

# Getting started with L<sup>A</sup>T<sub>E</sub>X using Overleaf

Collaborative writing and publishing

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Oct 16, 2019



# Lecture Outline

- 1 Introduction to LateX
- 2 Adding a title, author and date
- 3 Adding Comments
- 4 Bold, italics and underlining
- 5 Adding Images
- 6 Creating List
- 7 Add Equations
- 8 Chapters and Sections
- 9 Creating tables in L<sup>A</sup>T<sub>E</sub>X
- 10 Adding Table of Contents
- 11 Overleaf
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# L<sup>A</sup>T<sub>E</sub>X using Overleaf

- For this lecture, create & login into your overleaf account.

`https://www.overleaf.com/`

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

- L<sup>A</sup>T<sub>E</sub>X (pronounced LAY-tek or LAH-tek) is a tool used to create professional-looking documents.
- It is based on the WYSIWYM (what you see is what you mean) idea, meaning you only have focus on the contents of your document and the computer will take care of the formatting.

# Why learn L<sup>A</sup>T<sub>E</sub>X?

- L<sup>A</sup>T<sub>E</sub>X is used all over the world for scientific documents, books, as well as many other forms of publishing.
- One of the most important reasons people use L<sup>A</sup>T<sub>E</sub>X is that it separates the content of the document from the style. This means that once you have written the content of your document, we can change its appearance with ease.
- This allows scientific journals to create templates for submissions

# Writing your first piece of L<sup>A</sup>T<sub>E</sub>X

- You can use either [TexStudio](#) on your computer OR [Overleaf](#) for your documents. Lets explore Overleaf today.
- Start a new [Blank project](#) on [Overleaf](#), let's start with the simplest working example:

```
1 \documentclass{article}
2 \begin{document}
3 First document. This is a simple example, with no
4 extra parameters or packages included.
5 \end{document}
```

# Writing your first piece of L<sup>A</sup>T<sub>E</sub>X

```
1 \documentclass{article}
```

- The first line of code declares the **type of document**, known as the **class**. The class **controls the overall appearance** of the document.
- In this case, the class is **article**, the simplest and most common L<sup>A</sup>T<sub>E</sub>X class.
- Other types of documents you may be working on may require different classes such as **book** or **report**.
- After this, you write the content of our document, enclosed inside the **\begin{document}** and **\end{document}**
- **Compile** – To do this in Overleaf, simply **hit Recompile** OR press **Ctrl+S**.



# The preamble of a document

- Before the `\begin{document}` command, **everything in your .tex file is called the preamble**.
- In the **preamble** you define, the **packages you would like to use and several other elements**. For instance, a normal document preamble would look like this:

```
1 \documentclass[12pt, letterpaper]{article}
2 \usepackage[utf8]{inputenc}
```

- The extra parameters set the **font size (12pt) and the paper size (letterpaper)**.
- Other font sizes (9pt, 11pt, 12pt) can be used. As for the paper size other possible values are **a4paper and legalpaper**.

# The preamble of a document

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

- This is the [encoding for the document](#).
- It can be omitted or changed to another encoding but utf-8 is recommended.

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# The preamble of a document

- We can add **title** to our document.

```
1 \title{First document}    %This is the title.
```

- We can put the **name of the Author(s)** and, as a optional parameter, you can add the next command:

```
1 \author{Asad W. Malik}
```

- Useful if you need to **thank an institution** in your article with date.

```
1 \thanks{Resources provided by the Overleaf team}  
2 \date{Oct 2019}
```

# The preamble of a document

```

1 \documentclass[12pt, letterpaper, twoside]{article}
2 \usepackage[utf8]{inputenc}
3 \title{First document}
4 \author{Hubert Farnsworth \thanks{Overleaf team}}
5 \date{February 2017}

```

- We can [print this information](#) on the document with the [maketitle command](#). This should be included in the body of the document at the place you want the title to be printed.

```

1 \begin{document}
2 \maketitle
3 We have now added a title, author and date to our first ↵
   LaTeX{} document!
4 \end{document}

```

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# Adding comments

- It can often be useful to include comments.
- Comments are pieces of text you can include in the document which will not be printed, and will not affect the document in any way.

```
1 % This line here is a comment. It will not be printed in ↵  
   the document.
```

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# Bold, italics and underlining

