Writing ACM Sig-alternate Papers with LyX

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ABSTRACT

LaTeX creates world-class publishing contents, but writing and revising papers in LaTeX is a tedious and challenging task, especially for those who are new to the technical writings. We present an LyX solution to this issue, and actually every part in this document itself is generated without touching any LaTeX. This template evidently proved the validity of writing serious papers in LyX, and opens a door of effective collaborative paper writing. More than its simplicity, still keep mind that LyX is TeX-based, and hence it retains sufficient functionalities for you to perform enough hacks if you are quite familiar with the LaTeX system.

Categories and Subject Descriptors

H.5.2 [**Information Interfaces and Presentation**]: User Interfaces—*Training, help, and documentation*[1]

General Terms

Theory[2]

Keywords

ACM proceedings, conference publishing, LyX

1. BACKGROUND

1.1 Introduction

LaTeX is the de facto golden standard of technical publishing. However, writing papers with LaTeX also has its drawback that there is semantic gap between LaTeX code and the texts actually to be appeared. To fill such gap, LyX creates an intermediate wrapper layer for LaTeX, providing both a WYSIWYM[3] graphical editor for users, at the same time a LaTeX backend to produce high-quality documents. We have found it ideal to effectively and efficiently creating technical papers using LyX, and created LyX layout for ACM proceedings. No more LaTeX code and tedious details, just write what you want, getting rid of the dirty low-level stuffs – A LyX document is almost always guaranteed to compile if no custom TeX code is used, and this greatly saved time fixing failed LaTeX compilations. Therefore, we build this template for ACM proceedings publishing, and this paper introduces faces of using LyX to produce sig-alternate document.

The easiest way to re-use this layout is copying all files of this template, and accordingly replace all the contents. You can also create a new LyX document with sig-alternate layout and write a paper from scratch – that yields a perfectly tuned ACM proceeding paper. Moreover, this document also contains useful guidance and tips of how to organize a paper, and how to fill paper's meta data (e.g., authors, affiliations, terms and keywords).

Finally, fine-tuned parameters and styles are listed below.

1. References are now in fine shape. Incorrect word breaking and heading numbering issue in the sig-alternate are fixed.
2. Margins and spacing are adjusted for a neat camera-ready conference publishing (e.g, this enumeration itself is an example).

For a complete guide, please refer to the Alternate Author's Guide to Preparing ACM SIG Proceedings [1], the tutorials and documents of LyX, and the rest of this paper.

1.2 Getting into LyX

Here are some quoted introduction to LyX from its official website [2]: LyX is a document processor that encourages an approach to writing based on the structure of your documents (WYSIWYM) and not simply their appearance (WYSIWYG). LyX combines the power and flexibility of TeX/LaTeX with an ease-to-use graphical interface. This results in world-class support for creation of mathematical content (via a fully integrated equation editor) and structured documents like academic articles, theses, and books. In addition, staples of scientific authoring such as reference list and index creation come standard. But you can also use LyX to create a letter or a novel or a theatre play or film script. A broad array of ready, well-designed document layouts are built in.

To use this ACM sig-alternate template, a 2.1 version of LyX is required. Windows and Mac OS X users can directly

[1]Categories and subject descriptors are listed in `http://www.acm.org/about/class/ccs98-html`.

[2]General terms are listed in `http://www.acm.org/about/class/1998`.

[3]What you see is what you *mean*.

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download the install package from the LyX website. If you cannot find the corresponding package in your Linux distribution's software repository (e.g., Ubuntu Linux), please download the source code package and build LyX from scratch. Make sure that the development library of hunspell[4] is installed in order to enable spell checking.

Right after LyX and LaTeX (packages) are ready, this document can be compiled in LyX. The document source itself is a good start to learn writing paper with LyX.

2. WRITING PAPERS WITH LyX

We recommend all the readers to have a look at the LyX tutorial and other official documents first. They are located in "Menu → Help", and are all written by LyX. In this section, we highlight LyX's useful artifacts to facilitate paper writing.

2.1 General Writing and Organization

2.1.1 Headings and Paragraphs

The Environment choice box is located on the left end of the toolbar and looks like this:

It indicates in which environment you are currently writing. While you were writing your first document, it said "Standard," which is the default environment for text. Document artifacts such as sections, subsections, enumerations are both treated as environments.

Within an environment, we write texts. Texts can have different text styles, e.g., select some texts and press *Ctrl-E* will create an `\emph` LaTeX environment, producing results *like this*). Any common character and paragraph options can be altered in a visualized way, including changing font faces and sizes, aligning a paragraph, to name but a few. With the heading and paragraph functions, most parts of a document can be easily created.

