



CS213: Software Systems Laboratory

Autumn 2023-24

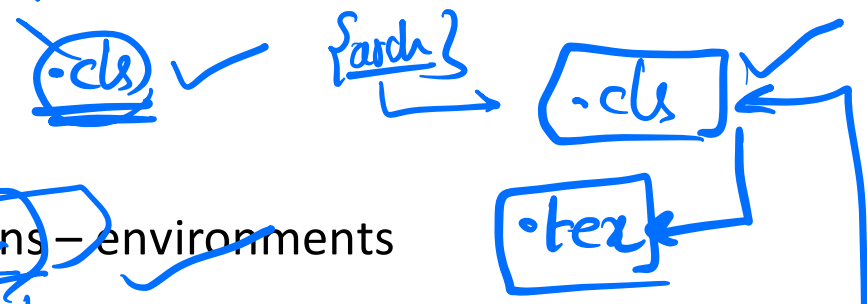
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* overleaf **

Recap

- Latex Introduction
- Document class – options – environments
- Itemize – enumerate
- Tables
- Figures
- Math
- Matrix
- Algorithms
- Calculus



[p2p] \backslash begin Silent
[enroll, single] IEEEtrans

\backslash documentclass []

\backslash begin {table} tblu2x
 \backslash end }

\backslash includegraphics [\longleftrightarrow] { \longleftrightarrow }
 \backslash begin {equation}

Outline ✂ ✓

documentclass {article
sepall ✓
[beamer]}

- Beamer Introduction ✓
- Beamer – Title – Author – Date ✓
- Section ✓
- Subsection ✓
- Content in slide ✓
- Customizing themes ✓
- Graphics and tables – drawing figures ✓
- Mathematical Equations ✓
- Bibliography
- Custom Commands ✓
- Animations – Slide transitions ✓
- Overlay specifications ✓



CS213: Mid-semester Instructions



- Exam date : 23/09/2023; 9:30 AM to 12:30
- Venue : CIF 401-402, PC
- Syllabus : Bash scripting, ^{after} Linux, and Beamer
- Total marks: 30 (25 coding + 5 viva) → 10 Quiz + 20 Mid-sem
- Exam mode: Offline and a not open book

What is Beamer?

Beamer?
{ slides }

- Beamer is a flexible LATEX class for making slides and presentations
- LaTeX class for creating presentations → slides, seminar, prosper, powerdot
- Each Beamer document class is made up of a series of frames. Each frame produces one or more slides, depending on the slide's overlays


Beam → Beamen → Beamer

- GitHub - josephwright/beamer: A LaTeX class for producing presentations and slides

```
\begin{frame}
```

```
\end{frame}
```

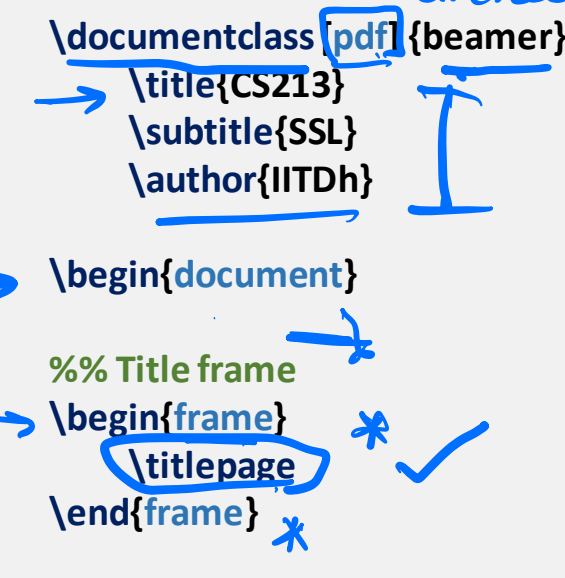
LaTeX Beamer class



LaTeX Beamer presentation screenshot

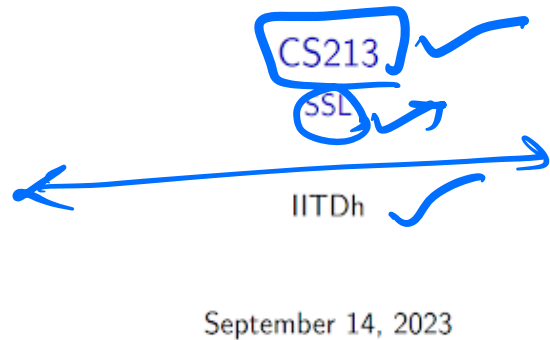
Developer(s)	Till Tantau, Joseph Wright, Vedran Miletic
Initial release	March 2003; 20 years ago
Stable release	3.63 / May 26, 2021; 2 years ago
Repository	github.com/josephwright/beamer
Written in	LaTeX, TeX
Operating system	Unix-like, Windows
Platform	TeX Live, MiKTeX

