Research Note-Taking with

Zotero
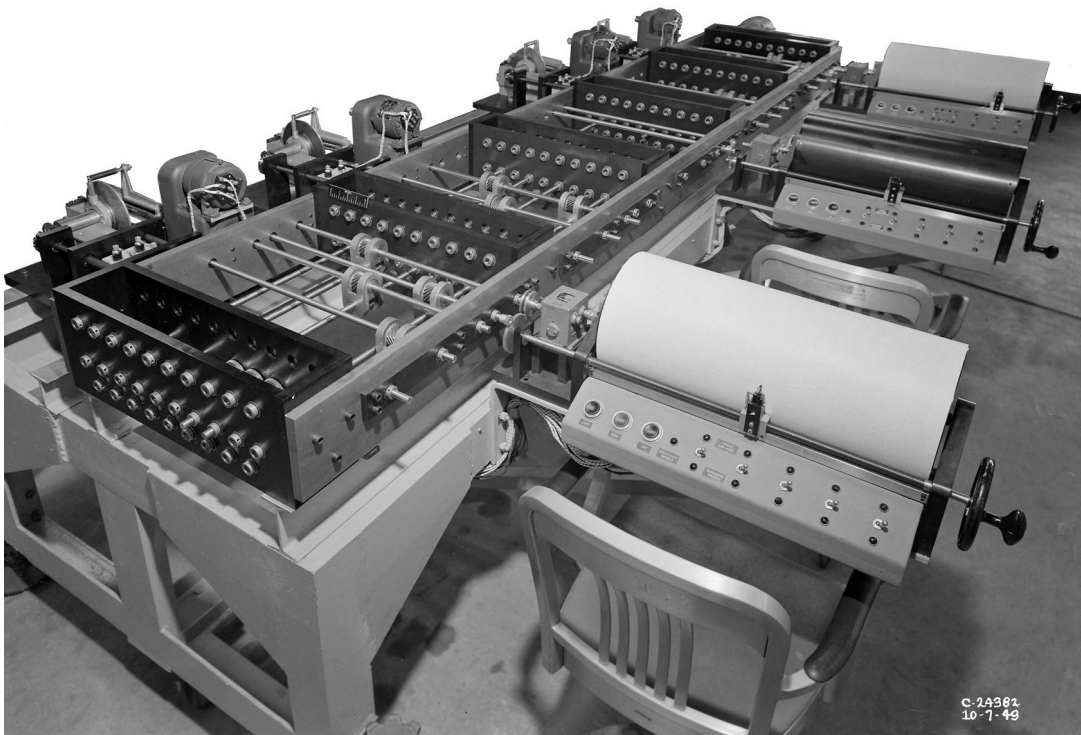
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Research Note-taking

If you write papers based on research for any length of time you will probably accumulate a large number of notes that you may or may not have some way of organizing for future reference. By the same token, your research output will also contain material, often different from your original notes, that could usefully be referred to in future research.

A growing number of apps offer a variety of ways to organize your research notes. A number of these have nice features and many are free and open-source. I have listed some of them in the Appendix. However a simple solution is to make use of your reference management app if it includes features for good note-taking.

Zotero Features

- Open-source and cross-platform. Works very well on Linux, Mac, and Windows.
- Integration with LibreOffice, LyX, Word, and Google Docs.
- The ability to Move Zotero Citations Between Google Docs, Word, and LibreOffice.
- Automatically senses research on the web. One-click download.
- Tag suggestions from existing list; tag pane to find related items.
- Manual addition of related items (links between notes and backlinks).
- Foldable collections, nested collections, and sub-collections of parent items.
- Multiple criteria for sorting standalone notes or along with parent items.
- Excellent advanced search including full text of pdfs with Zotxt plugin, and smart saved searches.
- Zotero is highly customizable and has a number of high quality, very useful add-ons or plug-ins, especially Zotfile,[1] Zotxt, Zutilo, Report Customizer and BetterBibTeX.
- Group library (incl. Notes and, optionally, files) can be created by drag and drop from your Library or collections and shared with collaborators using Zotero.org's free service.
- Database (and notes) can be synced across devices using your account on Zotero.org's free server.
- Import and export entire database to and from a wide range of formats.
- Excellent documentation and support, and continuous development.[2]

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1 Many of the homepages for these add-ons/plug-ins are still set up for the old Zotero which was itself a plug-in for Firefox. To correctly download the add-on right-click on the Download button and select "Save Link As ..." and save the .xpi to your Downloads folder. Then follow the install instructions for installing to Zotero 5 Standalone.
2 Zotero is supported by a nonprofit organization, the Corporation for Digital Scholarship, which develops software for researchers.

Zotero as a Note-taking application

Zotero is a free and open-source bibliographic reference management and citation app that was developed in part with the motivation to give researchers greater freedom to choose the tools they write with.[3] It performs better in most respects than proprietary, expensive bibliographic apps (D'Angelo et al., 2017, Ch.14).[4] Zotero is also a good way to organize your research notes and bibliographic sources together.

Some requirements that enable efficient note-taking[5] are atomicity,[6] unique naming, links to other notes, and tags or keywords. You should also be able to find notes easily and organize them usefully. With Zotero you can set up a workflow to satisfy these requirements and more.

Workflows

Quick Note-taking

Make a quick idea note when you don't want to interrupt your work flow.

1. For quick standalone notes: Open a new note in Zotero: Cmd+Shift+O on Mac or Ctrl+Shift+O on Linux or Windows, and type in the right-hand note editor pane.[7] The note is saved automatically.[8]
2. Go back to elaborate on your notes later in the day when you are ready to add more information. The next section has suggestions on adding information to make your notes more useful for your research.
3. Set a regular time to read through and analyse your idea notes.[9] Questions and associations that arise will give you ideas for further research. New question notes can be added as children to the idea notes.

Annotation Notes

When you install Zotero, the plug-in to integrate with your word processor should be added automatically.[10] You will want to install the connector for your browser, and then you can add reference items from the web to Zotero. If the citation's pdf is open-access, or you have navigated to its page through your institution's library site, the pdf should be attached to your reference item in Zotero's central pane. Double-clicking the item will open the pdf in your default pdf reader for reading and annotating.