We will now look at **some simple text formatting commands**.

```
1 Some of the \textbf{greatest}
2 discoveries in \underline{science}
3 were made by \textbf{\textit{accident}}.
```

⇒ Emphasized text is italicized, but this behaviour is reversed if used inside an italicized text- see example below:

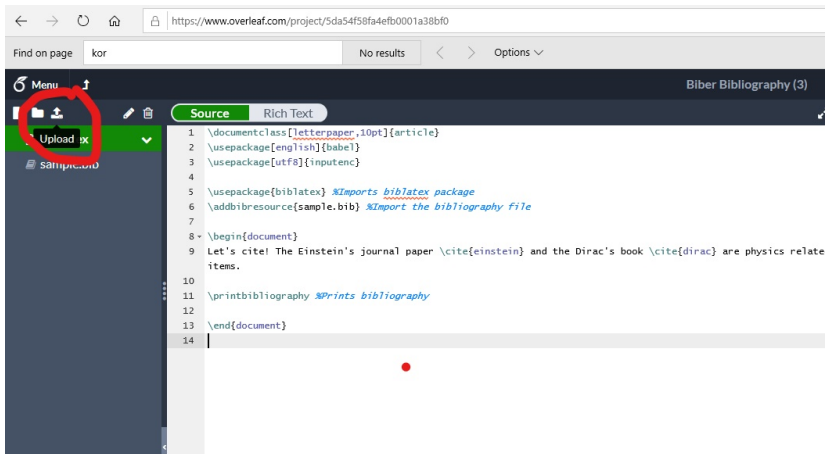
```
1 Some of the greatest \emph{discoveries} in science were ←
   made by accident.
2 \textit{Some of the greatest \emph{discoveries} in science} ←
   were made by accident.}
```

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# Adding images

⇒ Add images to a L<sup>A</sup>T<sub>E</sub>X document – on Overleaf, you will **first have to upload the images**.



# Adding images

⇒ Below is a example on how to **include a picture in your tex document**.

```
1 \documentclass{article}
2 \usepackage{graphicx}
3 \graphicspath{ {images/} }
4 \begin{document}
5 The universe is immense and it seems to be homogeneous ,
6 in a large scale, everywhere we look at.
7 \includegraphics{universe}
8 There is a picture of a galaxy above
9 \end{document}
```

# Adding images

⇒ The image will appear like shown below.

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.



There's a picture of a galaxy above

# Adding images

- ⇒ L<sup>A</sup>T<sub>E</sub>X can not manage images by itself, need to use a package.
- ⇒ Packages can be used to change the default look of your L<sup>A</sup>T<sub>E</sub>X document, or to allow more functionalities.
- ⇒ In this case, we need to include an image in our document, so you should use the `graphicx` package.

```
1 This package gives new commands, \includegraphics{...}. To↵  
   use the package package, include the following line ↵  
   in you preamble:  
2 \usepackage{graphicx}
```

## Refer image in a text

```
1 \begin{figure}[h]
2     \centering
3     \includegraphics[width=0.9\textwidth]{mesh}
4     \caption{a nice plot}
5     \label{fig:mesh1}
6 \end{figure}
```

⇒ In text we can refer figure using `\ref{fig:mesh1}`.

# Adjust images

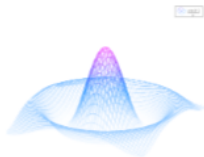


Figure 1: a nice plot

As you can see in the figure 1, the function grows near 0. Also, in the page 1 is the same example.

Figure 1: centered using `\centering` command



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# Creating lists in L<sup>A</sup>T<sub>E</sub>X – Unordered lists

- They start with a `\begin{...}` command and end with an `\end{...}` command.
- Unordered lists are produced by the `itemize` environment. Each entry must be preceded by the control sequence `\item` as shown below.

```
1 \begin{itemize}
2   \item The individual entries are indicated with a black dot, a so-called bullet.
3   \item The text in the entries may be of any length.
4 \end{itemize}
```

# Creating lists in L<sup>A</sup>T<sub>E</sub>X – Ordered lists

- **Ordered list** have the same syntax inside a different environment. We make ordered lists using the **enumerate** environment:

```
1 \begin{enumerate}
2   \item This is the first entry in our list
3   \item The list numbers increase with each entry we add
4 \end{enumerate}
```

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# Adding math to L<sup>A</sup>T<sub>E</sub>X

- Easy to write mathematical expressions.
- L<sup>A</sup>T<sub>E</sub>X allows two modes for mathematical expressions: inline mode and the display mode.
- inline Mode – is used to write formulas that are part of a text.
- display Mode – is to write expressions on separate lines. Let's see an example of the inline mode:

```
1 In physics, the mass-energy equivalence is stated by the ↵
   equation  $E=mc^2$ , discovered in 1905 by Albert ↵
   Einstein.
```

- To put your equations in inline mode use one of these delimiters: ..., \$ ... \$ or `\begin{math} ... \end{math}`. They all work and the choice is a matter of taste.

