

Academic Skills in Computer Science (ASiCS)

II) Text Processing with Latex
II.1) Introduction to Latex

30.04.2015

Agenda

- **LaTeX – Language features and syntax**
- **BibTeX – Bibliographies for LaTeX**
- **LaTeX – Tools and compiler**

LITERATURE

- [1] Sascha Lüdecke: Einführung in LaTeX.
<http://www.meta-x.de/faq/LaTeX-Einfuehrung.html>
- [2] Sascha Frank: LaTeX Umlaute.
<http://www.namsu.de/Extra/befehle/Umlaute.html>
- [3] Manuela Jürgens, Thomas Feuerstack: LaTeX – Eine Einführung und ein bisschen mehr...
http://www.fernuni-hagen.de/imperia/md/content/zmi_2010/a026_latex_einf.pdf
- [4] Manuela Jürgens: LaTeX – Fortgeschrittene Anwendungen.
Oder: Neues von den Hobbits...
http://www.fernuni-hagen.de/imperia/md/content/zmi_2010/a027_latex_fort.pdf

LATEX

Language Features and Syntax

Origins

- **TeX (Tau Epsilon Chi)** by Donald E. Knuth, 1978
 - **Open-Source** solution for layout of print media
 - Including formulas and tables
 - Available for almost **every OS**
- **LaTeX**: Frontend for TeX by Leslie Lamport in the 1980s
 - User responsible for **logical document structure** only
 - LaTeX code **translated into TeX**
 - Predefined layouts including font sizes, line distances etc.

WYSIWYG?

- LaTeX is **not a WYSIWYG-Editor** (What you see is what you get)
 - **Philosophy:** write **Content**, not Layout
 - But: many tools provide **hot updates** today
 - **Quasi-WYSIWYG**
 - Alternatively:
WYSIWYM (What you see is what you mean)-Frontends such as Lyx
- **Advantages**
 - **Platform-independent**
 - No dependencies to system fonts
 - Output is always the same
 - Generation of table of contents, bibliography, glossary, ...
 - Output is **print-ready** (e.g., PDF)

Why LaTeX?

- Today LaTeX is the **de-facto standard** for publications in science (at least in computer science)
- **Submission of papers** almost always as LaTeX files (e.g., Springer, ACM)
- Proceedings **layout and Styles** often as **LaTeX styles**

Compilation Process



- **Creation** of table of contents, bibliography etc.
requires up to three iterations for updating references!

LaTeX Syntax

- Commands start with **back slash** (\)
- Following **parameters** ([])) und **content** ({}))
- **Example:**
 - \documentclass[ngerman]{article}

Document Structure

1. Style

- Document class (e.g., article, book, beamer (slides), ...)

2. Preamble

- Metadata such as title, author
- Package and library imports

3. Body

- Real content, structured by chapters, sections, slides etc.

Document Structure

```
\documentclass{scrartcl}  
  
\title{My first Document}  
\author{John Doe}  
\usepackage[english]{babel}  
  
\begin{document}  
  
\maketitle  
  
Hello World!  
  
Next paragraph.  
  
\end{document}
```

Style

Package Imports:

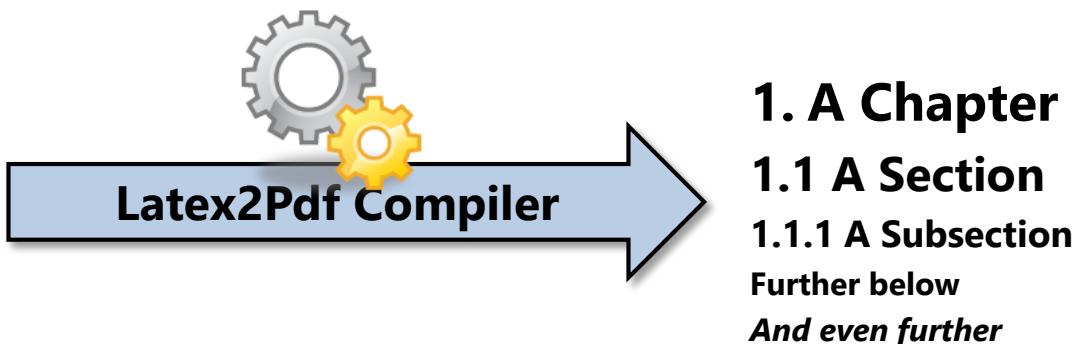
Packages exist for almost each requirement. They can be found and browsed here
<http://www.ctan.org/>

Body

[1]

Sections

```
\chapter{A Chapter} % only for scrbook not for scrartcl  
\section{A Section}  
\subsection{A Subsection}  
\subsubsection{Further below}  
\paragraph{And even further}
```



Sections

```
\section{A Section}
```

1. Section

```
\section*{A Section not to  
be numbered}
```

A Section not to be numbered
Will also not appear in the
table of contents.

