Standard Document Classes for \LaTeX\ version 2e

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Johannes Braams \LaTeX3 Project Team

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1 The docstrip modules

The following modules are used in the implementation to direct docstrip in generating the external files:

- \texttt{article} produce the documentclass article
- \texttt{report} produce the documentclass report
- \texttt{size10} produce the class option for 10pt
- \texttt{size11} produce the class option for 11pt
- \texttt{size12} produce the class option for 12pt
- \texttt{book} produce the documentclass book
- \texttt{bk10} produce the book class option for 10pt
- \texttt{bk11} produce the book class option for 11pt
- \texttt{bk12} produce the book class option for 12pt
- \texttt{driver} produce a documentation driver file

2 Initial Code

In this part we define a few commands that are used later on.

\texttt{\@ptsize} This control sequence is used to store the second digit of the pointsize we are typesetting in. So, normally, it’s value is one of 0, 1 or 2.

\texttt{\if@restonecol} When the document has to be printed in two columns, we sometimes have to temporarily switch to one column. This switch is used to remember to switch back.

\texttt{\if@titlepage} A switch to indicate if a titlepage has to be produced. For the article document class the default is not to make a separate titlepage.

\texttt{\if@openright} A switch to indicate if chapters must start on a right-hand page. The default for the report class is no; for the book class it’s yes.

\texttt{\if@mainmatter} The switch \texttt{\if@mainmatter}, only available in the document class book, indicates whether we are processing the main material in the book.
3 Declaration of Options

3.1 Setting Paper Sizes

The variables \texttt{\paperwidth} and \texttt{\paperheight} should reflect the physical paper size after trimming. For desk printer output this is usually the real paper size since there is no post-processing. Classes for real book production will probably add other paper sizes and additionally the production of crop marks for trimming. In compatibility mode, these (and some of the subsequent) options are disabled, as they were not present in \LaTeXe2.09.

\begin{verbatim}
9 \if@compatibility\else
10 \DeclareOption{a4paper}
11 {\setlength\paperheight {297mm}\
12 \setlength\paperwidth {210mm}}
13 \DeclareOption{a5paper}
14 {\setlength\paperheight {210mm}\
15 \setlength\paperwidth {148mm}}
16 \DeclareOption{b5paper}
17 {\setlength\paperheight {250mm}\
18 \setlength\paperwidth {176mm}}
19 \DeclareOption{letterpaper}
20 {\setlength\paperheight {11in}\
21 \setlength\paperwidth {8.5in}}
22 \DeclareOption{legalpaper}
23 {\setlength\paperheight {14in}\
24 \setlength\paperwidth {8.5in}}
25 \DeclareOption{executivepaper}
26 {\setlength\paperheight {10.5in}\
27 \setlength\paperwidth {7.25in}}
28 \fi

29 \if@compatibility
30 \renewcommand\@ptsize{0}
31 \else
32 \DeclareOption{10pt}{\renewcommand\@ptsize{0}}
33 \fi
34 \DeclareOption{11pt}{\renewcommand\@ptsize{1}}
35 \DeclareOption{12pt}{\renewcommand\@ptsize{2}}
\end{verbatim}

The option \texttt{landscape} switches the values of \texttt{\paperheight} and \texttt{\paperwidth}, assuming the dimensions were given for portrait paper.

\begin{verbatim}
28 \DeclareOption{landscape}
29 {\setlength\@tempdima {\paperheight}\
30 \setlength\paperheight {\paperwidth}\
31 \setlength\paperwidth {\@tempdima}}
\fi
\end{verbatim}

3.2 Choosing the type size

The type size options are handled by defining \texttt{\@ptsize} to contain the last digit of the size in question and branching on \texttt{if case} statements. This is done for historical reasons to stay compatible with other packages that use the \texttt{\@ptsize} variable to select special actions. It makes the declarations of size options less than 10pt difficult, although one can probably use 9 and 8 assuming that a class wont define both 8pt and 10pt options.

\begin{verbatim}
33 \if@compatibility
34 \renewcommand\@ptsize{0}
35 \else
36 \DeclareOption{10pt}{\renewcommand\@ptsize{0}}
37 \fi
38 \DeclareOption{11pt}{\renewcommand\@ptsize{1}}
39 \DeclareOption{12pt}{\renewcommand\@ptsize{2}}
\end{verbatim}
3.3 Two-side or one-side printing
For two-sided printing we use the switch \if@twoside. In addition we have to set the \if@mparswitch to get any margin paragraphs into the outside margin.
\begin{verbatim}
40 \if@compatibility \else
41 \DeclareOption{oneside}{\@twosidefalse \@mparswitchfalse}
42 \fi
43 \DeclareOption{twoside}{\@twosidetrue \@mparswitchtrue}
\end{verbatim}

3.4 Draft option
If the user requests draft we show any overfull boxes. We could probably add some more interesting stuff to this option.
\begin{verbatim}
44 \DeclareOption{draft}{\setlength\overfullrule{5pt}}
45 \if@compatibility \else
46 \DeclareOption{final}{\setlength\overfullrule{0pt}}
47 \fi
\end{verbatim}

3.5 Titlepage option
An article usually has no separate titlepage, but the user can request one.
\begin{verbatim}
48 \DeclareOption{titlepage}{\@titlepagetrue}
49 \if@compatibility \else
50 \DeclareOption{notitlepage}{\@titlepagefalse}
51 \fi
\end{verbatim}

3.6 openright option
This option determines whether or not a chapter must start on a right-hand page request one.
\begin{verbatim}
52 \if\package{article} \if@compatibility \else
53 \package{book} \@openrighttrue
54 \package{article} \else
55 \package{article} \DeclareOption{openright}{\@openrighttrue}
56 \package{article} \DeclareOption{openany}{\@openrightfalse}
57 \package{article} \fi
\end{verbatim}

3.7 Twocolumn printing
Two-column and one-column printing is again realized via a switch.
\begin{verbatim}
58 \if@compatibility \else
59 \DeclareOption{onecolumn}{\@twocolumnfalse}
60 \fi
61 \DeclareOption{twocolumn}{\@twocolumntrue}
\end{verbatim}

3.8 Equation numbering on the left
The option leqno can be used to get the equation numbers on the left side of the equation. It loads code which is generated automatically from the kernel files when the format is built. If the equation number does get a special formatting
then instead of using the kernel file the class would need to provide the code explicitly.

\DeclareOption{leqno}{\input{leqno.clo}}

3.9 Flush left displays

The option fleqn redefines the displayed math environments in such a way that they come out flush left, with an indentation of \mathindent from the prevailing left margin. It loads code which is generated automatically from the kernel files when the format is built.

\DeclareOption{fleqn}{\input{fleqn.clo}}

3.10 Open bibliography

The option openbib produces the “open” bibliography style, in which each block starts on a new line, and succeeding lines in a block are indented by \bibindent.

\DeclareOption{openbib}{First some hook into the bibliography environment is filled.

\AtEndOfPackage{\renewcommand\@openbib@code{\advance\leftmargin\bibindent\itemindent-\bibindent\listparindent\itemindent\parsep\z@}}%}

In addition the definition of \newblock is overwritten.

\renewcommand\newblock{\par}}%}

4 Executing Options

Here we execute the default options to initialize certain variables. Note that the document class ‘book’ always uses two sided printing.

\ExecuteOptions{letterpaper,10pt,oneside,onecolumn,final}\ExecuteOptions{letterpaper,10pt,oneside,onecolumn,final,openany}\ExecuteOptions{letterpaper,10pt,twoside,onecolumn,final,openright}

The \ProcessOptions command causes the execution of the code for every option FOO which is declared and for which the user typed the FOO option in his \documentclass command. For every option BAR he typed, which is not declared, the option is assumed to be a global option. All options will be passed as document options to any \usepackage command in the document preamble.

\ProcessOptions
Now that all the options have been executed we can load the chosen class option file that contains all size dependent code.

\input{size1@ptsize.clo}
\input{bk1@ptsize.clo}

5 Loading Packages
The standard class files do not load additional packages.

6 Document Layout
In this section we are finally dealing with the nasty typographical details.

6.1 Fonts
\LaTeX{} offers the user commands to change the size of the font, relative to the ‘main’ size. Each relative size changing command \texttt{\textbackslash size} executes the command \texttt{\@setfontsize\texttt{size}\langle font-size\rangle\langle baselineskip\rangle} where:

\texttt{\langle font-size\rangle} The absolute size of the font to use from now on.

\texttt{\langle baselineskip\rangle} The normal value of \texttt{\baselineskip} for the size of the font selected. (The actual value will be \texttt{\baselinestretch} \ast \langle baselineskip\rangle.)

A number of commands, defined in the \LaTeX{} kernel, shorten the following definitions and are used throughout. They are:

\begin{verbatim}
\@vpt 5 \@vipt 6 \@viipt 7
\@viiipt 8 \@ixpt 9 \@xpt 10
\@xipt 10.95 \@xiipt 12 \@xivpt 14.4
\end{verbatim}

\texttt{\normalsize} The user level command for the main size is \texttt{\normalsize}. Internally \LaTeX{} uses \texttt{\@normalsize} when it refers to the main size. \texttt{\@normalsize} will be defined to work like \texttt{\normalsize} if the latter is redefined from its default definition (that just issues an error message). Otherwise \texttt{\@normalsize} simply selects a 10pt/12pt size.

The \texttt{\normalsize} macro also sets new values for \texttt{\abovedisplayskip}, \texttt{\abovedisplayshortskip} and \texttt{\belowdisplayshortskip}.
The \texttt{\abovedisplayskip} is always equal to the \texttt{\belowdisplayskip}. The parameters of the first level list are always given by \texttt{\@listI}.

We initially choose the \texttt{\normalsize} font.

We use \texttt{\MakeRobust} instead of \texttt{\DeclareRobustCommand} above to avoid a log entry for the redefinition. But if we are running in a rollback situation (prior to 2015) we don’t touch it.

This is similar to \texttt{\normalsize}.
This is similar to \normalsize.

\footnotesize
\DeclareRobustCommand\footnotesize{\@setfontsize\footnotesize\@viiipt{9.5}}
\DeclareRobustCommand\scriptsize{\@setfontsize\scriptsize\@viiipt{9.5}}
\DeclareRobustCommand\tiny{\@setfontsize\tiny\@vipt\@vipt}
\DeclareRobustCommand\large{\@setfontsize\large\@xiipt{14}}
\DeclareRobustCommand\Large{\@setfontsize\Large\@xivpt{18}}
\DeclareRobustCommand\LARGE{\@setfontsize\LARGE\@xviipt{22}}
\DeclareRobustCommand\huge{\@setfontsize\huge\@xxpt{25}}
\DeclareRobustCommand\Huge{\@setfontsize\Huge\@xxvpt{30}}
\scriptsize
\footnotesize

These are all much simpler than the previous macros, they just select a new font size, but leave the parameters for displays and lists alone.
6.2 Paragraphing

These parameters control \TeX{}’s behaviour when two lines tend to come too close together.

\lineskip
\normallineskip

These are used as multipliers for \baselineskip. The default is to not stretch the baselines. Note that if this command doesn’t resolve to “empty” any plus or minus part in the specification of \baselineskip is ignored.

\baselinestretch
\parskip
\parindent

\parskip gives extra vertical space between paragraphs and \parindent is the width of the paragraph indentation. The value of \parindent depends on whether we are in two column mode.

