What’s the deal with Managed Services and Model Delivery?

Technical Overview

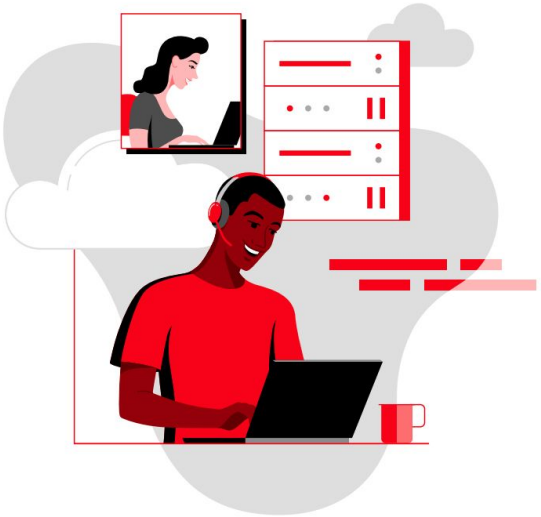
Audrey Reznik Data Scientist

Red Hat

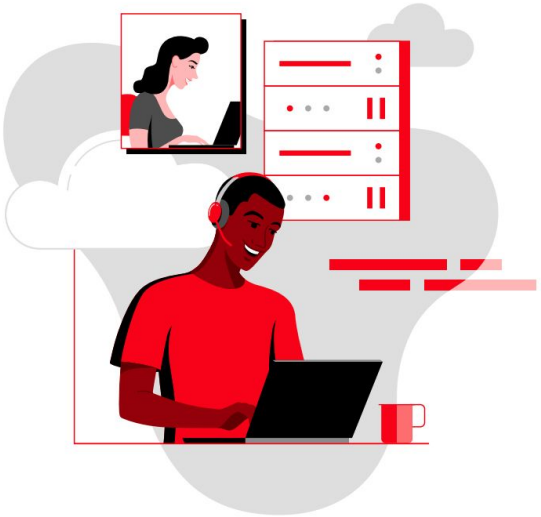
Agenda:

1. What are Managed Services?
    a. Who cares about them?
2. Where do I find Managed Services?
3. What do Managed Services have to do with Model Delivery?
    a. Use case
4. Are Managed Services easy to use?

