Welcome to your Jupyter Book

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This is a small sample book to give you a feel for how book content is structured. It shows off a few of the major file types, as well as some sample content. It does not go in-depth into any particular topic - check out the Jupyter Book documentation for more information.

Check out the content pages bundled with this sample book to see more.

Markdown Files

Whether you write your book's content in Jupyter Notebooks (`.ipynb`) or in regular markdown files (`.md`), you'll write in the same flavor of markdown called **MyST Markdown**. This is a simple file to help you get started and show off some syntax.

What is MyST?

MyST stands for "Markedly Structured Text". It is a slight variation on a flavor of markdown called "CommonMark" markdown, with small syntax extensions to allow you to write **roles** and **directives** in the Sphinx ecosystem.

For more about MyST, see the MyST Markdown Overview.

Sample Roles and Directives

Roles and directives are two of the most powerful tools in Jupyter Book. They are kind of like functions, but written in a markup language. They both serve a similar purpose, but **roles are written in one line**, whereas **directives span many lines**. They both accept different kinds of inputs, and what they do with those inputs depends on the specific role or directive that is being called.

Here is a "note" directive:

> **Note**
>
> Here is a note

It will be rendered in a special box when you build your book.

Here is an inline directive to refer to a document: Notebooks with MyST Markdown.

Citations

You can also cite references that are stored in a `bibtex` file. For example, the following syntax: `{cite}`holdgraf_evidence_2014`` will render like this: [HdHPK14].

Moreover, you can insert a bibliography into your page with this syntax: The `{bibliography}` directive must be used for all the `{cite}` roles to render properly. For example, if the references for your book are stored in `references.bib`, then the bibliography is inserted with:

[HdHPK14] Christopher Ramsay Holdgraf, Wendy de Heer, Brian N. Pasley, and Robert T. Knight. Evidence for Predictive Coding in Human Auditory Cortex. In *International Conference on Cognitive Neuroscience*. Brisbane, Australia, Australia, 2014. Frontiers in Neuroscience.

Learn more

This is just a simple starter to get you started. You can learn a lot more at jupyterbook.org.

Notebooks with MyST Markdown

Jupyter Book also lets you write text-based notebooks using MyST Markdown. See the Notebooks with MyST Markdown documentation for more detailed instructions. This page shows off a notebook written in MyST Markdown.

An example cell

With MyST Markdown, you can define code cells with a directive like so:

```
print(2 + 2)
```

```
4
```

When your book is built, the contents of any `{code-cell}` blocks will be executed with your default Jupyter kernel, and their outputs will be displayed in-line with the rest of your content.

> **See also**
>
> Jupyter Book uses Jupytext to convert text-based files to notebooks, and can support many other text-based notebook files.

Create a notebook with MyST Markdown

MyST Markdown notebooks are defined by two things:

1. YAML metadata that is needed to understand if / how it should convert text files to notebooks (including information about the kernel needed). See the YAML at the top of this page for example.
2. The presence of `{code-cell}` directives, which will be executed with your book.

That's all that is needed to get started!

Quickly add YAML metadata for MyST Notebooks

If you have a markdown file and you'd like to quickly add YAML metadata to it, so that Jupyter Book will treat it as a MyST Markdown Notebook, run the following command:

```
jupyter-book myst init path/to/markdownfile.md
```

Content with notebooks

You can also create content with Jupyter Notebooks. This means that you can include code blocks and their outputs in your book.

Markdown + notebooks

As it is markdown, you can embed images, HTML, etc into your posts!

You can also add_{math} and

$$math^{blocks}$$

or

$$\mathrm{mean} la_{tex}$$

$$mathblocks$$

But make sure you \$Escape \$your \$dollar signs \$you want to keep!

MyST markdown

MyST markdown works in Jupyter Notebooks as well. For more information about MyST markdown, check out the MyST guide in Jupyter Book, or see the MyST markdown documentation.