\smallskipamount
\medskipamount
\bigskipamount

The values for these parameters are set in the \LaTeX{} kernel. They should perhaps vary, according to the size option specified. But as they have always had the same value regardless of the size option we do not change them to stay compatible with both \LaTeX{} 2.09 and older releases of \LaTeX{} 2.ε.
The commands `\nopagebreak` and `\nolinebreak` put in penalties to discourage these breaks at the point they are put in. They use `\@lowpenalty`, `\@medpenalty` or `\@highpenalty`, dependent on their argument.

These penalties are used to discourage club and widow lines. Because we use their default values we only show them here, commented out.

Discourage (but not so much) widows in front of a math display and forbid breaking directly in front of a display. Allow break after a display without a penalty. Again the default values are used, therefore we only show them here.

Allow the breaking of a page in the middle of a paragraph.

We allow the breaking of a page after a hyphenated line.

All margin dimensions are measured from a point one inch from the top and lefthand side of the page.

### 6.3 Page Layout

#### 6.3.1 Vertical spacing

The `\headheight` is the height of the box that will contain the running head. The `\headsep` is the distance between the bottom of the running head and the top of the text. The `\topskip` is the `\baselineskip` for the first line on a page; \LaTeX's output routine will not work properly if it has the value 0pt, so do not do that!
\footnotesize

\footnotesize

The distance from the baseline of the box which contains the running footer to the baseline of last line of text is controlled by the \footnotesize{\footskip}.

\footnotesize

\footnotesize

\footnotesize

\footnotesize 248 \langle \textbackslash bk \rangle \setlength\footskip{30\p@}
\footnotesize

\footnotesize 249 \langle 10pt \& bk \rangle \setlength\footskip{.35in}
\footnotesize

\footnotesize 250 \langle 11pt \& bk \rangle \setlength\footskip{.38in}
\footnotesize

\footnotesize 251 \langle 12pt \& bk \rangle \setlength\footskip{30\p@}
\footnotesize

\footnotesize \maxdepth

\footnotesize

\footnotesize \maxdepth The \TeX{} primitive register \maxdepth has a function that is similar to that of \topskip. The register \@maxdepth should always contain a copy of \maxdepth. This is achieved by setting it internally at \begin{document}. In both plain \TeX{} and \LaTeX{} 2.09 \maxdepth had a fixed value of 4pt; in native \LaTeX{}2e mode we let the value depend on the typesize. We set it so that \maxdepth + \topskip = \text{typesize} \times 1.5. As it happens, in these classes \topskip is equal to the typesize, therefore we set \maxdepth to half the value of \topskip.

\footnotesize 252 \texttt{\if@compatibility \setlength\maxdepth{4\p@} \else}
\footnotesize 253 \setlength\maxdepth{.5\topskip} \fi
\footnotesize

\footnotesize 6.3.2 The dimension of text

\footnotesize \textwidth

\footnotesize

\footnotesize \textwidth When we are in compatibility mode we have to make sure that the dimensions of the printed area are not different from what the user was used to see.

\footnotesize 254 \texttt{\if@compatibility}
\footnotesize 255 \texttt{\if@twocolumn}
\footnotesize 256 \texttt{\setlength\textwidth{410\p@}}
\footnotesize 257 \texttt{\else}
\footnotesize 258 \texttt{(10pt\&!bk) \setlength\textwidth{345\p@}}
\footnotesize 259 \texttt{(11pt\&!bk) \setlength\textwidth{360\p@}}
\footnotesize 260 \texttt{(12pt\&!bk) \setlength\textwidth{390\p@}}
\footnotesize 261 \texttt{(10pt \& bk) \setlength\textwidth{4.5in}}
\footnotesize 262 \texttt{(11pt \& bk) \setlength\textwidth{5in}}
\footnotesize 263 \texttt{(12pt \& bk) \setlength\textwidth{5in}}
\footnotesize 264 \texttt{\else}
\footnotesize 265 \texttt{\fi}
\footnotesize

\footnotesize

\footnotesize

\footnotesize When we are not in compatibility mode we can set some of the dimensions differently, taking into account the paper size for instance.

\footnotesize 266 \texttt{\else}
\footnotesize 267 \texttt{\fi}
\footnotesize

\footnotesize

\footnotesize First, we calculate the maximum \textwidth, which we will allow on the selected paper and store it in \@tempdima. Then we store the length of a line with approximately 60–70 characters in \@tempdimb. The values given are more or less suitable when Computer Modern fonts are used.

\footnotesize 268 \texttt{\setlength\@tempdima{\paperwidth}}
\footnotesize 269 \texttt{\addtolength\@tempdima{-2in}}
\footnotesize 270 \texttt{(10pt) \setlength\@tempdimb{345\p@}}
\footnotesize 271 \texttt{(11pt) \setlength\@tempdimb{360\p@}}
\footnotesize 272 \texttt{(12pt) \setlength\@tempdimb{390\p@}}
\footnotesize

\footnotesize Now we can set the \textwidth, depending on whether we will be setting one or two columns.

\footnotesize In two column mode each \texttt{column} shouldn’t be wider than \texttt{\tempdimb} (which could happen on A3 paper for instance).

\footnotesize 273 \texttt{\if@twocolumn}
\footnotesize 274 \texttt{\ifi@dim\@tempdima\texttt{2}\@tempdimb\relax}
\setlength{textwidth}{\textwidth}
\else
\setlength{textwidth}{\textwidth}
\fi

In one column mode the text should not be wider than the minimum of the
paperwidth (minus 2 inches for the margins) and the maximum length of a line as
defined by the number of characters.
\else
\ifdim\textwidth>\textwidth\relax
\setlength{textwidth}{\textwidth}
\else
\setlength{textwidth}{\textwidth}
\fi
\fi

Here we modify the width of the text a little to be a whole number of points.
\if@compatibility\else
\setlength{\textwidth}{\textwidth}
\fi
\textwidth

Now that we have computed the width of the text, we have to take care of the
height. The \textwidth is the height of text (including footnotes and figures,excluding running head and foot).

First make sure that the compatibility mode gets the same dimensions as we
had with \TeX2.09. The number of lines was calculated as the floor of the old
\textwidth minus \topskip, divided by \baselineskip for \normalsize. The
old value of \textwidth was 528pt.
\if@compatibility
\langle 10pt \&! bk \rangle \setlength{\textwidth}{43\baselineskip}
\langle 10pt \& bk \rangle \setlength{\textwidth}{41\baselineskip}
\langle 11pt \rangle \setlength{\textwidth}{38\baselineskip}
\langle 12pt \rangle \setlength{\textwidth}{36\baselineskip}
\else
\setlength{\textwidth}{\textwidth}
\fi

Again we compute this, depending on the paper size and depending on the
baselineskip that is used, in order to have a whole number of lines on the page.
\else
\setlength{\textwidth}{\textwidth}
\fi
\textwidth

We leave at least a 1 inch margin on the top and the bottom of the page.
\addtolength{\textwidth}{-2in}
\addtolength{\textwidth}{-1.5in}

Then we divide the result by the current \baselineskip and store this in the
count register \@tempcnta, which then contains the number of lines that fit
on this page.
\divide\@tempcnta{\baselineskip}
\divide\@tempcnta{\textwidth}

From this we can calculate the height of the text.
\setlength{\textwidth}{\@tempcnta\baselineskip}
\fi
\addtolength{textheight}{\topskip}

6.3.3 Margins

Most of the values of these parameters are now calculated, based on the papersize in use. In the calculations the \marginparsep needs to be taken into account so we give it its value first.

The horizontal space between the main text and marginal notes is determined by \marginparsep, the minimum vertical separation between two marginal notes is controlled by \marginparpush.

Now we can give the values for the other margin parameters. For native \LaTeX, these are calculated.

First we give the values for the compatibility mode.

Values for two-sided printing:

Values for one-sided printing:

\addtolength{textheight}{\topskip}
And values for two column mode:

\if@twocolumn
  \setlength{\oddsidemargin}{30\p@}
  \setlength{\evensidemargin}{30\p@}
  \setlength{\marginparwidth}{48\p@}
\fi

When we are not in compatibility mode we can take the dimensions of the selected paper into account.

The values for \oddsidemargin and \marginparwidth will be set depending on the status of the \if@twoside.

If \@twoside is true (which is always the case for book) we make the inner margin smaller than the outer one.

\else
\if@twoside
  \setlength{\@tempdima}{\paperwidth}
  \addtolength{\@tempdima}{-\textwidth}
  \setlength{\oddsidemargin}{.4\@tempdima}
  \addtolength{\oddsidemargin}{-1in}
  \setlength{\marginparwidth}{.6\@tempdima}
  \addtolength{\marginparwidth}{-\marginparsep}
  \addtolength{\marginparwidth}{-.4in}
\fi
\fi

The width of the margin for text is set to the remainder of the width except for a ‘real margin’ of white space of width 0.4in. A check should perhaps be built in to ensure that the (text) margin width does not get too small!

\setlength{\marginparwidth}{.6\@tempdima}
\addtolength{\marginparwidth}{-\marginparsep}
\addtolength{\marginparwidth}{-.4in}

For one-sided printing we center the text on the page, by calculating the difference between \textwidth and \paperwidth. Half of that difference is than used for the margin (thus \oddsidemargin is 1in less).

\else
\setlength{\@tempdima}{\paperwidth}
\addtolength{\@tempdima}{-\textwidth}
\setlength{\oddsidemargin}{.5\@tempdima}
\addtolength{\oddsidemargin}{-1in}
\setlength{\marginparwidth}{.5\@tempdima}
\addtolength{\marginparwidth}{-\marginparsep}
\addtolength{\marginparwidth}{-.4in}
\addtolength{\marginparwidth}{-.4in}
\fi

With the above algorithm the \marginparwidth can come out quite large which we may not want.
Having done these calculations we make them pt values.
\ifdim \marginparwidth >2in
\setlength\marginparwidth{2in}
\fi
The \texttt{\evensidemargin} can now be computed from the values set above.
\setlength\evensidemargin {\paperwidth}
\addtolength\evensidemargin{-2in}
\addtolength\evensidemargin{-\textwidth}
\addtolength\evensidemargin{-\oddsidemargin}
Setting \texttt{\evensidemargin} to a full point value may produce a small error. However it will lie within the error range a doublesided printer of today's technology can accurately print.
\@settopoint\evensidemargin
\fi
\topmargin The \texttt{\topmargin} is the distance between the top of 'the printable area'—which is 1 inch below the top of the paper—and the top of the box which contains the running head.
It can now be computed from the values set above.
\if@compatibility
\langle !bk \rangle \setlength\topmargin{27pt}
\langle 10pt & bk \rangle \setlength\topmargin{.75in}
\langle 11pt & bk \rangle \setlength\topmargin{.73in}
\langle 12pt & bk \rangle \setlength\topmargin{.73in}
\else
\setlength\topmargin{\paperheight}
\addtolength\topmargin{-2in}
\addtolength\topmargin{-\headheight}
\addtolength\topmargin{-\headsep}
\addtolength\topmargin{-\textheight}
\addtolength\topmargin{-\footskip} % this might be wrong!
By changing the factor in the next line the complete page can be shifted vertically.
\addtolength\topmargin{-\topmargin}
\@settopoint\topmargin
\fi

6.3.4 Footnotes
\texttt{\footnotesep} is the height of the strut placed at the beginning of every footnote. It equals the height of a normal \texttt{\footnotesize} strut in this class, thus no extra space occurs between footnotes.
\setlength{\footnotesep}{6.65\p@}
\setlength{\footnotesep}{7.7\p@}
\setlength{\footnotesep}{8.4\p@}
\texttt{\footins} is the space between the last line of the main text and the top of the first footnote.
\setlength{\footins}{9\p@ \@plus 4\p@ \@minus 2\p@}
6.3.5 Float placement parameters

All float parameters are given default values in the \texttt{latex2e} kernel. For this reason parameters that are not counters need to be set with \texttt{renewcommand}.

