Hour 8

Table Preparation II

How commonly used tables can be prepared through the **tabular** and **tabularx** environments is discussed in Hour 7 on page 59. Preparation of complicated tables and table-related some high-level issues are discussed in this Hour.

8.1 Nested Tables*

When some materials are to be presented in complicated forms, two or more tables can be nested for entering the materials conveniently, i.e., a separate table can be drawn in a cell of another table. In that case, an inner table will be the entry of a cell of the outer table, and hence it is to be inserted in **{}**. Such an example is shown in Table 8.1 on the following page, where two separate **tabularx** environments are created in two cells (second cells of the second and third rows) of the outer table. In the same way, the **tabular** environments, or a combination of the **tabular** and **tabularx** environments, can also be nested.

8.2 Column Alignment About Decimal Point*

The column-generating options **l**, **c**, **r**, **X**, **p{}**, **m{}**, and **b{}** make all the entries of a column to be aligned either from one side or both sides. However, sometimes the entries of a column may need to be aligned about a particular location of the entries, e.g., numerical data are usually aligned about their decimal marks. The right-aligned option **r** can be used if all the entries contain equal number of decimal digits, like a currency which usually contains two decimal digits. Any other data may contain different numbers of decimal digits, like 50, 2.325, 23.43, etc. In such a situation, the **D{**`asymb`**}{**`aprint`**}{**`adigit`**}** option, defined in the **dcolumn** package, can be used in the **tabular** and **tabularx** environments for generating a column, where `asymb` is the symbol about which the entries are to be aligned, `aprint` is how the symbol is to

D. Datta, *LaTeX in 24 Hours: A Practical Guide for Scientific Writing*,
DOI 10.1007/978-3-319-47831-9_8

Table 8.1 Nesting two or more tables

LaTeX input

```
\begin{table}[!hbt]
\begin{tabularx}{\linewidth}{|l|X|c|}
\hline Semester& Subject-wise score& Total\\
\hline First& {
        \begin{tabularx}{\linewidth}{X|c}
        English & 69\\
        Science & 80\\
        Drawing & 92
        \end{tabularx}
    }& 241\\
\hline Second& {
        \begin{tabularx}{\linewidth}{X|c}
        English     & 77\\
        Science     & 85\\
        Mathematics & 83\\
        History     & 64
        \end{tabularx}
    }& 309\\
\hline
\multicolumn{2}{|r|}{Grand Total}& 550\\
\hline
\end{tabularx}
\end{table}
```

Output

Semester	Subject-wise score		Total
First	English	69	241
	Science	80	
	Drawing	92	
Second	English	77	309
	Science	85	
	Mathematics	83	
	History	64	
		Grand Total	550

Table 8.2 Aligning columns of a table about decimal marks

LaTeX input

```
\begin{tabular}{|r|D{.}{,}{4}|D{,}{\cdot}{2}|}
 \hline
      2354 &    2354 &    2354\\
    25.936 & 25.936 & 25,936\\
    319.48 & 319.48 & 319,48\\
   7.85867 & 7.8586 & 7,8586\\
      4322 &    4322 &    4322\\
 \hline
\end{tabular}
```

Output

2354	2354	2354
25.936	25,936	25·936
319.48	319,48	319·48
7.85867	7,8586	7·8586
4322	4322	4322

be printed in the output, and `adigit` is the maximum number of decimal digits for which space is to be created. Table 8.2 shows three different forms for presenting some data having different numbers of decimal digits. The first column in the **tabular** environment is generated by the option **r**, for which all the data in that column are right aligned irrespective of the number of decimal digits in a data. This is not a good presentation for the obvious reason as seen in the output. The second column is generated by the option **D{.}{,}{4}** to align the data about the '.' mark (first argument), to replace the '.' mark by a ',' (second argument), and to create a space for a maximum four digits after the '.' mark (third argument). Similarly, the third column is generated by the option **D{,}{\cdot}{2}** to align the data about the ',' mark, and to replace the ',' mark by **\cdot**[1], and to create a space for a maximum two digits after the ',' mark. It is seen that, since a space for accommodating a maximum two

[1]The **\cdot** command produces a '·' at the vertical center of a line, unlike a normal period mark that produces a '.' at the bottom level of a line.

digits after the ‘,’ mark was created in the third column, at least the fourth entry which contains four digits after the ‘,’ mark has gone beyond the right margin of the column. Note that if no change is required in the location mark, the same symbol as in the first argument of the **D{}{}{}** option may be used in its second argument also.

