

LaTeX Exercise 2

Tools around LaTeX



Any Questions?

- LaTeX – Some further hints ...
- BibTeX and biblatex – Some further hints ...
- Figures and Diagrams – Handling figures in LaTeX
- Lyx – A WYSIWYM-Frontend for LaTeX

- [1] LaTeX @ WikiBooks
<http://en.wikibooks.org/wiki/LaTeX/>
- [2] LaTeX Page Styles
<http://www.personal.ceu.hu/tex/pagestyl.htm>
- [3] Carsten Heinz, Brooks Moses: The Listings Package
<ftp://ftp.tex.ac.uk/tex-archive/macros/latex/contrib/listings/listings.pdf>

Some further hints

Information Sources for LaTeX

- ▶ Information about all packages:
texdoc <packagename>
- ▶ TU Corporate Design documentation (German only)
texdoc tudscr
- ▶ Guidelines for Scientific Writing with LaTeX (German only)
texdoc treatise

Recommended packages: see **texdoc treatise**

- ▶ tex.stackexchange.com
beware of outdated information!

LaTeX and Character Encoding

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Academic Skills in Computer Science (ASICS)

▶ Character encoding problems can be avoided with Unicode Versions of LaTeX:

▶ XeTeX

- All input is UTF-8
- Developed for non-latin character sets

▶ LuaTeX

- Similar to XeTeX, but with Lua scripting support

```
\begin{luacode}
```

```
...
```

```
\end{luacode}
```

```
\directlua{ ... }
```

Specify the **style of page numbers**

```
\pagenumbering{arabic}
```

- arabic: Arabic numerals (1, 2, 3, ...)
- roman: Lowercase roman numerals (i, ii, iii, iv, ...)
- Roman: Uppercase roman numerals (I, II, III, IV, ...)
- alph: Lowercase letters (a, b, c, ...)
- Alph: Uppercase letters (A, B, C, ...)

You can even **use multiple styles** within the same document

Listings

```
\usepackage{lstlistings}
```

Package import in preamble!

```
\lstset{language=Java}
```

Language for syntax highlighting

```
\begin{lstlisting}[label={list1},caption={Listing  
Caption}]
```

```
public class Main {
```

```
    public static void main(String[] args) {
```

```
        System.out.println("Hello World");
```

```
    }
```

```
}
```

```
\end{lstlisting}
```



LaTeX2PDF Compiler

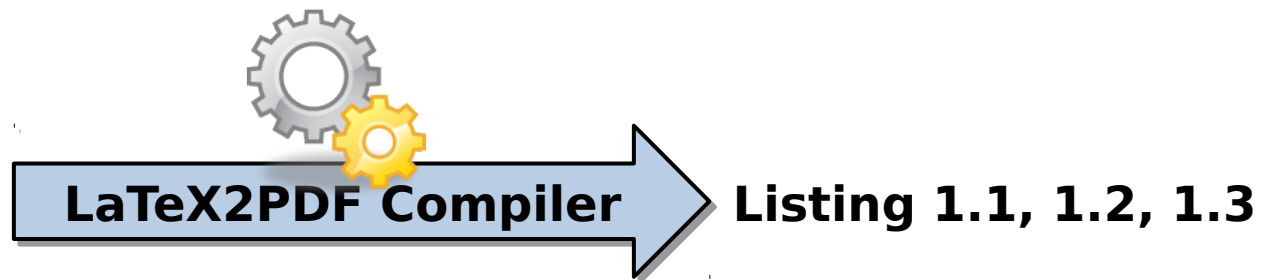
```
public class Main {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```

- Configures **appearance**
- Can be used
 - In the **preamble**
 - **In front of each listing**
 - Or both
 - Latest configs are valid
- `\lstset{language=Java}`

Listings – Number by Chapter

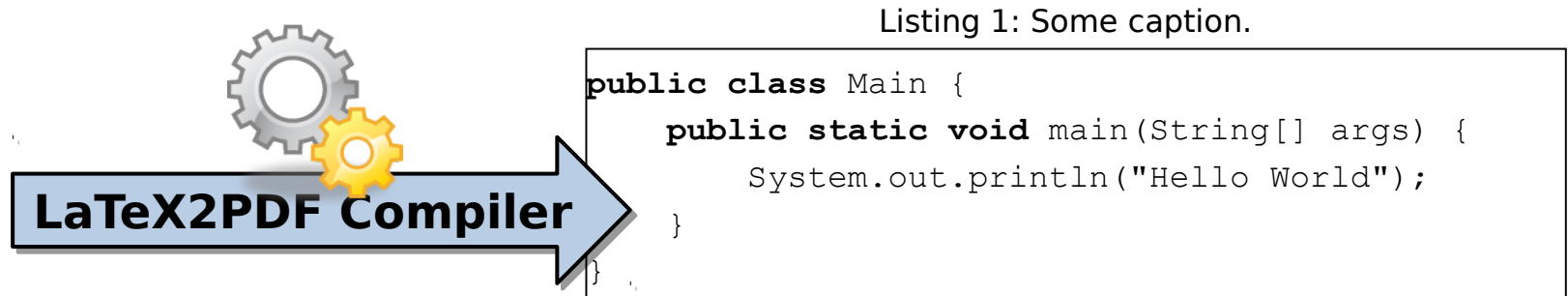
- If each chapter shall have its own Listings:

```
\lstset{numberbychapter = true}
```



Listings – Position of Caption

- `\lstset{captionpos = t}` (default)

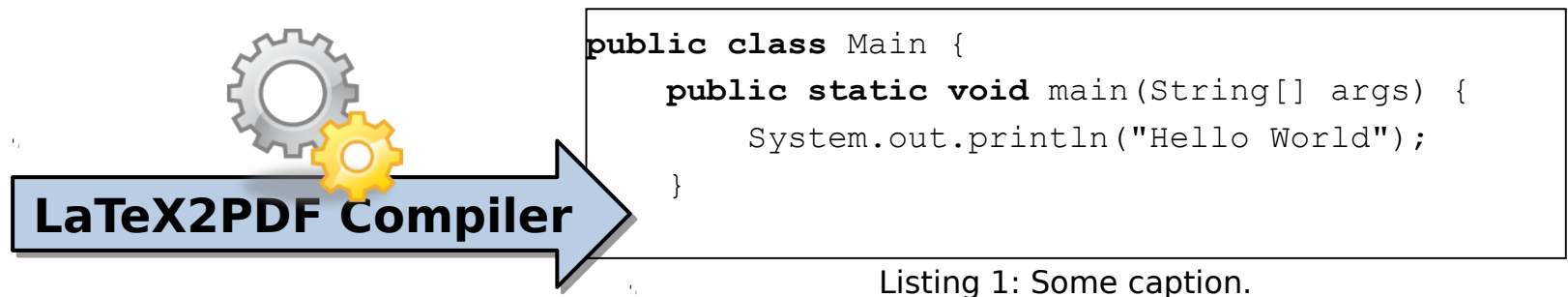


The diagram illustrates the process of compiling a LaTeX document. On the left, a blue arrow labeled "LaTeX2PDF Compiler" points to a code listing. Above the arrow are two interlocking gears, one grey and one yellow. The code listing is enclosed in a black box and contains the following Java code:

```
public class Main {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```

Below the code box, the caption "Listing 1: Some caption." is positioned at the top, demonstrating the default behavior of the `\lstset{captionpos = t}` command.

- `\lstset{captionpos = b}`



The diagram illustrates the process of compiling a LaTeX document. On the left, a blue arrow labeled "LaTeX2PDF Compiler" points to a code listing. Above the arrow are two interlocking gears, one grey and one yellow. The code listing is enclosed in a black box and contains the following Java code:

```
public class Main {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```

Below the code box, the caption "Listing 1: Some caption." is positioned at the bottom, demonstrating the effect of the `\lstset{captionpos = b}` command.

Listings – Line Numbers

```
\lstset{
  numbers=left,
  numberstyle=\tiny,
  stepnumber=2,
  numbersep=5pt
}
```

Position
Font Size
Steps
Space between numbers and lst.