Limits for the placement of floating objects

- \texttt{\c@topnumber} The \texttt{topnumber} counter holds the maximum number of floats that can appear on the top of a text page.
- \texttt{\topfraction} This indicates the maximum part of a text page that can be occupied by floats at the top.
- \texttt{\c@bottomnumber} The \texttt{bottomnumber} counter holds the maximum number of floats that can appear on the bottom of a text page.
- \texttt{\bottomfraction} This indicates the maximum part of a text page that can be occupied by floats at the bottom.
- \texttt{\c@totalnumber} This indicates the maximum number of floats that can appear on any text page.
- \texttt{\textfraction} This indicates the minimum part of a text page that has to be occupied by text.
- \texttt{\floatpagefraction} This indicates the minimum part of a page that has to be occupied by floating objects before a ‘float page’ is produced.
- \texttt{\c@dbltopnumber} The \texttt{dbltopnumber} counter holds the maximum number of two column floats that can appear on the top of a two column text page.
- \texttt{\dbltopfraction} This indicates the maximum part of a two column text page that can be occupied by two column floats at the top.
- \texttt{\dblfloatpagefraction} This indicates the minimum part of a page that has to be occupied by two column wide floating objects before a ‘float page’ is produced.
Floats on a text page

\floatsep When a floating object is placed on a page with text, these parameters control the separation between the float and the other objects on the page. These parameters are used for both one-column mode and single-column floats in two-column mode.
\textfloatsep is the space between adjacent floats that are moved to the top or bottom of the text page.
\intextsep is the space between in-text floats and the text.

\setlength\floatsep{12\p@ \plus 2\p@ \minus 2\p@}
\setlength\textfloatsep{20\p@ \plus 2\p@ \minus 4\p@}
\setlength\intextsep{12\p@ \plus 2\p@ \minus 2\p@}

\dblfloatsep When floating objects that span the whole \textwidth are placed on a text page when we are in twocolumn mode the separation between the float and the text is controlled by \dblfloatsep and \dbltextfloatsep.
\dblfloatsep is the space between adjacent floats that are moved to the top or bottom of the text page.
\dbltextfloatsep is the space between the main text and floats at the top or bottom of the page.

\setlength\dblfloatsep{12\p@ \plus 2\p@ \minus 2\p@}
\setlength\dbltextfloatsep{20\p@ \plus 2\p@ \minus 4\p@}

\fptop When floating objects are placed on separate pages the layout of such pages is controlled by these parameters. At the top of the page \fptop amount of stretchable whitespace is inserted, at the bottom of the page we get an \fpbot amount of stretchable whitespace. Between adjacent floats the \fffsep is inserted.
These parameters are used for the placement of floating objects in one column mode, or in single column floats in two column mode.

Note that at least one of the two parameters `@fptop` and `@fpbot` should contain a plus `.fil` to allow filling the remaining empty space.

\begin{verbatim}
\setlength{@fptop}{0\p@ \@plus 1fil}
\setlength{@fpsep}{8\p@ \@plus 2fil}
\setlength{@fpbot}{0\p@ \@plus 1fil}
\end{verbatim}

Double column floats in two column mode are handled with similar parameters.

\begin{verbatim}
\setlength{@dblftop}{0\p@ \@plus 1fil}
\setlength{@dblfpsep}{8\p@ \@plus 2fil}
\setlength{@dblfpbot}{0\p@ \@plus 1fil}
\end{verbatim}

6.4 Page Styles

The page style `foo` is defined by defining the command `\ps@foo`. This command should make only local definitions. There should be no stray spaces in the definition, since they could lead to mysterious extra spaces in the output (well, that’s something that should be always avoided).

The `\ps@...` command defines the macros `@oddhead`, `@oddfoot`, `@evenhead`, and `@evenfoot` to define the running heads and feet—e.g., `@oddhead` is the macro to produce the contents of the heading box for odd-numbered pages. It is called inside an `\hbox` of width `\textwidth`. 

\begin{verbatim}
\@evenhead
\@oddhead
\@evenfoot
\@oddfoot
\end{verbatim}
6.4.1 Marking conventions

To make headings determined by the sectioning commands, the page style defines the commands \chaptermark, \sectionmark, ..., where \chaptermark{⟨TEXT⟩} is called by \chapter to set a mark, and so on.

The \...mark commands and the \...head macros are defined with the help of the following macros. (All the \...mark commands should be initialized to no-ops.)

If \LaTeX\ extends \TeX\’s \mark facility by producing two kinds of marks, a ‘left’ and a ‘right’ mark, using the following commands:

```
\markboth{⟨LEFT⟩}{⟨RIGHT⟩}: Adds both marks.
\markright{⟨RIGHT⟩}: Adds a ‘right’ mark.
\leftmark: Used in the \@oddhead, \@oddfoot, \@evenhead or \@evenfoot macros, it gets the current ‘left’ mark. \leftmark works like \TeX\’s \botmark command.
\rightmark: Used in the \@oddhead, \@oddfoot, \@evenhead or \@evenfoot macros, it gets the current ‘right’ mark. \rightmark works like \TeX\’s \firstmark command.
```

The marking commands work reasonably well for right marks ‘numbered within’ left marks—e.g., the left mark is changed by a \chapter command and the right mark is changed by a \section command. However, it does produce somewhat anomalous results if two \markboth’s occur on the same page.

Commands like \tableofcontents that should set the marks in some page styles use a \@mkboth command, which is \let by the pagestyle command (\ps@...) to \markboth for setting the heading or to \@gobbletwo to do nothing.

6.4.2 Defining the page styles

The pagestyles empty and plain are defined in latex.dtx.

\ps@headings

The definition of the page style headings has to be different for two sided printing than it is for one sided printing.

```
474 \if@twoside
475 \def\ps@headings{%
476 \let\@oddfoot\@empty\let\@evenfoot\@empty
477 \def\@oddhead{⟨\thehead\hfill\slshape\leftmark⟩}%
478 \def\@evenhead{⟨\slshape⟨\rightmark⟩\hfill\thehead⟩}%
479 \let\@mkboth\markboth
```

When using this page style, the contents of the running head is determined by the chapter and section titles. So we \let \@mkboth to \markboth.

```
479 \let\@mkboth\markboth
```

For the article document class we define \sectionmark to clear the right mark and put the number of the section (when it is numbered) and its title in the left mark. The rightmark is set by \subsectionmark to contain the subsection titles.

Note the use of \#1 for the parameter of the \sectionmark command, which will be defined when \ps@headings is executed.

```
480 (*article)
```
In the report and book document classes we use the \chaptermark and \sectionmark macros to fill the running heads.

Note the use of \#1 for the parameter of the \chaptermark command, which will be defined when \ps@headings is executed.

The definition of \ps@headings for one sided printing can be much simpler, because we treat even and odd pages the same. Therefore we don’t need to define \@even... else

\def\ps@headings{%
  \let\@oddfoot\@empty
  \def\@oddhead{\rightmark\hfil\thepage}%
  \let\@mkboth\markboth
We use \markright now instead of \markboth as we did for two sided printing.

(*article)
\def\sectionmark##1{%
  \markright{\MakeUppercase{\ifnum \c@secnumdepth >\z@ \thesection\quad \fi \#1}{}}}
\def\subsectionmark##1{%
  \markright{\ifnum \c@secnumdepth >\@ne \thesubsection\quad \fi \#1}{}}

(*report | book)
\def\chaptermark##1{%
  \markboth{\MakeUppercase{\ifnum \c@secnumdepth >\m@ne \if@mainmatter \@chapapp\ thechapter. \ % \fi \#1}{}}{}}

(*article)
\def\sectionmark##1{%
  \markright{\MakeUppercase{\ifnum \c@secnumdepth >\z@ \thesection\quad \fi \#1}{}}}}
\def\subsectionmark##1{%
  \markright{\ifnum \c@secnumdepth >\@ne \thesubsection\quad \fi \#1}{}}

(*report | book)
The definition of the page style \textit{myheadings} is fairly simple because the user determines the contents of the running head himself by using the \texttt{markboth} and \texttt{markright} commands.

\begin{verbatim}
\def\ps@myheadings{\let\@oddfoot\@empty\let\@evenfoot\@empty
\def\@evenhead{\thepage\hfil\slshape\leftmark}\
\def\@oddhead{{\slshape\rightmark}\hfil\thepage}}
\end{verbatim}

We have to make sure that the marking commands that are used by the chapter and section headings are disabled. We do this \texttt{letting} them to a macro that gobbles its argument(s).

\begin{verbatim}
\let\@mkboth\@gobbletwo
\let\chaptermark\@gobble
\let\sectionmark\@gobble
\end{verbatim}

\section{Document Markup}

\subsection{The title}

\texttt{maketitle} The definition of \texttt{maketitle} depends on whether a separate title page is made. This is the default for the report and book document classes, but for the article class it is optional.

When we are making a title page, we locally redefine \texttt{footnotesize} and \texttt{footnoterule} to change the appearance of the footnotes that are produced by the \texttt{thanks} command; these changes affect all footnotes.
We center the entire title vertically; the centering is set off a little by adding a \vskip. (In compatibility mode the pagernumber is set to 0 by the titlepage environment to keep the behaviour of \LaTeX 2.09 style files.)

Then we set the title, in a \LARGE font; leave a little space and set the author(s) in a \large font. We do this inside a tabular environment to get them in a single column. Before the date we leave a little whitespace again.

Then we call \@thanks to print the information that goes into the footnote and finish the page.

We reset the footnote counter, disable \thanks and \maketitle and save some storage space by emptying the internal information macros.

After the title is set the declaration commands \title, etc. can vanish. The definition of \and makes only sense within the argument of \author so this can go as well.

When the title is not on a page of its own, the layout of the title is a little different. We use symbols to mark the footnotes and we have to deal with two column documents.

Therefore we first start a new group to keep changes local. Then we redefine \thefootnote to use \fnsymbol; and change \@makefnmark so that footnotemarks have zero width (to make the centering of the author names look better).
If this is a twocolumn document we start a new page in twocolumn mode, with the title set to the full width of the text. The actual printing of the title information is left to \maketitle.

\if@twocolumn
  \ifnum \col@number=\@ne
    \maketitle
  \else
    \twocolumn[\maketitle]\fi
\else
  \maketitle\fi

This page gets a plain layout. We call \thanks to produce the footnotes.

\thispagestyle{plain}\thanks

Now we can close the group, reset the footnote counter, disable \thanks, \maketitle and \maketitle and save some storage space by emptying the internal information macros.

