

FANTASTIC BEASTS AND HOW TO SHOW THEM

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ABSTRACT

Software can benefit from visual aids in a number of ways, for instance, through architectural overviews, data flow visualization, etc. These diagrams can help users and (potential) collaborators gain insight into the software without having to study its code. However, as with any metadata, these diagrams can be tedious to maintain and are therefore often neglected.

Defining these diagrams close to the source of truth they represent, may help decrease this burden. Kroki.jl is a package enabling integration of Julia's documentation system with the Kroki diagramming service. This enables the inclusion of *textual representations of diagrams* in various parts of the documentation system, providing *rich renderings* depending on the context in which the documentation is read.

MOTIVATION

Software does not live in a vacuum. Hence, developers often have to communicate with others about the systems they build covering internals, as well as the larger ecosystem they live in. These conversations tend to cross different areas of expertise, levels of experience, etc. Having visual representations of the systems in question can help guide conversations crossing these boundaries.

Numerous methods and frameworks exist to aid in creating these visualizations, e.g. UML component-, sequence- and state-diagrams, the C4 model, mind maps, etc. However, the tools - such as Visio - used to typically create these visualizations tend to be separated from the software itself. This makes it harder to keep the visualizations in sync with the systems they describe.



BACKGROUND

Julia has great support for adding different types of rich media to documentation. However, maintaining this media often requires separate maintenance through some external system. These representations also tend to be more difficult to keep under change management/version control, as they are either binary files or opaque textual representations (e.g. SVG).

Julia can be integrated with Graphviz, which would be a solution to most of these issues. However, the raw, low-level power of Graphviz does not really help making the creation of these visualizations more accessible. A problem which could be solved by introducing some additional layers of abstraction.

Other documentation systems, such as Doxygen, Sphinx, DocFX, offer higher-level textual diagramming facilities to varying degrees. They either have functionality built-in for certain types of diagrams or have community provided plug-ins available. During the hackathon at JuliaCon 2019 some people expressed interest in bringing similar functionality to Julia's documentation system.

A frequently used tool supporting these higher-level visualizations is PlantUML, a Graphviz-based textual representation of different UML diagrams and a variety of other visualizations typically used to represent IT/software systems. There are, however, numerous others of these types of tools, such as an increasing variety of diagrams through Mermaid and the blockdiag suite, entity relationship diagrams through erd, diagrams through ASCII art with ditaa and the list goes on.

Although it would be possible to create integrations for each of these tools, this has the potential to become cumbersome to maintain. Luckily such a project already exists in the form of Kroki, a hosted wrapper around the previously mentioned tools (and more) providing a consistent HTTP API for each. By integrating with this intermediate layer, Kroki.jl prevents the need for these individual integrations without having to maintain the wrapper itself.

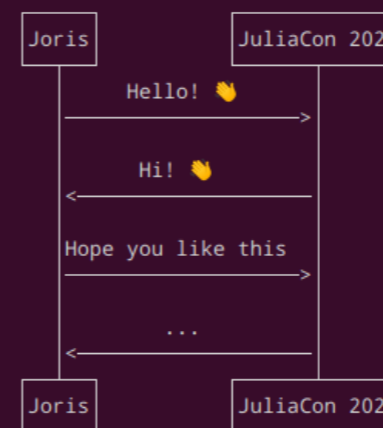
WHAT CAN IT DO?

Kroki.jl integrates with the freely available hosted version of Kroki by default, but can be easily configured to use self-managed instances. The latter being useful when rendering potentially sensitive information.

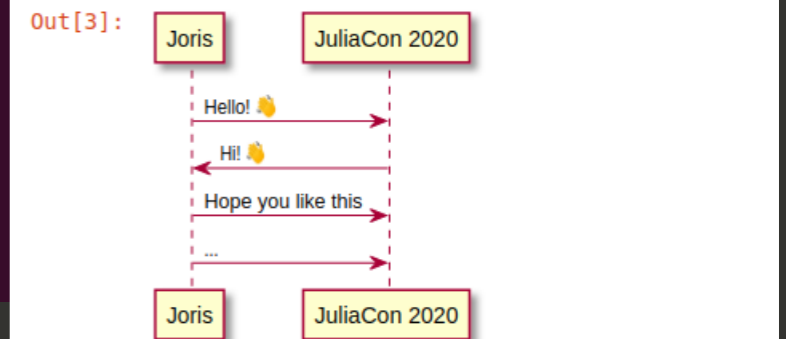
Diagrams are constructed through a simple single constructor. Macros and Markdown code-block extensions for Documenter.jl provide a better development and documenting experience.

