LaTeX workshop: Beamers

Frederick Yin

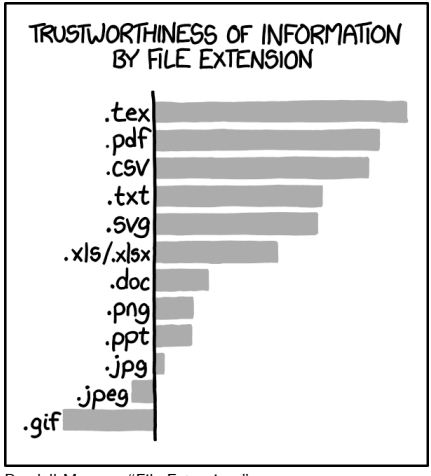
TechJI

2023

Table of Contents

Why beamer?

- Content-centric
- Math typesetting
- Looks professional
- Reuse LaTeX you wrote earlier



Randall Munroe, "File Extensions",
https://xkcd.com/1301/

Beamers 101

Instead of `article`, the first lines goes:

```
\documentclass{beamer}
```

Then metadata:

```
\title{\LaTeX\ workshop: Beamers}
\author{Frederick Yin}
\institute{TechJI}
\date{2023}
```

Then the document:

```
\begin{document}
% frames
\end{document}
```

Beamers 101

Instead of `article`, the first lines goes:

```
\documentclass{beamer}
```

Then metadata:

```
\title{\LaTeX\ workshop: Beamers}
\author{Frederick Yin}
\institute{TechJI}
\date{2023}
```

Then the document:

```
\begin{document}
% frames
\end{document}
```

DIY 1

In `diy.tex`, fill in your name, then compile.

Frames

A beamer is made of many **frames**:

```
\begin{frame}{Title}
    Frame content
\end{frame}
```

Or alternatively

```
\begin{frame}
    \frametitle{Title}
    Frame content
\end{frame}
```

Table of Contents

Multicolumn

```
\begin{columns}
    \begin{column}{0.5\textwidth}
        % ...
    \end{column}
    \begin{column}{0.3\textwidth}
        And that's how this frame
        was made!
    \end{column}
\end{columns}
```

And that's how this frame was made!

Note

This is a `beamer` feature, **not** the same thing as the `multicols` environment in an article.

Alignment option

Add option `t` to top-align:

```
\begin{columns}[t]
    \begin{column}{0.5\textwidth}
        % ...
    \end{column}
    \begin{column}{0.3\textwidth}
        % ...
    \end{column}
\end{columns}
```

All options:

- `c` — center
- `t` — top
- `T` — different top [1]
- `b` — bottom

[1] See section 12.7 of `beamer` docs.

Alignment option

Add option `t` to top-align:

```
\begin{columns}[t]
    \begin{column}{0.5\textwidth}
        % ...
    \end{column}
    \begin{column}{0.3\textwidth}
        % ...
    \end{column}
\end{columns}
```

All options:

- `c` — center
- `t` — top
- `T` — different top [1]
- `b` — bottom

DIY 2

Divide frame " □□□□, □□⟨⟨□□⟩⟩ " into two columns.

[1] See section 12.7 of `beamer` docs.

Table of Contents

Sections

Use sections to outline your presentation.

```
\section{}
% Frames
\subsection{}
% More frames
```

DIY 3

Group the lab report into sections, then compile and observe.

Table of Contents

Insert this frame where you want a Table of Contents (usually right after title page):

```
\begin{frame}{Table of Contents}
    \tableofcontents
\end{frame}
```

Table of Contents

Insert this frame where you want a Table of Contents (usually right after title page):

```
\begin{frame}{Table of Contents}
    \tableofcontents
\end{frame}
```

Or automatically insert one before each section:

```
\AtBeginSection[]{
    \begin{frame}{Table of Contents}
        \tableofcontents[currentsection]
    \end{frame}
}
```

(In the preamble, before beginning of document)

Table of Contents

Blocks

Some block environments always need a title:

Like this default block

```
\begin{block}{Like this default block}
\end{block}
```

Or this alertblock

```
\begin{alertblock}{Or this alertblock}
\end{alertblock}
```

Blocks

Others have a default title, but you can elaborate:

Example

This example does not tell you what it's about...

```
\begin{example}
\end{example}
```

Example (with a description)

But this one does!

```
\begin{example}[with a description]
\end{example}
```

Blocks

Apart from `example`, we have `examples`, `definition`, `definitions`, `theorem`, `proof`, and `corollary`, with similar syntax.

```
\begin{something}[optional description]
    % Block content
\end{something}
```

DIY 4

Put each paragraph in a block you think is suitable.

