Grafiken – Teil 2

LaTeX-Kurs der Unix-AG

Klaus Denker

18. Juni 2012

Grafiken in LaTeX-Dokumenten

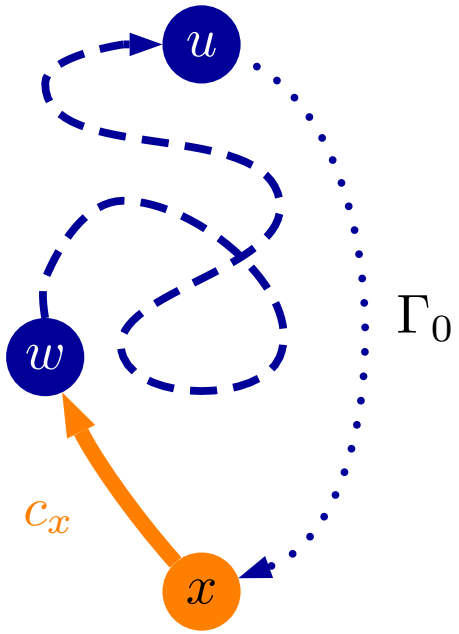
Wie werden Grafiken in LaTeX-Dokumente eingebunden?

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

pstricks

- pstricks erlaubt das Einfügen von Postscript-Anweisungen in LaTeX
- Funktioniert **nicht** mit pdflatex!
- Mehr für Experten gedacht
- http://tug.org/PSTricks/

- Beispiel aus Mattias Nisslers Seminarfolien (P2P und Grid Computing, WS 2006/07, DAG)

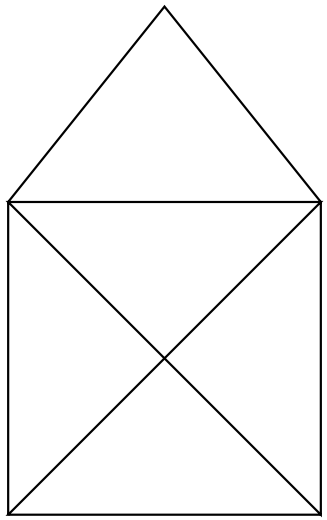


PGF und TikZ

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

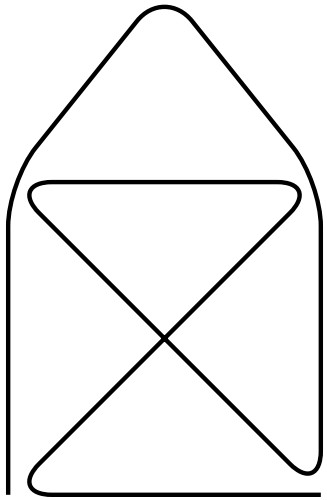
Drawing lines

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



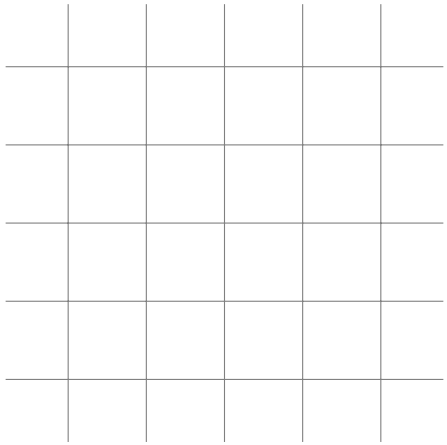
Drawing lines

```
\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}
```



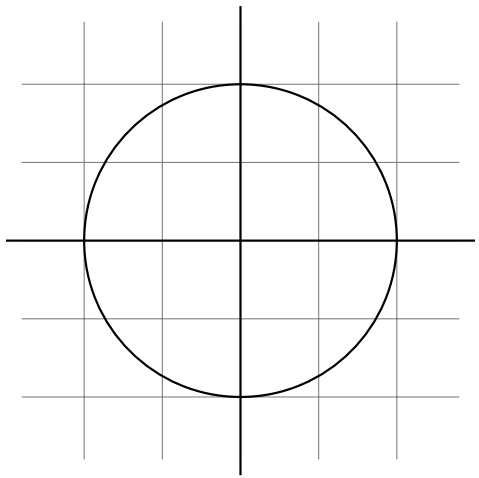
Grid, clipping

```
\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}
```



