COMP516 Practical 8: LaTeX (Bibliographies and BibTeX) [1] 2012-11-23

This practical continues last week's LaTeX practical. We have already seen how internal references work. In this practical you will learn how bibliographies and references to material listed in a bibliography are created in LaTeX documents.

If you are using TeXnicCenter to edit `small.tex`, whenever in the text below you are asked to run `pdflatex small` you can just press Control-F7 instead, to view the PDF just press F5, to run `bibtex small` just select from the `Build` menu `Current File -> BibTeX`, and similarly to run `makeindex small` select from the `Build` menu `Current File -> MakeIndex`.

LaTeX uses a dedicated list environment for bibliographies, called `thebibliography`. An example for the use of this environment is the following:

```
\begin{thebibliography}{1}
\bibitem{alur94}
Rajeev Alur and David~L. Dill.
\newblock A theory of timed automata.
\newblock {\em Theoretical Computer Science}, 126(2):183--235, April 1994.
\bibitem{halsall88}
Fred Halsall, editor.
\newblock {\em Data Communications, Computer Networks and {OSI}}.
\newblock Addison-Wesley Longman Publishing Co., Inc., Boston, {MA}, {USA},
  1988.
\end{thebibliography}
```

The default bibliography uses the ordinal-number style. That means the macros '`\bibitem{alur94}`' and `\bibitem{halsall88}` will be replaced by the numbers '1' and '2', respectively. At the same time, these numbers will be associated with the 'labels' `alur94` and `halsall88`.

The values associated with these 'labels' can be 'accessed' using the `\cite` macro. Examples of its use are:

```
In \cite{alur94}, Alur and Dill defined a natural model for analyzing
the behavior of real-time systems.
A lot of information about computer networks can be found in
\cite{metcalfe76, halsall88}.
```

Typesetting this text in the presence of the bibliography above would result in

In [2], Alur and Dill defined a natural model for analyzing the behavior of real-time systems. A lot of information about computer networks can be found in [5, 3].

The `thebibliography` environment together with `\cite` macros would allows us to emulate the approach to citing and the construction of bibliographies we have seen for MS Word in Practical 2. However, using the BibTeX tool, developed by Oren Patashnik and Leslie Lamport in 1985, we can make this process much more user-friendly. BibTeX assumes that all information on the sources that you use and might want to cite in one of your documents are maintained in a style-independent in one or more text-based 'bibliography files'. Just as for LaTeX files, there are specialised editors or even distributed database systems which allow you create and maintain BibTeX files, but a plain text editor is enough for a start.

In the following we will create a BibTeX file and see how it can be used to add references and a bibliography to `small.tex`. It is assumed that your file `small.tex` is currently in the

[1] This document can be found at

`http://cgi.csc.liv.ac.uk/~dominik/teaching/comp516/practicals/practical8.pdf`

state we have reached at the end of the last practical. If you do not have it anymore, you can download the already modified version of `small.tex` from `http://cgi.csc.liv.ac.uk/~dominik/teaching/comp516/misc/updated/small.tex`. The PDF file generated based on this source can found at `http://cgi.csc.liv.ac.uk/~dominik/teaching/comp516/misc/updated/small.pdf` You should check whether that more or less corresponds to the result you obtained yourself at the end of the last practical.

1. First, we want to achieve a similar result to Practical 2 using BibTeX. Add the following text to `small.tex` **before** `\printindex`.

   ```
   \subsection{Citations}
   A rigorous analysis of many common algorithms was first presented
   in the famous book \cite{knuth11}.
   Turing machine is a standard model of computation
   defined in 1936 \cite{turing12}.
   In \cite{alur94}, Alur and Dill defined a natural model for analyzing
   the behavior of real-time systems.
   A lot of information about computer networks can be found in
   \cite{metcalfe76, halsall88}.
   ```

   You may notice that this is the same text we have used in Practical 2, only that the references are now given using the `\cite` macro.

