Project: Innovative Open Source Courses for Computer Science

Open source tools for text processing
Teaching Material

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Project: Innovative Open Source Courses for Computer Science

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Project information

Project was implemented under the Erasmus+.
Project name: **“Innovative Open Source courses for Computer Science curriculum”**
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ZACHODNIOPOMORSKI UNIWERSYTET TECHNOLOGICZNY W SZCZECINIE
MENDELOVA UNIVERZITA V BRNĚ
ŽILINSKÁ UNIVERZITA V ŽILINE

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Method of document processing

Open source tools for text processing

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- Typography as a second step

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- Structural markup as a common tool

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- Open source implementation of documents

Document

- Document is composition of contents and format

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- Author – Designer – Typesetter

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- Visual representation of document elements – typography

Implementation

- Structural markup

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- Possibilities of structural markup in various systems

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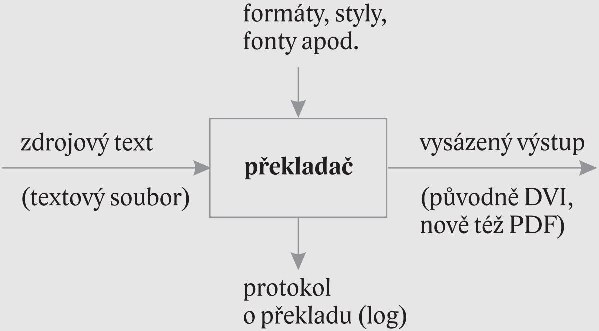
- Possibilities of structural markup in various systems
- Open source systems for text processing

- Basic principle of TEX-like systems



- Brief TEX history

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- Document implementation, styles and definition of structural markup

- My first document (overview), work with TEXonWeb

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- Compilation, log file, errors

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- Mixing font types: basic text is serif, headings, titles etc. are sans-serif

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- Other sizes: footnotes 8 pt, headings 12–24 pt

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- Language and typographic rules define proper shape and placement

Mixed and paragraph typesetting

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- Visual compatibility: ideal solution is special couple straight by professional foundry (e.g. Baskerville + John Sans by F. Štorm)
- Advantages of sans-serif additional font: emphasized and good readable in a short scope (heading on the one line, short captions, page headings etc.)

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- Any installed font is available, font formats: TTF, OTF, Adobe Type 1
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- Widely used parameter: `[Mapping=tex-text]` – use automatic ligatures for dashes etc. like TEX standard font (Computer/Latin Modern)

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- Special case: small caps

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- Other commands for typeface changes see textbook

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- This command have to be followed by `\selectfont` command

Paragraph parameters

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Length units

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name	*abbrev.*	*note*
English old point	pt	0,351 mm
Monotype point (big point)	bp	0,353 mm
pica	pc	1 pc = 12 pt
European Didôt point	dd	0,376 mm
cicero	cc	1 cc = 12 dd
inch	in	1 in = 25,4 mm
centimeter	cm	
milimeter	mm	
scaled point	sp	65 536 sp = 1 pt

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- Add to length: `\addtolength\register by length`

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- The `\baselineskip` is not available for given changing – it is changed by redefining of coefficient `\baselinestretch` from value 1 to any other value, e.g. `\def\baselinestretch{1.3}`

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- Paragraph aligning is set by three environments: `flushleft`, `flushright` and `center`

Page design

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- Unconditional page break: `\newpage` or `\clearpage` or `\cleardoublepage`

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- The footnote is automatically set by command `\footnote{text}`

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- `\vspace{\fill}` can be abbreviated to `\vfill`

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- Next levels: `\subsection{}`; `\subsubsection{}`; `\paragraph{}` and `\subparagraph{}`
- Each of section heading commands solves 4 tasks: a) visual shape of heading; b) numbering of section; c) material into page headings; d) material into table of contents

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- Any material into table of contents can be inserted by `\addtocontents{file}{text}`

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- Display value of counter is available via `\the`counter, e.g. `\thepage` or `\thesection`

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- Add value to counter: `\addtocounter{name}{value}`
- Step value by 1: `\stepcounter{name}`
- `\refstepcounter{name}` adds the one to counter and sets label to the new value of counter (usable for cross references)

