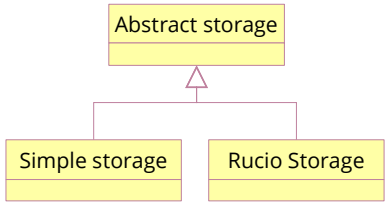
Execution Broker

Progress report



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Manchester
University

SRCNet PI25 planning
2nd December 2024

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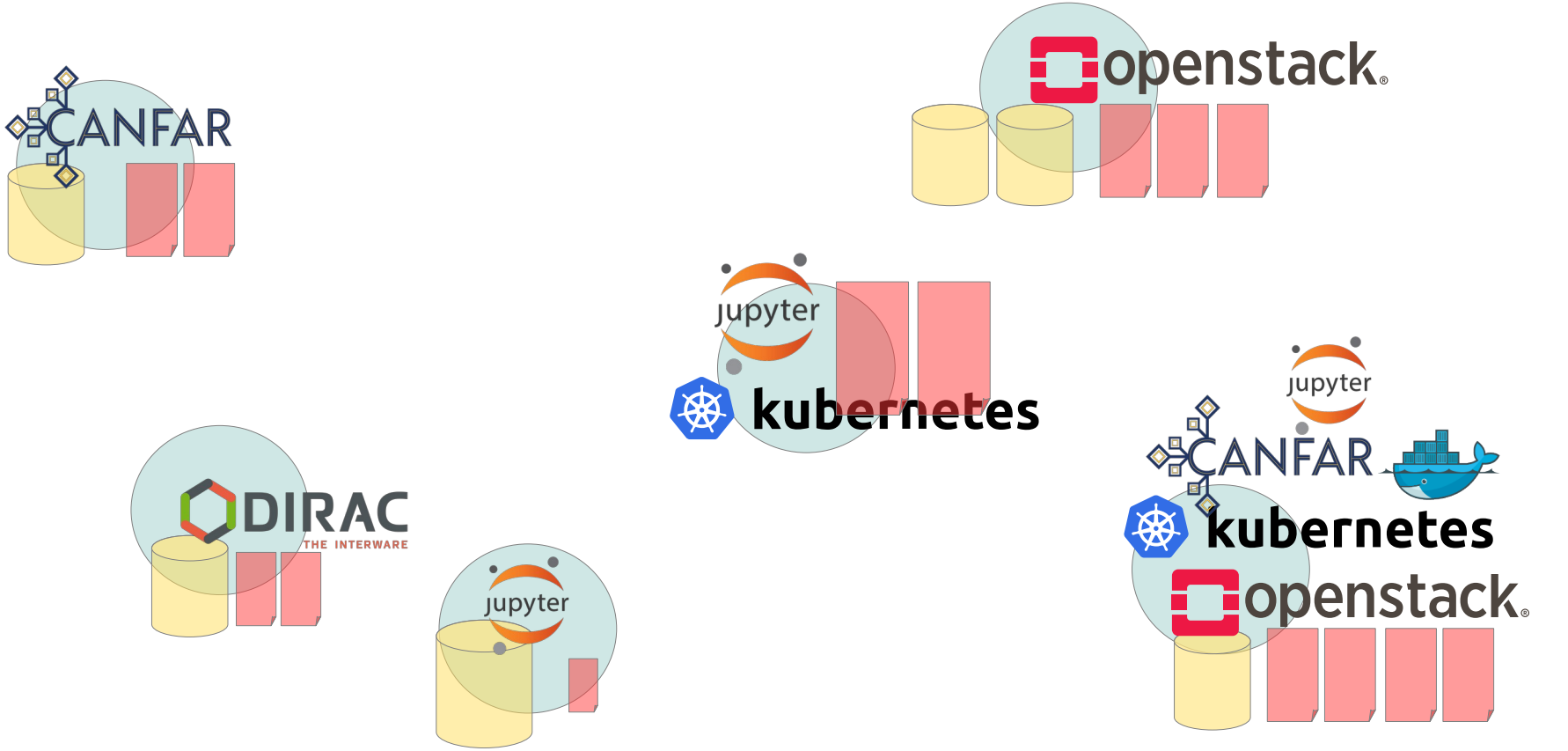
SKAO Regional Centre Network

IVOA

The problem

Lots of different execution platforms

Each with their own local capabilities and policies



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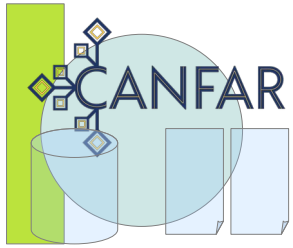
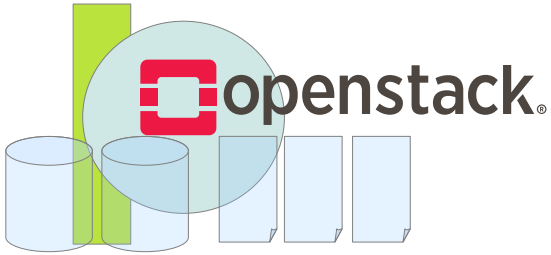
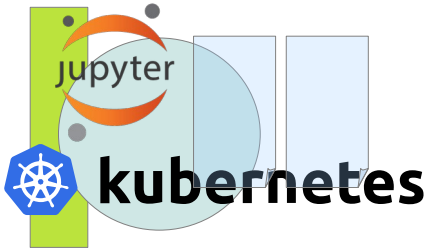
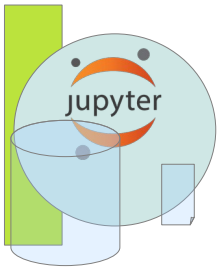
Execution Broker – the service

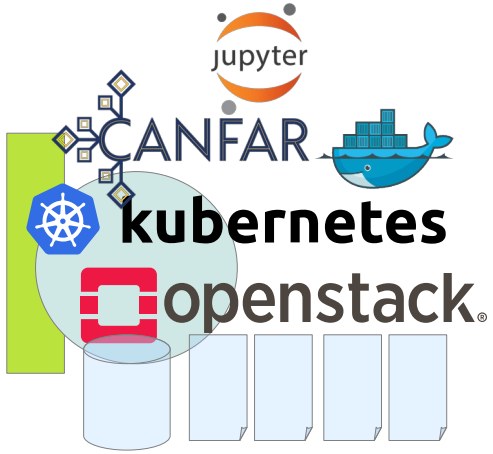
Deploys a common interface for executing things