to be

```
\section{Next Section}
```

2. Next Section



LaTeX2PDF Compiler

Table of Contents

\tableofcontents



Table of Contents

1. A Chapter	1
1.1 A Section	3
1.1.1 A Subsection	5

Appendix

```
\section{A Section}
```

1. Section

```
\appendix
```

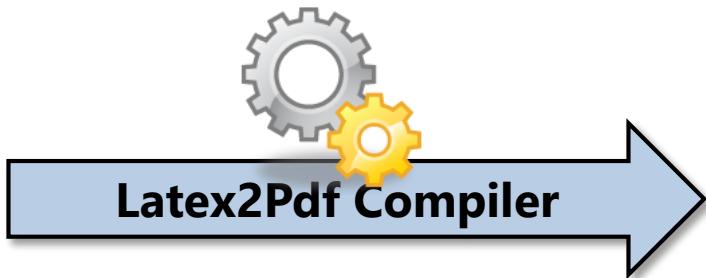
```
\section{Section in Appendix} A. Section in Appendix
```



References

```
\section{A Section}  
\label{section1}
```

This is some text with a reference to Section
\ref{section1}.



1.1 A Section

This is some text with a reference to Section 1.1.

The Tilde

- A so-called **protected white space**
- **No linebreak** allowed at this position.

This is some text with a reference to Section
\ref{section1}.

This is some text with a reference to
Section~\ref{section1}.



1.1 A Section

This is some text with a reference to Section
1.1.

This is some text with a reference to
Section 1.1.

References

Besides numbers of figures, tables, sections, ... you can also refer to **page numbers**:

See `figure~\ref{fig:test}` on page~\pageref{fig:test}.



See figure 1.2 on page 8.

Hyphenation

- Based on **automated algorithm**
- Can be itchy, especially for **German compound words**.

Global rules (in preamble)

```
\hyphenation{Sil-ben-tren-nung Al-go-rith-mus}
```

Local rules

`\-` Break at this position only
`"-"` Additional break at this position
`"="` Only for German documents!
`"~"` Hyphen without break

Staats\~-ver\~-trag
Staats"-vertrag
Karl"=Franzensuniversität
(Haupt"~) Straße

Hyphenation

- Sometimes, hyphenation won't work at all:
Overfull \hbox (305.0842pt too wide) in paragraph
at lines 20--22
- Means that somewhere a word is longer than its current line:

Especially URLs are sometimes tricky when breaking to new lines: http://www.somedomain.com/ |
You know that? Especially URLs are sometimes tricky when breaking to new lines:
http://www.somedomain.com/ You know that? Especially URLs are sometimes tricky
when breaking to new lines: http://www.somedomain.com/ You know that? Especially
URLs are sometimes tricky when breaking to new lines: http://www.somedomain.com/
You know that? Especially URLs are sometimes tricky when breaking to new lines:
http://www.somedomain.com/

- % Marks overful lines with black bar.
\setlength{\overfullrule}{4pt}

Font Size

\tiny
\scriptsize
\footnotesize
\small
\normalsize (standard)
\large
\Large
\LARGE
\huge
\Huge

→ You typically do not alter your
font size in points but using
these **relative sizes!**

Font Formats

```
\textrm{Roman}  
\textit{Italics}  
\textbf{Bold}  
\textsc{Capitals}  
\texttt{Typewriter}  
\textnormal{Normal}
```

Roman
Italics
Bold
CAPITALS
Typewriter
Normal



Umlauts

- Umlauts must be handled especially [2]

1. Markup in text

- `\"a, \"o, \"u, \"A, ... → ä, ö, ü, Ä, ...`
- `\ss → ß`

2. Easier solution: package import in preamble

- `\usepackage[utf8]{inputenc}`

Enumerations

```
\begin{itemize}
    \item First
    \item Second
\end{itemize}
```

- First
- Second

```
\begin{enumerate}
    \item First
    \item Second
    \item[III] Third
\end{enumerate}
```

1. First
2. Second
- III. Third



Figures

```
\begin{figure} [h]
    % requires \usepackage{graphicx}
    \includegraphics[width=\textwidth]
        {bilder/bild1.pdf}
    \caption{Caption.}
    \label{bild1}
\end{figure}
```

Reference to Figure~\ref{bild1}.

Figures

```
\begin{figure} [h]
    \includegraphics[width=\textwidth]
        {pictures/bild1.pdf}
    \caption{Caption.}
    \label{bild1}
\end{figure}
```

Typical formats:
PNG, PDF

Reference to Figure~\ref{bild1}.

Figures

```
\begin{figure} [h]
    \includegraphics[width=\textwidth]
        {bilder/bild1.pdf}
    \caption{Caption.}
    \label{bild1}
\end{figure}
```

Caption.
Must be in front of the label
(otherwise the label won't work)!

Reference to Figure~\ref{bild1}.

