JupyterHub Introduction into the Markdown Syntax

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1. What exactly is Markdown?

In general: Markdown is a lightweight markup language that allows formatting elements to be added to plain text documents. It was developed by John Gruber in 2004 and is now one of the most popular markup languages in the world (Cone, 20202).

Using Markdown is a little different from using a regular text editor, such as Microsoft Word. In applications like Word, you click buttons to format words and sentences so that the changes are immediately visible. This is not the case with Markdown. When you create a file formatted with Markdown, you add Markdown syntax to the text to indicate which words and phrases should look different (Cone, 2020).

2. Markdown in JupyterLab/Hub

Where to use Markdown within Jupyter

We assume that the launcher is already open. Here we have several options to use the Markdown language: Among other things, it goes as Notebook, but also under the option "Other" it is possible to select Markdown File.

How this works and how to use the language is explained in the following tutorial and the first steps with Jupyter are described.



Figure 1: Open Launcher via JupyterHub - Options for using Markdown

Using Markdown in a Notebook

Not only Python can be used via Notebook, but also the Markdown language can be used in the cells. The launcher does not automatically identify which language is used. Therefore, it is important that the cell type is defined. JupyterHub has automatically predefined the cell type "Code". So, if you write in the Markdown language, the cell type must be set to "Markdown" (Figure 2).

To create a preview, the selected cells must be scrolled, this can be done in the tab of the launcher or by holding SHIFT+ENTER.



Figure 2: Running through Markdown via JupyterHub Notebook or within a Launcher

When Markdown is used in the notebook via launcher option, it is also possible to save and download, or export it afterwards as e.g. LaTex, PDF, HTML, Asciidoc and much more.

This is NOT possible when using Markdown under the Launcher option "Other" as "Markdown File". Here there is only the possibility to save the created files individually as Markdown file.

How this looks like and is done will be explained in the following section.

Other

If "Other" is selected via the Launcher option then "Markdown File", a blank window appears. It must be made clear that there are no notebook options here. A Markdown file is used. The language is therefore predefined.

If you want to create a preview of the script afterwards, you just have to right-click in the window and choose "Show Markdown Preview". To get back to the edit mode, just right click again in the preview window and select "Show Markdown Editor". Normally, when you select the "Show Markdown Preview", the view just splits (as shown in Figure 3). Here you can continue to work in editor uninterrupted and at the same time have the preview directly in sight.



Figure 3: Markdown File Editor (on the left side) and the Markdown Preview (on the right side)

Here you can simply write down everything on the Markdown language and then only save and download the editor as a Markdown file. If you want to export the Markdown script afterwards, you just must copy the written text from the "Markdown File" editor and paste it into a Notebook cell or cells. As mentioned in the previous section: This option is only possible via the "Notebook" option.

3. Basics

This is an introduction into the basic syntax of the lightweight markdown language. The following examples were created within the JupyterHub platform and adapted and modified from those of Matt Cone (2022). Right here at the beginning I point all who want to learn more to the book "The Markdown Guide", by Matt Cone (see Further References).

Headings

To create a Heading, add the number sign (#) in front of the phrase. The number of used signs must correspond to the heading level.:

Markdown	HTML	Preview
# Heading level 1 ## Heading level 2	<h1>Heading level 1</h1>	Heading level 1
### Heading level 3	<h2>Heading level 2</h2> <h3>Heading level 3</h3> <h4>Heading level 4</h4>	Heading level 2
#### Heading level 4 ##### Heading level 5	<h5>Heading level 5</h5> <h6>Heading level 6</h6>	Heading level 4
###### Heading level 5		Heading level 6

Markdown applications don't agree on how to handle a missing space between the number signs (#) and the heading name. For compatibility, always put a space between the number signs and the heading name. You should also put blank lines before and after a heading for compatibility.

Note	Preview	
# Here's a Heading #Here's a Heading	Here's a Heading	

Alternative Syntax

Alternatively, on the line below the text, add any number of == characters for heading level 1 or - - characters for heading level 2.

Markdown	HTML	Preview
Heading level 1	<h1>Heading level 1</h1>	Heading level 1
	<h2>Heading level 2</h2>	Heading level 2

Paragraphs

Create paragraphs, by using a blank line to separate one or more lines of a text.

Markdown	HTML	Preview
I really like using Markdown.	I really like using Markdown.	l really like using Markdown.
I think I'll use it to format all of	I think I'll use it to format all	I think I'll use it to format all of my
my documents from now on.	of my documents from now on.	documents from now on.

Unless the paragraph is in a list, do not indent paragraphs with spaces or tabs. This can result in unexpected formatting problems.