Code blocks and outputs

Jupyter Book will also embed your code blocks and output in your book. For example, here's some sample Matplotlib code:

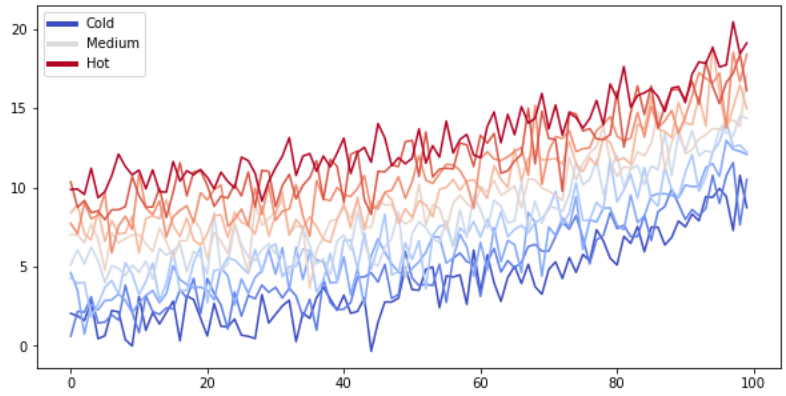
```
from matplotlib import rcParams, cycler
import matplotlib.pyplot as plt
import numpy as np
plt.ion()
```

```
# Fixing random state for reproducibility
np.random.seed(19680801)

N = 10
data = [np.logspace(0, 1, 100) + np.random.randn(100) + ii for ii in range(N)]
data = np.array(data).T
cmap = plt.cm.coolwarm
rcParams['axes.prop_cycle'] = cycler(color=cmap(np.linspace(0, 1, N)))


from matplotlib.lines import Line2D
custom_lines = [Line2D([0], [0], color=cmap(0.), lw=4),
                Line2D([0], [0], color=cmap(.5), lw=4),
                Line2D([0], [0], color=cmap(1.), lw=4)]

fig, ax = plt.subplots(figsize=(10, 5))
lines = ax.plot(data)
ax.legend(custom_lines, ['Cold', 'Medium', 'Hot']);
```



There is a lot more that you can do with outputs (such as including interactive outputs) with your book. For more information about this, see the Jupyter Book documentation

Notebook Bash

```
man ls
```

```
LS(1)                       General Commands Manual                      LS(1)

NNAAMMEE
     llss – list directory contents

SSYYNNOOPPSSIISS
     llss [--
@@AABBCCFFGGHHIILLOOPPRRSSTTUUWWaabbccddeeffgghhiikkllmmnnooppqqrrssttuuvvwwxxyy11
%%,,] [----ccoolloorr=_w_h_e_n]
        [--DD _f_o_r_m_a_t] [_f_i_l_e _._._.]

DDEESSCCRRIIPPTTIIOONN
     For each operand that names a _f_i_l_e of a type other than directory, llss
     displays its name as well as any requested, associated information.  For
     each operand that names a _f_i_l_e of type directory, llss displays the names
of
     files contained within that directory, as well as any requested, associated
     information.

     If no operands are given, the contents of the current directory are
     displayed.  If more than one operand is given, non-directory operands are
     displayed first; directory and non-directory operands are sorted separately
     and in lexicographical order.

     The following options are available:

     --@@      Display extended attribute keys and sizes in long (--ll) output.

     --AA      Include directory entries whose names begin with a dot (‘_.’)
except
             for _. and _._..  Automatically set for the super-user unless --II is
             specified.

     --BB      Force printing of non-printable characters (as defined by ctype(3)
             and current locale settings) in file names as \_x_x_x, where _x_x_x
is
```

the numeric value of the character in octal. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--CC Force multi-column output; this is the default when output is to a terminal.

--DD _f_o_r_m_a_t
When printing in the long (--ll) format, use _f_o_r_m_a_t to format the date and time output. The argument _f_o_r_m_a_t is a string used by strftime(3). Depending on the choice of format string, this may result in a different number of columns in the output. This option overrides the --TT option. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--FF Display a slash (‘/’) immediately after each pathname that is a directory, an asterisk (‘*’) after each that is executable, an at sign (‘@’) after each symbolic link, an equals sign (‘=’) after each socket, a percent sign (‘%’) after each whiteout, and a vertical bar (‘|’) after each that is a FIFO.