Figures

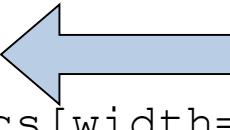
Width of figure (optional).
Value in cm, px, em. Also use
of variables possible:
\textwidth, \columnwidth

```
\begin{figure} [h]
    \includegraphics[width=\textwidth]
        {bilder/bild1.pdf}
    \caption{Caption.}
    \label{bild1}
\end{figure}
```

Reference to Figure~\ref{bild1}.

Figures

```
\begin{figure} [h]
    \includegraphics[width=
        {bilder/bild1.pdf}]
    \caption{Caption.}
    \label{bild1}
\end{figure}
```

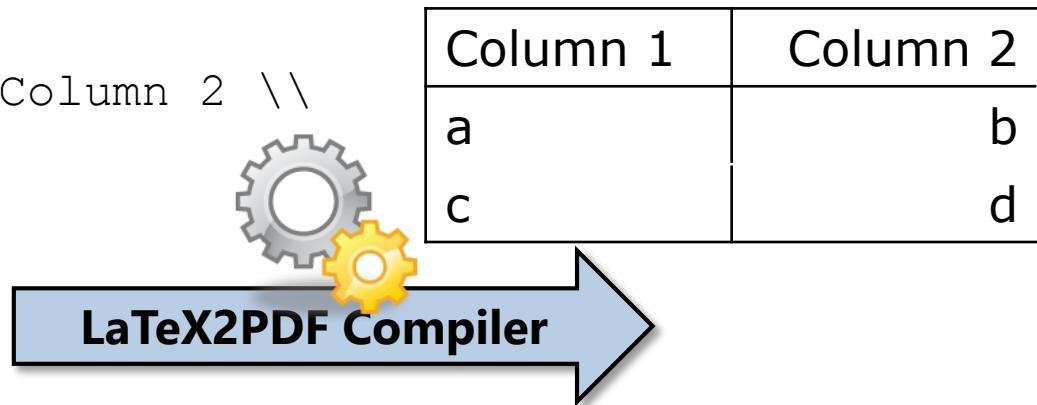


Positioning of figure:
h = Here (in text)
t = Top (of page)
b = Bottom (of page)
p = Page (separate page)
! + position = force position

Reference to Figure~\ref{bild1}.

Tables

```
\begin{table} [h]
  \begin{tabular} { |l|r}
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```



Tables

```
\begin{table}[h]
  \begin{tabular}{|l|l|}
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```

Positioning

h = here in the text

t = Top (of the page)

b = Bottom (of the page)

p = Page (on separate page)

! + position = force position

a		b
c		d

Tables

```
\begin{table} [h]
  \begin{tabular} { |l|r}
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```

Text Alignment:

l = left

r = right

c = centered

p{2cm} = justified with column width

c	d
---	---

Tables

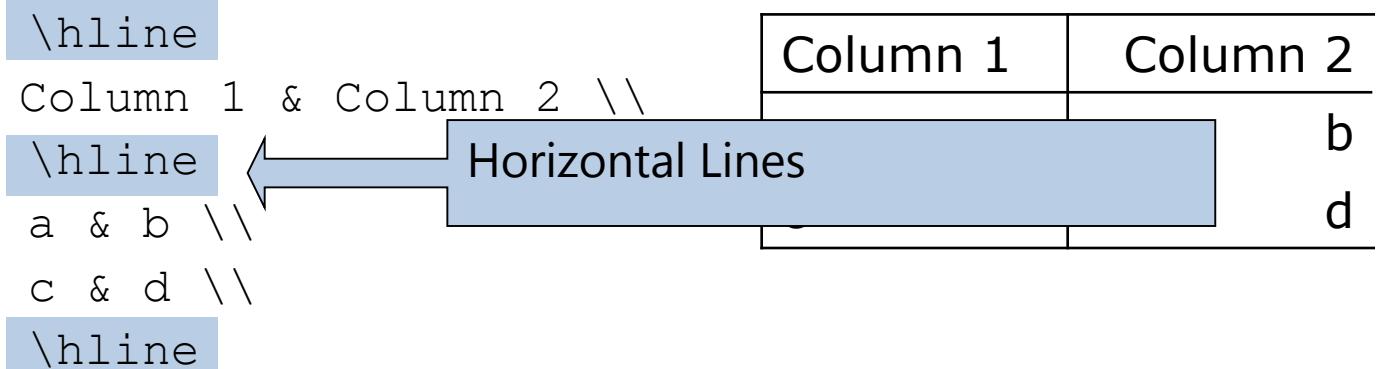
```
\begin{table} [h]
  \begin{tabular} {l|l|r}
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```