```
1 public class Main {
   public static void main(...) {
3     System.out.println("...");
   }
5 }
```

Listings – Line Numbers

- `\begin{lstlisting}[firstnumber=100]`



```
100 public class Main {  
    public static void main(...) {  
102         System.out.println("...");  
        }  
104     }
```

- `\begin{lstlisting}[firstnumber=last]`



```
105 public class Main {  
    public static void main(...) {  
107         System.out.println("...");  
        }  
109     }
```

Listings – Appearance of Code

```
\lstset{
  basicstyle=\small,
  keywordstyle=\color{black}\bfseries,
  identifierstyle=\color{blue},
  commentstyle=\color{white},
  stringstyle=\ttfamily,
  showstringspaces=false
}
```



```
public class Main {
  public static void main(String [] args) {
    System.out.println("Hello World");
  }
}
```

Listings – Syntax Highlighting

- `\lstset{language = Java}`
- Sometimes insufficient, e.g., extensions like AspectJ
- `\lstset{keywords = {public, class, aspect, pointcut, ...}}`
- Or even better:
- `\lstset{language = Java, morekeywords = {aspect, pointcut, ...}}`

Listings – Import of Listings

- For large listings, it's easier to import them as a whole file:
- ```
\lstset{language = Java}
\lstinputlisting{largeexample.java}
```

# Your Own Commands

- A typical useful command (defined in header):

```
% requires \usepackage{color}
\newcommand{\todo} [1]
 {\color{red}~\textbf{TODO #1}~\color{black}}
}
```

Placeholder for content.

- **Usage:**

Bla bla. \todo{Write something on X here.} Bla.



Bla bla. **TODO Write something on X here.** Bla.

- One of the top most advantages of LaTeX are the **math packages**

- `\usepackage{mathtools}`

- **In text**, use the `$` delimiter:

`$4 * 3 = 12$`

- **Equations:**

```
\begin{equation}
 4 * 3 = 12
 \label{equ1}
\end{equation}
```

$$4 * 3 = 12$$

- **Quantors [1]:**

`\forall x \in X, \quad \exists y \leq \epsilon`

$$\forall x \in X, \quad \exists y \leq \epsilon$$

- **Greek letters [1]:**

`\alpha, \beta, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \Phi`  
`\varphi, \Phi`

$$\alpha, \beta, \gamma, \Gamma, \pi, \Pi, \phi, \varphi, \Phi$$

- **Fractions [1]:**

`\frac{n!}{k!(n-k)!} = \binom{n}{k}`

$$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

- **Sums [1]:**

`\sum_{i=1}^{10} t_i`

$$\sum_{i=1}^{10} t_i$$

## Some further hints ...

- ▶ Do not use Bibtex, it's outdated!
- ▶ Biggest Problem: no real unicode support!
  
- ▶ **Biber** with biblatex:
  - Biber is conceptually a BIBTEX replacement for Biblatex.[...] Functionally, Biber offers a superset of BIBTEX's capabilities [...]. Biber's primary role is to support Biblatex by performing the following tasks:
    - Parsing data from datasources
    - Processing cross-references, entry sets, related entries
    - Generating data for name, name list and name/year disambiguation
    - Structural validation according to Biblatex data model
    - Sorting reference lists
    - Outputting data to a .bbl for Biblatex to consume

**[texdoc biber]**

- ▶ Do NOT use Bibtex, it's outdated!
- ▶ Biber with **biblatex**:
  - *The package is a complete reimplementaion of the bibliographic facilities provided by LaTeX. A custom backend Biber by default is used which processes the BibTeX format data files and them performs all sorting, label generation (and a great deal more). [texdoc biblatex]*
- ▶ `\usepackage[backend=biber]{biblatex}`
- ▶ Bibliography has the same format
- ▶ Call biber instead of biblatex



```
@INPROCEEDINGS{Reimann2012a,
 author = {Reimann, Jan and Wilke, Claas and Demuth,
 Birgit and Muck, Michael and Aßmann, Uwe},
 title = {Tool Supported OCL Refactoring Catalogue}},
 booktitle = {Workshop on OCL and Textual Modelling
 (OCL 2012)},
 year = {2012}
}
```

**Citation in document:** `\cite{Reimann2012a}`

**Printing the bibliography:** `\bibliographystyle{abbrv}`  
*%myBib.bib contains the entries*  
`\bibliography{myBib}`

## Citation in document:

```
\cite{Rei2012}
```

[RWB+12] or [1]

## Citation with page number:

```
\cite[pp. 1-3]{Rei2012}
```

[RWB+12, p. 1-3] or [1, p. 1-3]

## Multiple citations:

```
\cite{Rei2012,Ass03,Ass04}
```

[RWB+12,Ass03,Ass04] or [1-3]

## Kind of Citations

In `\cite{Rei2012}` and `\cite{Ass03}` ...

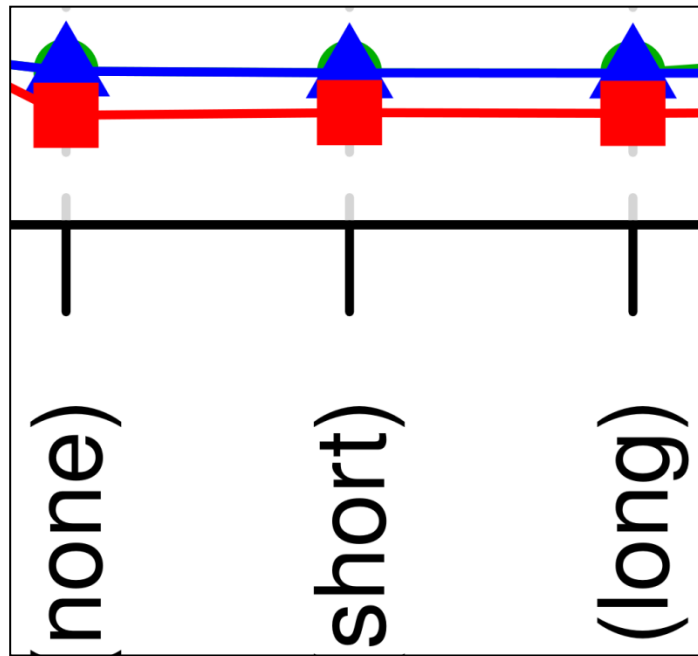
```
\bibliographystyle{abbrv}
```

