Beamer By Example

Subtitle: Frankfurt Theme

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Conference on Tasteful Presentations, 2008

Outline

1. Structure
   - Features
   - Processing
   - Basics
   - Colour

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   - Uncovering Text
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   - Columns
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Written by Till Tantau while completing his PhD.

- Process with either `pdflatex` or `latex+dvips`

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- Easy navigation through sections & subsections
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- Overlays & dynamic effects easily created
- Easy navigation through sections & subsections
- Many templates and examples included in package
- `article` style can be used to produce notes

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Processing

This document was processed with

- `latex`

Processing

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- `latex` then
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The alternative is to use pdflatex & pdf or jpg graphics

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Sample Code

\documentclass{beamer}
\usetheme{Frankfurt}
Use \section{..} and \subsection{..} to create items for the Table of Contents
The code for a frame is ...

```
\subsection{Basics}
\begin{frame}
  \frametitle{Sample Code}
        Frame content
        .
\end{frame}
```

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Colouring Text

This a 2–stage process

- Define the colour

```
\setbeamercolor{blue}{fg=blue!50}
```

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  {\usebeamercolor[fg]{blue} Some blue text}
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  `\setbeamercolor{blue}{fg=blue!50}`
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  `{\usebeamercolor[fg]{blue} Some blue text}`
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- or
  `\newcommand{\green}[1]{\usebeamercolor[fg]{green}#1}`
  `\green{some green text}`....some green text

`\alert<4>{Colours predefined in PSTRICKS}`

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Uncovering Text

Subtitle: A Short Example

- Use `itemize` a lot–with `\pause`

Uncovering Text

Subtitle: A Short Example

- Use `itemize` a lot–with `\pause`
- Use very short sentences or short phrases.

```
\begin{itemize}
\item
  Use \texttt{itemize} a lot--with \pause
\item
  Use very short sentences or short phrases.
\end{itemize}
```

Uncovering Text

Subtitle: A Longer Example

You can create overlays...

- using the `\pause` command:
  - First item. (`\pause`)

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You can create overlays...

- using the `\pause` command:
  - First item. (`\pause`)
  - Second item.
- using overlay specifications:

- using the general `\uncover` command:
  (`\uncover<5->{\item First item...}`)

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  - First item.

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  - First item.
  - Second item.

Uncover & alert

- Apple

```
\begin{itemize}[<+-| alert@+>]
   \item Apple
   \item Peach
   \item Plum
   \item Orange
\end{itemize}
```

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Uncovering Equations

$$A =$$

Uncovering Equations

$$A = B$$

Uncovering Equations

$$\begin{aligned} A &= B \\ &= C \end{aligned}$$

Uncovering Equations

$$\begin{aligned} A &= B \\ &= C \\ &= D \end{aligned}$$

```
\begin{align*}
A &=  \uncover<2->{B}\\
\uncover<2->{&=C\\}
\uncover<3->{&=D\\}
\end{align*}
```

An example of replacement

This uses five overlays, each separate equations. . .

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} =$$

Alignment not ideal.

An example of replacement

This uses five overlays, each separate equations...

$$\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} = \frac{(x-1)^2 - 2(x+3)(x-1)}{(x-1)^4}$$

\alt is used to replace the first line

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$$= \frac{(x-1)^2 - 2(x+3)(x-1)}{(x-1)^4}$$

and then \visible, as opposed to \uncover. Alignment not ideal.

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$$= \frac{(x-1)((x-1) - 2(x+3))}{(x-1)^4}$$

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Alignment not ideal.

An example of `align` with replacement

Three overlays, . . .

$$left = \text{rhs } 1$$

```
\begin{align*}
   left&=\alt<1>{rhs1}{\text{alternate rhs}}\\
  \visible<3->{&=rhs3}
\end{align*}
```

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Three overlays, . . .

