Augmented Docs

a love letter to rustdoc and docs.rs

Who Am I?

- François Mockers
- QA Lead at PayLead
- Maintainer of Bevy
- Developer of random things
- Find me at @FrancoisMockers@hachyderm.io

Documenting your Code

Why?

- Enhances discoverability
  - Helps users find your crate
  - And check that it matches their needs
- Improves usability
  - Clarifies the purpose and functionality of your code
  - Reduces the learning curve for new users

Documenting a Function

- What is it doing?
- Explain its parameters and return value
- Detail the error cases and the panics
- Unsafe? Give the conditions the caller has to check
- Example usage

Documenting a Struct

- Describe each field and its purpose
- Specify default values
- Explain any constraints or invariants
- Mention any related structs or traits
- Example usage

Documenting a Trait

- Explain the purpose and use cases of the trait
- Describe the expected behavior when implemented
- Detail the associated types
- Highlight relationships with other traits
- Discuss default method implementations
- Example implementation

Documenting a Module or a Crate

- Provide an overview of the module or crate's functionality
- Explain how the different components interact and fit together
- Highlight key features and capabilities
- Include examples of common usage patterns
- Guide users on where to find specific functionalities or components

rustdoc

The Tool

- You all know it!

```
rustdoc
```

```
cargo doc
```

- In rust-lang/rust/src/librustdoc
- The rustdoc book: https://doc.rust-lang.org/rustdoc

Rustdoc team

Developing and managing the Rustdoc documentation tool

#T-RUSTDOC ON ZULIP

Members

Guillaume Gomez
GitHub: GuillaumeGomez
Team leader

Alona Enraght-Moony
GitHub: aDotInTheVoid

Noah Lev
GitHub: camelid

León Orell Valerian Liehr
GitHub: fmease

Jacob Hoffman-Andrews
GitHub: jsha

Manish Goregaokar
GitHub: Manishearth

Wim
GitHub: Nemo157

Michael Howell
GitHub: notriddle

Alumni

We also want to thank all past members for their invaluable contributions!

Jakob Wiesmore
GitHub: CraftSpider

Jynn Nelson
GitHub: jyn514

Daniel Silverstone
GitHub: kinnison

Oliver Middleton
GitHub: ollie27

Onur Aslan
GitHub: onur

QuietMisdreavus
GitHub: QuietMisdreavus

Steve Klabnik
GitHub: steveklabnik

The Tool

- Build a website with the crate documentation
- List the signatures of all public elements of a crate
- Organized by module
- With search, links

docs.rs

The Website

- You all know it!
- https://docs.rs
- In rust-lang/docs.rs

Docs.rs team

Docs.rs, the documentation hosting service for crates

DOCS.RS TEAM REPOSITORY

#T-DOCS-RS ON ZULIP

Members

Denis Cornehl
GitHub: syphar
Team leader

Sebastian Thiel
GitHub: Byron

Guillaume Gomez
GitHub: GuillaumeGomez

Jacob Hoffman-Andrews
GitHub: jsha

Wim
GitHub: Nemo157

Alumni

We also want to thank all past members for their invaluable contributions!

Jynn Nelson
GitHub: jyn514

Chase Wilson
GitHub: Kixiron

Onur Aslan
GitHub: onur

Pietro Albini
GitHub: pietroalbini

QuietMisdreavus
GitHub: QuietMisdreavus

The Website

- Build the documentation of every crate published on crates.io
- Keep the documentation of every published version
- Use nightly rust
- https://docs.rs/about

Advanced Features

Let's Start Simple

- /// for documenting an item

```rust
/// This is documenting the module
mod example {}
```

- //! for documenting a container

```rust
mod example {
  //! This is documenting the module
}
```

Code Examples in Documentation

```
/// ```
/// # fn year() -> u32 {2024}
/// // Some explanation.
/// println!("Hello, EuroRust {}!", year());
/// ```
```

- Hide setup lines with #
- Will be run as doc tests
- Attributes: ignore, should_panic, no_run, compile_fail
- More details in the rustdoc book