8.3 Side-by-Side Tables*

Due to smaller sizes compared with the width of a page, or for the purpose of comparison of data, two or more tables may need to be drawn in a single row, i.e., side-by-side. Table 8.3 shows how individual **tabular** environments can be used for

Table 8.3 Side-by-side tables through consecutive **tabular** environments

LaTeX input

```
\begin{table}[!hbt]
\caption{Marks of 2015 and 2016.}
\begin{tabular}{|l|c|c|}
 \hline Name   & Math & Phy\\
 \hline Robin  &  80  &  68\\
 \hline Julie  &  72  &  62\\
 \hline Robert &  75  &  70\\
 \hline
\end{tabular}\hfill
%
\begin{tabular}{|l|c|c|}
 \hline Name   & Math & Phy\\
 \hline Robin  &  75  &  70\\
 \hline Julie  &  65  &  69\\
 \hline Robert &  78  &  67\\
 \hline
\end{tabular}
\end{table}
```

Output

Table 4: Marks of 2015 and 2016.

Name	Math	Phy
Robin	80	68
Julie	72	62
Robert	75	70

Name	Math	Phy
Robin	75	70
Julie	65	69
Robert	78	67

drawing multiple tables in a single row. Note that there should not be any new line or line break command (e.g., a blank line or a **** command) between two **tabular** environments, otherwise the tables will be drawn one below another. The tables can be separated using the available horizontal space through the **\hfill** command (or manually through the **\hspace{}** command) between each pair of **\end{tabular}** and **\begin{tabular}** commands.

Note that the two side-by-side tables of Table 8.3 are assigned a single serial number and a title as a whole. Such tables produced by consecutive **tabular** environments cannot be assigned individual serial number and title. In order to do that, each table may be prepared in an individual **minipage** environment, so that the tables can be numbered and titled individually by assigning the **\caption{}** command separately

to their hosting **minipage** environments[2] (refer §4.4 on page 31 for detail of the **minipage** environment). The side-by-side tables of Table 8.3 are reproduced in Table 8.4, but this time each **tabular** environment is nested inside an individual **minipage** environment, while all the **minipage** environments are nested inside a **table** environment. Further, a **\caption{}** command is used in each **minipage** environment,

Table 8.4 Side-by-side tables through the **minipage** environment

LaTeX input

```
\begin{table}[!hbt]
\begin{minipage}[c]{0.4\linewidth}
\centering
\caption{Marks of 2015.}
\label{1st_table}
\begin{tabular}{|l|c|c|}
 \hline Name   & Math & Phy\\
 \hline Robin  &  80  &  68\\
 \hline Julie  &  72  &  62\\
 \hline Robert &  75  &  70\\
 \hline
\end{tabular}
\end{minipage}\hfill
%
\begin{minipage}[c]{0.4\linewidth}
\centering
\caption{Marks of 2016.}
\label{2nd_table}
\begin{tabular}{|l|c|c|}
 \hline Name   & Math & Phy\\
 \hline Robin  &  75  &  70\\
 \hline Julie  &  65  &  69\\
 \hline Robert &  78  &  67\\
 \hline
\end{tabular}
\end{minipage}
\end{table}
```

Output

Table 5: Marks of 2015.

Name	Math	Phy
Robin	80	68
Julie	72	62
Robert	75	70

Table 6: Marks of 2016.

Name	Math	Phy
Robin	75	70
Julie	65	69
Robert	78	67

which has assigned individual serial number and title to its table. Moreover, each table can be referred separately using its unique reference key assigned through the **\label{}** command. As between two **tabular** environments in Table 8.3, there should not be any line break or new line command between two **minipage** environments also, otherwise the mini pages will be created one below another.

