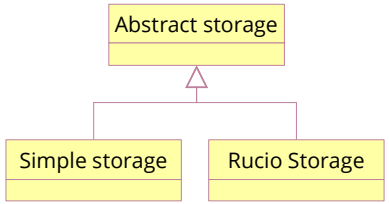
Using OpenAPI for IVOA standards

Lessons learned



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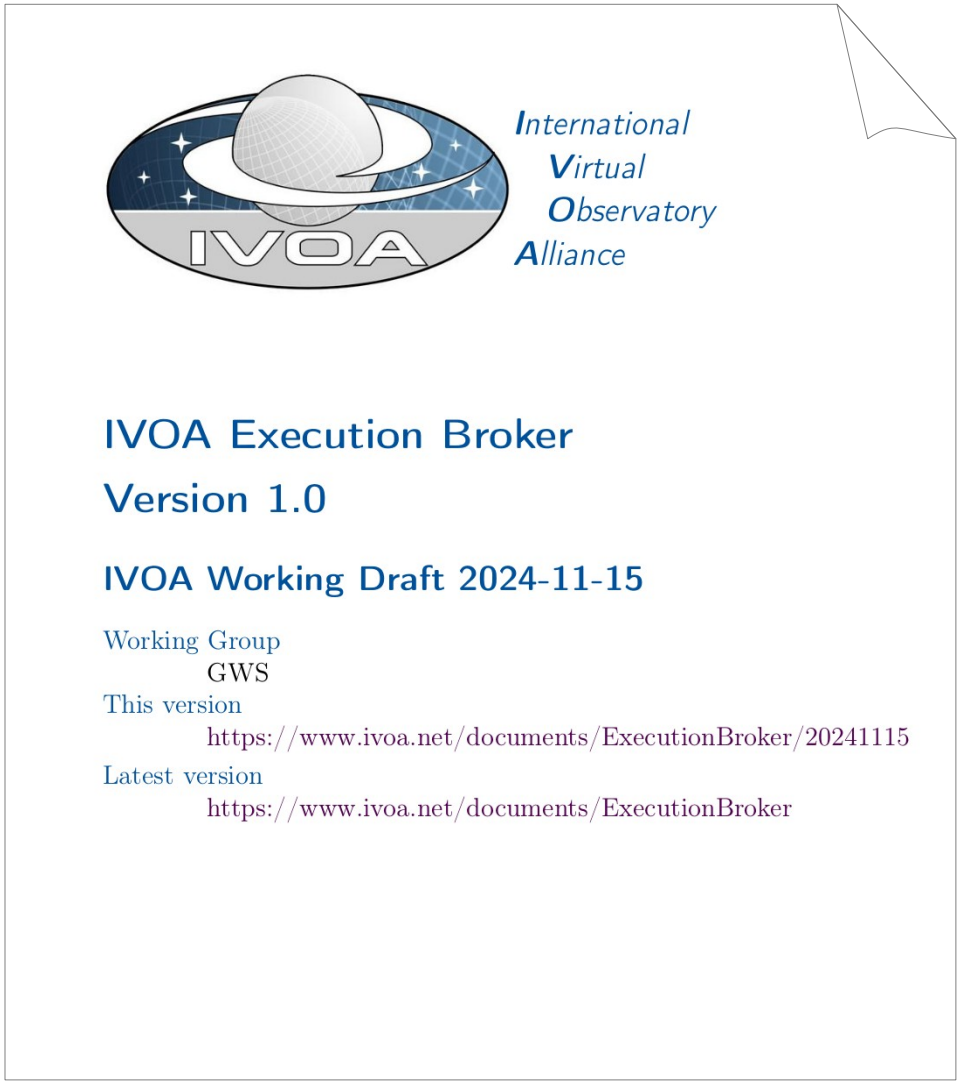
GWS working group

Developing a new standard for remote execution of software.

Moving the code to the data.



