Introduction to writing with LaTeX

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May 12, 2017

Outline

- Morning lecture
  - What is LaTeX
  - Motivating LaTeX
  - LaTeX software environment
  - Basics of writing LaTeX documents
  - BibTeX reference management
  - Scientific documents with journal LaTeX templates
  - LaTeX for slides and posters
  - Collaborative writing and versioning of LaTeX documents
- Afternoon hands-on
  - Develop your LaTeX manuscript
  - Style your manuscript with journal templates
  - Revise your manuscript tracking changes
  - Create slides and a poster to present your work
  - Collaborative writing with your co-authors

Schedule

10.00 - 11.30	Lecture
11.30 - 12.30	*Lunch*
12.30 - 13.15	Hands-on I
13.15 - 13.30	*Break*
13.30 - 14.15	Hands-on II
14.15 - 14.45	*Coffee break*
14.45 - 15.30	Hands-on III
15.30 - 15.45	*Break*
15.45 - 16.30	Hands-on IV
16.30 - 17.00	Closing

About me

- Postdoc with PANGAEA at MARUM
- PhD in environmental informatics at University of Eastern Finland
- MSc in informatics at University of Zurich
- MSc in environmental science at University of Eastern Finland *(soon)*
- My history with LaTeX goes back to 2001 when ...

What is LaTeX

- Document preparation system
- Authored by Leslie Lamport, first released in 1985
- Most often used for technical or scientific documents
- Separate presentation from content
- Worry less about style and more about content
- Write plain text rather than formatted text
- Leave document design to designers
- Free software
- Available for Windows, Mac OS, Linux, Online

`https://www.latex-project.org`

What is LaTeX

- **Markup tagging** is central to writing with LaTeX
- Label parts of the document using tags, e.g. `\textit{}`
- It is used to do things like
  - Define document structure, e.g. chapters, sections
  - Style text, e.g. italic, symbols, tables
  - Cite, footnote, cross-reference, ...
- Anyone familiar with HTML?

Markup tagging

```
\textit{Example}
markup
\underline{tagging}
```

Example markup <u>tagging</u>

Markup tagging

```
\begin{itemize}
\item Eggs
\item Milk
\item Cheese
\item Carrots
\end{itemize}
```

- Eggs
- Milk
- Cheese
- Carrots

Markup tagging

```
$ E = mc^2 $
```

$E = mc^2$

Why LaTeX: Advantages

- High typographic quality
- Excels at difficult typesetting tasks, e.g. mathematical text
- Makes things easy, e.g. citation, cross-reference, table of content
- Great engineering, fast and stable
- Even with long and complex documents
- No corrupt files, content loss, etc.
- Truly portable across systems

Why *not* LaTeX: Disadvantages

- Learning curve, somewhat difficult to learn
- Though, basics are *really* easy
- Surely requires some time
- Not WYSIWYG
- More difficult in collaborative writing
- Less support for tracking changes