Linking to Items by Name

- Can link to items in scope

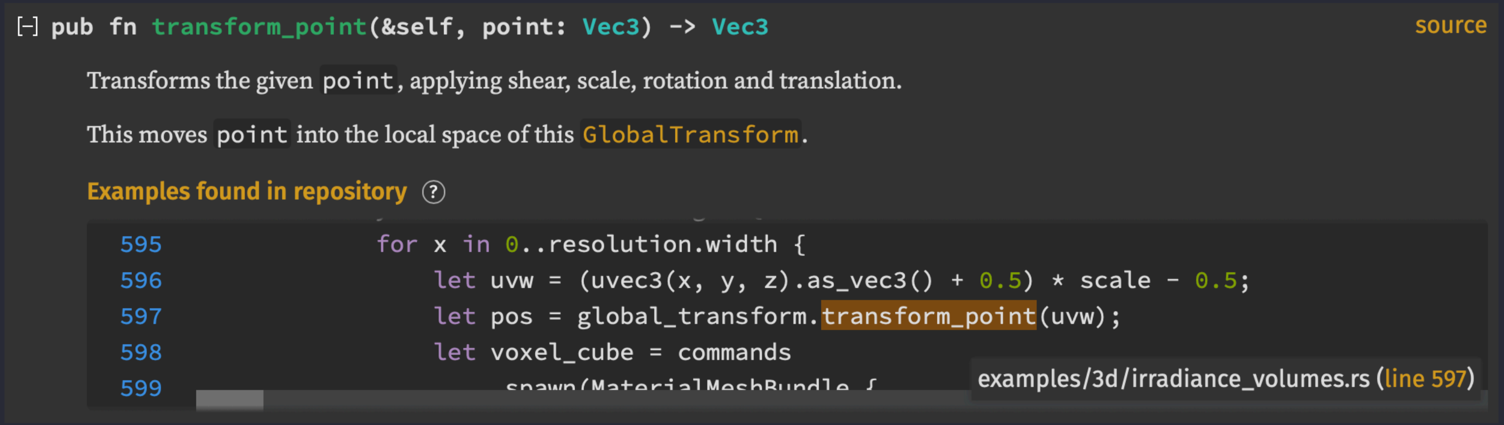
```rust
use std::sync::mpsc::Receiver;

/// This version of [`Receiver`] supports [`future`](std::future).
///
/// You can obtain a [`Future`] by calling [`Self::recv()`].
/// [`Future`]: std::future::Future
pub struct AsyncReceiver {
  sender: Receiver
}

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

- More details in the rustdoc book

Scraping Examples

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

- Find examples where the item being documented is used



```
[-] pub fn transform_point(&self, point: Vec3) -> Vec3
```
source

Transforms the given `point`, applying shear, scale, rotation and translation.

This moves `point` into the local space of this `GlobalTransform`.

Examples found in repository ?

```
            for x in 0..resolution.width {
                let uvw = (uvec3(x, y, z).as_vec3() + 0.5) * scale - 0.5;
                let pos = global_transform.transform_point(uvw);
                let voxel_cube = commands
                    .spawn(MaterialMeshBundle {
```

examples/3d/irradiance_volumes.rs (line 597)

- More details in the rustdoc book

The #[doc] Attribute

```rust
/// This is a doc comment.
```

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

- More details in the rustdoc book

The #[doc] Attribute

- Configuration at the crate level

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

  - Branding: logo, favicon, ...
  - Configuration: doc test options, root html, src

- Configuration on items

```rust
#[doc(hidden)]
pub struct InternalDetail;
```

  - Hidden, Inline

Include a File

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

- Included file will be used as documentation
- Code block will be compiled and tested
- If the markdown file is also rendered outside of rustdoc, pay attention to intra doc links

Other Macros: document-features

- Automatically document your features: crate document-features

```
#![doc = document_features::document_features!()]
```

- Reads the Cargo.toml file, extract the list of features and their comments
- Format it and present it in the documentation

document-features

```
[features]
default = ["foo"]
#! This comments goes on top

## The foo feature enables the `foo` functions
foo = []

## The bar feature enables the bar module
bar = []

#! ### Experimental features
#! The following features are experimental

## Enable the fusion reactor
##
## ⚠️ Can lead to explosions
fusion = []
```

This comments goes on top

- **`foo`** *(enabled by default)* — The foo feature enables the `foo` functions
- **`bar`** — The bar feature enables the bar module

Experimental features

The following features are experimental

- **`fusion`** — Enable the fusion reactor

  ⚠️ Can lead to explosions

Aliases

```rust
#[doc(alias = "haptic", "force", "feedback", "vibration", "vibrate")]
pub enum Rumble {...}
```

- Helps users find the item

Conditional Compilation for rustdoc