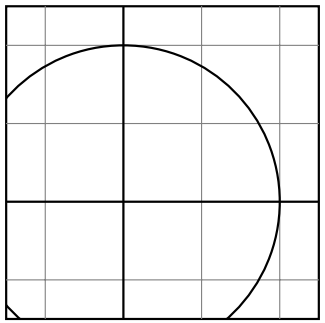
Grid, clipping

```
\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}
```



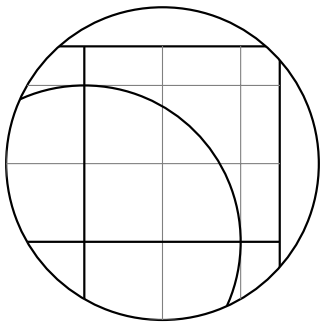
Grid, clipping

```
\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}
```



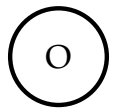
Grid, clipping

```
\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}
```



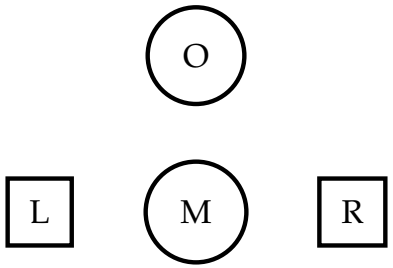
Nodes

```
\tikzstyle{mycircle}=[circle,draw,thick]
\tikzstyle{myrect}=[rectangle,draw,thick]
\begin{tikzpicture}
 \node[mycircle] (oben) {\tiny 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}
```



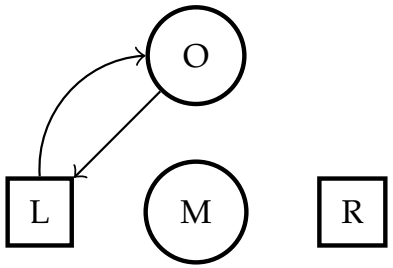
Nodes

```
\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}
```



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}
```



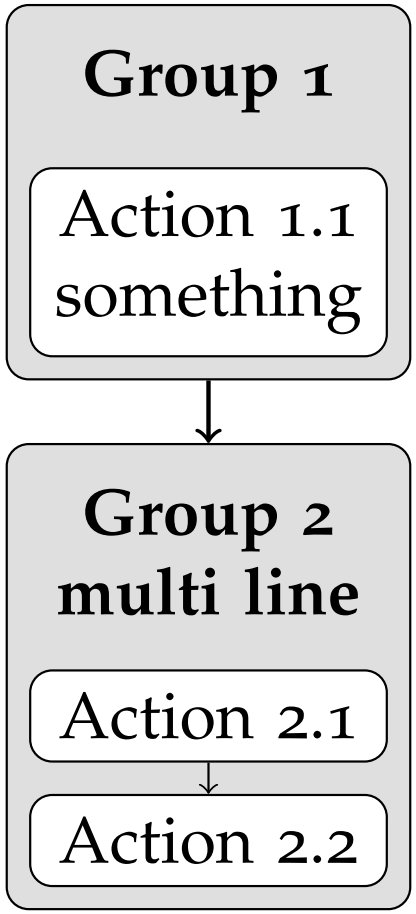
Nested nodes