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\end{align*}
```

Uses \alt and \visible, as opposed to \uncover. Alignment spoiled because alternative is longer than original.

An example of `align` with replacement

Use of \phantom to add invisible text to 3rd overlay to ensure correct alignment when \alt string is longest. . .

$$\text{left} = \text{rhs 1}$$

```
\begin{align*}
   \text{left}&=
        \alt<1>{\text{rhs 1}}{\text{alternate rhs 2}}\\
   \visible<3->
        {&=\text{rhs 3}\phantom{extra appended}}\\
\end{align*}
```

An example of `align` with replacement

Use of \phantom to add invisible text to 3rd overlay to ensure correct alignment when \alt string is longest. . .

$$\text{left} = \text{alternate rhs 2}$$

```
\begin{align*}
   \text{left}&=
        \alt<1>{\text{rhs 1}}{\text{alternate rhs 2}}\\
   \visible<3->
        {&=\text{rhs 3}\phantom{extra appended}}\\
\end{align*}
```

An example of `align` with replacement

Use of \phantom to add invisible text to 3rd overlay to ensure correct alignment when \alt string is longest. . .

$$\begin{aligned} \text{left} &= \text{alternate rhs 2} \\ &= \text{rhs 3} \end{aligned}$$

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```

The `align` environment with replacement

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The `align` environment with replacement

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\alt replaces the first line

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$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} &= \frac{(x-1)^2-2(x+3)(x-1)}{(x-1)^4}\\ &= \frac{(x-1)^2-2(x+3)(x-1)}{(x-1)^4}\end{aligned}$$

\alt replaces the first line and then \visible, as opposed to \uncover.

The `align` environment with replacement

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Uncovering Rows

Class	A	B	C	D
X	1	2	3	4

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Class	A	B	C	D
X	1	2	3	4
Y	3	4	5	6

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Class	A	B	C	D
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```
\usepackage{colortbl}
```

Uncovering Rows

Class	A	B	C	D
X	1	2	3	4
Y	3	4	5	6
Z	5	6	7	8

```
\usepackage{colortbl}

\rowcolors[]{1}{blue!20}{red!10}
\begin{tabular}{l!{\vrule}cccc}\hline
Class & A &  B &  C &  D\\\hline
X & 1 &  2 &  3 &  4 \\\pause
Y & 3 &  4 &  5 &  6 \\\pause
Z &     5 &   6 &  7 &  8
\end{tabular}
```

Uncovering Columns

Class	A

Uncovering Columns

Class	A	B
		2
		4
		6

Uncovering Columns

Class	A	B	C
		2	3
		4	5
		6	7

Uncovering Columns

Class	A	B		D
		2		4
		4		6
		6		8

Uncovering Columns

Class	A	B
X	1	2
Y	3	4
Z	5	6

D
4
6
8

```
\begin{tabular}%
  {l!{\vrule}c<{\onslide<2->}%
     c<{\onslide<3>}
     c<{\onslide<4->}c}
     ....
 \end{tabular}
```

`c<{decl.}` inserts decl. right after the entry for the column.

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Theorem and Proof

Theorem

There is no largest prime number

Proof.

- Suppose p ... the largest prime

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- Suppose p ... the largest prime
- Let q be the product of the first p numbers

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- Thus $q + 1$ is a prime number larger than p.

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- Suppose p ... the largest prime
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□

Theorem and Proof-Code

```
\begin{theorem}
   There is no largest prime number
\end{theorem}

\begin{proof}
\begin{itemize}
\item Suppose $p$ were the largest prime\pause
\item Let $q$ be ... first $p$ numbers\pause
\item Then $q+1$ is not divisible ...\pause
\item Thus $q+1$ is a prime ... $p$.\pause
\end{itemize}
\end{proof}
```

Cantor's Theorem

Theorem

$\alpha < 2^\alpha$ for all ordinals α.

▸ Proof details

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Printing slides for handouts

With the header
\documentclass[t,handout]{beamer}

(i) the `t` option specifies vertically aligned top frames

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(ii) all piecewise defined slides are aggregated into one.