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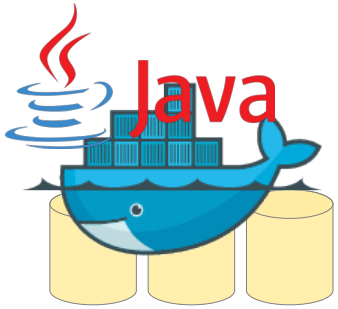
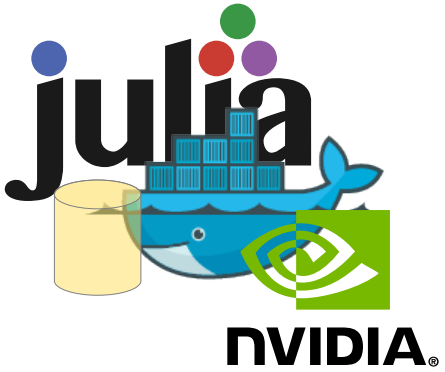
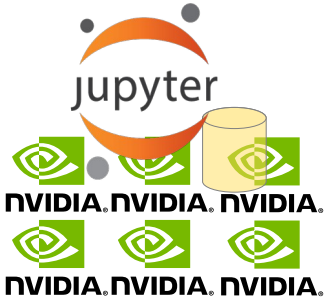
The problem

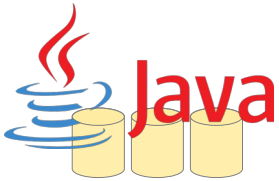
Lots of different types of software

Each with their own requirements and interfaces









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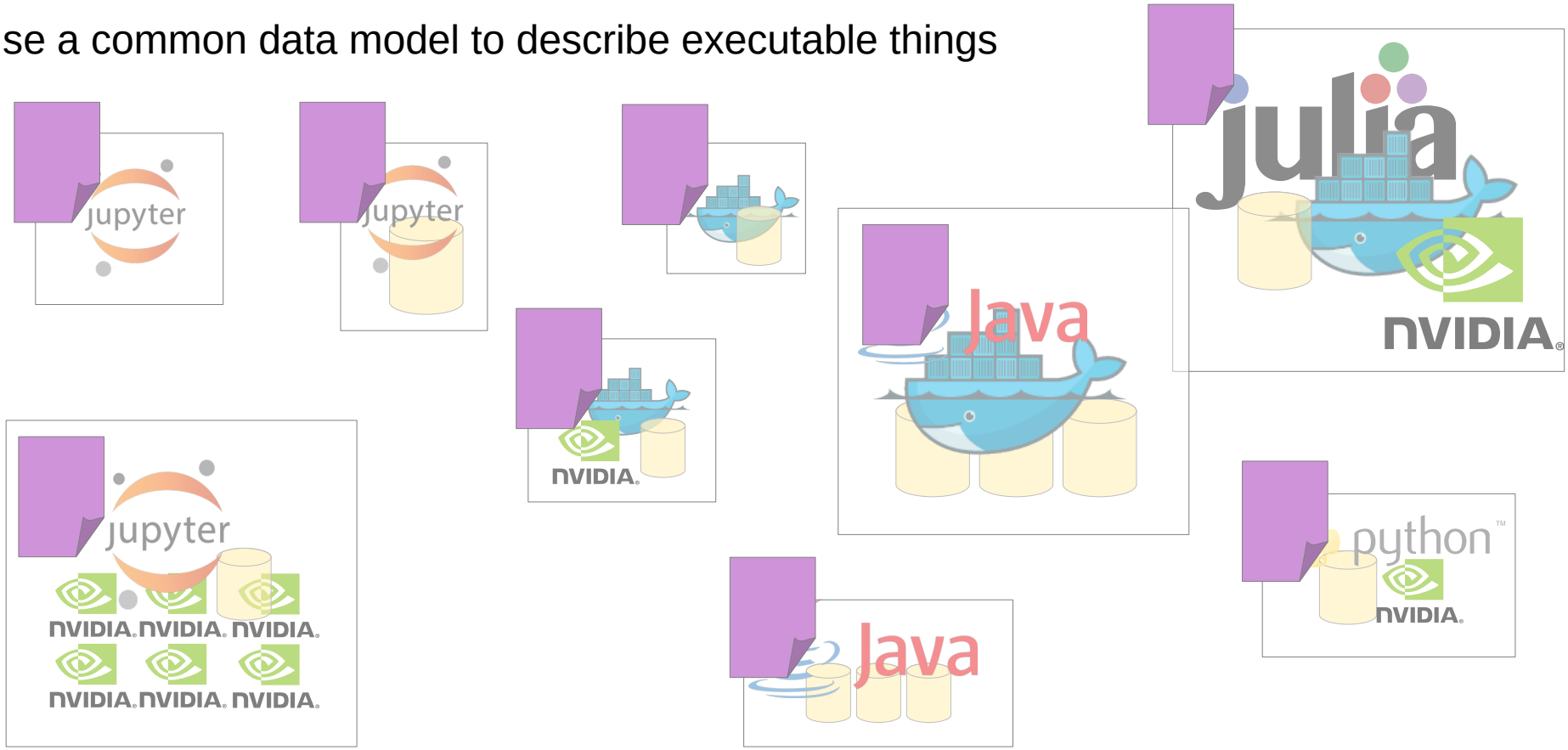
Execution Broker – the data model

