will manage a database of references that you will then call upon to incorporate citations into your document. BibTeX comes bundled with standard latex distributions, so you usually don't need to worry about installing it if you already have latex up and running.

I am going to include an example of a type of document many people make when assembling their references. It is formatted like an article in latex, but it is not meant for publication. It is a story of a particular research field and what each reference says and how it contributes to the overall narrative. It is separate from but uses the bibliographic database, which will be used over and over again by other papers that are intended for publication. You don't have to read the whole document I am providing, but I want you to see the general idea of it and get a feel for how many references you typically have to handle for a research specialty. In this case I had ninety-three papers at the time I wrote this summary, which is honestly a fairly small number as these things go.

When you start to do original academic research, if you haven't already, I encourage you to put together a similar document for yourself that covers the important background sources for your field. It will put your particular contribution in perspective, even if a senior professor or principal investigator defines your project for you, and it will help clarify in your own mind what is known and what remains to be done.

2 The bibliographic database

To use bibtex you first need to store your references in a separate, plain-text file (just like your source code) with a particular format and a name that ends in the appropriate extension (.bib) to identify it. The format for these entries varies depending on whether the source is an article, book, etc. A typical entry for an article looks like this.

```
@article{Callen51,
  Author = {Callen, H. B. and Welton, T. A.},
  Title = {Irreversibility and generalized noise},
  Journal = {Phys. Rev.},
  Volume = {83},
  Pages = {34-40},
  Year = {1951} }
```

The `@article` command alerts bibtex that the entry is for an article, and it has a number of arguments separated by commas. The first argument, `Callen51` in this example, is the label I used to identify this reference. It is what will go in the command to cite this reference in your paper, *e.g.* `\cite{Callen51}`. You can use any labeling scheme you like, but I prefer the last name of the first author followed by the last two digits of the year of publication. (Rare cases of degeneracy are handled by dashes with additional numbers, *e.g.* `Brown28-1` and `Brown28-2`.) The next six arguments specify the author list, title, etc., as you can see in the example.

There are many different classes of entry besides articles. I will list them in Appendix A at the end of this handout, along with their required and optional argument fields.

There are no requirements for the bibliographic database other than properly-formatted entries and the correct extension on its filename (.bib). No preamble or special environments are necessary. It's just a list of sources.

3 Calling on the database

To call on your database from an article you are writing, first you must include two lines in your article's source code, one to specify the style of the bibliography as it will appear in your document, and another to create the bibliography and identify the location and name of the bibliography database. Those two lines in my example look like this

```
\bibliographystyle{unsrt}
\bibliography{/Users/eric/Documents/Bibliographies/thermal-noise-story}
```

There are many bibliography styles, but the two you will find most useful are *plain* and *unsrt*. A *plain* bibliography is formatted "more or less as suggested by van Leunen in *A Handbook for Scholars* [1]. Entries are sorted alphabetically and are labeled with numbers." [2]. The *unsrt* style is the same as *plain*, except

that the entries are listed in the order of their citation, rather than alphabetically.

The `\bibliography{file}` command tells the compiler to create your list of references and where to find your bibliography database. It can have multiple arguments, if you want to cite references from multiple databases, and those multiple arguments are separated by commas without spaces. Note that I did not have to include the `.bib` extension in my filename, as that is understood.

Once you have your database constructed and those two lines in your source code, all you need to do in Overleaf is compile your code. If you put your `.bib` file in the same folder as the rest of your files for that project, all you have to do is list its filename in your `\bibliography{}` command. No additional path is necessary. If you are running a local latex distribution you will need to run latex on your source code to identify what citations need to be built, then run bibtex on your source code, the same file you processed with latex. This will produce an auxiliary file with a `.bbl` extension that latex will then use to construct your bibliography. Finally, you must run latex on your source code twice more, once to draw the necessary information from your `.bbl` file, and again to correctly number your citations. Again, Overleaf handles this process transparently for you, so if you are using it all you have to do is click Recompile once.

4 Exercise

Exercise 1: Make a bibliography database of the two books cited in this document, and the books cited at the end of the Week 5 handout. Use bibtex to cite them from your hello world document. Bibtex will sometimes adjust capitalization and formatting of titles to conform to a particular bibliography style. You can override this by enclosing words or letters you don't want changed in pointy brackets `{}`.

Note: Don't worry if the format of your references doesn't exactly match that of mine in the Week 5 handout. I used the bibliography environment there, which I often do with a small number of references I am not planning on reusing (much). In checking this exercise I constructed a `.bib` file and used bibtex for this handout, so your format should match that of the bibliography below.

References

- [1] Mary-Claire van Leunen. *A Handbook for Scholars*. Oxford University Press, New York, Oxford, 1992.
- [2] Leslie Lamport. *L^AT_EX: A Document Preparation System User's Guide and Reference Manual*. Addison-Wesley Publishing Company, 2nd. edition, 1994.

A Bibliographic database entry types [2]

1. **article** An article from a journal or magazine. Required fields: author, title, journal, year. Optional fields: volume, number, pages, year, note.
2. **book** A book with an explicit publisher. Required fields: author or editor, title, publisher, year. Optional fields: volume or number, series, address, edition, month, note.
3. **booklet** A work that is printed and bound, but without a named publisher or sponsoring institution. Required field: title. Optional fields: author, howpublished, address, month, year, note.
4. **conference** The same as **inproceedings**, included for compatibility with older versions.
5. **inbook** A part of a book, usually untitled; it may be a chapter (or other sectional unit) and/or a range of pages. Required fields: author or editor, title, chapter and/or pages, publisher, year. Optional fields: volume or number, series, type, address, edition, month, note.
6. **incollection** A part of a book with its own title. Required fields: author, title, booktitle, publisher, year. Optional fields: editor, volume or number, series, type, chapter, pages, address, edition, month, note.
7. **inproceedings** An article in a conference proceedings. Required fields: author, title, booktitle, year. Optional fields: editor, volume or number, series, pages, address, month, organization, publisher, note.
8. **manual** Technical documentation. Required field: title. Optional fields: author, organization, address, edition, month, year, note.
9. **mastersthesis** A masters thesis. Required fields: author, title, school, year. Optional fields: type, address, month, note.
10. **misc** Use this type when nothing else fits. Required fields: none. Optional fields: author, title, howpublished, month, year, note.
11. **phdthesis** A Ph.D. thesis. Required fields: author, title, school, year. Optional fields: type, address, month, note.
12. **proceedings** The proceedings of a conference. Required fields: title, year. Optional fields: editor, volume or number, series, address, month, organization, publisher, note.
13. **techreport** A report published by a school or other organization, usually numbered within a series. Required fields: author, title, institution, year. Optional fields: type, number, address, month, note.
14. **unpublished** A document with an author and title, but not formally published. Required fields: author, title, note. Optional fields: month, year.