

Read Me First

December 23, 2023

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1 `TEX` and `LATEX`

`TEX` is a typesetting program by Donald Knuth, originally designed for mathematical and scientific documents and increasingly used in other fields. The Mac`TEX` distribution contains the `TEX` program and a large number of support files: fonts, style files, and documentation.

These files are hidden from users; they interact with `TEX` via a front end. Many front ends are available for macOS. If you are already familiar with a front end, perhaps from using it on another operating system, use that program. We provide the front end TeXShop for users brand new to TeX; it has been available for macOS since the introduction of the operating system in 2001.

The ‘smallest possible’ `TEX` knows only primitive input commands. Plain `TEX` is a set of macros (developed by Knuth) which makes `TEX` usable in the everyday life of a typist. See the web site <https://tex.stackexchange.com/questions/97520/what-is-plain-tex> for more details.

Later on, Leslie Lamport developed a more extensive macro set, called `LATEX`, which is often used today, and will be referenced in this document. If you are writing in `LATEX`, you

are using \TeX with a particular set of macros, and you are probably adding many of the style files and packages developed by a multitude of others after Lamport’s work.

2 First Steps with TeXShop

If you have never used \TeX or \LaTeX , we’ll provide a short introduction using TeXShop. Go to `/Applications/TeX` and find the TeXShop application. Drag its icon to your dock. Click this icon to run the program. You will be presented with a blank window; at the top right of this window you’ll find a pull down menu named “Templates”. From this menu choose “ \LaTeX Template”. The blank window will fill with some standard boilerplate required in each \TeX source file. The red lines are comments which \TeX ignores.

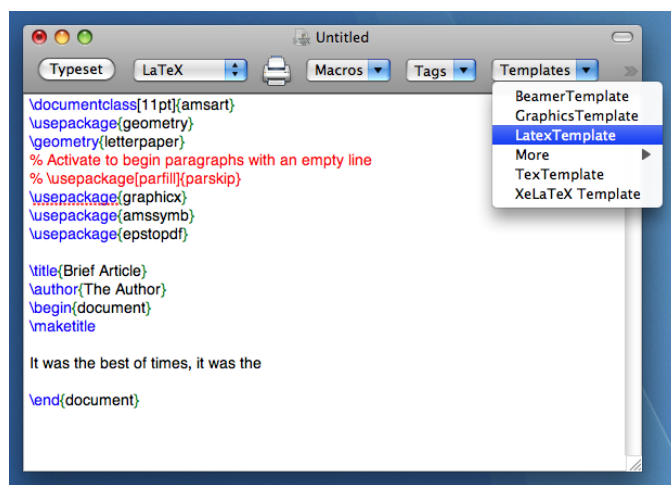


Figure 1: Edit Window

New material goes between these lines:

```
\begin{document}

--- new material ---

\end{document}
```

Type some sentences there now. \TeX will ignore most carriage returns because it knows how to format text, so insert them randomly if you wish. Use a blank line to indicate the start of a new paragraph.

Uncomment the source line with the words “`usepackage[parfill]parskip`” if you prefer to separate paragraphs with an empty line instead of an indent.

When you have some material, hit the “Typeset” button at the top left of the window. A dialog will appear asking you to save the document. You can give the document a name in a field at the top; a field below that shows the folder where the document will be saved. At the right side of this field there is a small arrow. If the arrow points down, click it and the dialog will expand to a form which allows you to navigate to other locations and create new folders.

When \TeX typesets, it creates three or four additional files, so it is not a good idea to save directly to a location with many other files. Instead, navigate to a reasonable location, say `~/Documents`, and then click the “New Folder” button at the bottom of the dialog. Accept the default name or choose another and create the folder. Then name the document and save it. The default “Untitled” name will do.

As soon as you save, \TeX will typeset the document and open a second window showing the result.