Generic IT Managed Services

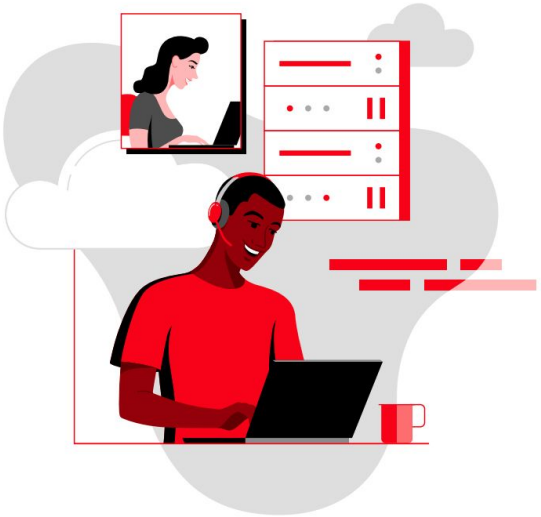


Generic IT Managed Services



Help Desk

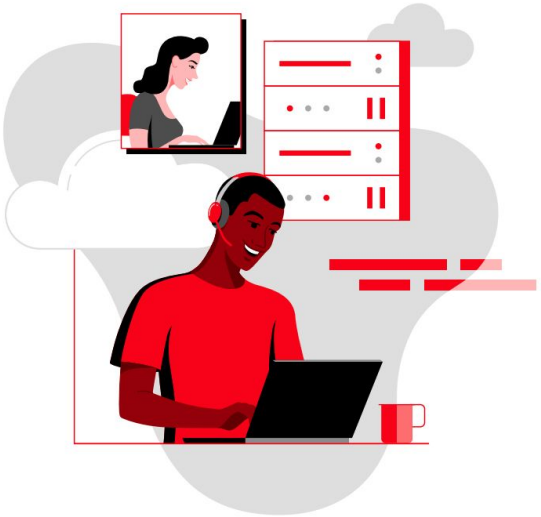
Generic IT Managed Services



Equipment installation

Help Desk

Generic IT Managed Services

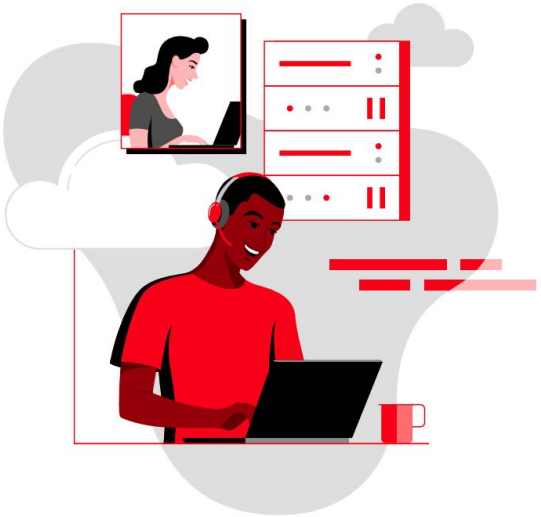


Equipment installation

Help Desk

Hardware maintenance

Generic IT Managed Services



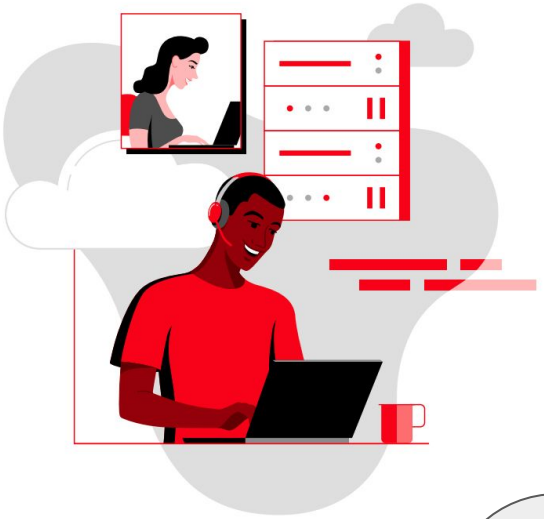
Equipment installation

Help Desk

Hardware maintenance

Firewall Security

Generic IT Managed Services



Equipment installation

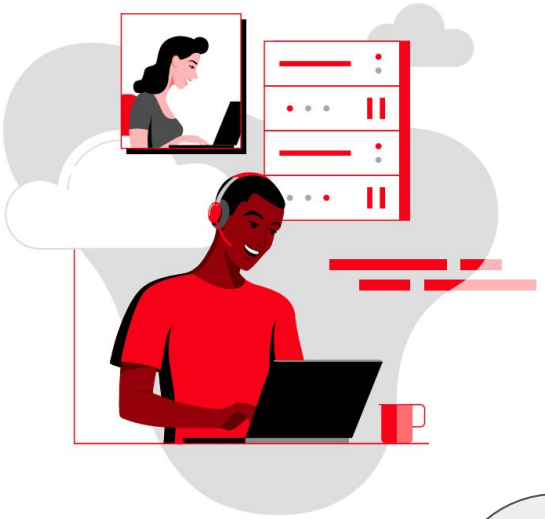
Help Desk

Hardware maintenance

Firewall Security

Anti-virus & patch updates

Generic IT Managed Services



Equipment installation

Help Desk

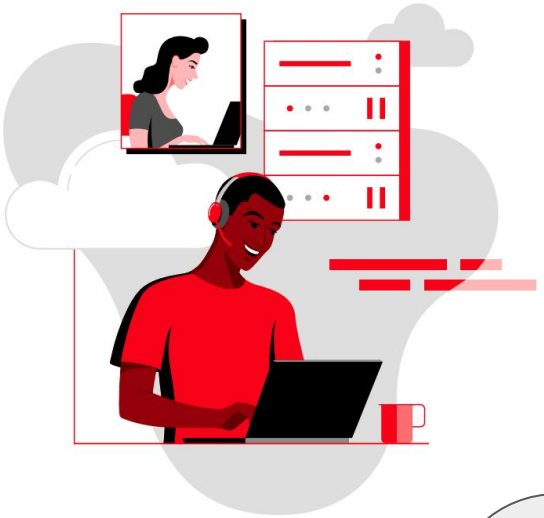
Hardware maintenance

Firewall Security

Anti-virus & patch updates

Systems Monitoring

Generic IT Managed Services



Equipment installation

Help Desk

Hardware maintenance

Disaster Recovery

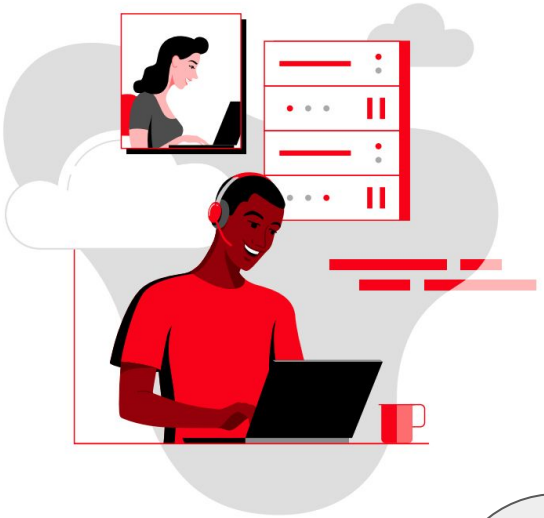
Firewall Security

Anti-virus & patch updates

Systems Monitoring

Generic IT Managed Services

Managed Backups



Equipment installation

Help Desk

Hardware maintenance

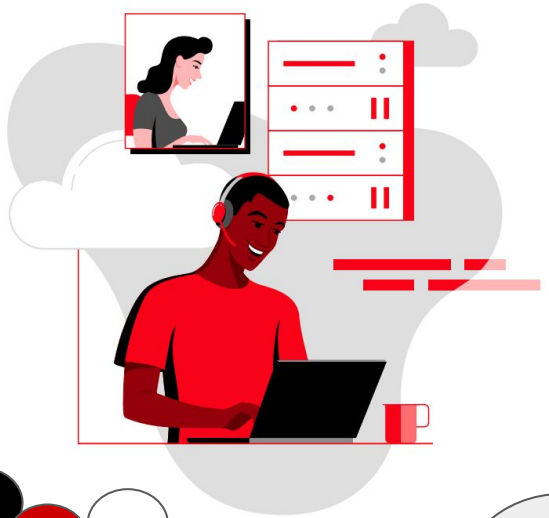
Disaster Recovery

Firewall Security

Anti-virus & patch updates

Systems Monitoring

Generic IT Managed Services



Managed Backups

Equipment installation

Help Desk

Hardware maintenance

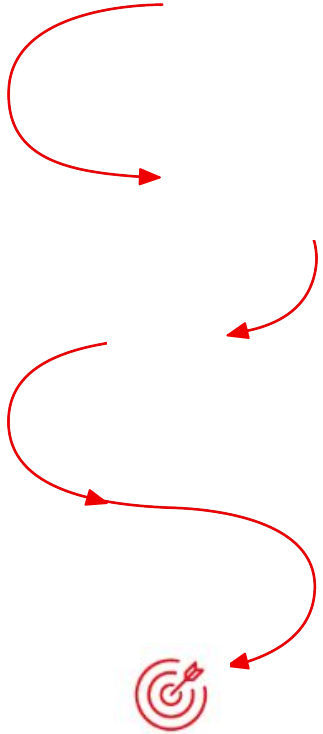
Disaster Recovery

Firewall Security

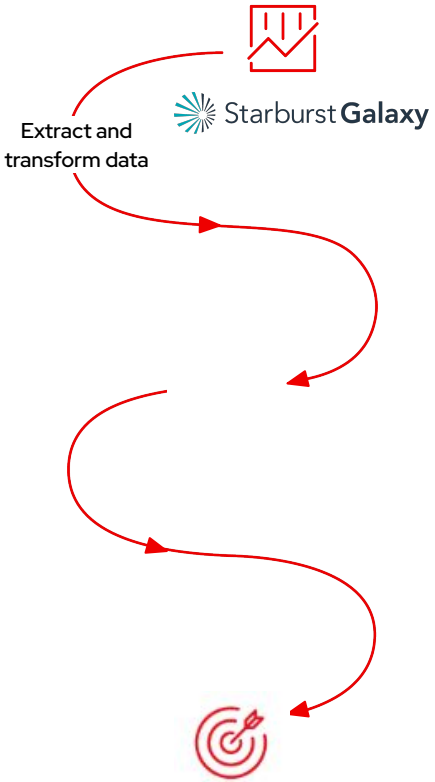
Anti-virus & patch updates

Systems Monitoring

Managed Services for Data Scientists



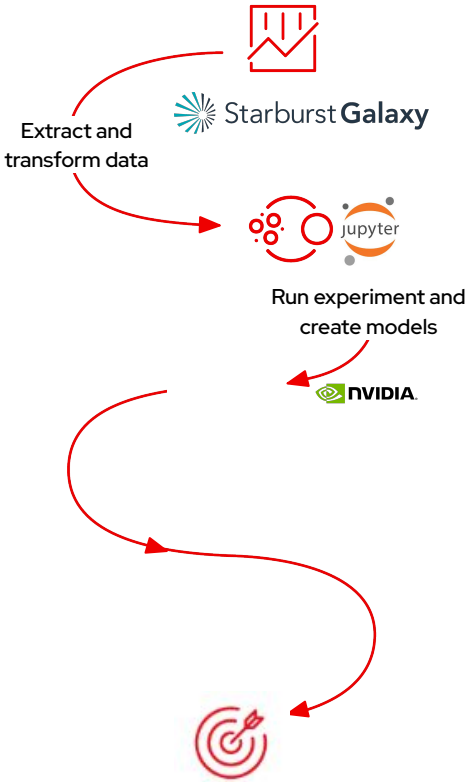
Managed Services for Data Scientists



Extract & Transform the Data

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

Managed Services for Data Scientists



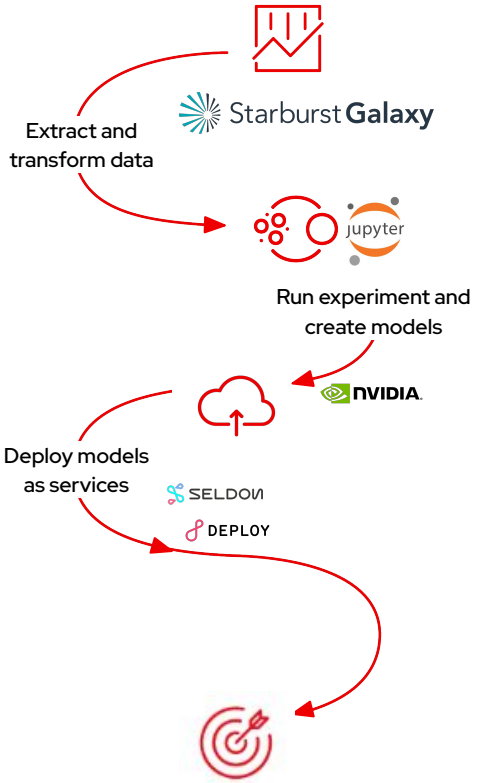
Extract & Transform the Data

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

Run experiments and create models

Would like to run experiments and build / run models using various data science library packages. And... open source products!