Beamer: Syntax



```
\documentclass[pdf]{beamer} ✓  
→ \title{CS213}  
  \subtitle{SSL}  
  \author{IITDh}  
→ \begin{document}  
  %% Title frame  
  → \begin{frame}  
    \titlepage  
  \end{frame} * ✓  
→ \end{document}
```

Annotations: "separate article" with an arrow pointing to the [pdf] box; a large blue "I" shape spanning the first three lines of code; a blue arrow pointing to the \title command; a blue arrow pointing to the \begin{frame} command; a blue arrow pointing to the \end{document} command; a blue arrow pointing to the \titlepage command; a blue arrow pointing to the \documentclass command; a blue arrow pointing to the %% Title frame comment; a blue arrow pointing to the \begin{frame} command; a blue arrow pointing to the \end{frame} command; a blue arrow pointing to the \end{document} command; a blue arrow pointing to the \titlepage command; a blue arrow pointing to the \documentclass command; a blue arrow pointing to the %% Title frame comment; a blue arrow pointing to the \begin{frame} command; a blue arrow pointing to the \end{frame} command; a blue arrow pointing to the \end{document} command.



September 14, 2023

Beamer: Syntax (1)

Header Commands

```
\documentclass[pdf]{beamer}
\usepackage[utf8]{inputenc}
\usetheme{default}
\usecolortheme{default}
\title{CS 213}{Software Systems Lab}
\subtitle{L5}
\author{KK}{Koteswararao Kondepu}
\begin{document}
\begin{frame}
\titlepage
\end{frame}
\end{document}
```

Handwritten annotations:
 - Blue arrows point to `\usetheme{default}` and `\usecolortheme{default}`.
 - A double-headed arrow is above `\usetheme{default}`.
 - A bracket is to the right of `\usecolortheme{default}`.
 - `CS 213` is circled in red.
 - `Software Systems Lab` is underlined.
 - `L5` is underlined.
 - `KK` is circled in blue.
 - `Koteswararao Kondepu` is underlined.
 - A bracket is to the right of `\title{CS 213}{Software Systems Lab}`.
 - A bracket is to the right of `\author{KK}{Koteswararao Kondepu}`.
 - A bracket is to the right of `\begin{document}`.
 - A bracket is to the right of `\begin{frame}`.
 - A bracket is to the right of `\titlepage`.
 - A bracket is to the right of `\end{frame}`.
 - A bracket is to the right of `\end{document}`.

```
\usetheme{Madrid}
```

- Default slides will come with a **navigation bar** at the bottom right.
- It allows users to move one slide forward or backward, move to the next section, etc.
- To eliminate this → `\beamertemplatenavigationsymbolempty`

→ Software Systems Lab
L5 ✓

Koteswararao Kondepu

September 15, 2023

\setbeamertemplate{navigationsymbols}{}



Beamer: Frames ***

Each beamer project is made up of a series of *frames*.
Each *frame* produces one or more slides.

`\begin{frame}[...]`
`htbp`
`[#]`

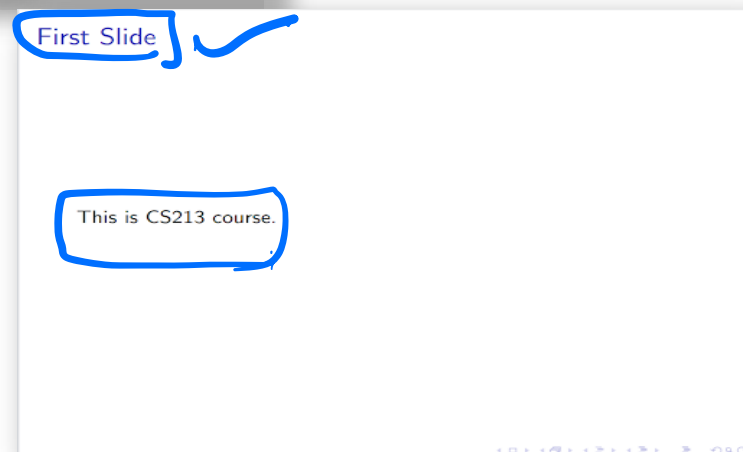
A Basic Frame

```
\begin{frame} [<option>]  
  \frametitle {<frame title>}  
  <frame body>  
\end{frame}
```

```
\begin{frame}{First Slide}  
→ This is CS213 course.  
\end{frame}
```