[2] In order to have individual number and title for side-by-side tables produced in a row, each table may be prepared in an individual **minipage** environment along with assigning a **\caption{}** command separately to each **minipage** environment.

8.4 Sideways (Rotated) Table*

It is discussed in §7.4 on page 62 that some entries in a table can be rotated in the vertical direction through the **sideways** environment defined in the **rotating** package. The same environment can be used for rotating an entire table also (but the caption will remain in the horizontal direction). In this case the table-generating environment, such as **tabular** or **tabularx**, is to be inserted in the **sideways** environment. Such an example is shown in Table 8.5. It would be interesting to see that some entries in the table, which is already rotated vertically through the **sideways** environment, can be rotated horizontally using the same environment. In this case, however, such entries are printed as reflected about the horizontal as shown in Table 8.5.

Table 8.5 Rotated table through the **sideways** environment

LaTeX input

```
\begin{table}[!hbt]
\centering
\caption{Obtained marks.}
\begin{sideways}
\begin{tabular}{|l|*{4}{c|}}
\hline Name& \begin{sideways}Math\end{sideways}&
                \begin{sideways}Phy\end{sideways}&
              \begin{sideways}Chem\end{sideways}&
            \begin{sideways}English\end{sideways}\\
 \hline Robin  & 80 & 68 & 60 & 57\\
 \hline Julie  & 72 & 62 & 66 & 63\\
 \hline Robert & 75 & 70 & 71 & 69\\
 \hline
\end{tabular}
\end{sideways}
\end{table}
%
Table~\ref{tab-marks} shows the marks ...
```

Output

Table 7: Obtained marks.

Name	Math	Phy	Chem	English
Robin	80	68	60	57
Julie	72	62	66	63
Robert	75	70	71	69

Table 7 shows the marks obtained by students.

The table shown in Table 8.5 through the **sideways** environment is produced on the same portrait-size page along with other texts of the document. However, a big table, which cannot be accommodated along the width of a portrait page, may need to be drawn on a landscape-size page. Such tables are drawn through the **sidewaystable** environment defined in the **rotating** package. Unlike in the **table** environment, the preferences for the vertical location of a table do not work in the **sidewaystable** environment. This is because the **sidewaystable** environment draws a table on a new page in landscape-mode and no other text is permitted to be printed on that page. An example of the **sidewaystable** environment is shown in Table 8.6 on the next page (output is not shown).

Table 8.6 Rotated table on landscape page through the **sidewaystable** environment

```
\begin{sidewaystable}
\centering
\caption{Marks obtained by three students in different subjects.}
\begin{tabular}{|*{7}{c|}}
 \hline Name & Physics & Mathematics & Chemistry & Biology & English & History\\
 \hline Robin & 80 & 68 & 60 & 75 & 70 & 71\\
 \hline Julie & 72 & 62 & 66 & 80 & 68 & 60\\
 \hline Robert & 75 & 70 & 71 & 72 & 62 & 66\\
 \hline
\end{tabular}
\end{sidewaystable}
```

8.5 Long Table on Multiple Pages*

Sometimes a lot of information may need to be presented in a single table, which cannot be accommodated on a single page or in the remaining space of the current page. In that case, the **longtable** environment, defined in the **longtable** package, may be used for preparing a table which is expandable through multiple pages[3]. An example of a long table stretching over two pages is shown in Table 8.7 on the next page, whose various points are explained below:

1. A separate **tabular** environment is not required for generating the table. It is done in the **longtable** environment itself.
2. The columns of the table are defined as the mandatory argument of the **\begin{longtable}[]{}** command, whose optional argument takes one of the letters **l**, **c**, and **r** as the alignment of the table (**l** for left aligned, **c** for centered, and **r** for right aligned). By default a **longtable** is center aligned.
3. The **\caption{}** command is followed by the line break command ****.
4. The header of the table is created in two steps: header for the first page and header for the successive pages. The header of the first page is ended by **\endfirsthead** and that of the successive pages is ended by **\endhead**. The header of the first page contains the **\caption{}** command and the headings of the columns. Similarly, the header of the successive pages also contains the continued caption of the table and the headings of the columns. Since the **\caption{}** command cannot be repeated in a single table, the caption in Table 8.7 for the successive pages is generated manually through the syntax **\multicolumn{5}{c}{\tablename\ \thetable**: `First Year Marks (contd`**\ldots**`)`**}**. The **\multicolumn{5}{c}{}** command is used for producing a centered caption covering all five columns of the table. The commands **\tablename** and **\thetable** print, respectively, the label-word and serial number of the table.

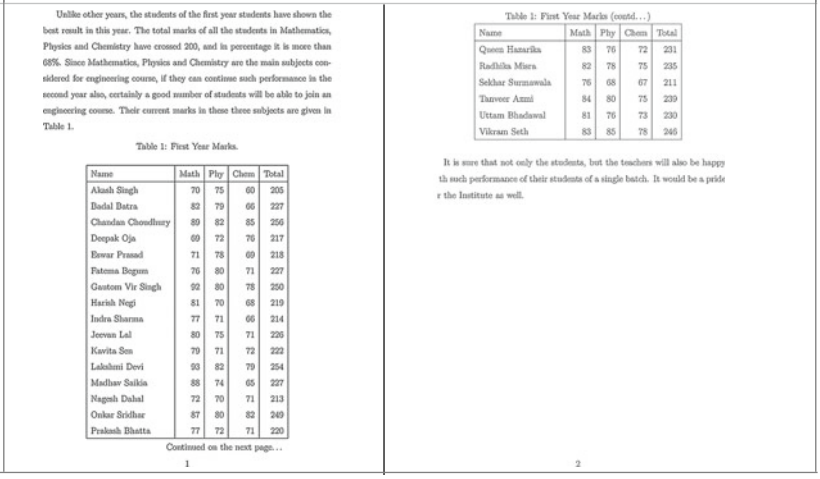
[3] A table prepared in the **longtable** environment, defined in the **longtable** package, is split automatically over multiple pages if it cannot be accommodated on a single page or in the remaining space of the current page.

Table 8.7 Long table in multiple pages through the **longtable** environment

LaTeX input

```
Unlike other years, ... subjects are given in Table~\ref{marksheet}.
%
\begin{longtable}[c]{|l|*{4}{r|}}
\caption{First Year Marks.}\\
\hline  Name& Math& Phy& Chem& Total\\
\hline  \endfirsthead
\multicolumn{5}{c}{\tablename\ \thetable:
                   First Year Marks (contd\ldots)}\\
\hline  Name& Math& Phys& Chem& Total\\
\hline  \endhead
\hline  \multicolumn{5}{r}{Continued on the next page\ldots}\\
\endfoot
\hline  \endlastfoot
\label{marksheet}
%       End of headers and footers
 Akash Singh     & 70 & 75 & 60 & 205\\
 Badal Batra     & 82 & 79 & 66 & 227\\
 :
 Uttam Bhadawal  & 81 & 76 & 73 & 230\\
 Vikram Seth     & 83 & 85 & 78 & 246\\
\end{longtable}
%
It is sure that not only the students, ...
```

Output



Unlike other years, the students of the first year students have shown the best result in this year. The total marks of all the students in Mathematics, Physics and Chemistry have crossed 200, and in percentage it is more than 68%. Since Mathematics, Physics and Chemistry are the main subjects considered for engineering course, if they can continue such performance in the second year also, certainly a good number of students will be able to join an engineering course. Their current marks in these three subjects are given in Table 1.

Table 1: First Year Marks.

Name	Math	Phy	Chem	Total
Akash Singh	70	75	60	205
Badal Batra	82	79	66	227
Chandan Choudhury	89	82	85	256
Deepak Oja	69	72	76	217
Eswar Prasad	71	78	69	218
Fatema Begum	76	80	71	227
Gautom Vir Singh	92	80	78	250
Harish Negi	81	70	68	219
Indra Sharma	77	71	66	214
Jeevan Lal	80	75	71	226
Kavita Sen	79	71	72	222
Lakshmi Devi	93	82	79	254
Madhav Saikia	88	74	65	227
Nagesh Dahal	72	70	71	213
Onkar Sridhar	87	80	82	249
Prakash Bhatta	77	72	71	220

Continued on the next page...