\endgroup
\setcounter{footnote}{0}\global\let\thanks\relax
\global\let\maketitle\relax
\global\let\@maketitle\relax
\global\let\@thanks\@empty
\global\let\@author\@empty
\global\let\@date\@empty
\global\let\@title\@empty
\global\let\title\relax
\global\let\author\relax
\global\let\date\relax
\global\let\and\relax
}\maketitle

This macro takes care of formatting the title information when we have no separate title page.

We always start a new page, leave some white space and center the information. The title is set in a \LARGE font, the author names and the date in a \large font.
7.2 Chapters and Sections

7.2.1 Building blocks

The definitions in this part of the class file make use of two internal macros, \@startsection and \seccntdef. To understand what is going on here, we describe their syntax.

The macro \@startsection has 6 required arguments, optionally followed by an optional argument and a required argument:
\@startsection\langle name\rangle\langle level\rangle\langle indent\rangle\langle beforeskip\rangle\langle afterskip\rangle\langle style\rangle optional * \langle altheading\rangle\langle heading\rangle

It is a generic command to start a section, the arguments have the following meaning:

⟨name⟩ The name of the user level command, e.g., ‘section’.

⟨level⟩ A number, denoting the depth of the section – e.g., chapter=1, section = 2, etc. A section number will be printed if and only if ⟨level⟩ ≤ the value of the secnumdepth counter.

⟨indent⟩ The indentation of the heading from the left margin

⟨beforeskip⟩ The absolute value of this argument gives the skip to leave above the heading. If it is negative, then the paragraph indent of the text following the heading is suppressed.

⟨afterskip⟩ If positive, this gives the skip to leave below the heading, else it gives the skip to leave to the right of a run-in heading.

⟨style⟩ Commands to set the style of the heading.

* When this is missing the heading is numbered and the corresponding counter is incremented.

⟨altheading⟩ Gives an alternative heading to use in the table of contents and in the running heads. This should not be present when the * form is used.

⟨heading⟩ The heading of the new section.
A sectioning command is normally defined to \texttt{@startsection} and its first six arguments.

The macro \texttt{\seccdef} can be used when a sectioning command is defined without using \texttt{@startsection}. It has two arguments:

\begin{verbatim}
\seccdef\langle unstarcmds \rangle\langle starcmds \rangle
\end{verbatim}

\textbf{\langle unstarcmds \rangle} Used for the normal form of the sectioning command.

\textbf{\langle starcmds \rangle} Used for the $*$-form of the sectioning command.

You can use \texttt{\seccdef} as follows:

\begin{verbatim}
\def\chapter { ... \seccdef \CMDA \CMDB }
\def\CMDA [#1]#2{ ... } % Command to define \chapter[#1]{#2}
\def\CMDB #1{ ... } % Command to define \chapter*{#1}
\end{verbatim}

\subsection*{7.2.2 Mark commands}

\texttt{\chaptermark} Default initializations of \ldots mark commands. These commands are used in the definition of the page styles (see section 6.4.2) Most of them are already defined by \texttt{latex.dtx}, so they are only shown here.

\begin{verbatim}
\texttt{\def\chaptermark{\newcommand*{\chaptermark}[1]{}}}
\texttt{\def\sectionmark{\newcommand*{\sectionmark}[1]{}}}
\texttt{\def\subsectionmark{\newcommand*{\subsectionmark}[1]{}}}
\texttt{\def\subsubsectionmark{\newcommand*{\subsubsectionmark}[1]{}}}
\texttt{\def\paragraphmark{\newcommand*{\paragraphmark}[1]{}}}
\texttt{\def\subparagraphmark{\newcommand*{\subparagraphmark}[1]{}}}
\end{verbatim}

\subsection*{7.2.3 Define Counters}

\texttt{\c@secnumdepth} The value of the counter \texttt{secnumdepth} gives the depth of the highest-level sectioning command that is to produce section numbers.

\begin{verbatim}
\texttt{\setcounter{secnumdepth}{3}}
\texttt{\setcounter{secnumdepth}{2}}
\end{verbatim}

\texttt{\c@part} These counters are used for the section numbers. The macro \texttt{\newcounter{newctr}[oldctr]} defines\texttt{(newctr)} to be a counter, which is reset to zero when counter \texttt{oldctr} is stepped. Counter \texttt{oldctr} must already be defined.

\begin{verbatim}
\texttt{\newcounter {part}}
\texttt{\newcounter {chapter}}
\texttt{\newcounter {section}}
\texttt{\newcounter {subsection}}
\texttt{\newcounter {paragraph}}
\texttt{\newcounter {subparagraph}}
\end{verbatim}
For any counter $CTR$, \texttt{theCTR} is a macro that defines the printed version of counter $CTR$. It is defined in terms of the following macros:

- \texttt{arabic\{COUNTER\}} prints the value of $COUNTER$ as an arabic numeral.
- \texttt{roman\{COUNTER\}} prints the value of $COUNTER$ as a lowercase roman numeral.
- \texttt{Roman\{COUNTER\}} prints the value of $COUNTER$ as an uppercase roman numeral.
- \texttt{alph\{COUNTER\}} prints the value of $COUNTER$ as a lowercase letter: $1 = a$, $2 = b$, etc.
- \texttt{Alph\{COUNTER\}} prints the value of $COUNTER$ as an uppercase letter: $1 = A$, $2 = B$, etc.

Actually to save space the internal counter representations and the commands operating on those are used.

\texttt{\renewcommand \thepart {\@Roman\c@part}}
\texttt{\renewcommand \thesection {\@arabic\c@section}}
\texttt{\renewcommand \thechapter {\@arabic\c@chapter}}
\texttt{\renewcommand \thesubsection {\thesection.\@arabic\c@subsection}}
\texttt{\renewcommand \thesubsubsection {\thesubsection.\@arabic\c@subsubsection}}
\texttt{\renewcommand \theparagraph {\thesubsubsection.\@arabic\c@paragraph}}
\texttt{\renewcommand \thesubparagraph {\theparagraph.\@arabic\c@subparagraph}}

\texttt{\@chapapp} \texttt{\@chapapp} is initially defined to be ‘\texttt{chaptername}’. The \texttt{appendix} command redefines it to be ‘\texttt{appendixname}’.

\texttt{\newcommand \frontmatter{\%\if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}}  
\texttt{\newcommand \mainmatter \{}\% \if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}  
\texttt{\newcommand \frontmatter{\% \if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}}  
\texttt{\newcommand \mainmatter \{}\% \if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}

7.2.4 Front Matter, Main Matter, and Back Matter

A book contains these three (logical) sections. The switch \texttt{\@mainmatter} is true iff we are processing Main Matter. When this switch is false, the \texttt{chapter} command does not print chapter numbers.

Here we define the commands that start these sections.

This command starts Roman page numbering and turns off chapter numbering. Since this restarts the page numbering from 1, it should also ensure that a recto page is used.

\texttt{\newcommand \frontmatter{\% \if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}}  
\texttt{\newcommand \mainmatter \{}\% \if@openright \cleardoublepage \else \clearpage \fi \@mainmatterfalse \pagenumbering{roman}}

This command clears the page, starts arabic page numbering and turns on chapter numbering. Since this restarts the page numbering from 1, it should also ensure that a recto page is used.

\texttt{\newcommand \mainmatter \{}\%
\backmatter

This clears the page, turns off chapter numbering and leaves page numbering unchanged.

\newcommand\backmatter{%  
  \if@openright \cleardoublepage \else \clearpage \fi  
  \@mainmatterfalse}

\part

The command to start a new part of our document.

In the article class the definition of \part is rather simple; we start a new paragraph, add a little white space, suppress the indentation of the first paragraph and make use of \secdef. As in other sectioning commands (cf. \@startsection in the \LaTeX{} kernel), we need to check the @noskipsec switch and force horizontal mode if it is set.

\part

\newcommand\part{%  
  \if@noskipsec \leavevmode \fi  
  \par  
  \addvspace{4ex}  
  \@afterindentfalse  
  \secdef@part@spart}

\part

For the report and book classes we things a bit different.

We start a new (righthand) page and use the plain pagestyle.

\part

\newcommand\part{%  
  \if@openright \cleardoublepage \else \clearpage \fi  
  \thispagestyle{plain}  
}

When we are making a two column document, this will be a one column page. We use @tempswa to remember to switch back to two columns.

\part

\if@twocolumn  
  \onecolumn  
\else  
  \@tempswatrue  
\fi  
\@tempswafalse
We need an empty box to prevent the fil glue from disappearing.
Here we use \texttt{\textbackslash secdef} to indicate which commands to use to make the actual heading.

\texttt{\textbackslash secdef\textbackslash @part\textbackslash @spart}}

\@part This macro does the actual formatting of the title of the part. Again the macro is differently defined for the article document class than for the document classes report and book.

When \texttt{secnumdepth} is larger than \texttt{-1} for the document class article, we have a numbered part, otherwise it is unnumbered.

\texttt{\textbackslash def\textbackslash @part[\#1]\#2\%}
\texttt{\ifnum c@secnumdepth >\m@ne}
\texttt{\refstepcounter{part}\%}
\texttt{\addcontentsline{toc}{part}{\thepart\hspace{1em}\#1}\%}
\texttt{\else}
\texttt{\addcontentsline{toc}{part}{\#1}\%}
\texttt{\fi}

We print the title flush left in the article class. Also we prevent breaking between lines and reset the font.

\texttt{\parindent \z@ \raggedright}
\texttt{\interlinepenalty \@M}
\texttt{\normalfont}

When this is a numbered part we have to print the number and the title. The \texttt{\nobreak} should prevent a page break here.

\texttt{\ifnum c@secnumdepth >\m@ne}
\texttt{\Large\bfseries \partname \nobreakspace \thepart\par
\nobreak}
\texttt{\huge \bfseries \#1\%}
\texttt{\fi}

Now we empty the mark registers, leave some white space and let \texttt{\textbackslash@afterheading} take care of suppressing the indentation.

\texttt{\markboth{}{}\par}\%}
\texttt{\nobreak}
\texttt{\vskip 3ex}
\texttt{\@afterheading}

When \texttt{secnumdepth} is larger than \texttt{-2} for the document class report and book, we have a numbered part, otherwise it is unnumbered.

\texttt{\def\@part[\#1]\#2\%}
\texttt{\ifnum c@secnumdepth >-2\relax}
\texttt{\refstepcounter{part}\%}
\texttt{\addcontentsline{toc}{part}{\thepart\hspace{1em}\#1}\%}
\texttt{\else}
\texttt{\addcontentsline{toc}{part}{\#1}\%}
\texttt{\fi}
We empty the mark registers and center the title on the page in the report and book document classes. Also we prevent breaking between lines and reset the font.

\texttt{\markboth{}{}\%}
\texttt{\centering}
\texttt{\interlinepenalty \@M}
\texttt{\normalfont}

When this is a numbered part we have to print the number.

\texttt{\ifnum \c@secnumdepth >-2\relax}
\texttt{\huge \bfseries \partname \nobreakspace \thepart}
\texttt{\par}

We leave some space before we print the title and leave the finishing up to \texttt{@endpart}.

\texttt{\vskip 20\@P}
\texttt{\fi}
\texttt{\Huge \bfseries #2\par}
\texttt{@endpart}

\texttt{\@spart} This macro does the actual formatting of the title of the part when the star form of the user command was used. In this case we never print a number. Otherwise the formatting is the same.

