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Skill Pill: LaTeX Course

Lecture 4: Beamer/Tikz

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What is Beamer

Beamer is documentclass for latex that enables the creation of presentations from within latex. As an example this presentation and some of the previous presentations in this skill pill have been written with Beamer.

Benefits:

- Maths
- References and Citations
- Consistency

What is Tikz/PGF

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PGF (portable graphics format)

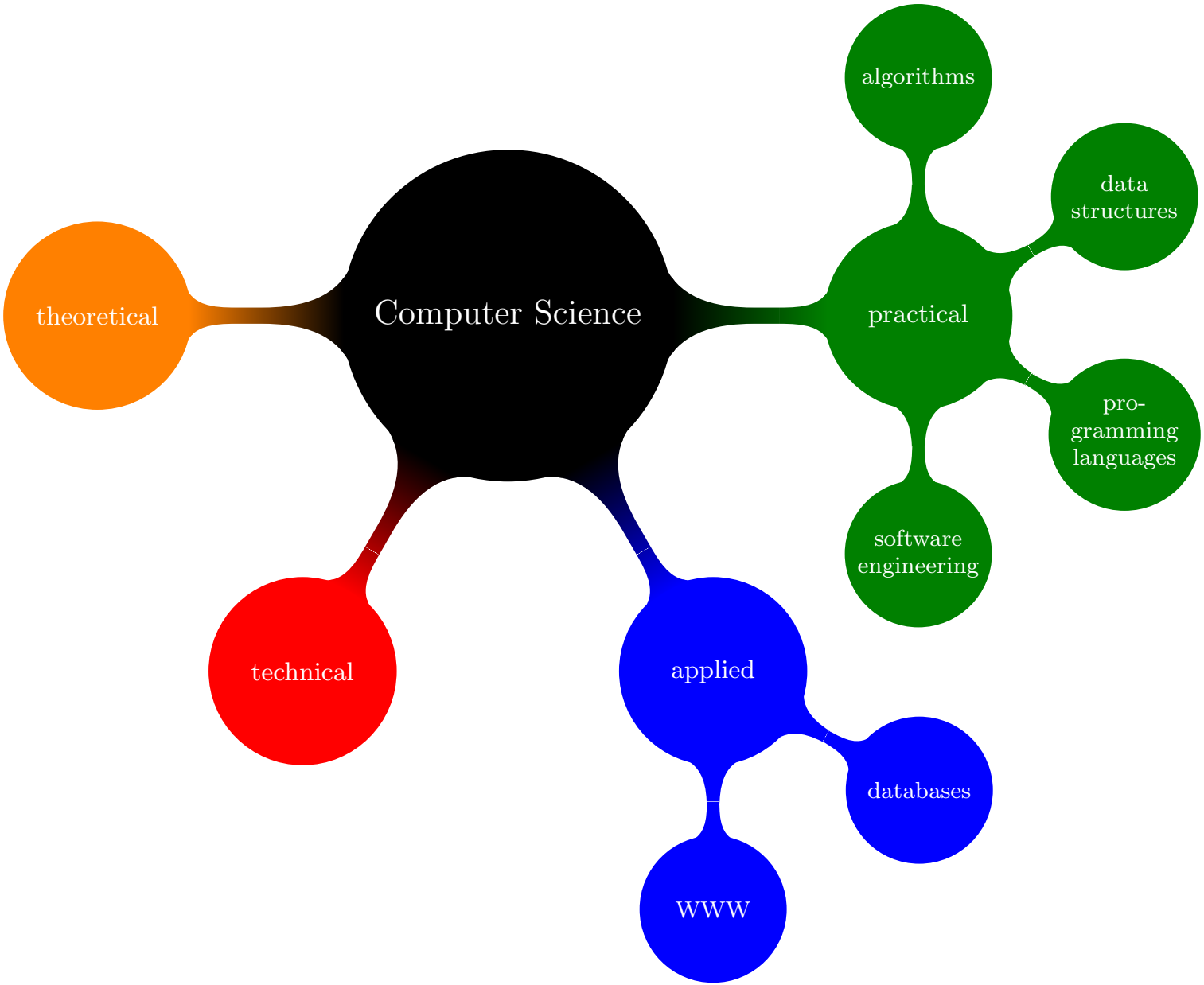
- package for creating graphics "inline"
- TEXand LATEXinput
- three layers: System, Basic, and Frontend

Tikz (TikZ ist kein Zeichenprogramm / Tikz is not a drawing program)

- is a PGF frontend layer.
- high-level user interface

Take a look at http://www.texample.net/tikz/examples/

Simple Tikz/PGF example



Complex Tikz/PGF example

- Coriolis acceleration

$$\vec{a}_p = \vec{a}_o + \frac{{}^b d^2}{dt^2}\vec{r} + 2\vec{\omega}_{ib} \times \frac{{}^b d}{dt}\vec{r} + \vec{\alpha}_{ib} \times \vec{r} + \vec{\omega}_{ib} \times (\vec{\omega}_{ib} \times \vec{r})$$

