Hour 21

Slide Preparation I

The LaTeX platform is applicable for preparing slides also, which can be presented like those prepared in popularly known Microsoft PowerPoint package. In LaTeX, slides can be prepared through the document classes of **seminar**, **slides**, **prosper**, or **beamer**. All LaTeX macros (packages, commands, and environments), used in other document classes as discussed in previous Hours, are applicable in these document classes also. However, because of widespread application, only the document-class **beamer** is discussed here.

The BEAMER package, which defines the **beamer** document-class, is generally included in most of the standard LaTeX distributions mentioned in §1.3 on page 2. Like normal LaTeX input files, an input file with the document-class **beamer** also has the `tex` extension and it can be prepared in any LaTeX editor. Further, a **beamer** document-class file can be compiled using the same set of commands discussed in §1.4, §14.3 or §15.4, as applicable.

21.1 Frames in Presentation

In the document-class **beamer**, a presentation consists of a number of frames (or slides). A frame is created either by the **\frame[][]{}** command or the **frame** environment as **\begin{frame}[][]**…**\end{frame}**. The contents of a frame is inserted in the mandatory argument of the **\frame[][]{}** command or in the body of the **frame** environment. On the other hand, the first optional argument of a frame is to specify the piece-wise presentation of items as discussed in §22.1 on page 217, while the second optional argument is for other options for a frame (two options separating by a comma). A frame generally consists of some or all of the following eight components:

(1) Headline and footline: These are similar to header and footer of standard LaTeX, but generated automatically by the chosen theme (§21.4 on page 209 discusses themes) for displaying presentation-related various information.

(2) Sidebars: Sidebars are generated automatically by the chosen theme on either side for displaying mainly the table of contents of the presentation.

D. Datta, *LaTeX in 24 Hours: A Practical Guide for Scientific Writing*,
DOI 10.1007/978-3-319-47831-9_21

(3) Navigation bars: Navigation bars are also produced automatically by the chosen theme mainly for the following two purposes:

(a) At any point of time during the presentation, the audience can see how much of the talk have been covered and what is yet to come.
(b) If required, the presenter can jump to a particular frame by clicking on the corresponding link.

(4) Navigation symbols: Eight number of default navigation symbols are shown by small icons in light gray color in the bottom right corner of every slide. These from left to right are known as the slide icon, frame icon, subsection icon, section icon, presentation icon, appendix icon, back and forward icons, and search icon. Each of the slide, frame, subsection, and section icons is preceded by a left arrow and followed by a right arrow. A click on the left arrow will lead, respectively, to the previous slide, the last slide of the previous frame, the last slide of the previous subsection, or the last slide of the previous section. Similarly, a click on the right arrow will lead, respectively, to the next slide, the first slide of the next frame, the first slide of the next subsection, or the first slide of the next section.

(5) Logo: A logo can be printed globally in all the frames through **\logo{}** in the preamble. It can contain a piece of plain texts or a figure insertion command, e.g., **\logo{\includegraphics[width=**`8`**mm]{**`tul`**}}** (§21.5.1 on page 213 discusses in detail).

(6) Frame title: A title and a subtitle can be assigned to a frame using the **\frametitle{}** and **\framesubtitle{}** commands in the mandatory argument of **\frame[][]{}** or inside the **frame** environment.

(7) Background: Each frame has a background, which consists of a background canvas and the main background. The background canvas is a big rectangle filling the whole frame, on which the main background and other things appear.

(8) Frame contents: The contents of a frame could be LaTeX supported any text, except the **\verb" "** command or **verbatim** environment[1], but including frame title and subtitle stated above. The contents of a frame are inserted in the mandatory argument of **\frame[][]{}** or inside the **frame** environment. By default the contents of a frame (except the title and subtitle) are vertically center aligned. This default alignment can be changed by the options **t** for top alignment, **c** (default) for vertically center alignment and **b** for bottom alignment. A vertical alignment option may be assigned to **\documentclass[]{beamer}** for global effect in all frames. Alternatively, it can be used as an option to a particular frame for local effect only, e.g., **\frame[t]{}** or **\begin{frame}[t]**.

[1] Verbatim texts can be inserted in a frame through the **\verb" "** command or **verbatim** environment using the **containsverbatim** option (e.g., as **\frame[containsverbatim]{}**) defined in the **fancyvrb** package (however, it does not work under any overlay specification as discussed in Hour 22).