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(i) the `t` option specifies vertically aligned top frames

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(iii)
```
\usepackage{enumerate}
...
\begin{enumerate}[<+->][(i)]
  \item the \texttt{\blue{t}} option specifies .
  \item all piecewise defined ....
\end{enumerate}
```

Printing as article class

The header
\documentclass{article}
and package
\usepackage{beamerarticle}
cause the material to be typeset as a “normal” article—all frame references are ignored.

Sample page

Outline

Contents

1 Structure 1
- 1.1 Features . . . 1
- 1.2 Basics . . . 1
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2 Lists 2
- 2.1 Uncovering Text . . . 2
- 2.2 Theorems/Proofs . . . 5
- 2.3 Handouts . . . 6

3 Fancy Bits 6
- 3.1 Columns . . . 6
- 3.2 pstricks package . . . 7
- 3.3 Movies . . . 8

1 Structure

1.1 Features

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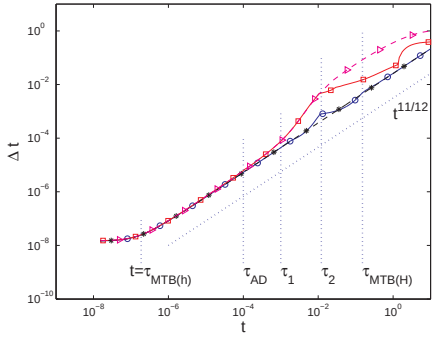
Graphics & Text Side by Side

```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
      \includegraphics[width=1.3in]%
           {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
      text column
  \end{column}
\end{columns}
```



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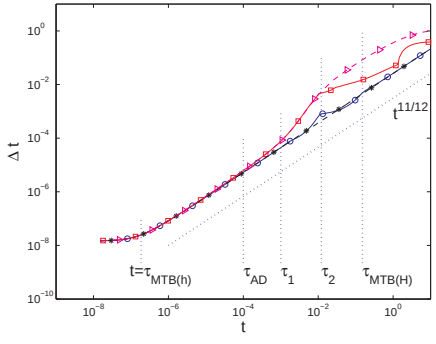


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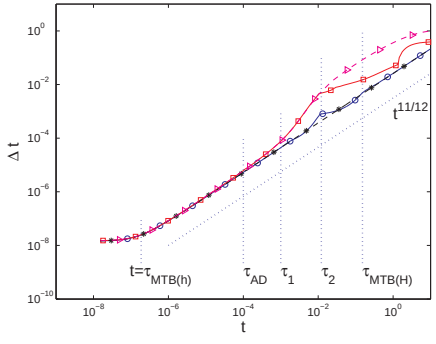

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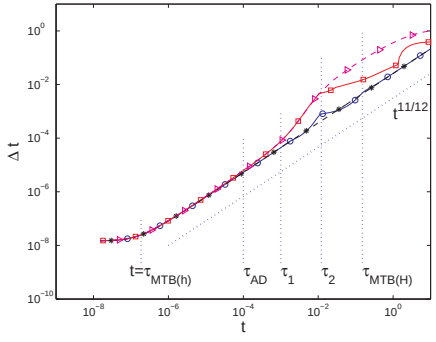


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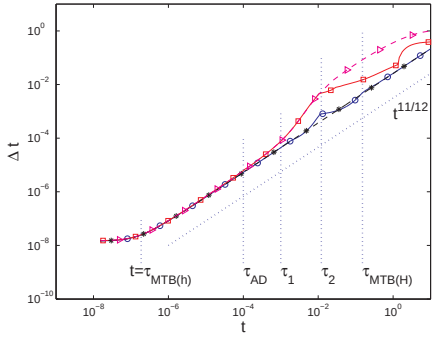
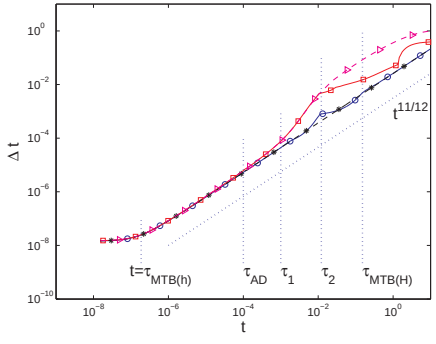
\end{columns}
```



Graphics & Text Side by Side