- Coriolis acceleration
- Transversal acceleration

$$\vec{a}_p = \vec{a}_o + \frac{{}^b d^2}{dt^2}\vec{r} + 2\vec{\omega}_{ib} \times \frac{{}^b d}{dt}\vec{r} + \vec{\alpha}_{ib} \times \vec{r} + \vec{\omega}_{ib} \times (\vec{\omega}_{ib} \times \vec{r})$$

- Coriolis acceleration
- Transversal acceleration
- Centripetal acceleration

$$\vec{a}_p = \vec{a}_o + \frac{{}^b d^2}{dt^2}\vec{r} + 2\vec{\omega}_{ib} \times \frac{{}^b d}{dt}\vec{r} + \vec{\alpha}_{ib} \times \vec{r} + \vec{\omega}_{ib} \times (\vec{\omega}_{ib} \times \vec{r})$$

Basic structure

```
\documentclass{beamer}
\begin{document}
\begin{frame}{Title}
  Frame content
\end{frame}
\end{document}
```

Titlepage and ToC

Similarly to Latex you can also automatically create table of contents. In order to do so add sections and subsections *outside* your frames.

```
\begin{frame}
  \titlepage
\end{frame}
\begin{frame}{Table of Contents}
  \tableofcontents
\end{frame}
\section{Introduction}
\begin{frame}{Introduction}
\end{frame}
\section{Beamer}
\subsection{Examples}
```

Effects I

```
\alert<1-2>{Effects} can help draw attentions to
    talking points.
\pause
\begin{itemize}
  \item<1-> Text visible on slide 1
  \item<2> Text visible on slide 2
  \item<3-> Text visible on slide 3
\end{itemize}
% Short version
\begin{itemize}[<+->]
  \item 1
  \item 2
\end{itemize}
```

Effects in action

Effects can help draw attentions to talking points.

Effects in action

Effects can help draw attentions to talking points.

- Text visible on slide 1
- Text visible on slide 2

- 1

Effects in action

Effects can help draw attentions to talking points.

- Text visible on slide 1
- Text visible on slide 3
- 1
- 2

Effects II

```
\begin{itemize}[<+-| alert@+>]
  \item Combining effects.
  \item Really now?
\end{itemize}
\only<3>{Yes, really.}
\setbeamercovered{transparent}
\begin{itemize}[<+->]
  \item This is quite fancy?
  \item How does this work?
\end{itemize}
```

Effects in action

- Combining effects.

- This is quite fancy?
- How does this work?

Effects in action

- Combining effects.
- Really now?
- This is quite fancy?
- How does this work?

Effects in action

- Combining effects.
- Really now?

Yes, really.

- This is quite fancy?
- How does this work?

Effects in action

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- Combining effects.
- Really now?

- This is quite fancy?
- How does this work?

Blocks

```
In this slide, some important text will be
\alert{highlighted} beause it's important.
Please, don't abuse it.
\begin{block}{Remark}
  Sample text
\end{block}
\begin{alertblock}{Important theorem}
  Sample text in alert block
\end{alertblock}
\pause
\begin{examples}
  Sample text in example block. "Examples" is
      fixed as block title.
\end{examples}
```

Blocks in action

In this slide, some important text will be highlighted beause it's important. Please, don't abuse it.

Remark

Sample text

Important theorem

Sample text in red box

Blocks in action

In this slide, some important text will be highlighted beause it's important. Please, don't abuse it.

Remark

Sample text

Important theorem

Sample text in red box

Examples

Sample text in green box. "Examples" is fixed as block title.

Themes

There is a plethora of built-in themes available:
`https://www.hartwork.org/beamer-theme-matrix` and on the internet. It is also possible to write your own.

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Demo time

References and Tutorials

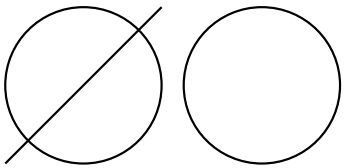
- https://www.sharelatex.com/learn/Beamer
- http://mirrors.ctan.org/macros/latex/contrib/beamer/doc/beameruserguide.pdf
- https://en.wikibooks.org/wiki/LaTeX/Presentations

Exercise

1. Create a simple beamer presentation with a few slides, that has a title page and a table of contents.
2. Create a slide with a list of talking points, that appear after each other.

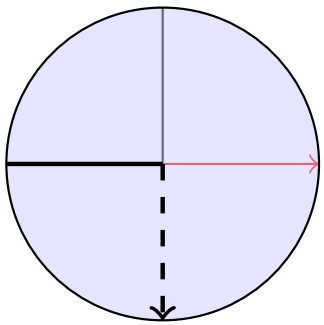
Basic usage

```
\usepackage{tikz}
\usetikzlibrary{...}
\begin{tikzpicture}
  \draw (0,0) circle (0.5);
  \draw (-0.5,-0.5) -- (0.5,0.5);
\end{tikzpicture}
\tikz \draw (0,0) circle (0.5);
```



A path is a series of straight and curved line segments.