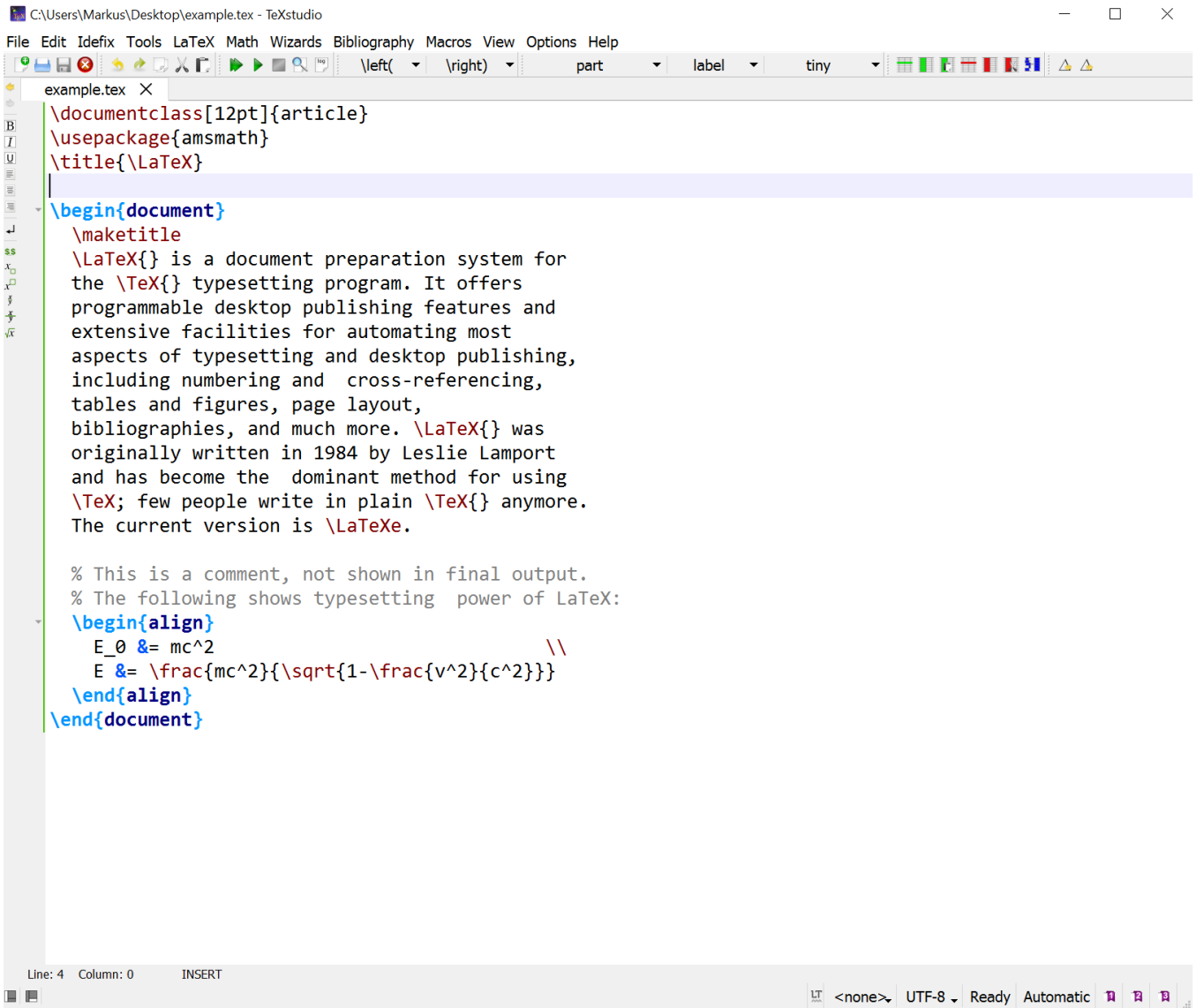
Working with LaTeX

- You need a distribution
  - Most likely TeX Live (`http://www.tug.org/texlive/`)
  - Or MiKTeX on Windows (`https://miktex.org/`)
  - Possibly MacTeX (`http://www.tug.org/mactex/`)
- Some kind of editor
- If you like Notepad, Vim, Emacs, ...
- Preferably,
  - TeXstudio (`http://texstudio.org/`)
  - Texmaker (`http://www.xm1math.net/texmaker/`)
  - TeXnicCenter on Windows (`http://www.texniccenter.org/`)
  - TeXShop on Mac OS (`http://pages.uoregon.edu/koch/texshop/`)
  - Among others ...
- Make use of packages, of which there are several thousands

Working with LaTeX

1. Install distribution and editor
2. Install required packages
3. Write LaTeX document using editor
4. Translate LaTeX document into PDF document
5. Iterate over points (2) and 3-4 until done

TeXstudio


C:\Users\Markus\Desktop\example.tex - TeXstudio
File Edit Idefix Tools LaTeX Math Wizards Bibliography Macros View Options Help
\left(\right) part label tiny
example.tex
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}
\begin{document}
\maketitle
\LaTeX{} is a document preparation system for
the \TeX{} typesetting program. It offers
programmable desktop publishing features and
extensive facilities for automating most
aspects of typesetting and desktop publishing,
including numbering and cross-referencing,
tables and figures, page layout,
bibliographies, and much more. \LaTeX{} was
originally written in 1984 by Leslie Lamport
and has become the dominant method for using
\TeX; few people write in plain \TeX{} anymore.
The current version is \LaTeXe.
% This is a comment, not shown in final output.
% The following shows typesetting power of LaTeX:
\begin{align}
E_0 &= mc^2 \\
E &= \frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}}
\end{align}
\end{document}
Line: 4 Column: 0 INSERT
<none> UTF-8 Ready Automatic

Writing LaTeX documents

- Start with minimal document
- Develop it gradually by introducing new elements
- Structural elements, e.g. title, sections
- Style text, e.g. font size, italic, bold
- Mathematical and chemical formulae, quantities and units
- Tables, graphics and figures
- Cross-references, footnotes, and index
- Citation and reference list
- Table of contents, list of figures and tables
- Tracking changes

Minimal document

```
\documentclass{article}

\begin{document}
  Hello World.
\end{document}
```

Minimal document

Hello World.