Use a common data model to describe executable things



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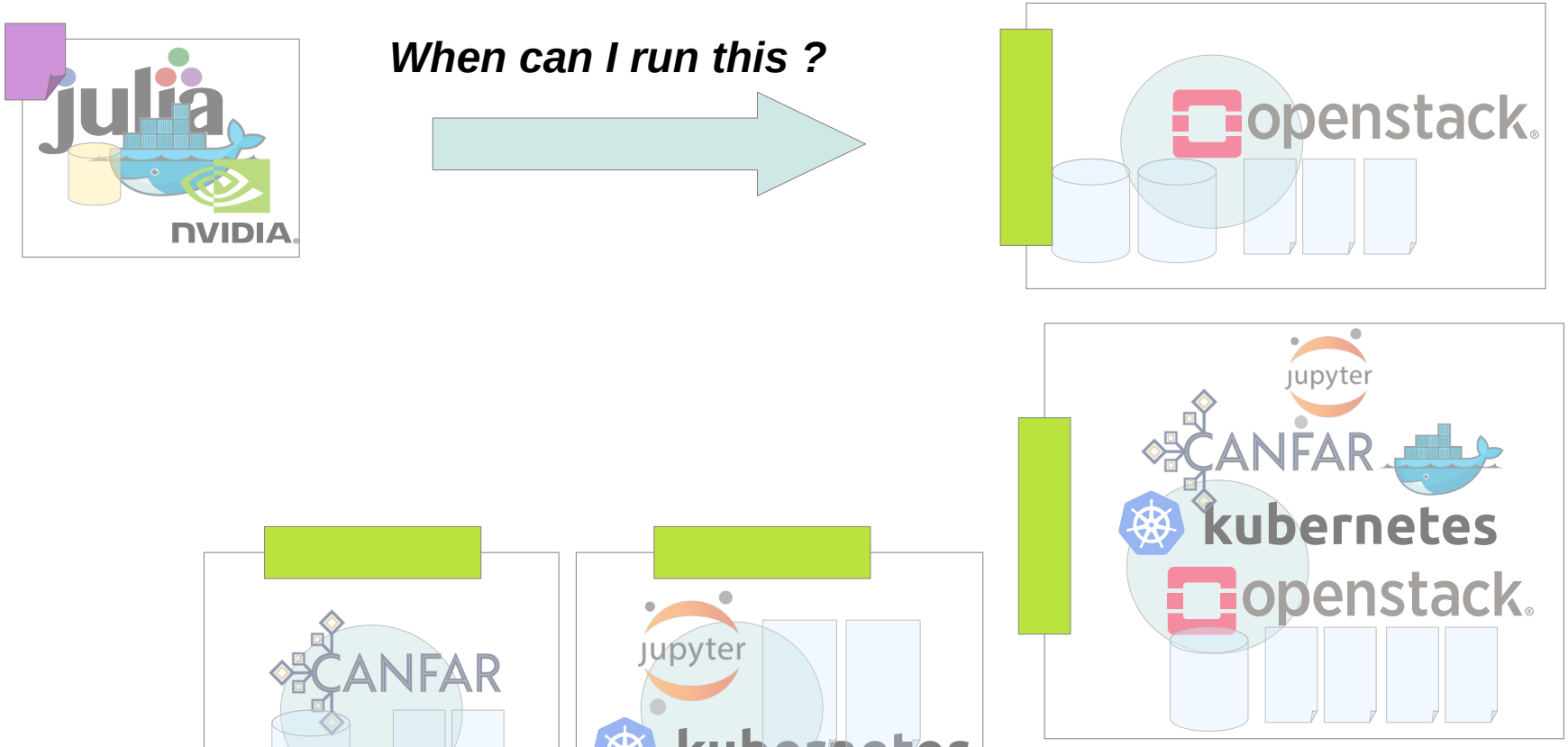
Execution Broker – the solution

Pass a common data-model description to a common interface



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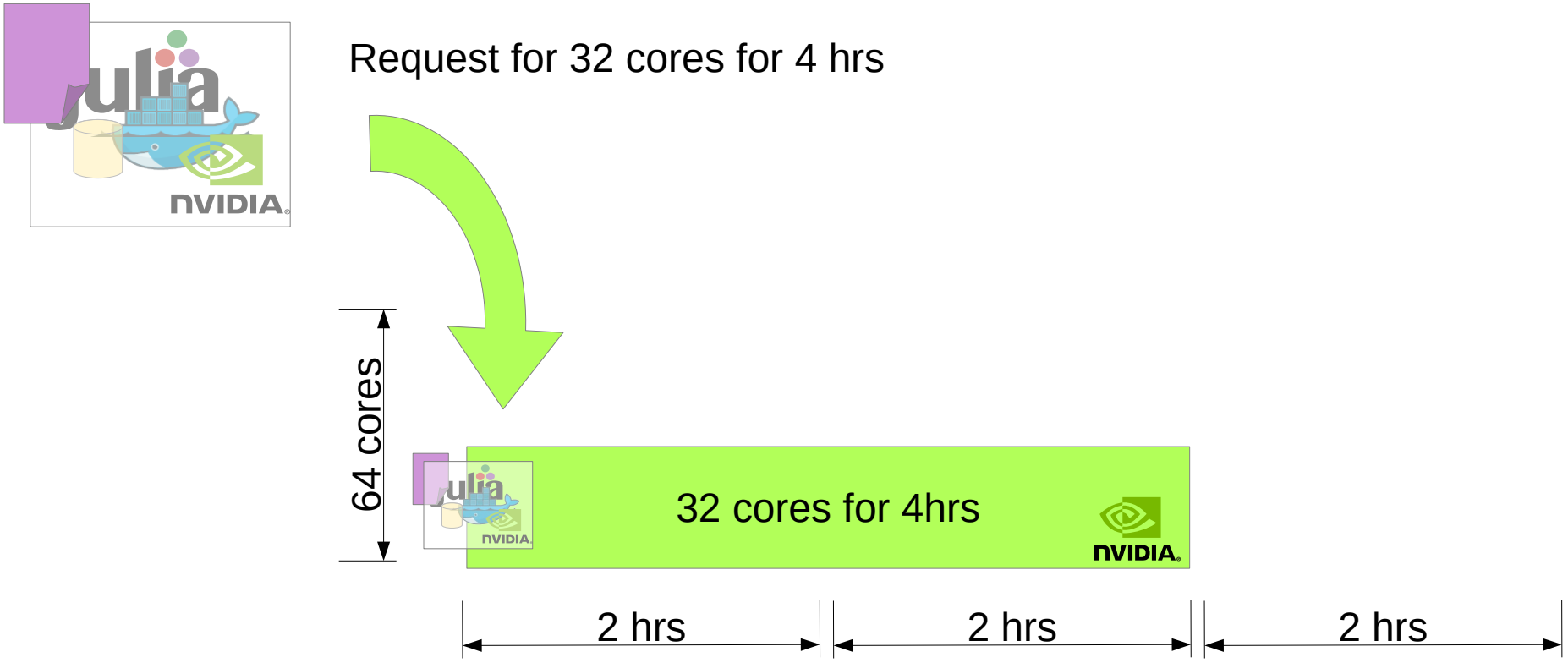
Resource scheduling

When can I run <this> ?



