

# L<sup>A</sup>T<sub>E</sub>X

## Introduction

Dr. Julian Huber - Translated from Malte Schmitz <sup>1</sup>

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<sup>1</sup><https://github.com/malteschmitz/latex-talk>

# Learning Goals

- ▶ get to know  $\text{\LaTeX}$
- ▶ structure von  $\text{\LaTeX}$ -documents, -commands and -environments.
- ▶ application of  $\text{\LaTeX}$  for papers and theses.
- ▶ where to use and not to use  $\text{\LaTeX}$ .

# Table of Content

## What is $\LaTeX$ ?

- Context

- $\LaTeX$ -Documents

## Installing $\LaTeX$

- Toolbox

## Using $\LaTeX$

- Markups, Commands and Environments

## Structure and Preamble

- Structure of a Document

- Dokument classes

- Loading packages

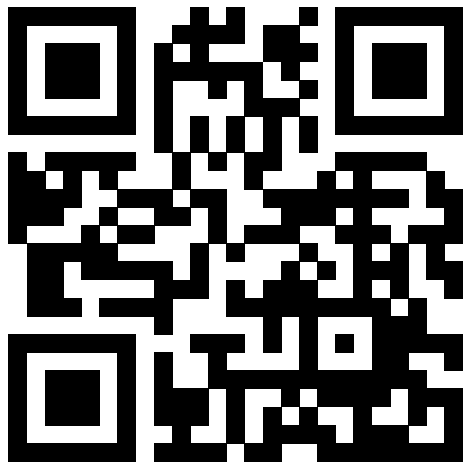
## Theses

- Modular Documents and Sections

- Sections, Math, Lists, Tables and Figures

- Bibliographies with  $\text{Bib}\TeX$

## Website



[mlte.de/latex](https://mlte.de/latex)

- ▶ German original of this presentation.
- ▶ script for this presentation.
- ▶ links to  $\text{\LaTeX}$  distributions, IDEs and further reading.

# Dimensions of a Document

Content is the meaning of a document.

# Dimensions of a Document

Content is the *meaning* of a document.

Structure is the *outline* of a document.

# Dimensions of a Document

**Content** is the meaning of a document.

**Structure** is the outline of a document.

**Form** is the apperance of a document.

# Structure vs. Form

## Example (Structure)

- ▶ heading
- ▶ grouping
- ▶ listing

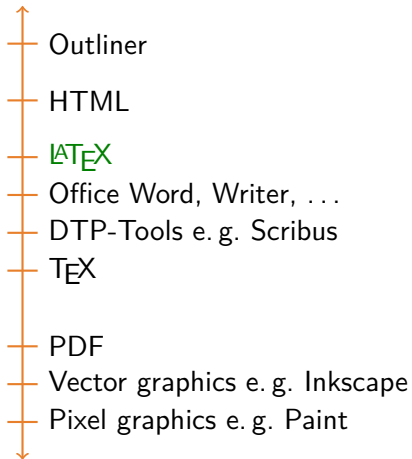
## Example (Form)

- ▶ 13,37 cm wide coloured box
- ▶ 0,6 cm indentation
- ▶ bullet ▶ at beginning of the column