Options:

- plain → No headlines, foot lines, sidebars
- b → Bottom alignment
- c → Center alignment
- t → Top alignment
- fragile → Require for verbatim environment
- shrink n → Shrink everything by n percent



Beamer: Themes

- For the appearance of the presentation
- Beamer classifies the **Themes** into five categories

Theme Category	Description	Default / Optional
Presentation Themes ✓	Slide template	Default
Color Themes ✓	Color scheme of slide template	Optional
Font Themes ✓	Defines the fonts	Optional
✗ Inner Themes ✓	Defines inside of slide like bullets, boxes, etc.,	Optional
✗ Outer Themes ✓	Defines outside of slide head- and foot lines.	Optional

- Presentation Themes

Syntax: `\usetheme{themename}`

AnnArbor Antibes Bergen ✓ Berkeley Berlin Boadilla boxes CambridgeUS
Copenhagen Darmstadt default ✓ Dresden Frankfurt Goettingen Hannover Ilmenau
JuanLesPins Luebeck Madrid Malmoe Marburg Montpellier PaloAlto Pittsburgh
Rochester Singapore Szeged Warsaw

Beamer: Themes (1)

- Color Themes

Syntax: `\usecolortheme{color theme name}`

Complete ✓ : albatross, beetle, crane, dove, fly, seagull, wolverine, beaver

Inner ✓ : lily, orchid, rose

Outer ✓ : whale, seahorse, dolphin

- Inner Themes

Syntax: `\useinnertheme{inner theme name}`

circles, default, inmargin, rectangles, rounded

- Outer Themes

Syntax: `\useoutertheme{outer theme name}`

default infolines miniframes sidebar smoothbars
smoothtree split tree

① use theme
② frame

Beamer: Environment Lists

- Itemize

```
\begin{itemize}  
  \item <item name>  
\end{itemize}
```

%% Beamer-Environment

```
\begin{frame}{Beamer-Environment}
```

```
  \begin{itemize}
```

```
    \item Itemize
```

```
  \end{itemize}
```

```
\end{frame}
```

Beamer-Environment



- Enumerate

```
\begin{enumerate}  
  \item <item name>  
\end{enumerate}
```

%% Beamer-Environment

```
\begin{frame}{Beamer-Environment}
```

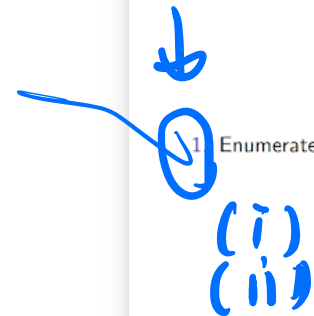
```
  \begin{enumerate}
```

```
    \item Enumerate
```

```
  \end{enumerate}
```

```
\end{frame}
```

Beamer-Environment



Beamer: Environment – Lists (1)

- Itemize

```
\begin{description}  
  \item <item name>  
\end{description}
```

```
%% Beamer-Environment
```

```
\begin{frame}{Beamer-Environment}  
  \begin{description}  
    \item Itemize  
  \end{description}  
\end{frame}
```

Beamer-Environment

```
\item1 description
```

Beamer: Environment – Mathematics Blocks

`\begin{frame}` *`\theoremstyle`*

`\begin{theorem}` ✓

Let r, s be integers such that $\gcd(r, s) = 1$. Given integers a, b , there exists unique $x < rs$ such that

`\end{theorem}` ✓

`\begin{corollary}` ✓

Corollary statement

`\end{corollary}`

`\begin{definition}` ✓

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`\end{definition}`

`\begin{proof}` ✓

Proof of $a^2 + b^2 = c^2$

`\end{proof}`

`\begin{lemma}` ✓

Lemma

`\end{lemma}` ✓

Mathematics Blocks

Theorem

Let r, s be integers such that $\gcd(r, s) = 1$. Given integers a, b , there exists unique $x < rs$ such that

Corollary

Corollary statement

Definition

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Proof.

Proof of $a^2 + b^2 = c^2$ □

Lemma

Lemma

Beamer: Animations

- Animation → The process of creating an illusion of motion or movement and rapidly showing a sequence of static figures that are (slightly) different.
- Uses the following packages:
 - animate ✕
 - tikz ✕ ✕ ✕
- Animations can be included for the following file formats
 - Static image or PNGs ✓
 - Text ✓
 - Videos or GIFs

Beamer: Animations - Text

When we have multiple lines of text, we can reveal these texts line by line using the `pause` command.

