Duckumentation documentation

This book describes the features of our documentation system and the procedures to update it.

Contents

PART A

Contributing to the documentation

✎

This part describes the workflow for contributing to our documentation.

Contents

Unit A-1
Overview

1.1. Where the documentation is

The documentation is contained in a series of repositories called `docs-`*short name*:

For example:

- `docs-duckumentation` (this book)
- `docs-AIDO`

1.2. Documentation format

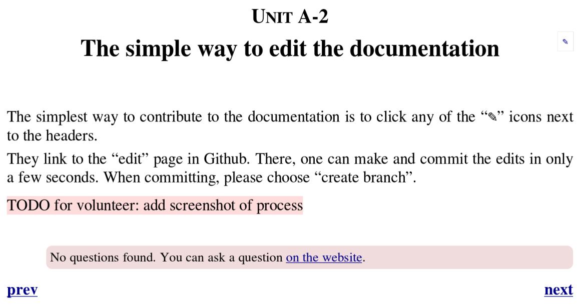
The documentation is written as a series of small files in Markdown format.

It is then processed by a series of scripts to create publication-quality PDF and an on-line HTML version.

You can find all these artifacts produced at the site `https://docs.duckietown.org`.

UNIT A-2
The simple way to edit the documentation ✎

The simplest way to contribute to the documentation is to click any of the “✎” icons next to the headers, in the book itself.


UNIT A-2

The simple way to edit the documentation ✎

The simplest way to contribute to the documentation is to click any of the “✎” icons next to the headers.

They link to the “edit” page in Github. There, one can make and commit the edits in only a few seconds. When committing, please choose “create branch”.

TODO for volunteer: add screenshot of process

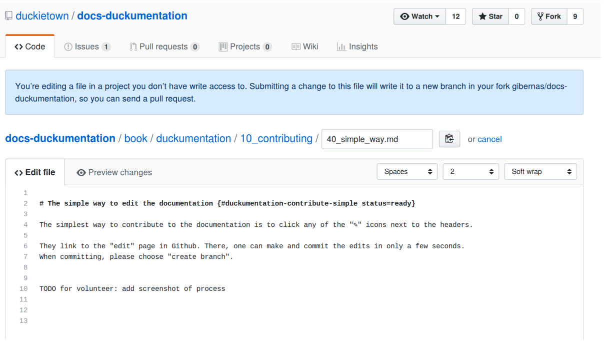
No questions found. You can ask a question on the website.

prev next

Figure 2.1. Click on edit button.

They link to the “edit” page in Github. One can make and commit the edits in only a few seconds.

If you are in the Duckietown organization, then you can just “edit” the page then and there. Otherwise, you need to “fork” the repo. Don’t worry, it’s a one click process.


duckietown / docs-duckumentation

You’re editing a file in a project you don’t have write access to. Submitting a change to this file will write it to a new branch in your fork gibernas/docs-duckumentation, so you can send a pull request.

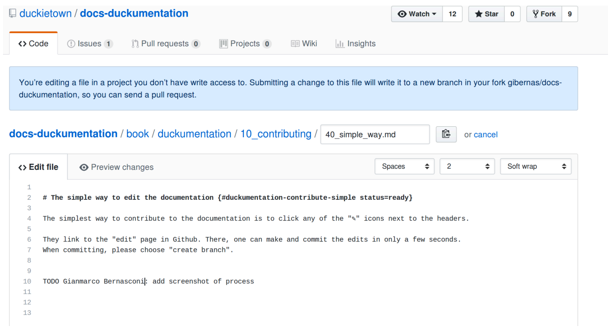
docs-duckumentation / book / duckumentation / 10_contributing / 40_simple_way.md or cancel

Spaces 2 Soft wrap

```
# The simple way to edit the documentation {#duckumentation-contribute-simple status=ready}

The simplest way to contribute to the documentation is to click any of the "✎" icons next to the headers.

They link to the "edit" page in Github. There, one can make and commit the edits in only a few seconds.
When committing, please choose "create branch".


TODO for volunteer: add screenshot of process
```

Figure 2.2. You will land on GitHub

Do your edits where appropriate.

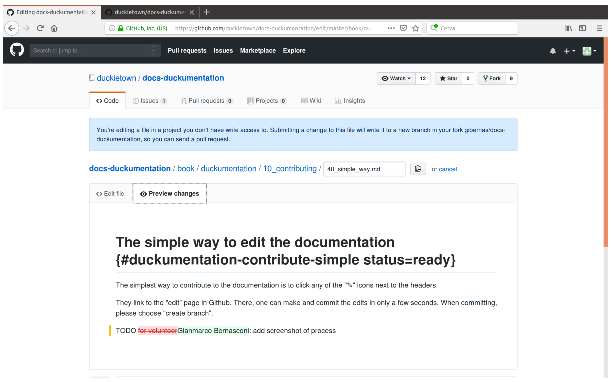


You're editing a file in a project you don't have write access to. Submitting a change to this file will write it to a new branch in your fork gibernas/docs-duckumentation, so you can send a pull request.

```

# The simple way to edit the documentation {#duckumentation-contribute-simple status=ready}

The simplest way to contribute to the documentation is to click any of the "✎" icons next to the headers.

They link to the "edit" page in Github. There, one can make and commit the edits in only a few seconds.
When committing, please choose "create branch".


TODO Gianmarco Bernasconi: add screenshot of process
```

Figure 2.3. Editing the docs.

You can check the outcome by clicking on `Preview changes`, note that not all functionalities are visible by the preview. For large changes refer to Unit A-3 - Second method: local editing+docker.


Editing docs-duckumentatio
duckietown/docs-duckume
GitHub, Inc. (US)
https://github.com/duckietown/docs-duckumentation/edit/master/book/du
Cerca
Search or jump to...
Pull requests
Issues
Marketplace
Explore
duckietown / docs-duckumentation
Watch 12
Star 0
Fork 9
Code
Issues 1
Pull requests 0
Projects 0
Wiki
Insights
docs-duckumentation / book / duckumentation / 10_contributing / 40_simple_way.md
or cancel
Edit file
Preview changes

You're editing a file in a project you don't have write access to. Submitting a change to this file will write it to a new branch in your fork gibernas/docs-duckumentation, so you can send a pull request.

The simple way to edit the documentation {#duckumentation-contribute-simple status=ready}

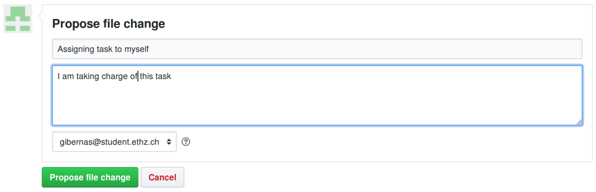
The simplest way to contribute to the documentation is to click any of the "✎" icons next to the headers.