The differences between the definition of this macro in the article document class and in the report and book document classes are similar as they were for \texttt{@part}.

\texttt{\@endpart} This macro finishes the part page, for both \texttt{@part} and \texttt{@spart}.

First we fill the current page.

\texttt{\@endpart}

Then, when we are in twosided mode and chapters are supposed to be on right hand sides, we produce a completely blank page.
When this was a two column document we have to switch back to two column mode.

Then we prevent floats from appearing at the top of this page because it looks weird to see a floating object above a chapter title.

Then we suppress the indentation of the first paragraph by setting the switch \@afterindent to false. We use \seccdef to specify the macros to use for actually setting the chapter title.

This macro is called when we have a numbered chapter. When \secnumdepth is larger than −1 and, in the book class, \@mainmatter is true, we display the chapter number. We also inform the user that a new chapter is about to be typeset by writing a message to the terminal.

After having written an entry to the table of contents we store the (alternative) title of this chapter with \chaptermark and add some white space to the lists of figures and tables.
Then we call upon \@makechapterhead to format the actual chapter title. We have to do this in a special way when we are in twocolumn mode in order to have the chapter title use the entire \textwidth. In one column mode we call \@afterheading which takes care of suppressing the indentation.

\def\@makechapterhead#1{\vspace*{50\p@} \parindent \z@ \raggedright \normalfont

Then we check whether the number of the chapter has to be printed. If so we leave some whitespace between the chapter number and its title.

\interlinepenalty\@M

Now we set the title in a large bold font. We prevent a pagebreak from occurring in the middle of or after the title. Finally we leave some whitespace before the text begins.

\def\@schapter#1{\if@twocolumn

This macro is called when we have an unnumbered chapter. It is much simpler than \@chapter because it only needs to typeset the chapter title.

\def\@schapter#1{\if@twocolumn

The macro above uses \@makechapterhead{text} to format the heading of the chapter. It is similar to \@makechapterhead except that it never has to print a chapter number.
7.2.7 Lower level headings

These commands all make use of \@startsection.

\section This gives a normal heading with white space above and below the heading, the
title set in \Large\bfseries, and no indentation on the first paragraph.
\subsection This gives a normal heading with white space above and below the heading, the
title set in \large\bfseries, and no indentation on the first paragraph.
\subsubsection This gives a normal heading with white space above and below the heading, the
title set in \normalsize\bfseries, and no indentation on the first paragraph.
\paragraph This gives a run-in heading with white space above and to the right of the heading,
the title set in \normalfont\normalsize\bfseries.
\subparagraph This gives an indented run-in heading with white space above and to the right of
the heading, the title set in \normalfont\normalsize\bfseries.
7.3 Lists

7.3.1 General List Parameters

The following commands are used to set the default values for the list environment’s parameters. See the \LaTeX{} manual for an explanation of the meanings of the parameters. Defaults for the list environment are set as follows. First, \rightmargin, \listparindent and \itemindent are set to 0pt. Then, for a Kth level list, the command \@listK is called, where ‘K’ denotes ‘i’, ‘ii’, ... ‘vi’ (i.e., \@listiii is called for a third-level list.) By convention, \@listK should set \leftmargin to \leftmarginK.

When we are in two column mode some of the margins are set somewhat smaller.

\leftmargin \leftmargini
\leftmarginii \leftmarginiii
\leftmarginiv \leftmarginv
\leftmarginvi

Until the whole of the parameter setting in these files is rationalised, we need to set the value of \leftmargin at this outer level.

The following three are calculated so that they are larger than the sum of \labelsep and the width of the default labels (which are ‘(m)’, ‘vii.’ and ‘M.’).

\labelsep \labelwidth

\partopsep

When the user leaves a blank line before the environment an extra vertical space of \partopsep is inserted, in addition to \parskip and \topsep.

\@beginparpenalty \@endparpenalty These penalties are inserted before and after a list or paragraph environment.

\@itempenalty

This penalty is inserted between list items.
\@listi \@listi defines the values of \leftmargin, \parsep, \topsep, \itemsep, etc. for the lists that appear on top-level. Its definition is modified by the font-size commands (eg within \small the list parameters get “smaller” values).

For this reason listI is defined to hold a saved copy of listi so that \normalsize can switch all parameters back.

\def\@listi{\leftmargin\leftmargini  \parsep 4\p@ \plus2\p@ \sanscap@ \topsep 8\p@ \plus2\p@ \plus4\p@ \itemsep4\p@ \plus2\p@ \plus4\p@}
\let\@listI\@listi

We initialise the parameters although strictly speaking that is not necessary.

\def\@listii{\leftmargin\leftmarginii  \labelwidth\leftmarginii  \advance\labelwidth-\labelsep  \parsep 4.5\p@ \plus2\p@ \plus4\p@ \topsep 4\p@ \plus2\p@ \plus4\p@ \parsep 2\p@ \plus\p@ \plus\p@}

Here are the same macros for the higher level lists. Note that they don’t have saved versions and are not modified by the font size commands. In other words this class assumes that nested lists only appear in \normalsize, i.e. the main document size.

\def\@listiii {\leftmargin\leftmarginiii  \labelwidth\leftmarginiii  \advance\labelwidth-\labelsep  \parsep 4\p@ \plus2\p@ \plus4\p@ \topsep 4.5\p@ \plus2\p@ \plus4\p@ \parsep 2\p@ \plus\p@ \plus\p@}

\def\@listiv {\leftmargin\leftmarginiv  \labelwidth\leftmarginiv  \advance\labelwidth-\labelsep  \parsep 4\p@ \plus2\p@ \plus4\p@ \topsep 5\p@ \plus2\p@ \plus4\p@ \parsep 2.5\p@ \plus\p@ \plus\p@}

\def\@listv {\leftmargin\leftmarginv  \labelwidth\leftmarginv  \advance\labelwidth-\labelsep  \parsep 4\p@ \plus2\p@ \plus4\p@ \topsep 5\p@ \plus2\p@ \plus4\p@ \parsep 2.5\p@ \plus\p@ \plus\p@}

\def\@listvi {\leftmargin\leftmarginvi  \labelwidth\leftmarginvi  \advance\labelwidth-\labelsep  \parsep 4\p@ \plus2\p@ \plus4\p@ \topsep 5\p@ \plus2\p@ \plus4\p@ \parsep 2.5\p@ \plus\p@ \plus\p@}

\@listi
7.3.2 Enumerate

The enumerate environment uses four counters: \texttt{enumi}, \texttt{enumii}, \texttt{enumiii} and \texttt{enumiv}, where \texttt{enumN} controls the numbering of the \texttt{N}th level enumeration.

\renewcommand{\theenumi}{\@arabic\c@enumi}
\renewcommand{\theenumii}{\@alph\c@enumii}
\renewcommand{\theenumiii}{\@roman\c@enumiii}
\renewcommand{\theenumiv}{\@Alph\c@enumiv}

The label for each item is generated by the commands

\renewcommand{\labelenumi}{\theenumi.}
\renewcommand{\labelenumii}{(\theenumii)}
\renewcommand{\labelenumiii}{\theenumiii.}
\renewcommand{\labelenumiv}{\theenumiv.}

The expansion of \texttt{p\textbackslash enumerate} defines the output of a \texttt{\ref} command when referencing an item of the \texttt{N}th level of an enumerated list.

7.3.3 Itemize

Itemization is controlled by four commands: \texttt{\labelitemi}, \texttt{\labelitemii}, \texttt{\labelitemiii}, and \texttt{\labelitemiv}, which define the labels of the various itemization levels: the symbols used are bullet, bold endash, centered asterisk and centred dot.

\newcommand{\labelitemi}{\labelitemfont \textbullet}
\newcommand{\labelitemii}{\labelitemfont \textbf{-}}
\newcommand{\labelitemiii}{\labelitemfont \textbullet}
\newcommand{\labelitemiv}{\labelitemfont \textbullet}
The default definition for \labelitemfont is to reset the font to \normalfont so that always the same symbol is produced regardless of surrounding conditions.

A possible alternative would be

\renewcommand\labelitemfont{\fontseries\seriesdefault
\fontshape\shapedefault\selectfont}

which resets series and shape doesn’t touch the family.

\newcommand\labelitemfont{\normalfont}

7.3.4 Description

The description environment is defined here – while the itemize and enumerate environments are defined in latex.dtx.

\newenvironment{description}{\list{}{\labelwidth\z@ \itemindent-\leftmargin
\let\makelabel\descriptionlabel}}{\endlist}

\descriptionlabel

To change the formatting of the label, you must redefine \descriptionlabel.

\newcommand*\descriptionlabel[1]{\hspace\labelsep\normalfont\bfseries #1}

7.4 Defining new environments

7.4.1 Abstract

When we are producing a separate titlepage we also put the abstract on a page of its own. It will be centred vertically on the page.

Note that this environment is not defined for books.

% \changes{v1.3m}{1995/10/23}{Added setting of \cs{beginparpenalty} to discourage page break before abstract heading.}
69
69 (*article | report)
690 \if@titlepage
691 \newenvironment{abstract}{\titlepage
692 \null\vfil
693 \begin{center}\fseries \abstractname
694 \end{center}\%}
697 \endtitlepage
698 \else
699 \bfseries \abstractname
700 \begin{center}\fseries \abstractname
701 \end{center}\%}
704 \end{center}\%}
707 \null\vfil\null\endtitlepage

When we are not making a separate titlepage – the default for the article document class – we have to check if we are in twocolumn mode. In that case the abstract is as a \section*, otherwise the quotation environment is used to typeset the abstract.
7.4.2 Verse

The verse environment is defined by making clever use of the list environment's parameters. The user types `\` to end a line. This is implemented by `\let` `\` equal `\@centercr`.

```
\newenvironment{verse}{\let\\@centercr
\list{}{\itemsep \z@ 
\itemindent -1.5em 
\listparindent\itemindent 
\rightmargin \leftmargin 
\advance\leftmargin 1.5em} 
\item\relax}{{\endlist} 
```

7.4.3 Quotation

The quotation environment is also defined by making clever use of the list environment's parameters. The lines in the environment are set smaller than `\textwidth`. The first line of a paragraph inside this environment is indented.

```
\newenvironment{quotation}{\list{}{\listparindent 1.5em 
\itemindent \listparindent 
\rightmargin \leftmargin 
\parsep \z@ \@plus\p@} 
\item\relax}{{\endlist} 
```

7.4.4 Quote

The quote environment is like the quotation environment except that paragraphs are not indented.

```
\newenvironment{quote}{\list{}{\rightmargin\leftmargin} 
\item\relax}{{\endlist} 
```
7.4.5 Theorem

This document class does not define its own theorem environments, the defaults, supplied by \texttt{latex.dtx} are available.

7.4.6 Titlepage

In the normal environments, the titlepage environment does nothing but start and end a page, and inhibit page numbers. In the report style, it also resets the page number to one, and then sets it back to one at the end. In compatibility mode, it sets the page number to zero. This is incorrect since it results in using the page parameters for a right-hand page but it is the way it was. In two-column style, it still makes a one-column page.