```
#[cfg(doc)]
```

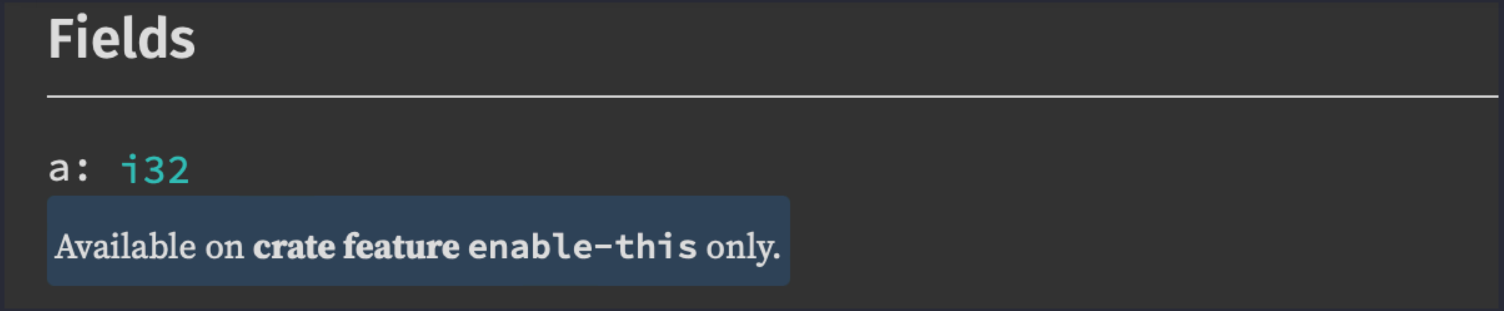
- Can be used to build part of the code only for documentation
- Can be used to document platforms other than the one doing the build

```
#[cfg(any(windows, doc))]
pub struct WindowsSpecificThing;
```

Marking Items as Feature Gated

```
#![feature(doc_cfg)]
```

```
pub struct StructUnderFeature {
  #[cfg(feature = "enable-this")]
  #[doc(cfg(feature = "enable-this"))]
  pub a: i32,
}
```


Fields

a: i32

Available on **crate feature** `enable-this` only.

Marking Items as Feature Gated

- Soon will be automatic: doc_auto_cfg
- Forces you to use nightly, unless...

```rust
#![cfg_attr(docsrs, feature(doc_cfg))]

pub struct StructUnderFeature {
  #[cfg(feature = "enable-this")]
  #[cfg_attr(docsrs, doc(cfg(feature = "enable-this")))]
  pub a: i32,
}
```

docs.rs Configuration

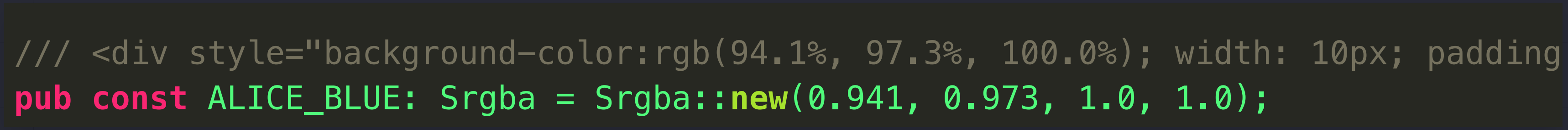
```
#[cfg(docsrs)]
```

- In your Cargo.toml:

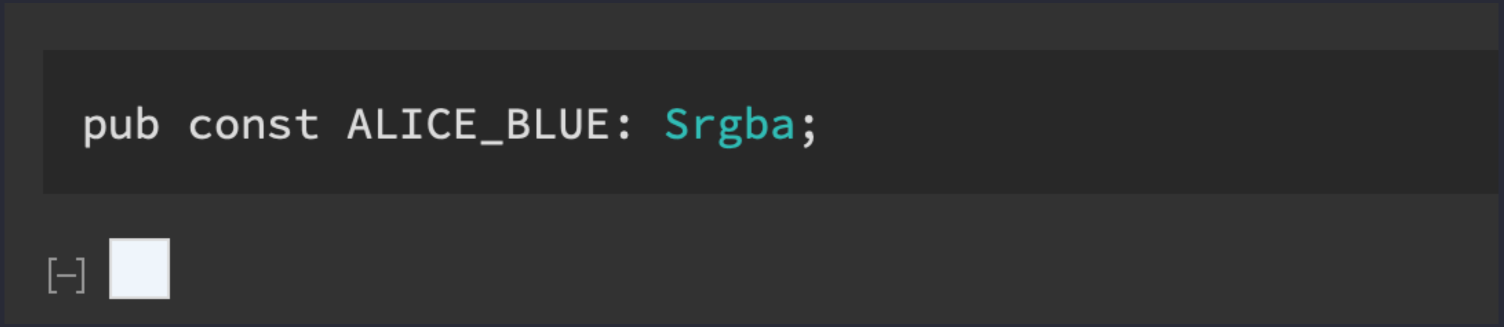
```
[package.metadata.docs.rs]
```

- Select features, targets
- Pass arguments to cargo, rustc, rustdoc
- More details on https://docs.rs/about/metadata

How about some HTML?



