

# Forschungskolleg / ACSE

## Exercise 1 - LaTeX

16.10.2012

# 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](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](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)
  - But: many tools provide **hot updates** today
  - **Quasi-WYSIWYG**
  - Alternatively:  
WYSIWYM (What you see is what you mean)-Frontends such as Lyx
  - **Philosophy**: write **Content**, not Layout
- **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), ...)

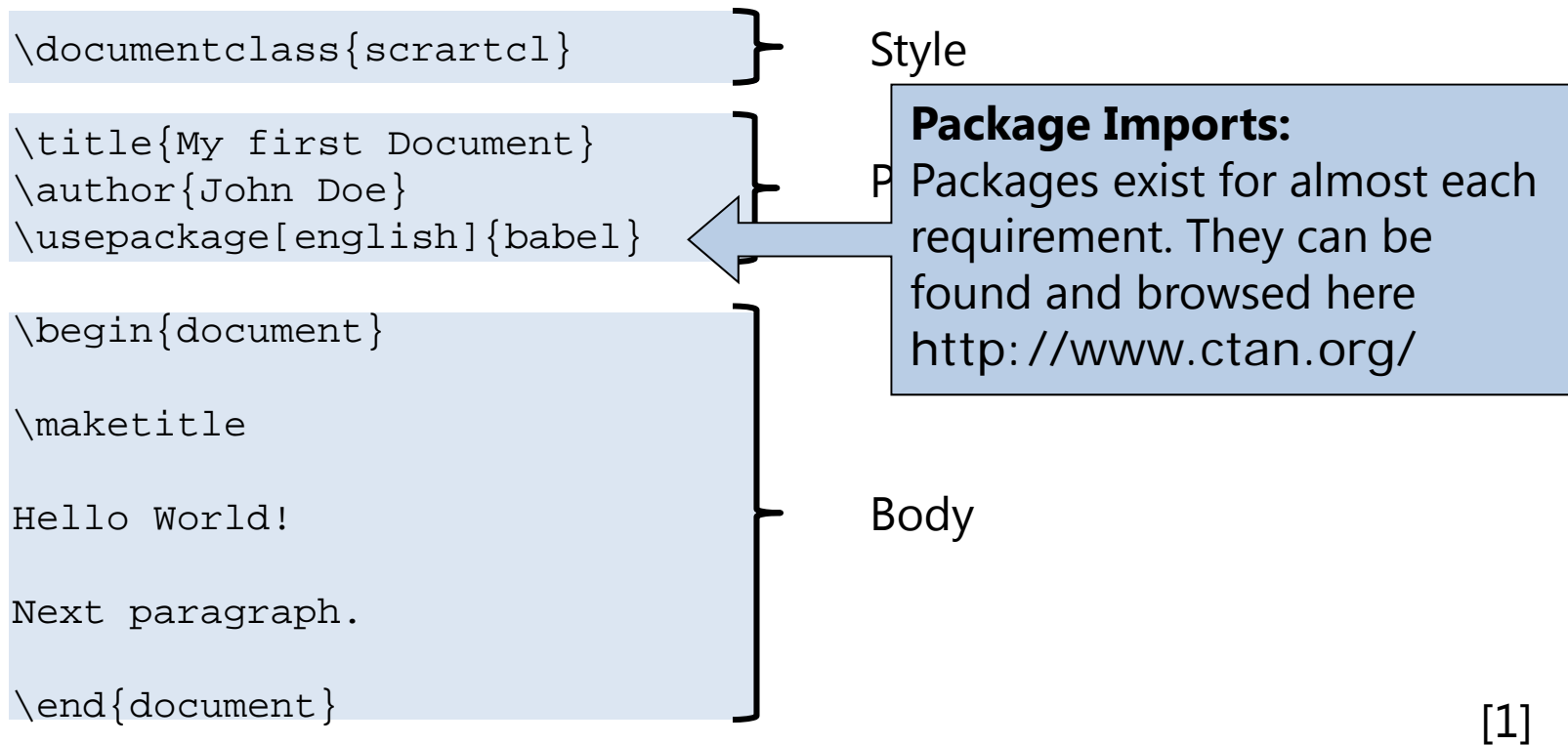
## 2. Preamble

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

## 3. Body

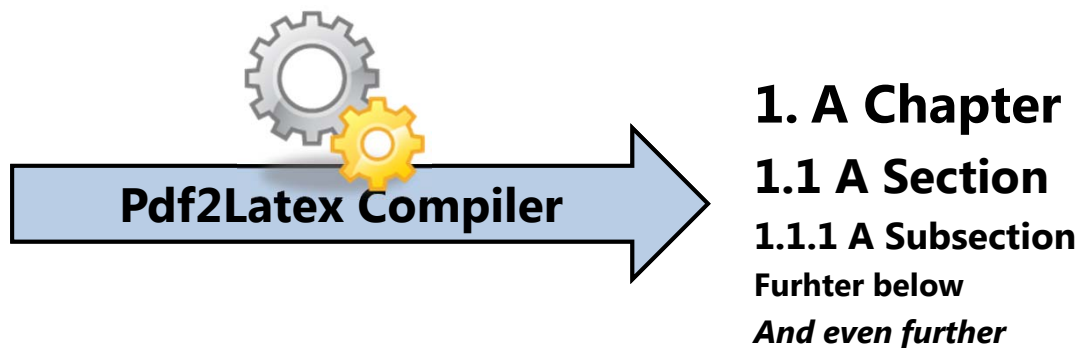
- Real content, structured by chapters, sections, slides etc.

# Document Structure



# Sections

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



# Table of Contents

`\tableofcontents`



## Table of Contents

<b>1. A Chapter .....</b>	<b>1</b>
<b>1.1 A Section .....</b>	<b>3</b>
<b>1.1.1 A Subsection .....</b>	<b>5</b>

# 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.

# 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

<pre>\- " - " = " ~</pre>	<p>Break at this position only</p> <p>Additional break at this position</p> <p>Hyphen without break</p>