First we do give the definition for compatibility mode.

\begin{verbatim}
\if@compatibility
\newenvironment{titlepage}{% \langle book \rangle \cleardoublepage \if@twocolumn
@restonecoltrue\onecolumn \else
@restonecolfalse\newpage \fi
\thispagestyle{empty} % \setcounter{page}\z@ \if@restonecol\twocolumn \else \newpage \fi
\fi}{% \if@restonecol\twocolumn \else \newpage \fi}
\end{verbatim}

And here is the one for native L\TeX{} 2\epsilon.

\begin{verbatim}
\else
\newenvironment{titlepage}{% \langle book \rangle \cleardoublepage \if@twocolumn
@restonecoltrue\onecolumn \else
@restonecolfalse\newpage \fi
\thispagestyle{empty} % \setcounter{page}\@ne \if@restonecol\twocolumn \else \newpage \fi}
\end{verbatim}

If we are not in two-side mode the first page after the title page should also get page number 1.

\begin{verbatim}
\if@twoside\else
\setcounter{page}\@ne \fi}
\end{verbatim}
7.4.7 Appendix

The `\appendix` command is not really an environment, it is a macro that makes some changes in the way things are done.

In the article document class the `\appendix` command must do the following:

- reset the section and subsection counters to zero,
- redefine `\thesection` to produce alphabetic appendix numbers. This redefinition is done globally to ensure that it survives even if `\appendix` is issued within an environment such as `multicols`.

```
\newcommand\appendix{
  \setcounter{section}{0}\
  \setcounter{subsection}{0}\
  \gdef\thesection{\@Alph\c@section}}
```

In the report and book document classes the `\appendix` command must do the following:

- reset the chapter and section counters to zero,
- set `\@chapapp` to `\appendixname` (for messages),
- redefine the chapter counter to produce appendix numbers,
- possibly redefine the `\chapter` command if appendix titles and headings are to look different from chapter titles and headings. This redefinition is done globally to ensure that it survives even if `\appendix` is issued within an environment such as `multicols`.

```
\newcommand\appendix{
  \setcounter{chapter}{0}\
  \setcounter{section}{0}\
  \gdef\@chapapp{\appendixname}\
  \gdef\thechapter{\@Alph\c@chapter}}
```

7.5 Setting parameters for existing environments

7.5.1 Array and tabular

`\arraycolsep` The columns in an array environment are separated by 2 `\arraycolsep`.

```
\setlength{\arraycolsep}{5\p@}
```

`\tabcolsep` The columns in a tabular environment are separated by 2 `\tabcolsep`.

```
\setlength{\tabcolsep}{6\p@}
```

`\arrayrulewidth` The width of rules in the array and tabular environments is given by `\arrayrulewidth`.

```
\setlength{\arrayrulewidth}{.4\p@}
```

`\doublerulesep` The space between adjacent rules in the array and tabular environments is given by `\doublerulesep`.

```
\setlength{\doublerulesep}{2\p@}
```
7.5.2 Tabbing

\texttt{\tabbingsep} This controls the space that the \texttt{\textbackslash t} command puts in. (See \LaTeX{} manual for an explanation.)

\begin{verbatim}
1063 \setlength{\tabbingsep}{\labelsep}
\end{verbatim}

7.5.3 Minipage

\texttt{\minipagerestore} The macro \texttt{\minipagerestore} is called upon entry to a minipage environment to set up things that are to be handled differently inside a minipage environment. In the current styles, it does nothing.

\texttt{\mpfootins} Minipages have their own footnotes; \texttt{\skip\mpfootins} plays same rôle for footnotes in a minipage as \texttt{\skip\footins} does for ordinary footnotes.

\begin{verbatim}
1064 \skip\mpfootins = \skip\footins
\end{verbatim}

7.5.4 Framed boxes

\texttt{\fboxsep} The space left by \texttt{\fbox} and \texttt{\framebox} between the box and the text in it.

\texttt{\fboxrule} The width of the rules in the box made by \texttt{\fbox} and \texttt{\framebox}.

\begin{verbatim}
1065 \setlength{\fboxsep}{3\p@}
1066 \setlength{\fboxrule}{.4\p@}
\end{verbatim}

7.5.5 Equation and eqnarray

\texttt{\theequation} When within chapters, the equation counter will be reset at the beginning of a new chapter and the equation number will be prefixed by the chapter number.

This code must follow the \texttt{\chapter} definition or, more exactly, the definition of the chapter counter.

\begin{verbatim}
1067 \{article\}\renewcommand \theequation {\@arabic\c@equation}
1068 \{report | book\}
1069 \@addtoreset {equation}{chapter}
1070 \renewcommand \theequation
1071 \{\ifnum \c@chapter>\z@ \thechapter.\fi \@arabic\c@equation\}
1072 \{report | book\}
\end{verbatim}

\texttt{\jot} \texttt{\jot} is the extra space added between lines of an eqnarray environment. The default value is used.

\begin{verbatim}
1073 \% \setlength{\jot}{3pt}
\end{verbatim}

\texttt{\@eqnum} The macro \texttt{\@eqnum} defines how equation numbers are to appear in equations. Again the default is used.

\begin{verbatim}
1074 \% \def\@eqnum{\langle\theequation\rangle}
\end{verbatim}

7.6 Floating objects

The file \texttt{latex.dtx} only defines a number of tools with which floating objects can be defined. This is done in the document class. It needs to define the following macros for each floating object of type \texttt{TYPE} (e.g., \texttt{TYPE} = figure).

\texttt{\fps@TYPE} The default placement specifier for floats of type \texttt{TYPE}.
The type number for floats of type TYPE. Each TYPE has associated a unique positive TYPE number, which is a power of two. E.g., figures might have type number 1, tables type number 2, programs type number 4, etc.

The file extension indicating the file on which the contents list for float type TYPE is stored. For example, \texttt{\textbackslash ext@figure} = ‘lof’.

A macro to generate the figure number for a caption. For example, \texttt{\textbackslash fnum@figure} == ‘Figure \texttt{\textbackslash thefigure}’.

\texttt{\textbackslash @makecaption}⟨num⟩⟨text⟩ A macro to make a caption, with ⟨num⟩ the value produced by \texttt{\textbackslash fnum@...} and ⟨text⟩ the text of the caption. It can assume it’s in a \texttt{\parbox} of the appropriate width. This will be used for all floating objects.

The actual environment that implements a floating object such as a figure is defined using the macros \texttt{\textbackslash @float} and \texttt{\textbackslash end@float}, which are defined in \texttt{latex.dtx}.

An environment that implements a single column floating object is started with \texttt{\textbackslash @float{TYPE}[⟨placement⟩]} of type TYPE with ⟨placement⟩ as the placement specifier. The default value of ⟨PLACEMENT⟩ is defined by \texttt{\textbackslash fps@TYPE}.

The environment is ended by \texttt{\textbackslash end@float}. E.g., \texttt{\textbackslash figure} == \texttt{\textbackslash @floatfigure}, \texttt{\textbackslash endfigure} == \texttt{\textbackslash end@float}.

7.6.1 Figure

Here is the implementation of the figure environment.

First we have to allocate a counter to number the figures.

In the report and book document classes figures within chapters are numbered per chapter.

\texttt{\textbackslash newcounter{figure}}
\texttt{\textbackslash renumber \texttt{\textbackslash thefigure} \{\textbackslash arabic\texttt{\textbackslash c@figure}\}}
\texttt{\textbackslash renumber \texttt{\textbackslash thefigure}}

Here are the parameters for the floating objects of type ‘figure’.

\texttt{\textbackslash fps@figure} \texttt{\textbackslash ftype@figure} \texttt{\textbackslash ext@figure} \texttt{\textbackslash num@figure}

And the definition of the actual environment. The form with the * is used for double column figures.

\texttt{\textbackslash newenvironment{figure} \{\texttt{\textbackslash @floatfigure}\}}
\texttt{\textbackslash newenvironment{figure*} \{\texttt{\textbackslash @dblfloatfigure}\}}
7.6.2 Table

Here is the implementation of the table environment. It is very much the same as the figure environment.

\c@table

First we have to allocate a counter to number the tables.

In the report and book document classes tables within chapters are numbered per chapter.

\newcounter{table}
\renewcommand\thetable{\arabic{\c@table}}

Here are the parameters for the floating objects of type ‘table’.

\fps@table
\ftype@table
\ext@table
\num@table

And the definition of the actual environment. The form with the * is used for double column tables.

\newenvironment{table}{}
\newenvironment{table*}{}

7.6.3 Captions

\@makecaption

The \caption command calls \@makecaption to format the caption of floating objects. It gets two arguments, \langle number\rangle, the number of the floating object and \langle text\rangle, the text of the caption. Usually \langle number\rangle contains a string such as ‘Figure 3.2’. The macro can assume it is called inside a \parbox of right width, with \normalsize.

\abovecaptionskip
\belowcaptionskip

These lengths contain the amount of white space to leave above and below the caption.

\newlength{abovecaptionskip}
\newlength{belowcaptionskip}
\setlength{abovecaptionskip}{10\p@}
\setlength{belowcaptionskip}{0\p@}

The definition of this macro is \long in order to allow more then one paragraph in a caption.

\long\def\@makecaption#1#2{%
\vskip\abovecaptionskip
\parbox{\textwidth}{\centering\texttt{#1}\hspace{1em}#2}\par
\vskip\belowcaptionskip}
We want to see if the caption fits on one line on the page, therefore we first typeset it in a temporary box.

\sbox\@tempboxa{#1: #2}\

We can measure its width. It that is larger than the current \hsize we typeset the caption as an ordinary paragraph.

\ifdim \wd\@tempboxa >\hsize
1120 #1: #2\par
1121 \fi

If the caption fits, we center it. Because this uses an \hbox directly in vertical mode, it does not execute the \everypar tokens; the only thing that could be needed here is resetting the ‘minipage flag’ so we do this explicitly.

\global \@minipagefalse
1123 \hb@xt@\hsize{\hfil\box\@tempboxa\hfil}\
1124 \fi
1125 \vskip\belowcaptionskip}

7.7 Font changing

Here we supply the declarative font changing commands that were common in \LaTeX version 2.09 and earlier. These commands work in text mode and in math mode. They are provided for compatibility, but one should start using the \text... and \math... commands instead. These commands are defined using \DeclareTextFontCommand, a command with three arguments: the user command to be defined; \LaTeX commands to execute in text mode and \LaTeX commands to execute in math mode.

\rm The commands to change the family. When in compatibility mode we select the ‘default’ font first, to get \LaTeX2.09 behaviour.

\tt \sf
1127 \DeclareOldFontCommand{\rm}{\normalfont}{\rmfamily}{\mathrm}
1128 \DeclareOldFontCommand{\sf}{\normalfont}{\sfamily}{\mathsf}
1129 \DeclareOldFontCommand{\tt}{\normalfont}{\ttfamily}{\mathtt}

\bf
1130 \DeclareOldFontCommand{\bf}{\normalfont}{\bfseries}{\mathbf}

\sl And the commands to change the shape of the font. The slanted and small caps shapes are not available by default as math alphabets, so those changes do nothing in math mode. However, we do warn the user that the selection will not have any effect. One should use \upshape to explicitly change back to the upright shape.

\it \sc
1131 \DeclareOldFontCommand{\it}{\normalfont}{\itshape}{\mathit}
1132 \DeclareOldFontCommand{\sl}{\normalfont}{\slshape}{\@nomath\sl}
1133 \DeclareOldFontCommand{\sc}{\normalfont}{\scshape}{\@nomath\sc}

\cal \mit
The commands \cal and \mit should only be used in math mode, outside math mode they have no effect. Currently the New Font Selection Scheme defines these commands to generate warning messages. Therefore we have to define them ‘by hand’.