```
/// <div style="background-color:rgb(94.1%, 97.3%, 100.0%); width: 10px; padding
pub const ALICE_BLUE: Srgba = Srgba::new(0.941, 0.973, 1.0, 1.0);
```

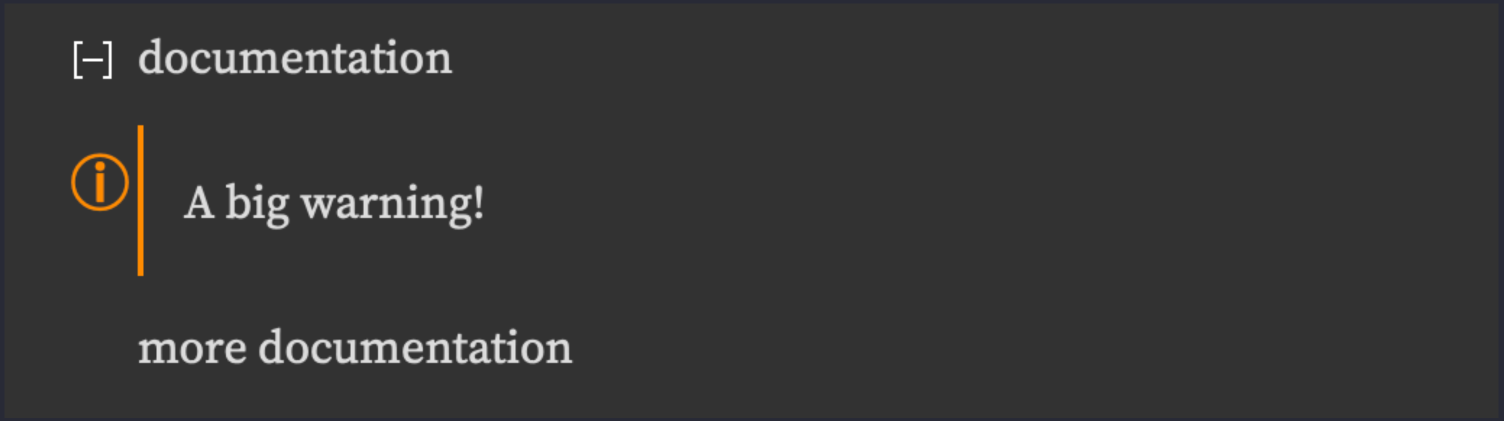


```
pub const ALICE_BLUE: Srgba;
```

[−] ⬜

How about some HTML?

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



[−] documentation

A big warning!

more documentation

How about some HTML?

- rustdoc options to include additional CSS / HTML
- --extend-css
- --html-in-header, --html-before-content, --html-after-content
- Set it up with docsrs config to also be used in the published documentation

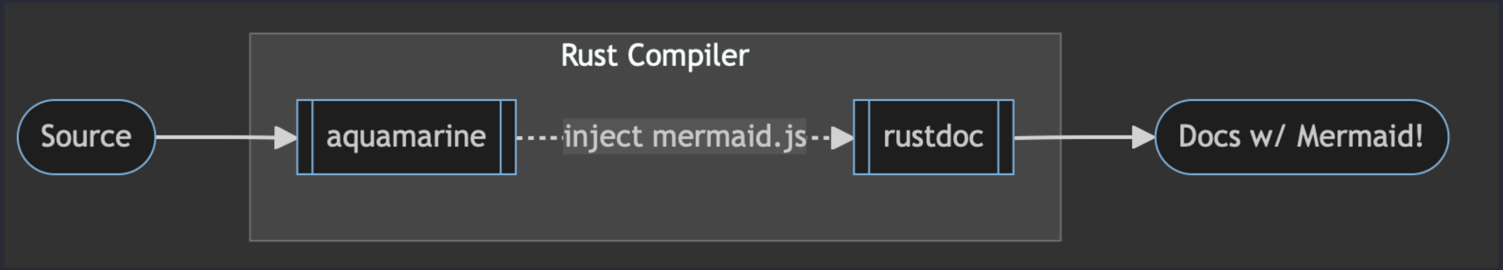
```toml
[package.metadata.docs.rs]
rustdoc-args = [ "--html-in-header", "path/to/file.html" ]
```

- Be nice!

Mermaid | Diagramming and Charting Tool

- Crate: aquamarine

```
#[cfg_attr(doc, aquamarine)]
//! ```mermaid
//! graph LR
//!     s([Source]) --> a[[aquamarine]]
//!     r[[rustdoc]] --> f([Docs w/ Mermaid!])
//!     subgraph rustc[Rust Compiler]
//!     a -. inject mermaid.js .-> r
//!     end
//! ```
```



KaTeX | Math Typesetting Library

- Crate: katex_doc