They link to the "edit" page in Github. There, one can make and commit the edits in only a few seconds. When committing, please choose "create branch".

TODO ~~for volunteer~~Gianmarco Bernasconi: add screenshot of process

Figure 2.4. A preview of the changes.

Then after your edits, in the bottom part of the webpage, describe your commit and click on `Propose file change`. When committing, please choose "create branch".



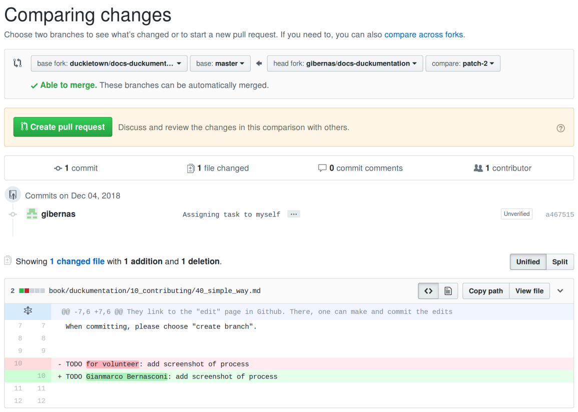
Assigning task to myself

I am taking charge of this task

gibernas@student.ethz.ch

Figure 2.5. Describe and commit.

Then, click on `Create pull request`, as you probably don't have rights to push directly.



Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also compare across forks.

base fork: duckietown/docs-duckument... base: master ← head fork: gibernas/docs-duckumentation compare: patch-2

✓ Able to merge. These branches can be automatically merged.

Create pull request Discuss and review the changes in this comparison with others.

1 commit 1 file changed 0 commit comments 1 contributor

Commits on Dec 04, 2018

gibernas Assigning task to myself Unverified a467515

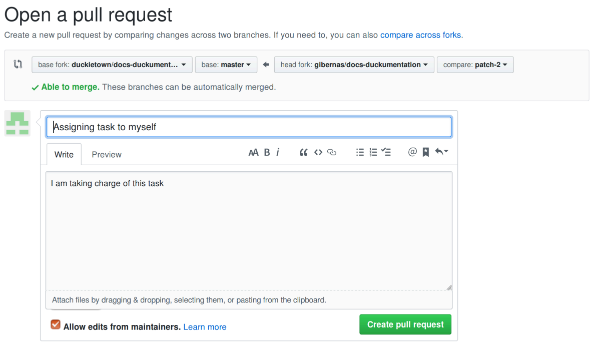
Showing 1 changed file with 1 addition and 1 deletion.

2 book/duckumentation/10_contributing/40_simple_way.md

```
@@ -7,6 +7,6 @@ They link to the "edit" page in Github. There, one can make and commit the edits
 When committing, please choose "create branch".


- TODO for volunteer: add screenshot of process
+ TODO Gianmarco Bernasconi: add screenshot of process


```

Figure 2.6. Create a pull request.

Again you need to confirm that you want to open the pull request.



Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also compare across forks.

base fork: duckietown/docs-duckument... base: master ← head fork: gibernas/docs-duckumentation compare: patch-2

✓ Able to merge. These branches can be automatically merged.

Assigning task to myself

Write Preview

I am taking charge of this task

Attach files by dragging & dropping, selecting them, or pasting from the clipboard.

✓ Allow edits from maintainers. Learn more

Create pull request

Figure 2.7. Confirm a pull request.

Unit A-3
Second method: local editing+docker ✎

This section describes the workflow to edit the documentation for one single book. In a nutshell:

- You *fork* the repos to your Github account.
- You compile locally using a Docker container (no installation necessary).
- You contribute by opening a pull request.

3.1. Workflow ✎

1) Github setup ✎

We assume that you have setup a Github account with working public keys.

➡ Basic SSH config (unknown ref software_reference/github-access)

warning next (1 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/github-access'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

.

➡ Key pair creation (unknown ref software_reference/howto-create-key-pair)

previous warning next (2 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/howto-create-key-pair'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

.

➡ Adding public key on Github (unknown ref software_reference/github-access)

previous warning next (3 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/github-access'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

.

2) Install Docker ✎

Before you start, make sure that you have installed Docker (unknown ref software_reference/docker)

previous warning next (4 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/docker'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

.

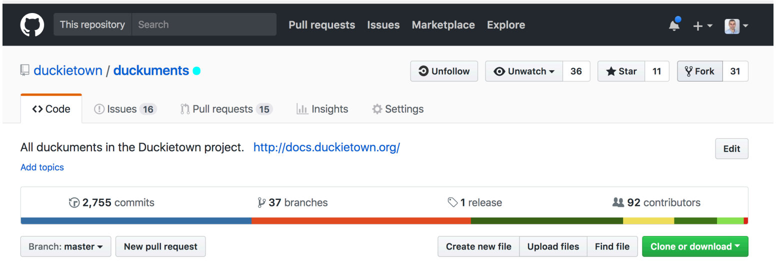
3) Install the Duckieton Shell ✎

Install the Duckietown Shell using these instructions.

4) Fork the `docs-`***book*** repo on the Github site ✎

Fork one of the `docs-`*book* repos on the Github site (Figure 3.1).

This will create a new repo on your account that is linked to the original one.



All duckuments in the Duckietown project. http://docs.duckietown.org/

2,755 commits · 37 branches · 1 release · 92 contributors

Figure 3.1

5) Checkout your fork locally

Check out the forked repository as you would do normally.

6) Initialize your folder

Go into the folder:

```
$ cd docs-book
```

When compiling a book for the first time, you need to run:

```
$ git submodule init
```

And:

```
$ git submodule update
```

7) Do your edits

Do your edits on your local copy. The source files are in the directory `book/book`. The file and folder names start with numbers, these are used to determine the order that things show up in output.

8) Compile

Compile using the `docs` commands in the Duckietown Shell:

```
$ dts docs build
```

Re-compile from scratch using:

```
$ dts docs clean
$ dts docs build
```

If there are errors you should open `duckuments-dist/errors.html` and look at them and fix them.

9) Look at the local copy ✎

Open the file `index.html` and navigate to whichever pages you have changed to make sure that they look the way want them to.

10) Commit and push ✎

Commit and push as you would do normally.

11) Make a pull request ✎

Create a pull request to the original repository.

Option 1: Use the Github website: ✎

Github offers a nice interface to create a pull request.

TODO for volunteer: add image of pull request

task next (1 of 5) index

for:volunteer task

The following was marked as "todo".

> TODO for volunteer: add image of pull request

Location not known more precisely.

Created by function `n/a` in module `n/a`.