--GG Enable colorized output. This option is equivalent to defining CLICOLOR or COLORTERM in the environment and setting ----ccoolloorr=_a_u_t_o.
(See below.) This functionality can be compiled out by removing the definition of COLORLS. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--HH Symbolic links on the command line are followed. This option is assumed if none of the --FF, --dd, or --ll options are specified.

--II Prevent --AA from being automatically set for the super-user. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--LL Follow all symbolic links to final target and list the file or directory the link references rather than the link itself. This option cancels the --PP option.

--OO Include the file flags in a long (--ll) output. This option is incompatible with IEEE Std 1003.1-2008 (“POSIX.1”). See chflags(1) for a list of file flags and their meanings.

--PP If argument is a symbolic link, list the link itself rather than the object the link references. This option cancels the --HH and --LL options.

--RR Recursively list subdirectories encountered.

--SS Sort by size (largest file first) before sorting the operands in lexicographical order.

--TT When printing in the long (--ll) format, display complete time information for the file, including month, day, hour, minute, second, and year. The --DD option gives even more control over the output format. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--UU Use time when file was created for sorting or printing. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--WW Display whiteouts when scanning directories. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--aa Include directory entries whose names begin with a dot (‘_.’).

--bb As --BB, but use C escape codes whenever possible. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--cc Use time when file status was last changed for sorting or printing.

----ccoolloorr=_w_h_e_n
Output colored escape sequences based on _w_h_e_n, which may be set to either aallwwaayyss, aauuttoo, or nneevveerr.

aallwwaayyss will make llss always output color. If TERM is unset or set to an invalid terminal, then llss will fall back to explicit ANSI escape sequences without the help of termcap(5). aallwwaayyss is the default if ----ccoolloorr is specified without an argument.

aauuttoo will make llss output escape sequences based on termcap(5), but only if stdout is a tty and either the --GG flag is specified or the COLORTERM environment variable is set and not empty.

nneevveerr will disable color regardless of environment variables.
nneevveerr is the default when neither ----ccoolloorr nor --GG is specified.

For compatibility with GNU coreutils, llss supports yyeess or ffoorrccee as
equivalent to aallwwaayyss, nnoo or nnoonnee as equivalent to nneevveerr, and ttttyy or
iiff--ttttyy as equivalent to aauuttoo.

--dd Directories are listed as plain files (not searched recursively).

--ee Print the Access Control List (ACL) associated with the file, if present, in long (--ll) output.

--ff Output is not sorted. This option turns on --aa. It also negates the effect of the --rr, --SS and --tt options. As allowed by IEEE Std
1003.1-2008 (“POSIX.1”), this option has no effect on the --dd, --ll, --RR and --ss options.

--gg This option has no effect. It is only available for compatibility with 4.3BSD, where it was used to display the group name in the long (--ll) format output. This option is incompatible with IEEE Std 1003.1-2008 (“POSIX.1”).

--hh When used with the --ll option, use unit suffixes: Byte, Kilobyte, Megabyte, Gigabyte, Terabyte and Petabyte in order to reduce the number of digits to four or fewer using base 2 for sizes. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--ii For each file, print the file's file serial number (inode number).

--kk This has the same effect as setting environment variable BLOCKSIZE to 1024, except that it also nullifies any --hh options to its left.

--ll (The lowercase letter “ell”.) List files in the long format, as described in the _T_h_e _L_o_n_g _F_o_r_m_a_t subsection below.

--mm Stream output format; list files across the page, separated by commas.

--nn Display user and group IDs numerically rather than converting to a user or group name in a long (--ll) output. This option turns on the --ll option.

--oo List in long format, but omit the group id.

--pp Write a slash (‘/’) after each filename if that file is a directory.

--qq Force printing of non-graphic characters in file names as the character ‘?’; this is the default when output is to a terminal.

--rr Reverse the order of the sort.

