



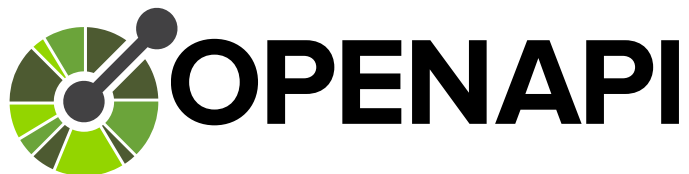
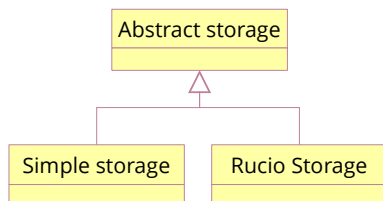
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# Execution Broker

Progress report

Dave Morris  
Manchester  
University



12<sup>th</sup> March 2025

Dave Morris  
dave.morris@manchester.ac.uk



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## New standard, new document structure.

*The Execution Broker service is based on the following IVOA standards :*

- *The IVOA REST service framework*
- *The IVOA structured error messages*
- *The IVOA HTTP protocol profile*
- *The IVOA JSON encoding profile*
- *The IVOA YAML encoding profile*

*Unless otherwise stated, the Execution Broker service follows the profiles defined in these standards.*



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Virtual  
Observatory  
Alliance

**IVOA Execution Broker**

**Version 1.0**

**IVOA Working Draft 2024-11-15**

Working Group  
GWS

This version

<https://www.ivoa.net/documents/ExecutionBroker/20241115>

Latest version

<https://www.ivoa.net/documents/ExecutionBroker>



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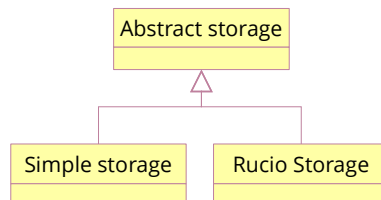
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## New standard, new document structure.

*“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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Alliance

IVOA Execution Broker  
Version 1.0

IVOA Working Group  
GWS

This version  
<https://www.ivoa.net/documents/20160501/1.0/>

Latest version  
<https://www.ivoa.net/documents/20160501/1.0/>



**OPENAPI**

```
openapi: 3.1.0
info:
  title: IVOA Execution Broker
  version: "1.0"
  description: >
    IVOA Execution Broker web service
  license:
    Name: >
      Creative Commons Attribution
      Share Alike 4.0 International
    identifier: CC-BY-SA-4.0

paths:
  /offersets:
    post:
      requestBody:
        content:
          application/json:
            schema:
              $ref: 'OfferSetRequest'
          application/yaml:
            schema:
              $ref: 'OfferSetRequest'
        required: true
```

12<sup>th</sup> March 2025

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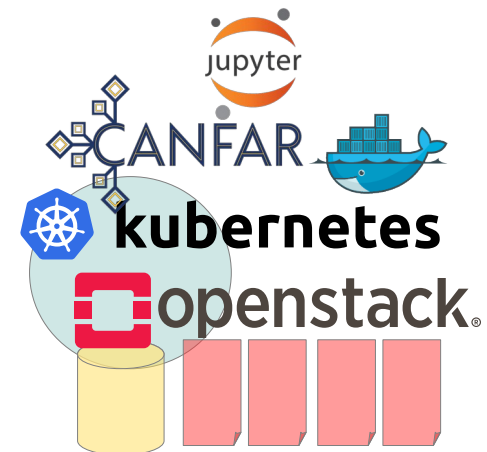
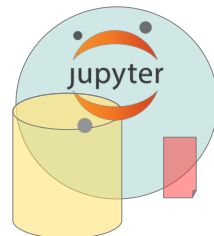
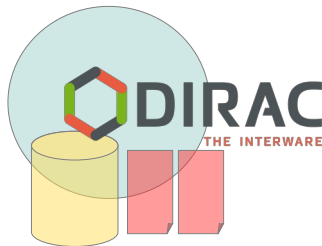
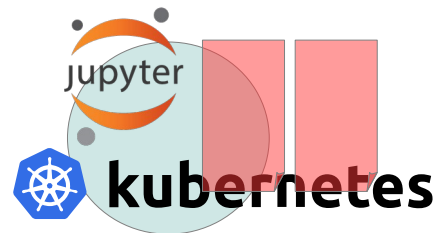
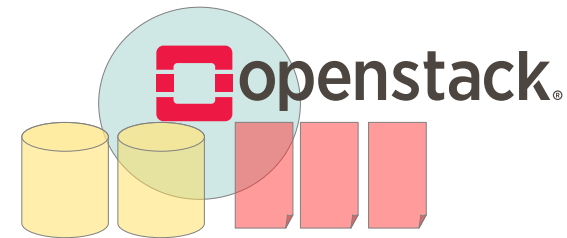
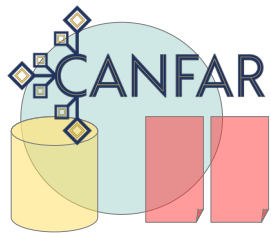
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## The problem

