An Example of LaTeX Documentation

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Abstract

This short article contains some commonly used commands of LaTeX. This is produced when Mr. Wenguang Wang and Mrs. Yanping Zhao learned LaTeX. Commands presented in this article include fonts, tabular, tabbing, figure and table, math mode, and bibliography.

1 Introduction

Most of the materials are adopted from [2]. Some pictures are from the 890 paper of Wenguang Wang and Yanping Zhao.

LaTeX is an excellent typesetting system. Donald E. Knuth developed the TeX system [3] which is the foundation of LaTeX. Thanks D. E. Knuth. He is a retired professor of Stanford University. He retired because he wants to finish his book "The arts of computer programming". LaTeX was developed by Leslie Lamport.

2 Paragraph and Fonts

You just type what you want in the text editor. An empty line creates a new paragraph. The article is seperated by sections, subsections, and subsubsections. For further levels, you can use paragraph and subparagraph. Here are the list of these levels. If you want to number them, the following commands should be set in the preamble.

```
\setcounter{secnumdepth}{5}
\setcounter{tocdepth}{5}
```

2.1 test subsection

2.1.1 test subsubsection

2.1.1.1 test paragraph

2.1.1.1.1 test subparagraph

2.2 test subsection again

Different fonts can be used. Two common fonts are **bold** and *italic*. Other fonts can be used like the following example.

`\texttt{This is typewrite}`	$\Longrightarrow$	This is typewriter
`\textrm{This is roman}`	$\Longrightarrow$	This is roman
`\textsc{This is small caps}`	$\Longrightarrow$	This is small caps
`\textsf{This is sans serif}`	$\Longrightarrow$	This is sans serif

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3 Lists

There are **three** intrinsic list environments, distinguished by what appears at the beginning of each item: description (i.e. *Description List Environment*), bullet (i.e. *Itemize List Environment*), or number (i.e. *Enumerate List Environment*)

3.1 Description List Environment

Document Preparation. Knowing how to setup ...

Making Tables. LaTeX provides a means ...

Bibliography. Knowing how to create a bibliography ...

Mathematics. This is the power of LaTeX and one ...

Graphics. This has progressed a great deal in the ...

Other. There are a great many things to learn ...

3.2 Itemize List Environment

- This is item 1
- This is item 2.

  A blank line within an item does create a new paragraph, using the indentation of the itemize environment.

  - A nested itemized list changes the bullet and indents another level.

3.3 Enumerate List Environment

1. This is item 1
2. This is item 2
   (a) This is item 2.1
   (b) This is item 2.2
      i. One again!
      ii. Two again!

3.4 Lists with small seperation

1. This list has a normal separation
2. The second line
3. The third line
4. The last line

The variable `\itemsep` control the space between items. You can set it to 0 to reduce the space between items. This is the sample.

1. This list has a small seperation
2. The second line
3. The third line
4. The last line

4 Tables

A table is made with the **tabular** environment. Table 1 is an example of complex table.

	First Half		Second Half	
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
East	20.4	27.4	90	20.4
West	30.6	38.6	34.6	31.6
North	45.9	46.9	45	43.9

Table 1: An Example of Complex Table

Table 2 is an example of nested table.

Table 2: An Example of Nested Table

Table 1

Object	Symbols used
variable	lowercase Roman
parameter	*Greek*
constant	Upper Case Roman

Table 2

*	1	2
	3	4

5 Tabbing

The **tabbing** environment provides an alternative to the **tabular** environment by letting you set your own column tabs. Figure 1 is an example of the use of **tabbing**.

You don't have to put tabbing inside a figure. Here is another short example:

```
apples      integral  derivative
grapefruit  sum       difference
            variables constants
```

6 Math

A simple math equation can be put between two $ signs: $E = mc^2$, $\frac{x_{c-d}^{a+b} + \int_a^b f(x)\,dx}{y_i + \sum_{i=1}^{n} z_i}$. Figure 2 gives an example of complex mathematical equation: Figure 3 is an example of the use of **eqnarray** Environment where you could enumerate your expression.

7 Float (table and figure)

7.1 Importing an EPS picture into LaTeX

Two environments **table** and **figure** can be used for a float object. You can put any thing less than a page inside a table or a figure. Figure 3 is a sample.

The way to import a picture into LaTeXis to convert it to **encapsulated postscript** (i.e. eps). Other formats like gif, jpeg are also supported. But eps is the recommended format.

