

Beamer By Example

Subtitle: Frankfurt Theme

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³University of Dundee

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Outline

1

Structure

- Features
- Processing
- Basics
- Colour

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Lists

- Uncovering Text
- Theorems/Proofs
- Handouts

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3 Fancy Bits

- Columns
- Movies

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Written by Till Tantau while completing his PhD.

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

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- Overlays & dynamic effects easily created
- Easy navigation through sections & subsections

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- `tableofcontents` works
- Overlays & dynamic effects easily created
- Easy navigation through sections & subsections
- Many templates and examples included in package

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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

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Processing

This document was processed with

`pdflatex`

so we cannot use the package `pstricks`.

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Graphics files are usually `jpg` or `pdf`.

Including `\usepackage{epstopdf}` will convert `eps` files to `pdf`.

Do **not** include filename extensions on graphics files.

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If processing fails, try deleting all `aux` files.

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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

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

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

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

- 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`)

Uncovering Text

Subtitle: A Longer Example

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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 - Second item. (`\item<4>`)
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 - First item.

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(`\uncover<5->{\item First item...}`)
 - First item.
 - Second item.

Uncover & alert

- Apple

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

Uncover & alert

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


An example of replacement

This uses five overlays, each separate equations. . .

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

Alignment not ideal.

An example of replacement

This uses five overlays, each separate equations. . .

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

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

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Alignment not ideal.

An example of `align` with replacement

Three overlays, ...

$$left = rhs\ 1$$

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

An example of `align` with replacement

Three overlays, ...

left = alternate rhs

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


An example of `align` with replacement

Three overlays, ...

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

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  left&=\alt<1>\{rhs1\}\{\text{alternate rhs}\}\backslash\backslash
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Uses `\alt` and `\visible`, as opposed to `\uncover`.

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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}\}\backslash\backslash
  \visible<3->
    \&=\text{rhs 3}\phantom{\text{extra appended}}\backslash\backslash
\end{align*}
```

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

left = 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. . .

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

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

The `align` environment with replacement

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

.

The `align` environment with replacement

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

`\alt` replaces the first line

.

The `align` environment with replacement

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

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

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 \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 |
| | | | | |

Uncovering Rows

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

Uncovering Rows

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

Uncovering Rows

| Class | A | B | C | D |
|-------|---|---|---|---|
| X | 1 | 2 | 3 | 4 |
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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} {1! {\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 |
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Uncovering Columns

| Class | A | B | D |
|-------|---|---|---|
| X | 1 | 2 | 4 |
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```
\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

Theorem and Proof

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

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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 .

Theorem and Proof

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- 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

$\alpha < 2^\alpha$ 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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With the header

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- (i) the `t` option specifies vertically aligned top frames
- (ii) all piecewise defined slides are aggregated into one.

Printing slides for handouts

With the header

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\documentclass[t,handout]{beamer}
```

- (i) the `t` option specifies vertically aligned top frames
- (ii) all piecewise defined slides are aggregated into one.
- (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

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| 2.1 | Uncovering Text | 2 |
| 2.2 | Theorems/Proofs | 5 |
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| 3.3 | Movies | 8 |

1 Structure

1.1 Features

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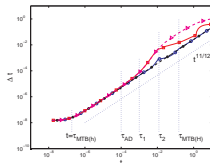
- Columns
- Movies

Graphics & Text Side by Side

```

\begin{columns}[b]
\begin{column}{.25\textwidth}
\includegraphics[width=1.3in]{%
{FILE}} ( no ext.)
\end{column}
\begin{column}{.75\textwidth}
text column
\end{column}
\end{columns}

```

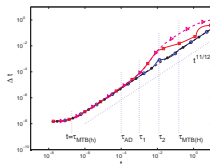


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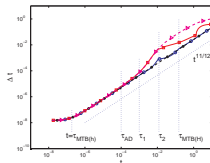


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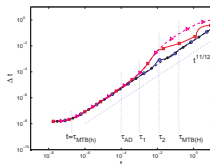


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\end{columns}

```

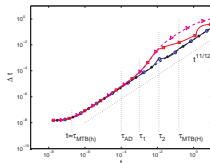


Graphics & Text Side by Side

```

\begin{columns}[b]
\begin{column}{.25\textwidth}
\includegraphics[width=1.3in]{%
{FILE} ( no ext.)
}
\end{column}
\begin{column}{.75\textwidth}
text column
\end{column}
\end{columns}

```

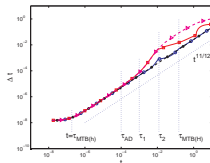


Graphics & Text Side by Side

```

\begin{columns}[b]
\begin{column}{.25\textwidth}
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{FILE} ( no ext.)
}
\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
- **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.

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.

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.

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.

Cantor's Theorem

Theorem

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

Proof.

As shown by Cantor...



◀ Return

For Further Reading I



D F Griffiths & D J Higham.

Learning \LaTeX .

SIAM, 1997



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>