DAT110: The Methods Course
Quick Start Guide for LaTeX

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I. Introduction

LaTeX, or simply LaTeX in the following, is an often used system for creating scientific documents such as papers and reports. In LaTeX, it is efficient to work with at least two different source files, one for the text (`.tex`) and one for the bibliography (`.bib`).

II. Compiling LaTeX Files

We have the option to use figure files based on the (`.eps`) or the (`.pdf`) formats. The Encapsulated PostScript format used to be very common, but nowadays Adobe's Portable Document Format is overtaking EPS (read more about figures in Sec. III-D). As a default thus, to compile a LaTeX document that is based on PDF figures, we use the pdflatex software in the Linux environment. The following flow assumes we have one file `latex_guide.tex` that refers to a bibliography file.

```
pdflatex latex_guide
bibtex latex_guide
pdflatex latex_guide
pdflatex latex_guide
```

The bibliography is further described in Sec. IV.

III. Structure of .tex Files

Start by defining the document class, i.e., *conference* as far as reports in DAT110 are concerned. Then define any packages and style files that you wish to utilize. Individual parameters set in the previous step may be fine tuned, e.g., by adding

```
\setlength{\parskip}{.8ex}
\setlength{\parindent}{0ex}
```

we reset the parindent parameter, to avoid indentation of new paragraphs which otherwise is default for many document classes, and instead use a leading space.

Next we state title and authors followed by the document body which is defined to start and end using

```
\begin{document}
...
\end{document}
```

A. Abstract

Prior to the introduction we can add an abstract to summarize a report.

```
\begin{abstract}
...
\end{abstract}
```

B. Sections

In a report we typically find sections such as Introduction, Background, Method, a section describing the contributions, Evaluation and Results, Conclusion, and Bibliography. You can create an introductory section by using

```
\section{Introduction}
...
```

You can create a subsection within the section by using

```
\subsection{An In-Depth Study}
...
```

If you do not want to number a headings that you create, you can suppress numbering by adding a star

```
\subsection*{An In-Depth Study}
...
```

C. Tables

It takes some effort to create tables in LaTeX but in exchange the final result can be excellent, as shown in Table I.

TABLE I
Normalized Area and Energy Overheads

SRAM Block [rows x columns]	Area	Read Energy per Access	Total Line Fetch Energy
128 x 256b	1.91	4.15	1.43
256 x 128b	1.30	2.87	1.26
1024 x 32b	1.00	1.00	1.00

D. Figures

Remember to store all figures that you develop in a lossless format. As an example, Fig. 1 shows a figure that is stored in a vectorized format, while Fig. 2 shows what happens if you work with JPG files.

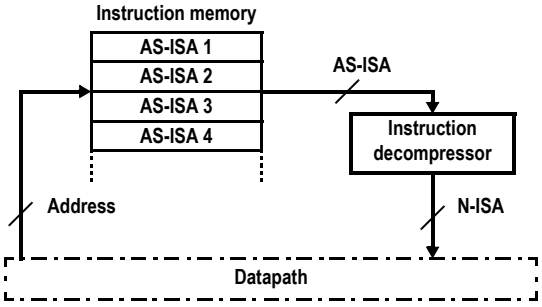

Fig. 1. This picture was initially stored in a lossless format.

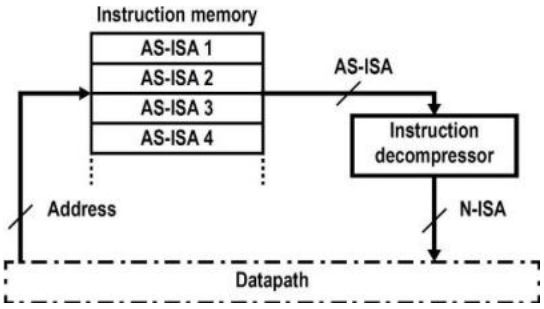

Fig. 2. In an intermediate step, this picture was stored in a lossy JPG format.

As far as software, Linux offers a few environments that support editing block diagram figures. An older alternative is `xfig`, while a newer one is `inkscape`.

IV. Using a Bibliography

You collect all reference information under different BibTeX items in a `.bib` file. The reference list, as it appears in the report, will be organized and formatted in a way that depends on the chosen bibliography style. Since the IEEE bibliography style is a common style in our technical area, we use this. The two lines below are given at the end of this file, invoking first the bibliography style and then calling the `.bib` file:

```
\bibliographystyle{IEEE}
\bibliography{refs}
```

For textbook references, you add a book-type item in the `.bib` file by giving the following essential entries of information:

```
@book{*,
  AUTHOR =     {*},
  TITLE =      {*},
  YEAR =       {*},
  PUBLISHER = {*}
}
```

If you need to make a reference to a scientific paper in a journal, you use an article-type item in the `.bib` file containing, at least, the four entries specified below:

```
@article{*,
  AUTHOR =     {*},
  TITLE =      {*},
  JOURNAL =    {*},
  YEAR =       {*}
}
```

Finally, when you want to include a reference to a scientific paper published at a conference (in a conference proceedings), you use the following inproceedings-type item in the `.bib` file. Note that the booktitle entry, which is one of the four essential entries, is the name of the conference.

```
@inproceedings{*,
  AUTHOR =        {*},
  TITLE =         {*},
  BOOKTITLE =     {*),
  YEAR =          {*}
}
```

Examples, including a richer set of entries, e.g., page numbers, of all three types of BibTeX items above are available in the `refs.bib` file that is provided. We conclude this quick guide by making one reference to one textbook that offers more information about LaTeX [1], to one journal paper that describes aspects of TLM [2], and to one conference paper that addresses EDA for FPGA [3].

References

[1] P. Flynn, *Formatting Information: A Beginner's Guide to LaTeX*, 5th ed. Silmaril Corporation, 2011. [Online]. Available: http://latex.silmaril.ie/formattinginformation/

[2] G. Schirner and R. Dömer, "Quantitative analysis of the speed/accuracy trade-off in transaction level modeling," *ACM Trans. Embed. Comput. Syst.*, vol. 8, no. 1, pp. 4:1–4:29, Dec. 2008.

[3] M. Jose, Y. Hu, and R. Majumdar, "On power and fault-tolerance optimization in FPGA physical synthesis," in *Proc. of IEEE/ACM Int. Conf. on Computer-Aided Design (ICCAD)*, 2010, pp. 224–229.