Managed Services for Data Scientists



Extract & Transform the Data

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

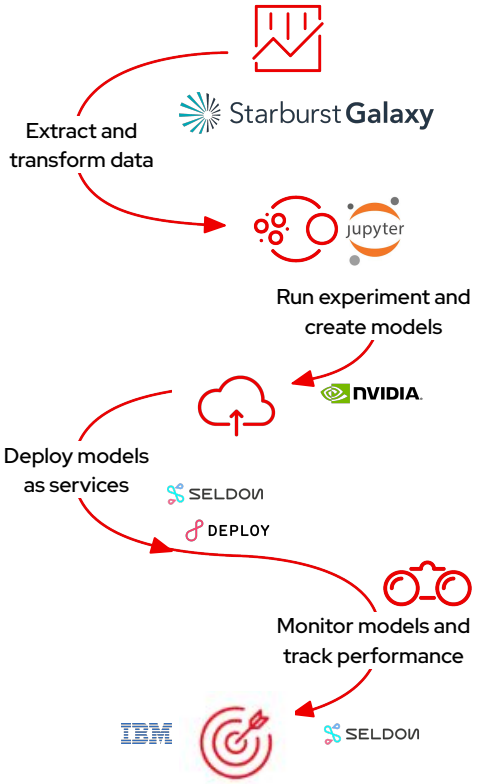
Run experiments and create models

Would like to run experiments and build / run models using various data science library packages. And... open source products!

Deploy models as services

Simplify and accelerate the process of deploying and managing your machine learning models.

Managed Services for Data Scientists



Extract & Transform the Data

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

Run experiments and create models

Would like to run experiments and build / run models using various data science library packages. And... open source products!

Deploy models as services

Simplify and accelerate the process of deploying and managing your machine learning models.

Monitor models & track performance

Monitor model performance and gleam meaningful analytics from the model

Who cares about Data Science Managed Services?

Data Scientists, Data Engineers and the ITOps that support them.

Who Cares about Data Science Managed Services?

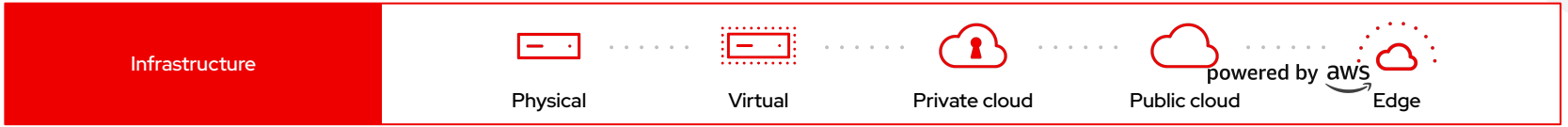
Data Scientists, Data Engineers and the ITOps that support them.

What else (besides Managed Services) should they care about?

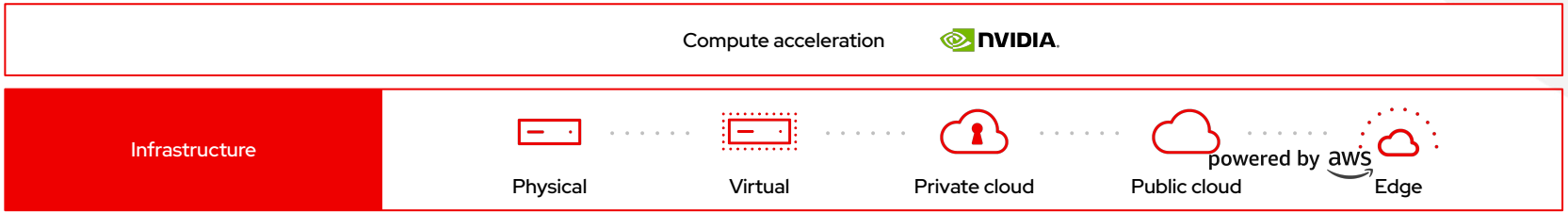
1. AIML model operational lifecycle
2. Production Ready Platform (that ITOps feels good about)
3. Flexibility to use available Open Source services
4. Ability to deploy and Portability to move from the platform you initially developed on.

Let’s build a platform that fits our Managed Services requirements!

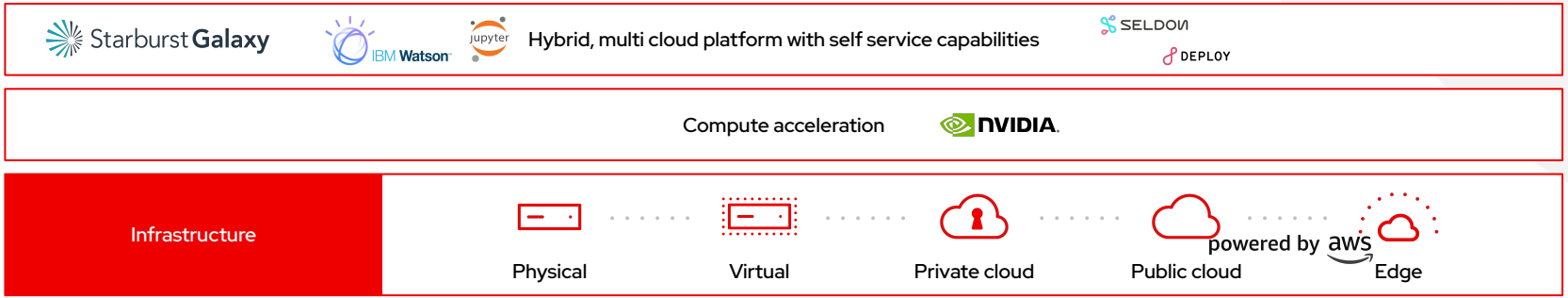
Infrastructure



Compute Acceleration



Hybrid, multi cloud platform with self (managed services)



Red Hat OpenShift

Data Science Managed Services and Model Delivery

Gather and prepare data

- Data storage
- Data lake
- Data exploration
- Data preparation
- Stream processing

Starburst Galaxy · IBM Watson · jupyter · Hybrid, multi cloud platform with self service capabilities · SELDON · DEPLOY

Compute acceleration · NVIDIA

Infrastructure

Physical · Virtual · Private cloud · Public cloud (powered by aws) · Edge

Data Science Managed Services and Model Delivery

Gather and prepare data	Develop model
Data storage Data lake Data exploration Data preparation Stream processing	ML notebooks ML libraries

Starburst Galaxy · IBM Watson · jupyter · Hybrid, multi cloud platform with self service capabilities · SELDON DEPLOY

Compute acceleration · NVIDIA

Infrastructure

Physical · Virtual · Private cloud · Public cloud (powered by aws) · Edge

Data Science Managed Services and Model Delivery

Gather and prepare data	Develop model	Deploy models in an application
Data storage Data lake Data exploration Data preparation Stream processing	ML notebooks ML libraries	Model lifecycle CI/CD

Starburst Galaxy · IBM Watson · jupyter · Hybrid, multi cloud platform with self service capabilities · SELDON DEPLOY