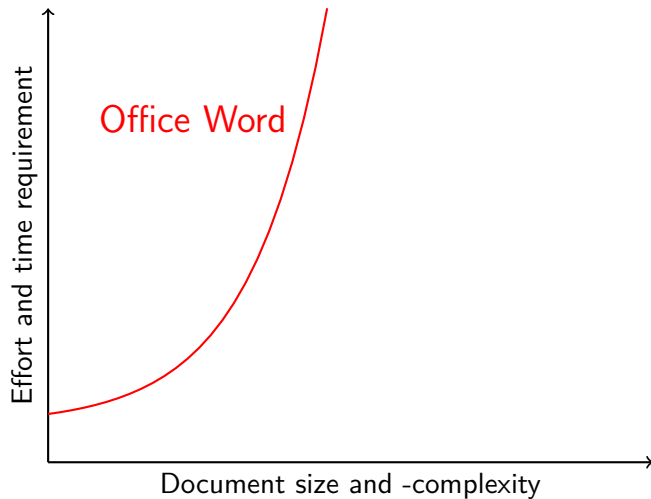
# Markdown Languages

Struktur

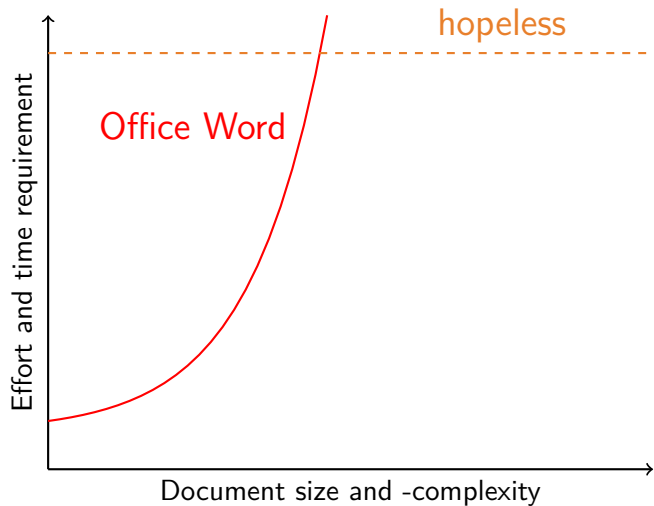


Form

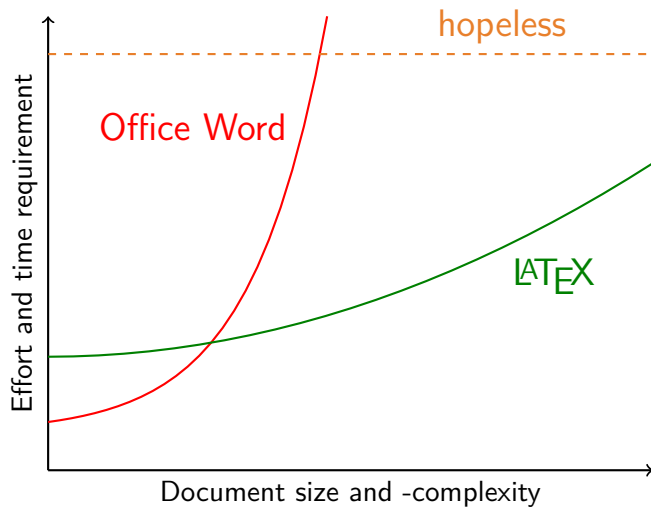
## $\text{\LaTeX}$ vs. Office Word



# $\text{\LaTeX}$ vs. Office Word



# $\text{\LaTeX}$ vs. Office Word



# A $\text{\LaTeX}$ -Document

- ▶ are pure text files with content

```
Die Ermordung  
Iulius Caesars  
  
Marcus Iunius Brutus  
Iden des März  
  
Einleitung  
  
Vor dem Senatsgebäude stieß  
Caesar nochmals auf den Seher  
Spurinna und stellte  
abschätzig fest "Die Iden  
des März sind da!", worauf  
dieser entgegnete:  
"Da sind sie, aber noch  
nicht vorbei."
```

Content

# A L<sup>A</sup>T<sub>E</sub>X-Document

- ▶ are pure **text files** with **content**
- ▶ also contain **structure** of the content

```
\documentclass{scrartcl}
\title{Die Ermordung
  Iulius Caesars}
\author{Marcus Iunius Brutus}
\date{Iden des März}
\begin{document}
  \maketitle
  \section{Einleitung}
  Vor dem Senatsgebäude stieß
  Caesar nochmals auf den Seher
  Spurinna und stellte
  abschätzig fest \enquote{Die
  Iden des März sind da!},
  worauf dieser entgegnete:
  \enquote{Da sind sie, aber
  noch nicht vorbei.}
\end{document}
```

Content &  
Structure

# A $\text{\LaTeX}$ -Document

- ▶ are pure **text files** with **content**
- ▶ also contain **structure** of the content
- ▶ typesetting is done by  $\text{\LaTeX}$  **separately**

```
\documentclass{scrartcl}
\title{Die Ermordung
  Iulius Caesars}
\author{Marcus Iunius Brutus}
\date{Iden des März}
\begin{document}
  \maketitle
  \section{Einleitung}
  Vor dem Senatsgebäude stieß
  Caesar nochmals auf den Seher
  Spurinna und stellte
  abschätzig fest \enquote{Die
  Iden des März sind da!},
  worauf dieser entgegnete:
  \enquote{Da sind sie, aber
  noch nicht vorbei.}
\end{document}
```