```
\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

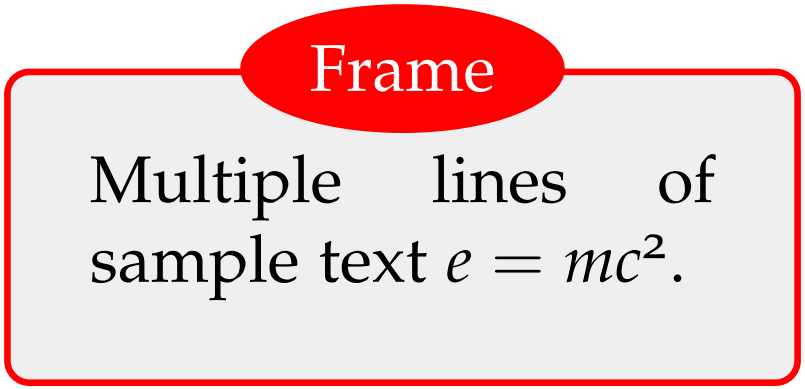
```
\begin{tikzpicture}[node distance=4mm and 2mm]
  \node[topic] (g1) {
    \begin{tikzpicture}[node distance=2mm and 4mm]
      \node[heading] (g1h) {\textbf{Group 1}};
      \node[box] (a11) [below=of g1h] {Action 1.1
        something};
    \end{tikzpicture} };
  \node[topic] (g2) [below=of g1] {
    \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



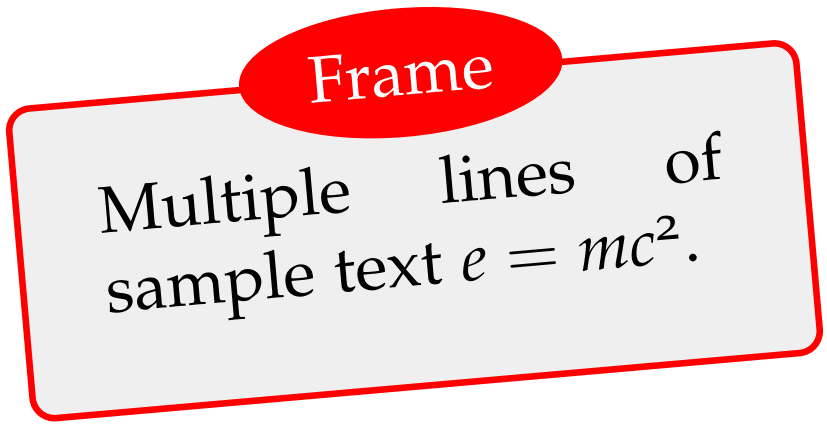
Frames

```
\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}
```



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}
```



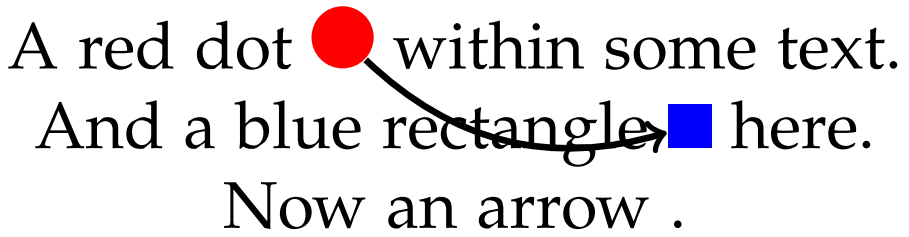
Overlay layer

```
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.

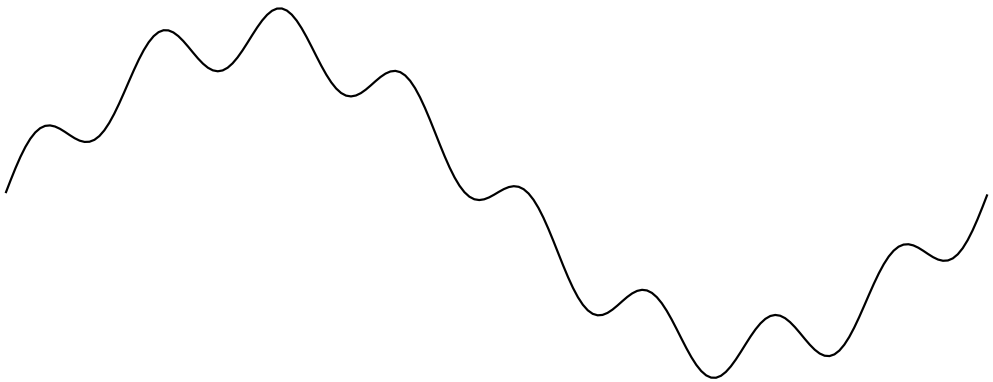
Overlay layer