```
/// ```math
/// f(x) = \int_{-\infty}^\infty
///   \hat f(\xi)\,e^{2 \pi i \xi x}
///   \,d\xi
/// ```
```

$$f(x) = \int_{-\infty}^\infty \hat f(\xi)\,e^{2 \pi i \xi x} \,d\xi$$

Some things I didn't talk about

rustdoc json output interface

- nightly-rustc/rustdoc_json_types
- json of everything rustdoc knows about your code
- Can use it for multi steps build
- ... or use your imagination!

Contributing to rustdoc / docs.rs

- There's always work to do!
- HTML/design? JS/reactivity? Rust introspection? Website management with asynchronous tasks?
- rustdoc development guide
- docs.rs git repository

Some Useful Tips

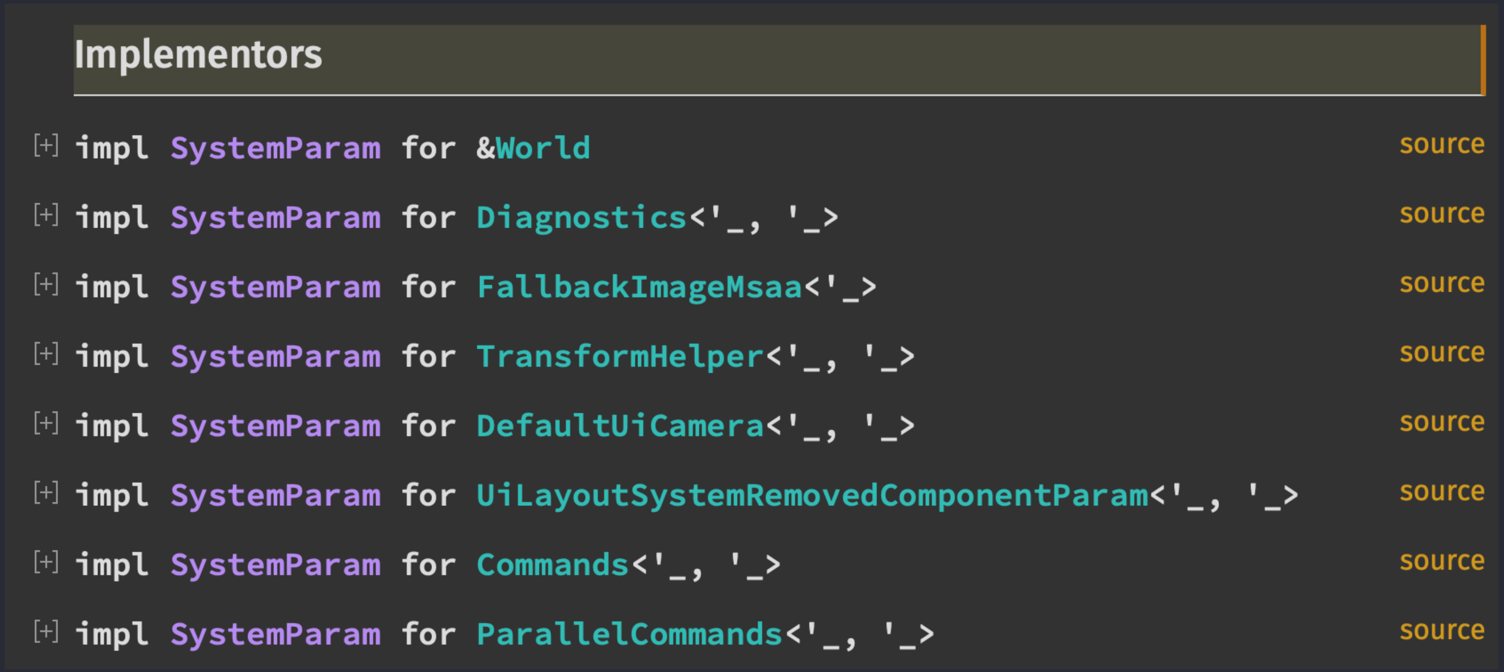
Search by Signature

- Searching by type signature for functions

Query	Results
usize -> vec	Vec::with_capacity
vec, vec -> bool	Vec::eq
option<T>, fnonce -> option<U>	Option::map
option<T>, (T -> bool) -> option<T>	Option::filter
iterator<T>, fnmut -> T	Iterator::find

- Use it in links in your documentation

Implementors Section for Traits



Implementors

```
[+] impl SystemParam for &World                                                source
[+] impl SystemParam for Diagnostics<'_, '_>                                   source
[+] impl SystemParam for FallbackImageMsaa<'_>                                 source
[+] impl SystemParam for TransformHelper<'_, '_>                               source
[+] impl SystemParam for DefaultUiCamera<'_, '_>                               source
[+] impl SystemParam for UiLayoutSystemRemovedComponentParam<'_, '_>           source
[+] impl SystemParam for Commands<'_, '_>                                      source
[+] impl SystemParam for ParallelCommands<'_, '_>                              source
```

- Use it in links in your documentation

Documentation Coverage