\cal \mit
1134 \DeclareRobustCommand*{\cal}{\@fontswitch\relax\mathcal}
1135 \DeclareRobustCommand*{\mit}{\@fontswitch\relax\mathnormal}

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8 Cross Referencing

8.1 Table of Contents, etc.

A \section command writes a \contentsline{section}{⟨title⟩}{⟨page⟩} command on the .toc file, where ⟨title⟩ contains the contents of the entry and ⟨page⟩ is the page number. If sections are being numbered, then ⟨title⟩ will be of the form \numberline{⟨num⟩}{⟨heading⟩} where ⟨num⟩ is the number produced by \thesection. Other sectioning commands work similarly.

A \caption command in a ‘figure’ environment writes \contentsline{figure}{\numberline{⟨num⟩}{⟨caption⟩}}{⟨page⟩} on the .lof file, where ⟨num⟩ is the number produced by \thefigure and ⟨caption⟩ is the figure caption. It works similarly for a ‘table’ environment.

The command \contentsline{(name)} expands to \l@⟨name⟩. So, to specify the table of contents, we must define \l@chapter, \l@section, \l@subsection, ... ; to specify the list of figures, we must define \l@figure; and so on. Most of these can be defined with the \dottedtocline command, which works as follows.

\dottedtocline{⟨level⟩}{⟨indent⟩}{⟨numwidth⟩}{⟨title⟩}{⟨page⟩}

⟨level⟩ An entry is produced only if ⟨level⟩ <= value of the tocdepth counter. Note, \chapter is level 0, \section is level 1, etc.

⟨indent⟩ The indentation from the outer left margin of the start of the contents line.

⟨numwidth⟩ The width of a box in which the section number is to go, if ⟨title⟩ includes a \numberline command.

\pnumwidth\tocrmarg\dotsep

This command uses the following three parameters, which are set with a \newcommand (so em’s can be used to make them depend upon the font).

\pnumwidth The width of a box in which the page number is put.
\tocrmarg The right margin for multiple line entries. One wants \tocrmarg \geq \pnumwidth
\dotsep Separation between dots, in mu units. Should be defined as a number like 2 or 1.7

\newcommand\pnumwidth{1.55em}
\newcommand\tocrmarg{2.55em}
\newcommand\dotsep{4.5}
\setcounter{tocdepth}{3}
\setcounter{tocdepth}{2}

8.1.1 Table of Contents

\tableofcontents

This macro is used to request that \LaTeX produces a table of contents. In the report and book document classes the tables of contents, figures etc. are always set in single-column style.

\newcommand\tableofcontents{%
\if@twocolumn

The title is set using the `\chapter*` command, making sure that the running head –if one is required– contains the right information.

```
\chapter*{\contentsname
⟨/report | book⟩
⟨article⟩
\section*{\contentsname
The code for `\@mkboth` is placed inside the heading to avoid any influence on vertical spacing after the heading (in some cases). For other commands, such as `\listoffigures` below this has been changed from the \LaTeX\,2e version as it will produce a serious bug if used in two-column mode (see, pr/3285). However `\tableofcontents` is always typeset in one-column mode in these classes, therefore the somewhat inconsistent setting has been retained for compatibility reasons.

```
\@mkboth{\MakeUppercase\contentsname}{\MakeUppercase\contentsname}
```

The actual table of contents is made by calling `\@starttoc{toc}`. After that we restore two-column mode if necessary.

```
\@starttoc{toc}
```

Each sectioning command needs an additional macro to format its entry in the table of contents, as described above. The macro for the entry for parts is defined in a special way.

First we make sure that if a pagebreak should occur, it occurs before this entry. Also a little whitespace is added and a group begun to keep changes local.

```
\newcommand*\l@part[2][]{%
\ifnum\c@tocdepth>\relax
\addpenalty\@secpenalty
\addpenalty{-\@highpenalty}%
\addvspace{2.25em \@plus\p@}
\setlength\@tempdima{3em}%
\begingroup
\parindent\z@ \rightskip\@pnumwidth
\parfillskip-\@pnumwidth
\relax
\ifnum\c@tocdepth<\z@%
\addpenalty(-\@highpenalty)
\addvspace(2.25em \@plus\p@)
\setlength\@tempdima{3em}%
\begingroup
\parindent\z@ \rightskip\@pnumwidth
\parfillskip-\@pnumwidth
\relax
\ifnum\c@tocdepth<\z@%
```

The macro `\numberline` requires that the width of the box that holds the part number is stored in \LaTeX\,X’s scratch register `\@tempdima`. Therefore we initialize it there even though we do not use `\numberline` internally—the value used is quite large so that something like `\numberline{VIII}` would still work.

```
\setlength\@tempdima{3em}%
\begingroup
We set `\parindent` to 0pt and use `\rightskip` to leave enough room for the pagernumbers.\footnote{We should really set `\rightskip` to `\@tocmarg` instead of `\@pnumwidth` (no version of \LaTeX\ ever did this), otherwise the `\rightskip` is too small. Unfortunately this can’t be changed in \LaTeX\,X as we don’t want to create different versions of \LaTeX\,\,X\,E which produce different typeset output unless this is absolutely necessary; instead we suspend it for \LaTeX\,3.}
To prevent overfull box messages the `\parfillskip` is set to a negative value.

```
\parindent\z@ \rightskip\@pnumwidth
\parfillskip-\@pnumwidth
```

\footnote{We should really set `\rightskip` to `\@tocmarg` instead of `\@pnumwidth` (no version of \LaTeX\ ever did this), otherwise the `\rightskip` is too small. Unfortunately this can’t be changed in \LaTeX\,X as we don’t want to create different versions of \LaTeX\,\,X\,E which produce different typeset output unless this is absolutely necessary; instead we suspend it for \LaTeX\,3.}
Now we can set the entry, in a large bold font. We make sure to leave vertical mode, set the part title and add the pagenumber, set flush right.
\leavevmode
\large \bfseries #1\hfil
\hb@xt@0\@pnumwidth{\hss #2%}
\kern-\p0\kern\p0\par

Prevent a pagebreak immediately after this entry, but use \everypar to reset the \if@nobreak switch. Finally we close the group.
\nobreak
⟨article⟩
\if@compatibility
\global@nobreaktrue
\everypar\global@nobreakfalse\everypar{}
\fi
\endgroup
\fi}
\l@chapter
This macro formats the entries in the table of contents for chapters. It is very similar to \@part

First we make sure that if a pagebreak should occur, it occurs before this entry. Also a little whitespace is added and a group begun to keep changes local.
\nobreak
⟨*report | book⟩
\newcommand\l@chapter[2]{%
\ifnum \c@tocdepth >\m@ne
\addpenalty{-\@highpenalty}\
\vskip 1.0em \@plus\p@\fi

The macro \numberline requires that the width of the box that holds the part number is stored in LATEX’s scratch register \@tempdima. Therefore we initialize it there even though we do not use \numberline internally (the position as well as the values seems questionable but can’t be changed without producing compatibility problems). We begin a group, and change some of the paragraph parameters (see also the remark at \@part regarding \rightskip).
\setlength\@tempdima{1.5em}\
\begingroup
\parindent \z@ \rightskip \@pnumwidth
\parfillskip -\@pnumwidth

Then we leave vertical mode and switch to a bold font.
\leavevmode \bfseries

Because we do not use \numberline here, we have done some fine tuning ‘by hand’, before we can set the entry. We discourage but not disallow a pagebreak immediately after a chapter entry.
\advance\leftskip\@tempdima
\hskip -\leftskip
#1\nobreak\hfil
\nobreak\hb@xt@0\@pnumwidth{\hss #2%}
\kern-\p0\kern\p0\par
\penalty@highpenalty
\endgroup
\fi}
⟨/report | book⟩
In the article document class the entry in the table of contents for sections looks much like the chapter entries for the report and book document classes.

First we make sure that if a pagebreak should occur, it occurs before this entry. Also a little whitespace is added and a group begun to keep changes local.

\begin{verbatim}
\newcommand{\l@section}[2]{% 
  \ifnum \c@tocdepth >\z@ 
  \addpenalty\sectionpenalty 
  \addvspace{1.0em \@plus\p@} \% 
  \setlength{\@tempdima}{1.5em} \% 
  \begingroup \parindent \z@ \rightskip \@pnumwidth \% 
  \parfillskip \m@ne \% 
  \leavevmode \bfseries \setlength{\@tempdima}{1.5em} \% 
  \hfill \hfill 
  #1
  \nobreak \hfil \hfill 
  \hb@xt@\@pnumwidth{\hss \kern-\p@ \kern\p@} \par 
  \endgroup \fi}
\end{verbatim}

The macro \numberline requires that the width of the box that holds the part number is stored in \TeX's scratch register \@tempdima. Therefore we put it there. We begin a group, and change some of the paragraph parameters (see also the remark at \l@part regarding \rightskip).

\begin{verbatim}
\advmargin\leftskip \@tempdima \% 
\hskip \leftskip \% 
\hfill \hfill \% 
\nobreak \hfill \hfill \% 
\kern-\p@ \kern\p@ \% 
\end{verbatim}

Then we leave vertical mode and switch to a bold font. Because we do not use \numberline here, we have do some fine tuning 'by hand', before we can set the entry. We discourage but disallow a pagebreak immediately after a chapter entry.

\begin{verbatim}
\leavevmode \bfseries \setlength{\@tempdima}{1.5em} \% 
\hfill \hfill \% 
\nobreak \hfill \hfill \% 
\kern-\p@ \kern\p@ \% 
\end{verbatim}

In the report and book document classes the definition for \l@section is much simpler.

\begin{verbatim}
\newcommand{\l@section}{\dottedtocline{1}{1.5em}{2.3em}} \% 
\newcommand{\l@subsection}{\dottedtocline{2}{3.8em}{3.2em}} \% 
\newcommand{\l@subsubsection}{\dottedtocline{3}{7.0em}{4.1em}} \% 
\newcommand{\l@paragraph}{\dottedtocline{4}{10em}{5em}} \% 
\newcommand{\l@subparagraph}{\dottedtocline{5}{12em}{6em}} \%
\end{verbatim}

\l@subsection All lower level entries are defined using the macro \dottedtocline (see above).
8.1.2 List of figures

\listoffigures This macro is used to request that \LaTeX produces a list of figures. It is very similar to \tableofcontents.

\newcommand\listoffigures{\%\*eport | \book\%\if@twocolumn\newpage\fi\else\fi\%\chapter*{\listfigurename}\%\newpage\section*{\listfigurename}\%\@mkboth{\MakeUppercase\listfigurename}{\MakeUppercase\listfigurename}\%\pagedetails{\listfigurename}{\report | \book\%\if@twocolumn\fi\}}\l@figure This macro produces an entry in the list of figures.

\let\l@table\l@figure

8.1.3 List of tables

\listoftables This macro is used to request that \LaTeX produces a list of tables. It is very similar to \tableofcontents.

\newcommand\listoftables{\%\*eport | \book\%\if@twocolumn\newpage\fi\else\fi\%\chapter*{\listtablename}\%\newpage\section*{\listtablename}\%\@mkboth{\MakeUppercase\listtablename}{\MakeUppercase\listtablename}\%\pagedetails{\listtablename}{\report | \book\%\if@twocolumn\fi\}}\l@table This macro produces an entry in the list of tables.

