LaTeXand Sweave
BCB 504: Applied Bioinformatics

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Outline

TeX, LaTeXand BibTeX
Reproducible Research
Web Resources

What is TeX, LaTeXand BibTeX
TeX
LaTeX
BibTeX

What is TeX, LaTeXand BibTeX

TeX with LaTeX and BibTeX macros are a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. LaTeX is the de facto standard for the communication and publication of scientific documents. BibTeX is a tool and file format used to describe and process references.

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What is TEX, LATEXand BibTeX
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History - TEX I

TEX (= tau epsilon chi, and pronounced similar to "blecch"),
current version 3.1415926.

In the late 1970s, Donald Knuth was revising the second volume of
his multivolume magnum opus "*The Art of Computer
Programming*", got the galleys, looked at them, and said
(approximately) "blecch"! Around the same time, he saw a new
book by Patrick Winston that had been produced digitally, and
ultimately realized that typesetting meant arranging 0's and 1's
(ink and no int) in the propper pattern, and said (approximately),

> *As a computer scientist, I really identify with patterns of
> 0's and 1's; I ought to be able to do something about this*

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History - TeX II

, so he said out that were the traditional rules for typesetting math, what constituted good typography, and as much as he could about type design. A project he originally thought would take 6 months ended up taking almost 10 years.

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What is TₑX, LᴬTₑXand BibTeX
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LᴬTₑX

LᴬTₑX is a set of macros build on top of TeX (current version is LᴬTₑX2e, but LᴬTₑX3 is close to being ready.)

LᴬTₑX is based on the idea that authors should be able to focus on the content of what they are writing without being distracted by its visual presentation. In preparing a LᴬTₑX document, the author specifies the logical structure using familiear concepts such as chapter, section, table, figure, etc., and lets the LᴬTₑX system worry about the presentation of the structures. It therefor encourages the separation of layout from content while still allowing manual typesetting adjustments where needed. This is similar to how HTML with CSS works.

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BibTeX

BibTeX is a reference management software for formatting lists of references. The BibTeX tool can be used together with the LATEXdocument preparation system.

BibTeX makes it easy to cite sources in a consistent manner, by separating bibliographic information from the presentation of this information.

Reproducible Research

Employing methods for reproducable research will help us by:

- Reproducing figures in the revisions of a paper, to create earlier results again in a later stage of our research, etc.

- Helping other people who want to do research in the field start from the current state of the art, instead of spending months trying to figure out what was exactly done in a certain paper. It is much easier to take up someone else's work if documented code is also available.

- It highly simplifies the task of comparing a new method to existing methods. Results can be compared more easily, and one is also sure that the implementation is the correct one.

Sweave and Reproducible Research

Sweave is a tool in the statistical programming language R that enables integration of R code into LATEX. The purpose is

to create dynamic reports, or publications, which can be updated automatically if data or analysis change.

Because Sweave files together with any external R files that might be sourced from them and the data files contain all the information necessary to trace back all steps of the data analysis, Sweave also has the potential to make research more transparent and reproducible to others.

LATEXResources

- Main site: http://www.LaTeX-project.org/
- TeX User Group (tug): http://www.tug.org/
- Comprehensive TeX Archival Network:
  http://www.ctan.org/
- BibTeX: http://www.bibtex.org
- LATEXfor Biologists:
  http://www.lecb.ncifcrf.gov/~toms/latex.html
- CRAN task view for reproducable research:
  http://http://cran.r-project.org/web/views/
  ReproducibleResearch.html
- Sweave:
  http://www.stat.uni-muenchen.de/~leisch/Sweave/