```
RUSTDOCFLAGS="-Z unstable-options --show-coverage" cargo +nightly doc \
  --workspace --all-features --no-deps
```

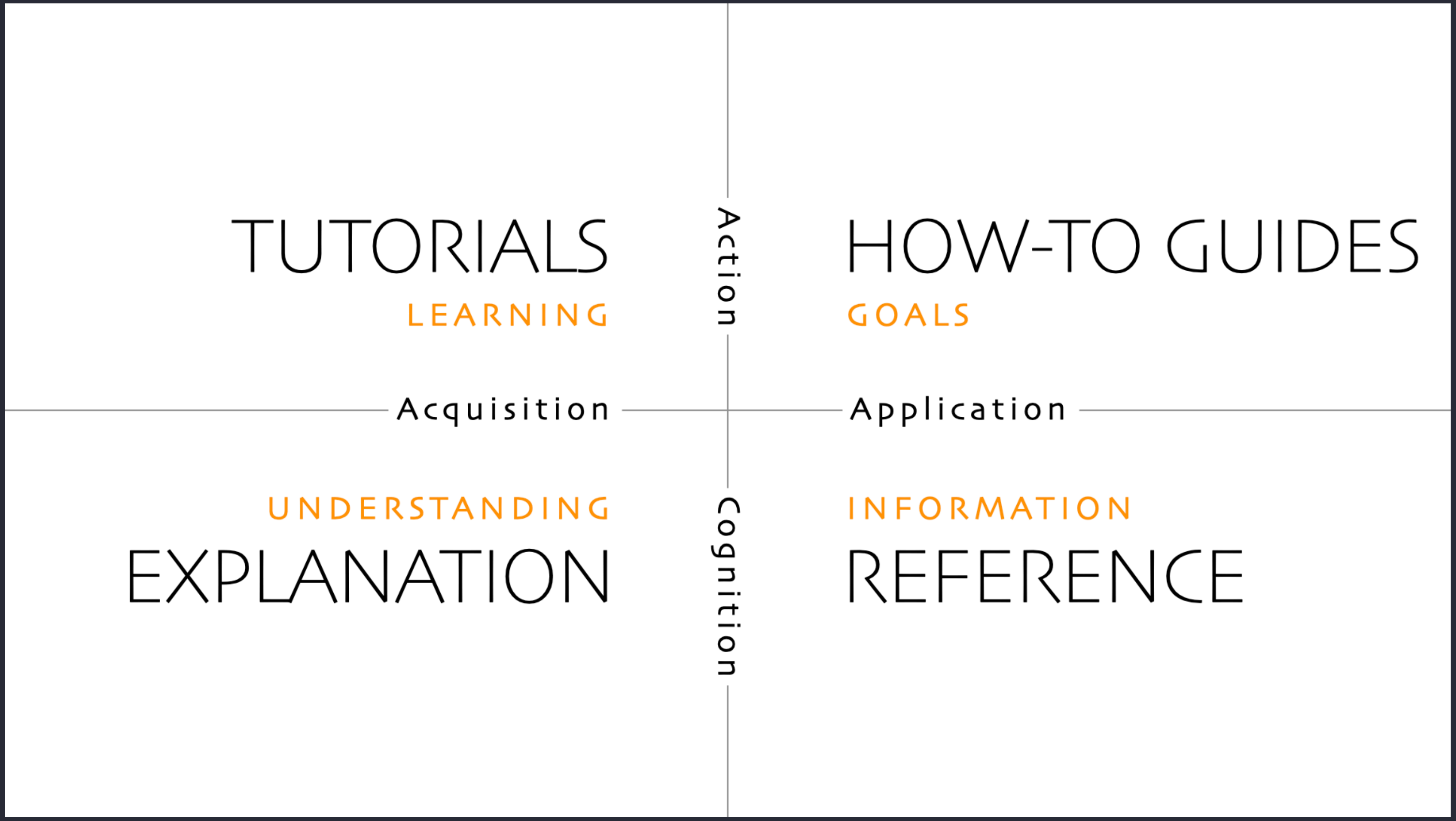
```
Documenting bevy_ecs v0.15.0-dev (bevy/crates/bevy_ecs)
+-------------------------------------+------------+------------+------------+------------+
| File                                | Documented | Percentage |   Examples | Percentage |
+-------------------------------------+------------+------------+------------+------------+
| crates/bevy_ecs/src/archetype.rs    |         52 |     100.0% |          0 |       0.0% |
| crates/bevy_ecs/src/batching.rs     |         10 |     100.0% |          0 |       0.0% |
| crates/bevy_ecs/src/bundle.rs       |         18 |     100.0% |          1 |       5.6% |
...
| crates/bevy_ecs/src/world/mod.rs    |        121 |     100.0% |         30 |      24.8% |
| ...es/bevy_ecs/src/world/reflect.rs |         12 |     100.0% |          1 |      25.0% |
| ...evy_ecs/src/world/spawn_batch.rs |          1 |     100.0% |          0 |       0.0% |
| ...s/src/world/unsafe_world_cell.rs |         41 |     100.0% |          2 |       4.9% |
+-------------------------------------+------------+------------+------------+------------+
| Total                               |       1001 |     100.0% |        141 |      24.9% |
+-------------------------------------+------------+------------+------------+------------+
```

So... what is documentation?

Rust Guidelines

- rustdoc book: How to write documentation
- Rust API Guidelines on Documentation
- Rust By Example on Documentation

Diátaxis


TUTORIALS
LEARNING
Action
HOW-TO GUIDES
GOALS
Acquisition
Application