Compute acceleration · NVIDIA

Infrastructure

Physical · Virtual · Private cloud · Public cloud (powered by aws) · Edge

Data Science Managed Services and Model Delivery

Gather and prepare data	Develop model	Deploy models in an application	Model monitoring and management
Data storage Data lake Data exploration Data preparation Stream processing	ML notebooks ML libraries	Model lifecycle CI/CD	Monitor / alerts Model visualization Model drift

Starburst Galaxy · IBM Watson · jupyter · Hybrid, multi cloud platform with self service capabilities · SELDON · DEPLOY

Compute acceleration · NVIDIA

Infrastructure	Physical	Virtual	Private cloud	Public cloud	Edge
				powered by aws	

Data Science Managed Services and Model Delivery

Gather and prepare data	Develop model	Deploy models in an application	Model monitoring and management
Data storage Data lake Data exploration Data preparation Stream processing	ML notebooks ML libraries	Model lifecycle CI/CD	Monitor / alerts Model visualization Model drift

Starburst Galaxy · IBM Watson · jupyter · Hybrid, multi cloud platform with self service capabilities · SELDON · DEPLOY

Compute acceleration · NVIDIA

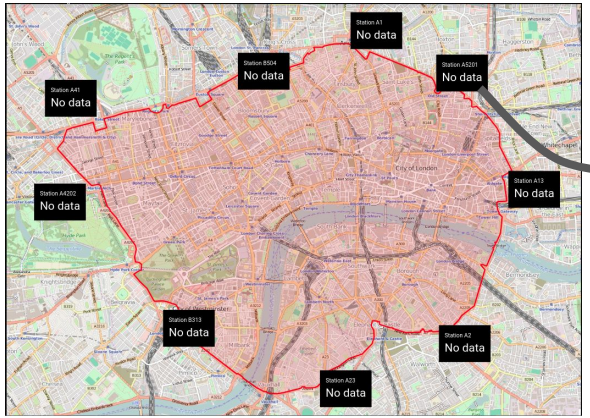
Infrastructure

Physical · Virtual · Private cloud · Public cloud (powered by aws) · Edge

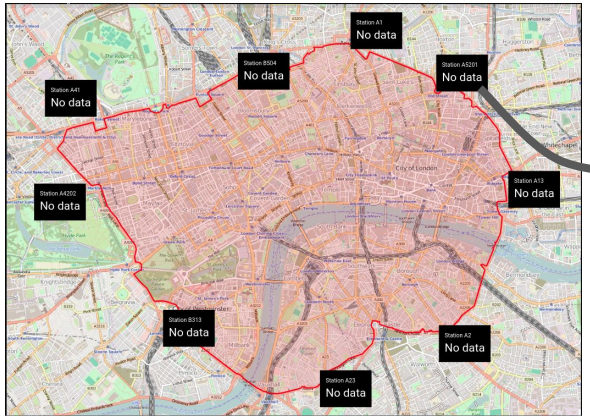
Red Hat OpenShift

AIML Use case

License Plate Detection

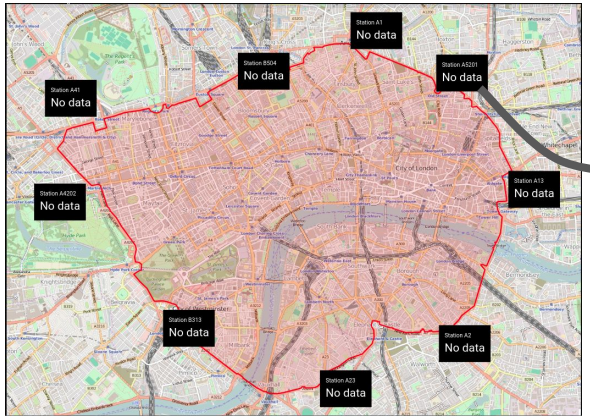


License Plate Detection



AKI8BZL

License Plate Detection



AKI8BZL

Kafka

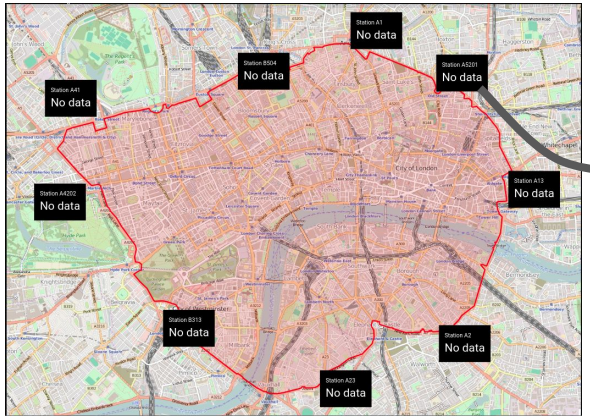
MirrorMaker

Kafka

AMBER ALERT

Red Hat OpenShift

License Plate Detection



AKI8BZL

Kafka

MirrorMaker

Kafka

LPR Event Consumer

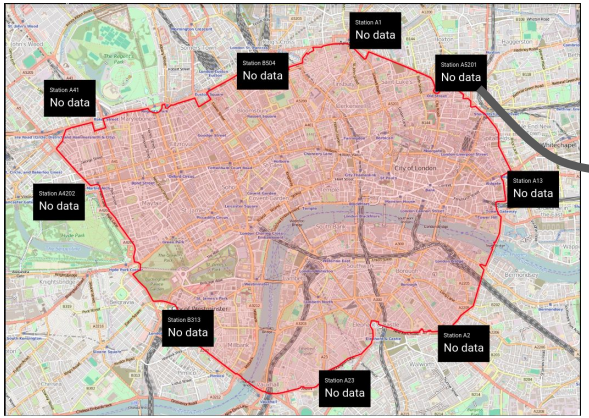
