

An Example L_YX Document

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Abstract

This short document should show you some of the features available in the L_YX document production system, and how different it is from the WYSIWYG approach taken by normal word processors. Don't forget to add a footnote and a note here, Warren!

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1 Introduction

L_YX is a program that provides a more modern approach to writing documents with a computer, an approach that breaks with the obsolete tradition of the “typewriter concept.” It is designed for authors who want professional output quickly with a minimum of effort *without* becoming **specialists** in typesetting. Compared to common word processors, L_YX will increase productivity a lot, since the

job of typesetting is done mostly by the computer, not the author. With LYX , the *AUTHOR* can concentrate on the contents of her writing, since the computer takes care of the look.

Some people might be tempted to call LYX a “frontend to $\text{L}\text{A}\text{T}\text{E}\text{X}$.” This isn’t quite fair. LYX performs some typesetting internally to generate the correct look on the screen. Furthermore, LYX has some extensions to $\text{L}\text{A}\text{T}\text{E}\text{X}$ specially designed to work with the WYSIWYM-concept. So, it’s actually better to call LYX a *High Level Wordprocessor* that uses $\text{L}\text{A}\text{T}\text{E}\text{X}$ as its backend.

1.1 How LYX Looks

Show people the Document and Paper Layout options. Also noun, emphasis and bold character styles. We should display some lists, which are commonly available in other systems.

- Your standard list.
- Everybody has seen one of these.
 1. Sub lists, numbered lists as well, of course.
 2. You can change depth and list type with LYX
 - (a) Lists can be nested to 7 levels, I think
 - i. You get the general idea, I hope!

Frogs have slimy skin and jump a lot.

Daffodils don’t have any legs, and smell nice.

First, the bad news: the help system is not as thorough or idiot-proof as in many commercial applications¹. Patience. We’re working on it. Now the good news: the help system consists of the LYX manuals. You can read *all* of the manuals from inside LYX . Just select the manual you want read from the Help menu.

Camomile is used to make infusions which are soothing when ingested.

Tea is grown in many countries of the world.

There are also environments for verses, computer code and quotations. We won’t explore these in the seminar today, unless someone actually wants to see them in action. Ah, who cares, here’s an example piece of code: Cool!

```
#include <stdio.h>

int main(void)
{
    printf("Hello World\n");
    return 0;
}
```

¹Don’t forget to mention footnotes!

2 Math Equations

Editing mathematical expressions in L_AT_EX is now almost-completely WYSIWYM. This is something that used to make many old T_EX users worried. Here’s a testimonial of one of those old T_EX users, DAVID JOHNSON:

I was finally convinced that the L_AT_EX math-editor (Mathed) was the way to go when I found that, with a few modifications, I could use it the same way I was accustomed to writing T_EX. As an example, I created this α by typing the following keys: First type **M-c m** to enter `math-mode`, then type `\alpha`, then **Space** and **Esc**. As soon as I typed that **Space** the α was right there on the screen.

There are several ways to invoke Mathed. You can just click on the icon with $\frac{a+b}{c}$ on it. That will open a little blue square, with a purple rectangle around it. If you are using `math-mode` to simply type, say, a Greek letter, α , there is a special shortcut, just type **M-m g a** to get α , **M-m g b** to get β , *etc.*

You can also invoke Mathed from the Math Panel popup, or Math Panel for short. The Math Panel is incredibly useful, so you may want to open it and leave it somewhere on the screen. Select **Math Panel** from the **Math** menu to open it. Selecting anything from the **Math Panel** will also start Mathed. See also Section 1.1, just to see how cross-references work. You can leave many Mathed structures, like this matrix, partially filled in, such as:

$$\left(\begin{array}{ccc} \lambda_1 & & \\ & \ddots & 25 + b^2 \\ & & \lambda_n \end{array} \right) \quad (1)$$

Warren, remember to add an equation label to the previous equation!

$$ic = \sum_{i=0}^{25} \frac{f_i(f_i - 1)}{N(N - 1)}$$

As shown in Equation 1, any math structure can be placed in a fraction, as this example shows:

$$\left[\frac{1}{\left(\begin{array}{cc} 2 & 3 \\ 4 & 5 \end{array} \right)} \right]$$