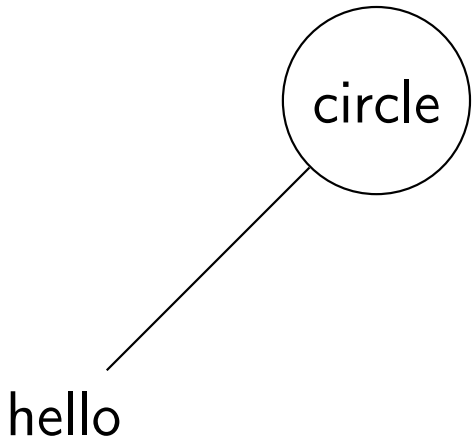
```
\begin{tikzpicture}
  \draw (0,0) -- (0, 1);
  \draw [->, color=red] (0, 0) -- (1, 0);
  \draw [fill=blue!20!white, fill opacity=0.5]
     (0,0) circle (1.0);
  \draw [thick] (0, 0) -- (-1, 0);
  \draw [thick, dashed, ->] (0, 0) -- (0, -1);
\end{tikzpicture}
```



Node and Coordinate

A node is a simple shape with some text on it a coordinate is a node without a text. Nodes can be named and referenced later one.

```
\begin{tikzpicture}
  \coordinate (origin) at (0,0);
  \node (A) at (origin) {hello};
  \node [shape=circle, draw] (C) at (2,2) {circle} ;
  \draw (A) -> (C);
\end{tikzpicture}
```



Coordinate systems

- Absolute coordinates

```
\tikz \draw [thick,red] (0,0) -- (2mm, 0)
    -- (2mm, 5pt);
```

- Relative coordinates

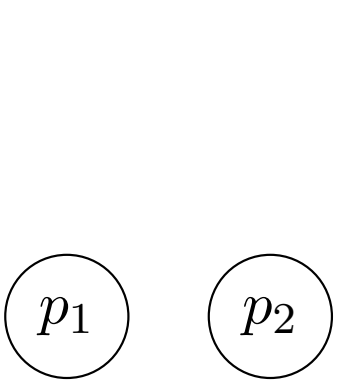
```
\tikz \draw [thick,red] (0,0) -- +(2mm, 0)
    -- +(0, 5pt);
```

- Shifting

```
\tikz \draw [thick,red] (0,0) -- ++(2mm, 0)
    -- +(0, 5pt);
```

Placing Nodes

```
\begin{tikzpicture}
  \node [circle, draw] (p1) at (0,0.5) {$p_1$};
  \node [circle, draw, right= 0.5 of p1] (p2)
     {$p_2$};
  \node [circle, draw, above right= of p2] (p3)
     {$p_3$};
\end{tikzpicture}
```



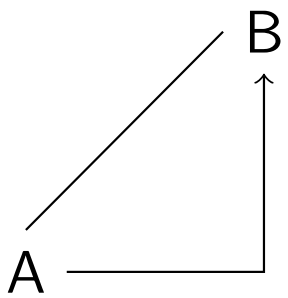
- Node (p2) should be right of (p1) (wherever (p1) happens to be)
- Requires the positioning TikZ library:

```
\usetikzlibrary{positioning}
```

- available:, right=of, below=of, above left=of

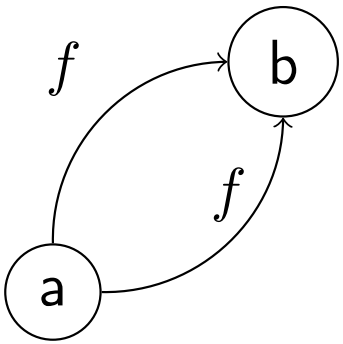
Anchors can be used to specify from which part of the node a path should start.

```
\begin{tikzpicture}
  \node [draw] (A) at (0,0) {A};
  \node [draw, above right=of A] (B) {B};
  \draw (A.north) -- (B.west);
  \draw [->] (A) -| (B);
\end{tikzpicture}
```



Labeling connections

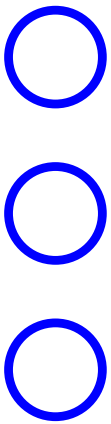
```
\begin{tikzpicture}
  \node [circle, draw] (a) {a};
  \node [circle, draw] (b) [above right=of a] {b};
  \draw [->] (a) to [bend left=45] node [auto]
     {$f$} (b);
  \draw [->] (a) to [bend right=45] node [above]
     {$f$} (b);
\end{tikzpicture}
```



- The *auto* option places the label such that it is next to the path and doesn't overlap anything.
- Also available: *left*, *right*, *below*, *above*

For loops

```
\begin{tikzpicture}
  \foreach \y in {1,2,3} {
    \draw [blue, ultra thick] (0,\y ) circle
        [radius=0.3];
  }
\end{tikzpicture}
```



Standalone

```
\documentclass[tikz]{standalone}
\begin{document}
  \begin{tikzpicture}
  \end{tikzpicture}
\end{document}
```

References and Tutorials

- Handbook: `http://mirrors.ctan.org/graphics/pgf/base/doc/pgfmanual.pdf`
- `http://www.texample.net/tikz/examples`
- `http://www.computational-logic.org/content/study/master/documents/softskills_tikz.pdf` Main source for this part
- `http://cremeronline.com/LaTeX/minimaltikz.pdf`