Object Data Warehouse

Vehicle Registration DB

AMBER ALERT

Red Hat OpenShift

License Plate Detection



AKI8BZL

Kafka

MirrorMaker

Kafka

LPR Event Consumer

Object Data Warehouse

Vehicle Registration DB

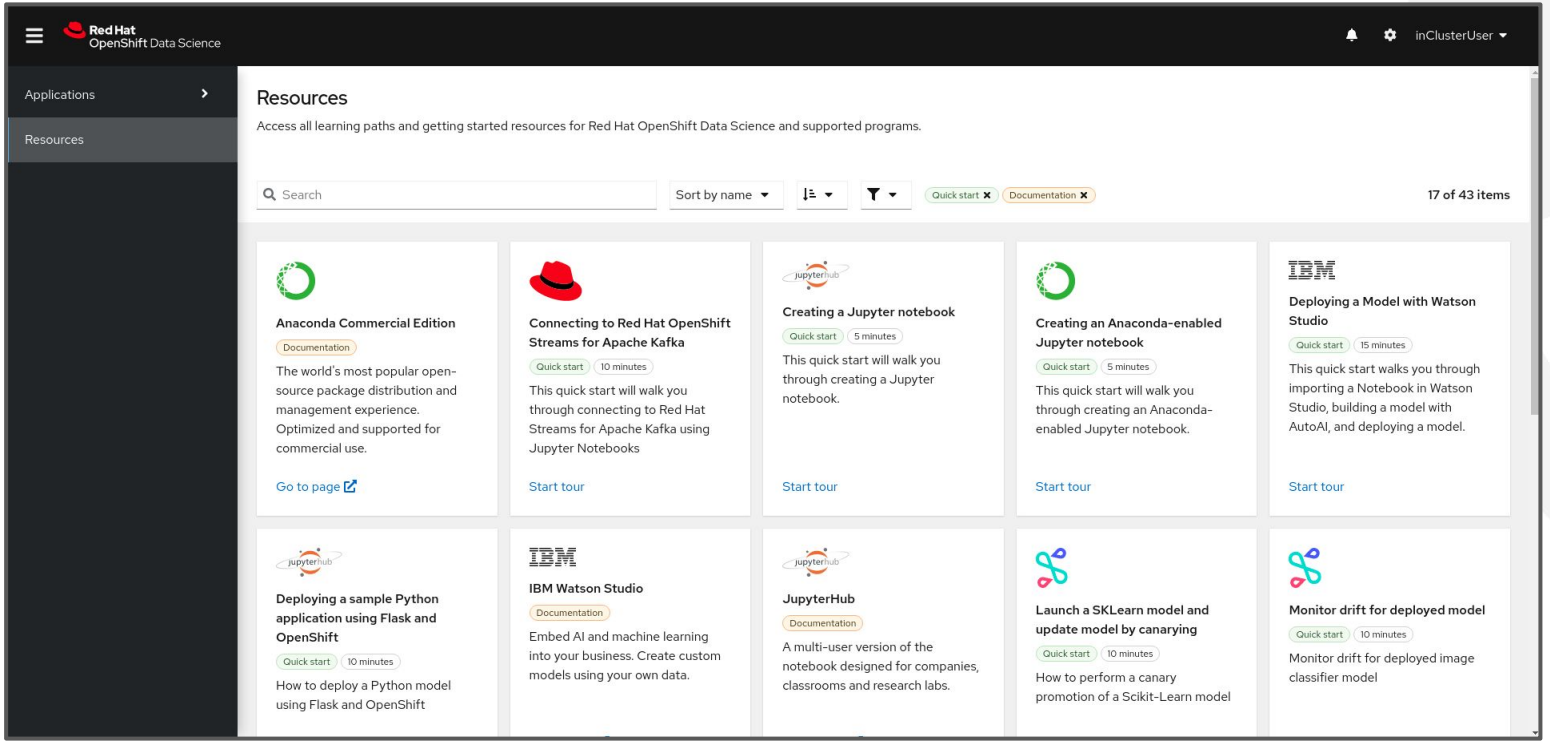
BI + Analytics Tools

AMBER ALERT

Red Hat OpenShift

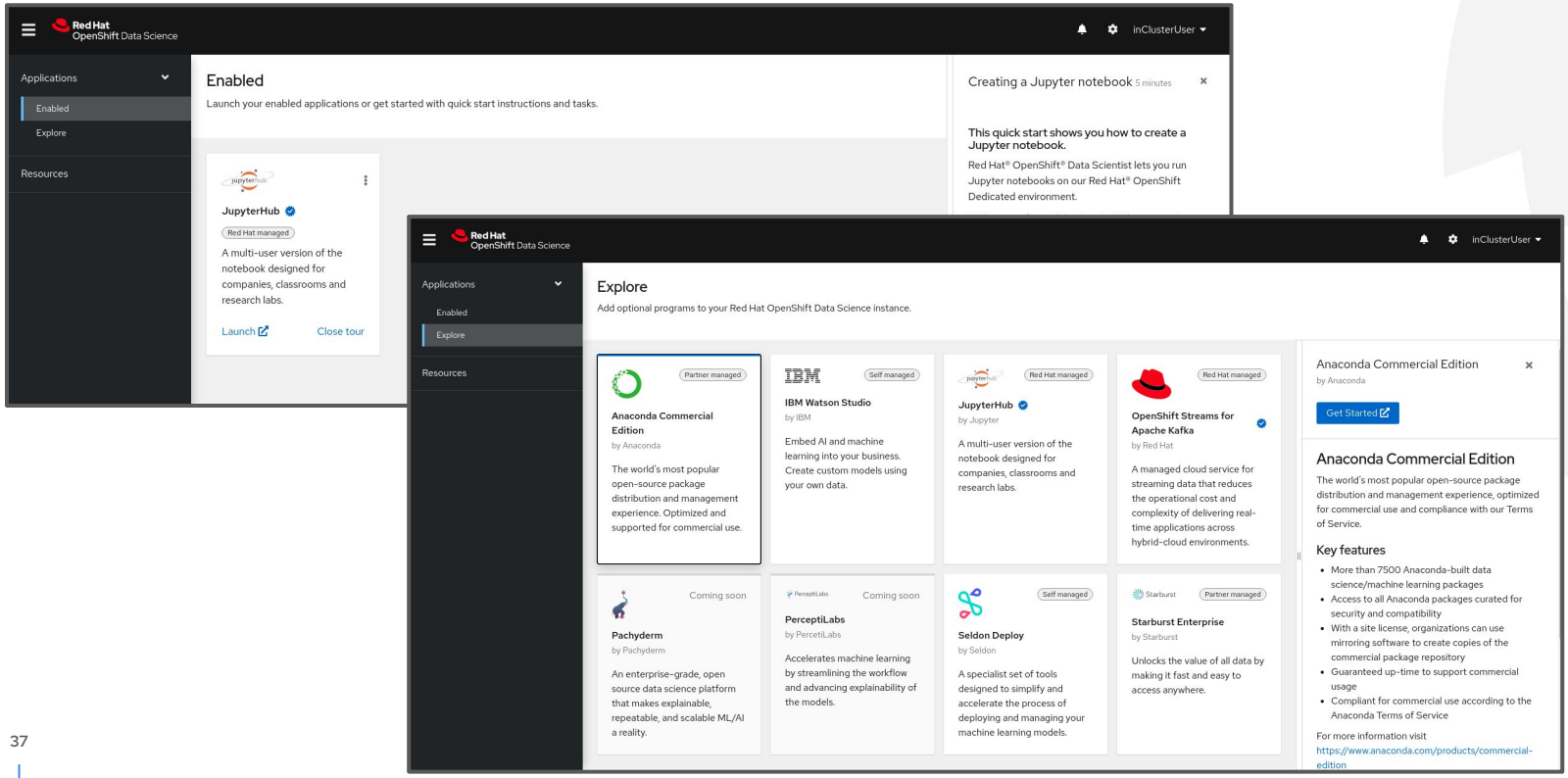
Confession Time

Red Hat Data Science Managed Services - Resources



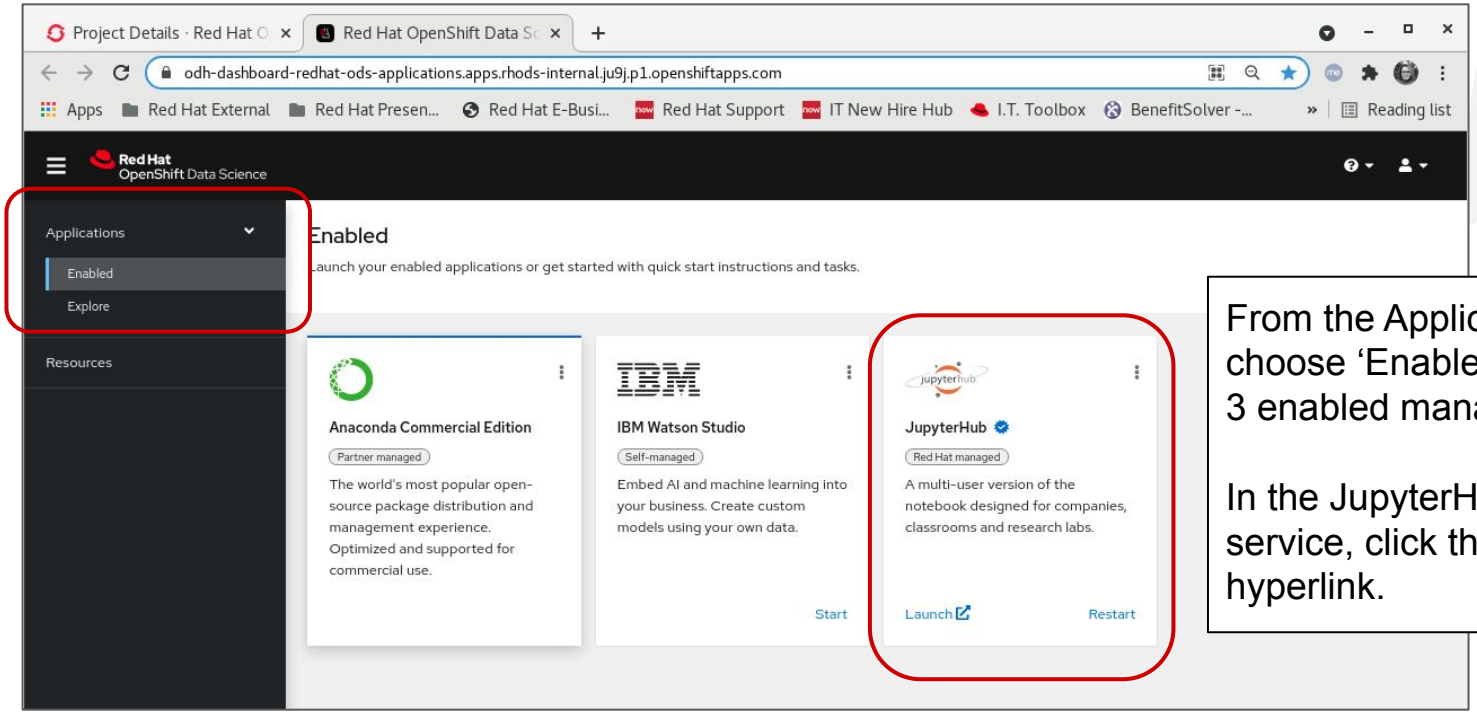
Red Hat OpenShift

Red Hat OpenShift Data Science - Dashboard (user interface)



Red Hat OpenShift

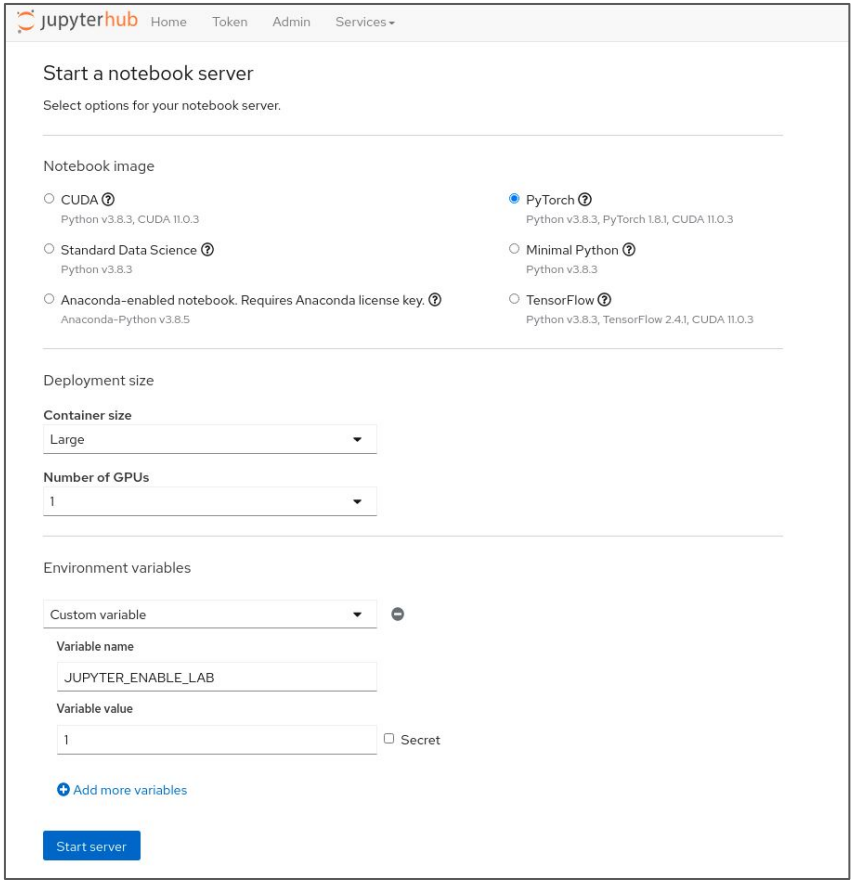
Launch (Enable) the JupyterHub Managed Service



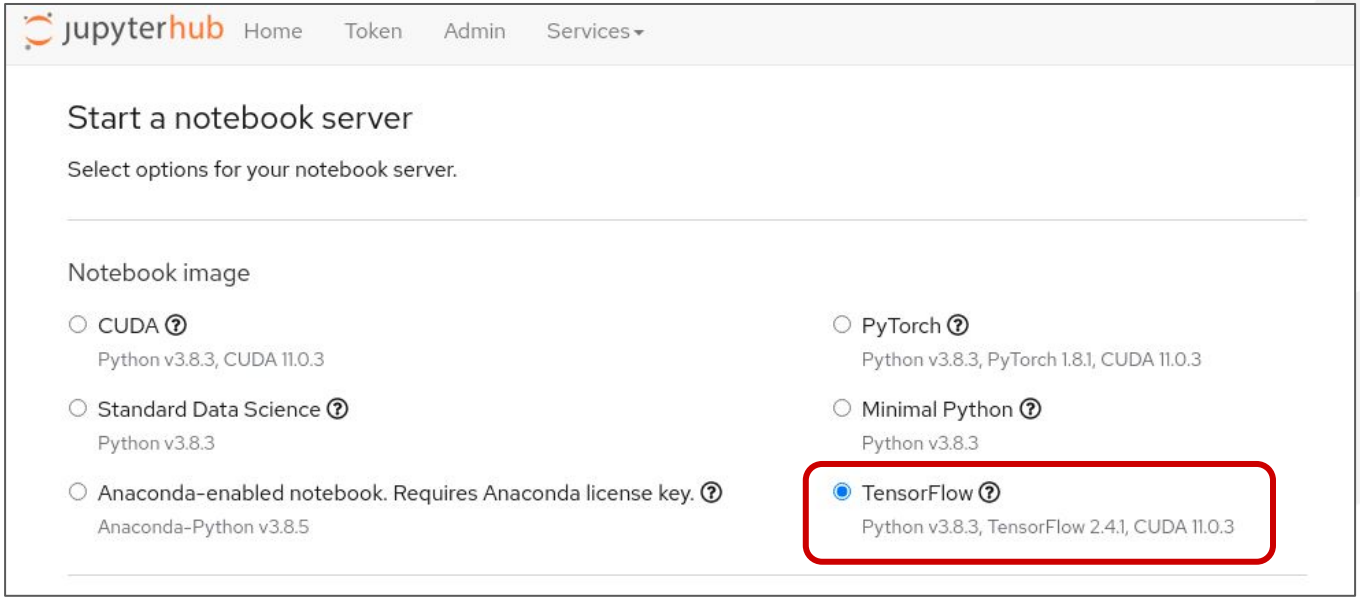
From the Applications menu, choose ‘Enabled’. You will see 3 enabled managed services.

In the JupyterHub managed service, click the ‘Launch’ hyperlink.