2. Save `small.tex` and execute `pdflatex small` in a Terminal window. You will see that LaTeX displays a number of warnings (page numbers and line numbers will depend on the exact state of `small.tex`):

   ```
   LaTeX Warning: Citation 'knuth11' on page 3 undefined on input line 117.
   LaTeX Warning: Citation 'turing12' on page 3 undefined on input line 118.
   LaTeX Warning: Citation 'alur94' on page 3 undefined on input line 120.
   LaTeX Warning: Citation 'metcalfe76' on page 3 undefined on input line 123.
   LaTeX Warning: Citation 'halsall88' on page 3 undefined on input line 123.
   LaTeX Warning: There were undefined references.
   ```

   These warnings indicate that LaTeX does not yet have any clue what sources you are referring to with your references.

3. Let's change that by creating a BibTeX file. You can download that file from

   `https://cgi.csc.liv.ac.uk/~dominik/teaching/comp516/misc/mysources.bib`

   You can just as well generate it using Zotero. For example, in Firefox, you just need to select Actions (the icon that looks like a cogwheel), select Export Library... and then BibTeX as the output format. Unfortunately, references to webpages such as Wikipedia have to be edited by hand, because Zotero does not export it in a way that is handled well by a typical BibTeX setup. Look into the `mysources.bib` file to see how such entries can be specified.

   The file `mysources.bib` contains four entries, two of *type* `article`, two of type book and one of type misc for the Wikipedia article. There are many more types available. Each entry has a **key**, e.g. `alur94`, `metcalfe76`. These must be identical to those used in the `\cite` macros in your LaTeX document. The order of entries does not matter, nor does the order of attributes like `author`, `title`, etc.

   Make sure the file `mysources.bib` is in the same directory where `small.tex` is currently stored.

4. Now we have to establish a connection between `small.tex` and `mysources.bib`. The connection should be a bibliography in *ordinal-number style* which should appear in our document in front of the index.

   To do this, add the text

   ```
   \bibliography{mysources}
   \bibliographystyle{plain}
   ```

   to `small.tex` **before** `\printindex`, and save the file. These two lines are intended to give BibTeX the information it needs to produce a bibliography for you. However, BibTeX will not read you LaTeX file to find this information, it will only read the file `small.aux`. So, we first have make sure that the information is passed from the file `small.tex` to the file `small.aux`.

5. We do so by executing `pdflatex small`. You should still get the same warnings regarding your citations and an additional warning

   ```
   No file small.bbl
   ```

   LaTeX has already picked up that there should be a bibliography and it expects that bibliography to be in a file `small.bbl`. But, since we haven't used BibTeX yet, this file doesn't exist.

6. Finally, everything is prepared to give BibTeX a try. Execute `bibtex small` in a terminal window. You should see the following diagnostic outpout:

   ```
   This is BibTeX, Version 0.99c (Web2C 7.5.4)
   The top-level auxiliary file: small.aux
   The style file: plain.bst
   Database file #1: mysources.bib
   ```

   This shows that everything was ok. If there would be references in `small.tex` for which there is no entry in `mysources.bib`, then you would see warnings like

   ```
   Warning--I didn't find a database entry for "BaaderHollunder1991"
   ```

   There is now also a file `small.bbl`. Have a look at it. You will see that it contains a `thebibliography` environment; that's your list of references.

7. Execute `pdflatex small` **twice** in a Terminal window. This should finally get rid of all the warnings. Why twice? In the first execution, LaTeX will process the `thebibliography` environment which associates ordinal numbers with the 'labels'/keys in the `cite` macros. Only during the second execution can LaTeX then replace those macros with the right numbers.

   Have a look at the PDF file and see what the typeset document looks like.

8. An alternative to the ordinal-number style that you have seen in one of our lectures is the *abbreviation style*. To change to this style is easy. **Replace** the line

   ```
   \bibliographystyle{plain}
   ```

   in `small.tex` by

   ```
   \bibliographystyle{alpha}
   ```

and save the file. Execute `pdflatex small`, then `bibtex small`, then `pdflatex small` twice.

