

# What is rustdoc?

The standard Rust distribution ships with a tool called `rustdoc`. Its job is to generate documentation for Rust projects. On a fundamental level, `Rustdoc` takes as an argument either a crate root or a Markdown file, and produces HTML, CSS, and JavaScript.

## Basic usage

Let's give it a try! Create a new project with Cargo:

```
$ cargo new docs --lib  
$ cd docs
```

In `src/lib.rs`, Cargo has generated some sample code. Delete it and replace it with this:

```
/// foo is a function  
fn foo() {}
```

Let's run `rustdoc` on our code. To do so, we can call it with the path to our crate root like this:

```
$ rustdoc src/lib.rs
```

This will create a new directory, `doc`, with a website inside! In our case, the main page is located in `doc/lib/index.html`. If you open that up in a web browser, you will see a page with a search bar, and "Crate lib" at the top, with no contents.

You can also use `cargo doc` to generate documentation for the whole project. See [Using rustdoc with Cargo](#).

## Configuring rustdoc

There are two problems with this: first, why does it think that our crate is named "lib"? Second, why does it not have any contents?

The first problem is due to `rustdoc` trying to be helpful; like `rustc`, it assumes that our crate's name is the name of the file for the crate root. To fix this, we can pass in a command-line flag:

```
$ rustdoc src/lib.rs --crate-name docs
```

Now, `doc/docs/index.html` will be generated, and the page says "Crate docs."

For the second issue, it is because our function `foo` is not public; `rustdoc` defaults to generating documentation for only public functions. If we change our code...

```
/// foo is a function
pub fn foo() {}
```

... and then re-run `rustdoc`:

```
$ rustdoc src/lib.rs --crate-name docs
```

We now have some generated documentation. Open up `doc/docs/index.html` and check it out! It should show a link to the `foo` function's page, which is located at `doc/docs/fn.foo.html`. On that page, you'll see the "foo is a function" we put inside the documentation comment in our crate.

## Using rustdoc with Cargo

Cargo also has integration with `rustdoc` to make it easier to generate docs. Instead of the `rustdoc` command, we could have done this:

```
$ cargo doc
```

If you want `cargo` to automatically open the generated documentation, you can use:

```
$ cargo doc --open
```

Internally, `cargo doc` calls out to `rustdoc` like this:

```
$ rustdoc --crate-name docs src/lib.rs -o <path>/docs/target/doc -L
dependency=<path>/docs/target/debug/deps
```

You can see this with `cargo doc --verbose`.

It generates the correct `--crate-name` for us, as well as pointing to `src/lib.rs`. But what about those other arguments?

- `-o` controls the output of our docs. Instead of a top-level `doc` directory, notice that Cargo puts generated documentation under `target`. That is the idiomatic place for generated files in Cargo projects.
- `-L` flag helps rustdoc find the dependencies your code relies on. If our project used dependencies, we would get documentation for them as well!

## Outer and inner documentation

The `///` syntax is used to document the item present after it. That's why it is called an outer documentation. There is another syntax: `//!`, which is used to document the item it is present inside. It is called an inner documentation. It is often used when documenting the entire crate, because nothing comes before it: it is the root of the crate. So in order to document an entire crate, you need to use `//!` syntax. For example:

```
//! This is my first rust crate
```

When used in the crate root, it documents the item it is inside, which is the crate itself.

For more information about the `//!` syntax, see [the Book](#).

## Using standalone Markdown files

`rustdoc` can also generate HTML from standalone Markdown files. Let's give it a try: create a `README.md` file with these contents:

```
# Docs

This is a project to test out `rustdoc`.

[Here is a link!](https://www.rust-lang.org)

## Example

```rust
fn foo() -> i32 {
    1 + 1
}
```
```

And call `rustdoc` on it:

```
$ rustdoc README.md
```

You will find an HTML file in `docs/doc/README.html` generated from its Markdown contents.

Cargo currently does not understand standalone Markdown files, unfortunately.

## Summary

This covers the simplest use-cases of `rustdoc`. The rest of this book will explain all of the options that `rustdoc` has, and how to use them.

# Command-line arguments

Here's the list of arguments you can pass to `rustdoc` :

## **`-h/--help`: help**

Using this flag looks like this:

```
$ rustdoc -h
$ rustdoc --help
```

This will show `rustdoc` 's built-in help, which largely consists of a list of possible command-line flags.

Some of `rustdoc` 's flags are unstable; this page only shows stable options, `--help` will show them all.

## **`-V/--version`: version information**

Using this flag looks like this:

```
$ rustdoc -V
$ rustdoc --version
```

This will show `rustdoc` 's version, which will look something like this:

```
rustdoc 1.17.0 (56124baa9 2017-04-24)
```

## **`-v/--verbose`: more verbose output**

Using this flag looks like this:

```
$ rustdoc -v src/lib.rs
$ rustdoc --verbose src/lib.rs
```

This enables "verbose mode", which means that more information will be written to standard out. What is written depends on the other flags you've passed in. For example, with `--version`:

```
$ rustdoc --verbose --version
rustdoc 1.17.0 (56124baa9 2017-04-24)
binary: rustdoc
commit-hash: hash
commit-date: date
host: host-triple
release: 1.17.0
LLVM version: 3.9
```

## **`-o/--out-dir`: output directory path**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -o target/doc
$ rustdoc src/lib.rs --out-dir target/doc
```

By default, `rustdoc`'s output appears in a directory named `doc` in the current working directory. With this flag, it will place all output into the directory you specify.

## **`--crate-name`: controlling the name of the crate**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --crate-name mycrate
```

By default, `rustdoc` assumes that the name of your crate is the same name as the `.rs` file. `--crate-name` lets you override this assumption with whatever name you choose.

## **`--document-private-items`: Show items that are not public**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --document-private-items
```

By default, `rustdoc` only documents items that are publicly reachable.

```
pub fn public() {} // this item is public and will be documented
mod private { // this item is private and will not be documented
    pub fn unreachable() {} // this item is public, but unreachable, so it will
    not be documented
}
```

`--document-private-items` documents all items, even if they're not public.

## **`-L/--library-path`: where to look for dependencies**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -L target/debug/deps
$ rustdoc src/lib.rs --library-path target/debug/deps
```

If your crate has dependencies, `rustdoc` needs to know where to find them. Passing `--library-path` gives `rustdoc` a list of places to look for these dependencies.

This flag takes any number of directories as its argument, and will use all of them when searching.

## **`--cfg`: passing configuration flags**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --cfg feature="foo"
```

This flag accepts the same values as `rustc --cfg`, and uses it to configure compilation. The example above uses `feature`, but any of the `cfg` values are acceptable.

## --check-cfg: check configuration flags

This flag accepts the same values as `rustc --check-cfg`, and uses it to check configuration flags.

Using this flag looks like this:

```
$ rustdoc src/lib.rs --check-cfg='cfg(my_cfg, values("foo", "bar"))'
```

The example above check every well known names and values ( `target_os` , `doc` , `test` , ...) and check the values of `my_cfg`: `foo` and `bar` .

## --extern: specify a dependency's location

Using this flag looks like this:

```
$ rustdoc src/lib.rs --extern lazy-static=/path/to/lazy-static
```

Similar to `--library-path`, `--extern` is about specifying the location of a dependency. `--library-path` provides directories to search in, `--extern` instead lets you specify exactly which dependency is located where.

## -C/--codegen: pass codegen options to rustc

Using this flag looks like this:

```
$ rustdoc src/lib.rs -C target_feature=+avx
$ rustdoc src/lib.rs --codegen target_feature=+avx

$ rustdoc --test src/lib.rs -C target_feature=+avx
$ rustdoc --test src/lib.rs --codegen target_feature=+avx

$ rustdoc --test README.md -C target_feature=+avx
$ rustdoc --test README.md --codegen target_feature=+avx
```

When rustdoc generates documentation, looks for documentation tests, or executes documentation tests, it needs to compile some rust code, at least part-way. This flag allows you to tell rustdoc to provide some extra codegen options to rustc when it runs these compilations. Most of the time, these options won't affect a regular documentation run, but if something



depends on target features to be enabled, or documentation tests need to use some additional options, this flag allows you to affect that.

The arguments to this flag are the same as those for the `-c` flag on `rustc`. Run `rustc -C help` to get the full list.

## **--test: run code examples as tests**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --test
```

This flag will run your code examples as tests. For more, see [the chapter on documentation tests](#).

See also `--test-args` and `--test-run-directory`.

## **--test-args: pass options to test runner**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --test --test-args ignored
```

This flag will pass options to the test runner when running documentation tests. For more, see [the chapter on documentation tests](#).

See also `--test`.

## **--test-run-directory: run code examples in a specific directory**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --test --test-run-directory=/path/to/working/directory
```

This flag will run your code examples in the specified working directory. For more, see [the chapter on documentation tests](#).

See also `--test` .

## **`--target`: generate documentation for the specified target triple**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --target x86_64-pc-windows-gnu
```

Similar to the `--target` flag for `rustc` , this generates documentation for a target triple that's different than your host triple.

All of the usual caveats of cross-compiling code apply.

## **`--default-theme`: set the default theme**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --default-theme=ayu
```

Sets the default theme (for users whose browser has not remembered a previous theme selection from the on-page theme picker).

The supplied value should be the lowercase version of the theme name. The set of available themes can be seen in the theme picker in the generated output.

Note that the set of available themes - and their appearance - is not necessarily stable from one rustdoc version to the next. If the requested theme does not exist, the builtin default (currently `light` ) is used instead.

## **`--markdown-css`: include more CSS files when rendering markdown**

Using this flag looks like this:

```
$ rustdoc README.md --markdown-css foo.css
```

When rendering Markdown files, this will create a `<link>` element in the `<head>` section of the generated HTML. For example, with the invocation above,

```
<link rel="stylesheet" type="text/css" href="foo.css">
```

will be added.

When rendering Rust files, this flag is ignored.

## **`--html-in-header`: include more HTML in `<head>`**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --html-in-header header.html
$ rustdoc README.md --html-in-header header.html
```

This flag takes a list of files, and inserts them into the `<head>` section of the rendered documentation.

## **`--html-before-content`: include more HTML before the content**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --html-before-content extra.html
$ rustdoc README.md --html-before-content extra.html
```

This flag takes a list of files, and inserts them inside the `<body>` tag but before the other content `rustdoc` would normally produce in the rendered documentation.

## **`--html-after-content`: include more HTML after the content**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --html-after-content extra.html  
$ rustdoc README.md --html-after-content extra.html
```

This flag takes a list of files, and inserts them before the `</body>` tag but after the other content `rustdoc` would normally produce in the rendered documentation.

## **--markdown-playground-url: control the location of the playground**

Using this flag looks like this:

```
$ rustdoc README.md --markdown-playground-url https://play.rust-lang.org/
```

When rendering a Markdown file, this flag gives the base URL of the Rust Playground, to use for generating Run buttons.

## **--markdown-no-toc: don't generate a table of contents**

Using this flag looks like this:

```
$ rustdoc README.md --markdown-no-toc
```

When generating documentation from a Markdown file, by default, `rustdoc` will generate a table of contents. This flag suppresses that, and no TOC will be generated.

## **-e/--extend-css: extend rustdoc's CSS**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -e extra.css  
$ rustdoc src/lib.rs --extend-css extra.css
```

With this flag, the contents of the files you pass are included at the bottom of the `theme.css` file.

## --sysroot: override the system root

Using this flag looks like this:

```
$ rustdoc src/lib.rs --sysroot /path/to/sysroot
```

Similar to `rustc --sysroot`, this lets you change the `sysroot` `rustdoc` uses when compiling your code.

## --edition: control the edition of docs and doctests

Using this flag looks like this:

```
$ rustdoc src/lib.rs --edition 2018  
$ rustdoc --test src/lib.rs --edition 2018
```

This flag allows `rustdoc` to treat your rust code as the given edition. It will compile doctests with the given edition as well. As with `rustc`, the default edition that `rustdoc` will use is 2015 (the first edition).

## --theme: add a theme to the documentation output

Using this flag looks like this:

```
$ rustdoc src/lib.rs --theme /path/to/your/custom-theme.css
```

`rustdoc`'s default output includes two themes: `light` (the default) and `dark`. This flag allows you to add custom themes to the output. Giving a CSS file to this flag adds it to your documentation as an additional theme choice. The theme's name is determined by its filename; a theme file named `custom-theme.css` will add a theme named `custom-theme` to the documentation.

## **--check-theme: verify custom themes against the default theme**

Using this flag looks like this:

```
$ rustdoc --check-theme /path/to/your/custom-theme.css
```

While `rustdoc`'s HTML output is more-or-less consistent between versions, there is no guarantee that a theme file will have the same effect. The `--theme` flag will still allow you to add the theme to your documentation, but to ensure that your theme works as expected, you can use this flag to verify that it implements the same CSS rules as the official `light` theme.

`--check-theme` is a separate mode in `rustdoc`. When `rustdoc` sees the `--check-theme` flag, it discards all other flags and only performs the CSS rule comparison operation.

## **--crate-version: control the crate version**

Using this flag looks like this:

```
$ rustdoc src/lib.rs --crate-version 1.3.37
```

When `rustdoc` receives this flag, it will print an extra "Version (version)" into the sidebar of the crate root's docs. You can use this flag to differentiate between different versions of your library's documentation.

## **-: load source code from the standard input**

If you specify `-` as the INPUT on the command line, then `rustdoc` will read the source code from stdin (standard input stream) until the EOF, instead of the file system with an otherwise specified path.

## **@path: load command-line flags from a path**

If you specify `@path` on the command-line, then it will open `path` and read command line options from it. These options are one per line; a blank line indicates an empty option. The file

can use Unix or Windows style line endings, and must be encoded as UTF-8.

## **--passes: add more rustdoc passes**

This flag is **deprecated**. For more details on passes, see [the chapter on them](#).

## **--no-defaults: don't run default passes**

This flag is **deprecated**. For more details on passes, see [the chapter on them](#).