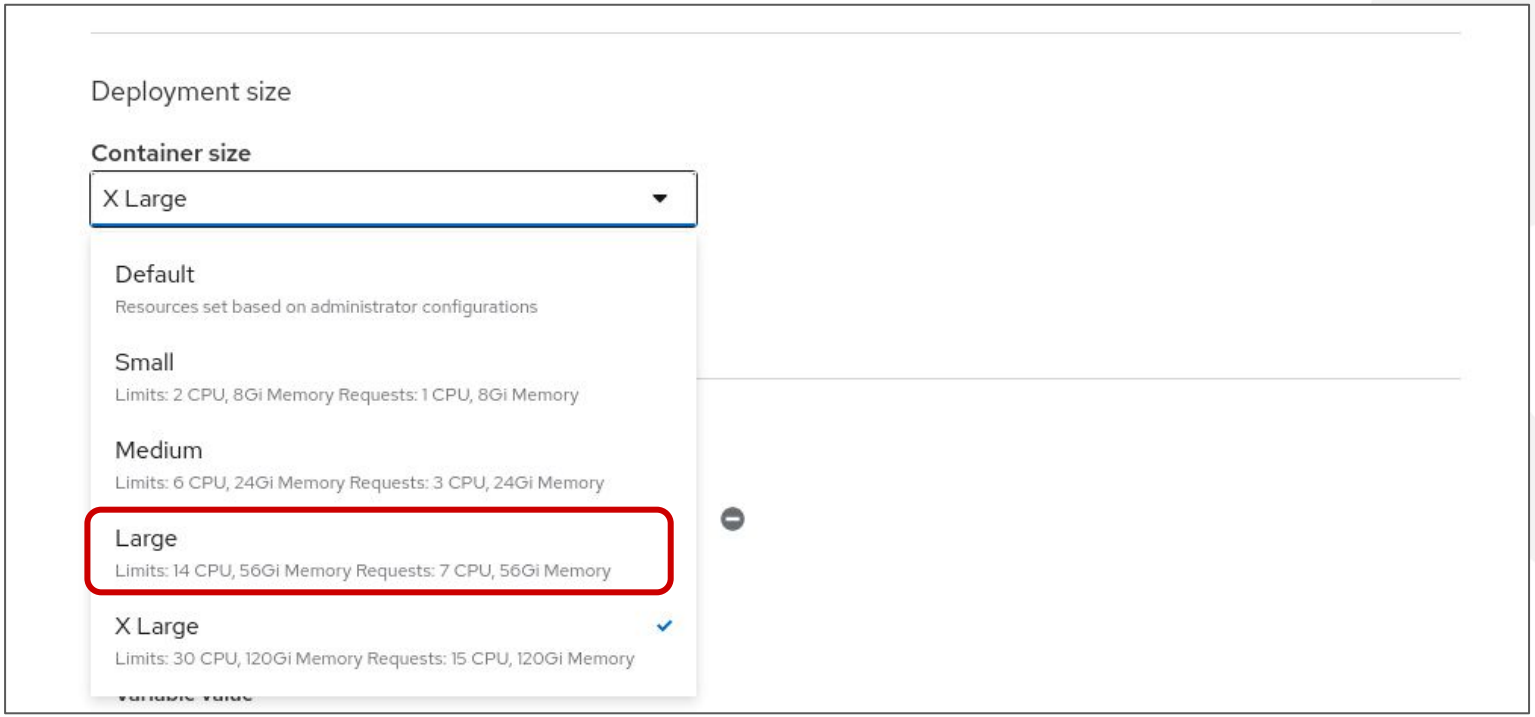
Create a JupyterHub notebook image



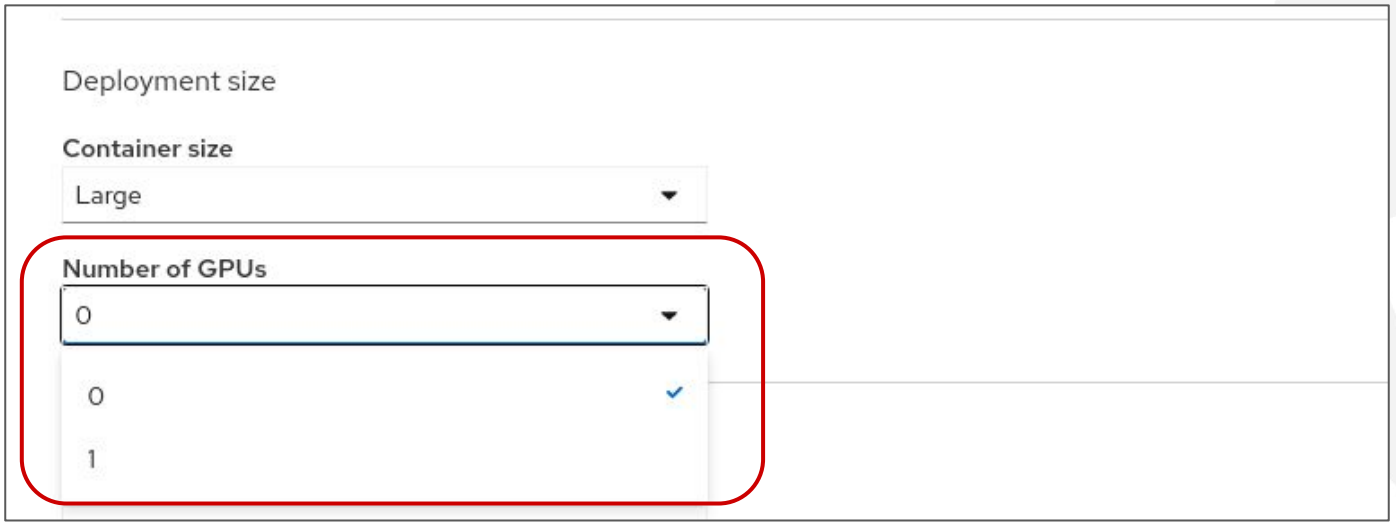
Available notebook images



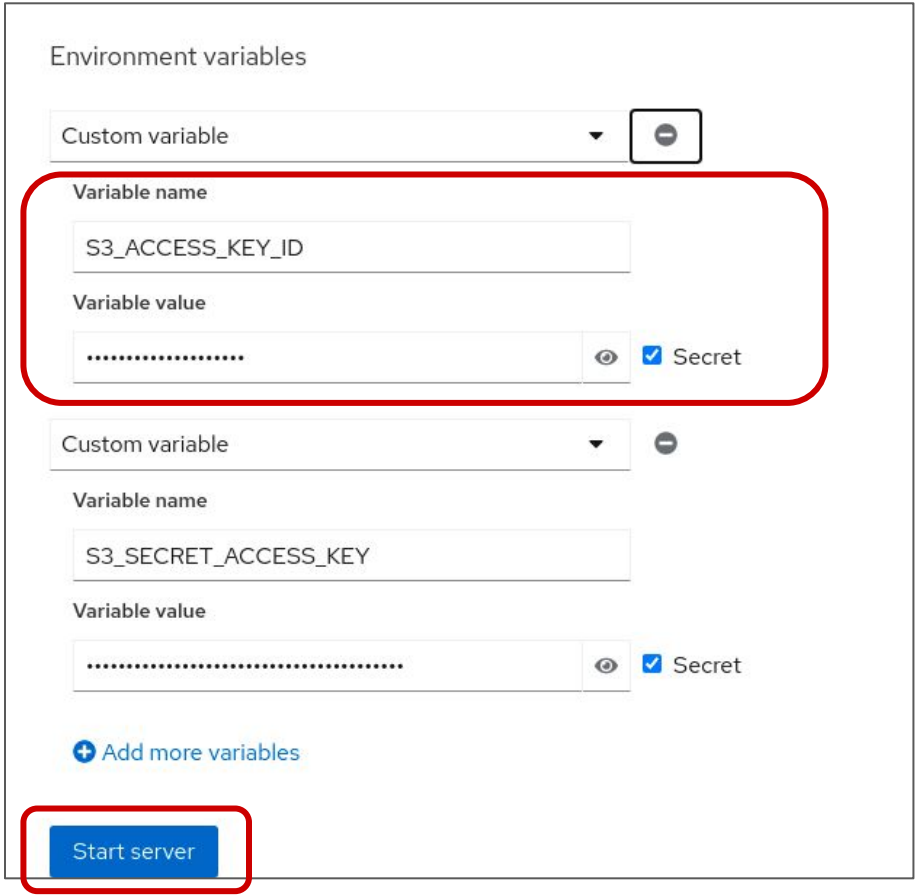
Deployment size: Choosing a Container size