On UNIX, **xfig** is an excellent system to draw figures, and export options include the eps file format. A basic plotting system , for both UNIX and WINDOWS, is **gnuplot**, which could produces eps files as well.

```
      PROCEDURE Minimum_smoothing(d(t), RATE)
1.      excess = 0
2.      FOR i = n TO 0
3.        IF d(i) > RATE THEN
4.          excess = excess + (d(i) − RATE)
5.          a(i) = RATE
6.        ELSE
7.          IF excess > (RATE − d(i)) THEN
8.            a(i) = RATE
9.            excess = excess − (RATE − d(i))
10.         ELSE
11.           a(i) = d(i) + excess
12.           excess = 0
13.         ENDIF
14.       ENDIF
15.     ENDFOR
      ENDPROCEDURE
```

Figure 1: An Example of the Use of **Tabbing** Environment

$$\sqrt{\frac{\prod_{n=1}^{N}\left(\sum_{i\in I_n} x_x^n\right)}{\sqrt[3]{\sum_{i\in I_\infty} x_i}}}$$

Figure 2: An Example of Mathematical Equation

Another way to obtain an eps file is with conversion. **xv** on UNIX can do this for a large variety of graphic file formats, including bitmap (xbm), gif and jpeg files. **gv** (on UNIX) or **gsview** (on WINDOWS) can do the same job, especially converting a ps file to eps file.

Once the file is in eps format, you can import it using the commands provided by the **graphicx** package [1]. If two figures are very small, you can put them in one line with two captions and two labels by minipage, see Figure 4 and Figure 5. You can put more than two figures together in this way.

$$x \quad \text{is equal to} \quad y \tag{1}$$

$$y \quad \preceq \quad \frac{a+b+c+d}{\Psi} + \frac{e+f+g+h}{\Phi} + I + K + J + L \tag{2}$$

Figure 3: An Example of the Use of **Eqnarray** Environment

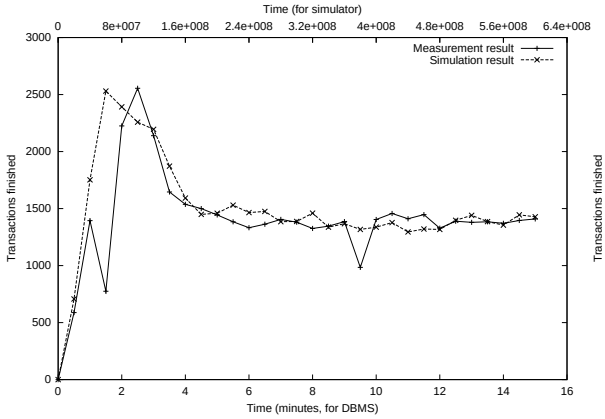


Figure 4: Simulation vs. Measurement

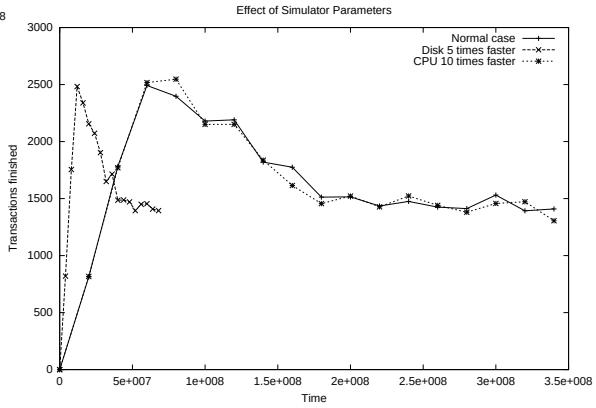
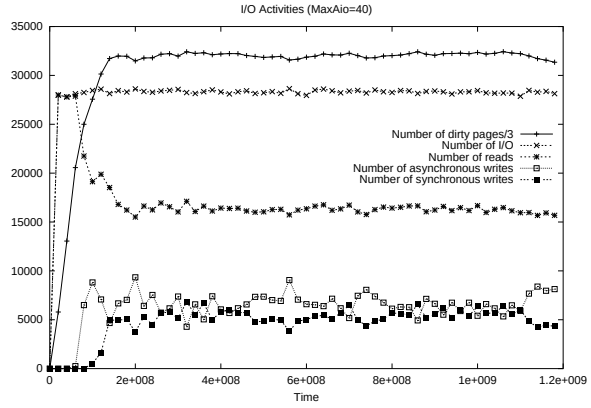
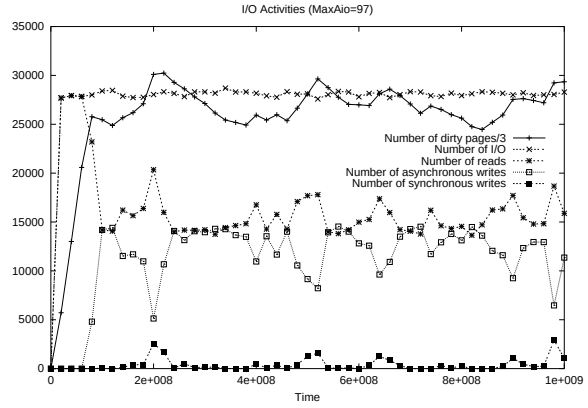


Figure 5: Effect of different parameters

You can also use the *subfigure* package, and create many subfigures like Figure 6. Each subfigure has a caption and a label. MikTeX does not include the package subfigure, you need download it from CTAN and install it.