Content &  
Structure

→  $\text{\LaTeX}$  →

## Die Ermordung Iulius Caesars

Marcus Iunius Brutus

Iden des März

### 1 Einleitung

Vor dem Senatsgebäude stieß Caesar nochmals auf den Seher Spurinna und stellte abschätzig fest „Die Iden des März sind da!“, worauf dieser entgegnete: „Da sind sie, aber noch nicht vorbei.“

typeset  
Document

## What You need to start

- ▶ **Distribution** that compiles the text



e.g., TexLive  
MikTex

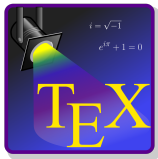


# What You need to start

- ▶ **Distribution** that compiles the text
- ▶ user friendly **Editor** to edit the  $\text{\LaTeX}$ -Document



e.g., TexLive  
MikTeX



e.g., TexStudio  
Texmaker

# What You need to start

- ▶ **Distribution** that compiles the text
- ▶ user friendly **Editor** to edit the  $\text{\LaTeX}$ -Document
- ▶ **Literature tool** if You want to manage many citations



e.g., TexLive  
MikTeX



e.g., TexStudio  
Texmaker



e.g., JabRef  
Citavi

# What is $\text{\LaTeX}$



Using  $\text{\LaTeX}$



# Structure of a Document

```
\documentclass{scrartcl}

\usepackage[ngerman]{babel}
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}

\KOMAoptions{%
  parskip=full,%
  fontsize=12pt}

\begin{document}
  Franz jagt im komplett
  verwahrlosten Taxi quer
  durch Bayern.
\end{document}
```

# Structure of a Document

```
\documentclass{scrartcl}
```

```
}Dokument class
```

```
\usepackage[ngerman]{babel}
```

```
\usepackage[utf8]{inputenc}
```

```
\usepackage[T1]{fontenc}
```

```
\KOMAoptions{%  
  parskip=full,%  
  fontsize=12pt}
```

```
\begin{document}
```

```
  Franz jagt im komplett  
  verwahrlosten Taxi quer  
  durch Bayern.
```

```
\end{document}
```

# Structure of a Document

```
\documentclass{scrartcl}
```

}Dokument class

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\usepackage[ngerman]{babel}
```

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\usepackage[utf8]{inputenc}
```

```
\usepackage[T1]{fontenc}
```

} loading  
packages

```
\KOMAoptions{%  
  parskip=full,%  
  fontsize=12pt}
```

```
\begin{document}
```

Franz jagt im komplett  
verwahrlosten Taxi quer  
durch Bayern.

```
\end{document}
```

# Structure of a Document

`\documentclass{scrartcl}` } Dokument class

`\usepackage[ngerman]{babel}`  
`\usepackage[utf8]{inputenc}`  
`\usepackage[T1]{fontenc}` } loading  
packages

`\KOMAoptions{%`  
    `parskip=full,%`  
    `fontsize=12pt}` } Settings

`\begin{document}`  
    Franz jagt im komplett  
    verwahrlosten Taxi quer  
    durch Bayern.  
`\end{document}`



# Structure of a Document

<code>\documentclass{scrartcl}</code>	}Dokument class	
<code>\usepackage[ngerman]{babel}</code>	} loading packages	} Preamble
<code>\usepackage[utf8]{inputenc}</code>		
<code>\usepackage[T1]{fontenc}</code>		
<code>\KOMAOPTIONS{% parskip=full,% fontsize=12pt}</code>	} Settings	
<code>\begin{document}</code> Franz jagt im komplett verwahrlosten Taxi quer durch Bayern. <code>\end{document}</code>		

# Structure of a Document

<code>\documentclass{scrartcl}</code>	}Dokument class
<code>\usepackage[ngerman]{babel}</code> <code>\usepackage[utf8]{inputenc}</code> <code>\usepackage[T1]{fontenc}</code>	}loading packages
<code>\KOMAOptions{% parskip=full,% fontsize=12pt}</code>	}Settings
<code>\begin{document}</code> Franz jagt im komplett verwahrlosten Taxi quer durch Bayern. <code>\end{document}</code>	}Document body

