LaTeX and Tools around it

DRESDEN concept
Exzellenz aus Wissenschaft und Kultur

Last Week

Any Questions?

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Agenda

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

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Last Week

[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

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Some further hints

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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  beware of outdated information!

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LaTeX and Character Encoding

- Character encoding problems ca 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{ … }
```

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Page Numbering

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

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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}
```

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


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Listings - \lstset

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

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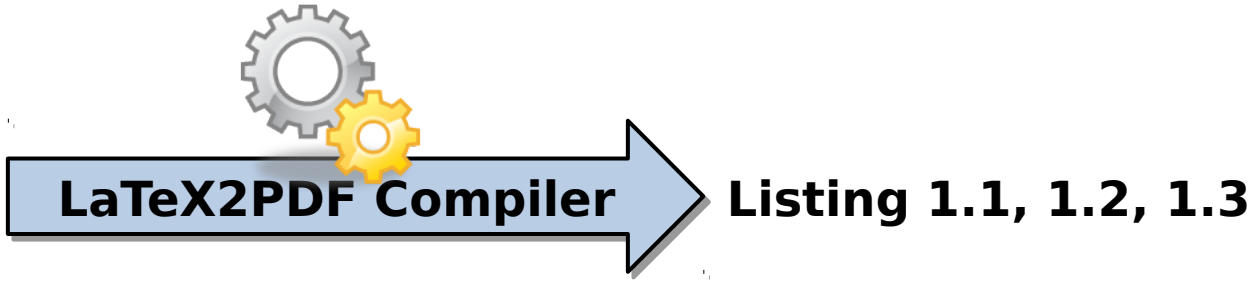
Listings – Number by Chapter

- If each chapter shall have its own Listings:

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



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Listings – Position of Caption

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

Listing 1: Some caption.

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

- `\lstset{captionpos = b}`

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

Listing 1: Some caption.

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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  }
```

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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 }
```

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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");
    }
}
```

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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, …}`

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Listings – Import of Listings

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

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Your Own Commands

- A typical useful command (defined in header):

Placeholder for content.

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

- **Usage**:

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

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

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LaTeX and Math

- 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}
```

$$4 * 3 = 12$$

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LaTeX and Math

- **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
  ```

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

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LaTeX and Math

- **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
  ```
  $$\sum_{i=1}^{10} t_i$$

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Some further hints ...

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BibLatex and Biber

- 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]`

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BibLatex and Biber

- Do NOT use Bibtex, it's outdated!

- Biber with **biblatex**:
  - *The package is a complete reimplementation 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

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Bibliography


```
@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}
```

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Bib(La)TeX Citations

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]

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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] …

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Handling Figures in LaTeX

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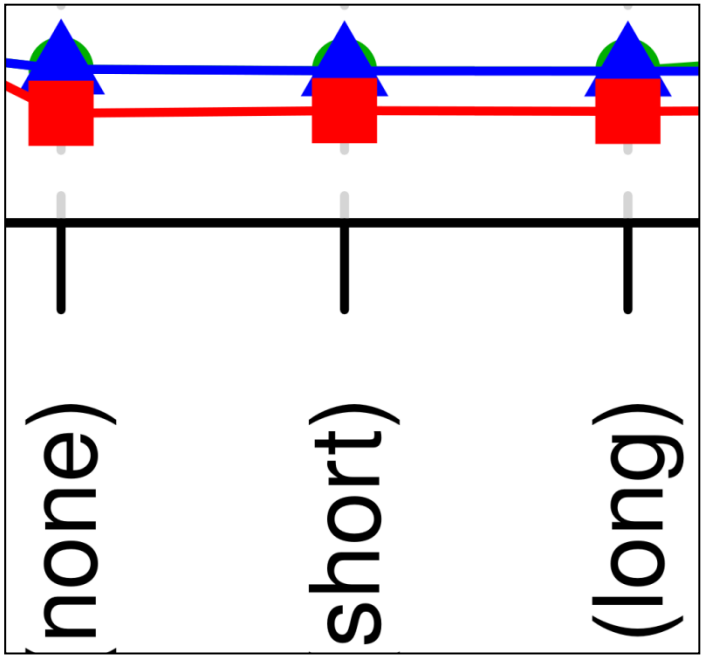
Vector vs. Bitmap Graphics