Lots of different execution platforms

Each with their own local capabilities and policies





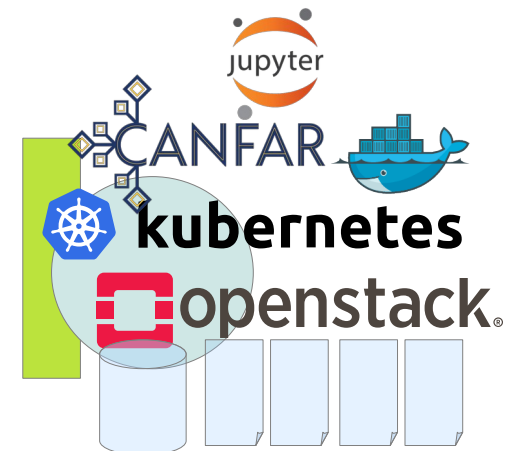
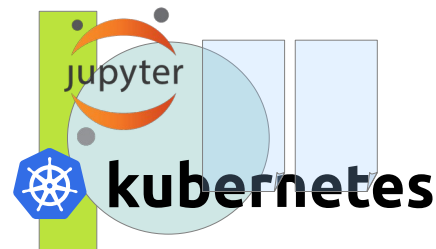
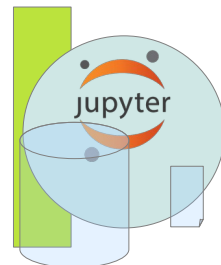
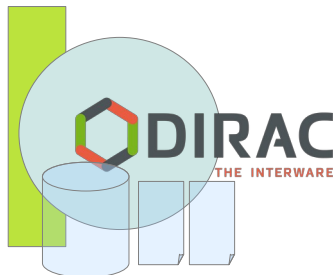
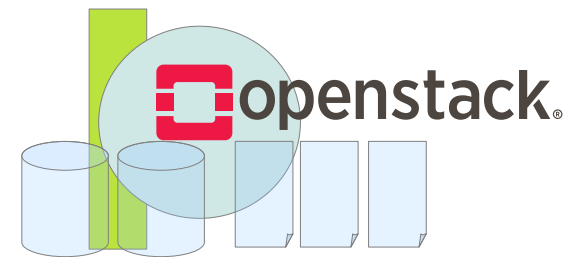
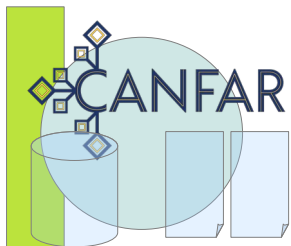
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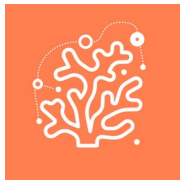
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## Execution Broker – the service

Deploys a common interface for executing things





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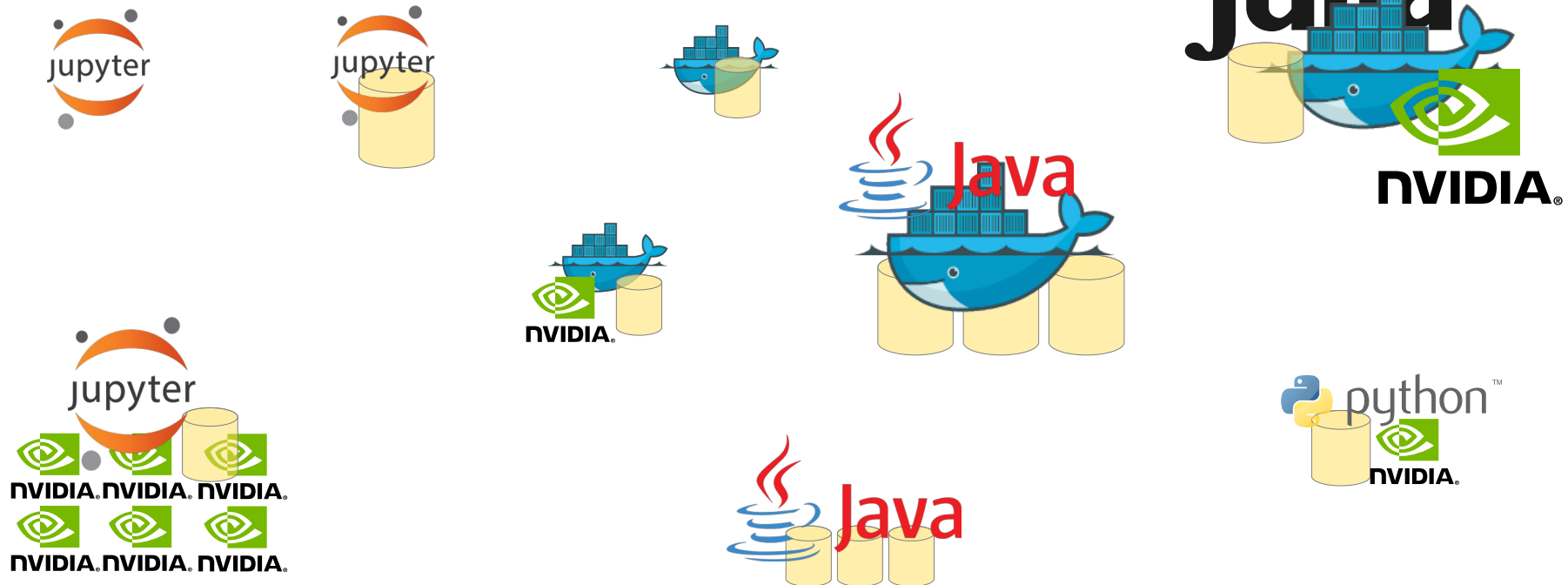
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## The problem