---------------------------	---

Only for German documents!

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



# 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

<code>\textrm{Roman}</code>	Roman
<code>\textit{Italics}</code>	<i>Italics</i>
<code>\textbf{Bold}</code>	<b>Bold</b>
<code>\textsc{Capitals}</code>	CAPITALS
<code>\texttt{Typewriter}</code>	Typewriter
<code>\textnormal{Normal}</code>	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



**Pdf2Latex Compiler**

# 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}
```

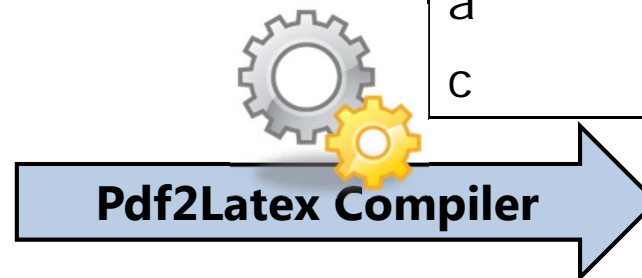
Positioning of figure:  
h = Here (in text)  
t = Top (of page)  
b = Bottom (of page)  
p = Page (separate page)  
! + position = force position

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}
```

Column 1	Column 2
a	b
c	d



# Tables

```
\begin{table}[h]  
  \begin{tabular} { | 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} {||1||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}
```