## **-r/--input-format: input format**

This flag is **deprecated** and **has no effect**.

Rustdoc only supports Rust source code and Markdown input formats. If the file ends in `.md` or `.markdown`, `rustdoc` treats it as a Markdown file. Otherwise, it assumes that the input file is Rust.

## **--test-builder: rustc-like program to build tests**

Using this flag looks like this:

```
$ rustdoc --test-builder /path/to/rustc src/lib.rs
```

Rustdoc will use the provided program to compile tests instead of the default `rustc` program from the sysroot.

## **--test-builder-wrapper: wrap calls to the test builder**

Using this flag looks like this:

```
$ rustdoc --test-builder-wrapper /path/to/rustc-wrapper src/lib.rs
$ rustdoc \
  --test-builder-wrapper rustc-wrapper1 \
  --test-builder-wrapper rustc-wrapper2 \
  --test-builder rustc \
  src/lib.rs
```

Similar to cargo `build.rustc-wrapper` option, this flag takes a `rustc` wrapper program. The first argument to the program will be the test builder program.

This flag can be passed multiple times to nest wrappers.



# How to read rustdoc output

Rustdoc's HTML output includes a friendly and useful navigation interface which makes it easier for users to navigate and understand your code. This chapter covers the major features of that interface, and is a great starting point for documentation authors and users alike.

## Structure

The `rustdoc` output is divided into three sections. Along the left side of each page is a quick navigation bar, which shows contextual information about the current entry. The rest of the page is taken up by the search interface at the top and the documentation for the current item below that.

## The Item Documentation

The majority of the screen is taken up with the documentation text for the item currently being viewed. At the top is some at-a-glance info and controls:

- the type and name of the item, such as "Struct `std::time::Duration`",
- a button to copy the item's path to the clipboard, which is a clipboard item
- a button to collapse or expand the top-level documentation for that item ( `[+]` or `[-]` ),
- a link to the source code ( `[src]` ), if [configured](#), and present (the source may not be available if the documentation was created with `cargo doc --no-deps` ),
- and the version in which the item became stable, if it's a stable item in the standard library.

Below this is the main documentation for the item, including a definition or function signature if appropriate, followed by a list of fields or variants for Rust types. Finally, the page lists associated functions and trait implementations, including automatic and blanket implementations that `rustdoc` knows about.

## Sections

### Aliased Type

A type alias is expanded at compile time to its [aliased type](#). That may involve substituting some or all of the type parameters in the target type with types provided by the type alias definition. The Aliased Type section shows the result of this expansion, including the types of public fields or variants, which may depend on those substitutions.

### Navigation

Subheadings, variants, fields, and many other things in this documentation are anchors and can be clicked on and deep-linked to, which is a great way to communicate exactly what you're talking about. The typographical character "\$" appears next to lines with anchors on them when hovered or given keyboard focus.

## The Navigation Bar

For example, when looking at documentation for the crate root, it shows all the crates documented in the documentation bundle, and quick links to the modules, structs, traits, functions, and macros available from the current crate. At the top, it displays a [configurable logo](#) alongside the current crate's name and version, or the current item whose documentation is being displayed.

## The Theme Picker and Search Interface

When viewing `rustdoc`'s output in a browser with JavaScript enabled, a dynamic interface appears at the top of the page composed of the [search](#) interface, help screen, and [options](#).

Paths are supported as well, you can look for `Vec::new` or `Option::Some` or even `module::module_child::another_child::struct::field`. Whitespace characters are considered the same as `::`, so if you write `Vec new`, it will be considered the same as `Vec::new`.

## Shortcuts

Pressing `s` while focused elsewhere on the page will move focus to the search bar, and pressing `?` shows the help screen, which includes all these shortcuts and more.

When the search results are focused, the left and right arrows move between tabs and the up and down arrows move among the results. Pressing the enter or return key opens the highlighted result.

When looking at the documentation for an item, the plus and minus keys expand and collapse all sections in the document.

# Rustdoc in-doc settings

Rustdoc's HTML output includes a settings menu, and this chapter describes what each setting in this menu does.

It can be accessed by clicking on the gear button () in the upper right.

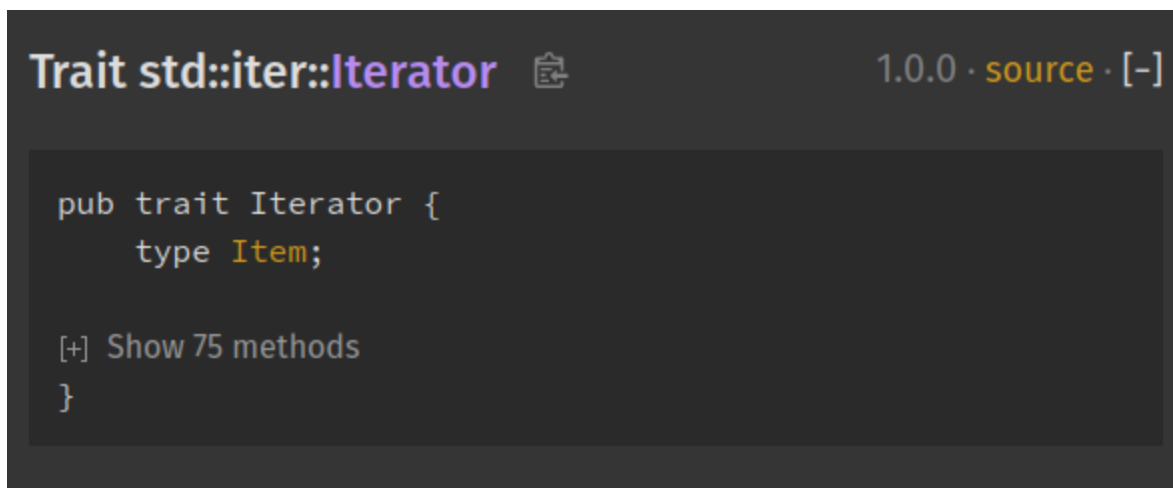
## Changing displayed theme

It is possible to change the theme. If you pick the "system preference", you will be able to see two new sub-menus: "Preferred light theme" and "Preferred dark theme". It means that if your system preference is set to "light", then rustdoc will use the theme you selected in "Preferred light theme".

## Auto-hide item contents for large items

If the type definition contains more than 12 items, and this setting is enabled, it'll collapse them by default. You can see them by clicking on the `[+]` button to expand them.

A good example of this setting in use can be seen in the [Iterator](#) doc page:



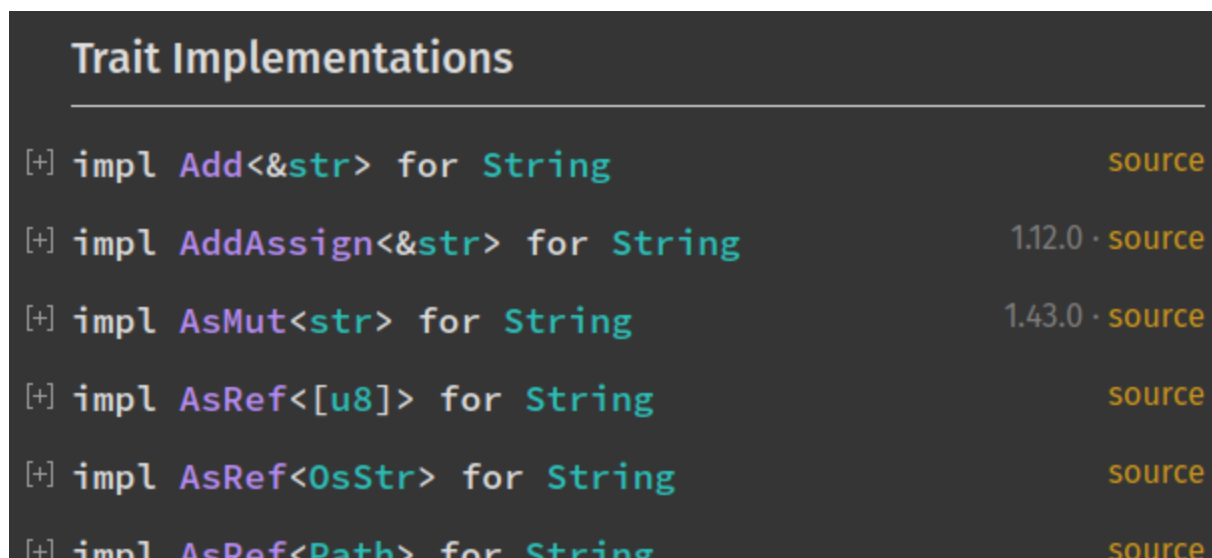
## Auto-hide item methods' documentation

If enabled, this setting will collapse all trait implementations blocks. It is convenient if you just want an overview of all the methods available. You can still see a method's documentation by expanding it.

## Auto-hide trait implementation documentation

If enabled, this setting will collapse all trait implementations blocks (you can see them in the "Trait Implementations" section). It is convenient if you just want an overview of all the trait implemented on a type. You can still see a trait implementation's associated items by expanding it.

Example:



## Directly go to item in search if there is only one result

If this setting is enabled, you will directly be taken to the result page if your search only returned one element. Useful if you know exactly what you're looking for and want to be taken there directly and not waste time selecting the only search result.

## Show line numbers on code examples

If enabled, this setting will add line numbers to the code examples in the documentation. It provides a visual aide for the code reading.

## Disable keyboard shortcuts

If this setting is enabled, the keyboard shortcuts will be disabled. It's useful in case some of these shortcuts are already used by a web extension you're using.

To see the full list of the rustdoc keyboard shortcuts, you can open the help menu (the button with the question mark on the left of the setting menu button).

# Rustdoc search

Typing in the search bar instantly searches the available documentation, matching either the name and path of an item, or a function's approximate type signature.

## Search By Name

To search by the name of an item (items include modules, types, traits, functions, and macros), write its name or path. As a special case, the parts of a path that normally get divided by `::` double colons can instead be separated by spaces. For example:

- `vec new` and `vec::new` both show the function `std::vec::Vec::new` as a result.
- `vec`, `vec vec`, `std::vec`, and `std::vec::Vec` all include the struct `std::vec::Vec` itself in the results (and all but the last one also include the module in the results).

As a quick way to trim down the list of results, there's a drop-down selector below the search input, labeled "Results in [std]". Clicking it can change which crate is being searched.

Rustdoc uses a fuzzy matching function that can tolerate typos for this, though it's based on the length of the name that's typed in, so a good example of how this works would be `HahsMap`. To avoid this, wrap the item in quotes, searching for `"HahsMap"` (in this example, no results will be returned).

## Tabs in the Search By Name interface

In fact, using `HahsMap` again as the example, it tells you that you're using "In Names" by default, but also lists two other tabs below the crate drop-down: "In Parameters" and "In Return Types".

These two tabs are lists of functions, defined on the closest matching type to the search (for `HahsMap`, it loudly auto-corrects to `hashmap`). This auto-correct only kicks in if nothing is found that matches the literal.

These tabs are not just methods. For example, searching the `alloc` crate for `Layout` also lists functions that accept layouts even though they're methods on the allocator or free functions.

## Searching By Type Signature for functions

If you know more specifically what the function you want to look at does, Rustdoc can search by more than one type at once in the parameters and return value. Multiple parameters are separated by `,` commas, and the return value is written with after a `->` arrow.

Before describing the syntax in more detail, here's a few sample searches of the standard library and functions that are included in the results list:

Query	Results
<code>usize -&gt; vec</code>	<code>slice::repeat</code> and <code>Vec::with_capacity</code>
<code>vec, vec -&gt; bool</code>	<code>Vec::eq</code>
<code>option&lt;T&gt;, fnonce -&gt; option&lt;U&gt;</code>	<code>Option::map</code> and <code>Option::and_then</code>
<code>option&lt;T&gt;, (fnonce (T) -&gt; bool) -&gt; option&lt;T&gt;</code>	<code>Option::filter</code>
<code>option&lt;T&gt;, (T -&gt; bool) -&gt; option&lt;T&gt;</code>	<code>Option::filter</code>
<code>option -&gt; default</code>	<code>Option::unwrap_or_default</code>
<code>stdout, [u8]</code>	<code>Stdout::write</code>
<code>any -&gt; !</code>	<code>panic::panic_any</code>
<code>vec::intoiter&lt;T&gt; -&gt; [T]</code>	<code>IntoIter::as_slice</code> and <code>IntoIter::next_chunk</code>
<code>iterator&lt;T&gt;, fnmut -&gt; T</code>	<code>Iterator::reduce</code> and <code>Iterator::find</code>

## How type-based search works

In a complex type-based search, Rustdoc always treats every item's name as literal. If a name is used and nothing in the docs matches the individual item, such as a typo-ed `usize -> vec` search, the item `uize` is treated as a generic type parameter (resulting in `vec::from` and other generic `vec` constructors).

After deciding which items are type parameters and which are actual types, it then searches by matching up the function parameters (written before the `->`) and the return types (written after the `->`). Type matching is order-agnostic, and allows items to be left out of the query, but items that are present in the query must be present in the function for it to match. The `self` parameter is treated the same as any other parameter, and `self` is resolved to the underlying type's name.

Function signature searches can query generics, wrapped in angle brackets, and traits will be normalized like types in the search engine if no type parameters match them. For example, a



function with the signature `fn my_function<I: Iterator<Item=u32>>(input: I) -> usize` can be matched with the following queries:

- `Iterator<Item=u32> -> usize`
- `Iterator<u32> -> usize` (you can leave out the `Item=` part)
- `Iterator -> usize` (you can leave out iterator's generic entirely)
- `T -> usize` (you can match with a generic parameter)

Each of the above queries is progressively looser, except the last one would not match `dyn Iterator`, since that's not a type parameter.