Minimal document

```
\documentclass{article}

% I am a comment
% This area is called the PREAMBLE
% Used to load packages and configure your document

\begin{document}

% This is the BODY of the document
% Document content goes here

\end{document}
```

Article title

```
\documentclass{article}

\title{Shine On You Crazy Diamond}
\author{Pink Floyd}
\date{1975}

\begin{document}
  \maketitle % Don't worry how it is displayed
             % It will look pretty good
\end{document}
```

Shine On You Crazy Diamond

Pink Floyd

1975

Article sections

```
\documentclass{article}

\title{Shine On You Crazy Diamond}
\author{Pink Floyd}
\date{1975}

\begin{document}
  \maketitle

  \section{Introduction}
  \section{History}
  \section{Lyrics}

\end{document}
```

Article sections

Shine On You Crazy Diamond

Pink Floyd

1975

Sectioning

```
% For article document class
\section{...}
\subsection{...}
\subsubsection{...}
\paragraph{...}
\subparagraph{...}

% Addtionally for book document class
\chapter{...}
```

Text styling

```
Remember \textbf{when} you \textit{were} young
    \underline{you} shone \texttt{like} the
   sun.

{\color{red}Now there's}     {\Huge{a}}
   \textbf{\underline{look in} your}
   eyes, like     {\tiny{``black holes
   {\Large{in the sky}}.''}}
```

Remember **when** you *were* young you shone `like` the sun.

Now there's **a** **look in** **your** eyes, like "black holes in the sky."

Mathematical formulae

```
\begin{displaymath}
  \lim_{n \to \infty}
  \sum_{k=1}^n
  \frac{1}{k^2}
\end{displaymath}

Math $a^2 + b^2 = c^2$ in text style.
```

$$\lim_{n \to \infty} \sum_{k=1}^{n} \frac{1}{k^2}$$

Math $a^2 + b^2 = c^2$ in text style.

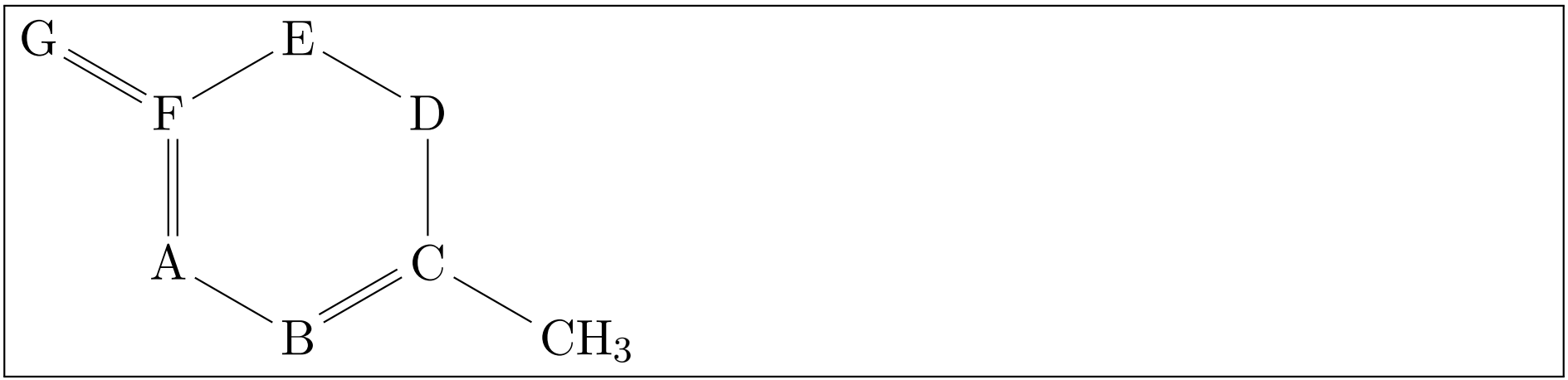
Chemical formulae

```
\ce{CO2}

\ce{CO2 + C -> 2 CO}

This is a \ce{H2O} molecule.

I can do charges \ce{CrO4^2-} and much more.
```

CO_2
$CO_2 + C \longrightarrow 2CO$
This is a H_2O molecule.
I can do charges CrO_4^{2-} and much more.