Note	Preview
Don't put tabs or spaces in front of your paragraphs.	Don't put tabs or spaces in front of your paragraphs.
Keep lines left-aligned like this	Keep lines left-aligned like this
This can result in unexpected formatting problems.	This can result in unexpected formatting problems.
Don't add tabs or spaces in front of paragraphs.	Don't add tabs or spaces in front of paragraphs.

Line Break

To create a line, end a line with two or more spaces, and then type return.

Markdown	HTML	Preview
This is the first line.	p>This is the first line.	This is the first line.
And this is the second line.	nd this is the second line.	And this is the second line.

In almost any Markdown application, you can use two or more spaces (often called "trailing spaces") as line breaks, but this is debatable. Trailing spaces are hard to see in editors, and many people put two spaces after each sentence, either accidentally or on purpose. So, you probably want to use something other than a trailing space for line breaks. If your Markdown application supports HTML, you can use the
 HTML tag.

For compatibility, use trailing spaces or
 HTML tags at the end of lines.

JupyterHubs lightweight markup language also allow you to type a backslash (\) at the end of a line.

Note	Preview
First line with two spaces after. And the next line. First line with the HTML tag after. And the next line. First line with a backslash after.\ And the next line.	First line with two spaces after. And the next line. First line with the HTML tag after. And the next line. First line with a backslash after. And the next line.

Emphasis

You can emphasize text by making it bold or italic.

Italic

To italicize text, add one asterisk or underscore before and after a word or phrase. To italicize the middle of a word for emphasis, add one asterisk without spaces around the letters.

Markdown	HTML	Preview
Italicized text is the *cat's meow*. Italicized text is the _cat's meow A*cat*meow	Italicized text is the cat's meow . Italicized text is the cat's meow . A cat meow	Italicized text is the <i>cat's meow.</i> Italicized text is the <i>cat's meow.</i> A <i>cat</i> meow

Bold

bold text, add two asterisks or underscores before and after a word or phrase. To bold the middle of a word for emphasis, add two asterisks without spaces around the letters.

Markdown	HTML	Preview
I just love **bold text**. I just lovebold text Love**is**bold	I just love bold text . I just love bold text . Love is bold	l just love bold text . I just love bold text . Love is bold

Bold and Italic

To emphasize text with bold and italics at the same time, add three asterisks or underscores before and after a word or phrase. To bold and italicize the middle of a word for emphasis, add three asterisks without spaces around the letters.

Markdown	HTML	Preview
This text is ***really important***. This text isreally important This text is*really important* This text is **_really important_**. This is really***very***important text.	This text is really important/em>. This text is really important/em>. This text is really important/em>. This text is really important/em>. This is really veryimportant text.	This text is really important . This is really very important text.

Markdown applications do not agree on how to handle underscores in the middle of a word. Therefore, use asterisks to bold up or italicize the middle of a word.

Blockquotes

To create a blockquote, add a < before the paragraph. It is also possible to create blockquotes across multiple paragraphs. Put a < on a blank line between paragraphs.

If you want to apply nested block quotes, just add << before the paragraph you want to nest.



Blockquotes may contain other elements in Markdown format. But be careful! Not all items are used!

Example	Preview
<pre>#### Blockquotes with Other Elements > #### The quarterly results look great! > - Revenue was off the chart. > - Profits were higher than ever. > *Everything* is going according to **plan**. #### Blockquotes Tips Try to put a blank line before > This is a blockquoteand after a blockquote.</pre>	Blockquotes with Other Elements The quarterly results look great! Revenue was off the chart. Profits were higher than ever. Everything is going according to plan. Blockquotes Tips Try to put a blank line before This is a blockquoteand after a blockquote. Without blank lines, this might not look right. This is a blockquote Don't do this

Lists

It is possible to organize items into ordered or unordered lists.

Ordered Lists

To create an ordered list, add line items with numbers followed by periods. The numbers don't have to be in numerical order, but the list should start with the number one.



JupyterHub, like some other lightweight markup languages, let you use parathesis ()) as a delimiter (e.g., 1) Number one). Not all Markdown applications support this. Test the compatibility first!

Unordered Lists

To create an unordered list, add dashes (-), arterisks (*), or plus signs (+) in front of the written items. To create a nested list: indent one or more items.

If you need to start an unordered list with a number followed by a period, you can use a backlash (\) to escape the period.



Adding Further Elements into a List

You can generate further lightweight markdown features into a list. To insert another element into a list while not affecting the continuity of the list.

Code

If you wish to format a phrase as a code, enclose it in brackticks (`).

Markdown	HTML	Preview
#### Code	<h4>Code</h4>	Code
At the command prompt, type 'nano'.	At the command prompt, type <code>nano</code> .	At the command prompt type name.
##### Escaping Backits	<h4>Escaping Backits</h4>	Escaping Backits
``Use 'code' in your Markdown file.``	<code>Use `code` in your Markdown file.</code>	Use 'code' in your Markdown file.