%% Beamer-Environment

`\begin{frame}{Pause text}`

This first line will appear in this slide

the second text will be partially visible

And this last text will then appear

`\end{frame}`

Output:

Pause text

This first line will appear in this slide

Beamer: Animations - PNG

`\animategraphics[<options>]{<frames per second>}{<name without extension>}{<first frame>}{<last frame>}`

0 1 2 3

%% Beamer-Environment

`\begin{frame}{GIFs in Beamer}`

`\centering`

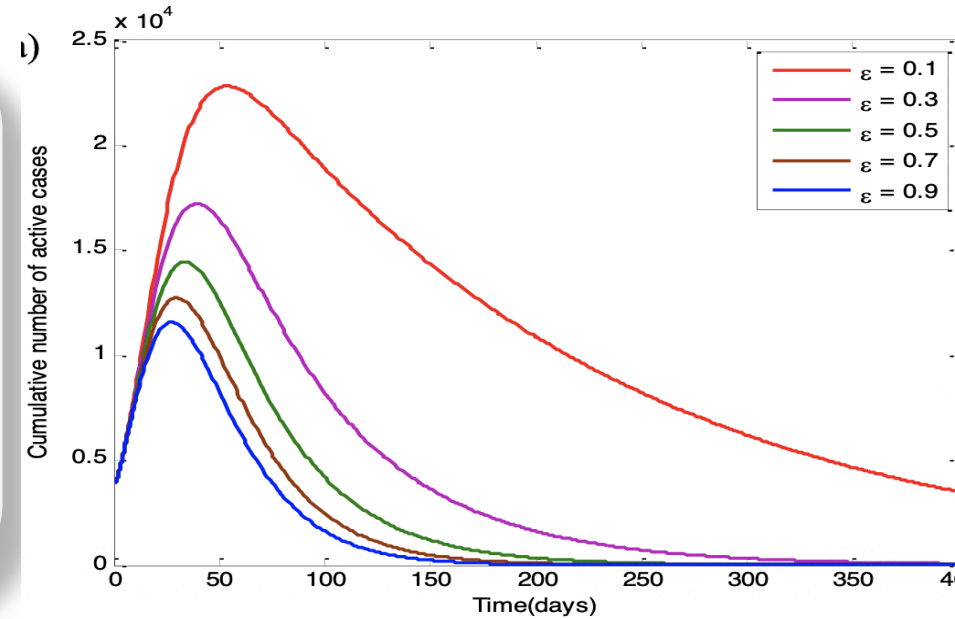
`\animategraphics[autoplay,loop,width=4cm]{10}{fig/effects}`

`{0}{3}`

`\end{frame}`

- Options: `autoplay` (the images play automatically), `loop` (once the images start moving, it continues in a loop (without stopping))
- frames per second]
- animation filename: must specify the animation filename without its extension and without the number
- first frame: the number of the first image
- last frame: number of the images

Output:



Beamer: Animations – GIF and Video

```
\documentclass{beamer}  
\usepackage{multimedia}  
\begin{document}  
\movie[options]{optional text}{GIF filename}  
\end{document}
```

- Options : autostart, loop, and width



Beamer: Slide transitions

- The PDF format offers a standardized way of defining transition effects from one slide to the next
- A slide transition is composed of a single command → `\transboxin` ✓
- This command specifies which transitions should be used when the frame is displayed

```
\begin{frame}  
\frametitle{<Titlename>  
tranboxin ✓  
  <content>  
\end{frame}
```

- Slide transitions are overlay specification aware, so `\transboxin<2>` will cause the second slide of the frame to use the `\transboxin` effect.
- There are two possible options for each transition:
 - `duration=<seconds>` specifies the number of seconds the transition effect needs.
 - `direction=<degree>` specifies the direction for directed effects.

Beamer: Bibliography

BibTeX

- Used in LaTeX environment to create unordered lists

```
\begin{frame} {References}
  \nocite{*}
  \bibliographystyle{unsrt}
  \bibliography{avg-ref}
\end{frame}
```

```
@article{TOUBAKH2021222,
  title = {Self adaptive learning scheme for
early diagnosis of simple and multiple switch
faults in multicellular power converters},
  journal = {ISA Transactions},
  volume = {113},
  pages = {222-231},
  year = {2021},
  author = {Houari Toubakh and Moamar Sayed-
Mouchaweh and Mohammed Benmiloud and Michael
Defoort and Mohamed Djemai},
}
```