If a bound has multiple associated types, specifying the name allows you to pick which one gets matched. If no name is specified, then the query will match of any of them. For example,

```
pub trait MyTrait {
    type First;
    type Second;
}

/// This function can be found using the following search queries:
///
///     MyTrait<First=u8, Second=u32> -> bool
///     MyTrait<u32, First=u8> -> bool
///     MyTrait<Second=u32> -> bool
///     MyTrait<u32, u8> -> bool
///
/// The following queries, however, will *not* match it:
///
///     MyTrait<First=u32> -> bool
///     MyTrait<u32, u32> -> bool
pub fn my_fn(x: impl MyTrait<First=u8, Second=u32>) -> bool { true }
```

Generics and function parameters are order-agnostic, but sensitive to nesting and number of matches. For example, a function with the signature `fn read_all(&mut self: impl Read) -> Result<Vec<u8>, Error>` will match these queries:

- `&mut Read -> Result<Vec<u8>, Error>`
- `Read -> Result<Vec<u8>, Error>`
- `Read -> Result<Error, Vec>`
- `Read -> Result<Vec<u8>>`
- `Read -> u8`

But it *does not* match `Result<Vec, u8>` or `Result<u8<Vec>>`.

To search for a function that accepts a function as a parameter, like `Iterator::all`, wrap the nested signature in parenthesis, as in `Iterator<T>, (T -> bool) -> bool`. You can also

search for a specific closure trait, such as `Iterator<T>, (FnMut(T) -> bool) -> bool`, but you need to know which one you want.

## Primitives with Special Syntax

Shorthand	Explicit names
<code>&amp;</code>	<code>primitive:reference</code>
<code>&amp;T</code>	<code>primitive:reference&lt;T&gt;</code>
<code>&amp;mut</code>	<code>primitive:reference&lt;keyword:mut&gt;</code>
<code>&amp;mut T</code>	<code>primitive:reference&lt;keyword:mut, T&gt;</code>
<code>[]</code>	<code>primitive:slice</code> and/or <code>primitive:array</code>
<code>[T]</code>	<code>primitive:slice&lt;T&gt;</code> and/or <code>primitive:array&lt;T&gt;</code>
<code>()</code>	<code>primitive:unit</code> and/or <code>primitive:tuple</code>
<code>(T)</code>	<code>T</code>
<code>(T,)</code>	<code>primitive:tuple&lt;T&gt;</code>
<code>!</code>	<code>primitive:never</code>
<code>(T, U -&gt; V, W)</code>	<code>fn(T, U) -&gt; (V, W)</code> , <code>Fn</code> , <code>FnMut</code> , and <code>FnOnce</code>

When searching for `[]`, Rustdoc will return search results with either slices or arrays. If you know which one you want, you can force it to return results for `primitive:slice` or `primitive:array` using the explicit name syntax. Empty square brackets, `[]`, will match any slice or array regardless of what it contains, or an item type can be provided, such as `[u8]` or `[T]`, to explicitly find functions that operate on byte slices or generic slices, respectively.

A single type expression wrapped in parens is the same as that type expression, since parens act as the grouping operator. If they're empty, though, they will match both `unit` and `tuple`, and if there's more than one type (or a trailing or leading comma) it is the same as `primitive:tuple<...>`.

However, since items can be left out of the query, `(T)` will still return results for types that match tuples, even though it also matches the type on its own. That is, `(u32)` matches `(u32,)` for the exact same reason that it also matches `Result<u32, Error>`.


The `->` operator has lower precedence than comma. If it's not wrapped in brackets, it delimits the return value for the function being searched for. To search for functions that take functions as parameters, use parenthesis.

## Limitations and quirks of type-based search

Type-based search is still a buggy, experimental, work-in-progress feature. Most of these limitations should be addressed in future version of Rustdoc.

- There's no way to write trait constraints on generic parameters. You can name traits directly, and if there's a type parameter with that bound, it'll match, but `option<T> -> T` where `T: Default` cannot be precisely searched for (use `option<Default> -> Default`).
- Supertraits, type aliases, and `Deref` are all ignored. Search mostly operates on type signatures *as written*, and not as they are represented within the compiler.
- Type parameters match type parameters, such that `option<A>` matches `option<T>`, but never match concrete types in function signatures. A trait named as if it were a type, such as `Option<Read>`, will match a type parameter constrained by that trait, such as `Option<T> where T: Read`, as well as matching `dyn Trait` and `impl Trait`.
- `impl Trait` in argument position is treated exactly like a type parameter, but in return position it will not match type parameters.
- Any type named in a complex type-based search will be assumed to be a type parameter if nothing matching the name exactly is found. If you want to force a type parameter, write `generic:T` and it will be used as a type parameter even if a matching name is found. If you know that you don't want a type parameter, you can force it to match something else by giving it a different prefix like `struct:T`.
- It's impossible to search for references or pointers. The wrapped types can be searched for, so a function that takes `&File` can be found with `File`, but you'll get a parse error when typing an `&` into the search field.
- Searching for lifetimes is not supported.
- It's impossible to search based on the length of an array.

## Item filtering

Names in the search interface can be prefixed with an item type followed by a colon (such as `mod:`) to restrict the results to just that kind of item. Also, searching for `println!` will search for a macro named `println`, just like searching for `macro:println` does. The complete list of available filters is given under the  Help area, and in the detailed syntax below.

Item filters can be used in both name-based and type signature-based searches.

# Search query syntax

```

ident = *(ALPHA / DIGIT / "_")
path = ident *(DOUBLE-COLON ident) [BANG]
slice-like = OPEN-SQUARE-BRACKET [ nonempty-arg-list ] CLOSE-SQUARE-BRACKET
tuple-like = OPEN-PAREN [ nonempty-arg-list ] CLOSE-PAREN
borrow-ref = AMP *WS [MUT] *WS [arg]
arg = [type-filter *WS COLON *WS] (path [generics] / slice-like / tuple-like /
borrow-ref)
type-sep = COMMA/WS *(COMMA/WS)
nonempty-arg-list = *(type-sep) arg *(type-sep arg) *(type-sep) [ return-args ]
generic-arg-list = *(type-sep) arg [ EQUAL arg ] *(type-sep arg [ EQUAL arg ]) *
(type-sep)
normal-generics = OPEN-ANGLE-BRACKET [ generic-arg-list ] *(type-sep)
CLOSE-ANGLE-BRACKET
fn-like-generics = OPEN-PAREN [ nonempty-arg-list ] CLOSE-PAREN [ RETURN-ARROW arg
]
generics = normal-generics / fn-like-generics
return-args = RETURN-ARROW *(type-sep) nonempty-arg-list

exact-search = [type-filter *WS COLON] [ RETURN-ARROW ] *WS QUOTE ident QUOTE [
generics ]
type-search = [ nonempty-arg-list ]

query = *WS (exact-search / type-search) *WS

type-filter = (
    "mod" /
    "externcrate" /
    "import" /
    "struct" /
    "enum" /
    "fn" /
    "type" /
    "static" /
    "trait" /
    "impl" /
    "tymethod" /
    "method" /
    "structfield" /
    "variant" /
    "macro" /
    "primitive" /
    "associatedtype" /
    "constant" /
    "associatedconstant" /
    "union" /
    "foreigntype" /
    "keyword" /
    "existential" /
    "attr" /
    "derive" /
    "traitalias" /

```

```
"generic")
```

```
OPEN-ANGLE-BRACKET = "<"
CLOSE-ANGLE-BRACKET = ">"
OPEN-SQUARE-BRACKET = "["
CLOSE-SQUARE-BRACKET = "]"
OPEN-PAREN = "("
CLOSE-PAREN = ")"
COLON = ":"
DOUBLE-COLON = "::"
QUOTE = %x22
COMMA = ","
RETURN-ARROW = "->"
EQUAL = "="
BANG = "!"
AMP = "&"
MUT = "mut"
```

```
ALPHA = %x41-5A / %x61-7A ; A-Z / a-z
DIGIT = %x30-39
WS = %x09 / " "
```

# How to write documentation

Good documentation is not natural. There are opposing goals that make writing good documentation difficult. It requires expertise in the subject but also writing to a novice perspective. Documentation therefore often glazes over implementation detail, or leaves readers with unanswered questions.

There are a few tenets to Rust documentation that can help guide anyone through the process of documenting libraries so that everyone has an ample opportunity to use the code.

This chapter covers not only how to write documentation but specifically how to write **good** documentation. It is important to be as clear as you can, and as complete as possible. As a rule of thumb: the more documentation you write for your crate the better. If an item is public then it should be documented.

## Getting Started

Documenting a crate should begin with front-page documentation. As an example, the [hashbrown](#) crate level documentation summarizes the role of the crate, provides links to explain technical details, and explains why you would want to use the crate.

After introducing the crate, it is important that the front-page gives an example of how to use the crate in a real world setting. Stick to the library's role in the example, but do so without shortcuts to benefit users who may copy and paste the example to get started.

[futures](#) uses inline comments to explain line by line the complexities of using a [Future](#), because a person's first exposure to rust's [Future](#) may be this example.

The [backtrace](#) documentation walks through the whole process, explaining changes made to the `Cargo.toml` file, passing command line arguments to the compiler, and shows a quick example of backtrace in the wild.

Finally, the front-page can eventually become a comprehensive reference how to use a crate, like [regex](#). In this front page, all requirements are outlined, the edge cases shown, and practical examples provided. The front page goes on to show how to use regular expressions then concludes with crate features.

Don't worry about comparing your crate, which is just beginning, to other more developed crates. To get the documentation to something more polished, start incrementally and put in an introduction, example, and features. Rome was not built in a day!

The first lines within the `lib.rs` will compose the front-page, and they use a different convention than the rest of the rustdocs. Lines should start with `//!` which indicate module-level or crate-level documentation. Here's a quick example of the difference:

```
//! Fast and easy queue abstraction.
//!
//! Provides an abstraction over a queue. When the abstraction is used
//! there are these advantages:
//! - Fast
//! - [`Easy`]
//!
//! [`Easy`]: http://thatwaseasy.example.com

/// This module makes it easy.
pub mod easy {

    /// Use the abstraction function to do this specific thing.
    pub fn abstraction() {}

}
```

Ideally, this first line of documentation is a sentence without highly technical details, but with a good description of where this crate fits within the rust ecosystem. Users should know whether this crate meets their use case after reading this line.

## Documenting components

Whether it is modules, structs, functions, or macros: the public API of all code should have documentation. Rarely does anyone complain about too much documentation!

It is recommended that each item's documentation follows this basic structure:

```
[short sentence explaining what it is]

[more detailed explanation]

[at least one code example that users can copy/paste to try it]

[even more advanced explanations if necessary]
```

This basic structure should be straightforward to follow when writing your documentation; while you might think that a code example is trivial, the examples are really important because they can help users understand what an item is, how it is used, and for what purpose it exists.

Let's see an example coming from the [standard library](#) by taking a look at the `std::env::args()` function:

Returns the arguments which this program was started with (normally passed via the command line).

The first element is traditionally the path of the executable, but it can be set to arbitrary text, and may not even exist. This means this property should not be relied upon for security purposes.

On Unix systems shell usually expands unquoted arguments with glob patterns (such as ``*`` and ``?``). On Windows this is not done, and such arguments are passed as-is.

#### # Panics

The returned iterator will panic during iteration if any argument to the process is not valid unicode. If this is not desired, use the `[`args_os`]` function instead.

#### # Examples

```
...
use std::env;

// Prints each argument on a separate line
for argument in env::args() {
    println!("{argument}");
}
...
```

```
[`args_os`]: ./fn.args_os.html
```

Everything before the first empty line will be reused to describe the component in searches and module overviews. For example, the function `std::env::args()` above will be shown on the [std::env](#) module documentation. It is good practice to keep the summary to one line: concise writing is a goal of good documentation.

Because the type system does a good job of defining what types a function passes and returns, there is no benefit of explicitly writing it into the documentation, especially since `rustdoc` adds hyper links to all types in the function signature.

In the example above, a 'Panics' section explains when the code might abruptly exit, which can help the reader prevent reaching a panic. A panic section is recommended every time edge cases in your code can be reached if known.

As you can see, it follows the structure detailed above: it starts with a short sentence explaining what the functions does, then it provides more information and finally provides a code example.



# Markdown

`rustdoc` uses the [CommonMark Markdown specification](#). You might be interested in taking a look at their website to see what's possible:

- [CommonMark quick reference](#)
- [current spec](#)

In addition to the standard CommonMark syntax, `rustdoc` supports several extensions:

## Strikethrough

Text may be rendered with a horizontal line through the center by wrapping the text with one or two tilde characters on each side:

```
An example of ~~strikethrough text~~. You can also use ~single tildes~.
```

This example will render as:

---

An example of ~~strikethrough~~ text. You can also use ~~single tildes~~.

---

This follows the [GitHub Strikethrough extension](#).

## Footnotes

A footnote generates a small numbered link in the text which when clicked takes the reader to the footnote text at the bottom of the item. The footnote label is written similarly to a link reference with a caret at the front. The footnote text is written like a link reference definition, with the text following the label. Example:

```
This is an example of a footnote[^note].
```

```
[^note]: This text is the contents of the footnote, which will be rendered  
towards the bottom.
```

This example will render as:

---

This is an example of a footnote<sup>1</sup>.

<sup>1</sup> This text is the contents of the footnote, which will be rendered towards the bottom.

---

The footnotes are automatically numbered based on the order the footnotes are written.

## Tables

Tables can be written using pipes and dashes to draw the rows and columns of the table. These will be translated to HTML table matching the shape. Example:

```
| Header1 | Header2 |  
|-----|-----|  
| abc    | def    |
```

This example will render similarly to this:

---

		Header1	Header2		
		abc	def		

---

See the specification for the [GitHub Tables extension](#) for more details on the exact syntax supported.

## Task lists

Task lists can be used as a checklist of items that have been completed. Example:

- [x] Complete task
- [ ] Incomplete task

This will render as:

- 
- ☒ Complete task
  - ☐ Incomplete task
- 

See the specification for the [task list extension](#) for more details.