```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
      \includegraphics[width=1.3in]%
           {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
      text column
  \end{column}
\end{columns}
```



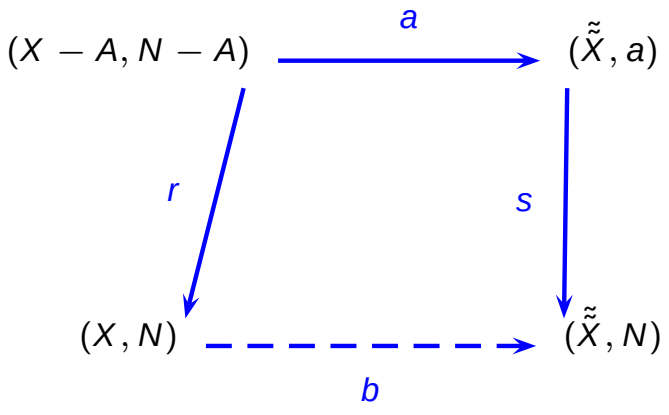
[We actually use `semiverbatim &` `incremental alerts`.]

Outline

1. Structure
   - Features
   - Processing
   - Basics
   - Colour
2. Lists
   - Uncovering Text
   - Theorems/Proofs
   - Handouts
3. Fancy Bits
   - Columns
   - pstricks package
   - Movies

Diagrams

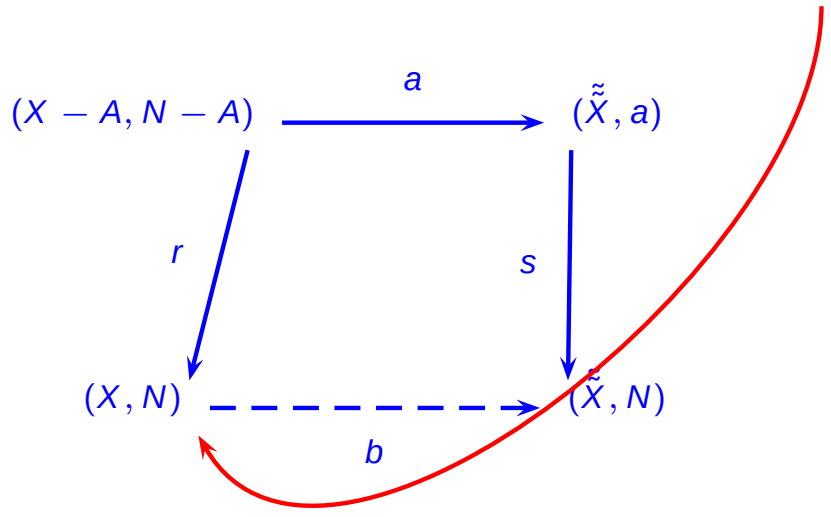
A small diagram with a few lines of LaTeX.




```
  \blue \rnode{START}{\textsc{PSTricks}}
...
  \visible<2>{\nccurve%
      [linecolor=red,angleA=270,angleB=300]{START}{c}}
```

Diagrams

A small diagram with a few lines of LaTeX. At the 2nd overlay we can add a link from one to another using PSTricks