--ss Display the number of blocks used in the file system by each file. Block sizes and directory totals are handled as described in _T_h_e _L_o_n_g _F_o_r_m_a_t subsection below, except (if the long format is not
also requested) the directory totals are not output when the output is in a single column, even if multi-column output is requested. (--ll) format, display complete time information for the file, including month, day, hour, minute, second, and year. The --DD option gives even more control over the output format. This option is not defined in IEEE Std 1003.1-2008 (“POSIX.1”).

--tt Sort by descending time modified (most recently modified first). If two files have the same modification timestamp, sort their names in ascending lexicographical order. The --rr option reverses both of these sort orders.

Note that these sort orders are contradictory: the time sequence is in descending order, the lexicographical sort is in ascending order. This behavior is mandated by IEEE Std 1003.2 (“POSIX.2”). This feature can cause problems listing files stored with sequential names on FAT file systems, such as from digital cameras, where it is possible to have more than one image with the same timestamp. In such a case, the photos cannot be listed in the sequence in which they were taken. To ensure the same sort order for time and for lexicographical sorting, set the environment variable LS_SAMESORT or use the --yy option. This causes llss to reverse the lexicographical sort order when sorting files with the same modification timestamp.

--uu Use time of last access, instead of time of last modification of the file for sorting (--tt) or long printing (--ll).

```
     --vv      Force unedited printing of non-graphic characters; this is the
               default when output is not to a terminal.

     --ww      Force raw printing of non-printable characters.  This is the
               default when output is not to a terminal.  This option is not
               defined in IEEE Std 1003.1-2001 (“POSIX.1”).

     --xx      The same as --CC, except that the multi-column output is produced
               with entries sorted across, rather than down, the columns.

     --yy      When the --tt option is set, sort the alphabetical output in the
same
               order as the time output.  This has the same effect as setting
               LS_SAMESORT.  See the description of the --tt option for more
               details.  This option is not defined in IEEE Std 1003.1-2001
               (“POSIX.1”).

     --%%      Distinguish dataless files and directories with a '%' character in
               long

     --11      (The numeric digit “one”.) Force output to be one entry per line.
               This is the default when output is not to a terminal.  (--ll) output,
               and don't materialize dataless directories when listing them.

     --,       (Comma) When the --ll option is set, print file sizes grouped and
               separated by thousands using the non-monetary separator returned by
               localeconv(3), typically a comma or period.  If no locale is set,
               or the locale does not have a non-monetary separator, this option
               has no effect.  This option is not defined in IEEE Std 1003.1-2001
               (“POSIX.1”).

     The --11, --CC, --xx, and --ll options all override each other; the last one
     specified determines the format used.

     The --cc, --uu, and --UU options all override each other; the last one
specified
     determines the file time used.

     The --SS and --tt options override each other; the last one specified
     determines the sort order used.

     The --BB, --bb, --ww, and --qq options all override each other; the last one
     specified determines the format used for non-printable characters.

     The --HH, --LL and --PP options all override each other (either partially or
     fully); they are applied in the order specified.

     By default, llss lists one entry per line to standard output; the exceptions
     are to terminals or when the --CC or --xx options are specified.

     File information is displayed with one or more (blank)s separating the
     information associated with the --ii, --ss, and --ll options.

   TThhee LLoonngg FFoorrmmaatt
     If the --ll option is given, the following information is displayed for each
     file: file mode, number of links, owner name, group name, number of bytes
     in the file, abbreviated month, day-of-month file was last modified, hour
     file last modified, minute file last modified, and the pathname.  If the
     file or directory has extended attributes, the permissions field printed by
     the --ll option is followed by a '@' character.  Otherwise, if the file or
     directory has extended security information (such as an access control
     list), the permissions field printed by the --ll option is followed by a '+'
     character.  If the --%% option is given, a '%' character follows the
     permissions field for dataless files and directories, possibly replacing
     the '@' or '+' character.

     If the modification time of the file is more than 6 months in the past or
     future, and the --DD or --TT are not specified, then the year of the last
     modification is displayed in place of the hour and minute fields.

     If the owner or group names are not a known user or group name, or the --nn
     option is given, the numeric ID's are displayed.

     If the file is a character special or block special file, the device number
     for the file is displayed in the size field.  If the file is a symbolic
     link the pathname of the linked-to file is preceded by “->”.

     The listing of a directory's contents is preceded by a labeled total number
     of blocks used in the file system by the files which are listed as the
     directory's contents (which may or may not include _. and _._. and other
files
     which start with a dot, depending on other options).

     The default block size is 512 bytes.  The block size may be set with option
     --kk or environment variable BLOCKSIZE.  Numbers of blocks in the output will
     have been rounded up so the numbers of bytes is at least as many as used by
```