Have a look at the PDF file and see how your references and the bibliography have changed.

9. The third style that you know is the *author-year style* for references. Edit `small.tex`, add

   ```
   \usepackage{natbib}
   ```

   directly after

   ```
   \documentclass{article}
   ```

   and change the bibliography style to `plainnat`, that is, change

   ```
   \bibliographystyle{alpha}
   ```

   to

   ```
   \bibliographystyle{plainnat}
   ```

   Save the file `small.tex` and update the PDF file for `small.tex` by executing the commands `pdflatex small.tex`, `bibtex small`, `pdflatex small.tex`.

10. See how the sample text and the list of references has changed. Note, for example, one of the sentences of the section on Citations now reads

    ```
    A rigorous analysis of many common algorithms was first presented in the famous
    book Knuth [2011].
    ```

    We know that this is stylistically wrong. A citation is given by the authors' names and the date enclosed in parentheses unless the authors' names are part of the sentence. See Lecture 7 for some examples. The correct way of citing is to use `\citet{key}` to obtain citations of the form `Jones et al. [1990]` and to use `\citep{key}` to obtain `[Jones et al., 1990]`. Make corrections to the Citations section so that all references are in a correct style. In this particular example the correct style is the following.

    ```
    A rigorous analysis of many common algorithms was first presented in the famous
    book [Knuth, 2011].
    ```

11. Extend the file `mysources.bib` by one more entry below:

    ```
    @INCOLLECTION{HHSS2006,
     AUTHOR        = {Horrocks, Ian and Hustadt, Ullrich and Sattler, Ulrike
     and Schmidt, Renate A.},
     TITLE         = {Computational Modal Logic},
     BOOKTITLE     = {Handbook of Modal Logic},
     PUBLISHER     = {Elsevier},
     YEAR          = {2006},
     EDITOR        = {Blackburn, Patrick and van Benthem, Johan and Wolter, Frank},
     CHAPTER       = {4},
     PAGES         = {181--245},
     MONTH         = nov,
    }
    ```

12. If you want an entry to appear in your bibliography, but you don't want to have a corresponding reference in your text, then LaTeX allows you to do so with the `\nocite` macro. For example, add

    ```
    \nocite{HHSS2006}
    ```

    to the section on Citations in `small.tex`. Save the file `small.tex` and update the PDF file for `small.tex` by executing `pdflatex small.tex`, `bibtex small`, and then `pdflatex small.tex` twice.

    Check that the typeset text in the section on Citations hasn't changed, but we have an additional entry in our bibliography.

13. If you want to quote a few words from a source, then you would put those words into double quotes and add a reference to the source at the appropriate point (e.g. after the end of the quote). LaTeX distinguishes between opening double quotes `` ` ` `` and closing double quotes `''`. Try to replicate the following sentences by using the key `dawson2009` to refer to [Dawson, 2009]:

    - According to Dawson [2009], rolling wave planning "is an incremental planning method".
    - Some experts in planning claim that it is "important to have a strategy for managing and chunking vision" [Dawson, 2009].

14. This form of quotation is inappropriate if you quote several sentences from a source. In such a case you would want to clearly separate the quoted text from the rest. You already know that in LaTeX you can use the `quote` environment to do so. You start such an environment using `\begin{quote}` and you end it using `\end{quote}`. Anything between those two is part of the quote. Try to replicate the following example:

    - Dawson [2009] states that

      > Before selecting any strategy, the project planning team should consider organizational climate and basic planning assumptions. Project planners hold many assumptions, or are influenced by organizational behaviours that reward certain assumptions.

15. This concludes today's practical. Have a look at the Wikipedia entry

    `http://en.wikipedia.org/wiki/BibTeX`

    to learn more about BibTeX. Also, have a look at `http://www.bibsonomy.org/` which is a social bookmarking site for research publications and from where you can copy references in a BibTeX format.