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- Available output shapes are: `\arabic{counter}` (default); `\alph{}` (small letters); `\Alph{}` (capital letters); `\roman{}` (roman number with small letters); `\Roman{}` (roman number with capital letters); `\fnsymbol{}` (symbols for footnotes)

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- Example: `\def\thesection{\Roman{section}}` redefines arabic numbers of sections to roman numbers with capital letters

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- Expression of dependency in output value: for example

  `\def\thename{\thesuperior:\arabic{name}}` sets display of value with current value of superior counter separated by colon

Typesetting of mathematics

Open source tools for text processing

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Project: Innovative Open Source Courses for Computer Science

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- TeX and its extensions have wide support for math typesetting; it is difficult to find a system that would make this better
- Math typesetting was said to be the main reason to develop the TeX (Knuth)

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- Example:

  `\begin{equation} c^2= a^2+b^2\end{equation}`

  yields

$$c^2 = a^2 + b^2 \tag{1}$$

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- The left part is aligned to the right, the middle part is centered and the right part is aligned to the left
- Simple example:

```
\begin{eqnarray}
    c^2 & = & a^2+b^2\\
    c   & = &\sqrt{a^2+b^2}
\end{eqnarray}
```

yields

$$\begin{aligned} c^2 &= a^2+b^2 \qquad (2)\\ c &= \sqrt{a^2+b^2} \qquad (3)\end{aligned}$$

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- More information about vertical aligning see `array` environment

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- Many of symbols are defined as a command – its shape is properly displayed
- Example: `$$C=A(\cos\alpha+\mathrm{i}\sin\alpha)=A\mathrm{e}^{\mathrm{i}\alpha}$$`

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- Indices and exponents: `a_1^3-a_{2x}^{3b}` yields

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Math elements

- Sums, limits, integrals...:

```
\sum_{a=1}^N x_a\cdot w_a
\lim_{x\rightarrow\infty}\frac{x+3}{x-1}
\int_0^\infty f(x)\mathrm{d}x
```

$$\textstyle\sum_{a=1}^N x_a\cdot w_a$$
$$\textstyle\lim_{x\rightarrow\infty}\frac{x+3}{x-1}$$
$$\textstyle\int_0^\infty f(x)\mathrm{d}x$$

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- Simple example:

```
\mathbf{A}=\left( % left large delimiter
\begin{array}{cc} % matrix, two centered columns
a_{11} & a_{12} \\
a_{21} & a_{22}
\end{array}\right)
```

$$\mathbf{A}=\left(\begin{array}{cc} a_{11} & a_{12} \\ a_{21} & a_{22} \end{array}\right)$$

Small overview of other symbols

- Greek alphabet: `\alpha` α `\beta` β `\gamma` γ `\delta` δ `\omega` ω `\phi` ϕ `\varphi` φ `\Delta` Δ `\Omega` Ω ...

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- Relations: `\leq` $\leq$ `\geq` $\geq$ `\in` $\in$ `\sim` $\sim$ `\approx` $\approx$ `\equiv` $\equiv$ `\subset` $\subset$ `\supset` $\supset$ `\ll` $\ll$ `\gg` $\gg$ ...

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- Arrows: `\leftarrow` $\leftarrow$ `\rightarrow` $\rightarrow$ `\Leftarrow` $\Leftarrow$ `\longleftarrow` $\longleftarrow$ `\longleftrightarrow` $\longleftrightarrow$ `\uparrow` $\uparrow$ `\mapsto` $\mapsto$ `\nearrow` $\nearrow$ `\swarrow` $\swarrow$ ...

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- Functions: `\sin` $\sin$ `\ln` $\ln$ `\inf` $\inf$ `\liminf` $\liminf$ `\max` $\max$ `\dim` $\dim$ `\arctan` $\arctan$ `\gcd` $\gcd$ `\lg` $\lg$ ...

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- Big delimiters: `\{` $\big\{$ `\lfloor` $\big\lfloor$ `\rfloor` $\big\rfloor$ `\lceil` $\big\lceil$ `\rceil` $\big\rceil$ `\langle` $\big\langle$ `\rangle` $\big\rangle$ `\|` $\big\|$ `\Uparrow` $\big\Uparrow$ ...