Table of Contents

Pauses

"Overlay" is just a fancy way of saying "hiding part of the frame". The simplest way is \pause:

```
\begin{frame}
    \begin{itemize}
        \item To be, or --- next slide, please ---
        \pause
        \item not to be, that is the question.
    \end{itemize}
\end{frame}
```

Pauses

"Overlay" is just a fancy way of saying "hiding part of the frame". The simplest way is \pause:

```
\begin{frame}
    \begin{itemize}
        \item To be, or --- next slide, please ---
        \pause
        \item not to be, that is the question.
    \end{itemize}
\end{frame}
```

Slide 1

- To be, or — next slide, please —

Pauses

"Overlay" is just a fancy way of saying "hiding part of the frame". The simplest way is \pause:

```
\begin{frame}
    \begin{itemize}
        \item To be, or --- next slide, please ---
        \pause
        \item not to be, that is the question.
    \end{itemize}
\end{frame}
```

Slide 2

- To be, or — next slide, please —
- not to be, that is the question.

Pauses

"Overlay" is just a fancy way of saying "hiding part of the frame". The simplest way is \pause:

```
\begin{frame}
    \begin{itemize}
        \item To be, or --- next slide, please ---
        \pause
        \item not to be, that is the question.
    \end{itemize}
\end{frame}
```

- To be, or — next slide, please —
- not to be, that is the question.

Problem: not very customizable

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

```
\begin{frame}
    \begin{itemize}
        \item<1> Shall I compare thee to a summer's day? Thou art
            --- next slide, please ---
        \item<2-> more lovely, and --- next slide, please ---
        \item<3-> more temperate.
    \end{itemize}
\end{frame}
```

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

```
\begin{frame}
    \begin{itemize}
        \item<1> Shall I compare thee to a summer's day? Thou art
            --- next slide, please ---
        \item<2-> more lovely, and --- next slide, please ---
        \item<3-> more temperate.
    \end{itemize}
\end{frame}
```

Slide 1

- Shall I compare thee to a summer’s day? Thou art — next slide, please —

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

```
\begin{frame}
    \begin{itemize}
        \item<1> Shall I compare thee to a summer's day? Thou art
            --- next slide, please ---
        \item<2-> more lovely, and --- next slide, please ---
        \item<3-> more temperate.
    \end{itemize}
\end{frame}
```

Slide 2

- more lovely, and — next slide, please —

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

```
\begin{frame}
    \begin{itemize}
        \item<1> Shall I compare thee to a summer's day? Thou art
            --- next slide, please ---
        \item<2-> more lovely, and --- next slide, please ---
        \item<3-> more temperate.
    \end{itemize}
\end{frame}
```

Slide 3

- more lovely, and — next slide, please —
- more temperate.

Overlay specifications

Solution: “overlay specifications” (aka angle brackets)

```
\begin{frame}
    \begin{itemize}
        \item<1> Shall I compare thee to a summer's day? Thou art
            --- next slide, please ---
        \item<2-> more lovely, and --- next slide, please ---
        \item<3-> more temperate.
    \end{itemize}
\end{frame}
```

- Shall I compare thee to a summer’s day? Thou art — next slide, please —
- more lovely, and — next slide, please —
- more temperate.