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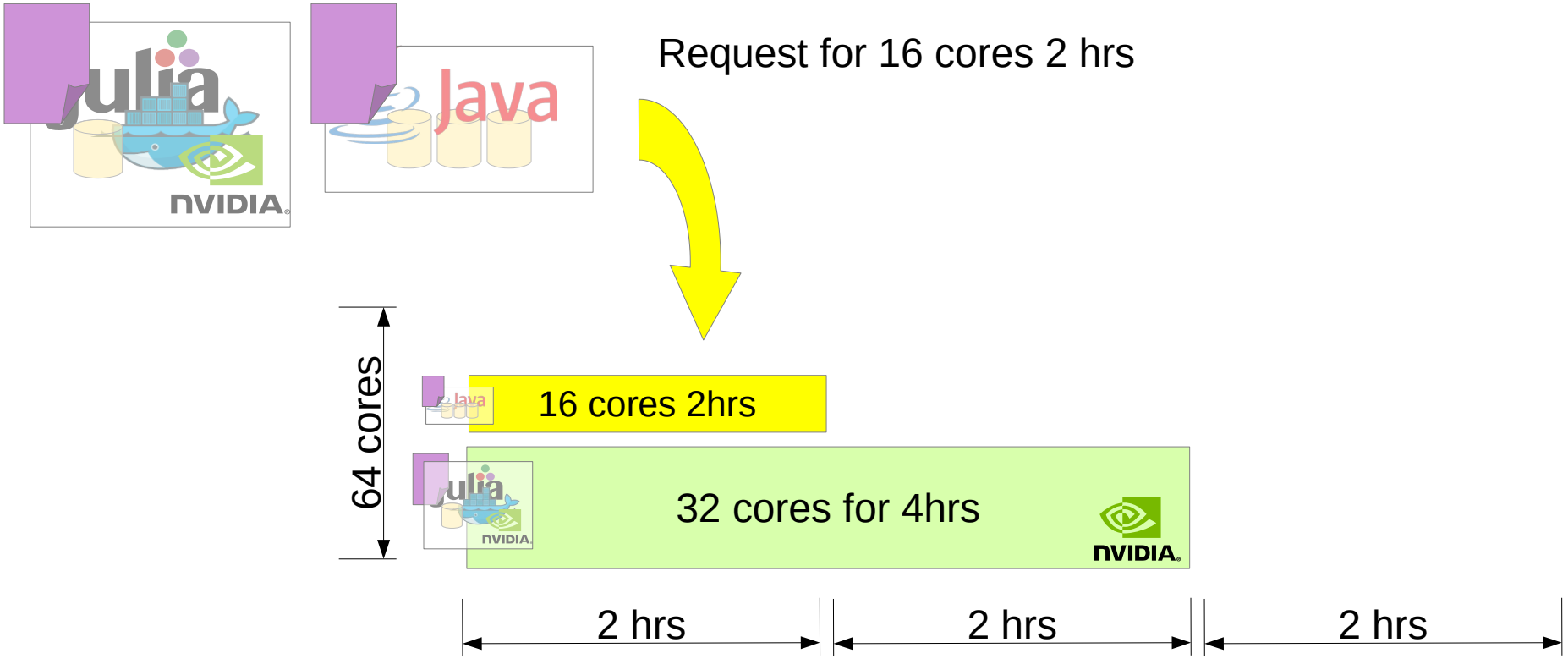
Resource scheduling

When can I run <this> ?



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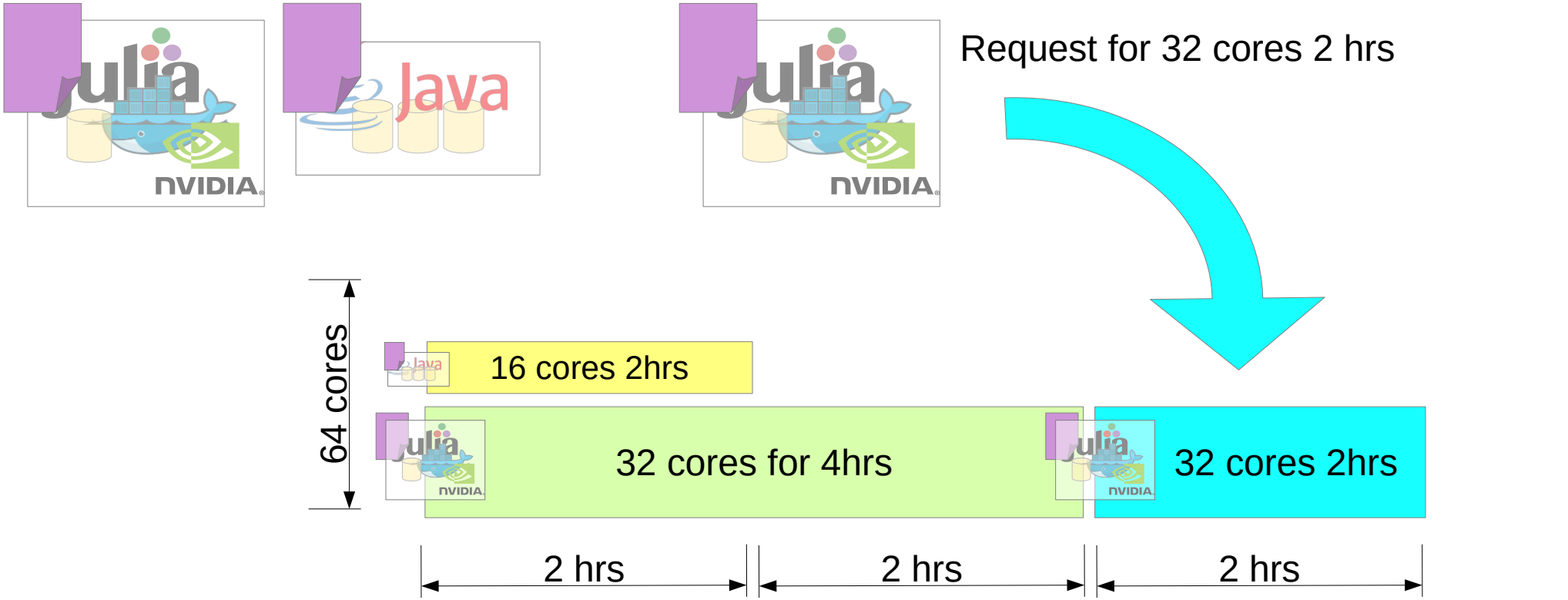
Resource scheduling

When can I run <this> ?