```
\bibliography{myBib}
```

| Style | Appearance                  |
|-------|-----------------------------|
| abbrv | In [2] and [1] ...          |
| alpha | In [RWD+12] and [Aßm03] ... |
| unsrt | In [1] and [2] ...          |

# Handling Figures in LaTeX

## Vector vs. Bitmap Graphics



## Vector vs. Bitmap

- LaTeX **output** is **often released digitally**
  - **Users can zoom in!**
  - Use **vector graphics wherever possible**
  - Or use **high resolution** bitmaps!
- You can **export PDF files** from
  - Excel
  - PowerPoint
  - Inkscape
- Use **bitmaps only when necessary** (e.g. Screenshots)

# Diagrams in LaTeX

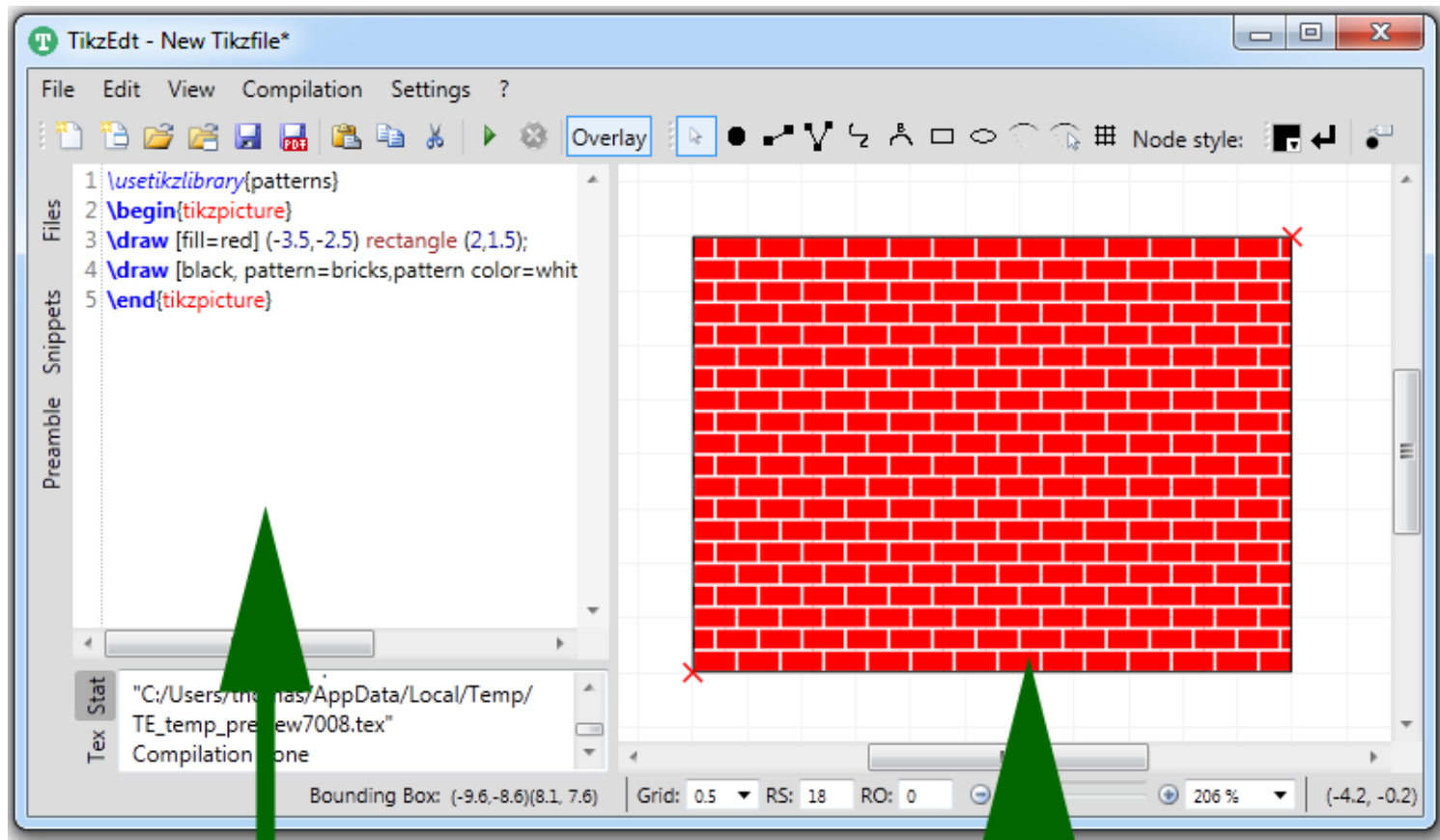
- TikZ and pgfplots
- PsTricks
  - Does not work with pdfLaTeX
  - Use package **auto-pst-pdf**

- ▶ Vector graphics drawn in LaTeX
  - **texdoc tikz**
  - Useful for drawing graphs
- ▶ Many packages for special diagram types
  - UML
  - Petri Nets
  - ...
- ▶ Plot graphs with pgfplots



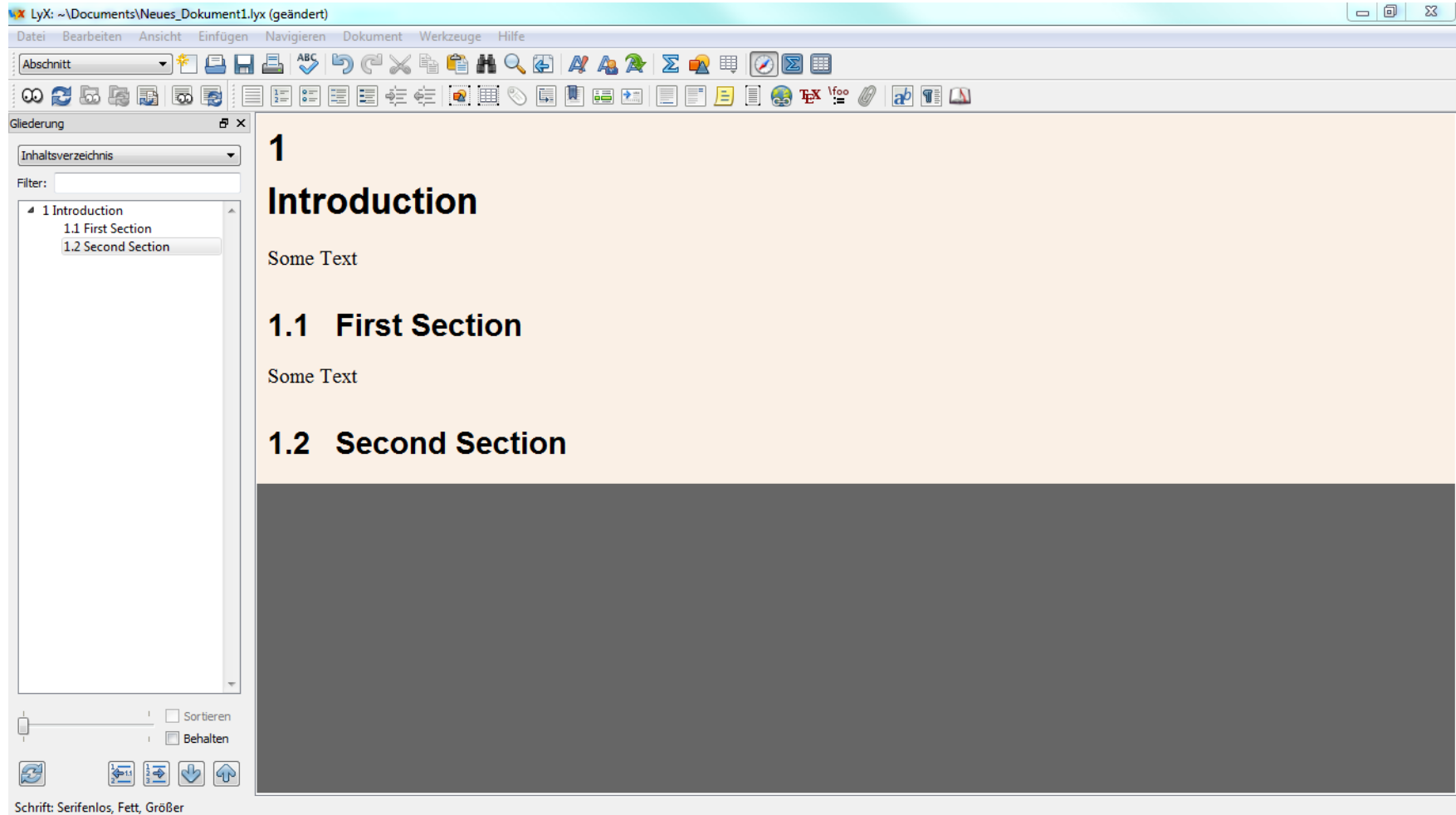
# TikZed

- ▶ Arranging complicated, but a nice tool exists: tikzedt
- ▶ <http://www.tikzedt.org/>



# A WYSIWYM Editor for LaTeX

- LaTeX is not a WYSIWYG-Editor (What you see is what you get)
  - Quasi-WYSIWYG
  
- Alternatively: WYSIWYM (What you see is what you mean)-Frontend
  
- LyX is a **WYSIWYM-Frontend for LaTeX**
  - Uses its own document format (\*.lyx)