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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)

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Diagrams in LaTeX

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

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TikZ

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

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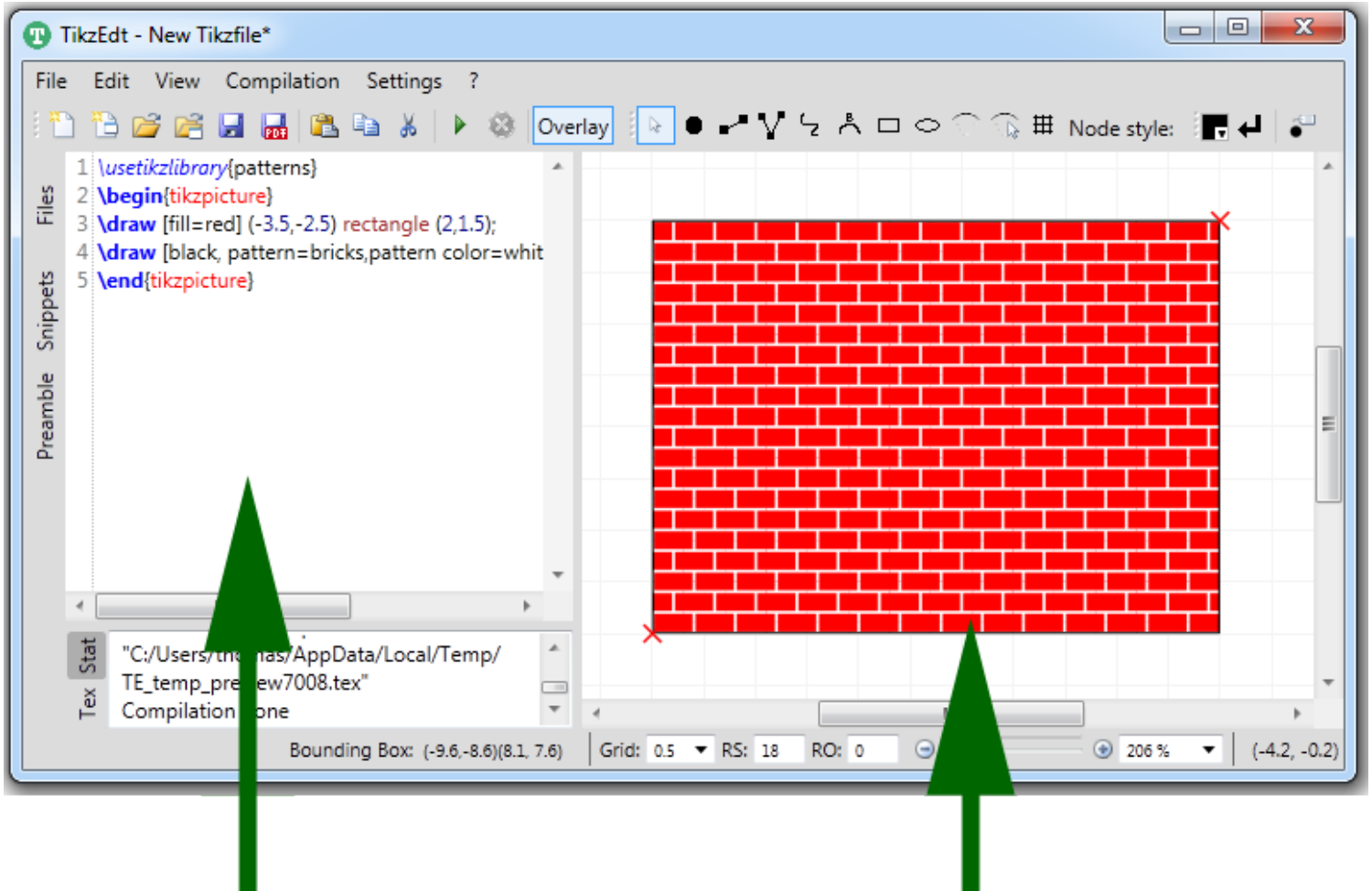
TikZedt