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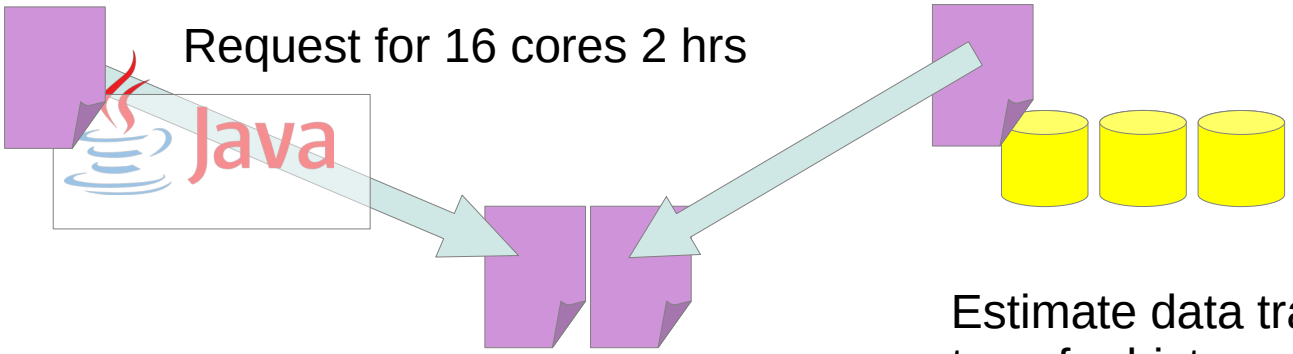
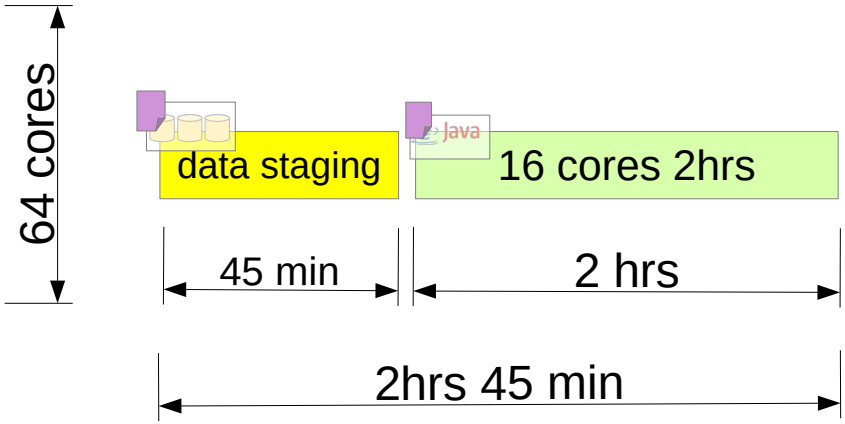
Data staging

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



3TiB input data in remote storage

Estimate data transfer time based on data size, transfer history, and current network metrics.



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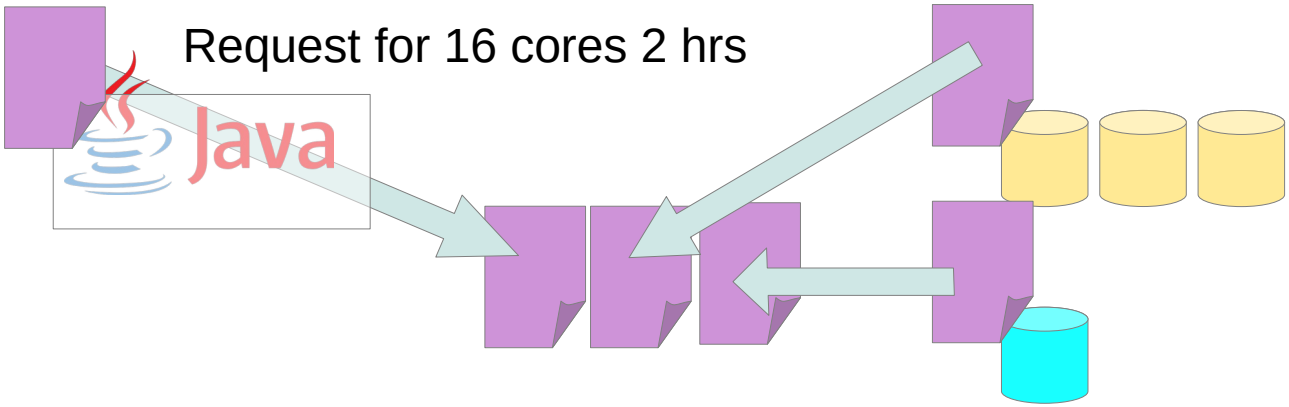
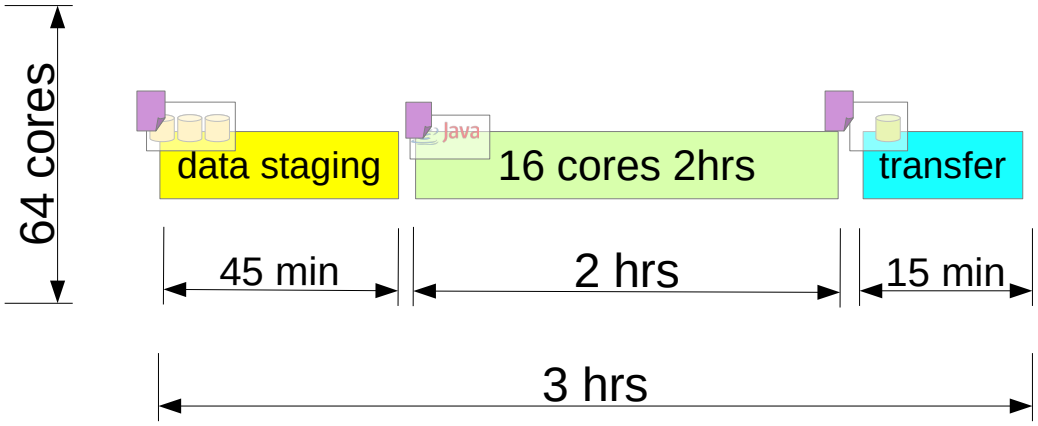
Data staging

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



3TiB input data in remote storage

1TiB output data in remote storage



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Software developer

python™

GitLab

Python code

GitLab

Metadata

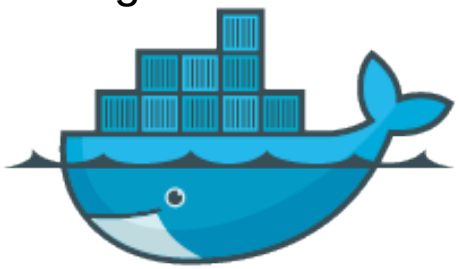
```
executable:
  type: uri:python-program
  requirements:
    python: > 3.10
    numpi: > 2.1.1
```