UNDERSTANDING
EXPLANATION
Cognition
INFORMATION
REFERENCE

Diátaxis

- https://diataxis.fr
- Content: what to write
- Style: how to write it
- Architecture: how to organize it

The Good Docs Project

- https://www.thegooddocsproject.dev
- Free templates for many kind of documentation documents
- Avoid the blank page syndrome

Where does it fit?

docs

- In the reference corner
- Best when a user is already using your crate
- Need to quickly find a specific information
- Focus on precision, linking related items, easy search

Examples

- Examples are in the How-To Guides corner
- Focus on how to use the crate to solve a use case
- Bridge from docs by scraped examples

Variants

QuadraticIn

$f(t) = t^2$

QuadraticOut

$f(t) = -(t * (t - 2.0))$

QuadraticInOut

Behaves as `EaseFunction::QuadraticIn` for t < 0.5 and as `EaseFunction::QuadraticOut` for t >= 0.5

CubicIn

$f(t) = t^3$

CubicOut

$f(t) = (t - 1.0)^3 + 1.0$

CubicInOut

Behaves as `EaseFunction::CubicIn` for t < 0.5 and as `EaseFunction::CubicOut` for t >= 0.5

QuarticIn

$f(t) = t^4$

QuarticOut

$f(t) = (t - 1.0)^3 * (1.0 - t) + 1.0$

QuarticInOut

Behaves as `EaseFunction::QuarticIn` for t < 0.5 and as `EaseFunction::QuarticOut` for t >= 0.5

QuinticIn

$f(t) = t^5$

QuinticOut

$f(t) = (t - 1.0)^5 + 1.0$

QuinticInOut

Behaves as `EaseFunction::QuinticIn` for t < 0.5 and as `EaseFunction::QuinticOut` for t >= 0.5

SineIn

$f(t) = 1.0 - \cos(t * \pi / 2.0)$

SineOut

$f(t) = \sin(t * \pi / 2.0)$

SineInOut

Behaves as `EaseFunction::SineIn` for t < 0.5 and as `EaseFunction::SineOut` for t >= 0.5

CircularIn

$f(t) = 1.0 - \mathrm{sqrt}(1.0 - t^2)$

CircularOut

$f(t) = \mathrm{sqrt}((2.0 - t) * t)$