  - LyX-Code is compiled into LaTeX
  - LyX is a LaTeX precompiler
  
- <http://www.lyx.org/>



The screenshot displays the LyX application window. The title bar reads "LyX: ~\Documents\Neues\_Dokument1.lyx (geändert)". The menu bar includes "Datei", "Bearbeiten", "Ansicht", "Einfügen", "Navigieren", "Dokument", "Werkzeuge", and "Hilfe". The toolbar contains various icons for file operations, editing, and navigation. On the left, the "Gliederung" (Table of Contents) panel is open, showing a hierarchical list of sections: "1 Introduction", "1.1 First Section", and "1.2 Second Section". The main editing area on the right shows the rendered document structure: a large heading "1 Introduction", followed by the text "Some Text", then a sub-heading "1.1 First Section" with "Some Text" below it, and finally "1.2 Second Section". At the bottom of the window, there are checkboxes for "Sortieren" and "Behalten", and a status bar indicating "Schrift: Serifenlos, Fett, Größer".

Configuration of used document class

- (Document -> Settings / Dokumente Einstellung)
- **Easy move** of whole **sections** and **paragraphs**
- **Easy work** with **multiple** lyx **files** (e.g. for each section/chapter)
- Integrated **spell checker**
- Integrated **change management**
- Integrated **formula editor**

# The End

- ▶ Initial slide set was done by Claas Wilke
- ▶ Some contributions by Johannes Mey