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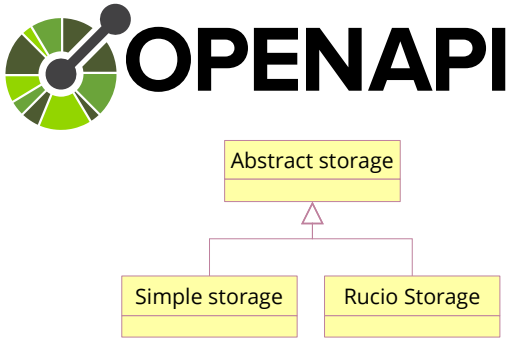
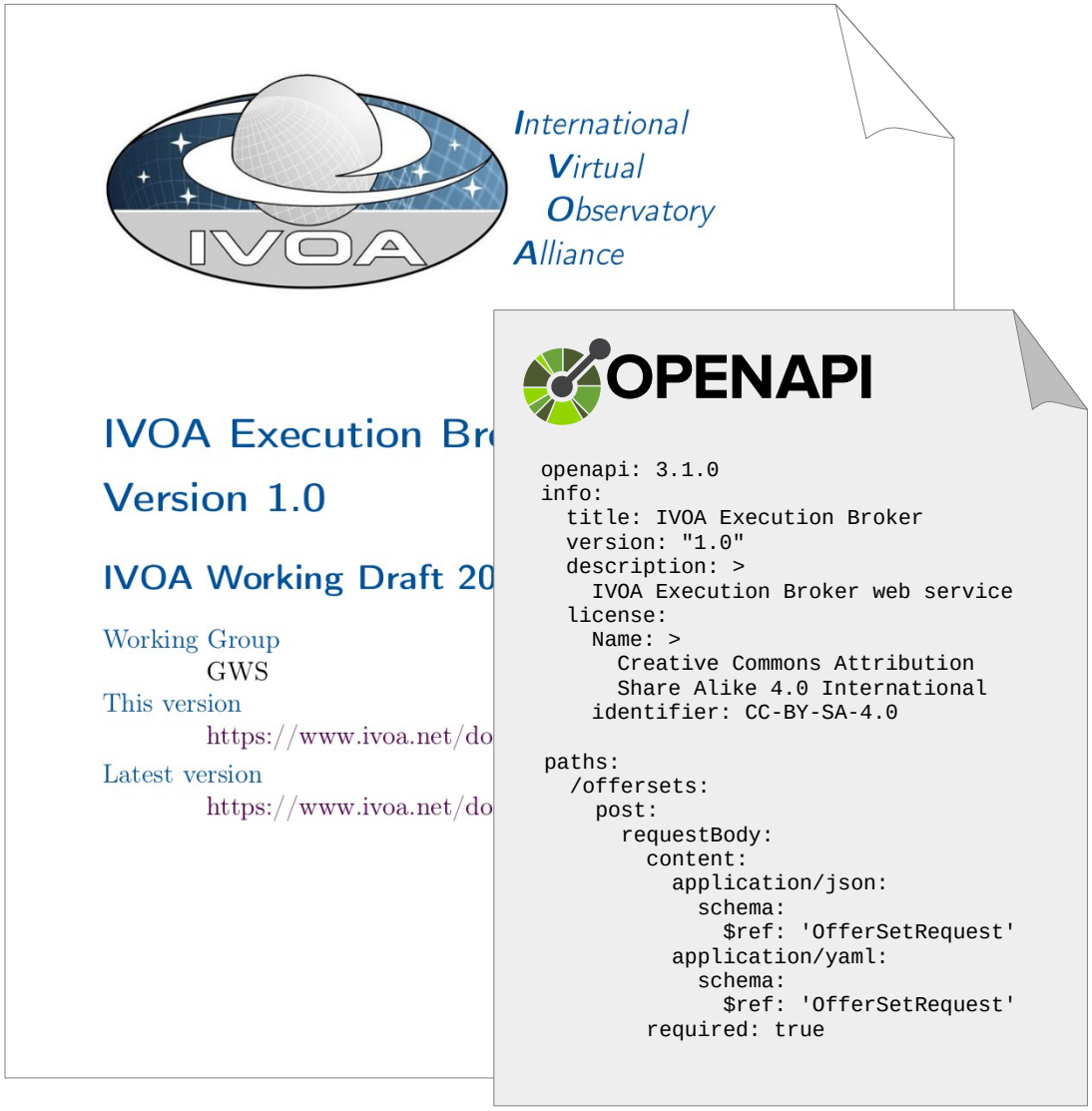
New standard, new document structure.