Preview on Mac, Okular on Linux,[11] and Adobe Acrobat Reader on Windows will all provide you with annotation tools.[12] If you are using Preview on Mac, the Tools menu points to the

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3   For example, Zotero allows portability between word processors while maintaining live citations.
4   A number of sites list Zotero as note-taking software, but, since it was not specifically designed for that purpose, it does lack some features that are common in dedicated note-taking apps. In particular, Zotero lacks support for adding timestamps, reordering items and notes within its collections tree, and exporting notes (and their metadata). My workflow provides workarounds for these missing features. Zotero's positive features may make up for its drawbacks.
5   Taking notes in class requires a somewhat different approach from taking notes from readings.
6   For your database of notes to be most useful, each note should contain the text and metadata of a single idea. Perhaps two or three sentences. This will allow new connections and patterns between ideas to develop as the database grows. This blogger also advocates the principle of "autonomy" meaning each note can stand on its own. This seems intuitive.
7   You can also edit the note in a larger, separate window by clicking the box at the bottom of the note editor.
8   To make quick note-taking even quicker set Zotero to start at login: System Preferences => Users and Groups => Login Items. I also set the free and open-source Quicksilver as a login item.
9   Reviewing your notes will help you retain the information and ideas in long-term memory (Boch & Piolat, 2005)
10 A good introduction to working with Zotero can be found here.
11 The instructions in this guide apply to Linux Mint. They should be similar for other environments based on Gnome.
12 Adobe's Reader runs on Mac or Windows https://helpx.adobe.com/reader/system-requirements.html. My preferred reader on Mac is Skim which, although a little quirky, comes with many good options. I

annotation features.[13] Highlights are extracted[14] as attached notes by Zotero's Zotfile plug-in. In Zotero's Notes edit pane you can add your summary, comments, related items and tags to these verbatim highlights.

Note also that researchers have found that long-hand note-taking with pen and paper is valuable for improving understanding (Steimle et al., 2007).[15]

For quick annotation[16] notes only the citation of, or link to your reference, and page number is necessary. If you are annotating a pdf attached to a parent item in Zotero the link to the item already exists.[17] Other information can be added as indicated below during an "elaboration"[18] session.

1. A summary of the passage quoted is useful, and a good paraphrase. Be clear on what is quoted verbatim in your notes. Cite the source and include page numbers.
2. Add "tags" or keywords which indicate the general subject, issue etc. directly related to this note.[19]
3. Add links to related items in your Zotero database and to related web 🔗 resources if any.[20]
4. Name the note with an appropriate title, hit the Enter key to put a paragraph break after your title, apply a Heading style to it - I prefer Heading 2 - useful to reorder notes within LibreOffice – point 8 below.

The following points are optional and/or additional to the workflow.

1. To make the best use of notes it is a good practice to separate long notes into small, paragraph sized ones (plus comments etc.) - If necessary, cut and paste each section of a long note to a new note.
2. I use a template for new notes – See the Appendix for my `Annotation_Zettel_Template.txt` and `Standalone_Zettel_Template.txt`
3. On my Mac I have added an espanso[21] text to insert these templates into a note – I just type the letters "z n t" for the annotation template and "z s t" for the standalone template.
4. If desired, you can add a "note to self" as a Blockquote at end of the note.

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have found that comments made with Skim (using "Add New Anchored Note") will be extracted as long as the pdf is then exported as pdf "with embedded notes" (I give it a suffix "N") and this file is then added to the Zotero item as an attachment. Zotero's Add Attachment => Attach Stored Copy of File … opens a dialog with drop-down at top. Go to Recent Places to find the folder (it will have a name like JK8HN7IE) and pdf with suffix "N" - highlight it and click "Open" then extract annotations.

13 I wrote this guide to record my own workflow and I hope it will be useful to others with a similar setup.
14 To extract: Right-click on the item in Zotero's central pane, select Manage Attachments => Extract Annotations. This requires the Zotfile plug-in.
15 For research reading note-taking is essential. Annotate pdfs as you read with highlights (and anchored margin notes if these work with your setup). In books I use sticky notes and type up later. Taking "quick notes" is also important because you need to record your (often valuable but fleeting) ideas as they occur to you.
16 You can also get creative with the way you make notes that refer to a reference source as described here.
17 You can optionally add your own pseudo Citekey. Instead of a Citekey to refer to additional references in your note simply type @authoryearabbreviatedtitlepg (e.g. @Habermas1985ComAct2p97). This can then be replaced with a live citation in LibreOffice.
18 On the linked web page scroll down and read on for suggestions. Standalone notes do not need to be organized into categories. Better just to add links (to Related items) and tags.
19 Keywords are best used economically so that they form a useful network. See the section on Tags & Keywords below.
20 In the notes editor "Related" is at the bottom, adding url links is at the top right. I suggest using links in a similar way to keywords. See the section on Links below.
21 The espanso default.yml file for creating shortcuts is stored at ~/Library/Preferences/espanso/default.yml
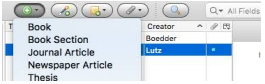
5. To maintain portability,[22] I prefer to add a unique ID as a prefix to the note's name.[23] Also, because the dates are not preserved in notes themselves on export by generating a Report, I record the date and time I made each note.

6. My shortcuts are - on Linux: Shift+Alt+T on Mac: Ctrl+⌘+= I also like to add such a timestamp for each modification.

7. You have the option to create parent items for standalone notes.[24] In Zotero's centre menu panel the first button is "New Item" Create a "Document" parent item with yourself as author and then duplicate it a few times with Zotero's context menu.

8. A link back to the Zotero stored pdf can be added to your note even if the note was not extracted from a pdf annotation.[25] These links are automatically included in generated Reports and can be helpful in the outline stage of writing and can simply be removed in later drafts. Such a link (which will become active in LibreOffice) to the item in Zotero can also be copied to the clipboard by right-clicking the item and using Zutilo "Copy select item links." Or highlight the item and use a (customizable) shortcut which you can set in Tools => Zutilo preferences. Mine is `Shift+W`

9. Use Zotero's customizable26 Report to create an html export of a note,27 collection, or notes in a saved search, which can be copied and pasted as rich text format (.rtf) in LibreOffice writer. The sections can be rearranged using LibreOffice's Navigator.28 You can generate Reports by quick searching for a term matching a section heading in your paper/thesis.

10. For collaboration use Zotero's Groups feature.

Tags & Keywords

A certain degree of metacognition is needed when adding a tag or keyword to a note. It is necessary to consider the purpose of tagging and the purpose of keywords. Tags or keywords added by the software are indexed to speed searching but keywords in general also point to specific subjects or themes within a research project, the name of which may not otherwise be included in the text of the note.