## Smart punctuation

Some ASCII punctuation sequences will be automatically turned into fancy Unicode characters:

ASCII sequence	Unicode
--	—
---	—
...	...
"	" or ", depending on context
'	' or ', depending on context

So, no need to manually enter those Unicode characters!

## Adding a warning block

If you want to make a warning or similar note stand out in the documentation, you can wrap it like this:

```
/// documentation
///
/// <div class="warning">A big warning!</div>
///
/// more documentation
```

Please note that if you want to put markdown in the HTML tag and for it to be interpreted as such, you need to have an empty line between the HTML tags and your markdown content. For example if you want to use a link:

```
/// documentation
///
/// <div class="warning">
///
/// Go to [this link](https://rust-lang.org)!
///
/// </div>
///
/// more documentation
```

# What to include (and exclude)

It is easy to say everything must be documented in a project and often times that is correct, but how can we get there, and are there things that don't belong?

At the top of the `src/lib.rs` or `main.rs` file in your binary project, include the following attribute:

```
#![warn(missing_docs)]
```

Now run `cargo doc` and examine the output. Here's a sample:

```
Documenting docdemo v0.1.0 (/Users/username/docdemo)
warning: missing documentation for the crate
--> src/main.rs:1:1
|
1 | / #![warn(missing_docs)]
2 | |
3 | | fn main() {
4 | |     println!("Hello, world!");
5 | | }
  | |_^
note: the lint level is defined here
--> src/main.rs:1:9
1 | #![warn(missing_docs)]
  |          ^^^^^^^^^^^^^
warning: 1 warning emitted

Finished dev [unoptimized + debuginfo] target(s) in 2.96s
```

As a library author, adding the lint `#![deny(missing_docs)]` is a great way to ensure the project does not drift away from being documented well, and `#![warn(missing_docs)]` is a good way to move towards comprehensive documentation.

There are more lints in the upcoming chapter [Lints](#).

## Examples

Of course this is contrived to be simple, but part of the power of documentation is showing code that is easy to follow, rather than being realistic. Docs often take shortcuts with error

handling because examples can become complicated to follow with all the necessary set up required for a simple example.

`Async` is a good example of this. In order to execute an `async` example, an executor needs to be available. Examples will often shortcut this, and leave users to figure out how to put the `async` code into their own runtime.

It is preferred that `unwrap()` not be used inside an example, and some of the error handling components be hidden if they make the example too difficult to follow.

```
/// Example
/// ```rust
/// let fortytwo = "42".parse::<u32>()?;
/// println!("{}", 10 + fortytwo, fortytwo+10);
/// ```
```

When rustdoc wraps that in a `main` function, it will fail to compile because the `ParseIntError` trait is not implemented. In order to help both your audience and your test suite, this example needs some additional code:

```
/// Example
/// ```rust
/// # fn main() -> Result<(), std::num::ParseIntError> {
/// let fortytwo = "42".parse::<u32>()?;
/// println!("{}", 10 + fortytwo, fortytwo+10);
/// # Ok(())
/// # }
/// ```
```

The example is the same on the doc page, but has that extra information available to anyone trying to use your crate. More about tests in the upcoming [Documentation tests](#) chapter.

## What to Exclude

Certain parts of your public interface may be included by default in the output of rustdoc. The attribute `#[doc(hidden)]` can hide implementation details to encourage idiomatic use of the crate.

For example, an internal `macro!` that makes the crate easier to implement can become a footgun for users when it appears in the public documentation. An internal `Error` type may exist, and `impl` details should be hidden, as detailed in the [API Guidelines](#).

## Customizing the output

It is possible to pass a custom css file to `rustdoc` and style the documentation.

```
rustdoc --extend-css custom.css src/lib.rs
```

A good example of using this feature to create a dark theme is documented [on this blog](#). Just remember, dark theme is already included in the rustdoc output by clicking on the gear icon in the upper right. Adding additional options to the themes are as easy as creating a custom theme `.css` file and using the following syntax:

```
rustdoc --theme awesome.css src/lib.rs
```

Here is an example of a new theme, [Ayu](#).

# The `#[doc]` attribute

The `#[doc]` attribute lets you control various aspects of how `rustdoc` does its job.

The most basic function of `#[doc]` is to handle the actual documentation text. That is, `///` is syntax sugar for `#[doc]`. This means that these two are the same:

```
/// This is a doc comment.  
#[doc = r" This is a doc comment."]
```

(Note the leading space and the raw string literal in the attribute version.)

In most cases, `///` is easier to use than `#[doc]`. One case where the latter is easier is when generating documentation in macros; the `collapse-docs` pass will combine multiple `#[doc]` attributes into a single doc comment, letting you generate code like this:

```
#[doc = "This is"]  
#[doc = " a "]  
#[doc = "doc comment"]
```

Which can feel more flexible. Note that this would generate this:

```
#[doc = "This is\n a \ndoc comment"]
```

but given that docs are rendered via Markdown, it will remove these newlines.

Another use case is for including external files as documentation:

```
#[doc = include_str!("../..//README.md")]
```

The `doc` attribute has more options though! These don't involve the text of the output, but instead, various aspects of the presentation of the output. We've split them into two kinds below: attributes that are useful at the crate level, and ones that are useful at the item level.

## At the crate level

These options control how the docs look at a crate level.

## html\_favicon\_url

This form of the `doc` attribute lets you control the favicon of your docs.

```
#![doc(html_favicon_url = "https://example.com/favicon.ico")]
```

This will put `<link rel="icon" href="{ }">` into your docs, where the string for the attribute goes into the `{ }`.

If you don't use this attribute, there will be no favicon.

## html\_logo\_url

This form of the `doc` attribute lets you control the logo in the upper left hand side of the docs.

```
#![doc(html_logo_url = "https://example.com/logo.jpg")]
```

This will put `<a href='../index.html'><img src='{ }' alt='logo' width='100'></a>` into your docs, where the string for the attribute goes into the `{ }`.

If you don't use this attribute, there will be no logo.

## html\_playground\_url

This form of the `doc` attribute lets you control where the "run" buttons on your documentation examples make requests to.

```
#![doc(html_playground_url = "https://playground.example.com/")]
```

Now, when you press "run", the button will make a request to this domain. The request URL will contain 2 query parameters: `code` and `edition` for the code in the documentation and the Rust edition respectively.

If you don't use this attribute, there will be no run buttons.

## issue\_tracker\_base\_url

This form of the `doc` attribute is mostly only useful for the standard library; When a feature is unstable, an issue number for tracking the feature must be given. `rustdoc` uses this number, plus the base URL given here, to link to the tracking issue.



```
#![doc(issue_tracker_base_url = "https://github.com/rust-lang/rust/issues/")]
```

## html\_root\_url

The `#![doc(html_root_url = "...")]` attribute value indicates the URL for generating links to external crates. When rustdoc needs to generate a link to an item in an external crate, it will first check if the extern crate has been documented locally on-disk, and if so link directly to it. Failing that, it will use the URL given by the `--extern-html-root-url` command-line flag if available. If that is not available, then it will use the `html_root_url` value in the extern crate if it is available. If that is not available, then the extern items will not be linked.

```
#![doc(html_root_url = "https://docs.rs/serde/1.0")]
```

## html\_no\_source

By default, rustdoc will include the source code of your program, with links to it in the docs. But if you include this:

```
#![doc(html_no_source)]
```

it will not.

## test(no\_crate\_inject)

By default, rustdoc will automatically add a line with `extern crate my_crate;` into each doctest. But if you include this:

```
#![doc(test(no_crate_inject))]
```

it will not.

## test(attr(...))

This form of the `doc` attribute allows you to add arbitrary attributes to all your doctests. For example, if you want your doctests to fail if they have dead code, you could add this:

```
#![doc(test(attr(deny(dead_code))))]
```

## At the item level

These forms of the `#[doc]` attribute are used on individual items, to control how they are documented.

### `inline` and `no_inline`

These attributes are used on `use` statements, and control where the documentation shows up. For example, consider this Rust code:

```
pub use bar::Bar;

/// bar docs
pub mod bar {
    /// the docs for Bar
    pub struct Bar;
}
```

The documentation will generate a "Re-exports" section, and say `pub use bar::Bar;`, where `Bar` is a link to its page.

If we change the `use` line like this:

```
#[doc(inline)]
pub use bar::Bar;
```

Instead, `Bar` will appear in a `Structs` section, just like `Bar` was defined at the top level, rather than `pub use 'd`.

Let's change our original example, by making `bar` private:

```
pub use bar::Bar;

/// bar docs
mod bar {
    /// the docs for Bar
    pub struct Bar;
}
```

Here, because `bar` is not public, `bar` wouldn't have its own page, so there's nowhere to link to. `rustdoc` will inline these definitions, and so we end up in the same case as the `#[doc(inline)]` above; `Bar` is in a `Structs` section, as if it were defined at the top level. If we add the `no_inline` form of the attribute:

```
#[doc(no_inline)]
pub use bar::Bar;

/// bar docs
mod bar {
    /// the docs for Bar
    pub struct Bar;
}
```

Now we'll have a `Re-exports` line, and `Bar` will not link to anywhere.

One special case: In Rust 2018 and later, if you `pub use` one of your dependencies, `rustdoc` will not eagerly inline it as a module unless you add `#[doc(inline)]`.

If you want to know more about inlining rules, take a look at the [re-exports](#) chapter.

## hidden

Any item annotated with `#[doc(hidden)]` will not appear in the documentation, unless the `strip-hidden` pass is removed. Re-exported items where one of its ancestors has `#[doc(hidden)]` will be considered the same as private.

You can find more information in the [re-exports](#) chapter.

## alias

This attribute adds an alias in the search index.

Let's take an example:

```
#[doc(alias = "TheAlias")]
pub struct SomeType;
```

So now, if you enter "TheAlias" in the search, it'll display `SomeType`. Of course, if you enter `SomeType` it'll return `SomeType` as expected!

## FFI example

This doc attribute is especially useful when writing bindings for a C library. For example, let's say we have a C function that looks like this:

```
int lib_name_do_something(Obj *obj);
```

It takes a pointer to an `Obj` type and returns an integer. In Rust, it might be written like this:

```
pub struct Obj {  
    inner: *mut ffi::Obj,  
}  
  
impl Obj {  
    pub fn do_something(&mut self) -> i32 {  
        unsafe { ffi::lib_name_do_something(self.inner) }  
    }  
}
```

The function has been turned into a method to make it more convenient to use. However, if you want to look for the Rust equivalent of `lib_name_do_something`, you have no way to do so.

To get around this limitation, we just add `#[doc(alias = "lib_name_do_something")]` on the `do_something` method and then it's all good! Users can now look for `lib_name_do_something` in our crate directly and find `Obj::do_something`.

# Re-exports

Let's start by explaining what are re-exports. To do so, we will use an example where we are writing a library (named `lib`) with some types dispatched in sub-modules:

```
pub mod sub_module1 {  
    pub struct Foo;  
}  
pub mod sub_module2 {  
    pub struct AnotherFoo;  
}
```

Users can import them like this:

```
use lib::sub_module1::Foo;  
use lib::sub_module2::AnotherFoo;
```

But what if you want the types to be available directly at the crate root or if we don't want the modules to be visible for users? That's where re-exports come in:

```
// `sub_module1` and `sub_module2` are not visible outside.  
mod sub_module1 {  
    pub struct Foo;  
}  
mod sub_module2 {  
    pub struct AnotherFoo;  
}  
// We re-export both types:  
pub use crate::sub_module1::Foo;  
pub use crate::sub_module2::AnotherFoo;
```

And now users will be able to do:

```
use lib::{Foo, AnotherFoo};
```

And since both `sub_module1` and `sub_module2` are private, users won't be able to import them.

Now what's interesting is that the generated documentation for this crate will show both `Foo` and `AnotherFoo` directly at the crate root, meaning they have been inlined. There are a few rules to know whether or not a re-exported item will be inlined.

## Inlining rules

If a public item comes from a private module, it will be inlined:

```
mod private_module {
    pub struct Public;
}
pub mod public_mod {
    // `Public` will be inlined here since `private_module` is private.
    pub use super::private_module::Public;
}
// `Public` will not be inlined here since `public_mod` is public.
pub use self::public_mod::Public;
```

Likewise, if an item inherits `#[doc(hidden)]` from any of its ancestors, it will be inlined:

```
#[doc(hidden)]
pub mod public_mod {
    pub struct Public;
}
// `Public` be inlined since its parent (`public_mod`) has `#[doc(hidden)]`.
pub use self::public_mod::Public;
```

If an item has `#[doc(hidden)]`, it won't be inlined (nor visible in the generated documentation):

```
// This struct won't be visible.
#[doc(hidden)]
pub struct Hidden;

// This re-export won't be visible.
pub use self::Hidden as InlinedHidden;
```

The same applies on re-exports themselves: if you have multiple re-exports and some of them have `#[doc(hidden)]`, then these ones (and only these) won't appear in the documentation:

```
mod private_mod {
    /// First
    pub struct InPrivate;
}

/// Second
#[doc(hidden)]
pub use self::private_mod::InPrivate as Hidden;
/// Third
pub use self::Hidden as Visible;
```

In this case, `InPrivate` will be inlined as `visible`. However, its documentation will be `First Third` and not `First Second Third` because the re-export with `Second` as documentation has `#[doc(hidden)]`, therefore, all its attributes are ignored.

## Inlining with `#[doc(inline)]`

You can use the `#[doc(inline)]` attribute if you want to force an item to be inlined:

```
pub mod public_mod {  
    pub struct Public;  
}  
#[doc(inline)]  
pub use self::public_mod::Public;
```

With this code, even though `public_mod::Public` is public and present in the documentation, the `Public` type will be present both at the crate root and in the `public_mod` module.

## Preventing inlining with `#[doc(no_inline)]`

On the opposite of the `#[doc(inline)]` attribute, if you want to prevent an item from being inlined, you can use `#[doc(no_inline)]`:

```
mod private_mod {  
    pub struct Public;  
}  
#[doc(no_inline)]  
pub use self::private_mod::Public;
```

In the generated documentation, you will see a re-export at the crate root and not the type directly.