“This document explains the reasoning behind the design and uses examples to describe the service behavior.”

“The technical details of the data model and web-service API are defined in the OpenAPI specification published alongside this document.”





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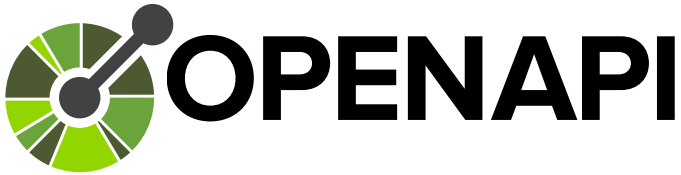
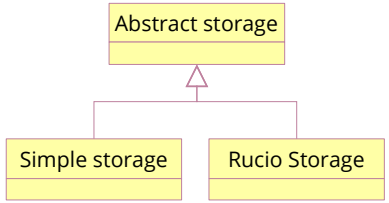
Using OpenAPI to specify the data model and web service API.





What worked

What didn’t work

Would I use it again

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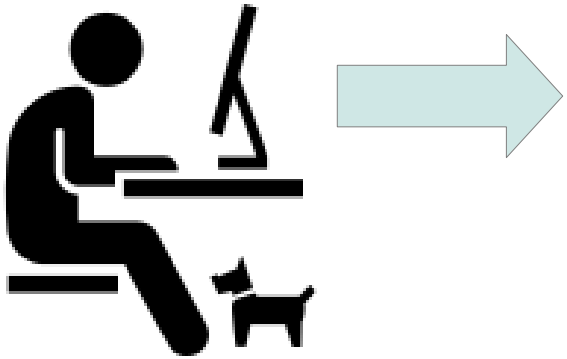
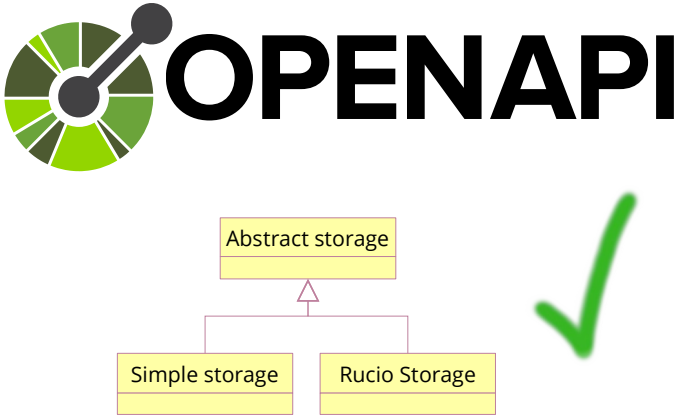
What worked