Since Zotero uses the single expression "tag" to refer to all types of tag or keyword, for the sake of clarity, I use "type tags" to refer to tags used for categorization or status of the note or information type and the term "keyword tag" to refer to descriptive "hashtags" or content tags which give information about the subject matter of the note.[26]

The result of a keyword tag search needs to be narrow enough to allow focus but broad enough to show serendipitous connections. For this reason, always immediately give each note at least one keyword tag, but avoid keywords which have only peripheral association with the subject matter of the note. When elaborating on notes add as many appropriate keywords as you like.[27]

The differentiation between type tags and keyword tags may be clear enough so that a formal distinction is not necessary. For example, a note which is assigned the tags: "diplomacy" "todo"

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22 .. and if your notes are plain-text (see below), as in QOwnNotes - I suggest creating these quick note files with MacDown or similar on a Mac. For plain-text notes you can use a compact timestamp for unique ID as part of the name of each note. See scripts in Appendix to integrate this with MacDown on Mac OS X and to use Shift+Alt+D on Linux.
23 See Scripts section in Appendix below.
24 Metadata Related items, and Date added is retained by parent items in reports but not by notes.
25 When you copy and paste an extracted annotation from Zotero the link to the annotated pdf page is clickable.
26 "Tag" and "Keyword" are used in different ways in different syntaxes. Compare the use of "keyword" in the SGML Standard (refers to categories) with the reference to content in relation to web pages (Velásquez et al., 2005)
27 See point 4 about half way through this blog post for one researcher's use of keywords: https://jostwald.wordpress.com/2012/10/20/an-exciting-note-taking-adventure/

and "Ottoman Empire" clearly requires some action by yourself but contains content referring to the subjects: "diplomacy" and "Ottoman Empire."[28]

The Format of Tags and Keywords

If you add your own tags in the text of your note it is sensible to adhere to one of the common conventions for plain-text syntax. Markdown is perhaps the most common. Its syntax does not use the combination: #keyword (with no space) so the hash sign "#" is commonly used for tags. Similarly, the combination: %tag is also available.

Because Zotero's otherwise excellent advanced search does not distinguish between standalone notes and attached notes, it may be useful to distinguish between "research" and "idea" notes. For example "Type" tags with prefix "%%%" are added by my scripts for annotations attached to research sources - %%%annotation and for standalone notes - %%%cjp - insert your initials for the standalone type tag. Some researchers create higher level notes using "Index" tags with prefix "%" or "Contents" tags with prefix "%%" for example.[29]

You can be creative and invent your own tags that convey meaning to you, but have improbable key combinations.[30] Further optional tags, for example, could be !x for important fact, ?x for point to be followed up, ?! for point in dispute.

In order to avoid duplicates of keywords I try to adhere to some simple rules. For example:

- Only proper nouns (Names of specific people, places, etc.) take capitals.
- Use common nouns if appropriate, rather than adjectives.
- Do not end the keyword with a period (full-stop).

Although keywords and tags are often conflated, their usages have historically developed to serve a variety of purposes. While keywords have long been used to describe the subject matter of a text or note, the term "tag" has recently been used for this purpose. However "tag" can also usefully be used to refer to the class or type of the note.

Links

Links between notes and links to reference sources form a wiki-like network of information that allows the discovery of connections between ideas and the grouping of ideas according to your chosen themes. Although full-text search will produce a list of items containing the same term, your handmade links are determined by associations that have occurred to you at the time of making the note. These associations will be closely related to the project you are currently working on and may produce links that you would not necessarily recognize from among the results of a full-text search.

 Zotero's "Related" function makes it simple to insert links to associated items by providing a dialog to search your whole library by multiple criteria.[31]

Annotating "Related" links

When annotating links to related items it is desirable to be concise in expressing the idea relevant to the link. Take a look at how Dan Scheffer annotates his links here.

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28 Compare the definition of Tag given on the org-mode wiki: https://orgmode.org/worg/org-glossary.html#tag and more examples of usage at https://sachachua.com/blog/2008/01/tagging-in-org-plus-bonus-code-for-timeclocks-and-tags/ Whether to make a formal distinction between these classes of tag is a matter of personal choice. Researchers in human or social sciences, however may find tags referring to "method" for example useful when making notes on their own research (Polonsky et al., 2006)

29 If you use "Index" and/or "Contents" notes add relevant new notes to the appropriate index when you elaborate them.

30 See, for example, Bernt Hansen's tags http://doc.norang.ca/org-mode.html#Tags

31 To a large extent this function depends on your deciding upon the associated items because it does not provide Advanced Search capabilities.

Searching your Notes – and Everything

The quick search box will find notes to which you have added your own heading if you use "All Fields & Tags" to search for the heading. Full-text search - "Everything" - requires Full-Text Indexing to be enabled - to search the contents of (most) attached pdf files.

Tag search can be performed either from the quick search box - "All Fields & Tags" – or by opening the tag selector at the bottom of the left Zotero pane. Click on the little dot and any existing tags will be shown.

Advanced Search

Zotero's advanced search is a powerful database query search that allows searching on multiple criteria including "Item Type." However, since standalone notes are not included in "Item Type" options, this is another reason for creating parent items for them.

From an advanced search you have the option to create a Saved Search which will be continuously updated. Saved searches can be used to export items meeting your criteria either by generating a report or using Right-click Export Saved Search. The latter can be used to produce (among many other formats) a plain-text .bib file which can be used by other bibliographic software or opened in any text editor.

Generating Reports from Notes

Generating a report is my recommended way of getting multiple notes out of Zotero. Individual notes can simply be copied and pasted (Export of notes in markdown format is possible with the add-on mdnotes). As suggested above: Use Zotero's customizable[32] Report to produce an html output of a note,[33]selected notes, a collection, or notes in search results or a saved search, which can then be copied and pasted as rich text format (.rtf) into LibreOffice writer.[34]

For example, you can generate a Report by quick searching for a term matching a section heading in your paper/thesis.

This generates a html report of the notes text with essential metadata from the notes.

The Report includes

- Parent item as Heading – allowing notes to be rearranged using LibreOffice's Navigator

- Link back to the note within Zotero

- In the case of Zotfile extracted annotations, the date extracted and a link to the page in the pdf.

- The tags attached to the note(s)

- External links attached to the note(s)

- Report *does not* include Related items attached to the *note*

- Report *does* include Related items attached to the *parent item* of the note

If you have given your notes headings, the sections can be further rearranged using LibreOffice's Navigator.

When Parent Item metadata is exported as a table (to include an abstract, for example) convert the table to text in LibreOffice: Table > Convert > Table to Text > Paragraph

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32 https://github.com/retorquere/zotero-report-customizer
33 Using `Ctrl+click` a subset of notes can be selected.
34 Unfortunately this does not seem to work with Google Docs. You get a similar font size & bold but not a Heading.