Preamble

# Dokument classes

`\documentclass{scrartcl}`

short articles

`\documentclass{scrreprt}`

Reports with covering page and chapters

`\documentclass{scrbook}`

double-pages book with parts, chapters and headers

## Preamble: Standard packages

```
\usepackage[utf8]{inputenc}
```

UTF-8 for text encoding

```
\usepackage[ngerman]{babel}
```

German hyphenation, date formats etc.

```
\usepackage[T1]{fontenc}
```

improves text encoding for western european languages

```
\usepackage{lmodern}
```

more modern fonts

## Präambel: zusätzliche Pakete

`\usepackage{xcolor}`

adds command `\textcolor` for colour

`\usepackage{graphicx}`

adds command `\includegraphics` for figures

`\usepackage[german=guillemets]{csquotes}`

adds command `\enquote` for parentheses

`\usepackage{amsmath}`

adds environment `align` for aligned mathematical formulas

`\usepackage[breaklinks=true]{hyperref}`

improves pdf creation (e.g. hyperlinks)

## Structure of a Document





UNIVERSITÄT ZUM BEISPIEL  
INSTITUT FÜR BEISPIELE

## Über Gummibärchen *On Gummy Bears*

### Masterarbeit

im Rahmen des Studiengangs  
**Informatik**  
der Universität zum Beispiel

vorgelegt von  
**Max Mustermann**

ausgegeben und betreut von  
**Prof. Dr. Erika Musterfrau**

mit Unterstützung von  
Lieschen Müller

Die Arbeit ist im Rahmen einer Tätigkeit bei der Firma Muster GmbH entstanden.

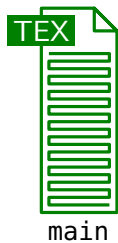
Musterhausen, den 15. Juli 2017

# Modular Documents





# Modular Documents



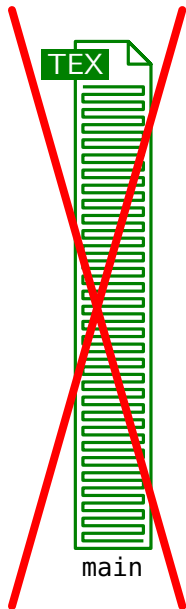
# Modular Documents



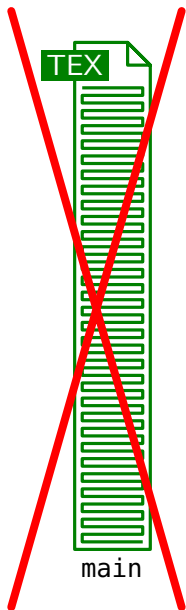
# Modular Documents



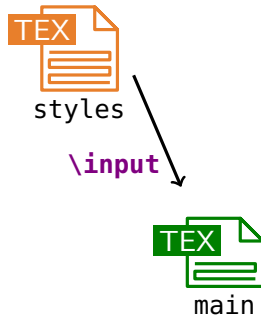
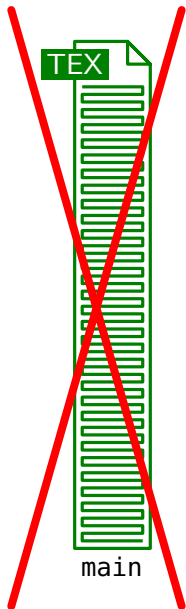
# Modular Documents



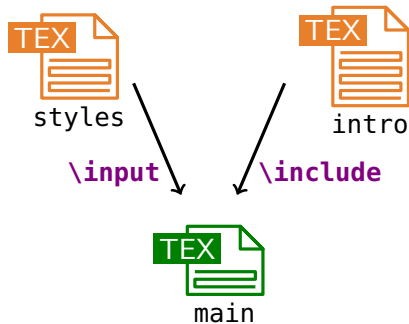
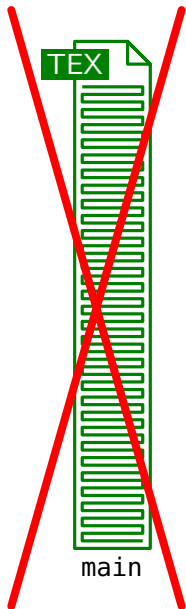
## Modular Documents