Lots of different types of software

Each with their own requirements and interfaces





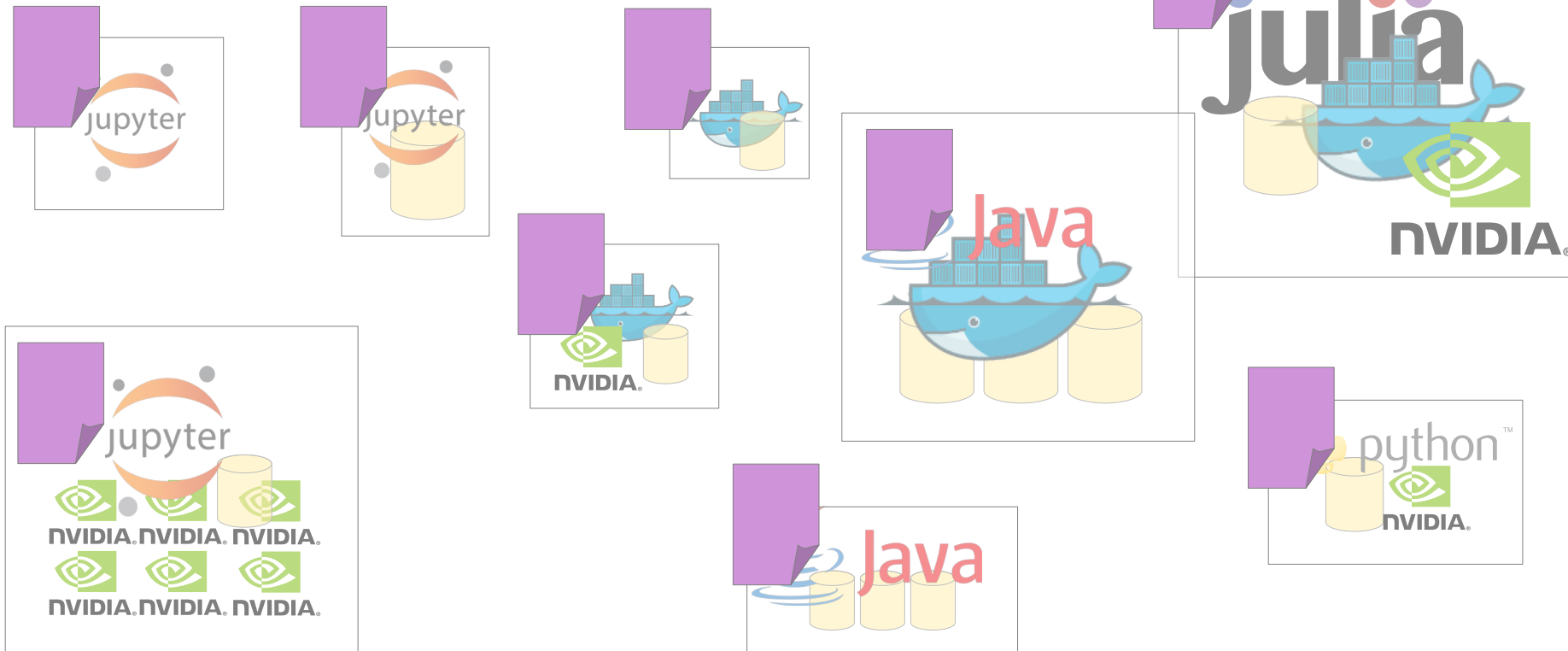
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## Execution Broker – the data model