CircularInOut

Behaves as `EaseFunction::CircularIn` for t < 0.5 and as `EaseFunction::CircularOut` for t >= 0.5

ExponentialIn

$f(t) = 2.0\text{^}(10.0 * (t - 1.0))$

ExponentialOut

$f(t) = 1.0 - 2.0\text{^}(-10.0 * t)$

ExponentialInOut

Behaves as `EaseFunction::ExponentialIn` for t < 0.5 and as `EaseFunction::ExponentialOut` for t >= 0.5

ElasticIn

$f(t) = -2.0\text{^}(10.0 * t - 10.0) * \sin((t * 10.0 - 10.75) * 2.0 * \pi / 3.0)$

ElasticOut

$f(t) = 2.0\text{^}(-10.0 * t) * \sin((t * 10.0 - 0.75) * 2.0 * \pi / 3.0) + 1.0$

ElasticInOut

Behaves as `EaseFunction::ElasticIn` for t < 0.5 and as `EaseFunction::ElasticOut` for t >= 0.5

BackIn

$f(t) = 2.70158 * t^3 - 1.70158 * t^2$

BackOut

$f(t) = 1.0 + 2.70158 * (t - 1.0)^3 - 1.70158 * (t - 1.0)^2$

BackInOut

Behaves as `EaseFunction::BackIn` for t < 0.5 and as `EaseFunction::BackOut` for t >= 0.5

BounceIn

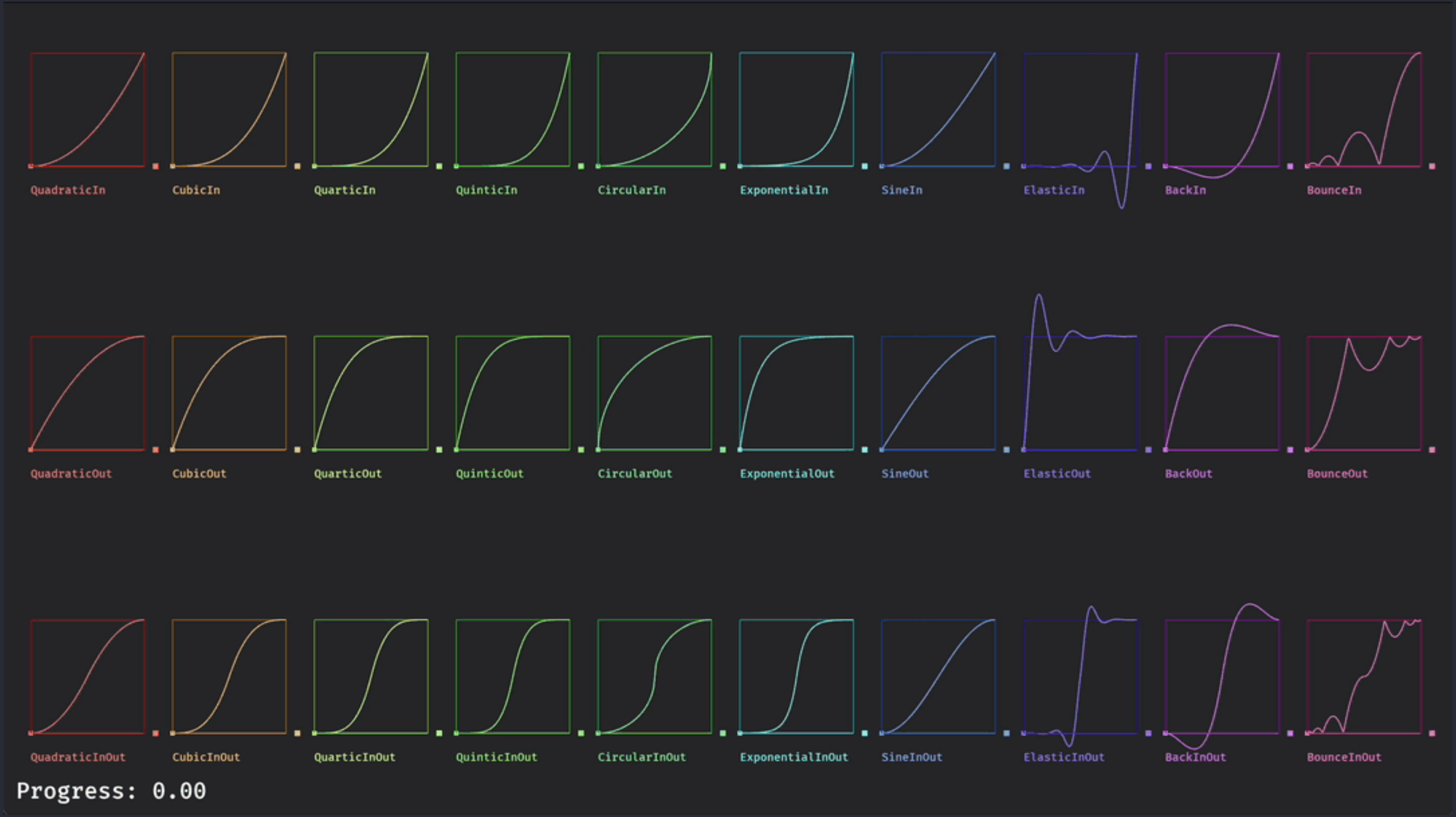
bouncy at the start!

BounceOut

bouncy at the end!

BounceInOut

Behaves as `EaseFunction::BounceIn` for t < 0.5 and as `EaseFunction::BounceOut` for t >= 0.5



```
Progress: 0.00
```

Explanation and Tutorials

- Included markdown files
  - Can be referenced without building docs
  - Easier for long form text
- Documentation only modules
  - Modules without code, only documentation
  - See clap documentation for an example (_tutorial, _faq, …)

mdBook

- mdBook documentation
- Easy to build books from markdown
- Rust code examples are tested
- Natural progression from rustdoc
- Widely used in the Rust ecosystem

Static Site Generators

- Cobalt, Zola
- Freeform website generators from markdown files
- No code validation*

Write good docs!