Organizing Notes into Outlines

Instructions from https://www.zotero.org/support/reports

Zotero is not designed as an outlining tool. I have listed some excellent outlining and note-taking apps under Open-source Plain-text Note-taking Applications on page 22 below. However it is possible to create outlines from notes that will not need rearranging as discussed above. Reports list child notes with their parent items but here is a way to include child notes in an outline and separated from their parent items:

Change the hidden preference "extensions.zotero.report.combineChildItems" to "false".

To build an outline, you will need to add a number at the beginning of each note to be included: e.g. 1.1, 1.2, 1.3, 2.1 etc. (not 1, 2, 3, 4 because 11 will be inserted before 2). You then need Ctrl to select multiple notes in Zotero, right-click and "Generate Report from items."

When working with a large number of notes use this procedure to avoid having to manually select each one:

1. Add a descriptive tag to each note, such as "chapter one" or "methods".

2. Do an Advanced Search for "Item Type" "is" "Note" and "Tag" "is" "methods".

3. Save the Advanced Search,

4. Right-click on the Saved Search and choose "Generate Report from Saved Search...".

5. Copy and paste the report including only the notes tagged "methods" into the methods chapter of your document.

Zotero Collections

Zotero collections do not function in the same way as nodes in an outliner or most note-taking software. Collections are automatically sorted alphanumerically but do provide a limited way of organizing your research material thanks to to sub-collections. You can drag any item into a collection or sub-collection to place a link from the original in the collection. The items remain in place within "My Library."

An item can be copied to multiple collections and sub-collections. This can be useful for viewing items in projects or topics, for example. If you import items from your browser or from your filesystem to a specific collection or drag them to collections from your library they will always also be part of the master index of "My Library" but will not show up in searches within other collections. This can be used as another way of organizing and filtering items and notes. Note however the limitation that collections are always sorted by Zotero alphanumerically.

Maintenance

1. Setup a Zotero.org account and use it to sync your database (also files if limited in number and size to less than 300 MB – otherwise you can upgrade storage).

2. Make a plain-text backup by exporting "My Library" to BibTeX format including notes (use BetterBibLaTeX export option and "include notes" and "keep updated"). Ideally this .bib file will be stored on an external hard drive or usb connected to your PC or Mac - and offsite if you have a cloud service. Because it is plain text it can also be stored on GitHub or GitLab.

3. Backup (but do not sync) Zotero offsite if you have a cloud service with sufficient capacity. I use Jottacloud which has a backup option separate from sync.

4. Once per week, with Zotero closed, copy the entire Zotero folder to an external drive. (FreeFileSync can be used for this – use the "Update" setting – top right)

5. If you are on a Mac use TimeMachine for full disk backup.[35] I use Borg with Vorta on Linux Mint.

6. From time to time check that your Zotero add-ons are up to date. Tools => ⚙ Add-ons =>

Rich-text Format

Zotero's TinyMCE editor produces rich-text format[36] which can be read by many free and open-source apps, including word processors LibreOffice Writer, AbiWord, Bean,[37] FocusWriter, and Ted;[38] and note-taking apps TiddlyWiki (all platforms), Cherrytree, and TreeLine (Linux and Windows).[39]

Copying and pasting a note or notes from Zotero to LibreOffice reproduces the heading levels from the note. As mentioned above this allows reordering of the sections using LibreOffice Writer's Navigator.

Similarly, copying and pasting a Report generated from multiple notes from Zotero into LibreOffice has the same result.[40]

HTML Format

Zotero's Reports are generated in html format[41] which will be clear when copying and pasting into a plain-text app like MacDown. A number of word processors are capable of opening, editing and saving HTML documents. These include the LibreOffice, OpenOffice, Microsoft, Apple, and AbiWord processors. The TinyMCE editor is another example.

As noted above, copying and pasting from a Zotero Report to LibreOffice, for example, will produce a properly formatted document that can then be edited as usual, including reordering the sections using Navigator. A finished document can be saved from LibreOffice in over a dozen formats, including docx, or exported as a PDF or EPUB.

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35 For added security you can also use SuperDuper. Another good option is the open-source, cross-platform Duplicati.
36 RTF was developed and maintained by Microsoft but the company no longer maintains the standard.
37 Bean 2.4.x is open source.
38 https://en.wikipedia.org/wiki/Rich_Text_Format
39 Apple Notes also supports rich text and there is even a free text exporter app available. Both are proprietary though.
40 If you want to turn this document into multiple plain-text notes one way to do that on Linux or Windows is to Import it into TreeLine with the option to split into multiple notes at paragraph endings. However, on Mac OS X and Linux this can also be achieved with the unix utility awk https://stackoverflow.com/questions/53866088/bash-how-to-split-file-on-empty-line-with-awk. The cross-platform, open-source app QOwnNotes will also split any imported text into multiple .txt or .md notes. The context menu has the option "Split note at cursor position" https://www.qownnotes.org
41 HTML standards are proposed by the W3C (World Wide Web Consortium) Web Platform Working Group while the format is developed by the Web Hypertext Application Technology Working Group (WHATWG).

Appendix

Scripts

Mac

These are my customized shortcuts.[42] See below for script code.

Insert Date and Time: `Ctrl+Cmd+T`

Insert Unique ID: `Crtl+Cmd+U`

Open new .md file with unique name: With [Quicksilver](#) running: `Ctrl+Cmd+W`

Create Parent Item - used for standalone notes: Highlight note and `Shift+P`
No code - This is customized from Zotero's `Tools => Zutilo Preferences => Shortcuts`

Linux

Insert Unique ID: `Shift+Alt+D`

Texpander: `Ctrl+Space`

Insert Timestamp: `Shift+Alt+T`

Code

Bash scripts begin with `#! /bin/sh` You can learn more about scripts [here](#).[43]

The script code below is in `Mono typeface` (that is what you need to copy and paste into your text editor). The filename of scripts is above the code in bold and I have indicated after the code the shortcut I gave to each.

Scripts for Linux

Create a new "Scripts" directory within your home directory and use your text editor[44] to save the code for each script (below) as a text file there.

Make the file executable by either

1. Navigating to the directory in Terminal and doing `chmod +x yourscript.sh` (replace "yourscript" with the name of your script) or
2. On Mac: Open Terminal. Type:

   `chmod +x`

   ...with a space at the end (and do NOT press enter yet).