1

Table 1: First Year Marks (contd...)

Name	Math	Phy	Chem	Total
Queen Hazarika	83	76	72	231
Radhika Misra	82	78	75	235
Sekhar Surmawala	76	68	67	211
Tanveer Azmi	84	80	75	239
Uttam Bhadawal	81	76	73	230
Vikram Seth	83	85	78	246

It is sure that not only the students, but the teachers will also be happy th such performance of their students of a single batch. It would be a pride r the Institute as well.

2

5. Following the headers are the footers of the table for printing some information at the bottom of the table. Usually on each page, other than on the last page, a footer is put to show that the table is continued on the following page (it is done in Table 8.7 by `\multicolumn{5}{r}{Continued on the next page\ldots}`). The footer of a page (other than the last page) is ended by the **\endfoot** command, while that of the last page is ended by the **\endlastfoot** command.
6. The table can be labeled through the **\label{}** command after the headers and footers of the table.

If a table appears on the middle of a page and the remaining space of the page is not sufficient to hold it, a normal table will be printed on the next page. Therefore, a table may be prepared in the **longtable** environment if it is suspected to be big enough (having many rows) to come on a single page or in a part of a page as shown in Table 8.7. If the table comes on a single page, it will be printed just like other normal tables. In that case, the **\endhead** and **\endfoot** commands will become inactive.

8.6 Tables in Multi-column Documents

In a multi-column document, where texts are printed in multiple columns on a page (refer §4.3 on page 29 for multi-column documents), a table is also placed in a column. However, if the width of the column is not large enough to accommodate a table in it, the **table*** environment may be used for drawing the table over the entire width of the page[4]. In that case, the **\begin{table}** and **\end{table}** commands are to be replaced by the **\begin{table*}** and **\end{table*}** commands, respectively.

8.7 Foot Notes in Tables*

In the **tabularx** and **longtable** environments, a foot note against a word/phrase can be generated by inserting the **\footnote{}** command after it with the foot note as the argument of the command. However, the **\footnote{}** command cannot be used directly inside the **tabular** environment. A foot note in the **tabular** environment can be generated through the **\footnotemark** and **\footnotetext{}** commands in the same way as in the case of a mini page (refer Table 4.7 on page 35). However, in this way only one foot note can be generated per **tabular** environment. If more than one foot notes are to be generated, the **tabular** environment may be put inside a **minipage** environment and then the **\footnote{}** command can be used to generate foot notes as many required. In this case, the foot notes will be printed just below the mini page. Examples of both the cases for generating foot notes in the **tabular** environment are shown in Table 8.8 on the facing page, where the foot note in the first **tabular** environment is prepared through the **\footnotemark** and **\footnotetext{}** commands, and hence it is printed at the bottom of the main page. On the other hand, the two foot notes in the second **tabular** environment inside a **minipage** environment are prepared through the **\footnote{}** command, and hence these are printed just after the mini page was over (refer §4.5.1 on page 33 for more detail).

[4] If the column width of a multi-column document is not sufficient to accommodate a table in it, the **table*** environment may be used for drawing the table over the entire width of the page.