Option 2: Use the command-line program `hub`: ✎

You can create a pull request from the command-line using hub (unknown ref software_reference/hub) previous warning next (5 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/hub'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

:

```
$ hub pull-request
```

➡ (unknown ref software_reference/hub)

previous warning next (6 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/hub'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

3.2. Using CircleCI

Circle CI makes it easier to check whether there are problems to be fixed.

1) Sign up on Circle

Sign up on the Circle CI service, at the link circleci.com.

2) Activate your build on Circle

Activate the building at the link:

```
https://circleci.com/setup-project/gh/username/duckuments
```

where *username* is your Github username.

Click “start building”.

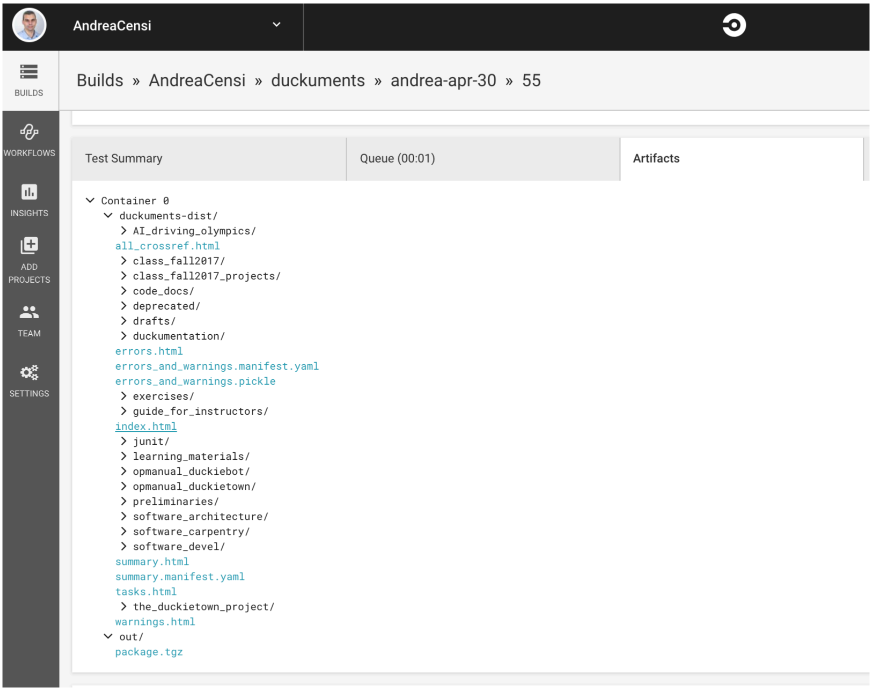
Make sure everything compiles on Circle:

Go to the URL:

```
https://circleci.com/gh/ username /duckuments
```

to see the status of your build.

You can also preview the results by clicking the “artifacts” tab and selecting `index.html` from the list.



```
Container 0
  duckuments-dist/
    AI_driving_olympics/
   all_crossref.html
    class_fall2017/
    class_fall2017_projects/
    code_docs/
    deprecated/
    drafts/
    duckumentation/
   errors.html
   errors_and_warnings.manifest.yaml
   errors_and_warnings.pickle
    exercises/
    guide_for_instructors/
   index.html
    junit/
    learning_materials/
    opmanual_duckiebot/
    opmanual_duckietown/
    preliminaries/
    software_architecture/
    software_carpentry/
    software_devel/
   summary.html
   summary.manifest.yaml
   tasks.html
    the_duckietown_project/
   warnings.html
  out/
   package.tgz
```

Figure 3.2

UNIT A-4

Troubleshooting for Duckumentation

4.1. Markduck problems

First, see the section Unit B-5 - Troubleshooting for common problems and their resolution.

Please report problems with the duckuments using the `duckuments` issue tracker.

Special notes:

- If you have a problem with a generated PDF, please attach the offending PDF.
- If you say something like “This happens for Figure 3”, then it is hard to know which figure you are referencing exactly, because numbering changes from commit to commit.

If you want to refer to specific parts of the text, please commit all your work on your branch, and obtain the name of the commit using the following commands:

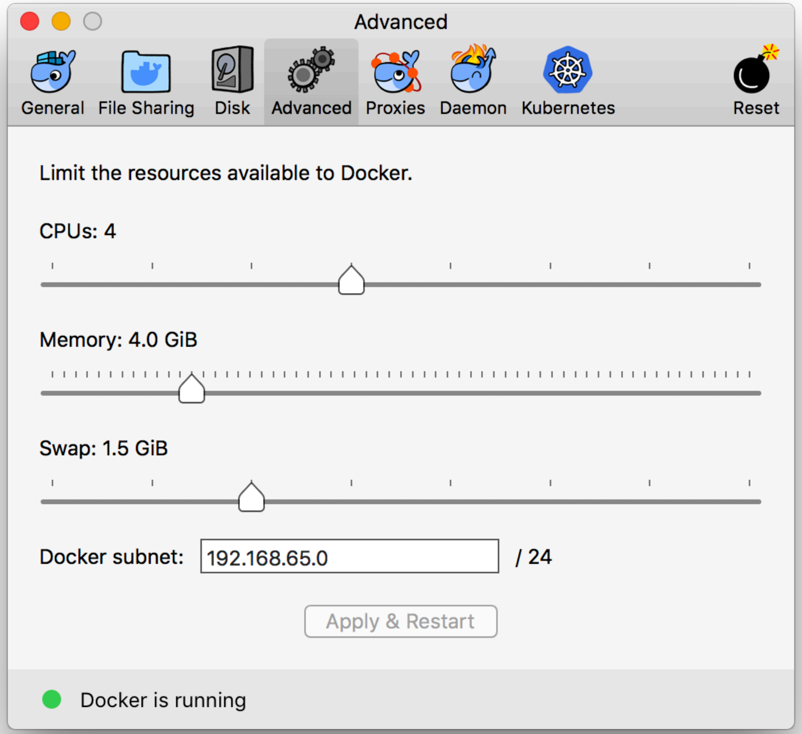
```
$ git rev-parse HEAD
```

4.2. Problem: The building hangs

1) Cause: insufficient memory

This might be due to insufficient memory.

For example, on Mac, the default setting is 2GB of RAM. Try increasing it (Figure 4.1).



Limit the resources available to Docker.

CPUs: 4

Memory: 4.0 GiB

Swap: 1.5 GiB

Docker subnet: 192.168.65.0 / 24

● Docker is running

Figure 4.1

A workaround is to stop and restart the process (but without doing `dts docs clean`).

2) Cause: downloading in the background

Sometimes the problem is that the code is downloading something in the background, for example a Git repository.

Currently this is hard to debug.