## Attributes

When an item is inlined, its doc comments and most of its attributes will be inlined along with it:

```
mod private_mod {
    /// First
    #[cfg(a)]
    pub struct InPrivate;
    /// Second
    #[cfg(b)]
    pub use self::InPrivate as Second;
}

/// Third
#[doc(inline)]
#[cfg(c)]
pub use self::private_mod::Second as Visible;
```

In this case, `visible` will have as documentation `First Second Third` and will also have as `cfg: #[cfg(a, b, c)]`.

[Intra-doc links](#) are resolved relative to where the doc comment is defined.

There are a few attributes which are not inlined though:

- `#[doc(alias="")]`
- `#[doc(inline)]`
- `#[doc(no_inline)]`
- `#[doc(hidden)]` (because the re-export itself and its attributes are ignored).

All other attributes are inherited when inlined, so that the documentation matches the behavior if the inlined item was directly defined at the spot where it's shown.

These rules also apply if the item is inlined with a glob re-export:

```
mod private_mod {
    /// First
    #[cfg(a)]
    pub struct InPrivate;
}

#[cfg(c)]
pub use self::private_mod::*;
```

Otherwise, the attributes displayed will be from the re-exported item and the attributes on the re-export itself will be ignored:



```
mod private_mod {  
    /// First  
    #[cfg(a)]  
    pub struct InPrivate;  
}  
  
#[cfg(c)]  
pub use self::private_mod::InPrivate;
```

In the above case, `cfg(c)` will not be displayed in the docs.

# Linking to items by name

Rustdoc is capable of directly linking to other rustdoc pages using the path of the item as a link. This is referred to as an 'intra-doc link'.

For example, in the following code all of the links will link to the rustdoc page for `Bar` :

```
/// This struct is not [Bar]
pub struct Foo1;

/// This struct is also not [bar](Bar)
pub struct Foo2;

/// This struct is also not [bar][b]
///
/// [b]: Bar
pub struct Foo3;

/// This struct is also not [`Bar`]
pub struct Foo4;

/// This struct is [`Bar`]!
pub struct Bar;
```

Unlike normal Markdown, `[bar][Bar]` syntax is also supported without needing a `[Bar]: ...` reference link.

Backticks around the link will be stripped, so `[`option`]` will correctly link to `option` .

## Valid links

You can refer to anything in scope, and use paths, including `self` , `self` , `super` , and `crate` . Associated items (functions, types, and constants) are supported, but [not for blanket trait implementations](#). Rustdoc also supports linking to all primitives listed in [the standard library documentation](#).

You can also refer to items with generic parameters like `Vec<T>` . The link will resolve as if you had written `[`Vec<T>`](Vec)` . Fully-qualified syntax (for example, `<Vec as IntoIterator>::into_iter()` ) is [not yet supported](#), however.

```
use std::sync::mpsc::Receiver;

/// This is a version of [Receiver<T>] with support for [std::future].
///
/// You can obtain a [std::future::Future] by calling [Self::recv()].
pub struct AsyncReceiver<T> {
    sender: Receiver<T>
}

impl<T> AsyncReceiver<T> {
    pub async fn recv() -> T {
        unimplemented!()
    }
}
```

Rustdoc allows using URL fragment specifiers, just like a normal link:

```
/// This is a special implementation of [positional parameters].
///
/// [positional parameters]: std::fmt#formatting-parameters
struct MySpecialFormatter;
```

## Namespaces and Disambiguators

Paths in Rust have three namespaces: type, value, and macro. Item names must be unique within their namespace, but can overlap with items in other namespaces. In case of ambiguity, rustdoc will warn about the ambiguity and suggest a disambiguator.

```
/// See also: [Foo](struct@Foo)
struct Bar;

/// This is different from [Foo](fn@Foo)
struct Foo {}

fn Foo() {}
```

These prefixes will be stripped when displayed in the documentation, so [`struct@Foo`] will be rendered as `Foo`. The following prefixes are available: `struct`, `enum`, `trait`, `union`, `mod`, `module`, `const`, `constant`, `fn`, `function`, `field`, `variant`, `method`, `derive`, `type`, `value`, `macro`, `prim` OR `primitive`.

You can also disambiguate for functions by adding `()` after the function name, or for macros by adding `!` after the macro name. The macro `!` can be followed by `()`, `{}`, or `[]`. Example:

```

/// This is different from [foo!()].
fn foo() {}

/// This is different from [foo()]
macro_rules! foo {
    () => {}
}

```

There is one case where the disambiguation will be performed automatically: if an intra doc link is resolved at the same time as a trait and as a derive proc-macro. In this case, it'll always generate a link to the trait and not emit a "missing disambiguation" warning. A good example of this case is when you link to the `Clone` trait: there is also a `Clone` proc-macro but it ignores it in this case. If you want to link to the proc-macro, you can use the `macro@` disambiguator.

## Warnings, re-exports, and scoping

Links are resolved in the scope of the module where the item is defined, even when the item is re-exported. If a link from another crate fails to resolve, no warning is given.

```

mod inner {
    /// Link to [f()]
    pub struct S;
    pub fn f() {}
}
pub use inner::S; // the link to `f` will still resolve correctly

```

When re-exporting an item, rustdoc allows adding additional documentation to it. That additional documentation will be resolved in the scope of the re-export, not the original, allowing you to link to items in the new crate. The new links will still give a warning if they fail to resolve.

```

/// See also [foo()]
pub use std::process::Command;

pub fn foo() {}

```

This is especially useful for proc-macros, which must always be defined in their own dedicated crate.

Note: Because of how `macro_rules!` macros are scoped in Rust, the intra-doc links of a `macro_rules!` macro will be resolved [relative to the crate root](#), as opposed to the module it is defined in.

If links do not look 'sufficiently like' an intra-doc link, they will be ignored and no warning will be given, even if the link fails to resolve. For example, any link containing `/` or `[]` characters will be ignored.

## What happens in case an intra-doc link cannot be generated

In some cases (items behind a `cfg` for example), an intra-doc link cannot be generated to item. There are different ways to create a link in markdown, and depending on the one you use, it will render differently in this case:

1. `[a]`
2. `[b][c]`
3. `[d](e)`
4. `[f]`

`[f]: g`

1. and 2. will be displayed as is in the rendered documentation (ie, `[a]` and `[b][c]`) whereas 3. and 4. will be replaced by a link targeting `e` for `[d](e)` and `g` for `[f]`.

# Documentation tests

`rustdoc` supports executing your documentation examples as tests. This makes sure that examples within your documentation are up to date and working.

The basic idea is this:

```
/// # Examples
///
/// ```
/// let x = 5;
/// ```
```

The triple backticks start and end code blocks. If this were in a file named `foo.rs`, running `rustdoc --test foo.rs` will extract this example, and then run it as a test.

Please note that by default, if no language is set for the block code, `rustdoc` assumes it is Rust code. So the following:

```
```rust
let x = 5;
```
```

is strictly equivalent to:

```
```
let x = 5;
```
```

There's some subtlety though! Read on for more details.

## Passing or failing a doctest

Like regular unit tests, regular doctests are considered to "pass" if they compile and run without panicking. So if you want to demonstrate that some computation gives a certain result, the `assert!` family of macros works the same as other Rust code:

```
let foo = "foo";
assert_eq!(foo, "foo");
```

This way, if the computation ever returns something different, the code panics and the doctest fails.

## Pre-processing examples

In the example above, you'll note something strange: there's no `main` function! Forcing you to write `main` for every example, no matter how small, adds friction and clutters the output. So `rustdoc` processes your examples slightly before running them. Here's the full algorithm `rustdoc` uses to preprocess examples:

1. Some common `allow` attributes are inserted, including `unused_variables`, `unused_assignments`, `unused_mut`, `unused_attributes`, and `dead_code`. Small examples often trigger these lints.
2. Any attributes specified with `#![doc(test(attr(...)))]` are added.
3. Any leading `#![foo]` attributes are left intact as crate attributes.
4. If the example does not contain `extern crate`, and `#![doc(test(no_crate_inject))]` was not specified, then `extern crate <mycrate>;` is inserted (note the lack of `#[macro_use]`).
5. Finally, if the example does not contain `fn main`, the remainder of the text is wrapped in `fn main() { your_code }`.

For more about that caveat in rule 4, see "Documenting Macros" below.

## Hiding portions of the example

Sometimes, you need some setup code, or other things that would distract from your example, but are important to make the tests work. Consider an example block that looks like this:

```
/// ```
/// /// Some documentation.
/// # fn foo() {} // this function will be hidden
/// println!("Hello, World!");
/// ```
```

It will render like this:

```
/// Some documentation.
println!("Hello, World!");
```

Yes, that's right: you can add lines that start with `#` , and they will be hidden from the output, but will be used when compiling your code. You can use this to your advantage. In this case, documentation comments need to apply to some kind of function, so if I want to show you just a documentation comment, I need to add a little function definition below it. At the same time, it's only there to satisfy the compiler, so hiding it makes the example more clear. You can use this technique to explain longer examples in detail, while still preserving the testability of your documentation.

For example, imagine that we wanted to document this code:

```
let x = 5;  
let y = 6;  
println!("{}", x + y);
```

We might want the documentation to end up looking like this:

---

First, we set `x` to five:

```
let x = 5;
```

Next, we set `y` to six:

```
let y = 6;
```

Finally, we print the sum of `x` and `y` :

```
println!("{}", x + y);
```

---

To keep each code block testable, we want the whole program in each block, but we don't want the reader to see every line every time. Here's what we put in our source code:



First, we set `x` to five:

```
...
let x = 5;
# let y = 6;
# println!("{}", x + y);
...
```

Next, we set `y` to six:

```
...
# let x = 5;
let y = 6;
# println!("{}", x + y);
...
```

Finally, we print the sum of `x` and `y`:

```
...
# let x = 5;
# let y = 6;
println!("{}", x + y);
...
```

By repeating all parts of the example, you can ensure that your example still compiles, while only showing the parts that are relevant to that part of your explanation.

The `#`-hiding of lines can be prevented by using two consecutive hashes `##`. This only needs to be done with the first `#` which would've otherwise caused hiding. If we have a string literal like the following, which has a line that starts with a `#`:

```
let s = "foo
# bar # baz";
```

We can document it by escaping the initial `#`:

```
/// let s = "foo
/// ## bar # baz";
```

## Using ? in doc tests

When writing an example, it is rarely useful to include a complete error handling, as it would add significant amounts of boilerplate code. Instead, you may want the following:

```

/// ```
/// use std::io;
/// let mut input = String::new();
/// io::stdin().read_line(&mut input)?;
/// ```

```

The problem is that `?` returns a `Result<T, E>` and test functions don't return anything, so this will give a mismatched types error.

You can get around this limitation by manually adding a `main` that returns `Result<T, E>`, because `Result<T, E>` implements the `Termination` trait:

```

/// A doc test using ?
///
/// ```
/// use std::io;
///
/// fn main() -> io::Result<()> {
///     let mut input = String::new();
///     io::stdin().read_line(&mut input)?;
///     Ok(())
/// }
/// ```

```

Together with the `#` from the section above, you arrive at a solution that appears to the reader as the initial idea but works with doc tests:

```

/// ```
/// use std::io;
/// # fn main() -> io::Result<()> {
/// let mut input = String::new();
/// io::stdin().read_line(&mut input)?;
/// # Ok(())
/// # }
/// ```

```

As of version 1.34.0, one can also omit the `fn main()`, but you will have to disambiguate the error type:

```

/// ```
/// use std::io;
/// let mut input = String::new();
/// io::stdin().read_line(&mut input)?;
/// # Ok::<(), io::Error>::Ok(())
/// ```

```

This is an unfortunate consequence of the `?` operator adding an implicit conversion, so type inference fails because the type is not unique. Please note that you must write the `(( ))` in one sequence without intermediate whitespace so that `rustdoc` understands you want an implicit `Result`-returning function.

## Showing warnings in doctests

You can show warnings in doctests by running `rustdoc --test --test-args=--show-output` (or, if you're using cargo, `cargo test --doc -- --show-output`). By default, this will still hide unused warnings, since so many examples use private functions; you can add `#![warn(unused)]` to the top of your example if you want to see unused variables or dead code warnings. You can also use `#![doc(test(attr(warn(unused))))]` in the crate root to enable warnings globally.

## Documenting macros

Here's an example of documenting a macro:

```
/// Panic with a given message unless an expression evaluates to true.
///
/// # Examples
/// ```
/// # #[macro_use] extern crate foo;
/// # fn main() {
///   panic_unless!(1 + 1 == 2, "Math is broken.");
/// # }
/// ```
///
/// ```should_panic
/// # #[macro_use] extern crate foo;
/// # fn main() {
///   panic_unless!(true == false, "I'm broken.");
/// # }
/// ```
#[macro_export]
macro_rules! panic_unless {
    ($condition:expr, $($rest:expr),+) => ({ if ! $condition { panic!($($rest),+); } });
}
```

You'll note three things: we need to add our own `extern crate` line, so that we can add the `#[macro_use]` attribute. Second, we'll need to add our own `main()` as well (for reasons discussed above). Finally, a judicious use of `#` to comment out those two things, so they don't show up in the output.