Chemical formulae

```
\chemfig{A*6(-B=C(-CH_3)-D-E-F(=G)=)}
```



Quantities and units

```
\num{.3e45}

\numlist{10;30;50;70}

\numrange{10}{30}

\si{\kilo\gram\metre\per\square\second}

\SI{1.25}{\metre\per\second}
```

0.3×10^{45}
10, 30, 50 and 70
10 to 30
$\mathrm{kg\,m\,s^{-2}}$
$1.25\,\mathrm{m\,s^{-1}}$

Tables

```
\begin{tabular}{|l|c|}
  \hline
  Year & Title \\
  \hline
  1973 & The Dark Side of the Moon \\
  1975 & Wish You Were Here \\
  1979 & The Wall \\
  \hline
\end{tabular}
```

Year	Title
1973	The Dark Side of the Moon
1975	Wish You Were Here
1979	The Wall

Graphics

```
\includegraphics[scale=0.8]{thewall.png}
```

Figures and captions

```
\begin{figure}
  \centering
  \includegraphics[scale=0.4]{thewall.png}
  \caption{The Wall album cover}
\end{figure}
```

Figure: The Wall album cover

Cross-references

```
\begin{equation}\label{eq}
E = mc^2
\end{equation}

As shown in Equation \ref{eq}, ...
```

$$E = mc^2 \tag{1}$$

As shown in Equation 1, ...

Note: Same approach is used for figures, tables, sections, ...

Footnotes

```
Remember when you were young,
  you shone like the sun.

Shine
on\footnote{Read as if a comma is placed here}
you crazy
diamond\footnote{The crazy diamond is Syd Barrett}.

Now there's a look in your eyes,
  like black holes in the sky.
```

Footnotes

Remember when you were young, you shone like the sun.
Shine on[1] you crazy diamond[2].
Now there's a look in your eyes, like black holes in the sky.

[1] Read as if a comma is placed here
[2] Syd Barrett is the crazy diamond

Index

```
\documentclass{article}

\usepackage{makeidx}

\makeindex

\begin{document}

  Shine\index{Sun} on you crazy\newpage
  diamond\index{Diamond}\index{Diamond!Syd}.

  \printindex

\end{document}
```

Index

Citation

```
\documentclass{article}

\begin{document}

  Shine on you crazy diamond \cite{pf}.

  \bibliographystyle{plain}
  \bibliography{bibliography.bib}

\end{document}
```

Reference list

Shine on you crazy diamond [1].

References

[1] Pink Floyd. Wish you where here. LP, September 1975.

Table of contents, list of figures and tables

```
\documentclass{article}

\begin{document}

  \tableofcontents  % Write out the Table of Contents
  \listoffigures  % Write out the List of Figures
  \listoftables  % Write out the List of Tables

\end{document}
```

Table of contents

```
\documentclass{article}

\title{Shine On You Crazy Diamond}
\author{Pink Floyd}
\date{1975}

\begin{document}
  \maketitle
  \tableofcontents
  \section{Introduction}
  Lorem ipsum dolor sit amet, consectetur adipiscing elit.
  \section{History}
  Morbi sagittis enim lorem, a pulvinar orci fringilla ac.
\end{document}
```

Table of contents

Shine On You Crazy Diamond

Pink Floyd

1975

Contents

1 Introduction

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

2 History

Morbi sagittis enim lorem, a pulvinar orci fringilla ac.

Tracking changes

```
\documentclass{article}

\usepackage{changes}

\definechangesauthor[name={John Doe}, color=blue]{JD}

\begin{document}

  \deleted{...}
  \replaced{...}{...}
  \added[id=JD]{...}

\end{document}
```

