IVOA - science platforms

Moving code to the data

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The problem

Heterogeneous code, data and compute.

Everyone is slightly different.

data

esa

code

GitLab

Java

IVOA

data

NASA

code

GitHub

docker

compute

hadoop

APACHE Spark

compute

openstack

kubernetes

code

GitLab

compute

jupyter

NVIDIA

data

VERA C. RUBIN OBSERVATORY

FAIR

Finding data sets

- #1 Science criteria for things I'm interested in
- ….

Finding analysis code

- #1 Science criteria for things I want to do
- ….

Finding execution platforms

- ….

FAIR

Finding data sets

- #1 Science criteria for things I'm interested in
- #2 In data formats I can use
- #2 At locations I can access

Finding analysis code

- #1 Science criteria for things I want to do
- #2 In packages I can use

Finding execution platforms

- #2 That can run the code I want
- #2 That can access the data I want
- #2 That are available when I need them

FAIR

Finding data sets

#1 Science criteria for things I'm interested in

IVOA Registry

Needs extending to cover datasets as stand alone things
Needs to reference to the data object itself rather than a data access service

#2 In data formats I can use

#2 At locations I can access

IVOA VOSpace

Supports immutable data

Supports multiple formats of the same data

Supports data in external 'cloud' storage – e.g. S3 and Rucio

Needs extending to handle location and proximity

FAIR

Finding analysis code

#1 Science criteria for things I want to do

...

#2 In packages I can use

IVOA ExecutionPlanner

Metadata schema for describing executable packages

The compute hardware it requires

The software environment it requires

FAIR

Finding execution platforms

#2 That can run the code I want
#2 That can access the data I want
#2 That are available when I need them

IVOA ExecutionPlanner

Metadata schema for describing executable tasks

- The compute hardware it requires
- The software environment it requires
- The external data it requires
- The time range it is required

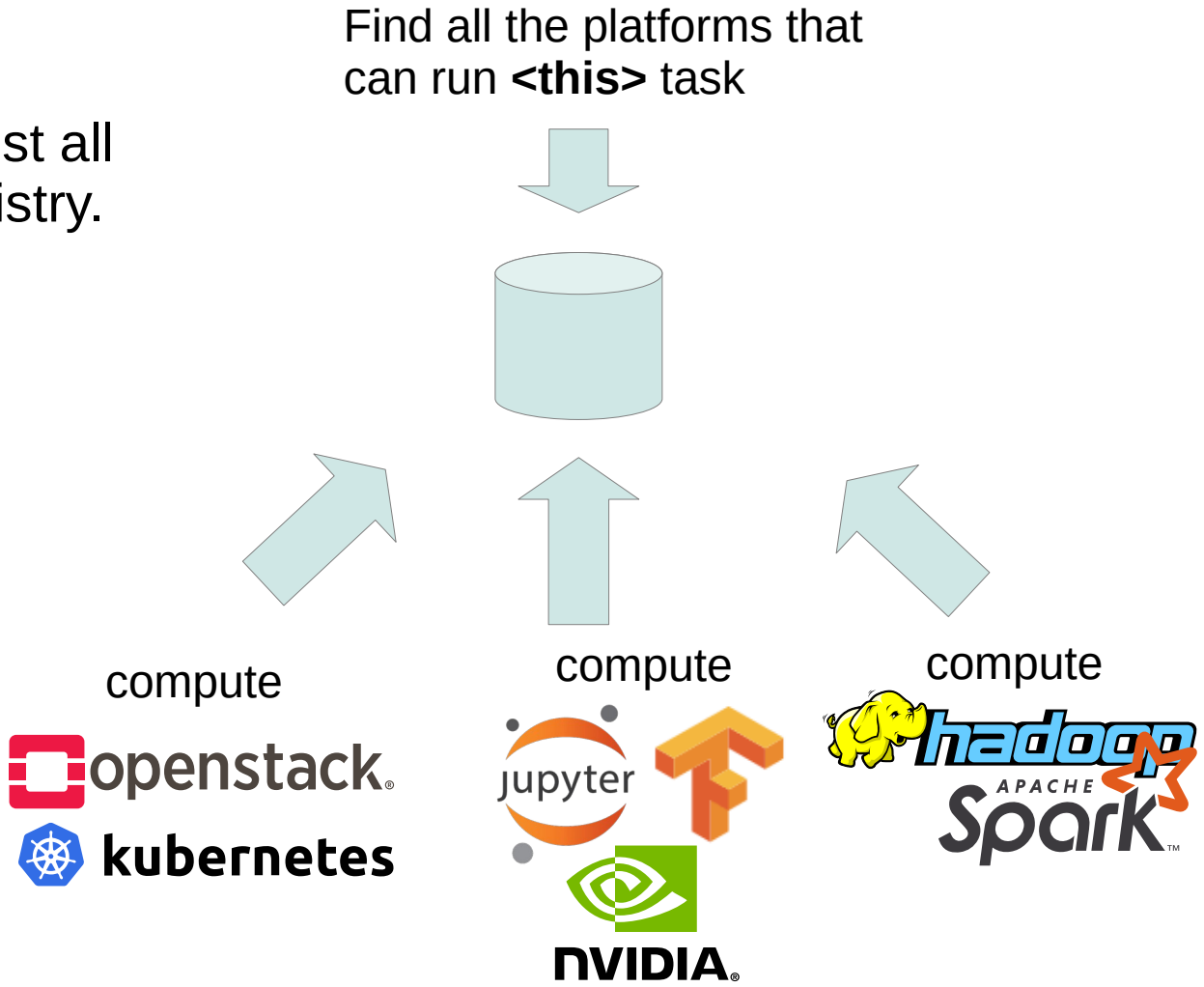
IVOA ExecutionPlanner

Asking the right question

In theory, it is possible to harvest all the metadata into a central registry.