Vertical lines

Column 1	Column 2
a	b
c	d

Tables

```
\begin{table} [h]
  \begin{tabular} { | l | r }
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```

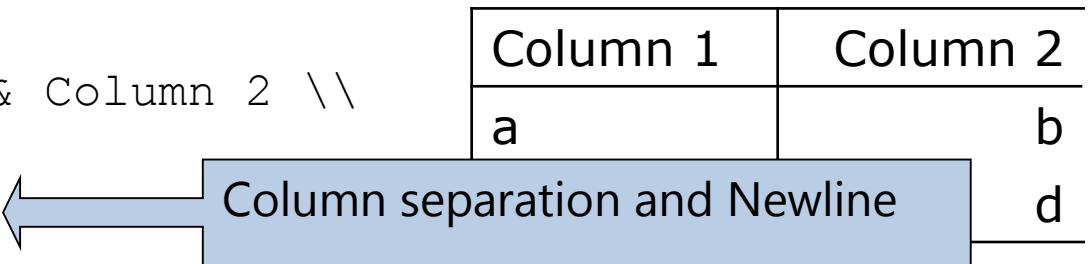


The diagram shows a tabular structure with two columns. The first column is labeled "Column 1" and the second is "Column 2". The rows are labeled "a & b" and "c & d". Three horizontal lines are drawn: one at the top (separating the header from the body), one in the middle (separating row 1 from row 2), and one at the bottom (separating the body from the footer). A blue box labeled "Horizontal Lines" contains arrows pointing to each of these three lines.

Column 1	Column 2
a	b
c	d

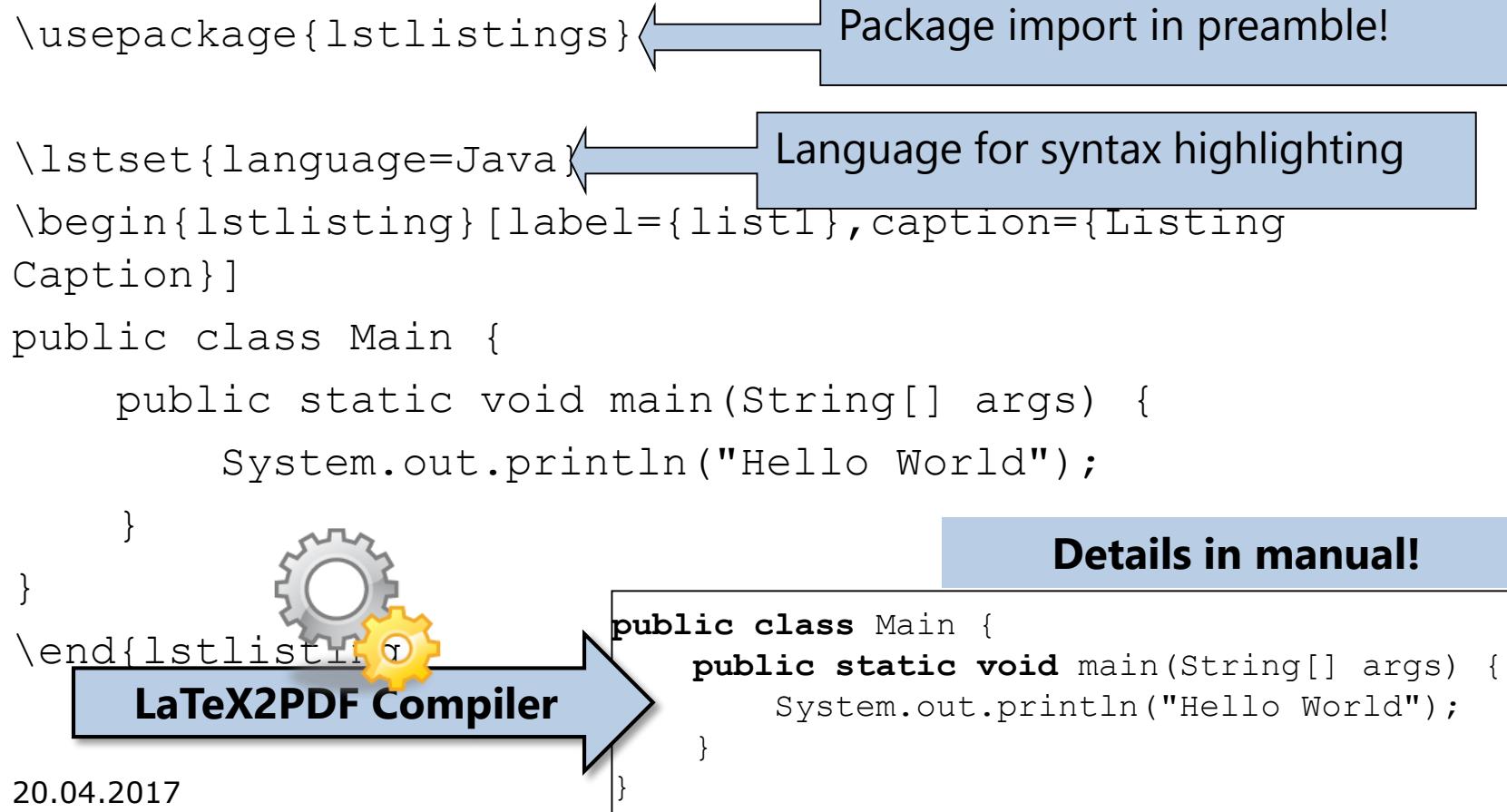
Tables

