Beamer By Example

Subtitle: Frankfurt Theme

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Outline

Contents

1 Structure

1.1 Features

Beamer

Written by Till Tantau while completing his PhD.

- Process with either `pdflatex` or `latex+dvips`
- Standard LaTeX commands still work
- `tableofcontents` works
- 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

1.2 Basics

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}
```

1.3 Colour

Colouring Text

This a 2–stage process

- Define the colour

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

- Use the colour

  `{\usebeamercolor[fg]{blue} Some blue text}`

  Some blue text

- or `\newcommand{\green}[1]{\usebeamercolor[fg]{green}#1}`

  `\green{some green text}`....some green text

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

2 Lists

2.1 Uncovering Text

Uncovering Text

- 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

You can create overlays...

- using the `\pause` command:
  - First item. (`\pause`)
  - Second item.
- using overlay specifications:
  - First item. (`\item<3->`)
  - Second item.(`\item<4>`)
- using the general `\uncover` command:
  (`\uncover<5->{\item First item...}`)
  - First item.
  - Second item.

Uncover & alert

- Apple
- Peach
- Plum
- Orange

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

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…

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

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

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

$$= \frac{((x-1) - 2(x+3))}{(x-1)^3} = -\frac{x+7}{(x-1)^3}$$

\alt is used to replace the first line and then \visible, as opposed to \uncover. *Alignment not ideal.*

An example of `align` with replacement

Three overlays, …

$$\begin{aligned} left &= \text{rhs 1} \\ &= \text{rhs 3} \end{aligned}$$

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

$$\begin{aligned} \text{left} &= \text{rhs 1} \\ &= \text{rhs 3} \end{aligned}$$

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

The `align` environment with replacement

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}x}\frac{x+3}{(x-1)^2} &= \\ &= \frac{(x-1)^2-2(x+3)(x-1)}{(x-1)^4} \\ &= \frac{(x-1)((x-1)-2(x+3))}{(x-1)^4} \\ &= \frac{((x-1)-2(x+3))}{(x-1)^3} = -\frac{x+7}{(x-1)^3}\end{aligned}$$

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

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	B	C	D
X	1	2	3	4
Y	3	4	5	6
Z	5	6	7	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.*

2.2 Theorems/Proofs

Theorem and Proof

Theorem 1. *There is no largest prime number*

Proof.
- Suppose p ... the largest prime
- Let q be the product of the first p numbers
- Then $q + 1$ is not divisible by any of them
- Thus $q + 1$ is a prime number larger than p.

□

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

Cantor<2>Proof details

Proof. As shown by Cantor... □

Cantor<1>Return

2.3 Handouts

Printing slides for handouts

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

1. the `t` option specifies vertically aligned top frames

2. all piecewise defined slides are aggregated into one.

3.
```
\usepackage{enumerate}
...
\begin{enumerate}[<+->][(i)]
  \item the \texttt{\blue{t}} option specifies ....
  \item all piecewise defined ....
\end{enumerate}
```

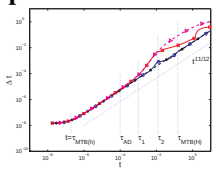
Printing as article class

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

3 Fancy Bits

3.1 Columns

Graphics & Text Side by Side



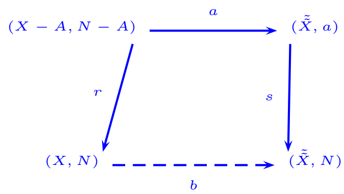
```
\begin{columns}[b]
 \begin{column}{.25\textwidth}
       \includegraphics[width=1.3in]%
            {FILE.epsc}
 \end{column}
  \begin{column}{.75\textwidth}
       text column
  \end{column}
\end{columns}
```

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

3.2 pstricks package

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.

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

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 ...

S–ICM S–ICM

```
\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}
```

3.3 Movies

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.
- The *second main message* of your talk in one or two lines.
- Perhaps a *third message*, but not more than that.

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

References

[1] A. Author. *Handbook of Everything*. Some Press, 1990.

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

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