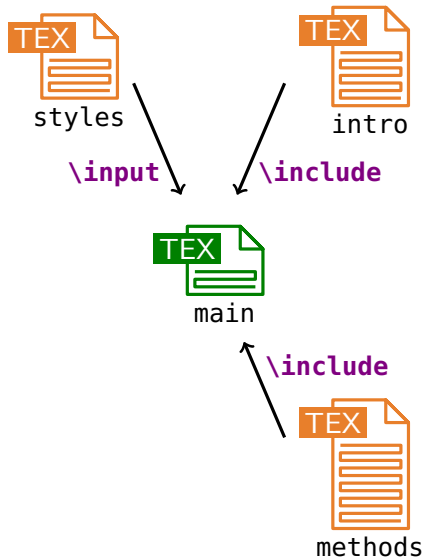
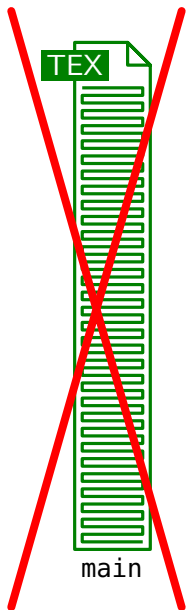
# Modular Documents



## Modular Documents

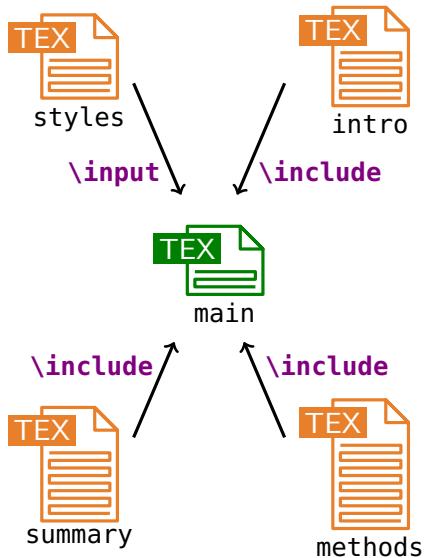
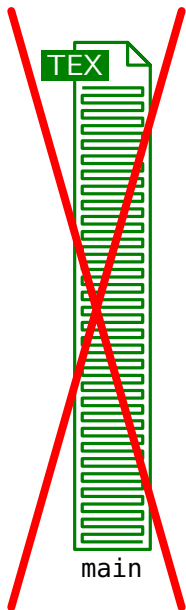


## Modular Documents

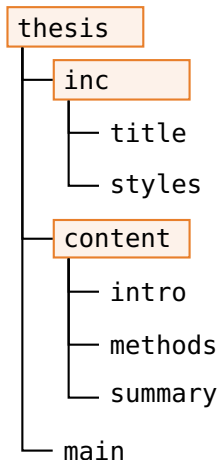




## Modular Documents



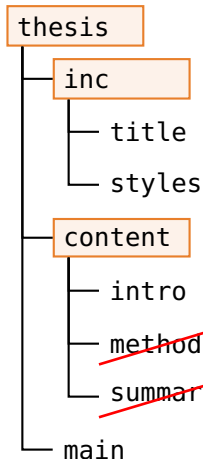
# Modular Structure



```
\documentclass{scrbook}
\input{inc/styles}
% \includeonly
\begin{document}
  \frontmatter
  \input{inc/title}
  \tableofcontents

  \mainmatter
  \include{content/intro}
  \include{content/methods}
  \include{content/summary}
\end{document}
```

# Modular Structure



```
\documentclass{scrbook}
\input{inc/styles}
\includeonly{content/intro}
\begin{document}
  \frontmatter
  \input{inc/title}
  \tableofcontents

  \mainmatter
  \include{content/intro}
  \include{content/methods}
  \include{content/summary}
\end{document}
```

# Commands for a modular Structure

**\input**    add content of the file.

**\include**    add content of the file and  
add pagebreaks before and behind.

**\includeonly**    list of files regarded  
by **\include** .

# Segments of long Documents (scrbook)

```
\begin{document}
  \frontmatter % Titlepage, Table of Content, etc.
  \begin{titlepage} ... \end{titlepage}
  \tableofcontents
                % Has Roman page numbering (i, ii, ...)
  \mainmatter % Main content
  \chapter{Einleitung}
                % Has Arabic page numbering (1, 2, ...)
  \appendix % Appendix, Bibliography
  \chapter{Glossar}

  \backmatter % Ending
  \listoffigures
\end{document}
```