# Adding math to L<sup>A</sup>T<sub>E</sub>X

- The displayed mode can be numbered and unnumbered.
- Numbered version is shown below:

```
1 \begin{equation}
2 E=mc^2
3 \end{equation}
```

- Unnumbered version is:

```
1 \begin{equation*}
2 E=mc^2
3 \end{equation*}
```

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# Chapters & Sections

- **Commands to organize a document** vary depending on the document type, the simplest form of organization is the **sectioning**, available in all formats.

```
1 \chapter{First Chapter}
2
3 \section{Introduction}
4
5 This is the first section.
6
7 \section{Second Section}
8
9 This is second section.
10
11 \subsection{First Subsection}
12 This is subsection.
13
14 \section*{Unnumbered Section}
15 This is unnumbered section.
```



# Chapters & Sections

- Use report as the document type.

```
1 \documentclass{report}
```

# Output LaTeX pdf

## Chapter 1

### First Chapter

#### 1.1 Introduction

This is the first section.

#### 1.2 Second Section

This is second section.

##### 1.2.1 First Subsection

This is subsection.

#### Unnumbered Section

This is unnumbered section.

# Chapters & Sections

- Section numbering is automatic and can be disabled by including a `*` in the section command as `\section*`.
- We can also have `\subsection{}`, and indeed `\subsubsection{}`. The basic levels of depth are listed below:

```
1 \chapter{chapter}
2
3 \section{section}
4
5 \subsection{subsection}
6
7 \subsubsection{subsubsection}
```

# Output LaTeX pdf

## Chapter 1

### Introduction

Chapter 1.....

#### 1.1 section

Section.....

##### 1.1.1 subsection

Subsection.....

##### subsubsection

subsubsection starts here.....

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# Creating a simple table in LaTeX

- Below you can see the simplest working example of a table:

```

1  \begin{center}
2  \begin{tabular}{c c c }
3      cell1 & cell2 & cell3 \\
4      cell4 & cell5 & cell6 \\
5      cell7 & cell8 & cell9
6  \end{tabular}
7  \end{center}

```

⇒ Output of above code:

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

# Creating a simple table in L<sup>A</sup>T<sub>E</sub>X

- The `tabular` environment is the default L<sup>A</sup>T<sub>E</sub>X method to create tables.
- The parameter `{c c c}` tells L<sup>A</sup>T<sub>E</sub>X that there will be three columns and that the text inside each one of them must be centred.
- You can also use `r` to align the text to the right and `l` for left alignment.
- The alignment symbol `&` is used to specify the breaks in the table entries.

# Adding borders

- The tabular environment is more flexible, you can put **separator lines in between each column**.

```

1  \begin{center}
2    \begin{tabular}{|c|c|c| }
3    \hline
4      cell1 & cell2 & cell3 \\
5      cell4 & cell5 & cell6 \\
6      cell7 & cell8 & cell9 \\
7    \hline
8    \end{tabular}
9  \end{center}

```

⇒ Output of above code:

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9



# Adding borders

- You can add **borders** using the **horizontal line** command `\hline` and the **vertical line** parameter `|`.
- `{|c|c|c|}`: This declares that three columns, separated by a vertical line, are going to be used in the table. The `|` symbol specifies that these columns should be separated by a **vertical line**.
- `\hline`: This will insert a **horizontal line**. We have included horizontal lines at the top and bottom of the table here. There is no restriction on the number of times you can use `\hline`.