## Attributes

Code blocks can be annotated with attributes that help `rustdoc` do the right thing when testing your code:

The `ignore` attribute tells Rust to ignore your code. This is almost never what you want as it's the most generic. Instead, consider annotating it with `text` if it's not code or using `# s` to get a working example that only shows the part you care about.

```
/// ```ignore
/// fn foo() {
/// ```
```

`should_panic` tells `rustdoc` that the code should compile correctly but panic during execution. If the code doesn't panic, the test will fail.

```
/// ```should_panic
/// assert!(false);
/// ```
```

The `no_run` attribute will compile your code but not run it. This is important for examples such as "Here's how to retrieve a web page," which you would want to ensure compiles, but might be run in a test environment that has no network access. This attribute can also be used to demonstrate code snippets that can cause Undefined Behavior.

```
/// ```no_run
/// loop {
///     println!("Hello, world");
/// }
/// ```
```

`compile_fail` tells `rustdoc` that the compilation should fail. If it compiles, then the test will fail. However, please note that code failing with the current Rust release may work in a future release, as new features are added.

```

/// ```compile_fail
/// let x = 5;
/// x += 2; // shouldn't compile!
/// ```

```

edition2015, edition2018 and edition2021 tell rustdoc that the code sample should be compiled using the respective edition of Rust.

```

/// Only runs on the 2018 edition.
///
/// ```edition2018
/// let result: Result<i32, ParseIntError> = try {
///     "1".parse::<i32>()?
///     + "2".parse::<i32>()?
///     + "3".parse::<i32>()?
/// };
/// ```

```

Starting in the 2024 edition<sup>1</sup>, compatible doctests are merged as one before being run. We combine doctests for performance reasons: the slowest part of doctests is to compile them. Merging all of them into one file and compiling this new file, then running the doctests is much faster. Whether doctests are merged or not, they are run in their own process.

An example of time spent when running doctests:

[sysinfo crate](#):

```

wall-time duration: 4.59s
total compile time: 27.067s
total runtime: 3.969s

```

Rust core library:

```

wall-time duration: 102s
total compile time: 775.204s
total runtime: 15.487s

```

<sup>1</sup> This is based on the edition of the whole crate, not the edition of the individual test case that may be specified in its code attribute.

In some cases, doctests cannot be merged. For example, if you have:

```

//! ```
//! let location = std::panic::Location::caller();
//! assert_eq!(location.line(), 4);
//! ```

```

The problem with this code is that, if you change any other doctests, it'll likely break when running `rustdoc --test`, making it tricky to maintain.

This is where the `standalone_crate` attribute comes in: it tells `rustdoc` that a doctest should not be merged with the others. So the previous code should use it:

```

//! ```standalone_crate
//! let location = std::panic::Location::caller();
//! assert_eq!(location.line(), 4);
//! ```

```

In this case, it means that the line information will not change if you add/remove other doctests.

## Custom CSS classes for code blocks

```

/// ```custom,{class=language-c}
/// int main(void) { return 0; }
/// ```
pub struct Bar;

```

The text `int main(void) { return 0; }` is rendered without highlighting in a code block with the class `language-c`. This can be used to highlight other languages through JavaScript libraries for example.

Without the `custom` attribute, it would be generated as a Rust code example with an additional `language-c` CSS class. Therefore, if you specifically don't want it to be a Rust code example, don't forget to add the `custom` attribute.

To be noted that you can replace `class=` with `.` to achieve the same result:

```

/// ```custom,{.language-c}
/// int main(void) { return 0; }
/// ```
pub struct Bar;

```

To be noted, `rust` and `.rust / class=rust` have different effects: `rust` indicates that this is a Rust code block whereas the two others add a "rust" CSS class on the code block.

You can also use double quotes:

```
/// ```"not rust" {."hello everyone"}  
/// int main(void) { return 0; }  
/// ```  
pub struct Bar;
```

## Syntax reference

The *exact* syntax for code blocks, including the edge cases, can be found in the [Fenced Code Blocks](#) section of the CommonMark specification.

Rustdoc also accepts *indented* code blocks as an alternative to fenced code blocks: instead of surrounding your code with three backticks, you can indent each line by four or more spaces.

```
let foo = "foo";  
assert_eq!(foo, "foo");
```

These, too, are documented in the CommonMark specification, in the [Indented Code Blocks](#) section.

However, it's preferable to use fenced code blocks over indented code blocks. Not only are fenced code blocks considered more idiomatic for Rust code, but there is no way to use attributes such as `ignore` or `should_panic` with indented code blocks.

## Include items only when collecting doctests

Rustdoc's documentation tests can do some things that regular unit tests can't, so it can sometimes be useful to extend your doctests with samples that wouldn't otherwise need to be in documentation. To this end, Rustdoc allows you to have certain items only appear when it's collecting doctests, so you can utilize doctest functionality without forcing the test to appear in docs, or to find an arbitrary private item to include it on.

When compiling a crate for use in doctests (with `--test` option), rustdoc will set `#[cfg(doctest)]`. Note that they will still link against only the public items of your crate; if you need to test private items, you need to write a unit test.

In this example, we're adding doctests that we know won't compile, to verify that our struct can only take in valid data:

```

/// We have a struct here. Remember it doesn't accept negative numbers!
pub struct MyStruct(pub usize);

/// ```compile_fail
/// let x = my_crate::MyStruct(-5);
/// ```
#[cfg(doctest)]
pub struct MyStructOnlyTakesUsize;

```

Note that the struct `MyStructOnlyTakesUsize` here isn't actually part of your public crate API. The use of `#[cfg(doctest)]` makes sure that this struct only exists while `rustdoc` is collecting doctests. This means that its doctest is executed when `--test` is passed to `rustdoc`, but is hidden from the public documentation.

Another possible use of `#[cfg(doctest)]` is to test doctests that are included in your README file without including it in your main documentation. For example, you could write this into your `lib.rs` to test your README as part of your doctests:

```

#[doc = include_str!("../README.md")]
#[cfg(doctest)]
pub struct ReadmeDoctests;

```

This will include your README as documentation on the hidden struct `ReadmeDoctests`, which will then be tested alongside the rest of your doctests.

## Controlling the compilation and run directories

By default, `rustdoc --test` will compile and run documentation test examples from the same working directory. The compilation directory is being used for compiler diagnostics, the `file!` macro and the output of `rustdoc` test runner itself, whereas the run directory has an influence on file-system operations within documentation test examples, such as `std::fs::read_to_string`.

The `--test-run-directory` flag allows controlling the run directory separately from the compilation directory. This is particularly useful in workspaces, where compiler invocations and thus diagnostics should be relative to the workspace directory, but documentation test examples should run relative to the crate directory.



# Lints

`rustdoc` provides lints to help you writing and testing your documentation. You can use them like any other lints by doing this:

```
#![allow(rustdoc::broken_intra_doc_links)] // allows the lint, no diagnostics will
be reported
#![warn(rustdoc::broken_intra_doc_links)] // warn if there are broken intra-doc
links
#![deny(rustdoc::broken_intra_doc_links)] // error if there are broken intra-doc
links
```

Note that, except for `missing_docs`, these lints are only available when running `rustdoc`, not `rustc`.

Here is the list of the lints provided by `rustdoc`:

## broken\_intra\_doc\_links

This lint **warns by default**. This lint detects when an [intra-doc link](#) fails to be resolved. For example:

```
/// I want to link to [`Nonexistent`] but it doesn't exist!
pub fn foo() {}
```

You'll get a warning saying:

```
warning: unresolved link to `Nonexistent`
--> test.rs:1:24
   |
1 | /// I want to link to [`Nonexistent`] but it doesn't exist!
   |                               ^^^^^^^^^^^^^^^^^ no item named `Nonexistent` in `test`
```

It will also warn when there is an ambiguity and suggest how to disambiguate:

```
/// [`Foo`]
pub fn function() {}

pub enum Foo {}

pub fn Foo() {}
```

```

warning: `Foo` is both an enum and a function
--> test.rs:1:6
  |
1 | /// [`Foo`]
  |      ^^^^^ ambiguous link
  |
  = note: `#[warn(rustdoc::broken_intra_doc_links)]` on by default
help: to link to the enum, prefix with the item type
  |
1 | /// [`enum@Foo`]
  |      ^^^^^^^^^^^
help: to link to the function, add parentheses
  |
1 | /// [`Foo()`]
  |      ^^^^^^^

```

## private\_intra\_doc\_links

This lint **warns by default**. This lint detects when [intra-doc links](#) from public to private items. For example:

```

#![warn(rustdoc::private_intra_doc_links)] // note: unnecessary - warns by default.

/// [private]
pub fn public() {}
fn private() {}

```

This gives a warning that the link will be broken when it appears in your documentation:

```

warning: public documentation for `public` links to private item `private`
--> priv.rs:1:6
  |
1 | /// [private]
  |      ^^^^^^^ this item is private
  |
  = note: `#[warn(rustdoc::private_intra_doc_links)]` on by default
  = note: this link will resolve properly if you pass `--document-private-items`

```

Note that this has different behavior depending on whether you pass `--document-private-items` or not! If you document private items, then it will still generate a link, despite the warning:

```
warning: public documentation for `public` links to private item `private`
--> priv.rs:1:6
  |
1 | /// [private]
  |     ^^^^^^^ this item is private
  |
= note: `[warn(rustdoc::private_intra_doc_links)]` on by default
= note: this link resolves only because you passed `--document-private-items`,
but will break without
```

## missing\_docs

This lint is **allowed by default**. It detects items missing documentation. For example:

```
#![warn(missing_docs)]

pub fn undocumented() {}
```

The `undocumented` function will then have the following warning:

```
warning: missing documentation for a function
--> your-crate/lib.rs:3:1
  |
3 | pub fn undocumented() {}
  | ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Note that unlike other rustdoc lints, this lint is also available from `rustc` directly.

## missing\_crate\_level\_docs

This lint is **allowed by default**. It detects if there is no documentation at the crate root. For example:

```
#![warn(rustdoc::missing_crate_level_docs)]
```

This will generate the following warning:

```
warning: no documentation found for this crate's top-level module
|
= help: The following guide may be of use:
       https://doc.rust-lang.org/nightly/rustdoc/how-to-write-
documentation.html
```

This is currently "allow" by default, but it is intended to make this a warning in the future. This is intended as a means to introduce new users on *how* to document their crate by pointing them to some instructions on how to get started, without providing overwhelming warnings like `missing_docs` might.

## missing\_doc\_code\_examples

This lint is **allowed by default** and is **nightly-only**. It detects when a documentation block is missing a code example. For example:

```
#![warn(rustdoc::missing_doc_code_examples)]

/// There is no code example!
pub fn no_code_example() {}
```

The `no_code_example` function will then have the following warning:

```
warning: Missing code example in this documentation
--> your-crate/lib.rs:3:1
|
LL | /// There is no code example!
|   ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

To fix the lint, you need to add a code example into the documentation block:

```
/// There is no code example!
///
/// ```
/// println!("calling no_code_example...");
/// no_code_example();
/// println!("we called no_code_example!");
/// ```
pub fn no_code_example() {}
```

## private\_doc\_tests

This lint is **allowed by default**. It detects documentation tests when they are on a private item. For example:

```
#![warn(rustdoc::private_doc_tests)]

mod foo {
    /// private doc test
    ///
    /// ```
    /// assert!(false);
    /// ```
    fn bar() {}
}
```

Which will give:

```
warning: Documentation test in private item
--> your-crate/lib.rs:4:1
|
4 | /      /// private doc test
5 | |      ///
6 | |      /// ```
7 | |      /// assert!(false);
8 | |      /// ```
  | |_____^
```

## invalid\_codeblock\_attributes

This lint **warns by default**. It detects code block attributes in documentation examples that have potentially mis-typed values. For example:

```
#![warn(rustdoc::invalid_codeblock_attributes)] // note: unnecessary - warns by default.

/// Example.
///
/// ```should-panic
/// assert_eq!(1, 2);
/// ```
pub fn foo() {}
```

Which will give:

```
warning: unknown attribute `should-panic`. Did you mean `should_panic`?
--> src/lib.rs:1:1
|
1 | / /// Example.
2 | | ///
3 | | /// ```should-panic
4 | | /// assert_eq!(1, 2);
5 | | /// ```
  | |_____^
  |
= note: `[warn(rustdoc::invalid_codeblock_attributes)]` on by default
= help: the code block will either not be tested if not marked as a rust one or
won't fail if it doesn't panic when running
```

In the example above, the correct form is `should_panic`. This helps detect typo mistakes for some common attributes.

## invalid\_html\_tags

This lint **warns by default**. It detects unclosed or invalid HTML tags. For example:

```
#![warn(rustdoc::invalid_html_tags)]

/// <h1>
/// </script>
pub fn foo() {}
```

Which will give:

```
warning: unopened HTML tag `script`
--> foo.rs:1:1
  |
1 | / /// <h1>
2 | | /// </script>
  | |-----^
  |
  note: the lint level is defined here
--> foo.rs:1:9
  |
1 | #![warn(rustdoc::invalid_html_tags)]
  |           ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

```
warning: unclosed HTML tag `h1`
--> foo.rs:1:1
  |
1 | / /// <h1>
2 | | /// </script>
  | |-----^
```

```
warning: 2 warnings emitted
```

## invalid\_rust\_codeblocks

This lint **warns by default**. It detects Rust code blocks in documentation examples that are invalid (e.g. empty, not parsable as Rust). For example:

```
/// Empty code blocks (with and without the `rust` marker):
///
/// ```rust
/// ```
///
/// Invalid syntax in code blocks:
///
/// ```rust
/// '<
/// ```
pub fn foo() {}
```

Which will give:

```
warning: Rust code block is empty
--> lint.rs:3:5
  |
3 |   /// ```rust
  |   ^
4 | |   /// ```
  | |   ^
  | |   ^
= note: `#[warn(rustdoc::invalid_rust_codeblocks)]` on by default

warning: could not parse code block as Rust code
--> lint.rs:8:5
  |
8 |   /// ```rust
  |   ^
9 | |   /// '<
10| |   /// ```
  | |   ^
  | |   ^
= note: error from rustc: unterminated character literal
```

## bare\_urls

This lint is **warn-by-default**. It detects URLs which are not links. For example:

```
#![warn(rustdoc::bare_urls)] // note: unnecessary - warns by default.