Using OpenAPI to describe the data model and service API





- Shallow learning curve
- Good documentation

- Clear and easy syntax
- Good feature coverage

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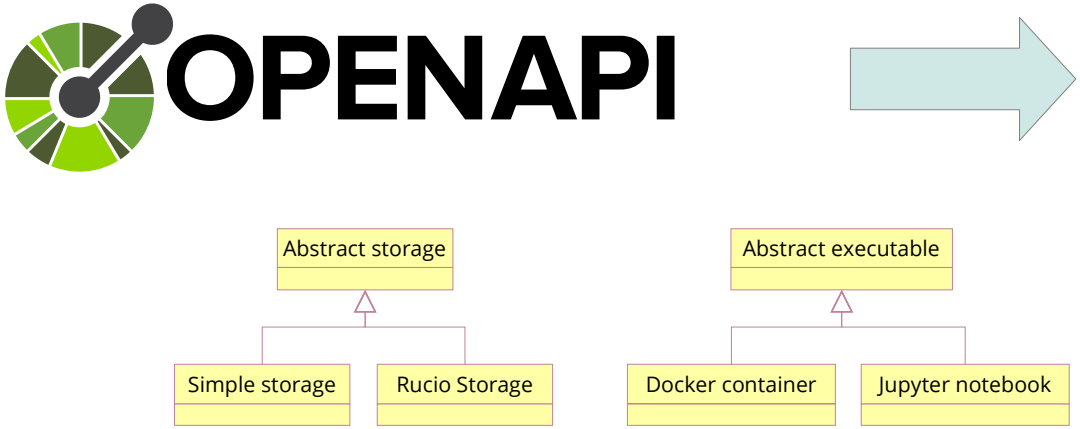
What worked

Generating Java service code from the OpenAPI specification

Including support for polymorphic types in the message content.



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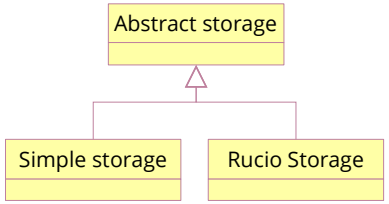
What ~~didn't work~~ works

Generating Python service code from the OpenAPI specification

Including support for polymorphic types in the message content.

OPENAPI → FastAPI

python™




```
Content-type:
Accept:
```

✓

Improvements to the code generators in 2025 mean this is no longer an issue

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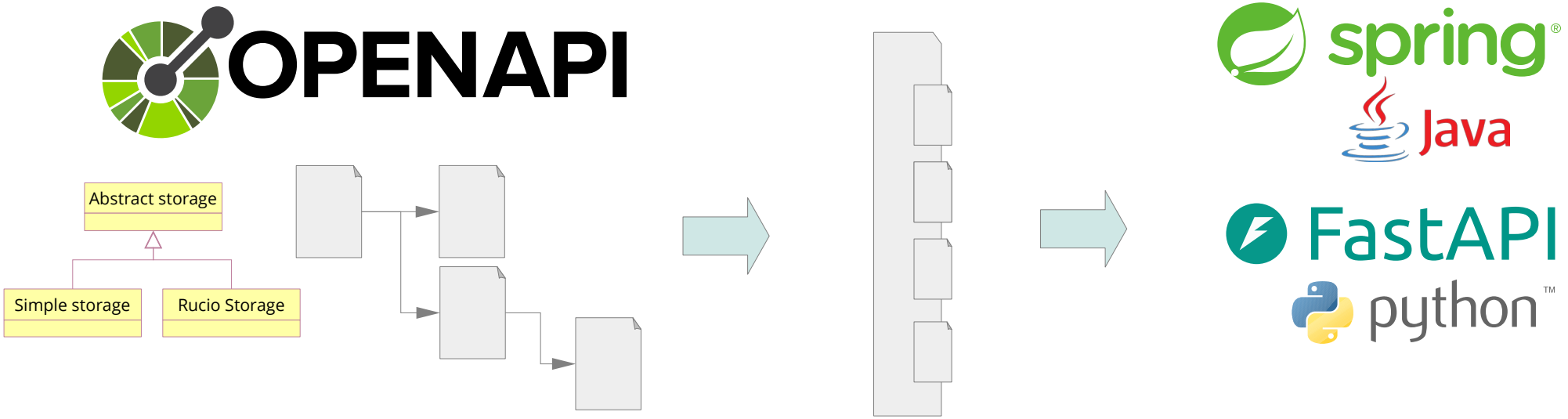
What ~~didn't work~~ works

Splitting the OpenAPI specification into separate files.