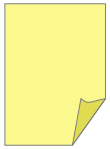
Software developer

Python code

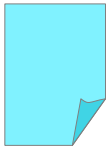
Metadata

Software packager

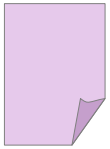




Dockerfile

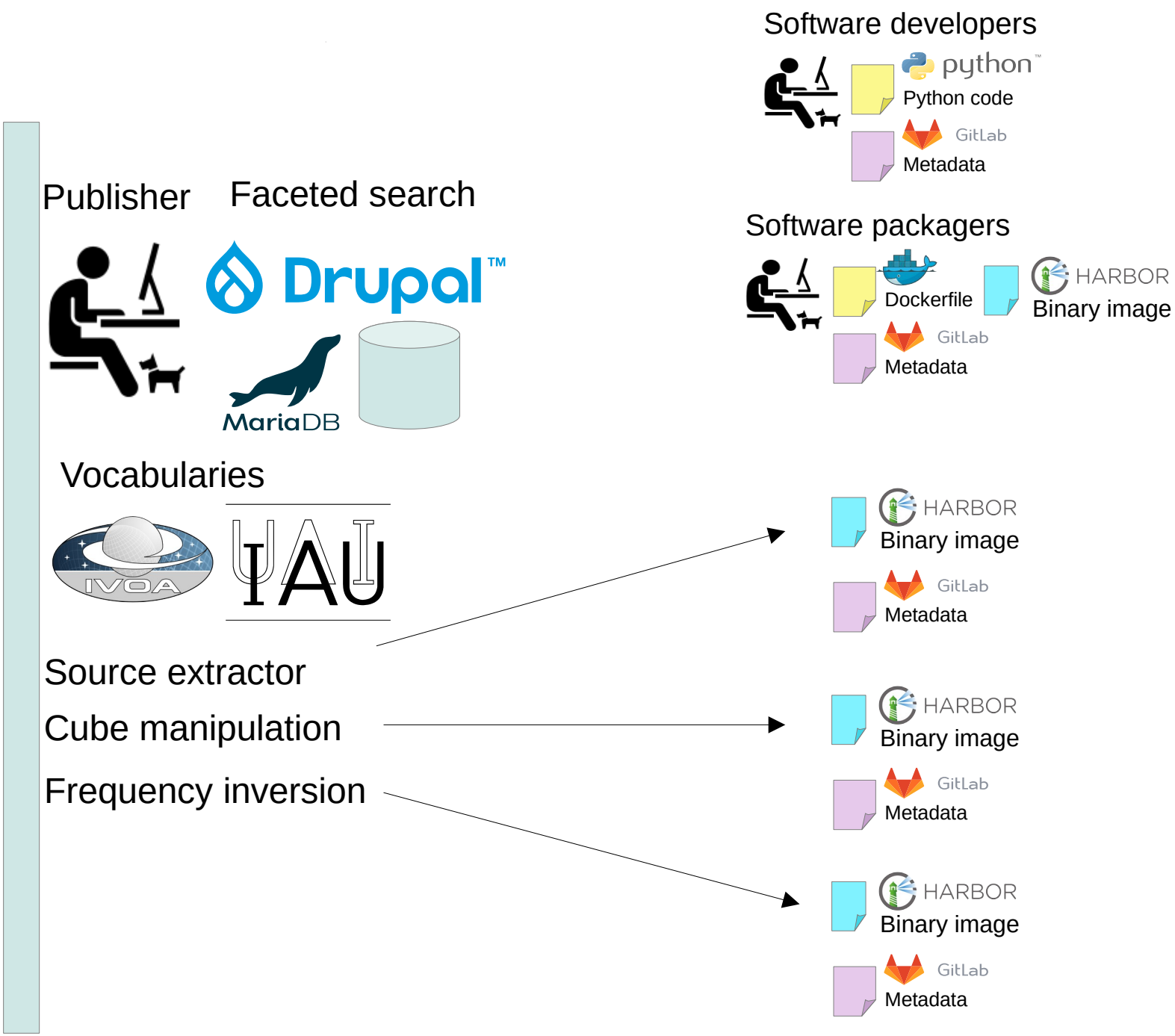


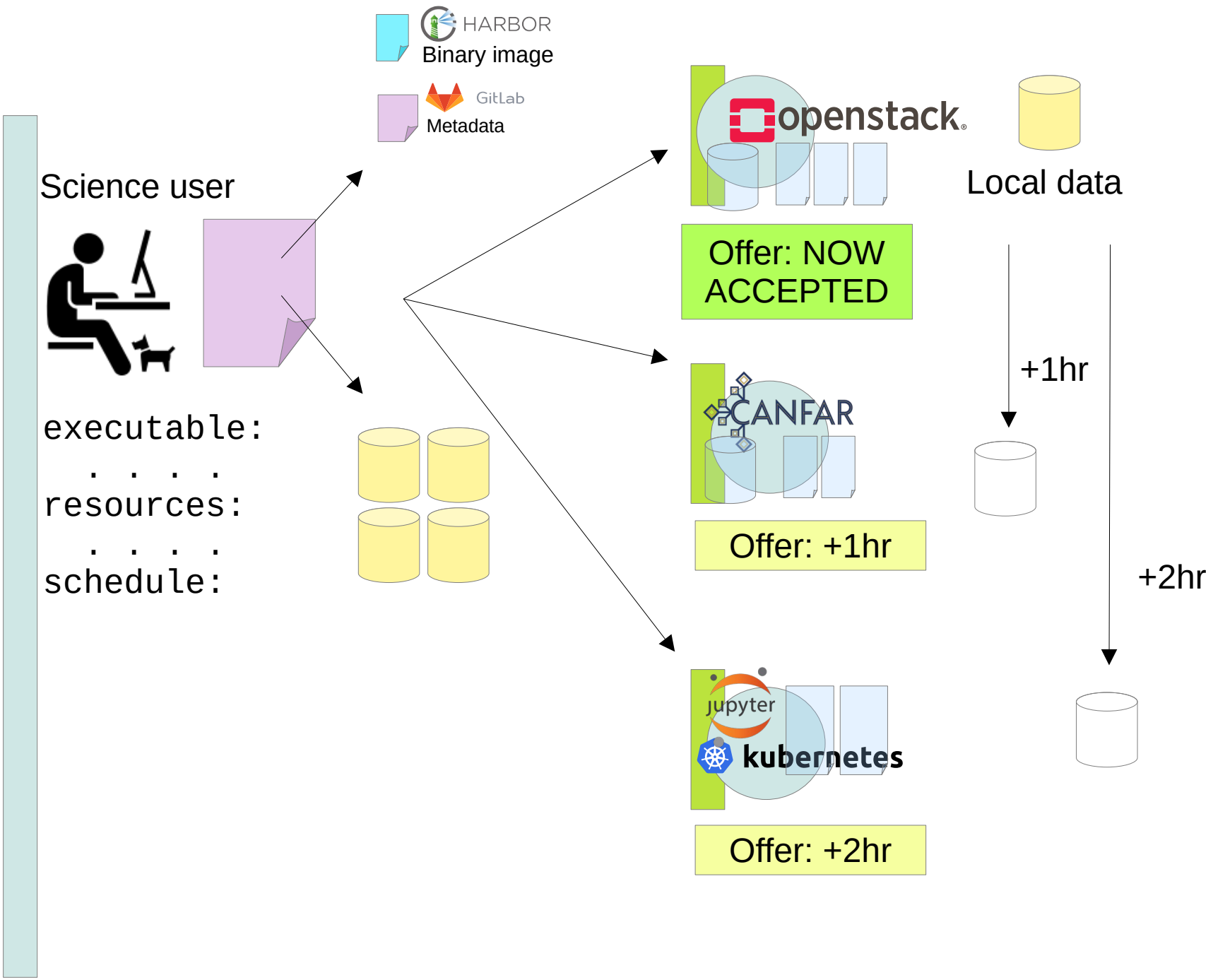
Binary image

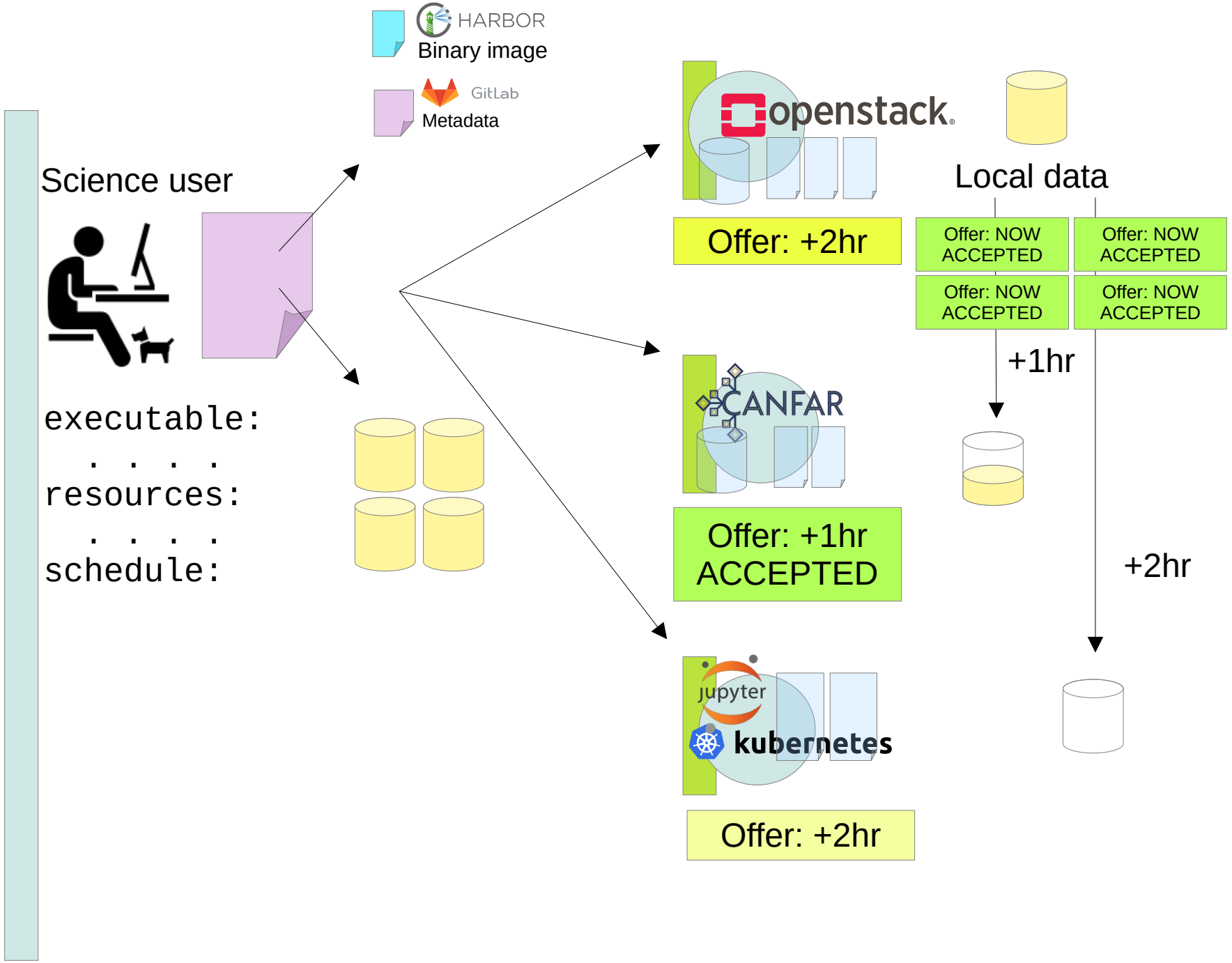


Metadata

```
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
```


Software developers
python
Python code
GitLab
Metadata
Publisher
Faceted search
Drupal
MariaDB
Software packagers
Dockerfile
HARBOR
Binary image
GitLab
Metadata
Vocabularies
IVOA
IAU
HARBOR
Binary image
GitLab
Metadata
Source extractor
Cube manipulation
Frequency inversion
HARBOR
Binary image
GitLab
Metadata
HARBOR
Binary image
GitLab
Metadata


HARBOR
Binary image
GitLab
Metadata
Science user
executable:
. . . .
resources:
. . . .
schedule:
openstack
Local data
Offer: NOW
ACCEPTED
+1hr
CANFAR
Offer: +1hr
+2hr
jupyter
kubernetes
Offer: +2hr