21.2 Sectional Units in Presentation

The frames of a presentation, as stated in §21.1, may be put under various sections and subsections produced through **\section[]{}** and **\subsection[]{}**. Unlike in standard LaTeX, **\section[]{}** and **\subsection[]{}** here do not create any heading at their positions, rather they add entries in the table of contents and navigation bars. Based upon the chosen theme (§21.4 on page 209 discusses themes), generally the full headings under the mandatory arguments of **\section[]{}** and **\subsection[]{}** are added in the table of contents, while the short headings under their optional arguments are added in navigation bars. In some cases, however, the subsections may be reflected by some symbols, such as a small circle.

21.3 Presentation Structure

Most of the presentations mainly contain the following types of pages/frames, which can be put under different sections and subsections for making their entry in the table of contents and navigation bars:

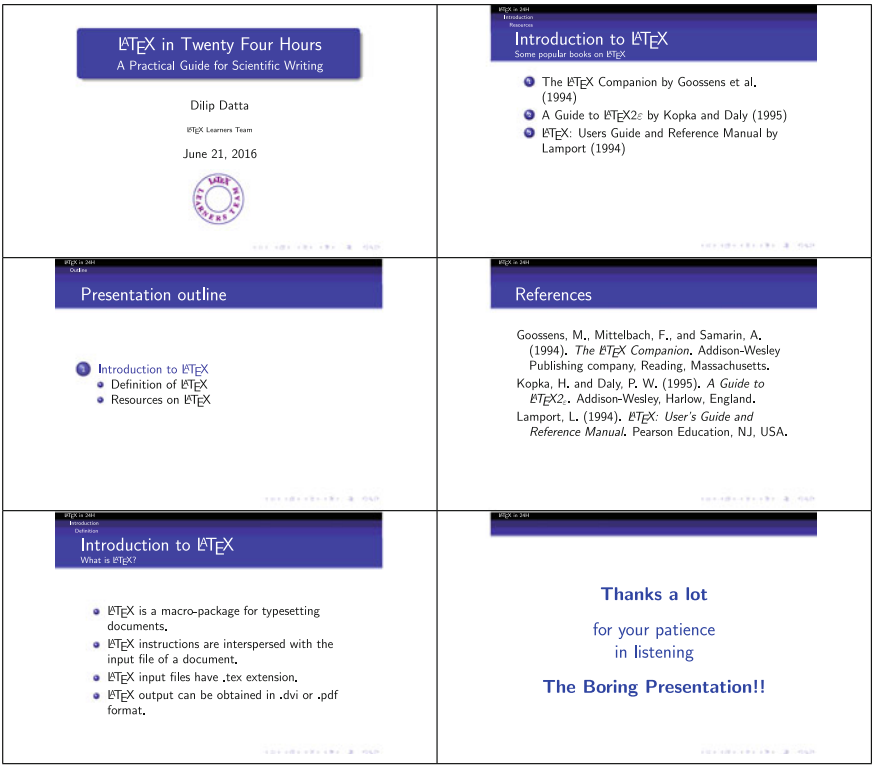
- ▷ Title page
- ▷ Table of contents
- ▷ Presentation materials
- ▷ Appendix
- ▷ Bibliography
- ▷ Thanks giving

Such a simple presentation input file consisting of six frames under the **JuanLesPins** presentation theme (§21.4 on page 209 discusses themes) is shown in Table 21.1 on the next page and its output column-wise in Table 21.2 on page 207. Just to show their applications, frames are created through both the **\frame[]{}** command and **frame** environment. The input file is started by **\documentclass{}** with the **beamer** document-class, followed by the **JuanLesPins** presentation theme loaded through **\usetheme{}**. Next, the **natbib** package is loaded through **\usepackage[]{}** with **sort** option for generating a sorted bibliographic list (Table 21.3 on page 209 discusses in detail). The other major component in the preamble is the title page related commands (refer §21.3.1 on page 207 for detail). Then the frames, containing different components of a presentation under various sectional units, are prepared in the **document** environment. The title page is generated in the very first frame. The next frame, producing the table of contents through **\tableofcontents**, is put under **\section*{}** for excluding its entry in the table of contents (§22.1.1 on page 217 discusses various options in the table of contents). Then the main contents of a presentation are inserted in intermediate frames, as shown in Table 21.1 producing frames 3 and 4 under one section and two subsections. Finally, the bibliographic reference list and thanks giving may be inserted in the ending frames. These two frames are