You can also always escape the brackticks rule, by simply adding add another pair of brackticks (``).

To generate code blocks, enclose each line of the block with at least four spaces or a tab.

Links

You can also optionally add a caption for the link. This appears as a tooltip when the user hovers the mouse pointer over the link. To add a title, wrap it in quotation marks after the URL.

There is also a shortcut to make a URL or Email address the link. You just put angle brackets around the address you want to link to.

Example	Preview
<pre>#### Adding Titles My favorite search engine is [Duck Duck Go] (https://duckduckgo.com "The best search engine for privacy"). ##### URLs and EMail Adresses <https: www.geo.uni-bremen.de=""> <fake@example.com></fake@example.com></https:></pre>	Adding Titles My favorite search engine is Duck Duck Go. URLs and EMail Adresses https://www.geo.uni-bremen.de fake@example.com

Reference-style Links

Reference-style links represent a particular type of link that simplifies the view and reading of URLs in Markdown. Reference-style links have two parts: the part you leave in your text, and the part you store elsewhere in the file to make the resulting text more readable.

The First Part

The first section of a link is formatted with pairs of parentheses. The first set of parentheses encloses the text that you want to link. The second set of brackets shows a label that refers to the link you are storing elsewhere in your document.

Although it is not required, you can add a blank space between the first and second set of parentheses. The caption in the second set of parentheses is not case-sensitive, and it can include letters, numbers, spaces, or punctuation marks.

The Second Part

The reference style second part of a link is formatted with the following attributes:

• The label in brackets, which is immediately followed by a colon and at least one space (for example, [label]:).

- The URL for the reference, which you can wrap in angle brackets as an alternative.
- The optional title for the reference, you can enclose it in double quotes, single quotes, or parentheses.

As a small info, the second part of the link is of course not visible as Markdown Preview. The view in the example is only to see how to write the links and how this looks in the final format.

Example	Preview
<pre>#### Reference-Style Links ##### Reference-Style Links ##### How the First Part is Formated [GEO Bremen Homepage[1] GEO Bremen Homepage [J] ##### Second Part []]: https://www.geo.uni-bremen.de []]: https://www.geo.uni-bremen.de [GEO Bremen Homepage" []]: https://www.geo.uni-bremen.de [GEO Bremen Homepage" []]: <https: <https:="" []]:="" []]]:<="" td="" www.geo.uni-bremen.de=""><td>Formating Links I love supporting the EFF. This is the GEO Bremen. See the section on code . Reference-Style Links How the First Part is Formated GEO Bremen homepage GEO Bremen Homepage 1</td></https:></pre>	Formating Links I love supporting the EFF. This is the GEO Bremen. See the section on code . Reference-Style Links How the First Part is Formated GEO Bremen homepage GEO Bremen Homepage 1

You can position this second part of the reference anywhere in your Markdown document. Most people place them right after the paragraph they appear in, while others position them at the bottom of the document (like endnotes or footnotes).

Further Reference-style Links

In the following a few more examples are shown, how the two parts of the Reference-style link look in practice. In addition, once again the reference-style link in the HTML syntax as an example.



Images

If you want to have an image added, add an exclamation mark (!) followed by alternative text in parentheses and the pathname or URL of the image in parentheses. As an option, you can insert a title in quotation marks after the path or URL.

For adding a hyperlink to an image, wrap the text for the image in brackets, and then paste the link in parenthesis.



4. Extended

Tables

Footnotes

Definition Lists

Task Lists

5. How to Export

It is quite easy to export from notebook format using JupyterHub. This part is for orientation on how exactly this is done and what it can be exported as.

Let's assume that a notebook has been created and formulated in Markdown syntax. Now the goal is to export the notebook as a PDF: You first go to "File" and then "Save and Export Notepad As". Here you have several export options. In this case PDF would be selected.



It is possible to export the notebook as Asciidoc, HTML, LaTex, Markdown, Restructed Text, Executable Script, Reveal.js Slides and as WebPDF.

6. HTML

As you can see in the introduction to Basic Markdown Syntax: It is possible to use HTML syntax on the JupyterHub platform. This is not obvious, since many providers do this for security reasons.

What is important to note here is that you should not carelessly mix both syntax. This can lead to unwanted formatting problems.

Of course, there are applications that make things easier by using the HTML syntax. If you decide to use HTML syntax the following things must be considered:

- Use blank lines to separate block-level HTML elements like <div>, , , and from the surrounding content. Try not to indent the tags with tabs or spaces that can interfere with the formatting.
- Do not use Markdown syntax inside block-level HTML tags. For example, italic and **bold** won't work.

7. Further References

Basic Syntax / Markdown Guide. (2022). <u>https://www.markdownguide.org/basic-syntax/</u>
Cone, M. (2020). *The Markdown Guide*. Independently published.