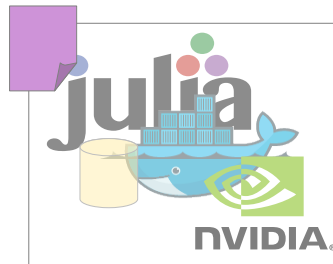
Use a common data model to describe executable things



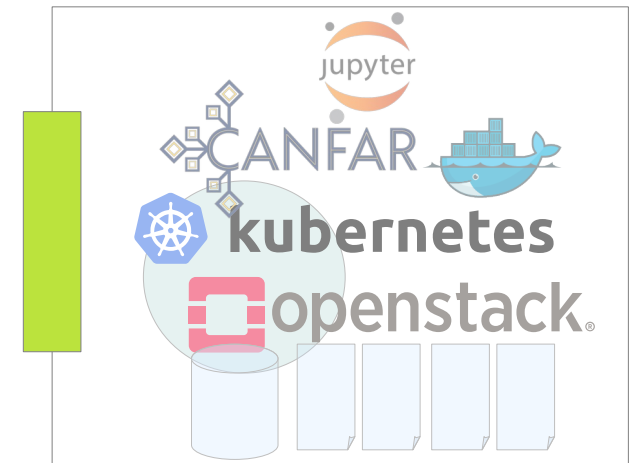
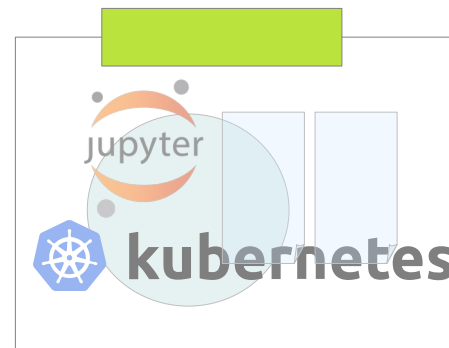
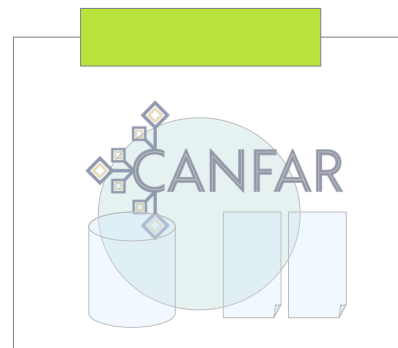
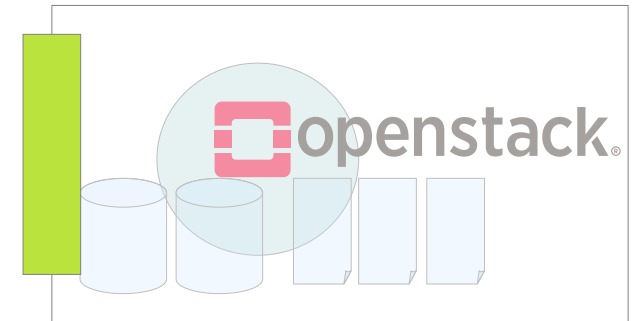