8.2 Bibliography

\bibindent The “open” bibliography format uses an indentation of \bibindent.

\newdimen\bibindent
\setlength\bibindent{1.5em}
The ‘thebibliography’ environment executes the following commands:

\renewcommand{\newblock}{\hskip.11em \@plus.33em \@minus.07em}
— Defines the “closed” format, where the blocks (major units of information) of an entry run together.
\sloppy — Used because it’s rather hard to do line breaks in bibliographies,
\sfcode\'.=1000\relax — Causes a ‘.’ (period) not to produce an end-of-sentence space.

The implementation of this environment is based on the generic list environment. It uses the \ennumiv counter internally to generate the labels of the list.

When an empty ‘thebibliography’ environment is found, a warning is issued.

\newenvironment{thebibliography}[1]
{\section*{\refname}\
\@mkboth{\MakeUppercase\refname}{\MakeUppercase\refname}\section*{\bibname}\
\@mkboth{\MakeUppercase\bibname}{\MakeUppercase\bibname}\section*{\article}
\list{\@biblabel{\@arabic\c@enumiv}}
{\settowidth\labelwidth{\@biblabel{#1}}\leftmargin\labelwidth\advance\leftmargin\labelsep\@openbib@code\usecounter{enumiv}\let\p@enumiv\@empty\renewcommand{\theenumiv}{\@arabic{enumiv}}}\sloppy
\@openbib@code

The \@mkboth was moved out of the heading argument since at least in report and book (twocolumn option) there are definitions for \chapter which would swallow it otherwise.
\@mkboth{\MakeUppercase\refname}{\MakeUppercase\refname}\@mkboth{\MakeUppercase\bibname}{\MakeUppercase\bibname}\@mkboth{\article}{\article}
\list{\@biblabel{\@arabic\c@enumiv}}{\settowidth\labelwidth{\@biblabel{#1}}\leftmargin\labelwidth\advance\leftmargin\labelsep\@openbib@code\usecounter{enumiv}\let\p@enumiv\@empty\renewcommand{\theenumiv}{\@arabic\c@enumiv}\\@sloppy
This is setting the normal (non-infinite) value of \clubpenalty for the whole of this environment, so we must reset its stored value also. (Why is there a % after the second 4000 below?)
\clubpenalty4000\clubpenalty4000\clubpenalty\clubpenalty\widowpenalty4000\widowpenalty4000%
\sfcode\'.\@m\def\@noitemerr{\@latex@warning{Empty ‘thebibliography’ environment}}
\endlist}

\newblock The default definition for \newblock is to produce a small space.
\newcommand{\newblock}{\hskip.11em \@plus.33em \@minus.07em}
\@openbib@code
The default definition for \@openbib@code is to do nothing. It will be changed by the openbib option.
\let\@openbib@code\@empty
\biblabel The label for a \bibitem[... ] command is produced by this macro. The default from \latex.dtx is used.
% \renewcommand*{\biblabel}[1]{\[\mbox{#1}\]}\hfill


The output of the `\cite` command is produced by this macro. The default from `latex.dtx` is used.

\begin{verbatim}
1291 \renewcommand*{\@cite}{[#1]}
\end{verbatim}

### 8.3 The index

The environment ‘theindex’ can be used for indices. It makes an index with two columns, each entry a separate paragraph. At the user level the commands `\item`, `\subitem` and `\subsubitem` are used to produce index entries of various levels. When a new letter of the alphabet is encountered an amount of white space can be added.

1292 \begin{verbatim}
1293 \newenvironment{theindex}
1294 {\if@twocolumn
1295 \@restonecolfalse
1296 \else
1297 \@restonecoltrue
1298 \fi
1299 ⟨article⟩\twocolumn[\section*{\indexname}]%
1300 ⟨!article⟩\twocolumn[\@makeschapterhead{\indexname}]%
1301 \@mkboth{\MakeUppercase{\indexname}}{\MakeUppercase{\indexname}}
1302 \thispagestyle{plain}\parindent\z@
1303 \parskip\z@ \@plus .3\p@ \relax
1304 \columnseprule \z@
1305 \columnsep 35\p@
1306 \let\item\@idxitem
1307 \end{verbatim}

Parameter changes to `\columnseprule` and `\columnsep` have to be done after `\twocolumn` has acted. Otherwise they can affect the last page before the index.

When the document continues after the index and it was a one column document we have to switch back to one column after the index.

\begin{verbatim}
1308 \if@restonecol\onecolumn\else\clearpage\fi
\end{verbatim}

These macros are used to format the entries in the index.

\begin{verbatim}
1309 \newcommand\@idxitem{\par\hangindent 40\p@}
1310 \newcommand\subitem{\@idxitem \hspace*{20\p@}}
1311 \newcommand\subsubitem{\@idxitem \hspace*{30\p@}}
\end{verbatim}

The amount of white space that is inserted between ‘letter blocks’ in the index.

\begin{verbatim}
1312 \newcommand\indexspace{\par \vskip 10\p@ \@plus5\p@ \@minus3\p@ \relax}
\end{verbatim}

### 8.4 Footnotes

Usually, footnotes are separated from the main body of the text by a small rule. This rule is drawn by the macro `\footnoterule`. We have to make sure that the rule takes no vertical space (see `plain.tex`) so we compensate for the natural height of the rule of 0.4pt by adding the right amount of vertical skip.

To prevent the rule from colliding with the footnote we first add a little negative vertical skip, then we put the rule and make sure we end up at the same point where we begun this operation.

\begin{verbatim}
1313 \renewcommand\footnoterule{\vskip 10\p@ \@plus3\p@ \@minus3\p@ \relax}
\end{verbatim}

\begin{verbatim}
1314 \renewcommand\footnoterule{\vskip 10\p@ \@plus3\p@ \@minus3\p@ \relax}
\end{verbatim}

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Footnotes are numbered within chapters in the report and book document styles. \c@footnote
\@addtoreset{footnote}{chapter}
\@makefntext

The footnote mechanism of \LaTeX{} calls the macro \@makefntext to produce the actual footnote. The macro gets the text of the footnote as its argument and should use \@thefnmark as the mark of the footnote. The macro \@makefntext is called when effectively inside a \parbox of width \columnwidth (i.e., with \hsize = \columnwidth).

An example of what can be achieved is given by the following piece of \TeX{} code.

\newcommand\@makefntext[1]{\parindent 1em\noindent\hb@xt@1.8em{\hss\@makefnmark}#1}

The effect of this definition is that all lines of the footnote are indented by 10pt, while the first line of a new paragraph is indented by 1em. To change these dimensions, just substitute the desired value for ‘10pt’ (in both places) or ‘1em’. The mark is flushright against the footnote.

In these document classes we use a simpler macro, in which the footnote text is set like an ordinary text paragraph, with no indentation except on the first line of a paragraph, and the first line of the footnote. Thus, all the macro must do is set \parindent to the appropriate value for succeeding paragraphs and put the proper indentation before the mark.

\newcommand\@makefntext[1]{\parindent 1em\noindent\hb@xt@1.8em{\hss\@makefnmark}#1}

The footnote markers that are printed in the text to point to the footnotes should be produced by the macro \@makefnmark. We use the default definition for it.

\renewcommand\@makefnmark{\normalfont\@thefnmark}

9  Initialization

9.1  Words

This document class is for documents prepared in the English language. To prepare a version for another language, various English words must be replaced. All the English words that require replacement are defined below in command names. These commands may be redefined in any class or package that is customising \LaTeX{} for use with non-English languages.


\texttt{article} \newcommand{\refname}{References}
\texttt{report | book} \newcommand{\bibname}{Bibliography}
\newcommand{\indexname}{Index}

\newcommand{\figurename}{Figure}
\newcommand{\tablename}{Table}

\newcommand{\partname}{Part}
\texttt{report | book} \newcommand{\chaptername}{Chapter}
\newcommand{\appendixname}{Appendix}
\texttt{book} \newcommand{\abstractname}{Abstract}

\section{9.2 Date}
\today This macro uses the \TeX primitives \texttt{\month, \day and \year} to provide the date of the \LaTeX-run.

At \texttt{\begin{document}} this definition will be optimised so that the names of all the ‘wrong’ months are not stored. This optimisation is not done here as that would ‘freeze’ \today in any special purpose format made by loading the class file into the format file.

\begin{verbatim}
\def{\today\ifcase{\month\or January\or February\or March\or April\or May\or June\or July\or August\or September\or October\or November\or December\fi \space{\number{\day}, \number{\year}}}
\end{verbatim}

\section{9.3 Two column mode}
\columnsep This gives the distance between two columns in two column mode.

\begin{verbatim}
\setlength{\columnsep}{10\p@}
\end{verbatim}

\columnseprule This gives the width of the rule between two columns in two column mode. We have no visible rule.

\begin{verbatim}
\setlength{\columnseprule}{0\p@}
\end{verbatim}

\section{9.4 The page style}
We have \texttt{plain} pages in the document classes article and report unless the user specified otherwise. In the ‘book’ document class we use the page style \texttt{headings} by default. We use arabic pagenumbers.

\begin{verbatim}
\texttt{!book} \pagestyle{plain} \\
\texttt{book} \pagestyle{headings} \\
\texttt{page numbering(arabic)}
\end{verbatim}
9.5 Single or double sided printing

When the `twoside` option wasn’t specified, we don’t try to make each page as long as all the others.

\[\texttt{\{if@twoside}
\texttt{\textbackslash else}
\texttt{\textbackslash raggedbottom}
\texttt{\fi}\]

When the `twocolumn` option was specified we call `\twocolumn` to activate this mode. We try to make each column as long as the others, but call `\sloppy` to make our life easier.

\[\texttt{\{if@twocolumn}
\texttt{\twocolumn}
\texttt{\sloppy}
\texttt{\flushbottom}\]

Normally we call `\onecolumn` to initiate typesetting in one column.

\[\texttt{\else}
\texttt{\onecolumn}
\texttt{\fi}\]

\texttt{\{/article | report | book\}}

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

\begin{tabular}{lll}
\texttt{\Roman} & \texttt{\dottedtocline} & 1214, 1217, 1218, 1220
\texttt{\afterheading} & & 1222, 1223
\texttt{\afterindentfalse} & & 1225, 1226, 1227
\texttt{\begin{center}} & 692, 788, 1250, 1272, 1273
\texttt{\author} & \texttt{\endcenter} & 544, 560, 572, 606, 625
\texttt{\begin{flushleft}} & & 1056
\texttt{\biblabel} & \texttt{\endflushleft} & 885, 974
\texttt{\chapapp} & \texttt{\@fsymbol} & 583
\texttt{\chapter} & \texttt{\@fontswitch} & 1134, 1135
\texttt{\cite} & \texttt{\@fontswitch} & 1134, 1135
\texttt{\clubpenalty} & \texttt{\@makecaption} & 1113
\texttt{\date} & \texttt{\@makechapterhead} & 828, 830, 832
\texttt{\dblfloat} & \texttt{\@makechapterhead} & 828, 830, 832
\texttt{\dblfptop} & \texttt{\@makecaption} & 1224
\texttt{\dotsep} & \texttt{\@makecaption} & 1134
\end{tabular}