

Grafiken – Teil 2

L^AT_EX-Kurs der Unix-AG

Klaus Denker

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UNIX
AG

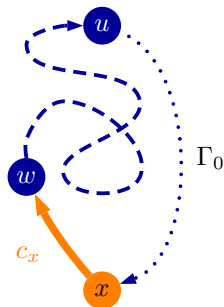
TU Kaiserslautern

Grafiken in L^AT_EX-Dokumenten

Wie werden Grafiken in L^AT_EX-Dokumente eingebunden?

1. Grafiken als externe Datei einbinden
 - ▶ `includegraphics`-Befehl
2. Grafiken in L^AT_EX „programmieren“
 - ▶ PSTricks - geht nicht mit `pdflatex`
 - ▶ TikZ - TikZ ist kein Zeichenprogramm

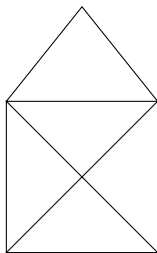
- ▶ pstricks erlaubt das Einfügen von Postscript-Anweisungen in \LaTeX
- ▶ Funktioniert **nicht** mit pdf \LaTeX !
- ▶ Mehr für Experten gedacht
- ▶ <http://tug.org/PSTricks/>
- ▶ Beispiel aus Mattias Nisslers Seminarfolien (P2P und Grid Computing, WS 2006/07, DAG)



- ▶ Vorführung mit **tikz2pdf** von Hans Meine
<http://kogs-www.informatik.uni-hamburg.de/~meine/tikz/process/#tikz2pdf>

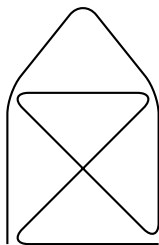
Drawing lines

```
\begin{tikzpicture}
\draw (0,0) -- (0,2) -- (1,3.25) -- (2,2) -- (2,0)
      -- (0,2) -- (2,2) -- (0,0) -- (2,0);
\end{tikzpicture}
```



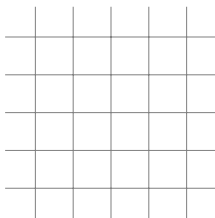
Drawing lines

```
\begin{tikzpicture}[thick,rounded corners=8pt]  
\draw (0,0) -- (0,2) -- (1,3.25) -- (2,2) -- (2,0)  
      -- (0,2) -- (2,2) -- (0,0) -- (2,0);  
\end{tikzpicture}
```



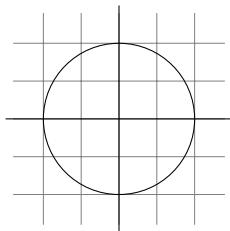
Grid, clipping

```
\begin{tikzpicture}
%\clip[draw] (0.5,0.5) circle (1cm);
%\clip[draw] (-0.75,-0.75) rectangle (1.25,1.25);
\draw[step=.5cm,gray,very thin] (-1.4,-1.4) grid
  (1.4,1.4);
%\draw (-1.5,0) -- (1.5,0);
%\draw (0,-1.5) -- (0,1.5);
%\draw (0,0) circle (1cm);
\end{tikzpicture}
```



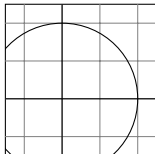
Grid, clipping

```
\begin{tikzpicture}
%\clip[draw] (0.5,0.5) circle (1cm);
%\clip[draw] (-0.75,-0.75) rectangle (1.25,1.25);
\draw[step=.5cm,gray,very thin] (-1.4,-1.4) grid
(1.4,1.4);
\draw (-1.5,0) -- (1.5,0);
\draw (0,-1.5) -- (0,1.5);
\draw (0,0) circle (1cm);
\end{tikzpicture}
```



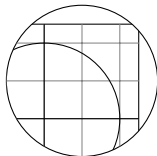
Grid, clipping

```
\begin{tikzpicture}
% \clip[draw] (0.5,0.5) circle (1cm);
\clip[draw] (-0.75,-0.75) rectangle (1.25,1.25);
\draw[step=.5cm,gray,very thin] (-1.4,-1.4) grid
  (1.4,1.4);
\draw (-1.5,0) -- (1.5,0);
\draw (0,-1.5) -- (0,1.5);
\draw (0,0) circle (1cm);
\end{tikzpicture}
```



Grid, clipping

```
\begin{tikzpicture}
\clip[draw] (0.5,0.5) circle (1cm);
\clip[draw] (-0.75,-0.75) rectangle (1.25,1.25);
\draw[step=.5cm,gray,very thin] (-1.4,-1.4) grid
(1.4,1.4);
\draw (-1.5,0) -- (1.5,0);
\draw (0,-1.5) -- (0,1.5);
\draw (0,0) circle (1cm);
\end{tikzpicture}
```