```
\begin{table} [h]
  \begin{tabular} { |l|r}
    \hline
    Column 1 & Column 2 \\
    \hline
    a & b \\
    c & d \\
    \hline
  \end{tabular}
  \caption{Text}
  \label{table1}
\end{table}
```



Column 1	Column 2
a	b
c	d

Listings

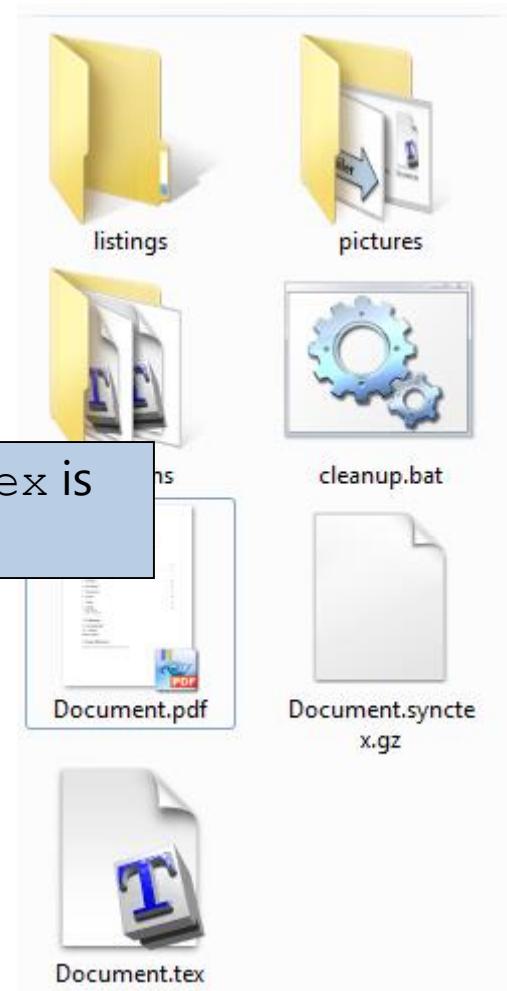


Project Structure

- Separation of logical parts into own files
- Figures and listings into own folders
- Easy to rearrange and restructure

```
\input{sections/intro}  
\input{sections/fontsize}  
\input{sections/fontshape}  
\input{sections/numerations}  
\input{sections/images}  
\input{sections/tables}  
\input{sections/listings}
```

File intro.tex is
imported



BIBTEX

Bibliographies for LaTeX

Bibliography

- Always underpin statements or claims with **citations**
- **Don't do it like Guttenberg or Schavan!**
- **BibTeX** extends LaTeX with **easy and reusable bibliographies**
 - Management of citations according to your citation style
 - E.g., [RWD+12] or [Reiman et al. 2012] or [1],[2]...
 - **Creation of bibliography** containing all citations of your LaTeX-document
 - **Excludes non-cited sources!**
- **Literature** is **stored in *.bib files**

Bibliography

```
@INPROCEEDINGS{Reimann2012a,  
author = {Reimann, Jan and Wilke, Claas and Demuth,  
Birgit and Muck, Michael and A\{ss}mann, 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}

Bibliography

- Different **types of entries** possible
- @book – Book
- @inproceedings – Conference paper
- @article – Journal article
- @masterthesis – Diploma and master theses
- ...
- @misc – Anything else

LATEX

Tools and Compiler

MiKTeX

- **De-Facto Standard** LaTeX-**Compiler** for Windows
- <http://miktex.org/>
- Comes with: TexWorks
- There are others: TeXLive,...

TexWorks

- Combination of
 - simple LaTeX **editor**
 - LaTeX **compiler**
 - **PDF viewer**
- **No syntax highlighting**