   Then, drag the file you want to change from the Finder and drop it on top of the Terminal window. The file path and filename should automatically fill in (and you should ensure that there's a space between "+x" and the file path).
   Press Enter.
3. On Linux, in your GUI file navigator (e.g. Nemo) right click on `File => Properties => Permissions=> Allow executing file as program`

Create a shortcut for your script: `Preferences => Keyboard => Shortcuts => Add custom shortcut` ... Give the shortcut a name to match the script then navigate to the "Command" (which is your script) in the box with the file icon. Click Add. Highlight the new item in the

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42 Sometimes there may be a conflict between shortcuts. See [this page.](#)
43 There are many resources on the web to help with learning Bash - Some examples: https://linuxhint.com/30_bash_script_examples/   http://linuxcommand.org/lc3_wss0010.php
44 Three good open-source cross-platform text editors are [Geany, Gedit](#), and [jEdit](#). I also like [Smultron](#).

shortcuts dialog and, in the "Keyboard bindings" below, double-click on the first "unassigned" and use your keyboard to enter your desired key combination for the shortcut.

These scripts require xdotool and xsel to be installed on your system

```
sudo apt update
sudo apt install xdotool
sudo apt install xsel
```

On some versions of Ubuntu/Mint the keystrokes have to be specified fully

see https://askubuntu.com/questions/695017/why-does-my-xdotool-key-command-not-work

Accordingly these scripts have been adjusted from those in version 1.0 of this guide.

InsertUniqueID.sh

```
#! /bin/sh
xdotool keyup Shift_L+Alt_R+d; #send that the user let go of the shift+alt+d keys, otherwise it interferes with ctrl-v
date +%Y%m%d%H%M%S | tr -d "\n" | xsel -i -b; #put Unique ID in the clipboard
xdotool key Control_L+v; #simulate a ctrl-v
```

My assigned shortcut key combination: Shift+Alt+D

InsertTimestamp.sh

```
#! /bin/sh
xdotool keyup Shift_L+Alt_R+t; #send that the user let go of the shift+alt+t keys, otherwise it interferes with ctrl-v
date "+%Y-%m-%d %H:%M:%S" | tr -d "\n" | xsel -i -b; #put the date/time in the clipboard
xdotool key Control_L+v; #simulate a ctrl-v
```

My assigned shortcut key combination: Shift+Alt+T

Texpander provided by Lee Blue. Follow his instructions at https://leehblue.com/ubuntu-text-expander/

texpander.sh

```bash
#!/bin/bash

# Version: 2.0
# Release: November 24, 2017

# Get window id, pass to getwindow pid to output the pid of current window
pid=$(xdotool getwindowfocus getwindowpid)

# Store text name of process based on pid of current window
proc_name=$(cat /proc/$pid/comm)

# If ~/.texpander directory does not exist, create it
if [ ! -d ${HOME}/.texpander ]; then
    mkdir ${HOME}/.texpander
fi

# Store base directory path, expand complete path using HOME environment variable
base_dir=$(realpath "${HOME}/.texpander")

# Set globstar shell option (turn on) ** for filename matching glob patterns on subdirectories of
~/.texpander
shopt -s globstar

# Find regular files in base_dir, pipe output to sed
abbrvs=$(find "${base_dir}" -type f | sort | sed "s?^${base_dir}/??g" )

name=$(zenity --list --title=Texpander --width=275 --height=400 --column=Abbreviations $abbrvs)

path="${base_dir}/${name}"

if [ -f "${base_dir}/${name}" ]
then
  if [ -e "$path" ]
  then
    # Preserve the current value of the clipboard
    clipboard=$(xsel -b -o)

    # Put text in primary buffer for Shift+Insert pasting
    echo -n "$(cat "$path")" | xsel -p -i

    # Put text in clipboard selection for apps like Firefox that
    # insist on using the clipboard for all pasting
    echo -n "$(cat "$path")" | xsel -b -i

    # Paste text into current active window
    sleep 0.3
    xdotool key shift+Insert

    # If you're having trouble pasting into apps, use xdotool
    # to type into the app instead. This is a little bit slower
    # but may work better with some applications.
    #
    # Make xdotool type RETURN instead of LINEFEED characters
    # otherwise some apps like Gmail in Firefox won't recognize
    # newline characters.
    #
    # To use this, comment out line #32 (xdotool key shift+Insert)
    # and uncomment the line below.
    #xdotool type -- "$(xsel -bo | tr \\n \\r | sed s/\\r*\$//)"

    # Restore the original value of the clipboard
    sleep 0.5
    echo $clipboard | xsel -b -i

  else
    zenity --error --text="Abbreviation not found:\n${name}"
  fi
fi
```

My assigned shortcut key combination for Texpander: `Ctrl+Space`
Texpander or espanso can insert templates for plain-text note-taking. See Templates below.

Scripts for Mac

Apple provides many keyboard shortcuts. See, for example, the links below in the section Useful Shortcuts.

Customized shortcuts and scripts will not always work in all applications since there may be conflicts.

You may wish to check to see it Apple's shortcuts provide what you want. Go to
System Preferences => Keyboard => Shortcuts => Services

Insert Unique ID

Open Automator and go to `File => New => Service => Choose`

At the top `"Service receives selected"` scroll down and select `"no input"`

In the search box next to `"Variables"` type "run" click and drag `"Run Applescript"` into the workflow area to the right.

Copy and paste the red text below to replace

(* Your script goes here *)

on run {input, parameters}
            set uiq **to do shell script** "date +'%Y%m%d%H%M%S'"
            tell *application* "System Events"
                        keystroke uiq
            end tell
            return input
end run

`File => Save => Save service as: Insert_UniqueID`   to save the workflow as a service.

Open `System Preferences => Keyboard => Shortcuts =>Services`

Locate your service – It should be under `"General"` toward the end.

Click on the name of your service and click to the right on "none"

Use your keyboard to assign a shortcut.

My assigned keybinding is `Ctrl+Cmd+U`

Insert Short Date and Time

In Automator `File => Open Recent => Insert_UniqueID`

Then `File => Duplicate`

Replace the script from **set** uiq to **end tell** with the script below

    set dateString to do shell script "date +'%Y-%m-%d %k.%M'"
        tell *application* "System Events"
      keystroke dateString
    end tell

 File =. Save => Save service as: Insert_Short_Date_Time to save the workflow as a service.

Set your shortcut for this service. Mine is `Ctrl+Cmd+T`

Texpander or espanso can insert templates for plain-text note-taking. See Templates below.

Scripts for Mac

Apple provides many keyboard shortcuts. See, for example, the links below in the section Useful Shortcuts.

Customized shortcuts and scripts will not always work in all applications since there may be conflicts.

You may wish to check to see if Apple's shortcuts provide what you want. Go to
System Preferences => Keyboard => Shortcuts => Services

Insert Unique ID

Open Automator and go to `File => New => Service => Choose`

At the top `"Service receives selected"` scroll down and select `"no input"`

In the search box next to `"Variables"` type `"run"` click and drag `"Run Applescript"` into the workflow area to the right.