UNIT A-5 Markdown editors

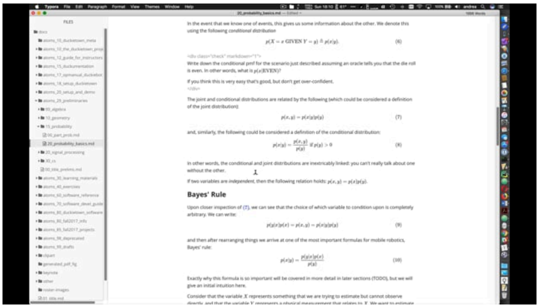
We suggest the following:

- Find a visual Markdown editor that you like.
- Complement with a superb text-only editor.

5.1. Graphical Markdown editors

1) Typhora

Typhora is our favorite beacause it allows to preview LaTeX formulas.



20_probability_basics.md — Edited

In the event that we know one of events, this gives us some information about the other. We denote this using the following *conditional distribution*

$$p(X = x \text{ GIVEN } Y = y) \triangleq p(x|y). \qquad (6)$$

<div class="check" markdown="1">

Write down the conditional pmf for the scenario just described assuming an oracle tells you that the die roll is even. In other words, what is $p(x|\text{EVEN})$?

If you think this is very easy that's good, but don't get over-confident.

</div>

The joint and conditional distributions are related by the following (which could be considered a definition of the joint distribution):

$$p(x, y) = p(x|y)p(y) \qquad (7)$$

and, similarly, the following could be considered a definition of the conditional distribution:

$$p(x|y) = \frac{p(x, y)}{p(y)} \text{ if } p(y) > 0 \qquad (8)$$

In other words, the conditional and joint distributions are inextricably linked: you can't really talk about one without the other.

If two variables are *independent*, then the following relation holds: $p(x, y) = p(x)p(y)$.

Bayes' Rule

Upon closer inspection of (7), we can see that the choice of which variable to condition upon is completely arbitrary. We can write:

$$p(y|x)p(x) = p(x, y) = p(x|y)p(y) \qquad (9)$$

and then after rearranging things we arrive at one of the most important formulas for mobile robotics, Bayes' rule:

$$p(x|y) = \frac{p(y|x)p(x)}{p(y)} \qquad (10)$$

Exactly why this formula is so important will be covered in more detail in later sections (TODO), but we will give an initial intuition here.

Consider that the variable X represents something that we are trying to estimate but cannot observe directly, and that the variable Y represents a physical measurement that relates to X. We want to estimate

5.2. Text editors good for Markdown

5.3. Atom

➡ (unknown ref software_reference/atom)

previous warning next (7 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/atom'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

5.4. PyCharm

✎

➡ (unknown ref software_reference/pycharm)

previous warning next (8 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#soft-
ware_reference/pycharm'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

Part B
Markduck format

✎

This part describes the Markdown dialect that is used in the documentation.

Contents

UNIT B-1

Basic Markduck guide

✎

The Duckiebooks are written in Markduck, a Markdown dialect.

It supports many features that make it possible to create publication-worthy materials.

Contents

1.1. Markdown

✎

The Duckiebook are written in a Markdown dialect.

➡ A tutorial on Markdown.

1.2. Comments

✎

You can insert comments using the HTML syntax for comments: any text between "`<!–`" and "`–>`" is ignored.

```
# My section

<!-- this text is ignored -->

Let's start by...
```

1.3. Variables in command lines and command output

Use the syntax "`![name]`" for describing the variables in the code.

example

For example, to obtain:

```
$ ssh robot name.local
```

Use the following:

```
For example, to obtain:

    $ ssh ![robot name].local
```

Make sure to quote (with 4 spaces) all command lines. Otherwise, the dollar symbol confuses the LaTeX interpreter.

1.4. Character escapes

Use the string "`&#36;`" to write the dollar symbol "`$`", otherwise it gets confused with LaTeX math materials. Also notice that you should probably use "USD" to refer to U.S. dollars.

Other symbols to escape are shown in Table 1.1.

TABLE 1.1. SYMBOLS TO ESCAPE

use `&#36;`	instead of `$`
use `&#96;`	instead of `` ` ``
use `&lt;`	instead of `<`
use `&gt;`	instead of `>`

1.5. Keyboard keys

Use the `kbd` element for keystrokes.

example

For example, to obtain:

Press a then Ctrl-C.

use the following:

```
Press <kbd>a</kbd> then <kbd>Ctrl</kbd>-<kbd>C</kbd>.
```

1.6. Figures

To create a figure, use the element `figure`:

```
<figure>
    <figcaption>Hello</figcaption>
    <img style='width:8em' src="duckietown-logo-transparent.png"/>
</figure>
```

Figure 1.1. Hello

1) More attributes

Use `class="caption-left"` to have the caption show up on the left rather than on the bottom:

```
<figure class="caption-left">
    <figcaption>Hello</figcaption>
    <img style='width:8em' src="duckietown-logo-transparent.png"/>
</figure>
```

Figure 1.2. Hello

1.7. Subfigures

✎

You can create subfigures by nesting `figure` elements:

```
<figure>
    <figcaption>Main caption</figcaption>
    <figure>
        <figcaption>Hello</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
    <figure>
        <figcaption>second</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
</figure>
```

(a) Hello

(b) second

Figure 1.3. Main caption

By default, they are displayed one per block. To make them flow horizontally, add `class="flow-subfigures"` to the external figure:

```
<figure class="flow-subfigures">
    <figcaption>Main caption</figcaption>
    <figure>
        <figcaption>Hello</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
    <figure>
        <figcaption>second</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
</figure>
```

(a) Hello (b) second

Figure 1.4. Main caption

For any element, adding an attribute called `figure-id` with value `fig:` *figure ID* or `tab:` *table ID* will create a figure that wraps the element.

1.8. Shortcut for tables

The shortcuts `col2`, `col3`, `col4`, `col5` are expanded in tables with 2, 3, 4 or 5 columns.

The following code:

```
<col2 figure-id="tab:mytable" figure-caption="My table">
    <span>A</span>
    <span>B</span>
    <span>C</span>
    <span>D</span>
</col2>
```

gives the following result:

TABLE 1.2. MY TABLE

A	B
C	D

1) `labels-row1` and `labels-row1`

Use the classes `labels-row1` and `labels-row1` to make pretty tables like the following.

`labels-row1`: the first row is the headers.

`labels-col1`: the first column is the headers.

TABLE 1.3. USING `CLASS="LABELS-COL1"`

header A	B	C	1
header D	E	F	2
header G	H	I	3

TABLE 1.4. USING `CLASS="LABELS-ROW1"`

header A	header B	header C
D	E	F
G	H	I
1	2	3

1.9. Linking to documentation

1) Establishing names of headers

You give IDs to headers using the format:

```
### header title {#topic ID}
```

For example, for this subsection, we have used:

```
### Establishing names of headers {#establishing}
```

With this, we have given this header the ID "`establishing`".