## Execution Broker – the solution

Pass a common data-model description to a common interface



*When can I run this ?*

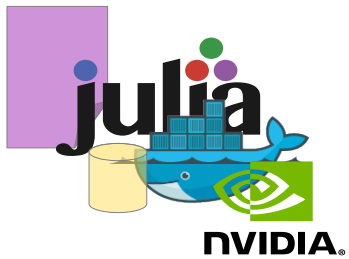




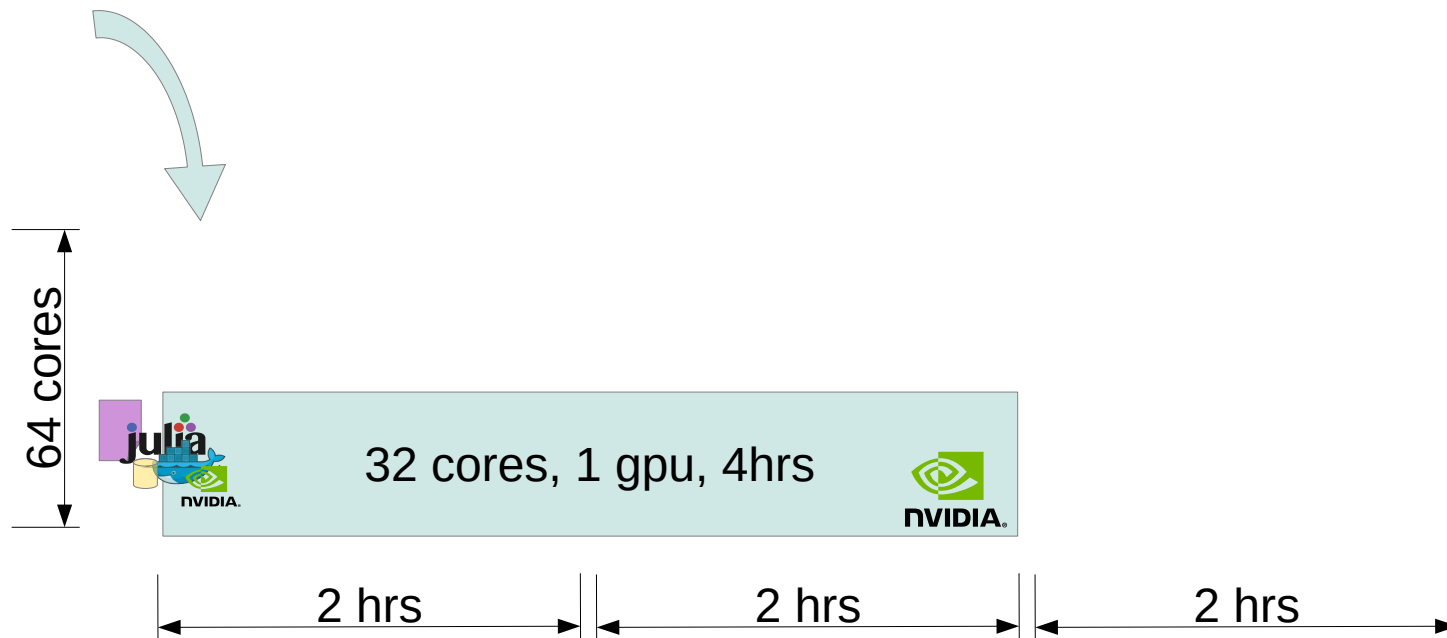


# Resource scheduling

*When can I run <this> ?*



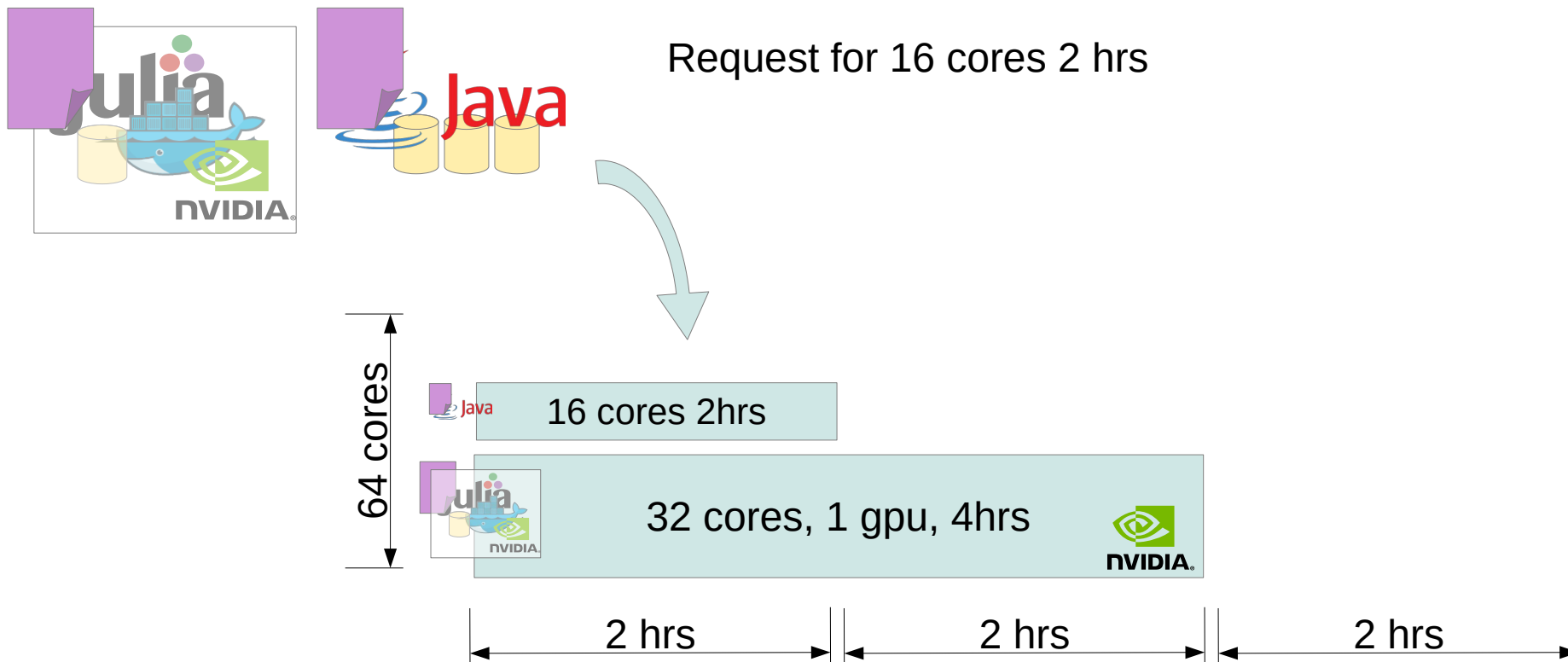
Request for 32 cores and a GPU for 4 hrs