2.1 Sums and Integrals

Sum \sum and integral \int signs are very often decorated with one or more sets of “limits”, which are placed in L_AT_EX (as in T_EX) as superscripts and subscripts. Sum will automatically place their “limits” over and under the symbol in `displaystyle`, but will move them to the side when inlined, such as $\sum_{n=0}^{\infty} \frac{1}{n!} = e$, versus

$$\sum_{n=1}^{\infty} \frac{x^n}{n} = \ln \left(\frac{1}{1-x} \right)$$

Integral signs, however, will not by default move the limits to directly over and under the integral sign in displaystyle, as in $\int_a^x f(t)dt := F(x)$, versus

$$\int_{-\infty}^{\infty} \frac{dx}{1+x^2} = \pi$$

Both symbols will be automatically re-sized when placed in display mode. In display mode, the placement of the limits (directly above and below, or offset to the right from the sign) can be changed by placing the cursor in front of the sign and hitting M-m l. Exactly what change occurs depends on the sign. Certain other mathematical expressions have this feature as well, such as

$$\lim_{x \rightarrow \infty} f(x),$$

which will place the $x \rightarrow \infty$ underneath the “lim” in display mode, but not in inlined mode, $\lim_{x \rightarrow \infty} f(x)$. The \lim , in red, has a special significance. It is considered as a special object in L^AT_EX, so that it treats subscripts that way.

Brackets are available to make it easier to see the layers of parentheses of an abomination such as:

$$\frac{1}{\left(1 + \left(\frac{1}{1 + \left(\frac{1}{1+x}\right)}\right)\right)}$$

or:

$$f(g + \alpha(h(k(l(x))))))$$

You can also create multi-line equations as well, as is shown in the following example:

$$f(x) := \begin{cases} \frac{1}{q}, & \text{if } x = \frac{p}{q} \text{ (in lowest terms)} \\ 0, & \text{if } x \text{ is irrational} \end{cases}$$

3 Tables in L^AT_EX

L^AT_EX has the capability of creating and editing WYSIWYM tables. You can insert a table using either the table toolbar button or Edit > Table > Inset Table. A popup will appear, asking you for the number of rows and columns. The default table has lines at the top and to the left of every cell, a line to the right of the rightmost column and a line at the bottom of the lowest row, forming a box around the table. Additionally, the topmost row also has a line at the bottom, which causes this row to appear separated from the rest of the table. Here’s an example:

	12	45	98
A			
B		multi	
C			

Many objects can be placed inside a table cell. Any single line of text, a math inset (not a displayed or multilined equation, though), or a figure can be in a cell, in fact, all three kinds of objects can be placed in the same cell. Font sizes and shapes can be altered, and the table will adjust to display them properly. However, you can’t put a table inside a cell of another table, nor can you put a

special environment in a cell (like **Section***, etc.), since LyX then tries to put the whole table in that environment, treating it like a paragraph. The results of that will be unpredictable.

It is possible to have multi-line entries in tables, but not in a completely WYSIWYM manner. Here is an example table:

1	2	3
4	This is a multiline entry in a table.	5
6	This is longer now.	7
8	This is a multiline entry in a table. This is longer now.	9
10	This is a <i>multi-line</i> entry in a table. This should be the same as below.	11
12	This is a <i>multi-line</i> entry in a table. This should be the same as above.	13

4 Images

There are three ways of inserting images into LyX:



1. Fixed-position images, which are placed between paragraphs. The image above is such an image.
2. In-line images such as this ∞ one, which appears inside paragraphs.

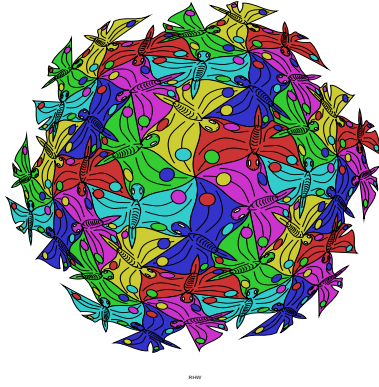


Figure 1: A drawing by M. C. Escher

3. Floating figures, which may or may not appear where they are placed in the LyX document. The system tries to fit them into the ‘best possible position’, where ‘best’ is determined by some heuristics built into L^AT_EX. Here is an example floating image with a caption, Figure 1. It has probably moved around to somewhere else in the final printed form.

Tables can also be inserted in floating form; when this is done, you can add references to tables elsewhere in the document. LyX can also produce a table of figures and a table of tables, similar to the table of contents.

5 Character Tables

Below is a table with all the characters in the Latin1 character set. You should be able to print all these characters directly from the keyboard without using too many modifier keys (if your keyboard is set up correctly, that is). Note that you must set your font encoding (in the Encoding combobox of the Layout > Document popup) to latin1 to use this keyset, and to latin2 to use the Latin2 keyset.