By convention, we use consistently dashes rather than underscores. For example, instead of using the ID `#my_cool_section`, use `#my-cool-section`.

2) How to name IDs - and why it's not automated

Some time ago, if there was a section called

```
## My section
```

then it would be assigned the ID "my-section".

This behavior has been removed, for several reasons.

One is that if you don't see the ID then you will be tempted to just change the name:

```
## My better section
```

and silently the ID will be changed to "my-better-section" and all the previous links will be invalidated.

The current behavior is to generate an ugly link like "autoid-209u31j".

This will make it clear that you cannot link using the PURL if you don't assign an ID.

Also, I would like to clarify that all IDs are *global* (so it's easy to link stuff, without thinking about namespaces, etc.).

Therefore, please choose descriptive IDs, with at least two IDs.

E.g. if you make a section called

```
## Localization  {#localization}
```

that's certainly a no-no, because "localization" is too generic.

✔

```
## Localization {#intro-localization}
```

Also note that you don't *need* to add IDs to everything, only the things that people could link to. (e.g. not subsubsections)

3) Linking from the documentation to the documentation ✎

You can use the syntax:

```
[](#topic ID)
```

to refer to the header.

You can also use some slightly more complex syntax that also allows to link to only the name, only the number or both (Table 1.5).

TABLE 1.5. SYNTAX FOR REFERRING TO SECTIONS.

```
See [](#establishing).
```

See Subsection 1.9.1 - Establishing names of headers

```
See <a class="only_name" href="#establishing"></a>.
```

See Establishing names of headers.

```
See <a class="only_number" href="#establishing"></a>.
```

See 1.9.1.

```
See <a class="number_name" href="#establishing"></a>.
```

See Subsection 1.9.1 - Establishing names of headers.

1.10. Linking to other books

It is possible to link from one book to another.

The syntax is a slightly extended syntax. Instead of using something like

```
See this [interesting section](#interesting-section).
```

You need to use add `+other-book-id` before the `#`:

```
See this [interesting section in another book](+other-book-id#interest-
ing-section).
```

To find out what is the book ID, go to the current index of all the books, which, for `daffy`, is `https://docs.duckietown.org/daffy/`. Go to the book you want to link, and note the URL. The book ID is the part after `daffy`.

For example, this book is published at

```
https://docs.duckietown.org/daffy/duckumentation/out/index.html
```

The book ID is `duckumentation`.

To link to the entire book, use something like `+BOOKID#book`. (By convention, each book will have the main header assigned the header `#book:book`.)

Here is a list of some of the books as of August 2020:

(unknown ref opmanual_developer/book)

previous warning next (9 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_developer/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

(unknown ref opmanual_duckiebot/book)

previous warning next (10 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_duckiebot/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

(unknown ref opmanual_duckietown/book)

previous warning next (11 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_duckietown/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

(unknown ref opmanual_autolab/book)

previous warning next (12 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_autolab/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

- (unknown ref duckumentation/book)

previous warning next (13 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#duck-
umentation/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

- this book.

- (unknown ref opmanual_sky/book)

previous warning next (14 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_sky/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

(unknown ref duckiesky_high_school_student/book) previous warning next (15 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#duck-
iesky_high_school_student/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

(unknown ref duckiesky_high_school/book)

previous warning next (16 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#duck-
iesky_high_school/book'.
```

Location not known more precisely.
Created by function `n/a` in module `n/a`.

1) (For developers) How to update the list of books that can be crossreferenced.

The dictionary between book ID and URL is maintained in the repo `docs-build` in the file `books.crossref.yaml`. When a new book is added, the list needs to be updated and the image `duckietown/docs-build` be updated.

Unit B-2
Special paragraphs and environments

2.1. Special paragraphs tags

The system supports parsing of some special paragraphs.

1) Special paragraphs must be separated by a line

A special paragraph is marked by a special prefix. The list of special prefixes is given in the next section.

There must be an empty line before a special paragraph; this is because in Markdown a paragraph starts only after an empty line.

This is checked automatically, and the compilation will abort if the mistake is found.

For example, this is invalid:

```
See: this book
See: this other book
```

This is correct:

```
See: this book

See: this other book
```

Similarly, this is invalid:

```
Author: author
Maintainer: maintainer
```

and this is correct:

```
Author: author

Maintainer: maintainer
```

2) Todos, task markers

✎

```
TODO: todo
```

TODO: todo

previous task next (2 of 5) index
task
The following was marked as "todo".

> TODO: todo

Location not known more precisely.
Created by function `n/a` in module `n/a`.

```
TOWRITE: towrite
```

To write: towrite

previous task next (3 of 5) index
task
The following was marked as "special-par-towrite".

> **To write:** towrite

Location not known more precisely.
Created by function `n/a` in module `n/a`.

```
Task: task
```

Task: task

```
Assigned: assigned
```

Assigned to: assigned

previous task next (4 of 5) index
task
The following was marked as "special-par-assigned".

> Assigned to: assigned

Location not known more precisely.
Created by function `n/a` in module `n/a`.

3) Notes and remarks

```
Remark: remark
```

Remark: remark

```
Note: note
```

Note: note

```
Warning: warning
```

Warning: warning

4) Troubleshooting

```
Symptom: symptom
```

Symptom: symptom

```
Resolution: resolution
```

Resolution: resolution

5) Guidelines ✎

```
Bad: bad
```

✖ bad

```
Better: better
```

✔ better

6) Questions and answers ✎

```
Q: question
```

Q: question

```
A: answer
```

Answer: answer

7) Authors, maintainers, Point of Contact ✎

```
Maintainer: maintainer
```

Maintainer: maintainer

```
Assigned: AndreaCensi
```

Assigned to: AndreaCensi

previous **task** (5 of 5) index
task
The following was marked as "special-par-assigned".

> Assigned to: AndreaCensi

Location not known more precisely.
Created by function `n/a` in module `n/a`.

8) References

```
See: see
```

➡ see

```
Reference: reference
```

➡ reference

```
Requires: requires
```

Requires: requires

```
Results: results
```

Results: results

```
Next steps: next steps
```

Next: next steps

```
Recommended: recommended
```

Recommended: recommended

```
See also: see also
```

☀ see also

2.2. Other `div` environments

For these, note the rules:

- You must include `markdown="1"`.
- There must be an empty line after the first `div` and before the closing `/div`.

1) Example usage

```
<div class='example-usage' markdown="1">

This is how you can use `rosbag`:

    $ rosbag play log.bag

</div>
```

example This is how you can use `rosbag`:

```
$ rosbag play log.bag
```

2) Check

```
<div class='check' markdown="1">

Check that you didn't forget anything.

</div>
```

Check before you continue
Check that you didn't forget anything.

3) Requirements

```
<div class='requirements' markdown="1">

List of requirements at the beginning of setup chapter.