/// http://example.org
/// [http://example.net]
pub fn foo() {}
```

Which will give:



```
warning: this URL is not a hyperlink
--> links.rs:1:5
  |
1 | /// http://example.org
  |          ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^ help: use an automatic link instead:
`<http://example.org>`
  |
  = note: `[warn(rustdoc::bare_urls)]` on by default

warning: this URL is not a hyperlink
--> links.rs:3:6
  |
3 | /// [http://example.net]
  |          ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^ help: use an automatic link instead:
`<http://example.net>`

warning: 2 warnings emitted
```

## unescaped\_backticks

This lint is **allowed by default**. It detects backticks (``) that are not escaped. This usually means broken inline code. For example:

```
#![warn(rustdoc::unescaped_backticks)]

/// `add(a, b) is the same as `add(b, a)`.
pub fn add(a: i32, b: i32) -> i32 { a + b }
```

Which will give:

```

warning: unescaped backtick
--> src/lib.rs:3:41
  |
3 | /// `add(a, b) is the same as `add(b, a)`.
  |                                     ^
note: the lint level is defined here
--> src/lib.rs:1:9
  |
1 | #![warn(rustdoc::unescaped_backticks)]
  |          ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
help: a previous inline code might be longer than expected
  |
3 | /// `add(a, b)` is the same as `add(b, a)`.
  |               +
help: if you meant to use a literal backtick, escape it
  |
3 | /// `add(a, b) is the same as `add(b, a)\`.
  |                                     +

warning: 1 warning emitted

```

## redundant\_explicit\_links

This lint is **warn-by-default**. It detects explicit links that are the same as computed automatic links. This usually means the explicit links are removable. For example:

```

#![warn(rustdoc::redundant_explicit_links)] // note: unnecessary - warns by
default.

/// add takes 2 [`usize`](usize) and performs addition
/// on them, then returns result.
pub fn add(left: usize, right: usize) -> usize {
    left + right
}

```

Which will give:

```

error: redundant explicit rustdoc link
--> src/lib.rs:3:27
  |
3 | /// add takes 2 [`usize`](usize) and performs addition
  |                                     ^^^^^^
  |
= note: Explicit link does not affect the original link
note: the lint level is defined here
--> src/lib.rs:1:9
  |
1 | #![deny(rustdoc::redundant_explicit_links)]
  |               ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
= help: Remove explicit link instead

```

# Scraped examples

Rustdoc has an unstable feature where it can automatically scrape examples of items being documented from the `examples/` directory of a Cargo workspace. These examples will be included within the generated documentation for that item. For example, if your library contains a public function:

```
// a_crate/src/lib.rs
pub fn a_func() {}
```

And you have an example calling this function:

```
// a_crate/examples/ex.rs
fn main() {
    a_crate::a_func();
}
```

Then this code snippet will be included in the documentation for `a_func`. This documentation is inserted by Rustdoc and cannot be manually edited by the crate author.

## How to use this feature

This feature is unstable, so you can enable it by calling Rustdoc with the unstable `rustdoc-scrape-examples` flag:

```
cargo doc -Zunstable-options -Zrustdoc-scrape-examples
```

To enable this feature on [docs.rs](https://docs.rs), add this to your Cargo.toml:

```
[package.metadata.docs.rs]
cargo-args = ["-Zunstable-options", "-Zrustdoc-scrape-examples"]
```

## How it works

When you run `cargo doc`, Rustdoc will analyze all the crates that match Cargo's `--examples` filter for instances of items being documented. Then Rustdoc will include the source code of these instances in the generated documentation.

Rustdoc has a few techniques to ensure these examples don't overwhelm documentation readers, and that it doesn't blow up the page size:

1. For a given item, a maximum of 5 examples are included in the page. The remaining examples are just links to source code.
2. Only one example is shown by default, and the remaining examples are hidden behind a toggle.
3. For a given file that contains examples, only the item containing the examples will be included in the generated documentation.

For a given item, Rustdoc sorts its examples based on the size of the example — smaller ones are shown first.

## FAQ

### **My example is not showing up in the documentation**

This feature uses Cargo's convention for finding examples. You should ensure that `cargo check --examples` includes your example file.

# Advanced features

The features listed on this page fall outside the rest of the main categories.

## `#[cfg(doc)]`: Documenting platform-specific or feature-specific information

For conditional compilation, Rustdoc treats your crate the same way the compiler does. Only things from the host target are available (or from the given `--target` if present), and everything else is "filtered out" from the crate. This can cause problems if your crate is providing different things on different targets and you want your documentation to reflect all the available items you provide.

If you want to make sure an item is seen by Rustdoc regardless of what platform it's targeting, you can apply `#[cfg(doc)]` to it. Rustdoc sets this whenever it's building documentation, so anything that uses that flag will make it into documentation it generates. To apply this to an item with other `#[cfg]` filters on it, you can write something like `#[cfg(any(windows, doc))]`. This will preserve the item either when built normally on Windows, or when being documented anywhere.

Please note that this `cfg` is not passed to doctests.

Example:

```
/// Token struct that can only be used on Windows.
#[cfg(any(windows, doc))]
pub struct WindowsToken;
/// Token struct that can only be used on Unix.
#[cfg(any(unix, doc))]
pub struct UnixToken;
```

Here, the respective tokens can only be used by dependent crates on their respective platforms, but they will both appear in documentation.

## Interactions between platform-specific docs

Rustdoc does not have a magic way to compile documentation 'as-if' you'd run it once for each platform (such a magic wand has been called the '[holy grail of rustdoc](#)'). Instead, it sees *all* of your code at once, the same way the Rust compiler would if you passed it `--cfg doc`. The

main difference is that rustdoc doesn't run all the compiler passes, meaning that some invalid code won't emit an error.

## Add aliases for an item in documentation search

This feature allows you to add alias(es) to an item when using the `rustdoc` search through the `doc(alias)` attribute. Example:

```
[doc(alias = "x")]
[doc(alias = "big")]
pub struct BigX;
```

Then, when looking for it through the `rustdoc` search, if you enter "x" or "big", search will show the `BigX` struct first.

There are some limitations on the doc alias names though: they cannot contain quotes ( ' , " ) or most whitespace. ASCII space is allowed if it does not start or end the alias.

You can add multiple aliases at the same time by using a list:

```
[doc(alias("x", "big"))]
pub struct BigX;
```

## Custom search engines

If you find yourself often referencing online Rust docs you might enjoy using a custom search engine. This allows you to use the navigation bar directly to search a `rustdoc` website. Most browsers support this feature by letting you define a URL template containing `%s` which will be substituted for the search term. As an example, for the standard library you could use this template:

```
https://doc.rust-lang.org/stable/std/?search=%s
```

Note that this will take you to a results page listing all matches. If you want to navigate to the first result right away (which is often the best match) use the following instead:

```
https://doc.rust-lang.org/stable/std/?search=%s&go_to_first=true
```

This URL adds the `go_to_first=true` query parameter which can be appended to any `rustdoc` search URL to automatically go to the first result.

## `#[repr(transparent)]`: Documenting the transparent representation

You can read more about `#[repr(transparent)]` itself in the [Rust Reference](#) and in the [Rustonomicon](#).

Since this representation is only considered part of the public ABI if the single field with non-trivial size or alignment is public and if the documentation does not state otherwise, Rustdoc helpfully displays the attribute if and only if the non-1-ZST field is public or at least one field is public in case all fields are 1-ZST fields. The term *1-ZST* refers to types that are one-aligned and zero-sized.

It would seem that one can manually hide the attribute with `#[cfg_attr(not(doc), repr(transparent))]` if one wishes to declare the representation as private even if the non-1-ZST field is public. However, due to [current limitations](#), this method is not always guaranteed to work. Therefore, if you would like to do so, you should always write it down in prose independently of whether you use `cfg_attr` or not.



# Unstable features

Rustdoc is under active development, and like the Rust compiler, some features are only available on nightly releases. Some of these features are new and need some more testing before they're able to be released to the world at large, and some of them are tied to features in the Rust compiler that are unstable. Several features here require a matching `#![feature(...)]` attribute to enable, and thus are more fully documented in the [Unstable Book](#). Those sections will link over there as necessary.

`[feature(...)]` attribute to enable, and thus are more fully documented in the [Unstable Book](#). Those sections will link over there as necessary.

## Nightly-gated functionality

These features just require a nightly build to operate. Unlike the other features on this page, these don't need to be "turned on" with a command-line flag or a `#![feature(...)]` attribute in your crate. This can give them some subtle fallback modes when used on a stable release, so be careful!

## Error numbers for `compile-fail` doctests

As detailed in [the chapter on documentation tests](#), you can add a `compile_fail` attribute to a doctest to state that the test should fail to compile. However, on nightly, you can optionally add an error number to state that a doctest should emit a specific error number:

```
```compile_fail,E0044
extern { fn some_func<T>(x: T); }
```
```

This is used by the error index to ensure that the samples that correspond to a given error number properly emit that error code. However, these error codes aren't guaranteed to be the only thing that a piece of code emits from version to version, so this is unlikely to be stabilized in the future.

Attempting to use these error numbers on stable will result in the code sample being interpreted as plain text.

## missing\_doc\_code\_examples lint

This lint will emit a warning if an item doesn't have a code example in its documentation. It can be enabled using:

```
#![deny(rustdoc::missing_doc_code_examples)]
```

## Extensions to the `#[doc]` attribute

These features operate by extending the `#[doc]` attribute, and thus can be caught by the compiler and enabled with a `#![feature(...)]` attribute in your crate.

### `#[doc(cfg)]`: Recording what platforms or features are required for code to be present

- Tracking issue: [#43781](#)

You can use `#[doc(cfg(...))]` to tell Rustdoc exactly which platform items appear on. This has two effects:

1. doctests will only run on the appropriate platforms, and
2. When Rustdoc renders documentation for that item, it will be accompanied by a banner explaining that the item is only available on certain platforms.

`#[doc(cfg)]` is intended to be used alongside `#[cfg(doc)]`. For example, `#[cfg(any(windows, doc))]` will preserve the item either on Windows or during the documentation process. Then, adding a new attribute `#[doc(cfg(windows))]` will tell Rustdoc that the item is supposed to be used on Windows. For example:

```

#![feature(doc_cfg)]

/// Token struct that can only be used on Windows.
#[cfg(any(windows, doc))]
#[doc(cfg(windows))]
pub struct WindowsToken;

/// Token struct that can only be used on Unix.
#[cfg(any(unix, doc))]
#[doc(cfg(unix))]
pub struct UnixToken;

/// Token struct that is only available with the `serde` feature
#[cfg(feature = "serde")]
#[doc(cfg(feature = "serde"))]
#[derive(serde::Deserialize)]
pub struct SerdeToken;

```

In this sample, the tokens will only appear on their respective platforms, but they will both appear in documentation.

`#[doc(cfg(...))]` was introduced to be used by the standard library and currently requires the `#![feature(doc_cfg)]` feature gate. For more information, see [its chapter in the Unstable Book](#) and [its tracking issue](#).

## `doc_auto_cfg`: Automatically generate `#[doc(cfg)]`

- Tracking issue: [#43781](#)

`doc_auto_cfg` is an extension to the `#[doc(cfg)]` feature. With it, you don't need to add `#[doc(cfg(...))]` anymore unless you want to override the default behaviour. So if we take the previous source code:

```

#![feature(doc_auto_cfg)]

/// Token struct that can only be used on Windows.
#[cfg(any(windows, doc))]
pub struct WindowsToken;

/// Token struct that can only be used on Unix.
#[cfg(any(unix, doc))]
pub struct UnixToken;

/// Token struct that is only available with the `serde` feature
#[cfg(feature = "serde")]
#[derive(serde::Deserialize)]
pub struct SerdeToken;

```

It'll render almost the same, the difference being that `doc` will also be displayed. To fix this, you can use `doc_cfg_hide`:

```
#![feature(doc_cfg_hide)]
#![doc(cfg_hide(doc))]
```

And `doc` won't show up anymore!

## Adding your trait to the "Notable traits" dialog

- Tracking issue: [#45040](#)

Rustdoc keeps a list of a few traits that are believed to be "fundamental" to types that implement them. These traits are intended to be the primary interface for their implementers, and are often most of the API available to be documented on their types. For this reason, Rustdoc will track when a given type implements one of these traits and call special attention to it when a function returns one of these types. This is the "Notable traits" dialog, accessible as a circled `i` button next to the function, which, when clicked, shows the dialog.

In the standard library, some of the traits that are part of this list are `Iterator`, `Future`, `io::Read`, and `io::Write`. However, rather than being implemented as a hard-coded list, these traits have a special marker attribute on them: `#![doc(notable_trait)]`. This means that you can apply this attribute to your own trait to include it in the "Notable traits" dialog in documentation.

The `#![doc(notable_trait)]` attribute currently requires the `#![feature(doc_notable_trait)]` feature gate. For more information, see [its chapter in the Unstable Book](#) and [its tracking issue](#).

## Exclude certain dependencies from documentation

- Tracking issue: [#44027](#)

The standard library uses several dependencies which, in turn, use several types and traits from the standard library. In addition, there are several compiler-internal crates that are not considered to be part of the official standard library, and thus would be a distraction to include in documentation. It's not enough to exclude their crate documentation, since information about trait implementations appears on the pages for both the type and the trait, which can be in different crates!

To prevent internal types from being included in documentation, the standard library adds an attribute to their `extern crate` declarations: `#[doc(masked)]`. This causes Rustdoc to "mask out" types from these crates when building lists of trait implementations.

The `#[doc(masked)]` attribute is intended to be used internally, and requires the `#![feature(doc_masked)]` feature gate. For more information, see [its chapter in the Unstable Book](#) and [its tracking issue](#).

## Document primitives

This is for Rust compiler internal use only.

Since primitive types are defined in the compiler, there's no place to attach documentation attributes. The `#[rustc_doc_primitive = "..."]` attribute is used by the standard library to provide a way to generate documentation for primitive types, and requires `#![feature(rustc_attrs)]` to enable.

## Document keywords

This is for Rust compiler internal use only.

Rust keywords are documented in the standard library (look for `match` for example).

To do so, the `#[doc(keyword = "...")]` attribute is used. Example:

```
#![feature(rustdoc_internals)]
#![allow(internal_features)]

/// Some documentation about the keyword.
#[doc(keyword = "keyword")]
mod empty_mod {}
```

## Use the Rust logo as the crate logo

This is for official Rust project use only.

Internal Rustdoc pages like `settings.html` and `scrape-examples-help.html` show the Rust logo. This logo is tracked as a static resource. The attribute `#![doc(rust_logo)]` makes this same built-in resource act as the main logo.