Copy and paste the red text below to replace

(* Your script goes here *)

```
on run {input, parameters}
            set uiq to do shell script "date +'%Y%m%d%H%M%S'"
            tell application "System Events"
                        keystroke uiq
            end tell
            return input
end run
```

`File => Save => Save service as: Insert_UniqueID`   to save the workflow as a service.

Open `System Preferences => Keyboard => Shortcuts =>Services`

Locate your service – It should be under `"General"` toward the end.

Click on the name of your service and click to the right on "none"

Use your keyboard to assign a shortcut.

My assigned keybinding is `Ctrl+Cmd+U`

Insert Short Date and Time

In Automator `File => Open Recent => Insert_UniqueID`

Then `File => Duplicate`

Replace the script from `set uiq` to `end tell` with the script below

```
        set dateString to do shell script "date +'%Y-%m-%d %k.%M'"
            tell application "System Events"
          keystroke dateString
        end tell
```

File =. Save => Save service as: Insert_Short_Date_Time to save the workflow as a service.

Set your shortcut for this service. Mine is `Ctrl+Cmd+T`

Generate unique identifier for plain text file names opening in default markdown app.

On GNU/Linux some good choices are Visual Studio Code, Ghostwriter, and on Mac MacDown

Original script provided by Mark Koester[45]

Insert your own notes folder path in place of "~/All_New_Notes"

For Mac:

zettel.sh

```bash
#!/bin/bash
#
# Bash script to generate a unique identifier for file name
# Used for a Plain Text Writing, Knowledge or Notes System
#
# Opens new file in target program
#
# Can be executed at command line with ~$ source zettel.sh
#
# Creates file like 201902111415.md in ~/All_New_Notes folder

file_date=$( date '+%Y%m%d%H%M' )

TARGET_NAME=${1}


 if [[ -z "$TARGET_NAME" ]]; then
filename="$file_date.md"
  else
    filename="$file_date""_$TARGET_NAME.md"
 fi

if [ -f $filename ]
  then
    echo "File already exists. Skipping."

fi

if [[ -z "$TARGET_NAME" ]]; then

     touch ~/All_New_Notes/$filename
     open ~/All_New_Notes/$filename
 fi
```

My assigned shortcut key combination: `Ctrl+Cmd+W` – with Quicksilver[46] running (with a custom trigger set to run zettel.sh) this will open the new file (created in the folder ~/All_New_Notes) with the default app for .md files.

Click into the title at the top centre of MacDown to add your own text to the title.

---

45 I have borrowed Mark's zettel_identifier_note_creator.bash which he kindly shared on GitHub Gist.
46 I set Quicksilver (on Mac) and Zotero to start at login: System Preferences => Users and Groups => Login Items

For GNU/Linux

Insert your own notes folder path in place of "~/All_New_Notes"

Insert the executable for your preferred markdown app in place of "ghostwriter"

zettel.sh

```bash
#!/bin/bash
#
# Bash script to generate a unique identifier for file name
# Used for a Plain Text Writing, Knowledge or Notes System
#
# Allows for following Options when entering ./zettel.sh on the command line:
# -o: opening file in a target program
# Additional Title or name appended to end of file name
#
# Examples
# ./zettelnote.bash # creates file like 201902111415.md
# ./zettelnote.bash -o # create and open file
# ./zettelnote.bash test # creates file like 201902111415_test.md
file_date=$( date '+%Y%m%d%H%M' )

if

 [[ $1 = "-o" ]]; then

TARGET_NAME=${2}

else

TARGET_NAME=${1}

fi

if [[ -z "$TARGET_NAME" ]]; then

filename="$file_date.md"

else

filename="$file_date""_$TARGET_NAME.md"

fi

if [ -f $filename ]

then

echo "File already exists. Skipping."

else

echo "Creating Note File: " $filename

touch ~/All_New_Notes/$filename

fi

if

 [[ $1 = "-o" ]]; then

echo "Opening file"

ghostwriter $filename

fi
```

For GNU/Linux: If you want to always have the file open in your markdown editor this can be assigned a keyboard shortcut.

zettel_o.sh

```
#!/bin/bash
#
# Bash script to generate a unique identifier for file name
# Used for a Plain Text Writing, Knowledge or Notes System
#
# Opens file in target program
#

file_date=$( date '+%Y%m%d%H%M' )


TARGET_NAME=${1}


if [[ -z "$TARGET_NAME" ]]; then
  filename="$file_date.md"
 else
   filename="$file_date""_$TARGET_NAME.md"
fi

if [ -f $filename ]
  then
    echo "File already exists. Skipping."
else
  echo "Creating Note File: " $filename
  touch $filename
fi

echo "Opening file"

code $filename
```

This will open the file in the popular markdown editor Visual Studio Code which works well with this script.

Create a shortcut for this script: Preferences=>Keyboard=>Shortcuts=>Add custom shortcut
Command: `gnome-terminal -e /home/user/scripts/zettel_o.sh`
Where "user" is your username.
In VSCode you can easily add the title you want after the ID by right-clicking on the file in the VSCode sidebar=>Rename.

Use pandoc to convert .odt files to .md

This requires use of the command line and for pandoc to be installed on your system. Open Terminal and navigate to the dedicated folder where you sent .odt files, as suggested, from Master Document of LibreOffice – See Plain-text Note-taking with Zotero? below. Paste this script into Terminal.

```
for i in *.odt ; do echo "$i" && /usr/local/bin/pandoc -s $i -o $i.md ; done
```

Hit Enter

The Command Line and Bash

Here are a few resources for learning to use the command line:

Beginner

https://programminghistorian.org/en/lessons/intro-to-bash

https://www.educative.io/blog/bash-shell-command-cheat-sheet

https://guide.bash.academy/

https://ryanstutorials.net/

https://towardsdatascience.com/basics-of-bash-for-beginners-92e53a4c117a

https://tutorials.ubuntu.com/tutorial/command-line-for-beginners#0

http://linuxcommand.org/lc3_learning_the_shell.php

http://linuxcommand.org/tlcl.php

https://www.tldp.org/LDP/Bash-Beginners-Guide/html/

https://learntocodewith.me/command-line/unix-command-cheat-sheet/

https://www.kendallgiles.com/intro-unix-command-line/intro.html

https://datacarpentry.org/shell-genomics/01-introduction/index.html

Advanced

https://wiki.archlinux.org/index.php/Command-line_shell

https://tldp.org/LDP/abs/html/

https://www.tldp.org/LDP/abs/abs-guide.pdf

https://devconnected.com/advanced-bash-scripting-guide/

Templates

You may find these useful if implementing a plain-text note-taking workflow outside of Zotero. On GNU/Linux and Mac you can add an espanso[47] text to insert these templates into a note. I suggest the shortcuts "z n t" for the annotation template and "z s t" for the standalone template.