## Second Example – Table

- Below you can see a another example.

```

1  \begin{center}
2  \begin{tabular}{||c c c c||}
3  \hline
4  Col1 & Col2 & Col2 & Col3 \\\ [0.5ex]
5  \hline\hline
6  1 & 6 & 87837 & 787 \\\
7  \hline
8  2 & 7 & 78 & 5415 \\\
9  \hline
10 3 & 545 & 778 & 7507 \\\
11 \hline
12 4 & 545 & 18744 & 7560 \\\
13 \hline
14 5 & 88 & 788 & 6344 \\\ [1ex]
15 \hline
16 \end{tabular}
17 \end{center}

```

# Adding borders

⇒ Output of above code:

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

# Creating tables using online interface

⇒ Create complex table using: <https://www.tablesgenerator.com/>

Function	Format	Objective	Explanation
glimpse	check the structure of a df	glimpse(df)	Identical to str()
select()	Select/exclude the variables	select(df, A, B ,C)	Select the variables A, B and C
		select(df, A:C)	Select all variables from A to C
		select(df, -C)	Exclude C
filter()	Filter the df based a one or many conditions	filter(df, condition1)	Condition
arrange()	Sort the dataset with one or many variables	arrange(A)	Ascending sort of variable A
		arrange(A, B)	Ascending sort of variable A and B
		arrange(desc(A), B)	Descending sort of variable A and ascending sort of B
%>%	Create a pipeline between each step	step 1 %>% step 2 %>% step 3	

Table 1:

# Complex tables

Function	Format	Objective	Explanation
glimpse	check the structure of a df	glimpse(df)	Identical to str()
select()	Select/exclude the variables	select(df, A, B ,C)	Select the variables A, B and C
		select(df, A:C)	Select all variables from A to C
		select(df, -C)	Exclude C
filter()	Filter the df based a one or many conditions	filter(df, condition1)	Condition
arrange()	Sort the dataset with one or many variables	arrange(A)	Ascending sort of variable A
		arrange(A, B)	Ascending sort of variable A and B
		arrange(desc(A), B)	Descending sort of variable A and ascending sort of B

Create a pipeline

# Captions, labels and references

- **Caption** and **reference tables** in the **same way as images**. The **difference** is instead of the figure, **use table** environment.

```

1  \begin{table}[h!]
2  \centering
3  \begin{tabular}{||c c c c||}
4  \hline
5   Col1 & Col2 & Col2 & Col3 \\ \ [0.5ex]
6  \hline\hline
7   1 & 6 & 87837 & 787 \\ \
8   2 & 7 & 78 & 5415 \\ \
9   3 & 545 & 778 & 7507 \\ \
10  4 & 545 & 18744 & 7560 \\ \
11  5 & 88 & 788 & 6344 \\ \ [1ex]
12  \hline
13  \end{tabular}
14  \caption{Table to test captions and labels}
15  \label{table:data}
16  \end{table}

```

# Refer Table in the text

- `\ref{table:data}` is an example of referenced LaTeX elements.

```

1 \begin{table}[h!]
2 \centering
3 \begin{tabular}{||c c c c||}
4 \hline
5 Col1 & Col2 & Col2 & Col3 \\\ [0.5ex]
6 \hline\hline
7 1 & 6 & 87837 & 787 \\\
8 2 & 7 & 78 & 5415 \\\
9 3 & 545 & 778 & 7507 \\\
10 4 & 545 & 18744 & 7560 \\\
11 5 & 88 & 788 & 6344 \\\ [1ex]
12 \hline
13 \end{tabular}
14 \caption{Table to test captions and labels}
15 \label{table:data}
16 \end{table}

```

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# Adding a Table of Contents

- To create the table of contents is straightforward, the command `\tableofcontents` does all the work for you:

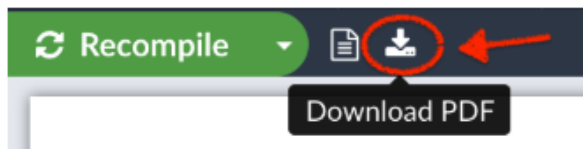
```
1 \documentclass{article}
2 \usepackage[utf8]{inputenc}
3 \title{Sections and Chapters}
4 \author{Gubert Farnsworth}
5 \date{ }
6 \begin{document}
7 \maketitle
8
9 \tableofcontents
10
11 \section{Introduction}
12 This is the first section.
13
14 \section{Second Section}
15
16 \end{document}
```