energy4apps.tex - TeXworks

Datei Bearbeiten Suche Format Textsatz Skripte Fenster Hilfe

pdfLaTeX+MakeIndex+BibTeX

\documentclass[english]{ini}

\IffileExists{latin1.sty}{\usepackage{latin1}}{\usepackage{isolatin1}}

\usepackage{graphicx}

\usepackage{color}

\usepackage{abrevs}

\usepackage{multrow}

\definecolor{gray}{rgb}{0.5,0.5,0.5}

\newcommand{\todo}[1]{\color{red}~\textbf{TODO #1}~\color{black}}

\newcommand{\todocp}[1]{\todo{Christian: #1}}

\newcommand{\todocw}[1]{\todo{Class: #1}}

\newcommand{\todogp}[1]{\todo{Georg: #1}}

\newcommand{\todogs}[1]{\todo{SebG: #1}}

\newcommand{\todosr}[1]{\todo{SebR: #1}}

\renewcommand{\emph}{\textit}

\input{abbreviations}

\author{ Claas Wilke, Sebastian Richly, Georg P\"uschel, Christian Piechnick, \\ Sebastian G\"otz, and Uwe Aßmann \\ \\ Fakult\"at Informatik, Institut f\"ur Software- und Multimediaentechnik \\ Lehrstuhl Softwaretechnologie, Technische Universit\"at Dresden \\ D-01062 Dresden \\ \{claas.wilke, sebastian.richly, georg.pueschel1, christian.piechnick, \\ uwe.assmann\}@tu-dresden.de, sebastian.goetz@acm.org }

\title{Energy Labels for Mobile Applications}

\begin{document}

\maketitle

\begin{abstract}

In recent years the usage of mobile devices and the expansion of their functionality by installing further applications have become very popular. Their frequent usage causes much faster battery discharging, and thus drastically limits the uptime of the devices and their applications. Hence, investigating and reducing the power consumption of mobile applications is one of the current, central challenges in software engineering. In this paper we propose an approach for profiling the power consumption of mobile applications and comparing their consumption for similar services. We show by example that such differences can be identified for two well-known email clients. We envision a repository or market place that allows users comparing and selecting applications based on energy labels and their personal requirements.

\end{abstract}

\%todo{Deadline: 01.05.2012, Page limit: 15 pages}

\input{introduction}

\input{approach}

\input{profiling}

\input{relatedwork}

\input{conclusion}

\section*{Acknowledgements}

\footnotetext{This research has been funded within the project ZESSY (#080951806, by the IESF and Federal State of Saxony and within the Collaborative Research Center 912 (HAEC), funded by the DFG). Furthermore, we thank Waltenegus Dargie and his team for providing the required power metering hardware, Doreen Fiss for her assistance to statistically investigate our measurement results and the reviewers of this paper for their very helpful and encouraging remarks.}

\bibliography{energy4apps}

\end{document}

LF UTF-8 Zeile 1 von 70; Spalte 0

energy4apps.pdf - TeXworks

Datei Bearbeiten Suche Ansicht Textsatz Skripte Fenster Hilfe

SyncTeX: "C:/Users/Claas Wilke/Documents/ST Projekte/Zessy2/EEBs2012_EnergyLabels/energy4apps.synctex" 100% Seite 1 von 15

Energy Labels for Mobile Applications

Claas Wilke, Sebastian Richly, Georg P\"uschel, Christian Piechnick, Sebastian G\"otz, and Uwe Aßmann

Fakult\"at Informatik, Institut f\"ur Software- und Multimediaentechnik
Lehrstuhl Softwaretechnologie, Technische Universit\"at Dresden
D-01062 Dresden
\{claas.wilke, sebastian.richly, georg.pueschel1, christian.piechnick, uwe.assmann\}@tu-dresden.de, sebastian.goetz@acm.org

Abstract: In recent years the usage of mobile devices and the expansion of their functionality by installing further applications have become very popular. Their frequent usage causes much faster battery discharging, and thus drastically limits the uptime of the devices and their applications. Hence, investigating and reducing the power consumption of mobile applications is one of the current, central challenges in software engineering. In this paper we propose an approach for profiling the power consumption of mobile applications and comparing their consumption for similar services. We show by example that such differences can be identified for two well-known email clients. We envision a repository or market place that allows users comparing and selecting applications based on energy labels and their personal requirements.

1 Introduction

Mobile devices, such as smart phones and tablets, have become very popular within the last years. Nowadays, we use them regularly and everywhere, checking emails, appointments or obtaining other content from the Internet. Besides the general usage of mobile devices, adapting and extending their functionality with small, domain-specific applications (i.e., *apps*) has become a typical scenario. The extensive usage of mobile devices and their low energy budgets, however, make power consumption of individual apps a major concern. Often, devices consume so much energy that they run out of it within hours or a day. Thus, investigating whether the power consumption of mobile devices can be decreased by developing applications more intelligently or more resource-saving is a major research challenge in software engineering. This is especially important for mobile applications that are not only executed during direct user interaction but are running as background services as well (e.g., to check email or news feed accounts for new incoming messages).

Thus, to increase the uptime of mobile devices, users should be able to base their decision, which application they want to install, not only on the provided functionality and the community's rating (e.g., a five star grading system as used in the Android market *Google Play*), but also on an expectation of the application's power consumption during runtime. To provide this information, we are working on a methodology that allows the comparison

TeXnicCenter

- Extensive **LaTeX editor for Windows**
 - **Code Completion**
 - **Syntax Highlighting**
 - Integrated **BibTex-Editor**
- <http://texniccenter.org/>

TeXnicCenter - [energy4apps]

File Bearbeiten Suchen Ansicht Einfügen Mathe Format Projekt Ausgabe Extras Fenster ?