Solved using a pre-processing tool to resolve $ref links



Pre-processor resolves $ref links and puts everything into one large file
https://github.com/ivoa/Calycopis-Isobeon

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What works

Interoperable Python client and Java server
generated from the OpenAPI specification

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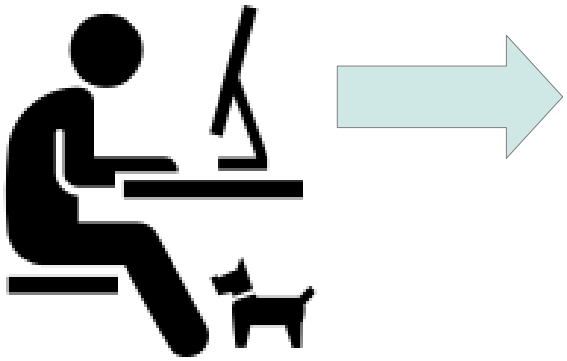
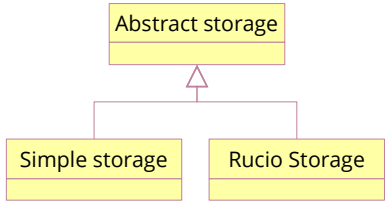
Would I use it again ? YES ✓

Using a structured schema to define the service API is a huge benefit.

Writing clear and precise technical specifications in text is hard.



OPENAPI



✓

- Shallow learning curve
- Good documentation

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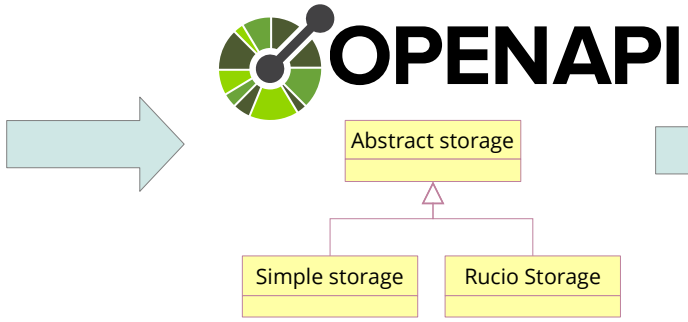
CANFAR Skaha client

Science platform with Python client for astronomers

CANFAR ⟺ python™

Already using curl to interact with the service
so creating an OpenAPI spec was easy

```
curl http:… \
   | jq '.'
```



Interoperable Java client generated
from an ad-hoc OpenAPI specification

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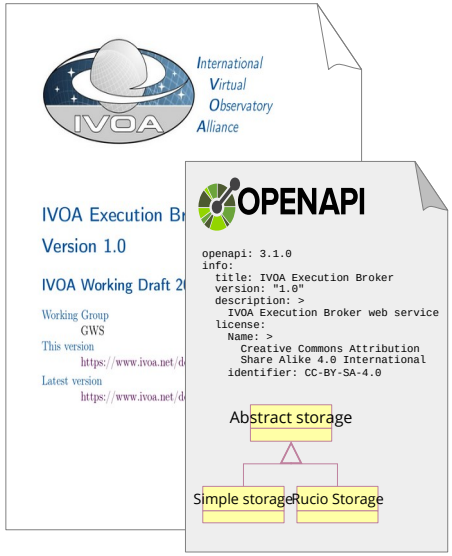
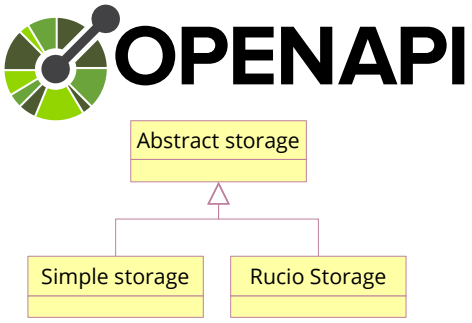
https://ziglang.org/

TAP client in Zig

Astronomer working in a new language,
asking about support for IVOA tools.