```
#![feature(rustdoc_internals)]
#![allow(internal_features)]
#![doc(rust_logo)]
//! This crate has the Rust(tm) branding on it.
```

## Effects of other nightly features

These nightly-only features are not primarily related to Rustdoc, but have convenient effects on the documentation produced.

### fundamental types

Annotating a type with `#![fundamental]` primarily influences coherence rules about generic types, i.e., they alter whether other crates can provide implementations for that type. The unstable book [links to further information](#).

For documentation, this has an additional side effect: If a method is implemented on `F<T>` (or `F<&T>`), where `F` is a fundamental type, then the method is not only documented at the page about `F`, but also on the page about `T`. In a sense, it makes the type transparent to Rustdoc. This is especially convenient for types that work as annotated pointers, such as `Pin<&mut T>`, as it ensures that methods only implemented through those annotated pointers can still be found with the type they act on.

If the `fundamental` feature's effect on coherence is not intended, such a type can be marked as fundamental only for purposes of documentation by introducing a custom feature and limiting the use of `fundamental` to when documentation is built.

## Unstable command-line arguments

These features are enabled by passing a command-line flag to Rustdoc, but the flags in question are themselves marked as unstable. To use any of these options, pass `-Z unstable-options` as well as the flag in question to Rustdoc on the command-line. To do this from Cargo, you can either use the `RUSTDOCFLAGS` environment variable or the `cargo rustdoc` command.

## **--markdown-before-content: include rendered Markdown before the content**

- Tracking issue: [#44027](#)

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --markdown-before-content extra.md
$ rustdoc README.md -Z unstable-options --markdown-before-content extra.md
```

Just like `--html-before-content`, this allows you to insert extra content inside the `<body>` tag but before the other content `rustdoc` would normally produce in the rendered documentation. However, instead of directly inserting the file verbatim, `rustdoc` will pass the files through a Markdown renderer before inserting the result into the file.

## **--markdown-after-content: include rendered Markdown after the content**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --markdown-after-content extra.md
$ rustdoc README.md -Z unstable-options --markdown-after-content extra.md
```

Just like `--html-after-content`, this allows you to insert extra content before the `</body>` tag but after the other content `rustdoc` would normally produce in the rendered documentation. However, instead of directly inserting the file verbatim, `rustdoc` will pass the files through a Markdown renderer before inserting the result into the file.

## **--playground-url: control the location of the playground**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --playground-url https://play.rust-
lang.org/
```

When rendering a crate's docs, this flag gives the base URL of the Rust Playground, to use for generating Run buttons. Unlike `--markdown-playground-url`, this argument works for standalone Markdown files *and* Rust crates. This works the same way as adding `#![doc(html_playground_url = "url")]` to your crate root, as mentioned in [the chapter about the `#\[doc\]` attribute](#). Please be aware that the official Rust Playground at <https://play.rust-lang.org> does not have every crate available, so if your examples require your crate, make sure the playground you provide has your crate available.

If both `--playground-url` and `--markdown-playground-url` are present when rendering a standalone Markdown file, the URL given to `--markdown-playground-url` will take precedence. If both `--playground-url` and `#![doc(html_playground_url = "url")]` are present when rendering crate docs, the attribute will take precedence.

## **--sort-modules-by-appearance: control how items on module pages are sorted**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --sort-modules-by-appearance
```

Ordinarily, when `rustdoc` prints items in module pages, it will sort them alphabetically (taking some consideration for their stability, and names that end in a number). Giving this flag to `rustdoc` will disable this sorting and instead make it print the items in the order they appear in the source.

## **--show-type-layout: add a section to each type's docs describing its memory layout**

- Tracking issue: [#113248](#)

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --show-type-layout
```

When this flag is passed, `rustdoc` will add a "Layout" section at the bottom of each type's docs page that includes a summary of the type's memory layout as computed by `rustc`. For example, `rustdoc` will show the size in bytes that a value of that type will take in memory.

Note that most layout information is **completely unstable** and may even differ between compilations.

## **--resource-suffix: modifying the name of CSS/JavaScript in crate docs**

- Tracking issue: [#54765](#)

Using this flag looks like this:



```
$ rustdoc src/lib.rs -Z unstable-options --resource-suffix suf
```

When rendering docs, `rustdoc` creates several CSS and JavaScript files as part of the output. Since all these files are linked from every page, changing where they are can be cumbersome if you need to specially cache them. This flag will rename all these files in the output to include the suffix in the filename. For example, `light.css` would become `light-suf.css` with the above command.

## **--extern-html-root-url: control how rustdoc links to non-local crates**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --extern-html-root-url some-  
crate=https://example.com/some-crate/1.0.1
```

Ordinarily, when `rustdoc` wants to link to a type from a different crate, it looks in two places: docs that already exist in the output directory, or the `#![doc(doc_html_root)]` set in the other crate. However, if you want to link to docs that exist in neither of those places, you can use these flags to control that behavior. When the `--extern-html-root-url` flag is given with a name matching one of your dependencies, `rustdoc` use that URL for those docs. Keep in mind that if those docs exist in the output directory, those local docs will still override this flag.

## **-Z force-unstable-if-unmarked**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z force-unstable-if-unmarked
```

This is an internal flag intended for the standard library and compiler that applies an `#[unstable]` attribute to any dependent crate that doesn't have another stability attribute. This allows `rustdoc` to be able to generate documentation for the compiler crates and the standard library, as an equivalent command-line argument is provided to `rustc` when building those crates.

## **--index-page: provide a top-level landing page for docs**

This feature allows you to generate an index-page with a given markdown file. A good example of it is the [rust documentation index](https://doc.rust-lang.org/rustdoc/print.html).

With this, you'll have a page which you can customize as much as you want at the top of your crates.

Using `index-page` option enables `enable-index-page` option as well.

## **--enable-index-page: generate a default index page for docs**

This feature allows the generation of a default index-page which lists the generated crates.

## **--nocapture: disable output capture for test**

When this flag is used with `--test`, the output (stdout and stderr) of your tests won't be captured by rustdoc. Instead, the output will be directed to your terminal, as if you had run the test executable manually. This is especially useful for debugging your tests!

## **--check: only checks the documentation**

When this flag is supplied, rustdoc will type check and lint your code, but will not generate any documentation or run your doctests.

Using this flag looks like:

```
rustdoc -Z unstable-options --check src/lib.rs
```

## **--static-root-path: control how static files are loaded in HTML output**

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --static-root-path '/cache/'
```

This flag controls how rustdoc links to its static files on HTML pages. If you're hosting a lot of crates' docs generated by the same version of rustdoc, you can use this flag to cache rustdoc's CSS, JavaScript, and font files in a single location, rather than duplicating it once per "doc root" (grouping of crate docs generated into the same output directory, like with `cargo doc`). Per-crate files like the search index will still load from the documentation root, but anything that gets renamed with `--resource-suffix` will load from the given path.

## --persist-doctests: persist doctest executables after running

- Tracking issue: [#56925](#)

Using this flag looks like this:

```
$ rustdoc src/lib.rs --test -Z unstable-options --persist-doctests
target/rustdoctest
```

This flag allows you to keep doctest executables around after they're compiled or run. Usually, rustdoc will immediately discard a compiled doctest after it's been tested, but with this option, you can keep those binaries around for farther testing.

## --show-coverage: calculate the percentage of items with documentation

- Tracking issue: [#58154](#)

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --show-coverage
```

It generates something like this:

```
+-----+-----+-----+-----+-----+
+-----+
| File           | Documented | Percentage | Examples |
Percentage |
+-----+-----+-----+-----+-----+
+-----+
| lib.rs         |           4 |    100.0% |         1 |
25.0% |
+-----+-----+-----+-----+-----+
+-----+
| Total         |           4 |    100.0% |         1 |
25.0% |
+-----+-----+-----+-----+-----+
+-----+
```

If you want to determine how many items in your crate are documented, pass this flag to rustdoc. When it receives this flag, it will count the public items in your crate that have documentation, and print out the counts and a percentage instead of generating docs.

Some methodology notes about what rustdoc counts in this metric:

- Rustdoc will only count items from your crate (i.e. items re-exported from other crates don't count).
- Docs written directly onto inherent impl blocks are not counted, even though their doc comments are displayed, because the common pattern in Rust code is to write all inherent methods into the same impl block.
- Items in a trait implementation are not counted, as those impls will inherit any docs from the trait itself.
- By default, only public items are counted. To count private items as well, pass `--document-private-items` at the same time.

Public items that are not documented can be seen with the built-in `missing_docs` lint. Private items that are not documented can be seen with Clippy's `missing_docs_in_private_items` lint.

Calculating code examples follows these rules:

1. These items aren't accounted by default:
  - struct/union field
  - enum variant
  - constant
  - static
  - typedef
2. If one of the previously listed items has a code example, then it'll be counted.

## JSON output

When using `--output-format json` with this option, it will display the coverage information in JSON format. For example, here is the JSON for a file with one documented item and one undocumented item:

```
/// This item has documentation
pub fn foo() {}

pub fn no_documentation() {}

{"no_std.rs":{"total":3,"with_docs":1,"total_examples":3,"with_examples":0}}
```

Note that the third item is the crate root, which in this case is undocumented.

If you want the JSON output to be displayed on `stdout` instead of having a file generated, you can use `-o -`.

## **-w/--output-format: output format**

`--output-format json` emits documentation in the experimental [JSON format](#). `--output-format html` has no effect, and is also accepted on stable toolchains.

JSON Output for toolchain crates (`std`, `alloc`, `core`, `test`, and `proc_macro`) is available via the `rust-docs-json` `rustup` component.

```
rustup component add --toolchain nightly rust-docs-json
```

Then the json files will be present in the `share/doc/rust/json/` directory of the `rustup` toolchain directory.

It can also be used with `--show-coverage`. Take a look at its [documentation](#) for more information.

## **--enable-per-target-ignores: allow ignore-foo style filters for doctests**

- Tracking issue: [#64245](#)

Using this flag looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --enable-per-target-ignores
```

This flag allows you to tag doctests with compiletest style `ignore-foo` filters that prevent rustdoc from running that test if the target triple string contains `foo`. For example:

```
///````ignore-foo,ignore-bar
///assert!(2 == 2);
///````
struct Foo;
```

This will not be run when the build target is `super-awesome-foo` or `less-bar-awesome`. If the flag is not enabled, then rustdoc will consume the filter, but do nothing with it, and the above example will be run for all targets. If you want to preserve backwards compatibility for older versions of rustdoc, you can use

```
///````ignore,ignore-foo
///assert!(2 == 2);
///````
struct Foo;
```

In older versions, this will be ignored on all targets, but on newer versions `ignore-gnu` will override `ignore`.

## **`--runtool`, `--runtool-arg`: program to run tests with; args to pass to it**

- Tracking issue: [#64245](#)

Using these options looks like this:

```
$ rustdoc src/lib.rs -Z unstable-options --runtool runner --runtool-arg --do-thing
--runtool-arg --do-other-thing
```

These options can be used to run the doctest under a program, and also pass arguments to that program. For example, if you want to run your doctests under `valgrind` you might run

```
$ rustdoc src/lib.rs -Z unstable-options --runtool valgrind
```

Another use case would be to run a test inside an emulator, or through a Virtual Machine.

## **`--with-examples`: include examples of uses of items as documentation**

- Tracking issue: [#88791](#)

This option, combined with `--scrape-examples-target-crate` and `--scrape-examples-output-path`, is used to implement the functionality in [RFC #3123](#). Uses of an item (currently functions / call-sites) are found in a crate and its reverse-dependencies, and then the uses are included as documentation for that item. This feature is intended to be used via `cargo doc --scrape-examples`, but the rustdoc-only workflow looks like:

```
$ rustdoc examples/ex.rs -Z unstable-options \
  --extern foobar=target/deps/libfoobar.rmeta \
  --scrape-examples-target-crate foobar \
  --scrape-examples-output-path output.calls
$ rustdoc src/lib.rs -Z unstable-options --with-examples output.calls
```

First, the library must be checked to generate an `rmeta`. Then a reverse-dependency like `examples/ex.rs` is given to rustdoc with the target crate being documented ( `foobar` ) and a path to output the calls ( `output.calls` ). Then, the generated calls file can be passed via `--with-examples` to the subsequent documentation of `foobar`.

To scrape examples from test code, e.g. functions marked `#[test]` , then add the `--scrape-tests` flag.

## **`--generate-link-to-definition`: Generate links on types in source code**

- Tracking issue: [#89095](#)

This flag enables the generation of links in the source code pages which allow the reader to jump to a type definition.

# Deprecated features

## Passes

Rustdoc has a concept called "passes". These are transformations that `rustdoc` runs on your documentation before producing its final output.

Customizing passes is **deprecated**. The available passes are not considered stable and may change in any release.

In the past the most common use case for customizing passes was to omit the `strip-private` pass. You can do this more easily, and without risk of the pass being changed, by passing `--document-private-items`.



# References

There are many great `rustdoc` references out there. If you know of other great resources, please submit a pull request!

## Official

- [Learn Rust](#)
- [Rust By Example](#)
- [Rust Reference](#)
- [RFC 1574: More API Documentation Conventions](#)
- [RFC 1946: Intra Rustdoc Links](#)

## Community

- [API Guidelines](#)
- [GitHub tagged RFCs](#)
- [GitHub tagged issues](#)
- [RFC \(stalled\) front page styleguide](#)
- [Guide on how to write documentation for a Rust crate](#)