</div>
```

KNOWLEDGE AND ACTIVITY GRAPH

List of requirements at the beginning of setup chapter.

UNIT B-3
Using LaTeX constructs in documentation

KNOWLEDGE AND ACTIVITY GRAPH

Requires: Working knowledge of LaTeX.

Contents

3.1. Embedded LaTeX

You can use *LaTeX* math, environment, and references. For example, take a look at

$$x^2 = \int_0^t f(\tau)\ \text{d}\tau$$

or refer to Proposition 1 - Proposition example.

Proposition 1. (Proposition example) This is an example proposition: $2x = x + x$.

The above was written as in Listing 3.1.

```
You can use $\LaTeX$ math, environment, and references.
For example, take a look at

\[
    x^2 = \int_0^t f(\tau)\ \text{d}\tau
\]

or refer to [](#prop:example).

\begin{proposition}[Proposition example]\label{prop:example}
This is an example proposition: $2x = x + x$.
\end{proposition}
```

Listing 3.1. Use of LaTeX code.

For the LaTeX environments to work properly you *must* add a `\label` declaration inside. Moreover, the label must have a prefix that is adequate to the environment. For example, for a proposition, you must insert `\label{prop:` *name* `}` inside.

The following table shows the list of the LaTeX environments supported and the label prefix that they need.

TABLE 3.1. LATEX ENVIRONMENTS AND LABEL PREFIXES

`definition`	`def:` *name*
`proposition`	`prop:` *name*
`remark`	`rem:` *name*
`problem`	`prob:` *name*
`theorem`	`thm:` *name*
`lemma`	`lem:` *name*

Examples of all environments follow.

example

```
\begin{definition}[My definition]   \label{def:lorem}
Lorem
\end{definition}
```

Definition 1. (My definition) Lorem

```
\begin{proposition}[My proposition]   \label{prop:lorem}
Lorem
\end{proposition}
```

Proposition 2. (My proposition) Lorem

```
\begin{remark}[My remark]   \label{rem:lorem}
Lorem
\end{remark}
```

Remark 1. (My remark) Lorem

```
\begin{problem}[My problem]    \label{prob:lorem}
Lorem
\end{problem}
```

Problem 1. (My problem) Lorem

```
\begin{example}[My example]   \label{exa:lorem}
Lorem
\end{example}
```

Example 1. (My example) Lorem

```
\begin{theorem}[My theorem]   \label{thm:lorem}
Lorem
\end{theorem}
```

Theorem 1. (My theorem) Lorem

```
\begin{lemma}[My lemma]   \label{lem:lorem}
Lorem
\end{lemma}
```

Lemma 1. (My lemma) Lorem

```
I can also refer to all of them:
[](#def:lorem),
[](#prop:lorem),
[](#rem:lorem),
[](#prob:lorem),
[](#exa:lorem),
[](#thm:lorem),
[](#lem:lorem).
```

I can also refer to all of them: Definition 1 - My definition, Proposition 2 - My proposition, Remark 1 - My remark, Problem 1 - My problem, Example 1 - My example, Theorem 1 - My theorem, Lemma 1 - My lemma.

3.2. LaTeX equations

We can refer to equations, such as (1):

$$2a = a + a$$

This uses `align` and contains (2) and (???).

$$\begin{aligned} a &= b \\ &= c \end{aligned}$$

```
We can refer to equations, such as \eqref{eq:one}:

\begin{equation}
    2a = a + a          \label{eq:one}
\end{equation}

This uses `align` and contains  \eqref{eq:two} and \eqref{eq:three}.

\begin{align}
    a &= b       \label{eq:two} \\
      &= c       \label{eq:three}
\end{align}
```

Note that referring to the equations is done using the syntax `\eqref{eq:`*name*`}`, rather than `[](#eq:`*name*`)`.

3.3. LaTeX symbols

You can place any LaTeX symbols definition in files called `*.symbols.tex`.

These will be included as preamble.

For example, this repository contains a file `a.symbols.tex` containing:

```
\newcommand{\mysymbol}{\text{This is defined in a.symbols.tex}}
```

So then when we create an equation with:

```
$$ \mysymbol $$
```

It gets rendered as:

$$\text{This is defined in a.symbols.tex}$$

3.4. Bibliography support

You need to have installed `bibtex2html`.

The system supports Bibtex files.

Place `*.bib` files anywhere in the directory.

Then you can refer to them using the syntax:

```
[](#bib:bibtex ID)
```

For example:

```
Please see [](#bib:siciliano07handbook).
```

Will result in:

> Please see [1].

Somewhere in the document, add the following:

```
&lt;div id="put-bibliography-here"&gt;&lt;/div&gt;
```

3.5. Embedding Latex in Figures through SVG ✎

KNOWLEDGE AND ACTIVITY GRAPH

> **Requires:** In order to compile the figures into PDFs you need to have Inkscape installed. Instructions to download and install Inkscape are here.

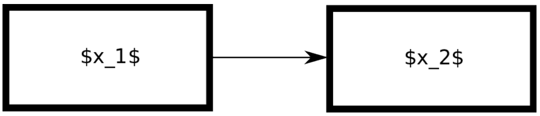
To embed latex in your figures, you can add it directly to a file and save it as `*filename*.svg` file and save in the `/docs` directory in a subfolder called `assets/svg2pdf`.

You can then run:

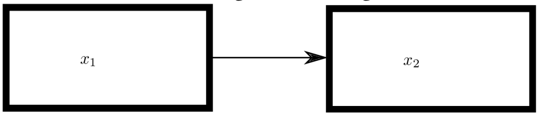
```
$ make process-svg-figs
```

And the SVG file will be compiled into a PDF figure with the LaTeX commands properly interpreted.

You can then include the PDF file in a normal way (Section 1.6 - Figures) using `*filename*.pdf` as the filename in the `<img>` tag.



(a) Image saved as svg



(b) Image as PDF after processing

Figure 3.1. Embedding LaTeX in images

It can take a bit of work to get the positioning of the code to appear properly on the figure.

3.6. Using the HTML equivalent of Latex environments

Contents

You can create an exercise as follows:

```
<div id="exercise:my-exercise" class="exercise" title="Exercise title">
    This is an exercise labeled "exercise:my-exercise".
</div>

<div class="exercise" title="Second exercise">
    This is an exercise not labeled.
</div>

Referring to the exercise: [](#exercise:my-exercise) or [](#my-exer-
cise).
```

> **Exercise 1.** This is an exercise labeled "exercise:my-exercise".

> **Exercise 2.** This is an exercise not labeled.

Referring to the exercise: Exercise 1 - Exercise title or Exercise 1 - Exercise title.

3.7. Alternative style

If you have block content element (e.g. code blocks), you must use headers as html cannot contain block-level Markdown.

You must use somethign like the following. The marker `end` tells the system to stop the level 4 section.