Standalone_Zettel_Template.txt

```
title:     A concise summary of main points prepended with a unique ID. The actual
zettel should start with this title text (i.e: delete the field name "title" and anything
else preceding it). Field names from "title" onward should be included in the zettel
```

e.g: 20210421192645 Developmental stages posited by all major theorists

```
compare:


related: (optionally annotate these)


notes:


references:



keywords: #    "tags" in markdown. The leading "#" is a markdown convention
```

e.g: #development #creativity #rationality #stages

```
mentions:          e.g: Freud, Erikson, Piaget
external links:



modified:
type tags: %%%cjp
status: - [ ] {EdPhD}
```

_____

title: A concise summary of main points prepended with a unique ID. The actual zettel should start with this title text (i.e: delete the field name "title" and anything else preceding it). Field names from "title" onward should be included in the zettel

author:

dates: a year (string) and nested era (string)

url: string

select item link: from Zotero Zutilo e.g: zotero://select/library/items/FQJ5W48M (these links are generated in Zotero reports and should be active in LibreOffice writer – otherwise you can type a short title, use Zutilo to copy the full path, and insert a hyperlink)[48]

cite: a bibkey   from same or another zettel and page number or range of page numbers

summary: string - concise summary of the note (instead of a paraphrase)
---

note: string - if verbatim text you are wanting to cite surround with:

\begin{quote}
A faith in the inevitability of a progression from less to more mature is present in the writings of the three major Western theorists of development: Freud, Erikson, and Piaget all posited a sequence of developmental stages through which children ascended to more satisfying, creative, or rational states.
\end{quote}

quotes: "quotable quote 1"; "quotable quote 2"
comment: string - any comment you want to make about the zettel in general

status: [ ] {"EdPhD"}

modified: timestamp

compare:

related: (optionally annotate these)

keywords: #

external links:

Easy CiteKey:

modified:

_____

_____

48 Absolute paths work in LibreOffice but markdown requires relative paths. If your markdown notes are in a folder under your home folder such as ~/notes/, then your link will look something like this linux example: [Heraclitus](/../home/user/Zotero/storage/CHPWWPET/Graham_2019_Heraclitus.pdf) The leading "/.." is required to point to the relative path i.e. back to home folder from ~/notes/

Useful Shortcuts

Zotero

Copy select item links

The Zotero plug-in, Zutilo can copy links from items in your library. In LibreOffice these should be clickable and can be useful during the outline stage of writing.[49] (Note: they are automatically included in generated Reports)

In Zotero: Tools => Zutilo Preferences => Shortcuts Scroll to "Copy select item links" and assign a shortcut. Mine is `Shift+W`

Similarly Zutilo provides a customizable script to create a parent item. I use this on standalone notes. My shortcut is `Shift+P`

Quick Copy Easy Citekey

Quick Copy is a way to get the Citekey from Zotero in various formats. `Cmd+Shift+C` or `Ctrl+Shift+C` copies the Citekey to the clipboard. Drag and drop also works.

Set the Default Format to Easy Citekey on Mac at `Zotero menu => Preferences => Export`

On Linux: `Edit => Preferences => Export`

More Zotero shortcuts at https://www.zotero.org/support/kb/keyboard_shortcuts

Mac

Mac OS X shortcuts here: https://support.apple.com/en-us/HT201236 and here: https://www.digitaltrends.com/computing/mac-keyboard-shortcuts/

Linux-Mint

Numerous web pages give linux shortcuts for various purposes. Some useful ones can be found here https://community.linuxmint.com/tutorial/view/45

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49 If using markdown and your markdown notes are in a folder under your home folder such as ~/notes/, then your link will look something like this linux example:
[Heraclitus](/../home/user/Zotero/storage/CHPWWPET/Graham_2019_Heraclitus.pdf)
The leading "/.." is required to point to the relative path i.e. back to home folder from ~/notes/

Plain-text Note-taking with Zotero?

One of Zotero's limitations is its inability to export notes in plain text.[50] For anyone who has ever experienced being "locked in" to an app because of its proprietary format, plain-text note-taking is an attractive option.[51] Export of notes in markdown format is possible with the add-on mdnotes.

If your notes are plain-text, as in QownNotes, you can create quick note files (also with MacDown or similar on a Mac - see scripts above). For plain-text notes you can use a compact timestamp for unique ID as part of the name of each note. See scripts in Appendix (including how to integrate this with MacDown or other apps on Mac OS X and also on Linux.

At the time of writing, to my knowledge, only quasi plain-text note-taking is possible with Zotero.

Zotero allows drag-and-drop of files to its main "Items" pane. You can create a new item and drag a .txt or .md file onto it and it becomes an attachment to which notes can be added. However these attachments become part of the database and are no longer plain-text.[52]

The Advanced Search in Zotero allows searches to be saved and then a customizable Report can be made from the saved search. The .md files could be exported (as a concatenated file) in this way. Copy and paste from the Report.

Links can of course be added in Markdown including links to a url, a resource on your network,[53] or a cross-reference.

Zotero notes can be copied and pasted into your favorite Markdown editor. You can paste the source code below an extracted annotation in Zotero into the Markdown file to get a clickable link that will take you to the page in the pdf e.g:
`<a href="zotero://open-pdf/library/items/X3VQ5RRC?page=1">Popper 2014:1</a>` is rendered as Popper 2014:1. Note however this is not possible with Zotero-5.0.97-beta because the notes editor is no longer html based.
Another option to get your notes sub-collection or saved search from Zotero into multiple plain-text notes is to use Reports. As described in the section above on Generating Reports of Notes you can generate a report, customize it to clear the fields you don't want, paste it into LibreOffice and split it into sub-documents. `File => Send => Create Master Document`. Save the sub-documents in a dedicated folder where you can use a bash script to convert to .md.[54] QOwnNotes allows you to split a note at the cursor, so this might be simpler.

However, if convenience and ease of use are important, luckily, the rtf format used by Zotero, although not as portable as plain-text, is also quite portable.

Although the new note editor and Mdnotes plugin probably make templates redundant in Zotero, you can use a template for new text notes in other apps – See the Appendix for my `Annotation_Zettel_Template.txt` and `Standalone_Zettel_Template.txt`

To distinguish between "research" and "idea" notes status tags could be used.

---

50 You can export all notes (incl. parent items) as one plain-text file by Right-clicking to export a collection, a saved search, or Right-click on one of a selection of items (Ctrl+click to select) as a BibTeX file using the Better BibLaTeX export. Standalone notes will need to have a parent item.