Table 21.1 A simple presentation input file

```
\documentclass{beamer}
\usetheme{JuanLesPins}
\usepackage[sort]{natbib}
% Components of the title page
\title[\LaTeX\ in 24H]{\LaTeX\ in Twenty Four Hours}
\subtitle{A Practical Guide for Scientific Writing}
\author[D. Datta]{Dilip Datta}
\institute[\LaTeX-LT]{\LaTeX\ Learners Team}
\date[L24H :: 21-06-2016]{June 21, 2016}
\titlegraphic{\includegraphics[width=20mm]{logo_LA}}
%
\begin{document}
% Frame 1
\frame[plain]{\titlepage}
% Frame 2
\section*{Outline}
\frame[t]{ \frametitle{Presentation outline} \tableofcontents }
% Frames 3 and 4
\section[Introduction]{Introduction to \LaTeX}
\subsection[Definition]{Definition of \LaTeX}
\frame[t]
{   \frametitle{Introduction to \LaTeX} \framesubtitle{What is \LaTeX?}
    \begin{itemize}
    \item \LaTeX\ is a macro-package for typesetting documents.
    \item \LaTeX\ instructions are interspersed with ...
    \item \LaTeX\ input files have .tex extension.
    \item \LaTeX\ output can be obtained in .dvi or .pdf format.
    \end{itemize}
}
\subsection[Resources]{Resources on \LaTeX}
\begin{frame}[t]
  \frametitle{Introduction to \LaTeX} \framesubtitle{Some popular books on \LaTeX}
  \begin{enumerate}
  \item The \LaTeX\ Companion by \citet{Goossens-etal-1994}
  \item A Guide to \LaTeX2$_\varepsilon$ by \citet{Kopka-Daly1997}
  \item \LaTeX: User's Guide and Reference Manual by \citet{Lamport-1994}
  \end{enumerate}
\end{frame}
% Frame 5
\section*{}
\begin{frame}[t]
  \frametitle{References}
  \bibliographystyle{apalike} \bibliography{lswbib}
\end{frame}
% Frame 6
\section*{}
\begin{frame}
  \begin{center}
  \Large{\bf\textcolor{blue}{Thanks a lot}}\\[5mm] ... \end{center}
\end{frame}
\end{document}
```

Table 21.2 Slides under the **JuanLesPins** presentation theme for input file of Table 21.1



prepared under **\section*{}** without any argument so as to skip their entry in the table of contents as well as in headline/footline and sidebars (without **\section*{}**, these frames may be shown wrongly under the previous sectional unit).

Note that the input file shown in Table 21.1 will be used, inserting additional sections and frames with required changes, in all examples of this Hour as well as those in Hour 22.

21.3.1 Title Page

The title page of a presentation is produced through the **\titlepage** command. In order to produce the title page in a frame, **\titlepage** is to be put in the **frame** environment, or in **\frame[][]{}** as shown in Table 21.1 as Frame 1. The **plain** option is used here for omitting headline/footline and sidebars in the frame (§21.5.5 on page 215 discusses in detail).

The title page generally contains sequentially a title, a subtitle, list of authors (or presenters), affiliations of the authors, presentation date, and a symbolic affiliation, which are generated in the preamble through the **\title[]{}**, **\subtitle{}**, **\author[]{}**, **\institute[]{}**, **\date[]{}**, and **\titlegraphic{}** commands, respectively.