(a) MaxAio=40



(b) MaxAio=97

Figure 6: I/O activities of the buffer pool

If you want to put a table and a figure together, you can define two commands in the preamble:

```
\makeatletter
    \newcommand\figcaption{\def\@captype{figure}\caption}
    \newcommand\tabcaption{\def\@captype{table}\caption}
```

Threshold	Dirty page percentage	
	Simulation	Measurement
1	85.1%	89.5%
30	85.2%	89.5%
60	84.8%	89.2%
80	84.8%	89.0%
99	84.8%	89.6%

Table 3: Dirty page percentage under various thresholds

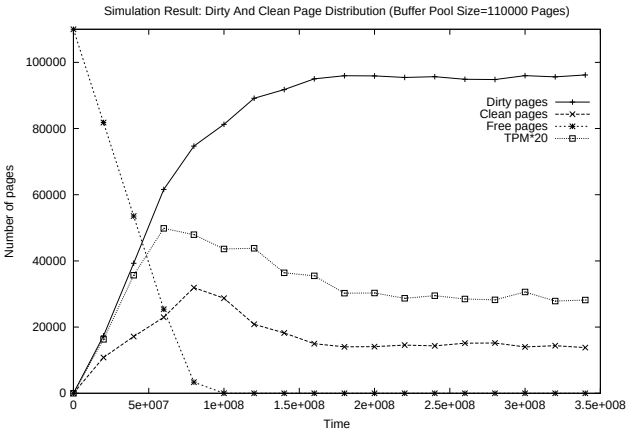


Figure 7: Pages in the buffer pool

7.2 Importing a MS Word Picture into LaTeX

For people who are used to drawing pictures in MS Word, there is a way to import them into LaTeX:

1. Install **Adobe@ Postscript Printer Driver** into your WINDOWS system (This can be downloaded from `http://www.adobe.com/support/downloads/main.html`)
2. Install and config the printer driver. Configuration for NT:
   (a) Click right button on the printer icon, select "Document Defaults...", and open a window.
   (b) From the "PostScript" tab, select output to "Encapsulated Postscript"
3. Configuration for Windows 98
   (a) Click right button on the printer icon, select "Properties...", and open a window.
   (b) From the "PostScript" tab, select output to "Encapsulated Postscript"
   (c) From the "Font" tab, select "Always use TrueType fonts".
4. Draw a picture in MS Word
5. Select "Print – Print to file", and name it as a ps file (not eps!)
6. Open this file in **gsview**, select "File – PS to EPS" to convert this file into a eps file
7. import the eps file into your LaTeXdocument
8. On Windows NT, you can draw picture with PowerPoint or Word. On Windows 98, you can only use Word.

Figure 8 is an example of imported MS Word Picture.

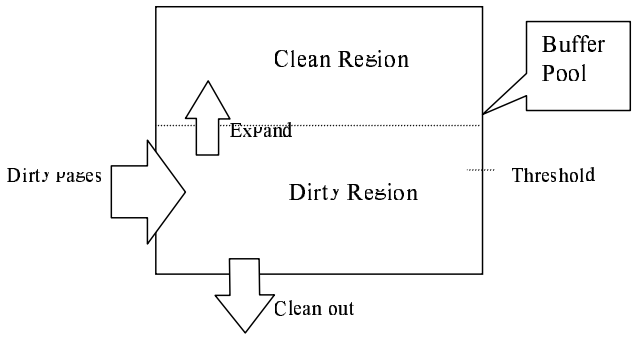


Figure 8: An Example of Imported MS Word Picture

8 Bibliography

You can reference a bibliography item by `\cite` command. A seperate bibliography database file should be maintained.

References

[1] David P. Carlisle. Packages in the 'graphics' bundle. World Wide Web, CTAN/macros/latex/required/graphics/.

[2] Harvey J. Greenberg. A simplified introduction to LaTeX, November 1999. http://www.cudenver.edu/ hgreenbe/.

[3] Donald E. Knuth. *The TeX Book*. Addison-Wesley Publishing Company, MA, 15 edition, 1989.