Column 1	Column 2
a	b
c	d

Horizontal Lines

# 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

Column separation and Newline

# 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}
```

**Details in manual!**

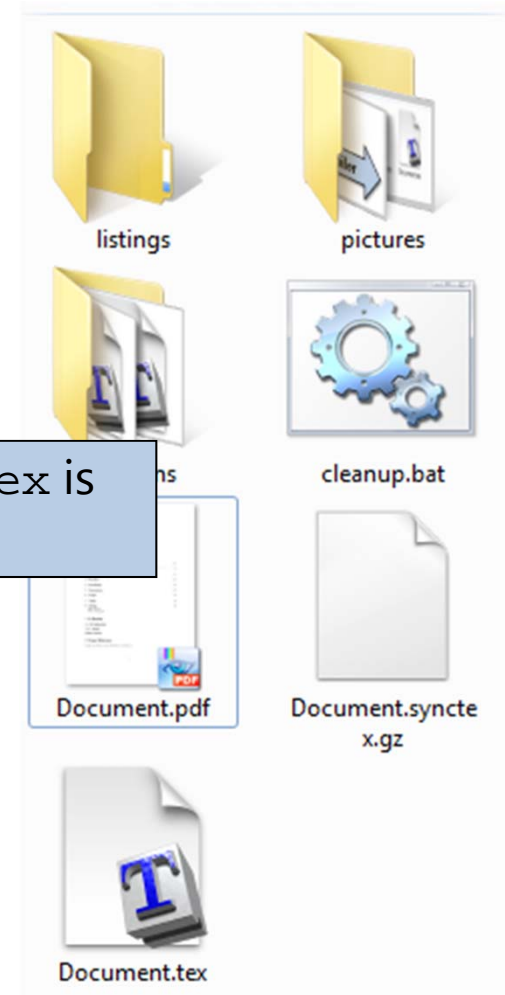


# Project Structure

- 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]{lni}

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

\usepackage{graphicx}
\usepackage{color}
\usepackage{abbrevs}
\usepackage{multitrow}

\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}}
\newcommand{\yemph}{\textit}

\input{abbreviations}

\author{
  Claas Wilke, Sebastian Richly, Georg Püschel, Christian Piechnick, \
  Sebastian Götzt, and Uwe Assmann \
  \
  Fakultät Informatik, Institut für Software- und Multimedialechnik \
  Lehrstuhl Softwaretechnologie, Technische Universität 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}
% \footnotesize
This research has been funded within the project ZEISSY \#080951806, by the ESF
and Federal State of Saxony and within the Collaborative Research Center 912
(HAEC), funded by the DFG. Furthermore, we thank Walteneug 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

```

## Energy Labels for Mobile Applications

Claas Wilke, Sebastian Richly, Georg Püschel, Christian Piechnick,  
Sebastian Götzt, and Uwe Assmann

Fakultät Informatik, Institut für Software- und Multimedialechnik  
Lehrstuhl Softwaretechnologie, Technische Universität 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

SynTeX: "C:/Users/Claas Wilke/Documents/ST Projekte/Zessy2/EEbS2012\_EnergyLabels/energy4apps.synctex" 100% Seite 1 von 15

# 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

Navigator

```
\documentclass[english]{lncs}

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

\usepackage{graphicx}
\usepackage{color}
\usepackage{abbrevs}
\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}}
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\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\ssmann \\\
  \\\
  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)\MiKTeX 2.9\miktex\bin\makeindex.exe [-ilqrogLI] [-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/>

Java - EEBS2012\_EnergyLabels/energy4apps.tex - Eclipse

File Edit Refactor Navigate Search Project Latex Run Latex Symbols Window Help

Quick Access

Package Explorer Navigator JUnit

Other Projects

- Diss
- EEBS2012\_EnergyLabels
  - figures
  - reviews
  - slides
  - submission
  - tmp
  - abbreviations.tex
  - approach.tex
  - conclusion.tex
  - energy4app.synctex.gz
  - energy4apps.aux
  - energy4apps.bib
  - energy4apps.log
  - energy4apps.pdf
  - energy4apps.tex
  - evaluation.tex
  - introduction.tex
  - latin1.sty
  - lni.bst
  - lni.cls
  - profiling.tex
  - relatedwork.tex
  - results.tex
- Individual Research Leaflet Claas
  - org.emftext.commons.antr3\_4\_0
  - SEAOGC2012
  - zessy
- JouleUnit
  - JouleUnit 4 Eclipse
  - JouleUnit 4 Eclipse Experiments
- NaoService
- BA Herrlich

energy4apps.tex

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

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functionality by installing further applications have become very popular. Their
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limits the uptime of the devices and their applications. Hence, investigating
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current, central challenges in software engineering. In this paper we propose
an approach for profiling the power consumption of mobile applications and
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differences can be identified for two well-known email clients. We envision a
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\end{abstract}

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\input{introduction}
\input{approach}
\input{profiling}
\input{relatedwork}
\input{conclusion}

\section*{Acknowledgements}
%\footnotesize
This research has been funded within the project ZESSY \#080951806, by the \ESF
and Federal State of Saxony and within the Collaborative Research Center 912
(HAEC), funded by the \DFG. Furthermore, we thank W\"altenegus 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}
```

Outline

- Preamble
- Acknowledgements

Problems Progress Console Call Hierarchy Tasks Properties

Android

Writable Insert 1 : 1 Loading data for Google Inc.: (100%)

# 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/](http://blog.kowalczyk.info/software/sumatrapdf/)

# JabRef

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

JabRef

File Edit View BibTeX Tools Web search Options Help

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...	
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