1. The title of the presentation is generated as **\title[**`stitle`**]{**`ftitle`**}**, where the optional `stitle` is a short title to be used in the headline/footline (if generated) and the mandatory `ftitle` is the full title to be produced in the title page. The **** command is allowed for splitting the title in multiple lines.
2. The **\subtitle{}** command may be used for producing a second title, in a smaller size, below the main title.
3. The list of authors is produced as **\author[**`sname`**]{**`fname`**}**, where the optional `sname` is a short name to be used in the headline/footline (if generated) and the mandatory `fname` is the full list of authors to be produced in the title page. In **\author[]{}**, two authors are separated by **\and**. If authors have different affiliations, their names are to be suffixed by **\inst{}** with affiliation number in its argument, e.g., **\author[**`Datta et al.`**]{**`D. Datta`**\inst{**`1`**}\and** `P.K. Nath`**\inst{**`2`**}\and** `S. Dutta`**\inst{**`2`**}}**.
4. The affiliation of authors is generated as **\institute[**`saff`**]{**`faff`**}**, where the optional `saff` is a short affiliation for headline/footline (if produced) and the mandatory `faff` is the full affiliation for the title page. Each of multiple affiliations marked in **\author[]{}** is to be prefixed by the corresponding **\inst{}**, and two affiliations are to be separated by **\and**. If required, line break may also be obtained using ****. For example, **\institute[**`TU` **\&** `NITS`**]{\inst{**`1`**}**`Tezpur University, Tezpur`**\\ \and \inst{**`2`**}**`National Institute of Technology, Silchar`**}**.
5. The presentation date may be displayed through **\date[**`sdate`**]{**`fdate`**}**, where the optional `sdate` is a short date for headline/footline (if produced) and the mandatory `fdate` is the full date for the title page, e.g., **\date[**`20/06/16`**]{**`June 20, 2016`**}**.
6. Finally, an affiliation logo may be inserted as **\titlegraphic{**`tgraph`**}**, where `tgraph` could be a piece of plain texts or a figure insertion command as shown in Table 21.1.

21.3.2 Presentation Contents

The actual contents of a presentation generally come in intermediate frames between the frames of the title page and bibliographic reference page as discussed in §21.3.1 and §21.3.3, respectively. The presentation contents of a frame may be produced under a frame title and a frame subtitle, which are generated through the **\frametitle{}** and **\framesubtitle{}** commands. Such examples are shown in Frame 3 and Frame 4 of Table 21.1, where two frames are produced under the same frame title but different frame subtitles.

Contents of a presentation could be LaTeX supported any text except **\verb" "** command or **verbatim** environment. Since the contents of a presentation are generally presented point-wise instead of in paragraph form, the contents of a frame are usually arranged in a listing environment, such as the **enumerate**, **itemize**, and **description** environments (refer Frames 3 and 4 in Table 21.1, where the **itemize** and **enumerate** environments are used for the same).

21.3.3 Bibliographic Reference Page

The BEAMER class seeks a bibliographic reference list to be prepared in the **thebibliography** environment discussed in Hour 14. However, the BIBTEX program discussed in Hour 15 is also accepted for the same. In that case, any error or warning message, like '`\newblock undefined`', may simply be ignored.

Most of the BEAMER themes (refer §21.4 for detail) put the bibliographic reference list under the default heading `References`. If not, the same may be generated through **\frametitle{}** as the title of the corresponding frame. Further, for a long list of bibliographic references, the **allowframebreaks** option may be used in the frame for splitting it over multiple slides (§21.5.6 on page 215 discusses in detail).

21.4 Appearance of a Presentation (BEAMER Themes)

It is always desirable to make a presentation attractive as much as possible. The appearance of a presentation in the **beamer** document-class can be controlled by five types of themes, which are presentation theme, color theme, font theme, inner theme, and outer theme. A presentation theme generally controls every single detail of the appearance of a presentation. Since every presentation theme uses a default set of other four themes, normally no other theme is required to be specified if a presentation theme is chosen. In order to alter the default setting of a presentation theme, still separate color, font, inner, or outer theme may be used as per requirement or choice.

The above five types of themes are to be loaded in the preamble, respectively, as **\usetheme[**`oname`**]{**`tname`**}**, **\usecolortheme[**`oname`**]{**`tname`**}**, **\usefonttheme[**`oname`**]{**`tname`**}**, **\useinnertheme[**`oname`**]{**`tname`**}**, and **\useoutertheme[**`oname`**]{**`tname`**}**, where mandatory `tname` is the name of the chosen presentation/color/font/inner/outer theme and optional `oname` is an option to `tname`. Combining all the five types into a single one, a theme can also be loaded as a package as **\usepackage{beamertheme**`tname`**}** by appending the fixed word **beamertheme** with `tname`, e.g., **\usepackage{beamerthemedefault}** for loading the **default** theme, or **\usepackage{beamerthemeBerkeley}** for loading the **Berkeley** theme.