the corresponding file system blocks (which might have a different size).

The file mode printed under the --ll option consists of the entry type and the permissions. The entry type character describes the type of file, as follows:

--	Regular file.
bb	Block special file.
cc	Character special file.
dd	Directory.
ll	Symbolic link.
pp	FIFO.
ss	Socket.
ww	Whiteout.

The next three fields are three characters each: owner permissions, group permissions, and other permissions. Each field has three character positions:

1. If rr, the file is readable; if --, it is not readable.

2. If ww, the file is writable; if --, it is not writable.

3. The first of the following that applies:

   SS If in the owner permissions, the file is not executable and set-user-ID mode is set. If in the group permissions, the file is not executable and set-group-ID mode is set.

   ss If in the owner permissions, the file is executable and set-user-ID mode is set. If in the group permissions, the file is executable and setgroup-ID mode is set.

   xx The file is executable or the directory is searchable.

   -- The file is neither readable, writable, executable, nor set-user-ID nor set-group-ID mode, nor sticky. (See below.)

   These next two apply only to the third character in the last group (other permissions).

   TT The sticky bit is set (mode 1000), but not execute or search permission. (See chmod(1) or sticky(7).)

   tt The sticky bit is set (mode 1000), and is searchable or executable. (See chmod(1) or sticky(7).)

The next field contains a plus (‘+’) character if the file has an ACL, or a space (‘ ’) if it does not. The llss utility does not show the actual ACL; use getfacl(1) to do this.

EENNVVIIRROONNMMEENNTT

The following environment variables affect the execution of llss:

BLOCKSIZE	If this is set, its value, rounded up to 512 or down to a multiple of 512, will be used as the block size in bytes by the --ll and --ss options. See _T_h_e _L_o_n_g _F_o_r_m_a_t subsection for more information.
CLICOLOR	Use ANSI color sequences to distinguish file types. See LSCOLORS below. In addition to the file types mentioned in the --FF option some extra attributes (setuid bit set, etc.) are also displayed. The colorization is dependent on a terminal type with the proper termcap(5) capabilities. The default “cons25” console has the proper capabilities, but to display the colors in an xterm(1), for example, the TERM variable must be set to “xterm-color”. Other terminal types may require similar adjustments. Colorization is silently disabled if the output is not directed to a terminal unless the CLICOLOR_FORCE variable is defined or ----ccoolloorr is set to “always”.
CLICOLOR_FORCE	Color sequences are normally disabled if the output is not directed to a terminal. This can be overridden by setting this variable. The TERM variable still needs to reference a color capable terminal however otherwise it is not possible to determine which color sequences to use.
COLORTERM	See description for CLICOLOR above.

COLUMNS If this variable contains a string representing a decimal integer, it is used as the column position width for displaying multiple-text-column output. The llss utility calculates how many pathname text columns to display based on the width provided. (See --CC and --xx.)

LANG The locale to use when determining the order of day and month in the long --ll format output. See environ(7) for more information.

LSCOLORS The value of this variable describes what color to use for which attribute when colors are enabled with CLICOLOR or COLORTERM. This string is a concatenation of pairs of the format _f_b, where _f is the foreground color and _b is the background color.