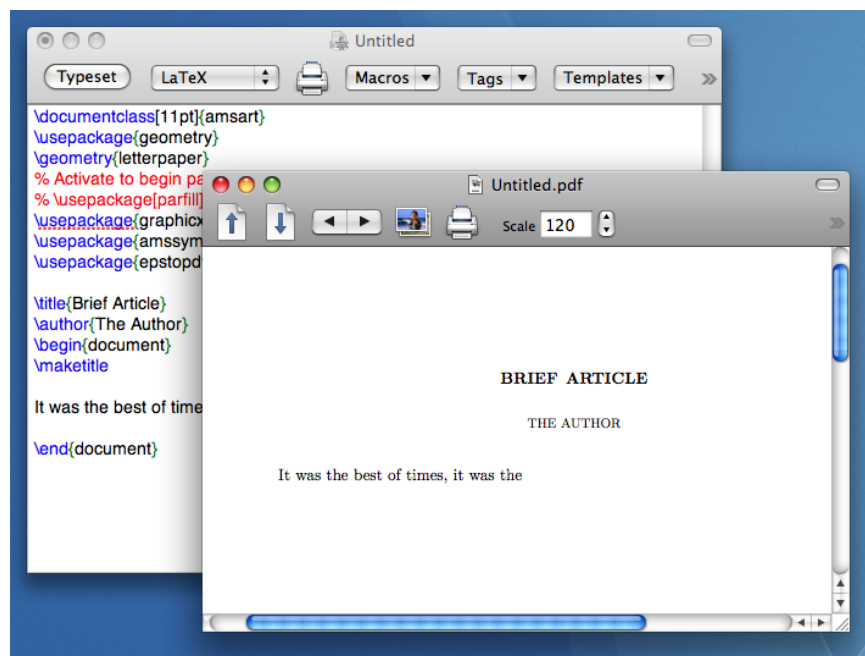


Figure 2: Typeset Window

Go back to the original window and add some additional text. Hit “Typeset” again. This time \TeX immediately typesets the new material and updates the output window.

Close the document by hitting the red button at the top of the edit window. There is no need to save the document first because TeXShop automatically saves regularly.

Quit TeXShop. Then restart it by clicking on the icon in the dock. It is possible to reopen the project by double clicking on the Untitled file or by starting TeXShop and navigating to Untitled in the Open dialog, but there is a much easier way. Start TeXShop and under the File menu choose the item “Open Recent...” In the resulting list, choose the document’s name and you will immediately return to it.

If you do not close the document before quitting TeXShop, then it may reappear automatically the next time you run TeXShop. This depends on a setting in Apple’s System Preferences. Run System Preferences and select the General module. In the middle of the resulting dialog, boxes appear labeled “Ask to keep changes when closing documents” and “Close windows when quitting an app”. If both are unchecked, then TeXShop and most other programs will reopen windows automatically if they were open when the program quit.

One configuration step is highly recommended when you first run TeXShop. Open a project which has both source and preview windows. Resize and position these windows as you prefer. Most users position the source window on the left half of the screen and the preview window on the right half of the screen, with both covering most of their half of the screen, but the choice is up to you. Select the source window and at the bottom of the TeXShop “Source” menu select “Save Source Position”. Select the preview window and at the bottom of the TeXShop “Preview” menu select “Save Preview Position.” After this step is done, all TeXShop windows will open in these positions.

Those are the basics. You will find further information in the TeXShop Help menu. The item “TeXShop Demos” contains two short movies. The first illustrates starting and type-setting a short document, and the second illustrates the configuration just made.

3 Second Steps with T_EX

The next crucial step is to learn T_EX. The easiest way to do that is to pick one or two short introductions to T_EX and work through them while trying examples in TeXShop. After a week or so working in this manner, it will be time to start using the program to write lecture notes and articles.

Ask friends where to start. Because it is how I started, I’d recommend Leslie Lamport’s book *L^AT_EX, A Document Preparation System*. Be sure to get the second edition, which will say “Updated for L^AT_EX 2e”. It would be enough to read chapters 2 and 3, a total of 52 pages.

TeX Live contains a free 139 page book on L^AT_EX, *The Not So Short Introduction to L^AT_EX2e*, by Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl. See [file: /Library/TeX/Root/texmf-dist/doc/latex/lshort-english/lshort.pdf](http://Library/TeX/Root/texmf-dist/doc/latex/lshort-english/lshort.pdf).

The link <https://learnlatex.org> leads to a series of online L^AT_EX lessons, with interactive examples, which were partly funded by the TeX User Group in 2020.

After reading one of these short works, I'd recommend starting to use the program for serious writing. This will be frustrating at first, and you'll probably want to buy one of the excellent books on T_EX for reference as you work. But don't ignore Google! A vast amount of information is available about T_EX and L^AT_EX by asking succinct questions of Google. Try "how do I type a url in LaTeX" if you don't believe me.

4 MacT_EX for Experts

MacT_EX installs T_EX Live 2024 in `/usr/local/texlive/2024`. The distribution it installs is exactly the same as the distribution that would be obtained by using T_EX Live's standard install script. T_EX Live runs on almost all architectures: macOS, Windows, GNU/Linux, and other Unix systems. The distribution is the same on all of these platforms; nothing has been added or removed to customize it for macOS.

The actual binary programs are in `/usr/local/texlive/2024/bin/universal-darwin`. Each is a universal binary containing both Arm code and Intel code. The location `/Library/TeX/texbin` is a symbolic link which indirectly leads to this location. If you use a different front end to T_EX, you should configure it to find the TeX binaries at `/Library/TeX/texbin`.

The MacT_EX installer performs extra tasks which aren't done when you install with T_EX Live's standard script. MacT_EX extends PATH and MANPATH so T_EX binaries and man pages for the distribution are available within Unix shells.