```
  \blue \rnode{START}{\textsc{PSTricks}}
...
  \visible<2>{\nccurve%
      [linecolor=red,angleA=270,angleB=300]{START}{c}}
```

Householder formula

The Householder formula below lets one compute $f(x_*) = 0$ for an arbitrary f.

$$x_{k+1} \mapsto \Phi_n(x_k) = x_k + (n-1)\frac{\left(\frac{1}{f(x_k)}\right)^{n-2}}{\left(\frac{1}{f(x_k)}\right)^{n-1}} + f(x_k)^{n+1} \quad \psi \qquad (1)$$

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where $n \geq 2$ and ψ is an arbitrary function.

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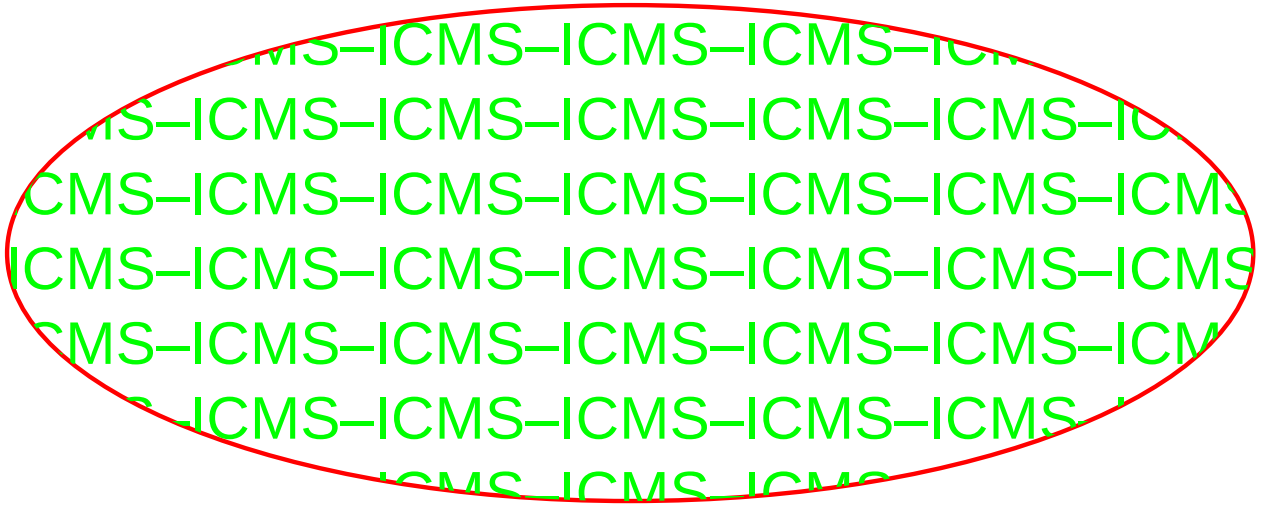
where $n \geq 2$ and ψ is an arbitrary function.
Formula (1) gives an iteration of order n converging towards x_* such that: $f(x_*) = 0$.

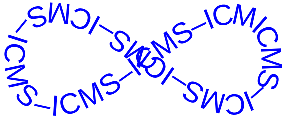
Some PSTRICKS

Any practical use for this?



Some more PSTRICKS

or this ...



```
\pstextpath{\psccurve[linestyle=none]%
(.5,0)(3.5,1)(3.5,0)(.5,1)}%
{\blue ICMS--ICMS--ICMS--ICMS--ICMS--ICMS--%
ICMS--ICMS--ICMS--ICMS--ICM}
```

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Including Movies

```
\movie[width=3in,height=2in,showcontrols,poster]%
                {}{thank.avi}
```

Even though the movie is “embedded” in the `.tex` file, the `.avi` file must still reside in the same folder as the `pdf` file.

Summary

- The first main message of your talk in one or two lines.

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- Outlook
  - Something you haven't solved.
  - Something else you haven't solved.

Cantor's Theorem

Theorem

$\alpha < 2^{\alpha}$ *for all ordinals* α*.*

Proof.

As shown by Cantor... □

Return

For Further Reading I

A. Author.
Handbook of Everything.
Some Press, 1990.

S. Someone.
On this and that.
Journal of This and That, 2(1):50–100, 2000.

D.F. Griffiths
Beamer By Example
http://www.maths.dundee.ac.uk/~dfg/talks.shtml