21.4.1 Presentation Theme

Various types of available presentation themes are listed in Table 21.3 on the following page. Effects of some of these presentation themes can be noticed in different examples as follows: **JuanLesPins** in Table 21.2, **Frankfurt** in Table 22.3, **Hannover** in Table 22.7, **Berlin** in Table 22.8, **Warsaw** in Table 22.9, **Madrid** in Table 22.11, **Singapore** in Table 22.12, and **Boadilla** in Table 22.14.

Navigational bars appearing under different presentation themes may occupy a large amount of space of a frame, like in displaying sectional units in different lines. If space is crucial, the **compress** option may be used in **\documentclass[]{beamer}** for making navigation bars globally as small as possible, and also to compress sectional units in one line.

Table 21.3 Various types of presentation themes under the BEAMER package

Type	Theme	Function
Without navigation bars	**default**	It is a sober theme that uses minimal color or font variations.
	boxes	Height of headline/footline boxes can be controlled through the options **headheight** and **footheight**, e.g., **headheight=**`10`**pt**.
	Bergen	It is based on **inmargin** and **rectangles** inner themes (refer Table 21.6).
	Boadilla	Gives a lot of information in a little space. The **secheader** option may be used for showing the current section and subsection in headline.
	Madrid	Similar to the **Boadilla** theme, except the use of stronger colors. It also support the option of the **Boadilla** theme.
	AnnArbor	Similar to the **Boadilla** theme, but uses colors of the University of Michigan.
	CambridgeUS	Similar to the **Boadilla** theme, but uses colors of MIT.
	EastLansing	Similar to the **Boadilla** theme, but uses colors of Michigan State University.
	Pittsburgh	A sober theme with right-flushed frame titles.
	Rochester	A dominant theme. The height of the frame title bar can be controlled through the **height** option, e.g., **height=**`10`**mm**.
With a tree like navigation bar	**Antibes**	Navigation bars are shown at the top in separate rectangular elements.
	JuanLesPins	Similar to the **Antibes** theme, but has a much smoother appearance.
	Montpellier	A sober theme giving basic navigational hints.
With a table of contents sidebar	**Berkeley**	A sidebar shows the table of contents with the current entry highlighted. Available options to the theme include **hideallsubsections** for suppressing all subsections in the sidebar, **hideothersubsections** for suppressing all subsections other than those of the current section, **right** for putting the sidebar on the right side (the default is **left**), and **width** for setting the width of the sidebar, e.g., **width=**`20`**mm** (**width=**`0`**mm** eliminates the sidebar).
	PaloAlto	Similar to the **Berkeley** theme with the same options applicable here also.
	Goettingen	A full table of contents is shown in a sidebar, and the options of the **Berkeley** theme are applicable here also.
	Marburg	Similar to the **Goettingen** theme with the same options applicable here also.
	Hannover	A sidebar is shown on the left side, and the frame title is right-flushed. The options **hideallsubsections**, **hideothersubsections** and **width**, as mentioned in the case of the **Berkeley** theme, are applicable here also.
With a mini frame navigation	**Berlin**	The headline and footline show a lot of information. The **compress** option may also be used to display the information of the headline in a single line.
	Ilmenau	Similar to the **Berlin** theme with the same options applicable here also.
	Dresden	Similar to the **Berlin** theme with the same options applicable here also.
	Darmstadt	There is a strong separation between the navigational upper part and the informational main part.
	Frankfurt	A variation of the **Darmstadt** theme, which is slightly less cluttered by leaving out the subsectional information.
	Singapore	The navigation is not so dominating one.
	Szeged	A sober theme with a strong dominance by horizontal lines.
With section and subsection tables	**Copenhagen**	Shows compressed information about the current section and subsection at the top, and about the title and author at the bottom.
	Luebeck	A variation of the **Copenhagen** theme.
	Malmoe	A more sober variation of the **Copenhagen** theme.
	Warsaw	A dominant variation of the **Copenhagen** theme.