LaTeX => PDF

H! F K S T KA

Navigator

```
\documentclass[english]{lni}

\IfFileExists{latin1.sty}{\usepackage{latin1}}{\usepackage{isolatin1}}

\usepackage{graphicx}
\usepackage{color}
\usepackage{abrevs}
\usepackage{multirow}

\definecolor{gray}{rgb}{0.5,0.5,0.5}

\newcommand{\todo}[1]{\color{red}~\textbf{TODO #1}~\color{black}}
\newcommand{\todoCP}[1]{\todo{Christian: #1}}
\newcommand{\todoCW}[1]{\todo{Claas: #1}}
\newcommand{\todoGP}[1]{\todo{Georg: #1}}
\newcommand{\todoSG}[1]{\todo{SebG: #1}}
\newcommand{\todoSR}[1]{\todo{SebR: #1}}
\renewcommand{\emph}{\textit}

\input{abbreviations}

\author{
  Claas Wilke, Sebastian Richly, Georg P\"uschel, Christian Piechnick, \\
  Sebastian G\"otz, and Uwe A\ss{}mann \\
  \\
  Fakult\"at Informatik, Institut f\"ur Software- und Multimediatechnik \\
  Lehrstuhl Softwaretechnologie, Technische Universit\"at Dresden
}
```

energy4apps

--line 134 of file energy4apps.bib
(There was 1 warning)
Couldn't find input index file C:\Users\Claas Wilke\Documents\ST Projekte\Zessy2\EEbS2012_EnergyLabels\energy4apps nor C:\Users\Claas Wilke
Usage: C:\Program Files (x86)\MiK\TeX 2.9\miktex\bin\makeindex.exe [-ilqrcgLT] [-s sty] [-o ind] [-t log] [-p num] [idx0 idx1 ...]

LaTeX-Ergebnis: 0 Fehler, 0 Warnung(en), 0 zu volle/leere Box(en), 15 Seite(n)

Erstellung Suchen 1 Suchen 2 Analyse

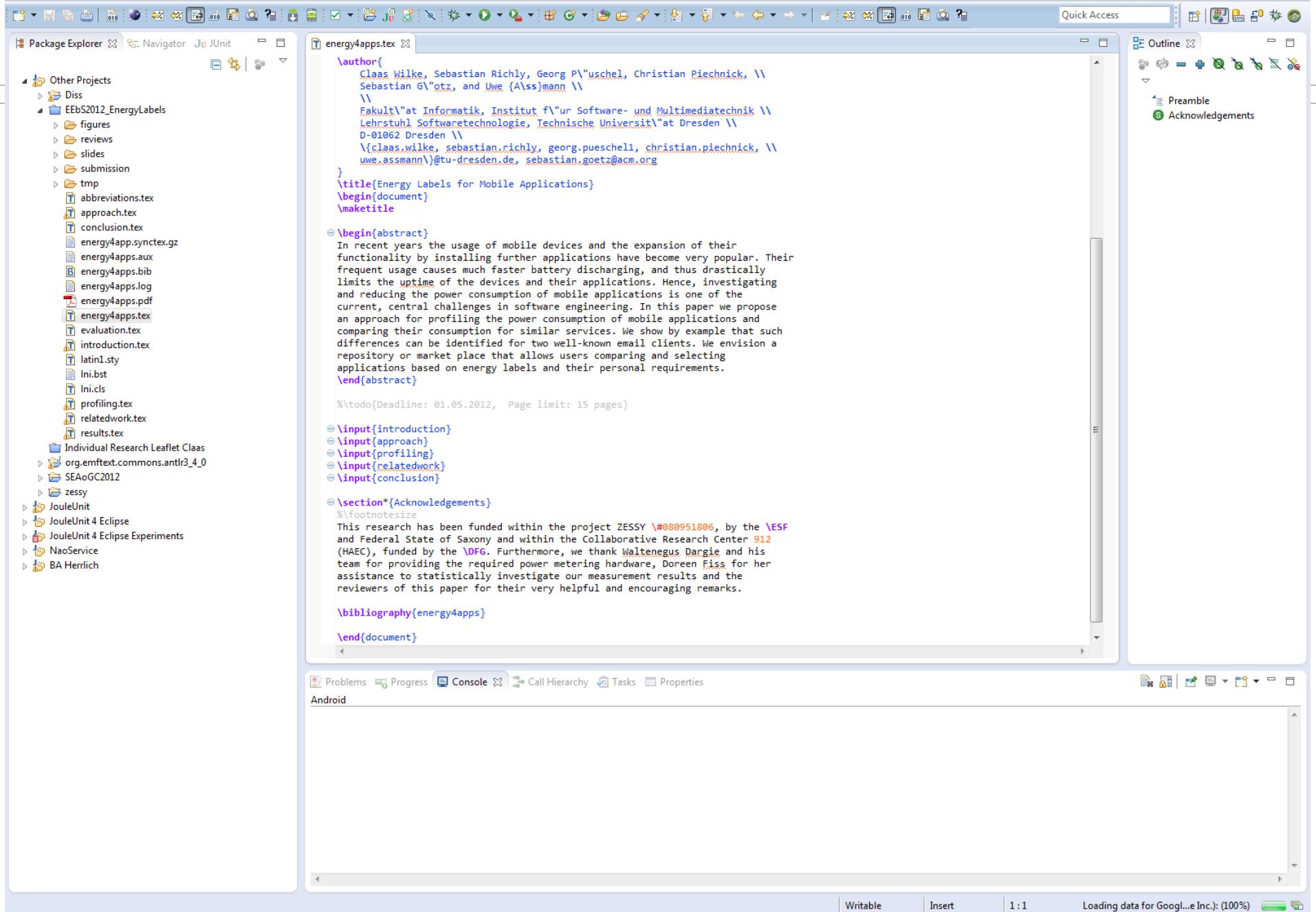
Drücken Sie F1, um Hilfe zu erhalten.