HARBOR
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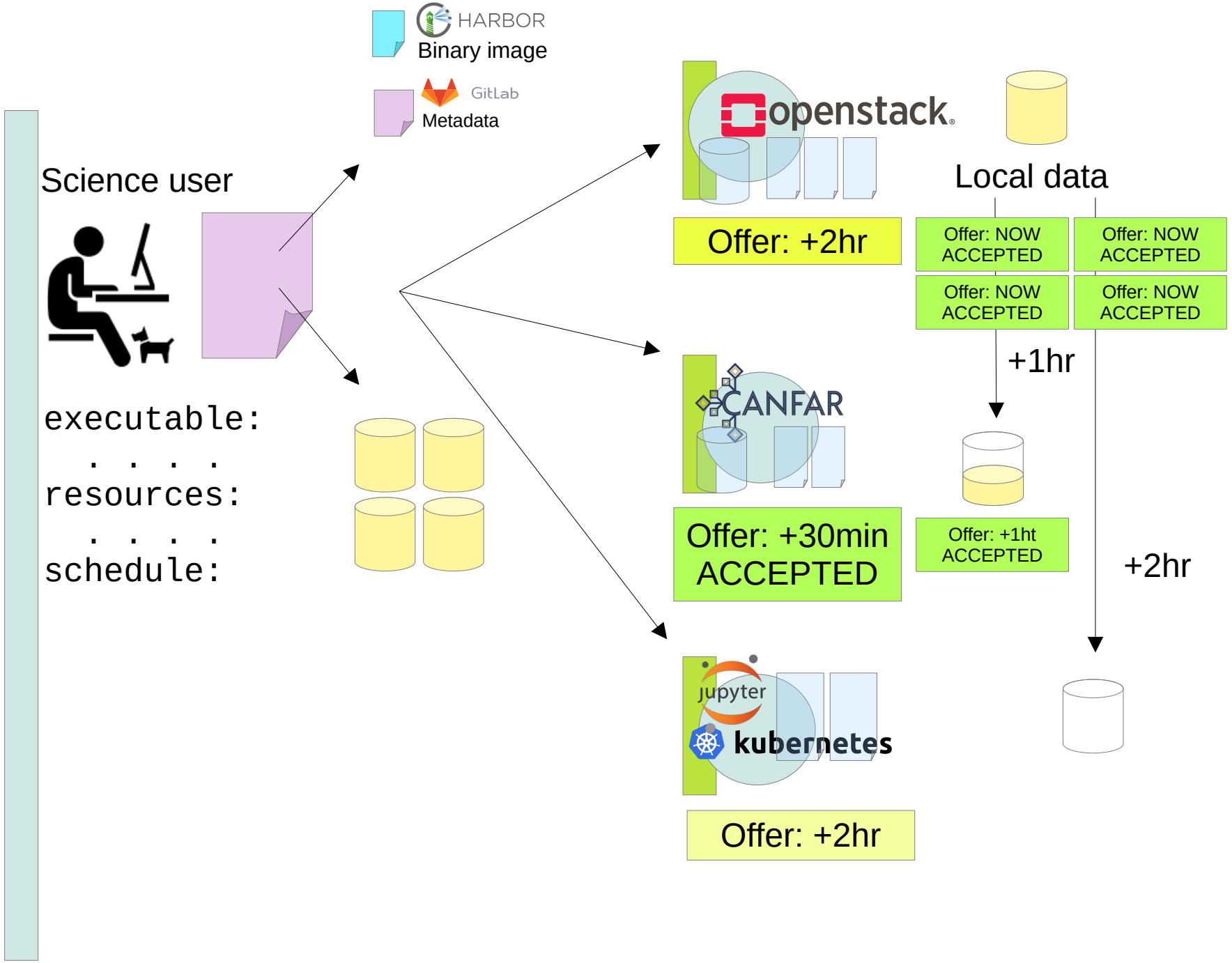
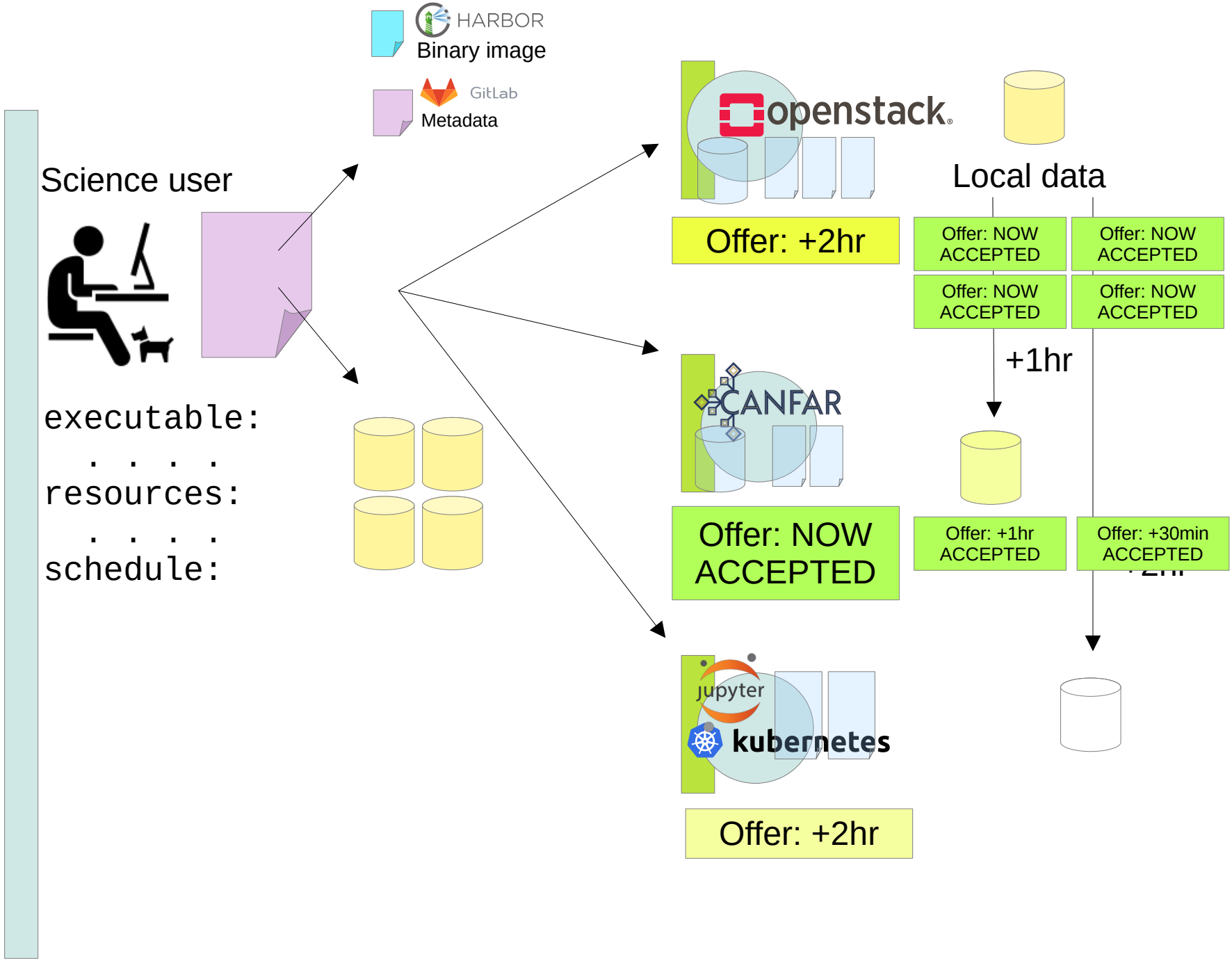
. . . .
resources:
. . . .
schedule:
openstack
Offer: +2hr
Local data
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
+1hr
CANFAR
Offer: +1hr ACCEPTED
+2hr
jupyter
kubernetes
Offer: +2hr


HARBOR
Binary image
GitLab
Metadata
Science user
executable:
. . . .
resources:
. . . .
schedule:
openstack
Offer: +2hr
Local data
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
+1hr
CANFAR
Offer: +30min ACCEPTED
Offer: +1ht ACCEPTED
+2hr
jupyter
kubernetes
Offer: +2hr


HARBOR
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Science user
executable:
. . . .
resources:
. . . .
schedule:
openstack
Offer: +2hr
Local data
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
Offer: NOW ACCEPTED
+1hr
CANFAR
Offer: NOW ACCEPTED
Offer: +1hr ACCEPTED
Offer: +30min ACCEPTED
jupyter
kubernetes
Offer: +2hr

Thank you

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GitHub

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

https://github.com/ivoa/Calycopis-broker

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