

# **Writing for Computer Science & Engineering**

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# Latex

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# Introduction

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- ❖ **TeX is essentially a Markup Language (like HTML, XML)**
- ❖ **TeX written by Donald Knuth in 70's**
  - A revolution in typesetting
- ❖ **Latex is an extension of TeX**
  - Macro packages to make TeX easier to use



# Latex vs. Word Processors

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- ❖ High typeset quality
- ❖ Easy to include math formulas
- ❖ Source file format is not bounded to a particular OS or platform
- ❖ Latex implementations exists for all platforms (Windows, MAC...)
- ❖ Latex is free



# Latex vs. Word Processors

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- ❖ De facto standard for scientific publishing
- ❖ Very few bugs
- ❖ Good for large documents
- ❖ Not very easy to learn
- ❖ WYSIWYG ( 'What you see is what you get' )
- ❖ WYSIWYM ( 'What you see is what you mean' )



# Example of Latex document

---

```
\documentclass{article}  
  
\title{Simple Example}  
  
\author{Andrei Gurtov}  
  
\date{March 2000}  
  
\begin{document}  
  
\maketitle  
  
Hello world!  
  
\end{document}
```



# Creating Latex Files

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**Your Latex File (a text file)**

**Your Bibtex File**



**Latex compile**



**Bibtex compile**



**Latex compile**

**Device independent  
output .dvi**



**dvips compile**

**Your Postscript File**



# Latex File Structure

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## ❖ Document Class

- Predefined Formats (article, report, book,...)

## ❖ Packages used

- Added Functionality (graphics, reference style,...)

## ❖ Main Body

- Text and Bibliography References





# The Basics

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## ❖ Document Class

```
\documentclass[options]{class}  
options = a4paper, 11pt, 12pt, 10pt, twocolumn,  
landscape,...  
class = article, report, book,...
```

## ❖ Packages

```
\usepackage{package name}
```



# Body of Text

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❖ **Start with** `\begin{document}`

❖ **End with** `\end{document}`

❖ **Typesetting Text**

– `\\` **or** `\newline` **and** `\newpage`

– **Bold** `\textbf{.....}` **or** `\bf`

– **Italics** `\emph{.....}` **or** `\textit{.....}` **or** `\it`

– **Underline** `\underline{.....}` **or** `\ul`



# Body of Text cont...

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## ❖ Including Multiple Files

- `\input{filename.tex}`



# Format

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## ❖ Sections

- `\section{...}` = 1. Latex is Great
- `\subsection{...}` = 1.1 Why Latex is Great
- `\subsubsection{...}` = 1.1.1 Reason One
- `\appendix` – changes numbering scheme
- `\chapter{...}` – To be used with book and report document classes

## ❖ Titles, Authors and others

- `\title{...}`                      `\author{...}`
- `\footnote{...}`



# Format Contd.

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- ❖ `\maketitle` – **Display Title and Author**
- ❖ `\tableofcontents` – **generates TOC**
- ❖ `\listoftables` – **generates LOT**
- ❖ `\listoffigures` – **generates LOF**
- ❖ **Labels**
  - `\label{marker}` – **Marker in document.**
  - `\pageref{marker}` – **Displays page no. of marker.**
  - `\ref{marker}` – **Displays section location of marker.**
- ❖ **Itemize**
  - Use either *enumerate*, *itemize* or *description*.
  - *see handout for example.*



# Lists

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## ❖ Source

- `\begin{itemize}`
- `\item Apple`
- `\item Orange`
- `\end{itemize}`

## ❖ Result

- Apple
- Orange



# Lists

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- ❖ Enumerate **instead of** `itemize` **gives a numbered list**
- ❖ **Lists can be recursive**



# Environment

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## ❖ Something between

- `\begin{name}`
- `\end{name}`

## ❖ Many command, for example `\bf` affect the text until the end of environment

## ❖ Environments can be recursive

## ❖ Examples:

- `itemize`, `center`, `abstract`





# Group

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- ❖ Group is some text between { and }
- ❖ Many commands work until the end of the group
- ❖ Code
  - put {one word \bf in bold} here
- ❖ Result
  - put one word in bold here



# Alignment

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❖ **Environments** `center`, `flushleft`, `flushright`

❖ **Example**

- `\begin{flushright}`
- Right aligned
- `\end{flushright}`

❖ **Result**

Right aligned



# Font size

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`\tiny \scriptsize \footnotesize`

`\small \normalsize`

`\large \Large`

`\LARGE \huge`

`\Huge`



# Example of Latex document

---

```
\documentclass{article}
```

```
\title{Simple Example}
```

```
\author{Andrei Gurtov}
```

```
\date{March 2000}
```

```
\begin{document}
```

```
\maketitle
```

```
Hello world!
```

```
\end{document}
```