That registry would need to understand the details of all the technologies.

Which places a lot of complexity in a single entity.



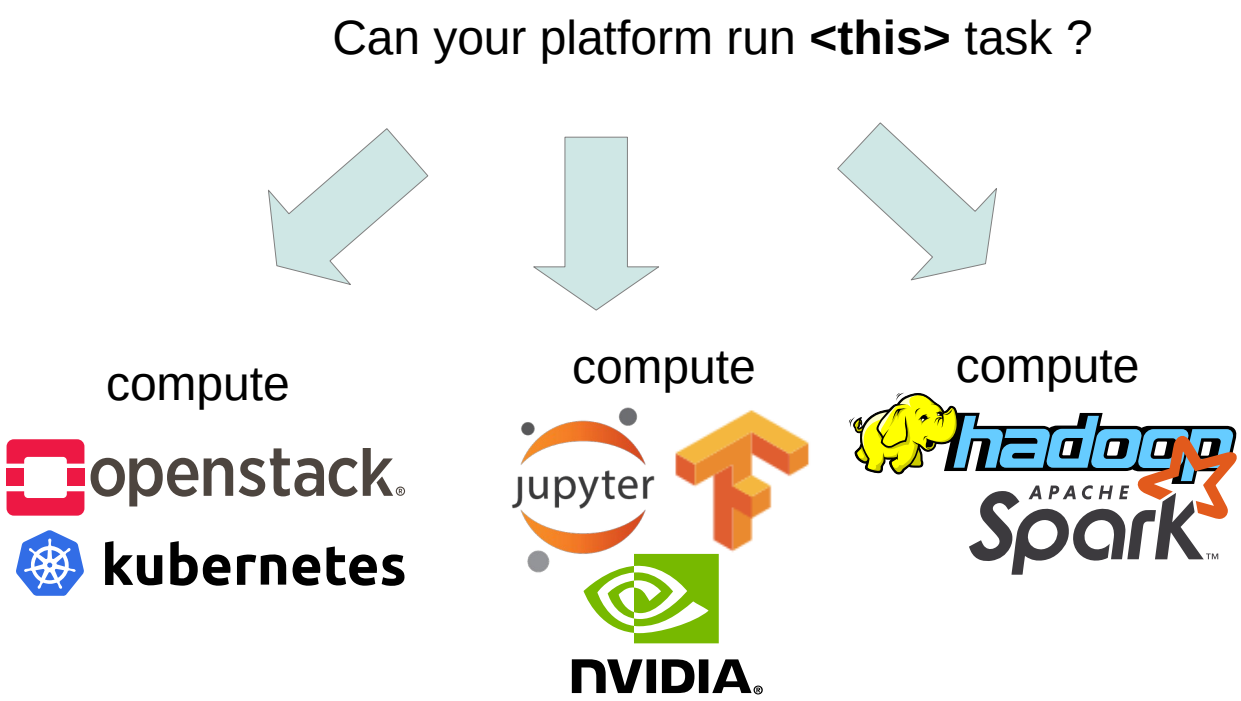
IVOA ExecutionPlanner

Asking the right question

Alternatively we can delegate the question to the individual platforms

Each platform only needs to understand the technologies it provides.

If a platform doesn't understand the question, it can just say no.



IVOA ExecutionPlanner

Asking the right question

If we add the user's identity, then the platforms can apply access controls.

The platforms can apply different quotas to different users.

If a platform doesn't understand the question, it can just say no.

Can **<I>** run **<this>** task on your platform ?

compute

openstack.

kubernetes

compute

jupyter

NVIDIA.

compute

hadoop

APACHE Spark™

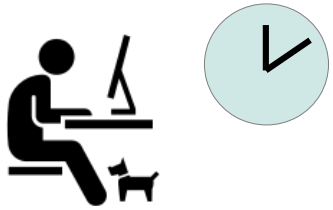
IVOA ExecutionPlanner

Asking the right question

If we add time, then a platform can take account of how busy it is.

The platforms can offer a range of time slots for the user to choose.

If a platform doesn't have any time available, it can just say no.



<when> can **<I>** run **<this>** task on your platform ?

compute

compute

compute

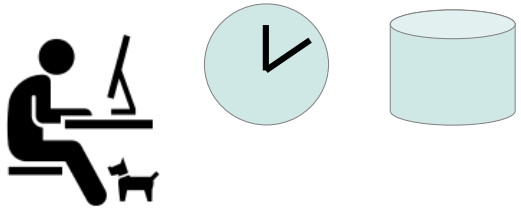
IVOA ExecutionPlanner

Asking the right question

If we add data, then a platform can take account how ‘close’ the data is.

The platforms can quote different start-up times depending on how long it will take to stage the data.

If a platform can’t access the data, it can just say no.



<when> can **<I>** run **<this>** task with **<that>** data on your platform ?

compute

compute

compute

Thank you, and any questions ?

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