	0	@	P	'	p		ř	À	Ð	à	ð
!	1	A	Q	a	q	ą	ś	Á	Ñ	á	ñ
“	2	B	R	b	r	ć	š	Â	Ò	â	ò
#	3	C	S	c	s	£	ș	Ã	Ó	ã	ó
\$	4	D	T	d	t	d'	t'	Ä	Ô	ä	ô
%	5	E	U	e	u	ě	ı	Å	Õ	å	õ
&	6	F	V	f	v	ę	ű	Æ	Ö	æ	ö
'	7	G	W	g	w	ğ	ű	Ç	Œ	ç	œ
(	8	H	X	h	x	Í	ÿ	È	Ø	è	ø
)	9	I	Y	i	y	ł	ź	É	Ù	é	ù
*	:	J	Z	j	z	ł	ź	Ê	Ú	ê	ú
+	;	K	[	k	{	ń	ź	Ë	Û	ë	û
,	<	L	\	l	|	ň	ij	Ï	Ü	ï	ü
-	=	M	]	m	}	■	ı	Í	Ý	í	ý
.	>	N	^	n	~	ó	ı	Î	Þ	î	þ
/	?	O	_	o		ř	£	Ï	ŠŠ	ï	ß

6 Dropped Capitals

Those of you who like the style of old books probably also like “dropped capitals”—those large capital letters which begin each new chapter or section. Implementing them with plain $\text{L}\text{Y}\text{X}/\text{L}\text{A}\text{T}\text{E}\text{X}$ is straightforward (assuming you know some plain TEX !) but does require a lot of work and many iterations, as you can see by all the ugly TEX -mode stuff at the beginning of this paragraph.

7 The Motivation Behind LYX

Part of the initial challenge of using LYX comes from the change in thinking that you, the user, must make. At one time, all we had for creating documents were typewriters, so we all learned certain tricks to get around their limitations. Underlining, which is little more than overstriking with the “_” character, became a way to emphasize text. To create a table, you figured out beforehand how big each column was to be and set the appropriate tab stops. The same applied for letters and other right justified text. Hyphenation at the end of a line required a careful eye and a lot of foresight.

In other words, we’ve all been trained to worry about the little details of which character goes where. Consequently, almost all word processors have this mentality. They still use tab stops for adding whitespace. You still need to worry about exactly where on the page something will appear. Emphasizing text means changing a font, similar to changing the typewriter wheel. You get the idea.

This is where LYX differs from an ordinary word processor. You don’t concern yourself with what character goes where. You tell LYX *what you’re doing* and LYX takes care of the rest, following a set of rules called a *style*.

Now let’s look at the problem of consistency. Five days later, you reopen your report and start Section 4. However, you forget that you were using 18pt bold instead of 16pt, so you type in the heading for Section 4 in a different font than what you used for Section 1. That problem doesn’t even exist in LYX . The computer takes care of all that silly bookkeeping about which thing has what size font, not you. After all, that’s what a computer is good at.

So, the basic idea behind LYX is: specify what you’re doing, not how to do it. Instead of “what you see is what you get,” the LYX model is “what you see is what you *mean*” or “WYSIWYM.”

7.1 Differences between LYX and Word Processors

Here’s a list of things you won’t find in LYX :

- The document ruler
- Tab stops
- Extra whitespace [i.e. hitting `Enter` or `Space` two or more times]

Tab stops, along with a ruler showing you the position of things on the page, are useless in LYX . The program worries about where things go on the page, not you. Extra whitespace is similar; LYX adds them where necessary, depending on context. Not being able to type two blank lines in a row will be annoying at first, but it makes more sense once you’re thinking in WYSIWYM terms.

Here are some things that exist in LYX , but aren’t used as you might think:

- Indenting controls
- Page breaks
- Line spacing [i.e. single spaced, double spaced, etc.]
- Whitespace, horizontal and vertical
- Fonts and font sizes
- Typefaces [bold, italic, underline, etc.]

Although they exist in L^AT_EX, you generally don't need them. L^AT_EX will take care of these things for you, depending on what you're doing. Different parts of the document are automatically set in a different typeface and font size. Paragraph indenting is context dependent; different types of paragraphs get indented differently. Page breaks get handled automatically, as well. In general, the space between lines, between words, and between paragraphs is variable, set by L^AT_EX.

Lastly, there are a few areas where L^AT_EX [and L^AT_EX] surpasses many word processors:

- Hyphenation
- Lists of any type
- Mathematics
- Tables
- Cross-referencing

Granted, many modern word processors can handle mathematical symbols, tables, and hyphenation, and some are even moving towards style definitions and the WYSIWYM concept. However, they've only recently been able to do so, whereas L^AT_EX is built upon the L^AT_EX document preparation system. L^AT_EX has been around for over 10 years, and *works*. All of the bugs have been long since ironed out.²

²Okay, we know nothing is perfect, but L^AT_EX is as close to bug-free as any computer program can get.