# Resource scheduling

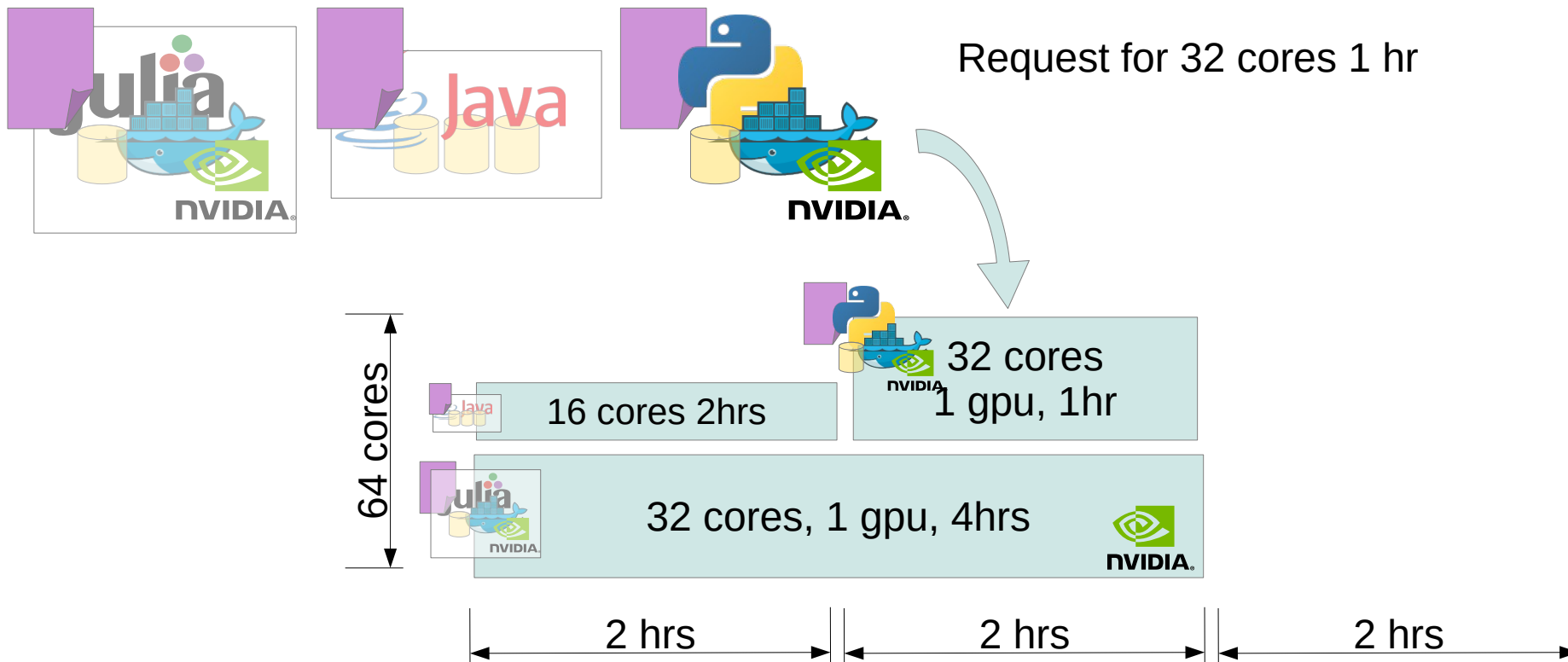
*When can I run <this> ?*





# Resource scheduling

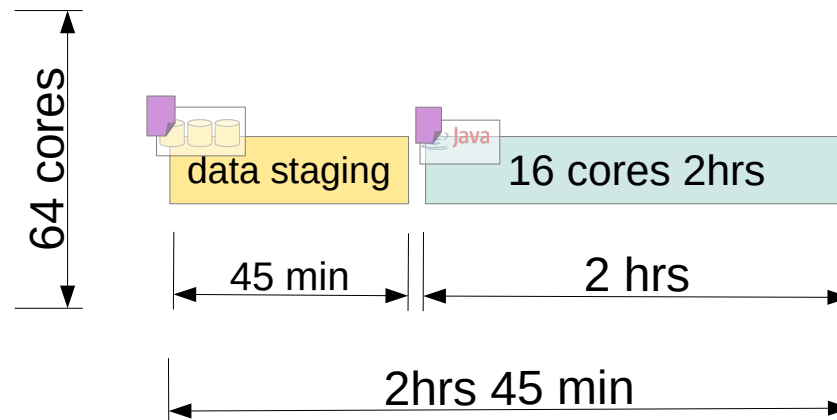