- Aranging compicated, but a nice tool exists: tikzedt
- http://www.tikzedt.org/



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A WYSIWYM Editor for LaTeX

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LyX

- 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/

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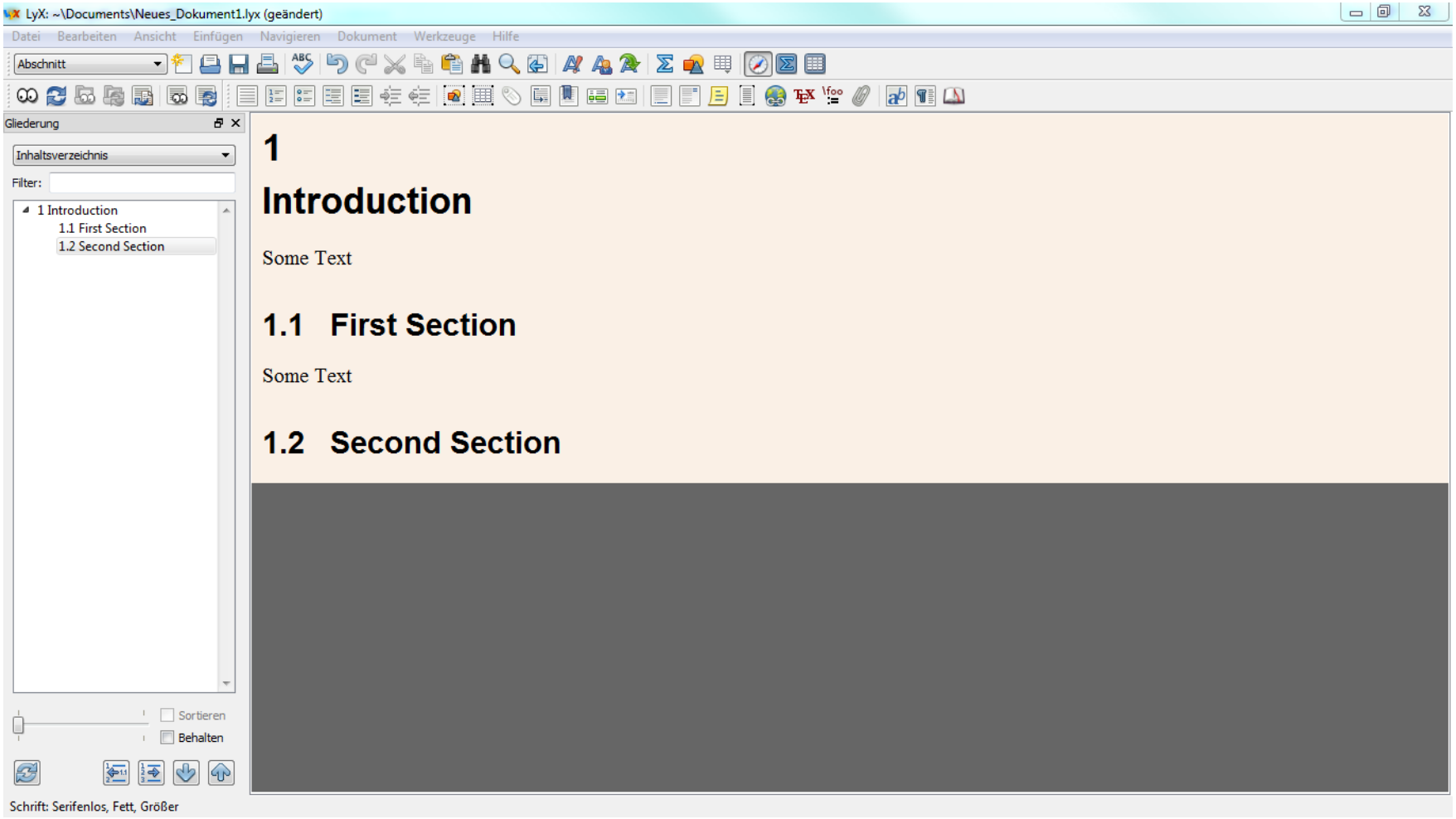
LyX



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LyX

Configuration of used document class

- (Document –> Settings / Dokumente Einstellung)
- **Easy moval** 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**

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The End

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

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