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- Functions: `\sin` $\sin$ `\ln` $\ln$ `\inf` $\inf$ `\liminf` $\liminf$ `\max` $\max$ `\dim` $\dim$ `\arctan` $\arctan$ `\gcd` $\gcd$ `\lg` $\lg$ ...
- Big delimiters: `\{` $\{$ `\lfloor` $\lfloor$ `\rfloor` $\rfloor$ `\lceil` $\lceil$ `\rceil` $\rceil$ `\langle` $\langle$ `\rangle` $\rangle$ `\|` $\|$ `\Uparrow` $\Uparrow$ ...
- Other: `\aleph` $\aleph$ `\forall` $\forall$ `\infty` ∞ `\nabla` ∇ `\surd` $\surd$ `\flat` $\flat$ `\backslash` $\backslash$ `\partial` ∂ `\clubsuit` $\clubsuit$ ...

Tables, figures

Open source tools for text processing

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Project: Innovative Open Source Courses for Computer Science

Funded by
the European Union

Vertical align, tabbing

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- The `tabbing` environment is model of tab stops
- This environment is useful for simple open tables only
- Basic principle: set tab stop `\=` and reference tab stop `\>`
- Small example: `\begin{tabbing}`

  ```
  City\hspace{30mm}\= Temperature \\
  New York \> 25 $^\circ$C \\
  Sydney   \> $-3$ $^\circ$C
  \end{tabbing}
  ```

City	Temperature
New York	25 $^\circ$C
Sydney	-3 $^\circ$C

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- Special case: a paragraph column `p{width}` – material in tab field is justified to given width
- The `\hline` command yields horizontal rule after given tab line

Table example

- Simple table with rules and various aligning in columns: `\begin{tabular}{|r|l|c|} \hline`

```
\bfseries No.&\bfseries Name &\bfseries University\\\hline
 1 & Paweł Obłąk & ZUT, Szczecin, Polska \\
 7 & Žaneta Čižmářová & MENDELU, Brno, Česko \\
 12 & Vladimír Bôčik & ŽU, Žilina, Slovensko \\ \hline
\end{tabular}
```

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- To change of some parameters of inserted file can be used optional parameters of `\includegraphics[pars]{file}`

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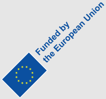
-
  ```
  \includegraphics[scale=0.05, angle=45]{logo.pdf}
  ```



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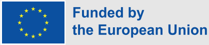

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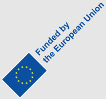

-
  ```
  \includegraphics[viewport=0 0 450 150,
      clip]{logo.pdf}
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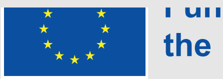

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- A command `\put(X, Y){element}` puts given element to the workspace on coordinates X, Y
- Size of workspace is given by parameters of `picture` environment
- Coordinates and size of workspace aren’t checked, so any element may be placed out of the workspace

Picture examples

- Size of unit is set to 1 mm

```
\begin{picture}(100,70)
\put(0,5){Any text}
\put(10,20){\line(1,0){30}}
\put(10,25){\vector(1,0){40}}
\put(10,30){\vector(1,1){40}}
\put(0,0){\framebox(100,70){}}
\put(70,35){\circle{20}}
\end{picture}
```

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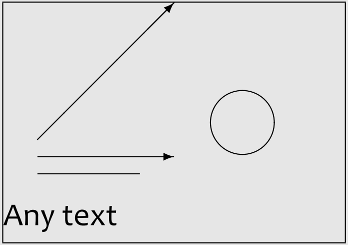
- 

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- Content of floating environment is placed to nearest appropriate place on next page(s)
- Algorithm for place of floating object is partially controlled by user specification
- There are three floating environments – for tables, for figures and for marginal notes

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- Simple example:

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- Specification in optional parameter: h – here (if fits), t – top of page, b – bottom of page, p – separate page; the order of the letters determines the priority
- The `\caption` command numbers tables with connected counter `table` and places the text of the caption into file `.lot` for list of tables

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- Environment name is `figure`
- The environment has the same optional parameter as `table`
- The same `\caption` command may be used
- Numbering of figures is done by a `figure` counter and caption text is placed into `.lof` file for list of figures
- The order of the tables and the order of the figures is never broken but tables and figures may be mixed