2.1.2 Math Environments

The most important reason for writing papers by LaTeX is because writing mathematical formulas in Microsoft Office is tedious, annoying and ugly. In LyX, a shortcut of *Ctrl-M* leads to a almost WYSIWYG formula editor, and you can type LaTeX math commands directly to produce high-quality formulas. For example, the maximum contiguous subarray problem is defined as finding

$$\max_{0\le i\le j<n}\left(\sum_{i\le k\le j} a_k\right)$$

for given $a_0, a_1, \ldots, a_{n-1}$. Both inline, numbered or non-numbered formulas are supported, and (1) illustrates a numbered equation.

$$\lim_{n\to\infty}\frac{1}{n}=0 \tag{1}$$

[4]Specifically, `libhunspell-dev` for Ubuntu Linux.

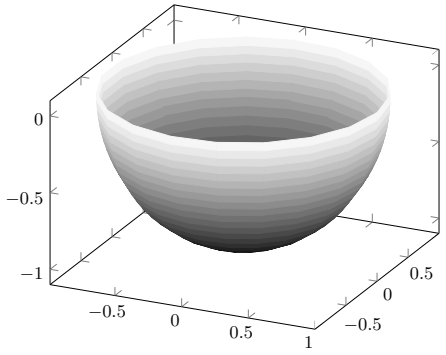
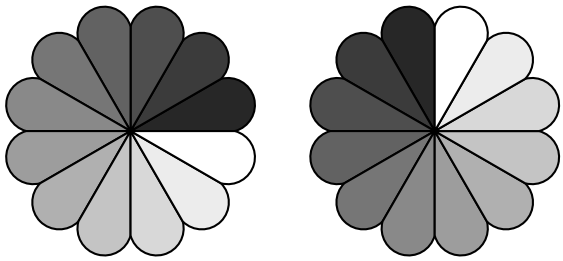


Figure 1: 3D plotting for a bowl



(a) A rosette (b) A rotated rosette

Figure 2: Sub-figure illustration

2.1.3 Figures and Tables

Figures can be inserted by the menu command "Menu → Insert → Float → Figure". You can also add labels and cross-references in the Insert menu. An example is shown in Figure 1. This plot requires a series of LaTeX packages (e.g., TikZ and pgfplots), and these `\usepackage` declarations are written in the "Menu → Document → Settings → LaTeX Preamble". Inserting a Figure environment inside a Figure yields a sub-figure, as as shown in Figure 2. LyX handles all low-level details (e.g., including the `subfig` package) for you.

Creating tables in a graphical-assisted way is a very awesome function of LyX, as shown in Table 1. Creating such a table requires only very little human effort, as opposed to the code-based approaches. If your figure or table is too wide to be fit into a single column, just right click on the gray caption of the float, and chooose "Settings", then "Span columns". This yields a column-spanning `figure*` or `table*`, like Table 1.

2.1.4 Cross References and Citations

LaTeX labels can be inserted by "Menu → Insert → Label". For example, you can insert a label in the section heading, and use "Menu → Insert → Cross-Reference" to refer to this section like 2.1.4. Note that you should *always use protected space* ("Menu → Insert → Formatting → Protected Space") before a cross-reference to avoid unintended line break.

Citations are much like cross-references, and LyX already has built-in BibTeX support. You should always insert the bibliography list at the end of the document by selecting "Menu → Insert → List/TOC → BibTeX Bibliography", and choose the corresponding `bib` file. After bibliography is inserted, use "Menu → Insert → Citation" to insert citations.

Table 1: Testing results

Subject	*Test results*				
	Test Case 1	test Case 2	Test Case 3	Test Case 4	Test Case 5
A	PASS	FAIL	PASS	PASS	FAIL
B	PASS	PASS	FAIL	PASS	PASS

Algorithm 1: The Collatz conjecture

Input: Integer $n \geq 1$
while $n \neq 1$ **do**
  if $n \bmod 2 = 0$ **then**
    $n \leftarrow n/2$;
  else
    $n \leftarrow 3n + 1$;
return *Success* // always reachable

Like cross references, bibliography entries are automatically managed by the LyX runtime.

2.1.5 Algorithms

By enabling the Algorithm2e module of LyX in the document settings, you can insert an algorithm environment by "Menu → Insert → Float → Algorithm". The algorithm environment is much like a normal figure or table. The algorithm body should be written in inset LaTeX code. An example is shown in Algorithm 1.

2.1.6 Theorems and Proofs

Theorem and proof environments are provided.

THEOREM 1 (EULER'S THEOREM). *$a^{\varphi(n)} \equiv 1 \bmod n$, where $\varphi(n)$ is Euler's totient function.*

PROOF. Let $R = \{x_1, x_2, \ldots, x_{\varphi(n)}\}$ be a reduced residue system (mod n) and let a be any integer coprime to n. The sets R and $aR = \{ax_1, ax_2, \ldots, ax_{\varphi(n)}\}$, considered as sets of congruence classes (mod n), are identical, so the product of all the numbers in R is congruent (mod n) to the product of all the numbers in aR:

$$\prod_{i=1}^{\varphi(n)} x_i \equiv \prod_{i=1}^{\varphi(n)} ax_i \equiv a^{\varphi(n)} \prod_{i=1}^{\varphi(n)} x_i \pmod{n},$$

and using the cancellation law to cancel the x_is gives Euler's theorem $a^{\varphi(n)} \equiv 1 \pmod{n}$. □

2.2 Fine-tunings for Conference Publishing

2.2.1 Balancing Columns

Many conferences required to balance columns in the last page, and we have already included the balance package in the preamble. Note that you should not always put the `\balance` command at the end of the document. Instead, putting the `\balance` command between two paragraphs in the first column of the last page yields the correct balancing result.