If you were using an earlier TeX distribution like T_EX Live 2023 before you installed MacT_EX-2024, that distribution remains unchanged on your machine after installing the new distribution. You can switch back and forth between T_EX Live 2024 and your old distribution by using the program TeX Live Utility in `/Applications/TeX`. Run this program and select the menu item "Change Default T_EX Live Version" in the Configure menu. A panel will appear listing all TeX distributions on your machine. Click the radio button attached to one of these items to activate that distribution.

When you click that button, PATH and MANPATH and all front ends and utilities are automatically reconfigured. A consequence of the mechanism used to make the command work is that all of the T_EX front ends and utilities provided by MacT_EX are automatically configured for T_EX; this applies to most current programs available over the web, not just those we supply with MacT_EX.

On other Unix machines it is common to set environment variables like TEXINPUTS. While T_EX Live recognizes these variables, it is usually not necessary or desirable to set

them.

MacTeX tries to guess your paper size at installation time. If it makes a mistake, you can set the paper size by running the program TeX Live Utility in `/Applications/TeX`, and selecting the “Change Paper Size...” item in the Action menu.

Use TeX Live Utility to keep your distribution up to date. When the program starts, it lists packages in TeX for which updates are available. Select the “Update All Packages” item in the Action menu to update these packages over the net.

For details about these features, read “What Is Installed” in `/Applications/TeX`.

The full TeX Live is installed in a folder inside `/usr/local/texlive` named for the release date of the distribution. For example, moving the folder 2023 in this location to the trash will erase last year’s distribution.

You may want to add style files, fonts, and other files to the TeX distribution. This can be done in two ways. To install files available only for the current user, create a folder named `texmf` in `~/Library`, where this is the Library folder in your home directory rather than the system Library folder. Create a series of subfolders in this location which match the structure of the folder tree in TeX Live. In practice, this means creating `~/Library/texmf/tex/latex`, `~/Library/texmf/bibtex/bib`, and `~/Library/texmf/bibtex/bst`. Put style files for L^AT_EX in the first location, bib files in the second location, and bst files in the third location.

To install extra files for all users, put the files in `/usr/local/texlive/texmf-local`. This location and an associated folder structure have already been created.

It is easier to use the first location because the user owns this spot and dragging files in and out is easy. Moreover, files placed there will immediately be recognized by TeX. The second location is harder to use because it is owned by root and dragging files in and out requires typing passwords again and again. Moreover, new files will not be recognized there without reindexing, so after adding or subtracting files to `/usr/local/texlive/texmf-local`, you must open Terminal in `/Applications/Utilities` and execute the command “texhash”. Another name for this command is “mktexlsr”.

When L^AT_EX searches for a style file, it first consults `~/Library/texmf` and then `/usr/local/texlive/texmf-local` before searching inside the TeX distribution. This means that if you insert a common style file in `~/Library/texmf`, it will be used rather than the similar files in the main distribution. If you later update the distribution, the old versions will be found first and the updated versions will not be used. This can cause serious typesetting problems when updating TeX Live. Therefore, the local texmf locations should only be used for special files not in TeX Live, like style files for particular journals or local thesis style files.

5 What Is Installed?

The MacTeX-2024 install package contains four subpackages; the final package is optional.

- TeXLive-2024
- GUI-Applications
- Ghostscript-10.02.1
- Ghostscript-10.02.1-Extras

The most important is TeXLive-2024, which installs the full T_EX Live 2024 distribution in `/usr/local/texlive/2024`. T_EX Live is the reference T_EX distribution produced by T_EX user groups across the world; it runs on almost all computer architectures including Windows, GNU/Linux, and other Unix systems. The distribution is the same on all of these platforms; nothing has been added or removed to customize it for macOS. Aside from a few minor links in `/Library/TeX`, the entire distribution is inside the folder 2024. To remove this installation, drag the folder 2024 to the trash.

GUI-Applications installs this document and four applications in `/Applications/TeX`. To uninstall an application, drag it to the trash.

Ghostscript installs support files in `/usr/local/share/ghostscript/10.02.1` and a few binaries in `/usr/local/bin`. In particular, it installs `gs-X11` and `gs-noX11` in `/usr/local/bin`, where the first requires X11 and the second does not. Then MacTeX installs a symbolic link `gs` pointing to the first binary if the user's machine has X11, and to the second binary otherwise. New versions of Ghostscript can be installed over version 10.02.1 without removing 10.02.1 first.

The Ghostscript-Extras package installs the library `libgs /usr/local/share/ghostscript/10.02.1/lib`. This library is used by only one TeX Live program, `dvisvgm`. MacTeX installs symbolic links to this library in `/usr/local/lib`. Otherwise MacTeX deliberately does not install library files in `/usr/local/lib` to avoid confusing other third party program with an unexpected dynamic library. Unless you use `dvisvgm`, there is no reason to install Ghostscript-Extras.

Many more details can be found at the TeX User Site <https://tug.org> and the MacTeX site <https://tug.org/mactex>.