```
#### Another exercise {#exercise:another}

This is another exercise with block content:

    $ echo hello

<end/>

This is part of the level 2 section.

Another exercise starts for the rest of the section.

#### Another exercise {#exercise:second}

contents

<end/>

After the second exercise.
```

> **Exercise 3. Another exercise.**
> This is another exercise with block content:
>
> ```
> $ echo hello
> ```

This is part of the level 2 section.

Another exercise starts for the rest of the section.

> **Exercise 4. Another exercise.**
> contents

After the second exercise.

Unit B-4
Embedding videos

It is possible to embed Vimeo videos in the documentation.

> **Note:** Do not upload the videos to your personal Vimeo account; they must all be posted to the Duckietown Engineering account.

> **Note:** The videos must be *public* for the embedding to work. If the video is not public the process will fail mentioning the video is not found (true, because it is not public).

This is the syntax:

```
<dtvideo src="vimeo:vimeo ID"/>
```

example

For example, this code:

```
<figure id="example-embed">
    <figcaption>Cool Duckietown by night</figcaption>
    <dtvideo src="vimeo:152825632"/>
</figure>
```

produces this result:

Figure 4.1. Cool Duckietown by night

Depending on the output media, the result will change:

- On the online book, the result is that a video player is embedded.
- On the e-book version, the result is that a thumbnail is produced, with a link to the video;
- (future improvement) On the dead-tree version, a thumbnail is produced with a QR code linking to the video.

UNIT B-5
Troubleshooting

Contents

5.1. Troubleshooting errors in the compilation process

Symptom: "Invalid XML"

Resolution: "Markdown" doesn't mean that you can put anything in a file. Except for the code blocks, it must be valid XML. For example, if you use "`>`" and "`<`" without quoting, it will likely cause a compile error.

Symptom: "Tabs are evil"

Resolution: Do not use tab characters. The error message in this case is quite helpful in telling you exactly where the tabs are.

Symptom: The error message contains `ValueError: Suspicious math fragment 'KEYMATHS000ENDKEY'`

Resolution: You probably have forgotten to indent a command line by at least 4 spaces. The dollar in the command line is now being confused for a math formula.

5.2. Not properly starting a list

There must be an empty line before the list starts.

This is correct:

```
I want to learn:

- robotics
- computer vision
- underwater basket weaving
```

This is incorrect:

```
I want to learn:
- robotics
- computer vision
- underwater basket weaving
```

and it will be rendered as follows:

I want to learn: - robotics - computer vision - underwater basket weaving

5.3. Forgetting `markdown=1`

If you forget `markdown=1` the contents of the tag will not be processed.

For example, this:

```
<div class="exercise" title="My exercise title">

  Open a new terminal and navigate to `~/.ssh` and open the file named
`config`.

</div>
```

results in:

> **Exercise 5.** Open a new terminal and navigate to $\overset{\sim}{\underset{\cdot}{-}}ssh$ and open the file named $config$.

5.4. Code inside html

> **Exercise 6.** Here is a code block: $ code block Another block: $pythonomty\pi ngimp$ or $tAny$ After block: `code block`

UNIT B-6

The Knowledge and Activity Graph Environment ✎

KNOWLEDGE AND ACTIVITY GRAPH

Requires: Linking between pages of the duckumentation

Recommended: Markduck, special paragraphs

Results: Knowledge how to write a knowledge box

6.1. Basics ✎

Every page, on every book, should have a ‘Knowledge Box’ - also called ‘Knowledge and Activity Graph’. It’s the blue box you see above. In markdown, a knowledge box looks like this:

```
<div class='requirements' markdown="1">

Requires: Important prerequisite XY

Requires: ...

Results: Infinite wisdom

</div>
```

6.2. Purpose ✎

Knowledge boxes give structure to the duckumentation. How do you know where to start? For example by following back links in knowledge boxes! Or by having an automated system follow back those references for you.

Also, imagine if dead references or circular dependencies were detected automatically. Authors could fix this right away, and you would have an easier time navigating the duckumentation. So: Add a knowledge box!

6.3. Guidelines ✎

Here are dos and don'ts how to write useful knowledge boxes:

✔ **One knowledge box per page.** (*Might change in the future.*)

Organize your pages in a way that one knowledge box per page makes sense. Optimally, one page should be about one distinct topic, or describe how to create one distinct thing. You can use most of the existing duckumentation as reference for a good "topic granularity".

✔ **Use 'Requires:', 'Recommended:' and 'Results:' markers.**

Start each line in a knowledge box with one of them.

✔ **In "Requires:" lines, link to pages that provide the requirement whenever possible.**

✔ **Link only to CSS-identifiers of other pages, not specific sections on that page.** (This might change in the future.)

✔ **One requirement or result per line.**

✖ **A list of multiple requirements in one line.**

Do not: (unknown ref opmanual_duckiebot/setup-duckiebot)

previous warning next (17 of 18) index

warning

```
I will ignore this because it is an external link.

 > I do not know what is indicated by the link '#op-
manual_duckiebot/setup-duckiebot'.
```

Location not known more precisely.

Created by function `n/a` in module `n/a`.

✔ **Use short descriptive texts, with good keywords that identify the requirement or result.**

✔ **Optimal:** Use the same description as in other knowledge boxes, when referring to the same entity. (Exception: If the other page's description violates these guidelines.)

✖ Long texts, with many unrelated keywords.

Do not:

```
Results: A correctly configured Duckiebot SD card in configuration DB18.
After assembling the Duckiebot, this will allow you to start it, con-
nect to the internet, and get going.

Requires: Software-X, with all requirements for the ROS example
```

✔ Put all text that does not directly describe the requirement between round brackets **. Omit unnecessary words.

Do:

```
Results: A configured Duckiebot SD card in configuration DB18. (After as-
sembling the Duckiebot, this will allow you to start it, connect to the
internet, and get going.)

Requires: Software-X ( with all requirements for the ROS example)
```

✔ For estimated time needed, use a 'Requires:' marker.

For example:

```
 Requires: Approximately 1 hour 30 minutes.
```

("1h30", or "1h, 30 min" works as well.)

✔ If you want, you can use the instructions here(Pointer to beta/draft material that was removed - instructions-refer-to-data)

previous warning (18 of 18) index
warning

`This link points to beta/draft material removed`

Location not known more precisely.

Created by function `n/a` in module `n/a`.

to pick a name of an entity that the EOD system knows already, from the data files, or add a new entity there via pull request.

** This *might* change in the future.

Part C

Documentation style guide

This part describes the style guide for our documentation.

Contents

UNIT C-1
Style guide

This chapter describes the conventions for writing the technical documentation.

1.1. Organization

The documentation is divided into books, parts (labeled 'part:') and units (with no CSS prefix).

To create a new part, put `{#part:name status=STATUS}` after the header, like so:

```
## Safety {#part:safety status=ready}
```

1.2. General guidelines for technical writing

The following holds for all technical writing.

- The documentation is written in correct English.
- Do not say "should" when you mean "must". "Must" and "should" have precise meanings and they are not interchangeable. These meanings are explained in this document.
- "Please" is unnecessary in technical documentation.
    - ✖ "Please remove the SD card."
    - ✔ "Remove the SD card".
- Do not use colloquialisms or abbreviations.