# Tabular

## Two Columns

### ❖ Columns

- `\begin{tabular}{|...|...|}`
- `\end{tabular}`

### ❖ Rows

- `&` – **Split text into columns**
- `\\` – **End a row**
- `\hline` – **Draw line under row**
- **e.g.** `123123 & 34.00\\ \hline`

**l** = automatically adjust size, left justify  
**r** = automatically adjust size, right justify  
**p** = set size  
    e.g `p{4.7cm}`  
**c** = centre text



## Example of table

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```
\begin{tabular}{|l|r|c|} \hline
Date & Price & Size \\ \hline
Yesterday & 5 & big \\ \hline
Today & 3 & small \\ \hline
\end{tabular}
```

Date	Price	Size
Yesterday	5	Big
Today	3	Small



# Floating Objects

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❖ **Floating objects can stop splitting of tables and images over pages.**

```
\begin{figure} [options]
```

```
\end{figure}
```

```
\begin{table} [options]
```

```
\end{table}
```

## **Options (recommendations)**

**h = place table here**

**t = place at top of page**

**b = place at bottom of page**



# Example of floating figure

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- ❖ `\begin{figure}[ht]`
- ❖ `\centering\epsfig{file=uni.ps, width=5cm}`
- ❖ `\caption{University of Helsinki}`
- ❖ `\label{uni}`
- ❖ `\end{figure}`

**Figure~\ref{uni}  
shows...**





# Images

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## ❖ Use epsfig package

❖ `\usepackage{epsfig}`

## ❖ Including images in main body

❖ `\epsfig{file=filename.eps, width=10cm,  
height=9cm, angle=90}`

## ❖ Creating EPS – Use xv and/or xfig.

❖ MS Power Point, save as GIF and convert to EPS.



# Images

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- ❖ Use graphics or graphicx package
- ❖ `includegraphics`
- ❖ Eps, compressed image file



# Bibliography by hand

---

```
\begin{thebibliography}{}  
\bibitem[Come95]{Come95} Comer,  
D. E., {\it Internetworking with TCP/IP:  
Principles, Protocols and Architecture},  
volume 1, 3rd edition. Prentice–Hall,  
1995.  
\end{thebibliography}
```



# Bibliography using Bibtex

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- ❖ Bibliography information is stored in a \*.bib file, in Bibtex format.
- ❖ Include chicago package
  - `\usepackage{chicago}`
- ❖ Set referencing style
  - `\bibliographystyle{chicago}`
- ❖ Create reference section by
  - `\bibliography{bibfile with no extension}`



## Bibliography using Bibtex

---

```
@book{Come95,  
author= "D. E. Comer" ,  
title={Internetworking with TCP/IP: Principles,  
      Protocols and Architecture},  
publisher= "Prentice-Hall" ,  
year=1995,  
volume=1,  
edition= "Third" }
```



# Bibliography contd.

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## ❖ Citing references in text

- `\cite{cuc98}` = **[Cuce 1998]**
- `\citeN{cru98}` = **Crud (1998)**
- `\shortcite{tom98}` = **(Tom, et. al. 1998)**



# Some Math

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`\begin{center}`

`{\large`

`$$ y=\frac{a^3+2c_{\{x\}}{1+\sqrt{b_{\{x\}}}}`

`$$ \\\`

`\vspace{0.2in}`

`$$`

`Q=\sum_{i=1}^j\int_{\mu}^{\infty}f(x_j)dx`  
`\\`

`\vspace{0.2in}`

`$$ \Psi = \oint_{-\infty}^{\infty} f_{xy}(\frac{\partial Q_x}{\partial Q_y})^{\Im_{\pi} \prime}`

`\\ }`

$$y = \frac{a^3 + 2c_x}{1 + \sqrt{b_x}}$$

$$Q = \sum_{i=1}^j \int_{\mu}^{\infty} f(x_j) dx$$

$$\Psi = \oint_{-\infty}^{\infty} f_{xy} \left( \frac{\partial Q_x}{\partial Q_y} \right)^{\Im_{\pi} \prime}$$



# Tools

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## ❖ Editing tool and IDE

- MAC : Texshop and so on
- Windows : TexStudio and so on

## ❖ 8 Best LaTeX Editors

- <https://beebom.com/best-latex-editors/>





# Conclusions

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- ❖ Latex is optimal for master and phd thesis?
- ❖ Many journal and conference provide latex template for editing
- ❖ Mathematical formula are easy.
- ❖ Use bibtex for reference