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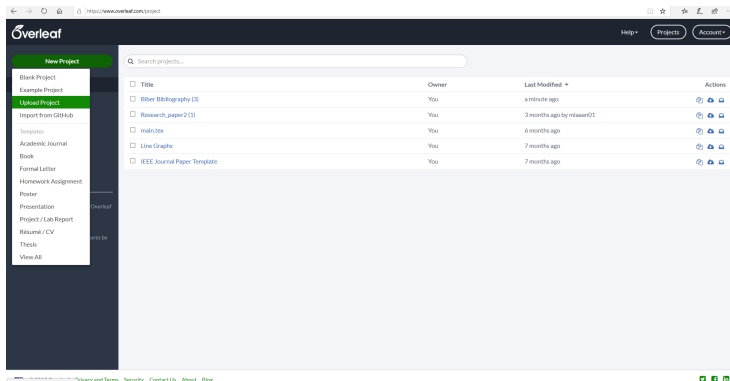
# Downloading your finished document

⇒ You can [download your finished PDF](#) from the left hand menu as above by [clicking PDF](#). There is also the [quicker option](#) of clicking the Download PDF button on your PDF viewer as shown below.



# Upload project on Overleaf

- To **upload** a project by **selecting New Project → Upload Project**.
- **Upload** a **zip file** available on **UM Spectrum**.
- **Explore** the **sample.bib** file.

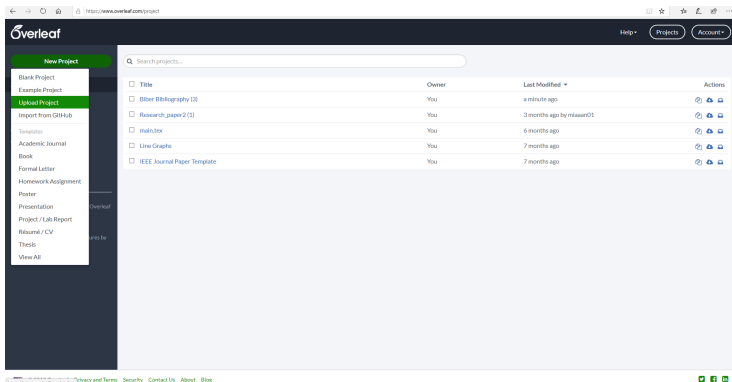


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# How to use biblatex

- Example of using biblatex is available on UM Spectrum.
- Upload the available project on Overleaf – Select upload project and browse to zip file.



# How to use biblatex

- You have two files in [sample project \(Biber\\_Bibliography\)](#).
- Having extension [tex](#) and [bib](#) file.
- [.bib](#) file includes all your references.

⇒ Try to cite another reference from bib file into you tex file using `\cite{}`.

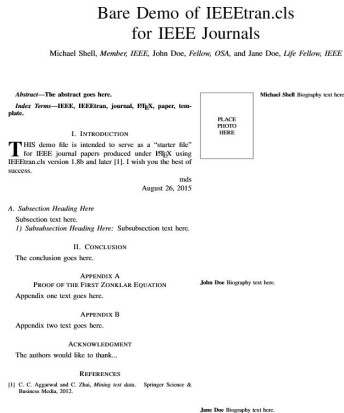
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# Working with IEEE Paper template

- Open **IEEE paper template** available under **New Project** → **Academic Journal**.



# Working with IEEE Paper template

- References using `\bibitem`.

```

1  \begin{thebibliography}{1}
2
3  \bibitem{IEEEhowto:kopka}
4  H.~Kopka and P.~W. Daly, \emph{A Guide to \LaTeX}, 3rd~ed↵
   .\hskip 1em plus
5  0.5em minus 0.4em\relax Harlow, England: Addison-Wesley, ↵
   1999.
6
7  \end{thebibliography}

```

# Add your reference in a bib file

- Step-1: Use Google source to find reference bibtex file.

The screenshot shows a Google Scholar search for "data analytics survey". The search bar at the top contains the text "data analytics survey" and a magnifying glass icon. Below the search bar, it says "Articles" and "About 486,000 results (0.54 sec)". On the left side, there are filters for "Any time" (with sub-options: Since 2019, Since 2018, Since 2015, Custom range...), "Sort by relevance" (with sub-option: Sort by date), and checkboxes for "Include patents", "Include citations", and "Create alert". The main results area shows three entries. The first entry is "[book] Mining text **data**" by CC Aggarwal and CX Zhai, published in 2012, with a link to books.google.com. The second entry is "[HTML] Big **data analytics**: a **survey**" by CW Tsai, CF Lai, HC Chao, and AV Vasilakos, published in 2015, with a link to biomedcentral.com. The third entry is "[HTML] A **survey** on platforms for big **data analytics**" by D Singh and CK Reddy, published in 2015, with a link to springer.com. Each entry includes a star icon, a citation count, and links for "Related articles" and "All versions".