*21.4.2 Color Theme**

The appearance of a presentation can be drastically changed using different color themes, which are listed in Table 21.4 on the next page. An outer color theme is used to change the colors of elements in outer themes (§21.4.5 on page 213 discusses outer

Table 21.4 Various color themes under the BEAMER package

Type	Theme	Function
Default and special-purpose color	**default**	Uses a little special colors and even less backgrounds.
	sidebartab	Changes colors in sidebars in a way that the current entry in the table of contents is highlighted by a different background.
	structure	Offers a convenient way of changing the color of the foreground structure. Various options available to the theme include **rgb=**{r,g,b} with r, g and b as the decimal values of red, green and blue between 0 and 1, e.g., **rgb=**{0.5,0.2,1}; **RGB=**{r,g,b} same with **rgb**, except the numbers ranging between 0 and 255, e.g., **RGB=**{120,0,70}; **cmyk=**{c,m,y,k} with c, m, y and k as the values of cyan, magenta, yellow and black between 0 and 1, e.g., **cmyk=**{1,0,0.3,0.5}; **cmy=**{c,m,y} same with **cmyk** without any black component; **hsb=**{h,s,b} with h, s and b as the values of hue, saturation and brightness between 0 and 1, e.g., **hsb=**{0.2,1,0.5}; and **named=**{cname} with cname as the name of a predefined color.
Complete color	**albatross**	Uses yellow on blue as the main colors, and also a slightly darker background for blocks (this background can be removed by additionally loading the **lily** color theme). The **overlystylish** option may be used to this theme for obtaining a background canvas.
	beetle	Uses white and black texts on gray background (white text is used for special emphasis and black text for normal cases). The outer stuff, like the headline/footline, however, uses a bluish color.
	crane	Uses the colors of Lufthansa, whose logo is a crane.
	dove	It is nearly black and white, which uses grayscale in certain unavoidable cases, but never a color. It also produces alerted texts in boldface fonts.
	fly	It is similar to the **beetle** theme, and uses white/black/gray throughout.
	monarca	It is based on the colors of the Monarch butterfly.
	seagull	Extensively uses different shades of gray color.
	wolverine	It is based on the colors of the University of Michigan's mascot, a wolverine.
	beaver	It is based on the colors of MIT's mascot, a beaver.
	spruce	It is based on the colors of the Michigan State University.
Inner color	**lily**	It is used mainly to restore the default colors by removing block colors setup by another theme, i.e., it removes all background colors of blocks.
	orchid	Uses white-on-dark block titles, red background for alerted blocks, and green background for example blocks.
	rose	Uses nearly transparent backgrounds for both block titles and block bodies.
Outer color	**whale**	Uses white-on-dark palettes for headline, footline, and sidebar.
	seahorse	Uses near-transparent backgrounds for headline, footline, and sidebar.
	dolphin	Its effect lies somewhere in between the **whale** and **seahorse** themes.

themes), such as headline, footline, and sidebar. On the other hand, an inner color theme specifies the colors of elements in inner themes (§21.4.4 on the next page discusses inner themes), specifically the colors used for blocks. If a color theme is used to change the default inner colors of a presentation theme or another color theme, it should be loaded after the other theme.

21.4.3 Font Theme*

The **beamer** document-class contains a set of font themes, which can be used to change certain font attributes. Such available themes are listed in Table 21.5.

Table 21.5 Various font themes under the BEAMER package

Theme	Function
default	Uses sans serif fonts for all texts of the presentation.
serif	Uses default serif fonts for all texts of the presentation. Some options may also be used, such as **stillsansserifmath** along with the **stillsansseriftext** option for producing mathematical texts in sans serif fonts; **stillsansserifsmall** for producing "small" texts in sans serif fonts, particularly the texts in headline, footline and sidebars; **stillsansseriflarge** for "large" texts in sans serif fonts, like the presentation or frame title; **stillsansseriftext** for normal texts in sans serif fonts; and **onlymath** for mathematical texts in serif fonts.
structurebold	Titles and texts in headline, footline and sidebars are produced in boldface fonts. The options that may be used in this theme are **onlysmall** for producing "small" texts in headline, footline and sidebars (but not titles) in boldface fonts; and **onlylarge** for producing "large" texts in boldface fonts, particularly in the main title, frame titles, and section entries in the table of contents.
structureitalicserif	Similar to the **structurebold** font theme, except texts are produced by serif fonts in boldface and italics modes. The options of the **structurebold** theme are supported by this theme also.
structuresmallcapsserif	Similar to the **structurebold** font theme, excepts texts are produced by serif fonts in small caps mode. The options of the **structurebold** theme are supported by this theme also.