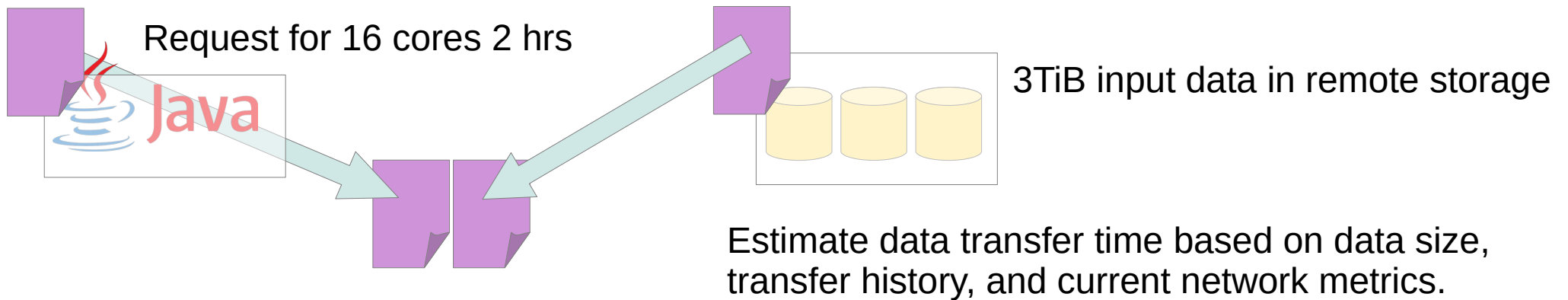
*When can I run <this> ?*





# Data staging (future work)

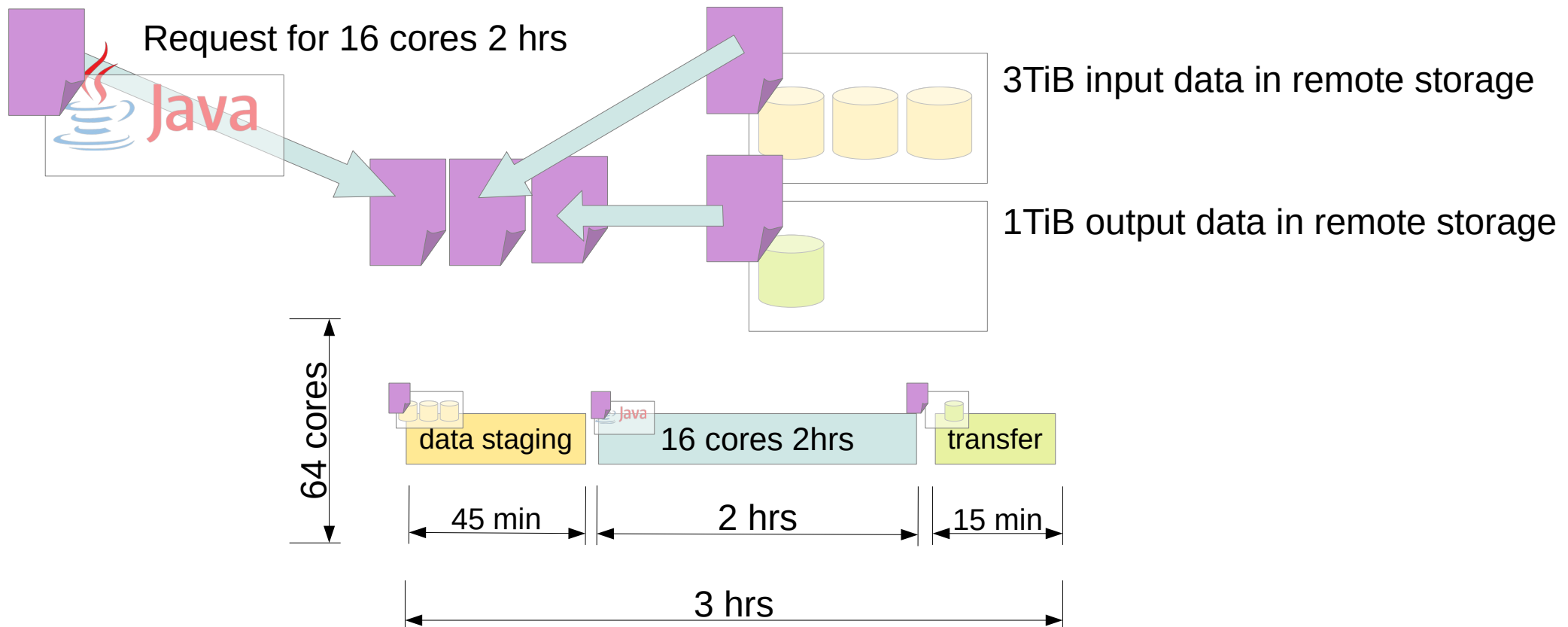
*When can I run <this> with <this> input data ?*