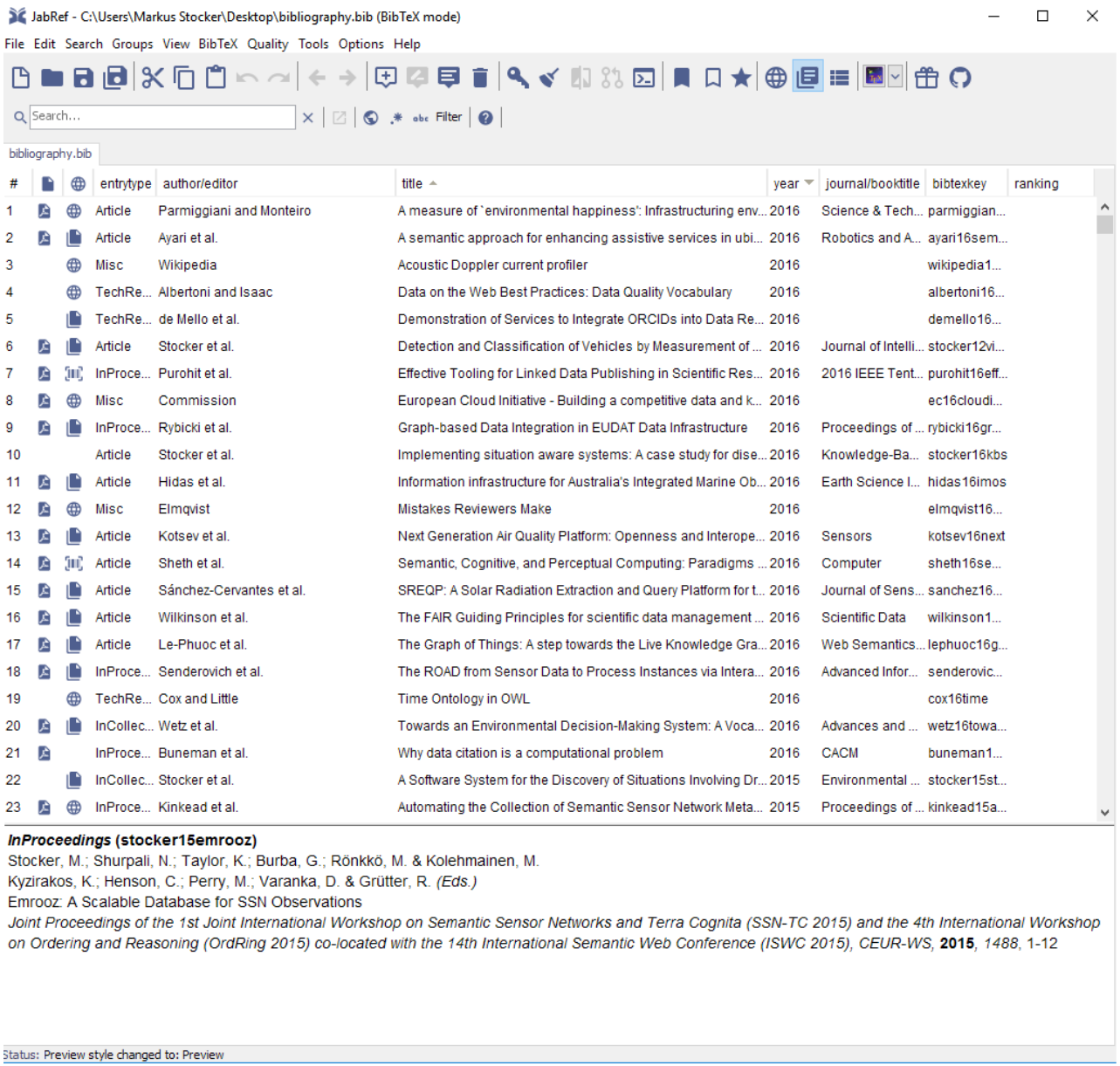
Tracking changes

Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. ~~Consetetur sadipscing elitr, sed diam nonumy eirmod tempor.~~[MS] Invidunt ut labore et dolore magna aliquyam erat.~~At vero eos et accusam et justo duo dolores et ea rebum.~~[JD] Lorem ipsum dolor sit amet.[MS] At vero eos et accusam et justo duo dolores et ea rebum.