21.4.4 Inner Theme*

An inner theme controls the appearance of the elements occurring inside the main texts of a frame, such as the title, listing/theorem/proof environments, figures, tables, foot notes, and bibliography entries. Various available inner themes are listed in Table 21.6.

Table 21.6 Various inner themes under the BEAMER package

Theme	Function
default	An item in the **itemize** environment start with a little triangle.
circles	An item in the **itemize** and **enumerate** environments, as well as an entry in the table of contents starts with a small circle.
rectangles	An item in the **itemize** and **enumerate** environments, as well as an entry in the table of contents starts with a small rectangle.
rounded	An item in the **itemize** and **enumerate** environments, as well as an entry in the table of contents starts with a small ball. The **shadow** option may be used to add a shadow to all the blocks.
inmargin	A block title or item marking is shown on the left side and its body on the right side.

*21.4.5 Outer Theme**

An outer theme controls the appearance of the elements occurring around the main texts of a frame, such as the headline, footline, sidebar, logo, and frame title. In other words, an outer theme controls roughly the overall layout of a frame. Various available outer themes are listed in Table 21.7.

Table 21.7 Various outer themes under the BEAMER package

Theme	Function
default	There is no headline/footline, and the frame title is left flushed.
infolines	Headline shows the current section and subsection, while footline shows the author, institution, presentation title, date, and frame count.
miniframes	Headline shows a navigational bar containing sections, and below every section a small clickable circle against each frame of the section or its subsections. Just below the navigation bar, the title of the current subsection is displayed, which can also be suppressed using the option **subsection=false**. Further, a footline can also be produced with the option **footline=**`fval`, where `fval` could be **authorinstitute** to show author and institute, **authortitle** to show author and title, **institutetitle** to show institute and title, and **authorinstitutetitle** to show author, institute and title.
smoothbars	Headline is similar with that under the **miniframes** theme. Showing the subsections in the headline can be suppressed with the option **subsection=false**. Further, footlines of the **miniframes** theme can be obtained by additionally loading this theme also.
sidebar	A sidebar is shown containing a small table of contents with the current section or subsection highlighted, and the frame title is vertically centered occupying the same amount of space in all frames. Options that can be used include **height=**`hdim` with `hdim` specifying the height of the space for the frame title (**height=**`0`**pt** will instruct to occupy only the required space), **hideothersubsections** to cause all subsections except those of the current section to be suppressed in the table of contents, **hideallsubsections** to suppress all subsections in the table of contents, **right** to put the sidebar on the right side (default is **left**), and **width=**`wdim` with `wdim` specifying the width of the sidebar (**width=**`0`**pt** suppresses it completely).
split	Sections are shown on the left side of the headline, while subsections of the current section on its right side. The footline shows the author on the left side and the presentation title on the right side.
shadow	Extends the **split** theme by putting a horizontal shading behind the frame title and adding a little shadow at the bottom of the headline.
tree	Headline shows a navigational tree containing the presentation title, current section, and current subsection in three different lines. The option **hooks** may be used to draw little hooks in front of section and subsection entries.
smoothtree	Similar to the **tree** theme, except background colors changing smoothly.

21.5 Frame Customization*

The frames of a presentation can be customized in different ways, such as the logo position, font type, global and local frame sizes, etc.

21.5.1 Logo in Frames

A logo is produced in the title page through **\titlegraphic{}** as stated in §21.3.1 on page 207, or globally in all the frames through **\logo{}** as stated in §21.1 on page 203. The position of the logo in the frames, inserted through **\logo{}**, is determined by the chosen theme discussed in §21.4 on page 209.

If the logo produced by **\logo{}** is unsatisfactory, the same can also be produced indirectly as the optional argument of one of the title page generating commands (refer §21.3.1 for detail), e.g., **\institute[**`TU`**\quad \epsfig{file=**`logo_tu.eps`**,width=**`10`**mm}]{}** for producing a graphical logo in the footline along with the institutional name. Note at this juncture that a command with an optional argument cannot be used in an optional argument of another command[2], e.g., in the above case the graphical logo cannot be produced in **[]** of **\institute[]{}** through **\includegraphics[]{}** command specifying the size of the figure in **[]** of **\includegraphics[]{}**.

21.5.2 Font Type

Even if a font theme is used as discussed in §21.4.3 on page 212, some font-related changes may still require some document-class specific options or special packages.