# Data staging (future work)

*When can I run <this> with <this> data, and put the results <there> ?*



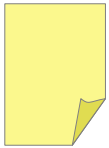


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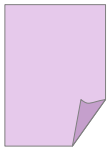


Software developer



GitLab

Python code



GitLab

Metadata

executable:

type: uri:python-program

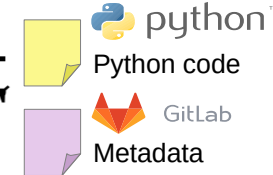
requirements:

python: > 3.10

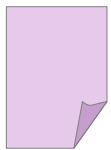
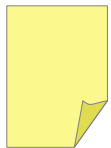
numpy: > 2.1.1



## Software developer

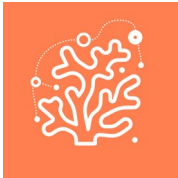


## Software packager



## executable:

```
name: Newton Rahpson tool
type: uri:docker-container-1.0
repository: example.org
image: ivoa/analytics/Newton-Rahpson-example
tag: 2024.12.02
digest: sha256:ac1b....fc70
```



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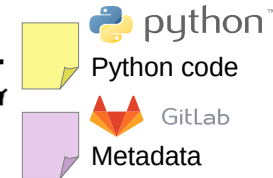
Publisher



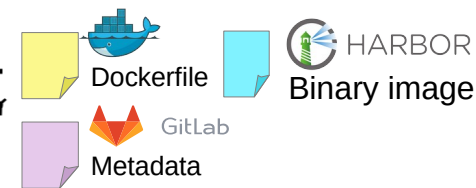
Vocabularies



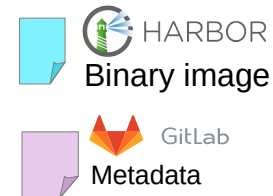
Software developers



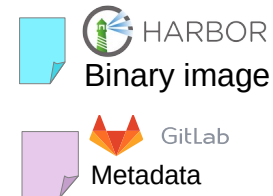
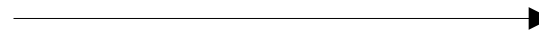
Software packagers



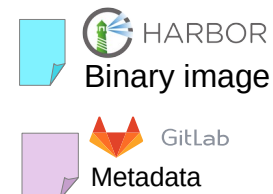
Source extractor



Cube manipulation



Frequency inversion



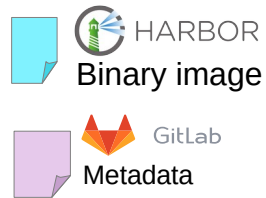
12<sup>th</sup> March 2025

Dave Morris  
dave.morris@manchester.ac.uk

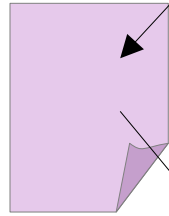




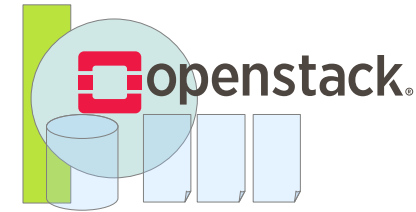
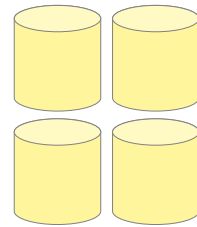
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Science user

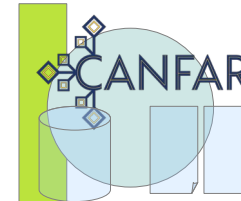


executable:  
resources:  
schedule:

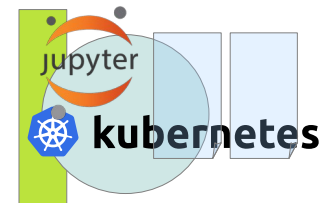


Local data

Offer: NOW



Offer: +1hr



Offer: +2hr



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# Thank you

Dave Morris  
dave.morris@manchester.ac.uk



<https://github.com/ivoa-std/ExecutionBroker>

<https://github.com/ivoa/CalycopisBroker>

12<sup>th</sup> March 2025

Dave Morris  
dave.morris@manchester.ac.uk