Table 8.8 Foot notes in a table under the **tabular** environment

LaTeX input

```
\begin{tabular}{|l|l|}
\hline Sonitpur\footnotemark & Tezpur\\
       Kamrup                & Guwahati\\
       Dibrugarh             & Dibrugarh\\
\hline
\end{tabular}
\footnotetext{Sonitpur is in Assam}
%
\begin{minipage}[t]{5cm}
\begin{tabular}{|l|l|}
\hline
Assam\footnote{Assam is in East}      & Dispur\\
Tripura\footnote{It is also in East} & Agartala\\
Nagaland                              & Kohima\\
\hline
\end{tabular}
\end{minipage}
```

Output

Sonitpur[1]	Tezpur
Kamrup	Guwahati
Dibrugarh	Dibrugarh

Assam[a]	Dispur
Tripura[b]	Agartala
Nagaland	Kohima

[a] Assam is in East
[b] It is also in East

[1] Sonitpur is in Assam

8.8 Changing Printing Format of Tables*

The default printing format of a table, as shown in Table 7.1 on page 59, can be changed in different ways. Four such changes are discussed here:

- ▷ If the **\caption{}** command is used in the **table** environment, LaTeX assigns a serial number to the table, which is preceded by the default label-word 'Table'. It can be replaced by any other word(s) by inserting the **\def\tablename{}** command in the preamble with the desired word(s) as the argument of the command, e.g., **\def\tablename{Tab.}** will replace Table by 'Tab.'.
- ▷ The type and size of fonts for the label-word and caption can also be changed using the **\captionsetup{}** command defined in the **caption** package (the **\captionsetup{}** command is also to be inserted in the preamble). As an example, **\captionsetup{margin=10pt, font=it, labelfont={large, bf, sf}}** may be used for printing the caption in 10 point italic fonts, and the label-word in large and boldface Sans serif fonts (because of more than one in number, the values of **labelfont** are inserted in **{}**).
- ▷ By default a single-line caption is center aligned, while a multi-line caption is full justified. In order to fully justify even a single-line caption, the **justification=justified** and **singlelinecheck=false** options may also be included in **\captionsetup{}**.
- ▷ If excess vertical blank space is left before or after the caption of a table, the **\abovecaptionskip** and **\belowcaptionskip** commands may be inserted in the preamble for skipping such blank spaces.

A noticeable thing in this book is that the serial number of a table (e.g., Table 8.1 on page 72) is composed of two parts, `8` and `1` separated by a period, where `8` is the serial number of the chapter (Hour in this book) and `1` is the serial number of the table in that chapter. In contrast, a table in the document-class **article** is assigned its serial number only, i.e., not preceded by the serial number of the section in which the table belongs (§11.4.3 on page 105 and §19.2.5 on page 189 discuss the process for obtaining section-wise serial numbers to tables in the document-class **article**).

8.9 Tables at the End of a Document

Some publishers want the tables and figures of an article to be grouped at the end of the article. Just the inclusion (loading) of the **endfloat** package in a normal document automatically performs this job, regardless of the actual positions of the tables and figures in the LaTeX input file[5] (the **endfloat** package produces two auxiliary files with `fff` and `ttt` extensions for writing information about the figures and tables, respectively). Not only the tables and figures are grouped at the end of the document, but also the notes are produced in their actual positions, like `[Table 3 about here.]` or `[Figure 7 about here.]`. Moreover, the tables and figures are preceded by two lists, namely '`List of Tables`' and '`List of Figures`', respectively, containing their contents. Note that the use of the **endfloat** package may require an additional `latex` run to move the tables and figures at the end of the document (§15.4 on page 149 and §16.2.3 on page 160 discuss about the `latex` run).

The produced lists of tables and figures can be turned off using the **\notablist** and **\nofiglist** commands in the preamble, in which case the tables and figures will be placed just under the headings of '`Tables`' and '`Figures`', respectively. Similarly, the notes in the actual positions of tables and figures can be turned off by putting the **\nomarkersintext** command in the preamble. On the other hand, the formats of the notes can be changed by redefining the **\tableplace** and **\figureplace** commands, e.g., the following two redefinitions will produce notes, like `[Table 3 is at the end of the article]` and `[Figure 7 is at the end of the article]`, respectively:

```
\renewcommand{\tableplace}%
  {[\tablename~\theposttbl\ is at the end of the article]}
```

and

```
\renewcommand{\figureplace}%
  {[\figurename~\thepostfig\ is at the end of the article]}
```

[5] Just the inclusion (loading) of the **endfloat** package automatically puts the tables and figures at the end of a document, regardless of their actual positions in the LaTeX input file.