51 Zotero's code is open source. It has about 30 export options. BibTeX export is enhanced by Better BibLaTeX.   Note: The Zotero export documentation says: Import/export is not recommended for transferring entire Zotero libraries between systems, and, if you use Zotero's word processor plugins, links to Zotero items from existing word processor documents will be lost after an export/import. See the Maintenance section above for backups and transferring.

52 The original remains in its own folder but is not updated by changes made in Zotero.

53 If your markdown notes are in a folder under your home folder such as ~/notes/, then your link will look something like this linux example:
[Heraclitus](/../home/user/Zotero/storage/CHPWWPET/Graham_2019_Heraclitus.pdf)
The leading "/.." is required to point to the relative path i.e. back to home folder from ~/notes/

54 See page 18 above for script to convert .odt files to .md.

For example "Type" tags with prefix "%%%" are added by my scripts for standalone notes - %%%cjp - insert your initials for the standalone type tag.

Some researchers create higher level notes using "Index" tags with prefix "%" or "Contents" tags with prefix "%%" for example.[55]

You can be creative and invent your own tags that convey meaning to you, but have improbable key combinations.[56] Further optional tags, for example, could be !x for important fact, ?x for point to be followed up, ?! for point in dispute.

Some researchers annotate their manually inserted "Related" links in their notes. When annotating links to related items or other notes it is desirable to be concise in expressing the idea relevant to the link. Take a look at how Dan Scheffer annotates his links here.

Open-source Plain-text Note-taking Applications

In most note-taking apps notes can be dragged to any order and exported in sequence. Insert citations from Zotero is generally possible with Zotxt or ZotPick (Mac only). In general all Markdown apps can add footnotes.

Cross-Platform

Org-mode Runs within Emacs and its variants (such as Spacemacs). Very versatile, steep learning curve. Programmed in E-Lisp. Tags. Excellent folding. Todo. Word target. Good footnote handling. Citations. Projects. Cite with org-ref. Undo tree. Vim or Emacs mode. Timestamp. Annotate PDF possible. Links. Very good search. Highly customizable. Versioning and collaboration with built-in Git support. Very good import and export. Pandoc. Many coding languages supported, syntax highlighting. Spellcheck. Online & Internal help is excellent. Huge community of users will answer questions on Reddit, Stackexchange etc.

Joplin Markdown note-taking and todo app. Uses an SQLite database. Javascript with Electron wrapper. Auto code & syntax detection & highlighting. GitHub flavoured Markdown. Web clipping. Pandoc integration. Import Enex (Evernote); Markdown files. Export Joplin Export format and raw .md files, to JSON or to PDF. Versioning. Sync with end-to-end encryption. Tasks/todo including alarms. Customizable. Excellent search. Image handling. Attachments as links (drag and drop on desktop app). Multi-layer folding. Links. Tags. Unique ID. Add metadata to note. Terminal app. Vim or Emacs mode in internal editor. ToDo. Dark theme. Also Android, iOS, and portable.

Zettlr Markdown editor with Zettelkasten for academic writing. Electron, Node.js, CodeMirror. Codeblocks, syntax highlighting, many languages. Zotero integration. With MS Word, LibreOffice etc through pandoc. Very good import/export. Sync. Highly customizable. Excellent search. LaTeX math. Virtual directories (collections). Folding. Links. Tags. Unique ID. Modes: Note-taking, Zettelkasten system, Full IDE. Readability mode. Night mode. Sidebar modes. Distraction free. Word target. Very good footnote handling. Citations - loads database CSL JSON or BibTeX database. Projects. Project export as pdf. Write and store in markdown, txt, tex (switches syntax highlighting to LaTex) files.

Zettelkasten 3 Digital slip box, or filing card system based on Niklas Luhmann's Zettelkasten. Notes stored as xml files and .bib. Programmed in Java. Citations. Outliner. Footnotes. Import authors & notes from BibTex file with update option. Imports & exports notes as separate items. V. Good export incl ODT. Find/show note sequences. Does not display duplicates. Excellent search (includes synonym search). Add metadata. Unique ID. Tags. Links. Tree folding. Attachments. Image handling. Autosave, backup to designated folder on exit. Pandoc. Spellcheck. Extensive tooltips. Note: No longer actively developed.

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55 If you use "Index" and/or "Contents" notes add relevant new notes to the appropriate index when you elaborate them.

56 See, for example, Bernt Hansen's tags http://doc.norang.ca/org-mode.html#Tags

QOwnNotes Plain-text markdown notes with (optional) Nextcloud integration. C++ with Qt framework. Notes stored as individual markdown files grouped into a hierarchy. IOS app. Split note at cursor position. Equation solver. External note diff. Tags: Incl. tag hierarchy. Tags are stored as metadata outside of the note text. Modes: Vim, dark, distraction free, full screen, & typewriter modes. View note in file manager. Workspaces. Timestamp or unique ID. Links. Image handling. Good search. Highly customizable. Priority, reminders, "completed" for ToDo items. Taskwarrior script for Linux and Mac. Collaboration through NextCloud with notification of external modifications to current note. Encrypt note. Sync with mobile devices, desktops through NextCloud, ownCloud or Git. Versioning. Autosave. Web clipping. Codeblocks.

GNU/Linux and Windows

Cherrytree A hierarchical note taking application storing data in a single xml or sqlite file. Programmed in C++/Gtk3. Portable app available. Provides Optional web-browser interface. Built-in terminal. Night mode. Nested notebooks. Timestamp. Tags. Links. Tree folding. TOC. Image handling. Excellent search. Encryption. Sync. Highly customizable. Stong import support. Print/save as pdf, export to html/plain text. Export to multiple plain text files. Export node and sub-nodes with TOC. Backup and Autosave. Pandoc integration. Codeboxes, execution, many supported languages, syntax highlighting. Spellcheck. Tasks/todo.

TreeLine Outliner. Mini-database. Programmed in Python, Qt. Notes can be stored as plain text, rich text, HTML, numbers, dates, times, booleans, URLs, etc. stored in a specific JSON text format. Markup: Plain text or RTF. Very flexible data storage features. Child nodes displayed as scrivenings. Sort by title or by predefined key fields. Data can be automatically re-arranged using categories from data fields. Add metadata including the file name, path, size, modified date and modified time. Timestamp. Tags or keywords can be configured as data types. Links. Cloned nodes. Templates. Saved search. Highly customizable. Tasks/todo can be set as fields. Encryption. Good individual file import. No bulk import except perhaps as CSV import or paragraph import. Export HTML, txt, XML, ODF, bookmarks. Autosave. Excellent Help built in and online. Spellcheck plugin.

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Cover Image: Water Droplet Computer https://archive.org