Unknown language …. but there is an OpenAPI code generator





Not there yet,
but watch this space

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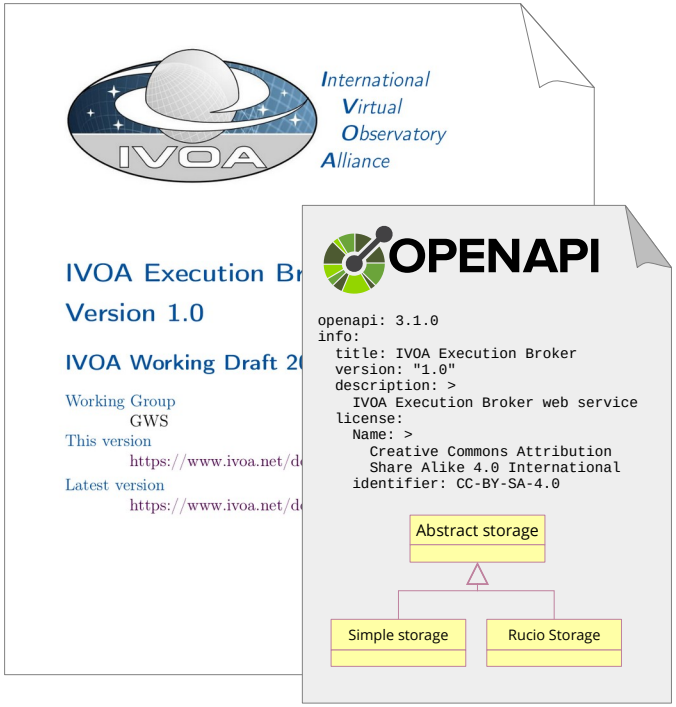
Where next ?

Automatically generate and publish libraries



GitHub

Automatic CI workflow triggered on commit

Same process as the preview PDFs

Java

spring

Maven

python

FastAPI

python Package Index

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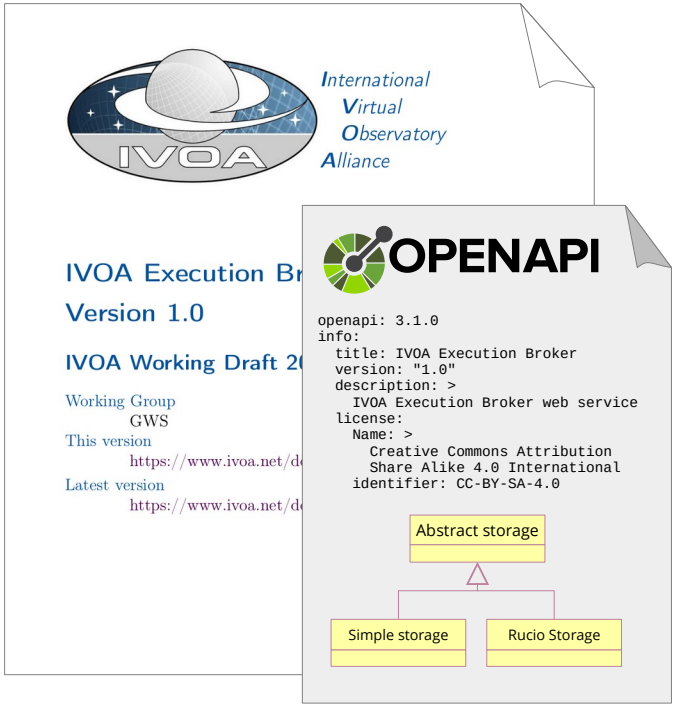
What do we need ?

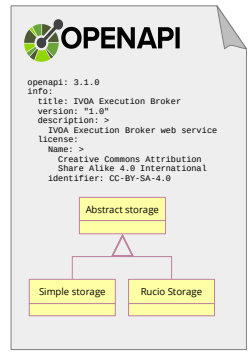
Permanent URLs to link schema components



www.purl.org works, but is a bit flakey

https://www.purl.org/ivoa.net/EB/schema/

GitHub



Add IVOA to w3id ?

https://w3id.org/ivoa/

Setup our own ?

https://purl.ivoa.net/

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