# Layout of the Segments

**\frontmatter** Prefix

- chapters not numbered
- Roman page numbers

**Abstract**

– iv –

# Layout of the Segments

## `\frontmatter` Prefix

- chapters not numbered
- Roman page numbers

## `\mainmatter` Main Content

- chapters numbered in Arabic
- `new` Arabic page numbers

## Abstract

– iv –

## 3. Konzept

– 5 –

# Layout of the Segments

## `\frontmatter` Prefix

- chapters not numbered
- Roman page numbers

## `\mainmatter` Main Content

- chapters numbered in Arabic
- **new** Arabic page numbers

## `\appendix` Appendix

- **new** alphabetic chapter numbers
- Arabic page numbers

## Abstract

– iv –

## 3. Konzept

– 5 –

## A. Anhang

– 126 –



# Layout of the Segments

## **\frontmatter** Prefix

- chapters not numbered
- Roman page numbers

## **\mainmatter** Main Content

- chapters numbered in Arabic
- **new** Arabic page numbers

## **\appendix** Appendix

- **new** alphabetic chapter numbers
- Arabic page numbers

## **\backmatter** Postamble

- chapters not numbered
- Arabic page numbers

## **Abstract**

– iv –

## **3. Konzept**

– 5 –

## **A. Anhang**

– 126 –

## **Literatur**

– 135 –

## Special Environments $\LaTeX$



## Bibliographies with BibT<sub>E</sub>X

In<sup>[Knu84]</sup> wird das Satzsystem T<sub>E</sub>X vom Autor des Systems vorgestellt. Jedes Zeichen hat dabei einen Category Code (vergleiche dazu<sup>[Eij92]</sup> S. 28 ff.).

## Literatur

[Eij92] EIJKHOUT, Victor: *T<sub>E</sub>X by Topic: A T<sub>E</sub>Xnician's Reference*. Addison-Wesley, 1992

[Knu84] KNUTH, Donald E.: *The*

# Das L<sup>A</sup>T<sub>E</sub>X-Dokument arbeit.tex

```
\documentclass{scrartcl}
```

```
%...
```

```
package [super , square , sort&compress ]{natbib}
```

```
\begin{document}
```

In \cite{Knuth} wird das Satzsystem  
\TeX{} vom Autor des Systems  
vorgestellt. Jedes Zeichen hat dabei  
einen Category Code (vergleiche dazu  
\cite[S.~28~ff.]{Eijkhout}).

```
\bibliographystyle{alphadin}
```

```
\bibliography{datenbank}
```

```
\end{document}
```

# The literature data base datenbank.bib

```
@book{Knuth,  
  author = {Donald E. Knuth},  
  title = {The \TeX book},  
  year = {1984},  
  publisher = {Addison-Wesley Professional},  
}
```

```
@book{Eijkhout,  
  author = {Victor Eijkhout},  
  title = {\TeX\ by Topic:  
    A \TeX nician's Reference},  
  year = {1992},  
  publisher = {Addison-Wesley},  
}
```

# Compilation

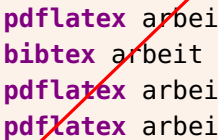
```
pdflatex arbeit
```

```
bibtex arbeit
```

```
pdflatex arbeit
```

```
pdflatex arbeit
```

# Compilation



```
pdflatex arbeit  
bibtex arbeit  
pdflatex arbeit  
pdflatex arbeit
```

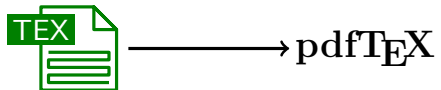
```
latexmk -pdf arbeit
```

## How does BIB<sub>T</sub>EXwork?

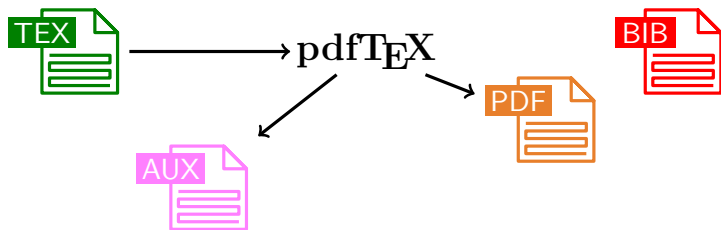




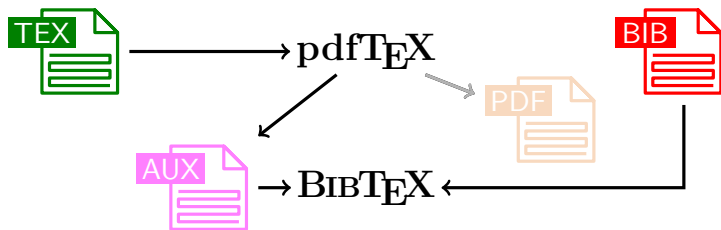
## How does BIB<sub>T</sub>EX work?