2.2.2 Customized LaTeX Insets

Finally, whenever you are feeling inconvenience or LyX cannot satisfy your needs, hack it by inserting custom LaTeX code (*Ctrl+L*). Be cautious using this trick because such hacks make the document messy and in exposure of inconsistency.

2.3 Tips for Effective Writing

2.3.1 General Editing

We recommend use LyX's shortcuts to accelerate the writing process (e.g, *Ctrl-R* to compile the source and popup the result, or *Ctrl-Shirt-R* to refresh the compile result). Also, copy-paste is always safe inside LyX. Formats will not be lost and labels and references are properly handled by the LyX system.

2.3.2 Macros

You might find it useful to define macros to simply the representation. User "Menu → Insert → Math → Macro" to create a new macro. Macros can have arguments, and here is an illustration (we defined `\mysum` macro to create summation). Please refer to the LyX document for more details, and the generated formulas are

$$\sum_{k=1}^{n} k^2 = \frac{1}{6} n(n+1)(n+2)$$

and

$$\sum_{k=1}^{n} k^p = \sum_{i=1}^{p} \sum_{j=0}^{i-1} (-1)^j (i-j)^p \binom{n+p-i+1}{n-i} \binom{p+1}{j}.$$

Unfortunately, so far LyX does not support defining customized text macros.

2.3.3 Hierarchical Document Management

If you feel putting all document parts together in a single file is difficult to manage, you can split a LyX file into smaller child documents. To include a LyX file as a child document, the following conditions must be satisfied:

1. Master document and the child document must be of the identical document class (i.e., in this example, sig-alternate).
2. Child document could only use modules that appeared in the master document (i.e., child document can use algorithm2e module only if the master document includes algorithm2e module).

After linking child documents to the master, all cross references and citations are automatically managed by the LyX system. Labels defined in a child document can be referenced in another one or in the master document. Raw TeX files can also be imported (e.g., Figure 1 includes a standalone TikZ picture in a TeX file), but in such a case, the correctness is left for the author.

3. COLLABORATIVE EDITING

3.1 Tracking Changes

Change tracking related functions are listed in the "Menu → Document → Change Tracking". To start revising, start with "Track Changes", and every action you done to the document would be marked as blue[5]: inserted text, deleted text or changed formatting. Another useful function is that you can "Show Changes in Output", which highlights the differences of the original and the revised version in the output document.

3.2 Version Control

If you are using a version control system (e.g., git) to manage sources, and two authors did non-conflicting revisions (e.g., revising two different paragraphs), the automatic fast-forward merging works well: you get a clean new version with changes from two sites correctly merged. In this case, "Menu → File → Version Control → Compare with Older Version" can easily visualize the differences made by both authors.

On the other hand, if there are conflicting revisions, manual efforts are required for a resolve, either by merging the raw LyX code, or by merging in the LyX. Comparing with older version becomes extremely useful in this case.

4. KNOWN BUGS AND ISSUES

Though this template is good enough to produce high-quality ACM compatible camera-ready papers, there are still some issues kept unresolved. It would be nice to see anybody can fix these existing bugs and issues.

1. Widow and orphans cannot be correctly eliminated, even if corresponding penalty values are set (i.e., `\widowpenalty=10000` and `\clubpenalty=10000`). This might be due to the sig-alternate's problem, and hand-tuning is required to eliminate widows and orphans.
2. End of proof (i.e., `\qed`) cannot be correctly handled when the last part of a proof is a display equation. This is due to the ACM template's bug, and we currently have not fixed it.

5. CONCLUSION

We made a thorough introduction to how to effectively and efficiently write papers with LyX in this document. We have we covered essential elements for a successful paper writing, including document artifacts, fine-tunings and collaborative editing. To be an efficient paper writer, we encourage practitioners to practice more, and to be familiar with LyX's shortcuts and advanced features (e.g., macros and change tracking). Any improvement to this template, this document or the LyX's code base is also welcomed.

6. ACKNOWLEDGMENTS

We thank the contributors who greatly improved the template and this template and this article (listed in alphabetic order): XXX, YYY.

7. REFERENCES

[1] Alternate author's guide to preparing ACM SIG proceedings. `http://www.acm.org/sigs/publications/sig-alternate-v1.1`, 2012.

[5]Colors can be changed in the Settings dialog.

[2] LyX homepage. `http://www.lyx.org/`, 2014.