Ln 1, Col 1

UNIX ÜB READ UF NUM RF

TeXlipse

- Extensive LaTeX editor for **Eclipse**
 - **Code Completion**
 - **Syntax Highlighting**
 - Integrated **BibTex-Editor**
 - **Platform-independent**
- <http://texlipse.sourceforge.net/>



Sumatra

- **Lightweight PDF viewer** for Windows
- **No hard links** to open PDF files
- Document can be regenerated without closing it
- blog.kowalczyk.info/software/sumatrapdf/

JabRef

- **Reference manager** for BibTex
- **Platform-independent** (Java)
- <http://jabref.sourceforge.net/>



Search

Search All Fields
Clear
Incremental
Float
Filter
Settings

Groups

All Entries
Cod
Ingestion
Energetics
Modelling
Salmon
Modelling
Rotifer
Modelling
Enrichment
Water quality
Resting eggs
Kyb
DHA
Artemia
Modelling
DEB
Assimilation
Ciliates
Settings

#	Author	Title	Year	Journal	Timestamp
22	Anderson et al.	Metabolic stoichiometry and the fate of excess carbon and nutrients i...	2005	The American ...	2005.09...
23	Ando and Kobayashi	Positional distribution of docosahexaenoic acid in triacyl-sn-glycero...	2004	Aquaculture Re...	
24	Ando et al.	Positional distribution of n-3 highly unsaturated fatty acids in triacyl...	2004	Aquaculture	
25	Ang and Petrell	Pellet wastage, and subsurface and surface feeding behaviours associ...	1998	Aquacultural E...	
26	Anon.	Tall og fakta 2005. {S}tatistikkblag til {FHL}s årsrapport	2005		2006.09...
27	Anras and Lagardère	Measuring cultured fish swimming behaviour: first results on rainbow...	2004	Aquaculture	
28	Aparici et al.	Sex allocation in haplodiploid cyclical parthenogens with density-de...	1998	American Natu...	2006.04...
29	Aragao et al.	Amino acid pools of rotifers and Artemia under different conditions: ...	2004	Aquaculture	
30	de Araujo and Hagiwara	Application of enzyme activity test for the diagnosis of rotifer mass c...	2001	Bulletin of the ...	2005.11...
31	de Araujo et al.	Effect of unionized ammonia, viscosity and protozoan contamination ...	2001	Hydrobiologia	2005.11...
32	de Araujo et al.	Effect of unionized ammonia, viscosity and protozoan contamination ...	2000	Aquaculture Re...	2005.11...
33	Attramadal	Water quality and microbial environment in a flow through and a recir...	2004		2006.08...
34	Baird et al.	Modelling the interacting effects of nutrient uptake, light capture and...	2001	Journal of Plan...	2005.09...
35	Balchen	Thirty years of research on the application of cybernetic methods in f...	1999	Modeling, Iden...	2006.06...
36	Balchen	Modeling, prediction, and control of fish behavior	1979		2006.06...
37	Balompapueng et al.	Resting egg formation of the rotifer <i>Brachionus plicatilis</i> usin...	1997	Fisheries Science	2005.12...
38	Balon	The theory of saltatory ontogeny and life history models revisited	1985		
39	Brockway, Bridges and K	Development and evaluation of microparticulate diets for early zwaani	2000	Aquaculture N	

Article

Required fields		Optional fields	General	Abstract	Review	BibTeX source
Author	Claudia Aragao and Luis E. C. Conceicao and Maria Teresa Dinis and Hans-Jorgen Fyhn					
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Questions?