```
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);.
```



Gnuplot

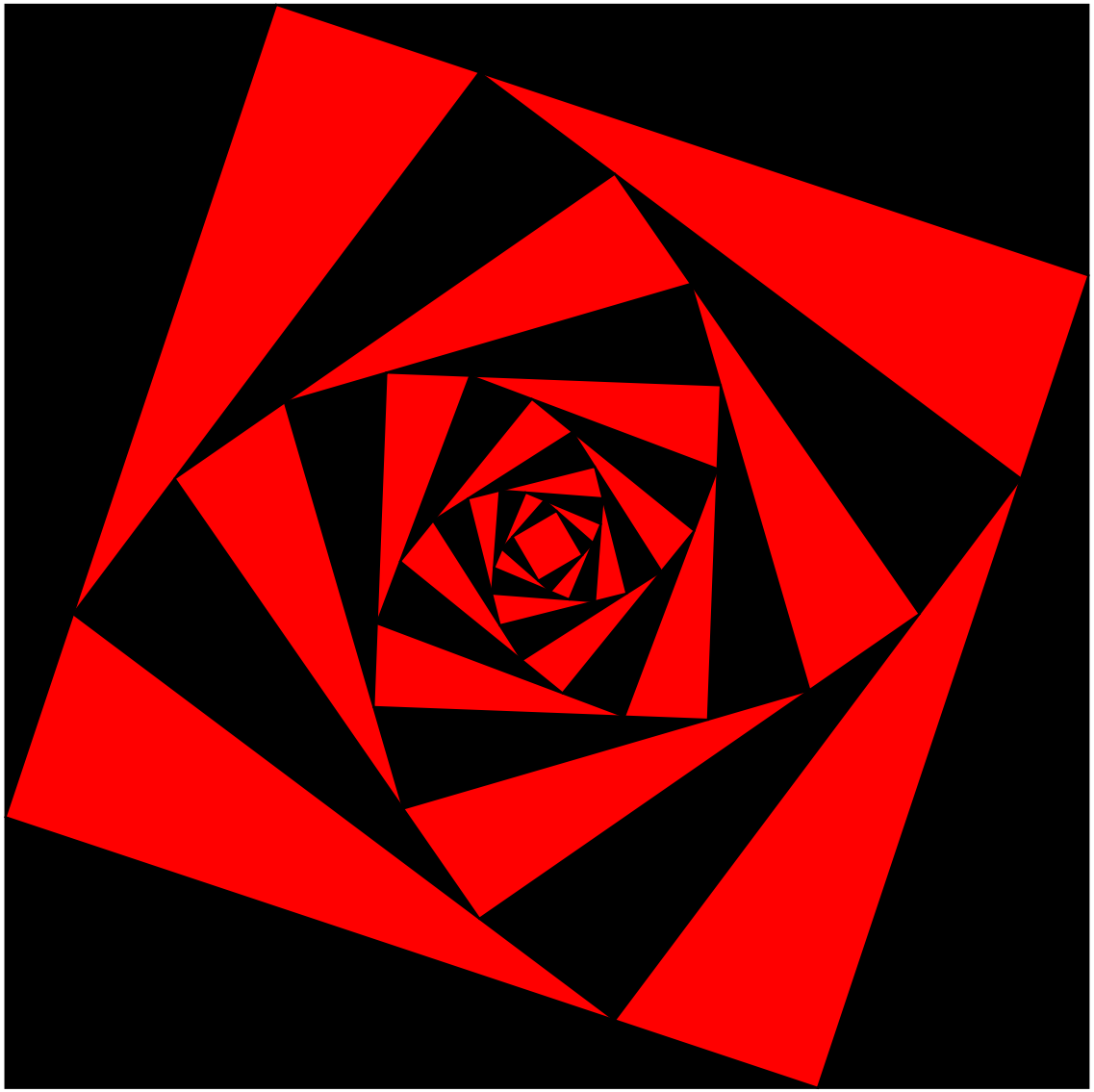
```
\begin{tikzpicture}[domain=0:6.28,samples=200]
 \draw plot[id=wave] function{sin(x)+sin(8*x)/5};
\end{tikzpicture}

%pdflatex --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 LaTeX-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 LaTeX-Code auch dann verwenden, wenn der Verlag nur wenige LaTeX-Pakete erlaubt

Ende

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/`