```
Bad: "The pwd is ubuntu."
```

```
Better: "The password is ubuntu."
```

    - ✖ "To create a ROS pkg..."
    - ✔ "To create a ROS package..."
- Python is capitalized when used as a name.
    - ✖ "If you are using python..."
    - ✔ "If you are using Python..."

- Do not use emojis.
- Do not use ALL CAPS.
- Make infrequent use of **bold statements.**
- Do not use exclamation points.

1.3. Style guide for the Duckietown documentation

- The English version of the documentation is written in American English. Please note that your spell checker might be set to British English.

  ✖ behaviour

  ✔ behavior

  ✖ localisation

  ✔ localization

- It's ok to use "it's" instead of "it is", "can't" instead of "cannot", etc.
- All the filenames and commands must be enclosed in code blocks using Markdown backticks.

✖ "Edit the ~/.ssh/config file using vi."

✔ "Edit the `~/.ssh/config` file using `vi`."

- Ctrl-C, `ssh` etc. are not verbs.

  ✖ "Ctrl-C from the command line".

  ✔ "Use Ctrl-C from the command line".

- Subtle humor and puns about duckies are encouraged.

1.4. Writing command lines

Use either "`laptop`" or "`duckiebot`" (not capitalized, as a hostname) as the prefix for the command line.

For example, for a command that is supposed to run on the laptop, use:

```
laptop $ cd ~/duckietown
```

It will become:

```
$ cd ~/duckietown
```

For a command that must run on the Duckiebot, use:

```
duckiebot $ cd ~/duckietown
```

It will become:

```
$ cd ~/duckietown
```

If the command is supposed to be run on both, omit the hostname:

```
$ cd ~/duckietown
```

Other rules:

- For a container use `container`.
- For a container on a Duckiebot use `duckiebot-container`.
- For a container on the laptop use `laptop-container`.

This:

```
container $ command
```

will become:

```
$ command
```

This:

```
duckiebot-container $ command
```

will become:

```
$ command
```

This:

```
laptop-container $ command
```

will become:

💻🐳
```
$ command
```

1.5. Frequently misspelled words

- “Duckiebot” is always capitalized.
- Use “Raspberry Pi”, not “PI”, “raspi”, etc.
- These are other words frequently misspelled: 5 GHz WiFi

1.6. Other conventions

When the user must edit a file, just say: “edit `/this/file`”.

Writing down the command line for editing, like the following:

```
$ vi /this/file
```

is too much detail.

(If people need to be told how to edit a file, Duckietown is too advanced for them.)

1.7. Troubleshooting sections

Write the documentation as if every step succeeds.

Then, at the end, make a “Troubleshooting” section.

Organize the troubleshooting section as a list of symptom/resolution.

The following is an example of a troubleshooting section.

1) Troubleshooting

Symptom: This strange thing happens.

Resolution: Maybe the camera is not inserted correctly. Remove and reconnect.

Symptom: This other strange thing happens.

Resolution: Maybe the plumbus is not working correctly. Try reformatting the plumbus.

Part D
Slides

Contents

Unit D-1
Creating slides ✎

See this presentation: ? Making slides

Making slides

To create slides, use `type=slides` for an H1 header:

```
# Making slides {#making-slides type=slides status=ready nonumber=1}

To create slides, use the attribute `type=slides` for an H1 header:
```

1.1. Next slides

Use second-level headers to make subsequent slides:

```
# Making slides {#making-slides type=slides status=ready}


To create slides, use `type=slides` for an H1 header:

...

## Next slides

Use second-level headers to make subsequent slides:
```

1.2. Stepping

Use the symbol `▶` to make the corresponding fragment appear on click.

```
* Step 1 ▶
* Step 2 ▶
* Step 3 ▶
```

- Step 1 ▶
- Step 2 ▶
- Step 3 ▶

1.3. Maths

Latex still works here.

A simple test for math:

$$a + b \geq \sqrt{c}$$

1.4. Stepping through equations

You can also step through equations:

```
Consider: ▶

$$
a = b ▶
$$

Then we get: ▶

$$
c = d ▶
$$
```

Consider: ▶

$$a = b▶$$

Then we get: ▶

$$c = d▶$$

Stepping through partial parts of equations is not supported.

1.5. Sub-slides

You can have “sub slides” to make the presentation nonlinear.

Defining subslides: Create a subslide by using header `h3`:

```
### Subslide 1

This is lower.

### Subslide 2

This is even lower.
```

Showing subslides: Press down to show the subslides.

Showing the slides map: Press ESC again to look at the slides map.

1) Subslide 1

This is lower.

2) Subslide 2

This is even lower.

1.6. Presentation mode

Press the key S to enter presenters mode.

Press ESC to exit presenter mode.

1.7. Presenter notes

Use a blockquote at the end of a slide to encode the presenter notes.

```
## Presenter notes

Use a blockquote at the end of a slide to encode the presenter notes:

> These are presenter notes that will appear in presenter mode.
```

> These are presenter notes that will appear in presenter mode.

1.8. Under the hood

- All of this is built on top of `reveal.js`.

- Please see `reveal.js` for the complete list of features.

1.9. Figures

All other duckuments features work as expected.

Example of a figure:

Figure 1.1

```
<figure class="stretch">
  <img style='width:8em'  src="duckietown-logo-transparent.png"/>
</figure>
```

1.10. Subfigures

Subfigures with animation:

▶ ▶ (a) Hello ▶ (b) second

Figure 1.2. Main caption

```
<figure class="flow-subfigures"> ▶
    <figcaption>Main caption</figcaption>
    <figure> ▶
        <figcaption>Hello</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
    <figure> ▶
        <figcaption>second</figcaption>
        <img style='width:8em' src="duckietown-logo-transparent.png"/>
    </figure>
</figure>
```

1.11. Cross references ✎

You can link to chapters and vice-versa: Unit D-1 - Creating slides

```
You can link to chapters and vice-versa: [](#creating-slides)
```

Link to the previous slide.

1.12. References ✎

[1] Bruno Siciliano and Oussama Khatib. *Springer Handbook of Robotics*. Springer-Verlag New York, Inc., Secaucus, NJ, USA, 2007.