The color designators are as follows:

aa	black
bb	red
cc	green
dd	brown
ee	blue
ff	magenta
gg	cyan
hh	light grey
AA	bold black, usually shows up as dark grey
BB	bold red
CC	bold green
DD	bold brown, usually shows up as yellow
EE	bold blue
FF	bold magenta
GG	bold cyan
HH	bold light grey; looks like bright white
xx	default foreground or background

Note that the above are standard ANSI colors. The actual display may differ depending on the color capabilities of the terminal in use.

The order of the attributes are as follows:

1. directory
2. symbolic link
3. socket
4. pipe
5. executable
6. block special
7. character special
8. executable with setuid bit set
9. executable with setgid bit set
10. directory writable to others, with sticky bit
11. directory writable to others, without sticky bit

The default is "exfxcxdxbxegedabagacad", i.e., blue foreground and default background for regular directories, black foreground and red background for setuid executables, etc.

LS_COLWIDTHS If this variable is set, it is considered to be a colon-delimited list of minimum column widths. Unreasonable and insufficient widths are ignored (thus zero signifies a dynamically sized column). Not all columns have changeable widths. The fields are, in order: inode, block count, number of links, user name, group name, flags, file size, file name.

LS_SAMESORT If this variable is set, the --tt option sorts the names of files with the same modification timestamp in the same sense as the time sort. See the description of the --tt option for more details.

TERM The CLICOLOR and COLORTERM functionality depends on a terminal type with color capabilities.

TZ The timezone to use when displaying dates. See environ(7) for more information.

EEXXIITT SSTTAATTUUSS

The llss utility exits 0 on success, and >0 if an error occurs.

EEXXAAMMPPLLEESS

List the contents of the current working directory in long format:

```
           $ ls -l

     In addition to listing the contents of the current working directory in
     long format, show inode numbers, file flags (see chflags(1)), and suffix
     each filename with a symbol representing its file type:

           $ ls -lioF

     List the files in _/_v_a_r_/_l_o_g, sorting the output such that the most
recently
     modified entries are printed first:

           $ ls -lt /var/log

CCOOMMPPAATTIIBBIILLIITTYY
     The group field is now automatically included in the long listing for files
     in order to be compatible with the IEEE Std 1003.2 (“POSIX.2”)
     specification.

LLEEGGAACCYY DDEESSCCRRIIPPTTIIOONN
     In legacy mode, the --ff option does not turn on the --aa option and the --
gg,
     --nn, and --oo options do not turn on the --ll option.

     Also, the --oo option causes the file flags to be included in a long (-l)
     output; there is no --OO option.

     When --HH is specified (and not overridden by --LL or --PP) and a file
argument
     is a symlink that resolves to a non-directory file, the output will reflect
     the nature of the link, rather than that of the file.  In legacy operation,
     the output will describe the file.

     For more information about legacy mode, see compat(5).

SSEEEE AALLSSOO
     chflags(1), chmod(1), getfacl(1), sort(1), xterm(1), localeconv(3),
     strftime(3), strmode(3), compat(5), termcap(5), sticky(7), symlink(7)

SSTTAANNDDAARRDDSS
     With the exception of options --gg, --nn and --oo, the llss utility conforms
to
     IEEE Std 1003.1-2001 (“POSIX.1”) and IEEE Std 1003.1-2008 (“POSIX.1”).  The
     options --BB, --DD, --GG, --II, --TT, --UU, --WW, --ZZ, --bb, --hh, --ww, --
yy and --, are non-
     standard extensions.

     The ACL support is compatible with IEEE Std 1003.2c (“POSIX.2c”) Draft 17
     (withdrawn).

HHIISSTTOORRYY
     An llss command appeared in Version 1 AT&T UNIX.

BBUUGGSS
     To maintain backward compatibility, the relationships between the many
     options are quite complex.

     The exception mentioned in the --ss option description might be a feature
     that was based on the fact that single-column output usually goes to
     something other than a terminal.  It is debatable whether this is a design
     bug.

     IEEE Std 1003.2 (“POSIX.2”) mandates opposite sort orders for files with
     the same timestamp when sorting with the --tt option.

macOS 12.3                      August 31, 2020                      macOS 12.3
```

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