Additional diagram types introduced upstream are automatically supported if they render to SVG.

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julia> plantuml"""
Joris -> "JuliaCon 2020": Hello! 🍌
Joris <- "JuliaCon 2020": Hi! 🍌
Joris -> "JuliaCon 2020": Hope you like this
Joris <- "JuliaCon 2020": ...
"""
```



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In [3]: Diagram(:PlantUML, """
Joris -> "JuliaCon 2020": Hello! 🍌
Joris <- "JuliaCon 2020": Hi! 🍌
Joris -> "JuliaCon 2020": Hope you like this
Joris -> "JuliaCon 2020": ...
""")
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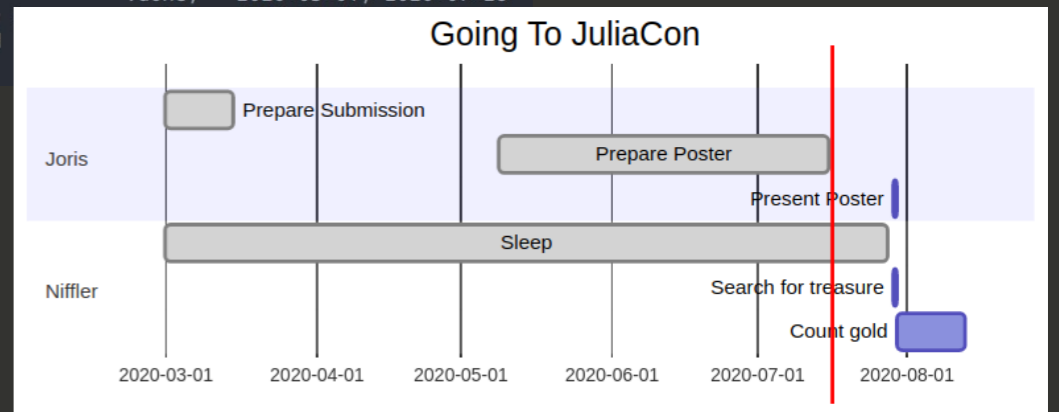


All diagram types can be rendered to SVG. This is suitable for a lot of common use cases, such as in HTML documentation, Jupyter cells, etc.

Other output targets include (in order of the number of supported diagram types) PNG, PDF, JPEG and ASCII art!

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3 title Going To JuliaCon
4 dateFormat YYYY-MM-DD
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6 section Joris
7 Prepare Submission :done, 2020-03-01, 2020-03-15
8 Prepare Poster :done, 2020-05-09, 2020-07-16
9 Present Poster : 2020-07-29, 1d
10
11 section Niffler
12 Sleep :done, 2020-03-01, 2020-07-28
13 Search for
14 Count gold
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WHAT'S NEXT?

Kroki.jl provides a solid foundation for adding a variety of diagrams directly to a Julia codebase, whether it be through docstrings or dedicated Markdown documentation.

It does not provide specific diagramming recipes, for instance, to generate an overview of a package, or a sequence diagram through a call stack. This is also not the purpose of Kroki.jl, which is to provide access to a plethora of diagramming tools from within Julia.

We hope enough people get inspired by the potential of having these different diagramming tools readily available, to come up with recipes and sharing them with the community. Some basic examples have been made, but those are not yet ready for prime-time.

Some short-term topics to address in Kroki.jl itself are:

- 1) Making the Markdown code-block syntax work outside of Documenter.jl.
- 2) Rendering diagrams in docstrings as images within Documenter.jl.

ACKNOWLEDGMENTS

The author would like to thank the community across programming languages for making all these diagramming tools available, Yuzu tech for building, maintaining and hosting Kroki and Miguel Raz Guzmán Macedo for his enthusiasm when shown the first prototype of a PlantUML-based version of this package at JuliaCon 2019.

JuliaCon Banner: JuliaCon 2020 organizers
GitHub/GitLab/Keybase logos: Simple Icons: CC0 1.0 Universal License
Thunderbird: experiencesea
Niffler with gold in pouch: Anastasiia Ivanova
8-bit Niffler: Amanda Wang