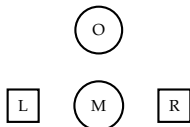
Nodes

```
\tikzstyle{mycircle}=[circle,draw,thick]
\tikzstyle{myrect}=[rectangle,draw,thick]
\begin{tikzpicture}
  \node[mycircle] (oben) {\tiny 0};
  % \node[mycircle] (mitte) [below of=oben] {\tiny M};
  % \node[myrect] (rechts) [right of=mitte] {\tiny R};
  % \node[myrect] (links) [left of=mitte] {\tiny L}
  % edge [->,bend left=45] (oben)
  % edge [<-] (oben);
\end{tikzpicture}
```



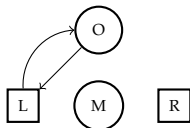
Nodes

```
\tikzstyle{mycircle}=[circle,draw,thick]
\tikzstyle{myrect}=[rectangle,draw,thick]
\begin{tikzpicture}
  \node[mycircle] (oben) {\tiny 0};
  \node[mycircle] (mitte) [below of=oben] {\tiny M};
  \node[myrect] (rechts) [right of=mitte] {\tiny R};
  \node[myrect] (links) [left of=mitte] {\tiny L};
  % edge [->,bend left=45] (oben)
  % edge [<-] (oben);
\end{tikzpicture}
```



Nodes

```
\tikzstyle{mycircle}=[circle,draw,thick]
\tikzstyle{myrect}=[rectangle,draw,thick]
\begin{tikzpicture}
  \node[mycircle] (oben) {\tiny O};
  \node[mycircle] (mitte) [below of=oben] {\tiny M};
  \node[myrect] (rechts) [right of=mitte] {\tiny R};
  \node[myrect] (links) [left of=mitte] {\tiny L}
  edge [->,bend left=45] (oben)
  edge [<-] (oben);
\end{tikzpicture}
```



Nested nodes

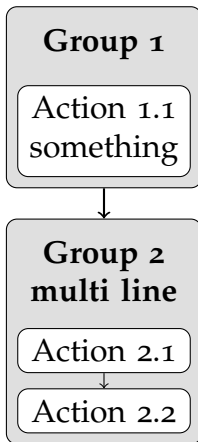
```
\usetikzlibrary{positioning}

\tikzstyle{heading}=[text width=2cm, align=center]
\tikzstyle{box}=[rectangle,fill=white,draw,rounded
  corners, text width=2cm, align=center]
\tikzstyle{topic}=[rectangle,fill=gray!25,draw,
  rounded corners, text width=2.3cm, align=center]
```

Nested nodes

```
\begin{tikzpicture}[node distance=4mm and 2mm]
  \node[topic] (g1) {
    \begin{tikzpicture}[node distance=2mm and 4mm]
      \node[heading] (g1h) {\textbf{Group 1}};
      \node[box] (a11) [below=of g1h] {Action 1.1
        something};
    \end{tikzpicture} };
  \node[topic] (g2) [below=of g1] {
    \begin{tikzpicture}[node distance=2mm and 4mm]
      \node[heading] (g2h)                {\
        \textbf{Group 2 multi line}};
      \node[box] (a21) [below=of g2h] {Action 2.1};
      \node[box] (a22) [below=of a21] {Action 2.2};
      \draw[->] (a21) -- (a22);
    \end{tikzpicture} };
  \draw[->,thick] (g1) -- (g2);
\end{tikzpicture}
```

Nested nodes



Frames

```
\usetikzlibrary{shapes}
\tikzstyle{mybox}=[draw=red,fill=gray!20,very thick,
  rectangle,rounded corners,inner sep=15pt]
\tikzstyle{ftitle}=[fill=red,text=white,ellipse]
\begin{tikzpicture} \node [mybox] (box) {
  \begin{minipage}[t!]{4cm}
    Multiple lines of sample text  $e=mc^2$ .
  \end{minipage} };
\node[ftitle] at (box.north) {Frame};
\end{tikzpicture}
```

Frame

Multiple lines of
sample text $e = mc^2$.

Frames

```
\usetikzlibrary{shapes}
\tikzstyle{mybox}=[draw=red,fill=gray!20,very thick,
  rectangle,rounded corners,inner sep=15pt]
\tikzstyle{ftitle}=[fill=red,text=white,ellipse]
\begin{tikzpicture} \node [mybox, rotate=5] (box) {
  \begin{minipage}[t!]{4cm}
    Multiple lines of sample text  $e=mc^2$ .
  \end{minipage} };
\node[ftitle,rotate=5] at (box.north) {Frame};
\end{tikzpicture}
```

Frame

Multiple lines of
sample text $e = mc^2$.