Problem: requires manual work, even for simplest effect

Incremental specifications

Author of `beamer` knew this, and came up with **incremental specifications**:

Incremental specifications

Author of beamer knew this, and came up with **incremental specifications**:

```
\begin{frame}
    \begin{itemize}
        \item<+-> ...
        \item<+-> ...
    \end{itemize}
\end{frame}
```

Incremental specifications

Author of beamer knew this, and came up with **incremental specifications**:

```
\begin{frame}
    \begin{itemize}
        \item<+-> ...
        \item<+-> ...
    \end{itemize}
\end{frame}
```

Slide 1

- It is a truth universally acknowledged, that a single man in possession of — next slide, please —

Incremental specifications

Author of beamer knew this, and came up with **incremental specifications**:

```
\begin{frame}
    \begin{itemize}
        \item<+-> ...
        \item<+-> ...
    \end{itemize}
\end{frame}
```

Slide 2

- It is a truth universally acknowledged, that a single man in possession of — next slide, please —
- a good fortune, must be in want of — next slide, please —

Incremental specifications

Author of beamer knew this, and came up with **incremental specifications**:

```
\begin{frame}
    \begin{itemize}
        \item<+-> ...
        \item<+-> ...
    \end{itemize}
\end{frame}
```

Slide 3

- It is a truth universally acknowledged, that a single man in possession of — next slide, please —
- a good fortune, must be in want of — next slide, please —
- a wife.

Incremental specifications

Author of beamer knew this, and came up with **incremental specifications**:

```
\begin{frame}
    \begin{itemize}
        \item<+-> ...
        \item<+-> ...
    \end{itemize}
\end{frame}
```

- It is a truth universally acknowledged, that a single man in possession of — next slide, please —
- a good fortune, must be in want of — next slide, please —
- a wife.

Problem: even this is too much work

Incremental specifications

They knew.

Incremental specifications

They knew. The previous example is equivalent to

```
\begin{frame}
    \begin{itemize}[<+->]
        \item ...
        \item ...
    \end{itemize}
\end{frame}
```

<+-> explained

How does <+-> work?

- Counter called `beamerpauses`
- `\pause` adds 1 to `beamerpauses`
- Things like <2-> do not
- + expands to current value of `beamerpauses`, then adds 1
- <+-> expands to <1->, <2->, etc
- Unless you `\paused`

<+-> explained

How does <+-> work?

- Counter called `beamerpauses`
- `\pause` adds 1 to `beamerpauses`
- Things like <2-> do not
- + expands to current value of `beamerpauses`, then adds 1
- <+-> expands to <1->, <2->, etc
- Unless you `\paused`

DIY 5

Follow instructions in `diy.tex` to create your own overlays.

Table of Contents

Aspect ratio

Beamers are 4:3 by default. Switch to 16:9 with

```
1 \documentclass[aspectratio=169]{beamer}
```

Page size (mm):

- 4:3 — 128×96
- 16:9 — 160×90

This means vertical content *might* overflow. Better settle on an aspect ratio from the beginning.

Formulas

Works as you would expect in an article, except:

Consistent

```
\int x^2 \mathsf{d} x
```

$$\int x^2 \mathsf{d} x$$

Not so much

```
\int x^2 \mathrm{d} x
```

$$\int x^2 \mathrm{d} x$$

`rm` = Roman; `sf` = sans-serif

Dirty hack

Too many `\mathrm`s to replace? Try

```
\renewcommand{\mathrm}{\mathsf}
```

Fragile frames

If you include code, you have to tell beamer that this frame is “fragile”.

```
\begin{frame}[fragile]
    % Content that contains code
\end{frame}
```

Remove navigation symbols

In the bottom right of your DIY slides are the navigation symbols:

This line removes them:

```
1 \setbeamertemplate{navigation symbols}{}
```

Why?

- Distracting clutter
- Manuel hates them
- Have you ever *used* it?

Further reading / References

- The `beamer` user guide:
  http://mirrors.ctan.org/macros/latex/contrib/beamer/doc/beameruserguide.pdf
  - Multicolumn: §12.7
  - Sections: §10.2
  - Blocks: §12.3
  - Overlays: §9
- LaTeX workshop by Liu Yihao:
  https://github.com/SJTU-UMJI-Tech/LaTeX/blob/master/build/c5_beamer.pdf

Thanks!