Reference managers

- References should be managed, using some tool
- Many out there, Mendeley, EndNote, RefWorks, ...
- Make sure the one you choose supports BibTeX file format
- Here we will be using JabRef

JabRef


JabRef - C:\Users\Markus Stocker\Desktop\bibliography.bib (BibTeX mode)
File Edit Search Groups View BibTeX Quality Tools Options Help
Search...
Filter
bibliography.bib
entrytype author/editor title year journal/booktitle bibtexkey ranking
1 Article Parmiggiani and Monteiro A measure of `environmental happiness': Infrastructuring env... 2016 Science & Tech... parmiggian...
2 Article Ayari et al. A semantic approach for enhancing assistive services in ubi... 2016 Robotics and A... ayari16sem...
3 Misc Wikipedia Acoustic Doppler current profiler 2016 wikipedia1...
4 TechRe... Albertoni and Isaac Data on the Web Best Practices: Data Quality Vocabulary 2016 albertoni16...
5 TechRe... de Mello et al. Demonstration of Services to Integrate ORCIDs into Data Re... 2016 demello16...
6 Article Stocker et al. Detection and Classification of Vehicles by Measurement of ... 2016 Journal of Intelli... stocker12vi...
7 InProce... Purohit et al. Effective Tooling for Linked Data Publishing in Scientific Res... 2016 2016 IEEE Tent... purohit16eff...
8 Misc Commission European Cloud Initiative - Building a competitive data and k... 2016 ec16cloudi...
9 InProce... Rybicki et al. Graph-based Data Integration in EUDAT Data Infrastructure 2016 Proceedings of ... rybicki16gr...
10 Article Stocker et al. Implementing situation aware systems: A case study for dise... 2016 Knowledge-Ba... stocker16kbs
11 Article Hidas et al. Information infrastructure for Australia's Integrated Marine Ob... 2016 Earth Science I... hidas16imos
12 Misc Elmqvist Mistakes Reviewers Make 2016 elmqvist16...
13 Article Kotsev et al. Next Generation Air Quality Platform: Openness and Interope... 2016 Sensors kotsev16next
14 Article Sheth et al. Semantic, Cognitive, and Perceptual Computing: Paradigms ... 2016 Computer sheth16se...
15 Article Sánchez-Cervantes et al. SREQP: A Solar Radiation Extraction and Query Platform for t... 2016 Journal of Sens... sanchez16...
16 Article Wilkinson et al. The FAIR Guiding Principles for scientific data management ... 2016 Scientific Data wilkinson1...
17 Article Le-Phuoc et al. The Graph of Things: A step towards the Live Knowledge Gra... 2016 Web Semantics... lephuoc16g...
18 InProce... Senderovich et al. The ROAD from Sensor Data to Process Instances via Intera... 2016 Advanced Infor... senderovic...
19 TechRe... Cox and Little Time Ontology in OWL 2016 cox16time
20 InCollec... Wetz et al. Towards an Environmental Decision-Making System: A Voca... 2016 Advances and ... wetz16towa...
21 InProce... Buneman et al. Why data citation is a computational problem 2016 CACM buneman1...
22 InCollec... Stocker et al. A Software System for the Discovery of Situations Involving Dr... 2015 Environmental ... stocker15st...
23 InProce... Kinkead et al. Automating the Collection of Semantic Sensor Network Meta... 2015 Proceedings of ... kinkead15a...
InProceedings (stocker15emrooz)
Stocker, M.; Shurpali, N.; Taylor, K.; Burba, G.; Rönkkö, M. & Kolehmainen, M.
Kyzirakos, K.; Henson, C.; Perry, M.; Varanka, D. & Grütter, R. (Eds.)
Emrooz: A Scalable Database for SSN Observations
Joint Proceedings of the 1st Joint International Workshop on Semantic Sensor Networks and Terra Cognita (SSN-TC 2015) and the 4th International Workshop on Ordering and Reasoning (OrdRing 2015) co-located with the 14th International Semantic Web Conference (ISWC 2015), CEUR-WS, 2015, 1488, 1-12
Status: Preview style changed to: Preview

BibTeX citation

```
@InProceedings{stocker08sparql,
  title = {{SPARQL Basic Graph Pattern Optimization
            Using Selectivity Estimation}},
  author = {Stocker, M. and Seaborne, A.
            and Bernstein, A. and Kiefer, C.
            and Reynolds, D.},
  booktitle = {Proceeding of the 17th international
               conference on World Wide Web},
  pages = {595--604},
  year = {2008},
  url = {http://doi.acm.org/10.1145/1367497.1367578},
  doi = {10.1145/1367497.1367578},
  publisher = {ACM},
  isbn = {978-1-60558-085-2}
}
```

Obtain citations

Cite

```
\documentclass{article}

\begin{document}

  In \cite{stocker08sparql}, the authors show that ...

  \bibliographystyle{plain}
  \bibliography{bibliography.bib}

\end{document}
```