Overlay layer

```
A red dot \tikz[remember picture] \node[circle,fill=red] (n1) {}; within some text.
```

```
And a blue rectangle \tikz[remember picture] \node[fill=blue] (n2) {}; here.
```

```
%Now an arrow \tikz[remember picture,overlay] \draw [->,very thick] (n1) to [bend right=30] (n2);.
```

A red dot  within some text.

And a blue rectangle  here.

Overlay layer



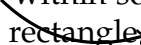
```
A red dot \tikz[remember picture] \node[circle,fill=red] (n1) {};
```

within some text.

```
And a blue rectangle \tikz[remember picture] \node[fill=blue] (n2) {};
```

here.

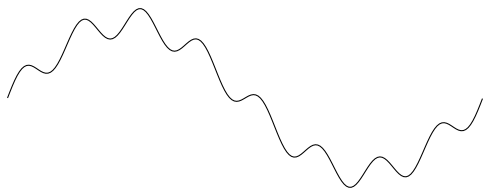
```
Now an arrow \tikz[remember picture,overlay] \draw [->,very thick] (n1) to [bend right=30] (n2);
```

A red dot  within some text.
And a blue rectangle  here.
Now an arrow  .

Gnuplot

```
\begin{tikzpicture}[domain=0:6.28,samples=200]
  \draw plot[id=wave] function{sin(x)+sin(8*x)/5};
\end{tikzpicture}

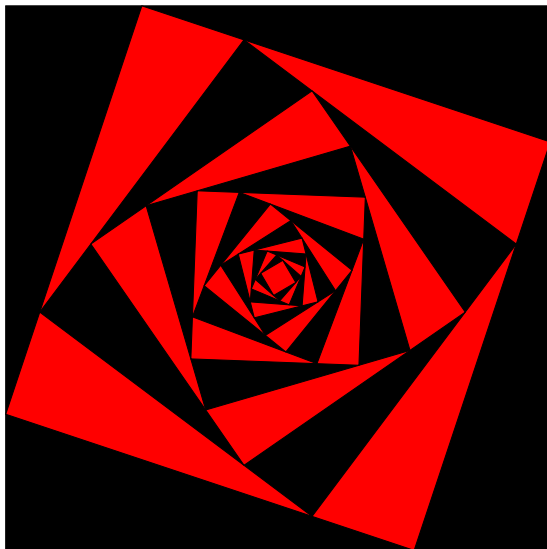
%pdflater --shell-escape input.tex
```



PGF und TikZ - Schleifen und Verzweigungen

```
\begin{tikzpicture}[scale=0.6]
  % Specify the initial square
  \path (0,0) coordinate (A) (12,0) coordinate (B)
        (12,12) coordinate (C) (0,12) coordinate (D);
  \foreach \i in {1,...,14}{
    \ifthenelse{\isodd{\i}}{\def\couleur{black}}
      {\def\couleur{red}}
    \draw[fill=\couleur] (A)--(B)--(C)--(D)--cycle;
    \path (A) coordinate (TMP);
    \path (A)--(B) coordinate[near end] (A)
          --(C) coordinate[near end] (B)
          --(D) coordinate[near end] (C)
          --(TMP) coordinate[near end] (D);
  }
\end{tikzpicture}
```

PGF und TikZ - Schleifen und Verzweigungen



Grafikdateigenerierung

- ▶ Bisher: Tikz für Grafiken im L^AT_EX-Dokument
- ▶ So bekommt man die Grafiken aus dem Dokument heraus:

```
\documentclass{minimal}
\usepackage[dvips,
  paperwidth=8.5cm,      % Breite
  paperheight=4.5cm,    % Hoehe
  left=0cm, right=0cm, top=0cm, bottom=0cm, % Raender
]{geometry}

\begin{document}
\noindent\centering
% Grafikbefehle
\end{document}
```


Grafikdateigenerierung

- ▶ Mit pdflatex ein PDF erzeugen:

```
pdflatex bild.tex
```

- ▶ Oder mit latex und dvips ein PS erzeugen:

```
latex bild.tex  
dvips -o bild.eps bild.dvi
```

- ▶ Dieses kann mit ps2pdf in ein PDF umgewandelt werden:

```
ps2pdf bild.eps bild.pdf
```

- ▶ Vorteile:

- ▶ Damit kann PS-spezifisches auch in PDFs verwendet werden
- ▶ Man braucht komplexe Grafiken nur einmal berechnen
- ▶ Man kann wilden L^AT_EX-Code auch dann verwenden, wenn der Verlag nur wenige L^AT_EX-Pakete erlaubt

PGF Bsp. <http://www.fauskes.net/pgftikzexamples/>
PGF Doku <http://www.ctan.org/tex-archive/graphics/pgf/base/doc/generic/pgf/pgfmanual.pdf>
gnuplot <http://www.gnuplot.info/>