@MISC

References

- Houari Toubakh, Moamar Sayed-Mouchaweh, Mohammed Benmiloud, Michael Defoort, and Mohamed Djemai.
Self adaptive learning scheme for early diagnosis of simple and multiple switch faults in multicellular power converters.
ISA transactions, 113:222–231, 2021.
- M Benmiloud and A Benalia.
Hybrid control scheme for multicellular converter.
In *2013 International Conference on Control, Decision and Information Technologies (CoDIT)*, pages 476–482. IEEE, 2013.
- Mohammed Benmiloud, Atallah Benalia, Mohamed Djemai, and Michael Defoort.
Hybrid control design for limit cycle stabilisation of planar switched systems.
International Journal of Control, 91(7):1720–1729, 2018.

Beamer: Overlay *

Overlays control the order in which parts of the frame appear

Allows us to control how different elements of a slide appear or change over a sequence of slides

Common overlay commands	Description
<code>\pause</code> ✓	Pauses the presentation and increments the slide counter
<code>\only</code> ✓	Displays the specified content only on the slide(s) specified in its argument
<code>\uncover</code> ✓ $\{1 \rightarrow 2\}$ $\{3 \rightarrow$	Shows the specified content on the slide(s) specified in its argument and makes it semitransparent on other slides
<code>\visible</code>	Displays the specified content on the slide(s) specified in its argument and keeps it invisible on other slides
<code>\alt</code> ✓	Shows one content on one slide and other content on another slide
<code>\onslide</code> ↗	Shows the specified content on the slide(s) specified in its argument and hides it on another slides
<code>\temporal</code> ✓	Allows us to specify content for three different time intervals within a slide

Beamer: Overlay - Pause

- Used in LaTeX environment to create ordered lists

```
\begin{enumerate}
\item Shown from first slide on.
\pause ✓
\item Shown from second slide on.
\pause
\item Shown from third slide on.
\pause
\item Shown from fourth slide on.
\end{enumerate}
```



① Shown from first slide on.

1

② Shown from second slide on.

③ Shown from third slide on.

④ Shown from fourth slide on.



① Shown from first slide on.



② Shown from second slide on.

2

③ Shown from third slide on.

④ Shown from fourth slide on.



① Shown from first slide on.

3



② Shown from second slide on.



③ Shown from third slide on.

④ Shown from fourth slide on.



① Shown from first slide on.

4



② Shown from second slide on.

③ Shown from third slide on.

④ Shown from fourth slide on.

Graphics

* * * \vspace{0mm} [common in]

- To include graphics in a Beamer presentation we can use the `\includegraphics` just like a regular LaTeX document

`\includegraphics[options]{filename}`

```
\documentclass{beamer}
\usepackage{graphicx} % Package for adding figures
\begin{document}
\begin{figure}[h]
\centering
\includegraphics{galaxy.jpg}
\caption{Galaxy of Stars}
\end{figure}
\end{document}
```

Options are:

`scale=<value>`: scale the picture by <value>

`height=<len>`: scale the picture so that the width is <len>

`width=<len>`: scale the picture so that the width is <len>

`angle=<x>`: rotate the picture by <x> degrees

`draft`: Don't display image, print filename in a box of the same size.



Figure 1: Galaxy of Stars

Beamer: Tikz ✓

```
\documentclass{beamer}
\usepackage{tikz} % Package for drawing
\usetikzlibrary{shapes, arrows, positioning}
\usepackage{pgfplots}
\pgfplotsset{compat = newest}
\begin{document}
\begin{tikzpicture}
\draw
\end{tikzpicture}
\begin{tikzpicture}
\begin{axis}[]
\addplot[]
\end{axis}
\end{tikzpicture}
\end{document}
```

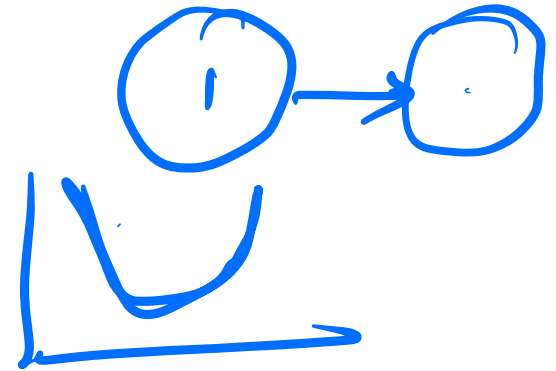


$\text{draw}(0,0)$ create (1):

Circle (a) (1):

$\text{add plot } x^2$

$\text{arrow}(a) \rightarrow (b)$



thank you!

email:

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