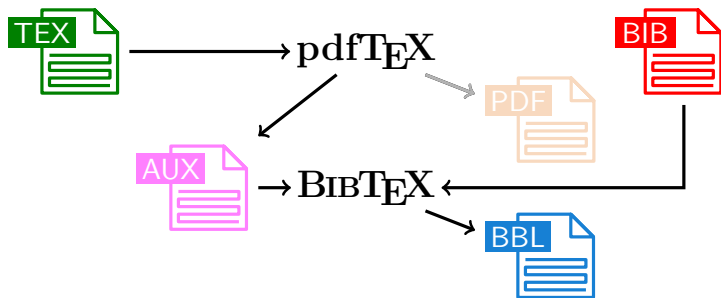
## How does BibT<sub>E</sub>X work?



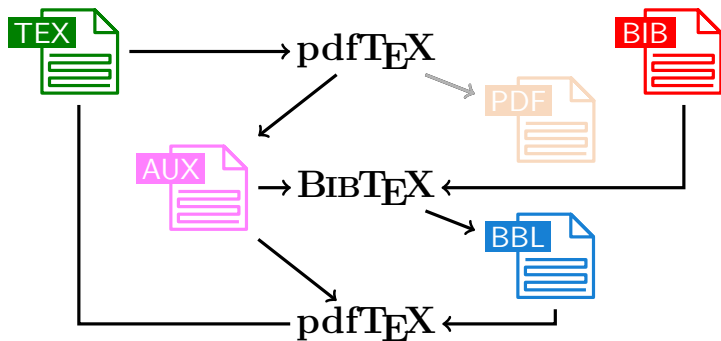
## How does BIBTEX work?



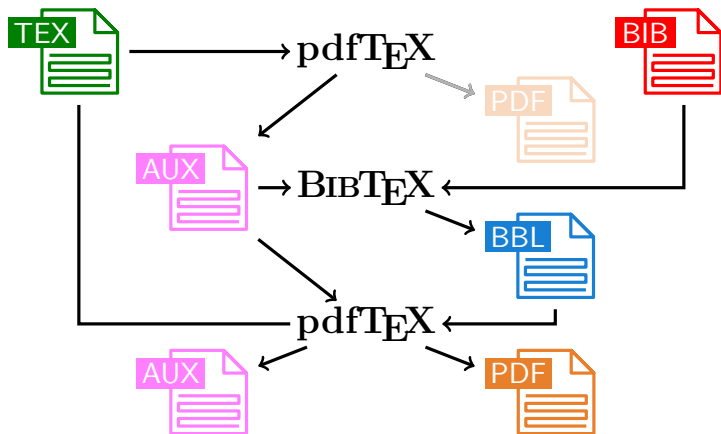
## How does BIBTEX work?



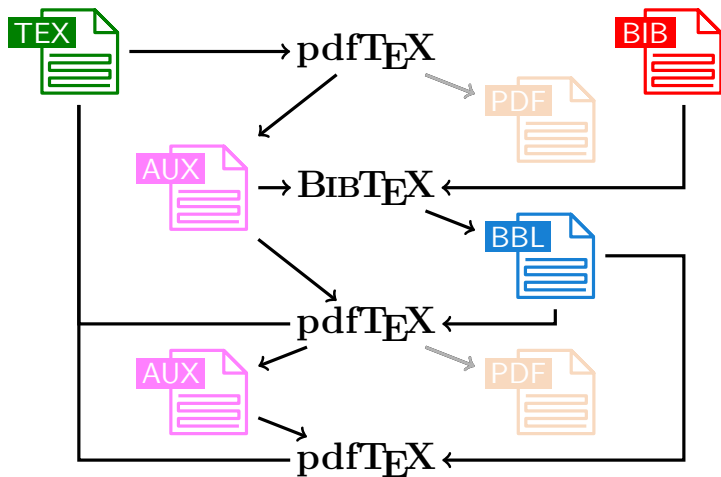
## How does BIBTEX work?