In regard to font size, its default value in the BEAMER class is 11 pt. If required, either a smaller font size may be opted in **\documentclass[]{beamer}** to accommodate more texts on each slide, or a larger font size to fill up the slides. Various font sizes defined in the BEAMER class are **8pt**, **9pt**, **10pt**, **smaller**, **11pt** (default), **12pt**, **bigger**, **14pt**, **17pt**, and **20pt** (some of these font sizes may require to load the **extsizes** package).

In regard to font family, by default the BEAMER class uses the Computer Modern fonts. This can be altered by loading appropriate package in the preamble, e.g., the **mathptmx** package for the Times font family, or the **helvet** package for the Helvetica font family.

21.5.3 Frame Size

The default size of a BEAMER frame is 128 mm×96 mm, whose aspect ratio is 4:3. This default size can be altered through the **aspectratio** option to **\documentclass[]{}** as **\documentclass[\aspectratio=**`arval`**]{beamer}**, where `arval` is the chosen value of the aspect ratio. The available values of `arval` are listed in Table 21.8 on the next page.

[2] A command with an optional argument cannot be used in an optional argument of another command.

Table 21.8 Available frame sizes in the BEAMER package

Value of aspectratio	Aspect ratio	Frame size
1610	16:10	160 mm × 100 mm
169	16:9	160 mm × 90 mm
149	14:9	140 mm × 90 mm
141	1.41:1	148.5 mm × 105 mm
54	5:4	125 mm × 100 mm
43	4:3	128 mm × 96 mm (default)
32	3:2	135 mm × 90 mm

21.5.4 Frame Shrinking

Even after adjusting frame size globally as discussed in §21.5.3, if any frame still fails marginally to display its entire contents, either the **squeeze** or **shrink** option may be used for shrinking a frame locally by a small amount.

The **squeeze** option reduces the vertical space between the enumerated and itemized items (i.e., **\item** in the **enumerate** and **itemize** environments) to zero. On the other hand, the **shrink** option shrinks the texts of a frame by the specified percentage. For example, a frame may be created as **\frame[squeeze]{}** or **\begin{frame}[squeeze]** for eliminating vertical space between enumerated and itemized items, or as **\frame[shrink=5]{}** or **\begin{frame}[shrink=5]** for shrinking all texts of the frame by 5%.

21.5.5 Removal of Headline/Footline and Sidebar

Headlines/footlines and sidebars are provided in slides for various reasons, such as displaying the status of a talk at any point of time, information about the presentation or author, containing navigational bars with clickable links to other frames, etc. However, they usually occupy a considerable amount of space of a slide, thus making it difficult in some cases to present a big piece of information, like a figure or a table, which can neither be accommodated in a single slide nor can be split over slides. As stated in §21.4.1, although the **compress** option in **\documentclass[]{beamer}** can reduce the space occupied by navigation bars in headline/footline and sidebar, it cannot remove them. Moreover, it is a global option to act on all the frames. Hence, in order to create a bigger space locally in a frame, its headline/footline or sidebar can be removed completely using the **plain** option in the frame. For example, a frame created as **\frame[plain]{}** or **\begin{frame}[plain]** will completely omit the headline/footline and sidebar of the frame, even if any theme (refer §21.4 for theme) is used with global effect for creating headline/footline and sidebar.

21.5.6 Frame Breaking

There may be cases where the entire contents of a frame cannot be displayed on a single slide (i.e., only a portion is displayed by truncating the remaining), even after changing the frame size, or shrinking a frame or removing its headline/footline and sidebar as discussed in §21.5.3–§21.5.5, respectively. Moreover, it also may not be very clear where to manually split such contents for putting in multiple frames, such as listed items, bibliographic list, or long equation array.

In above cases, the **allowframebreaks** option may be used in the frame (i.e., as **\frame[allowframebreaks]{}** or **\begin{frame}[allowframebreaks]**), which instructs to display the entire textual contents of a frame by allowing to break it into multiple slides, if required. In that case, the slides will be numbered by appending the frame title as `I`, `II`,…, e.g., `Advantages I`, `Advantages II`, etc. Further, the **allowdisplaybreaks** option (i.e., as **\frame[allowframebreaks, allowdisplaybreaks]{}** or **\begin{frame}[allowframebreaks, allowdisplaybreaks]**) may also be used if a long array of equations is to be split over multiple slides.