Google Scholar

data analytics survey

Articles About 486,000 results (0.54 sec)

Any time  
Since 2019  
Since 2018  
Since 2015  
Custom range...

Sort by relevance  
Sort by date

☒ Include patents  
☒ Include citations  
☒ Create alert

[book] Mining text **data**  
CC Aggarwal, CX Zhai - 2012 - books.google.com  
... Text in Social Media 2.1 A General Framework for Text **Analytics** 2.2 Time Sensitivity 2.3 Short Length 2.4 Unstructured Phrases 2.5 Abundant Information Applying Text **Analytics** to Social ... x MINING-TEXT **DATA** 13 A **Survey** of Opinion Mining and Sentiment **Analysis** Bing Liu ...  
☆ 99 Cited by 1006 Related articles All 6 versions

[HTML] Big **data analytics**: a **survey**  
CW Tsai, CF Lai, HC Chao, AV Vasilakos - Journal of Big **data**, 2015 - biomedcentral.com  
The age of big **data** is now coming. But the tradition that arises now is, how to develop a high performance platform to efficiently analyze big **data** and how to design an appropriate ...  
☆ 99 Cited by 295 Related articles All 12 versions

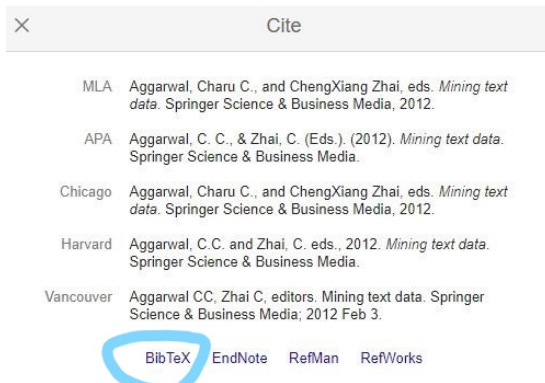
[HTML] A **survey** on platforms for big **data analytics**  
D Singh, CK Reddy - Journal of big **data**, 2015 - Springer  
The primary purpose of this paper is to provide an in-depth **analysis** of different platforms available for performing big **data analytics**. This paper **surveys** different hardware platforms available for big **data analytics** and assesses the advantages and drawbacks of each of ...  
☆ 99 Cited by 290 Related articles All 13 versions

[HTML] biomedcentral.com  
Full View

[HTML] springer.com  
Full View

# Working with IEEE Paper template

- Step-2: Bibtex reference.



# Working with IEEE Paper template

- Step-3: Copy the entire contents to sample.bib file.

```
@book{aggarwal2012mining,  
  title={Mining text data},  
  author={Aggarwal, Charu C and Zhai, ChengXiang},  
  year={2012},  
  publisher={Springer Science \& Business Media}  
}
```

# Working with IEEE Paper template

- Replace the below mentioned code:

```

1  \begin{thebibliography}{1}
2
3  \bibitem{IEEEhowto:kopka}
4  H.~Kopka and P.~W. Daly, \emph{A Guide to \LaTeX}, 3rd~ed↵
      .\hskip 1em plus
5  0.5em minus 0.4em\relax Harlow, England: Addison-Wesley, ↵
      1999.
6
7  \end{thebibliography}

```

- With the following code. Make sure that you have a sample.bib file added in your project.

```

1  \bibliographystyle{IEEEtran}
2  \bibliography{sample}

```

# Outline

- 1 Introduction to LaTeX
- 2 Adding a title, author and date
- 3 Adding Comments
- 4 Bold, italics and underlining
- 5 Adding Images
- 6 Creating List
- 7 Add Equations
- 8 Chapters and Sections
- 9 Creating tables in LaTeX
- 10 Adding Table of Contents
- 11 Overleaf
  - Download pdf from Overleaf
  - Upload a project
- 12 How to use biblatex in Overleaf
- 13 IEEE Paper Template
- 14 Acknowledgement\***

# Acknowledgement

⇒ Thanks to Overleaf team for sharing course contents.

Natalie Jonk (Community Manager), Overleaf team.