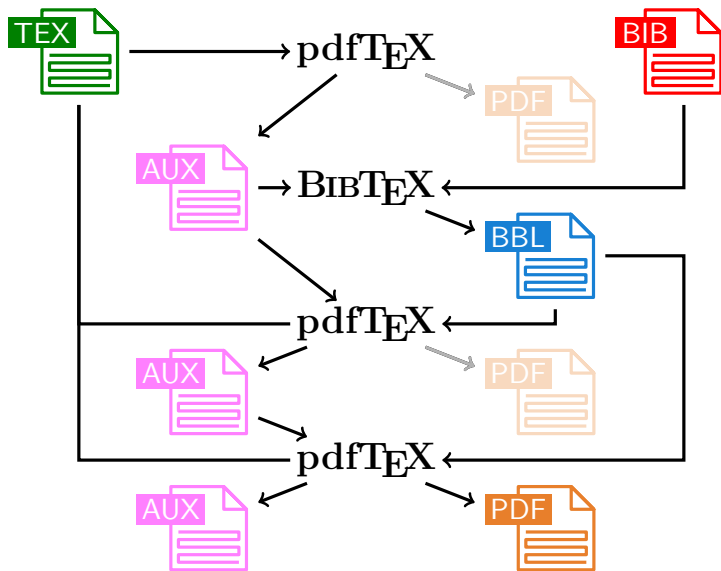
## How does BIBTEX work?



## How does BIBTEX work?

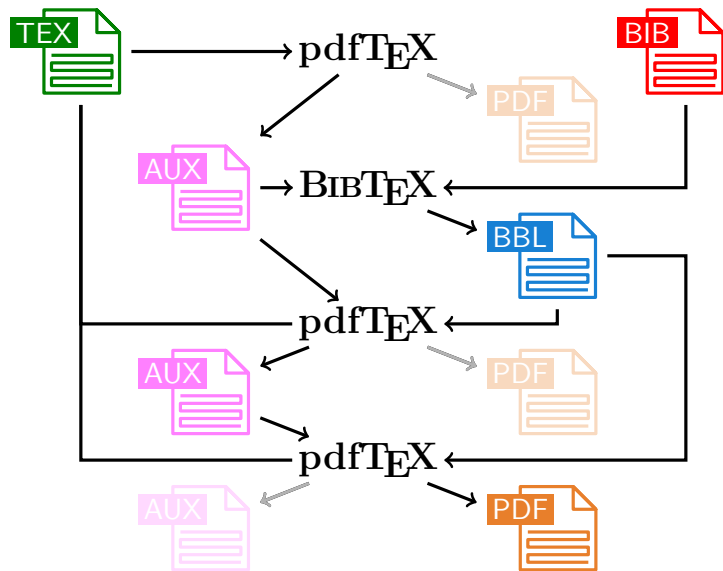


## How does BIBTEX work?





## How does BIBTEX work?



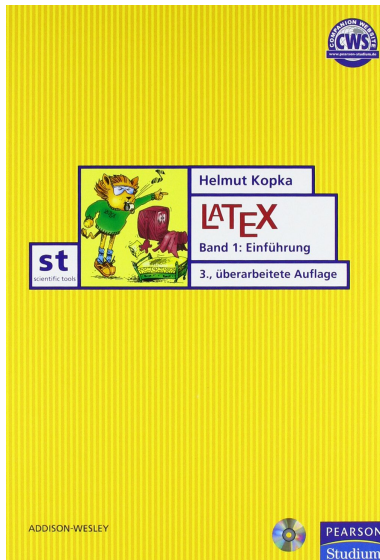
## Bibliographies in L<sup>A</sup>T<sub>E</sub>X



# Summary

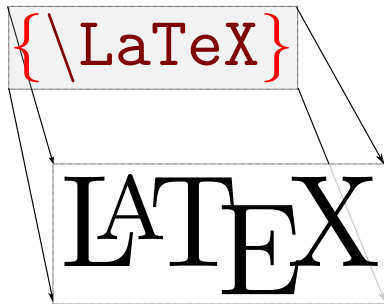
1. The  $\text{\LaTeX}$ -File contains content and structure.
2.  $\text{\LaTeX}$  typesets a PDF-document and ensures proper form.
3. Creating new Layouts is advanced.
4. A  $\text{\LaTeX}$ -document contains the document class, preamble und document body.
5.  $\text{\LaTeX}$  is very useful for longer Documents as it provides many possibilities for structuring and outlining. A document can be build from many source files.
6.  $\text{\BibTeX}$  generates a bibliography from a data base in a special format. There are many bibliography styles to choose from via `\bibliographystyle`.

# The L<sup>A</sup>T<sub>E</sub>X-Textbook



# Modern L<sup>A</sup>T<sub>E</sub>X-Introduction





Wikibook