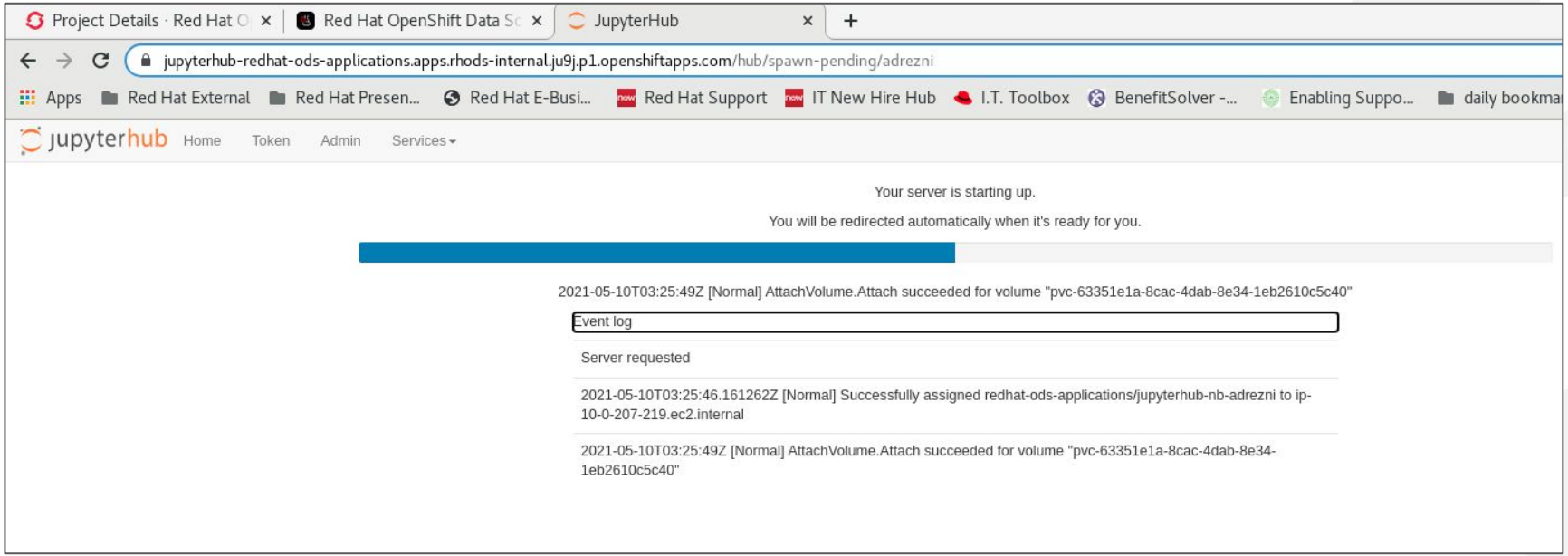
Deployment size: adding a GPU



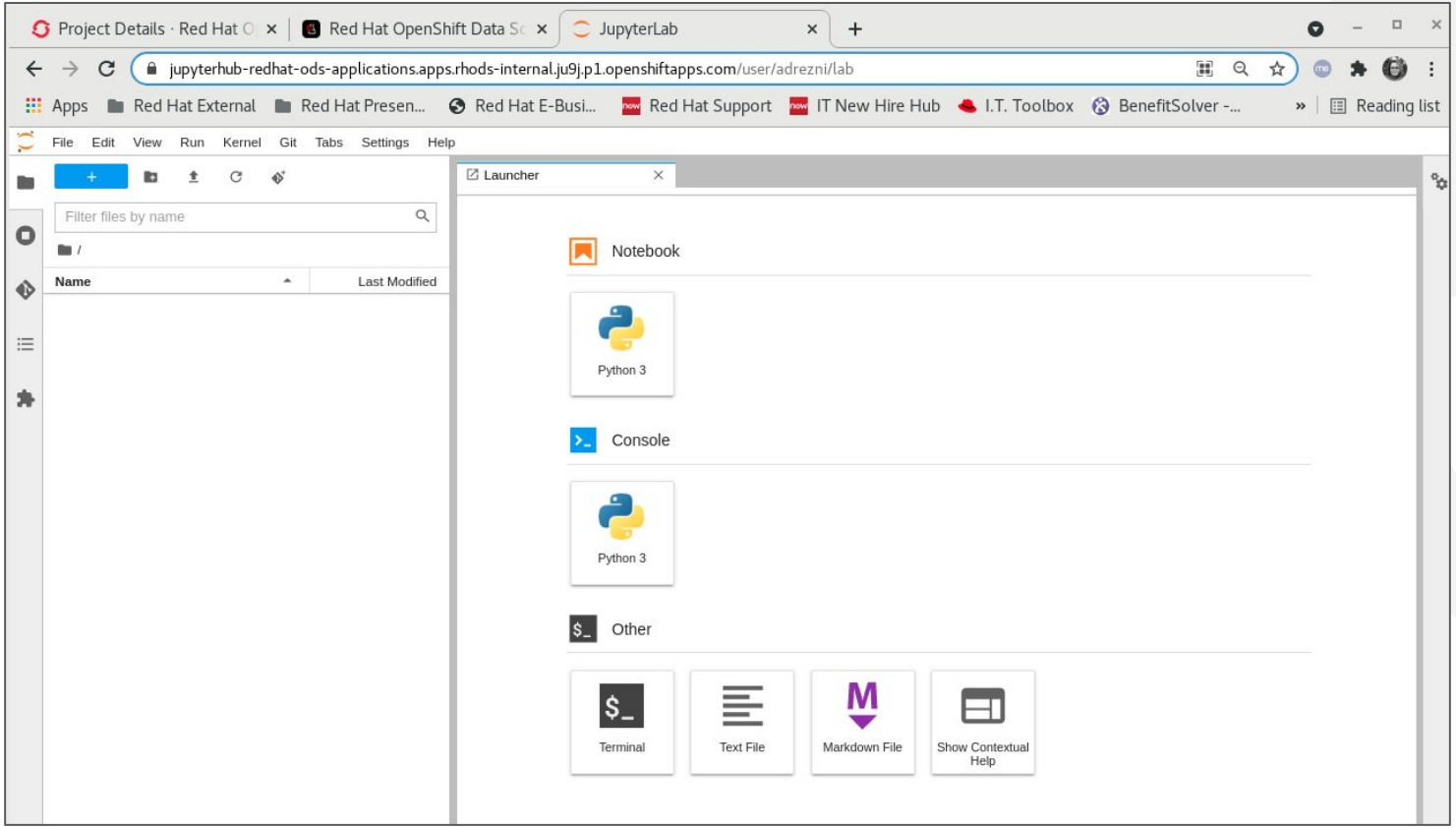
Environment Variables



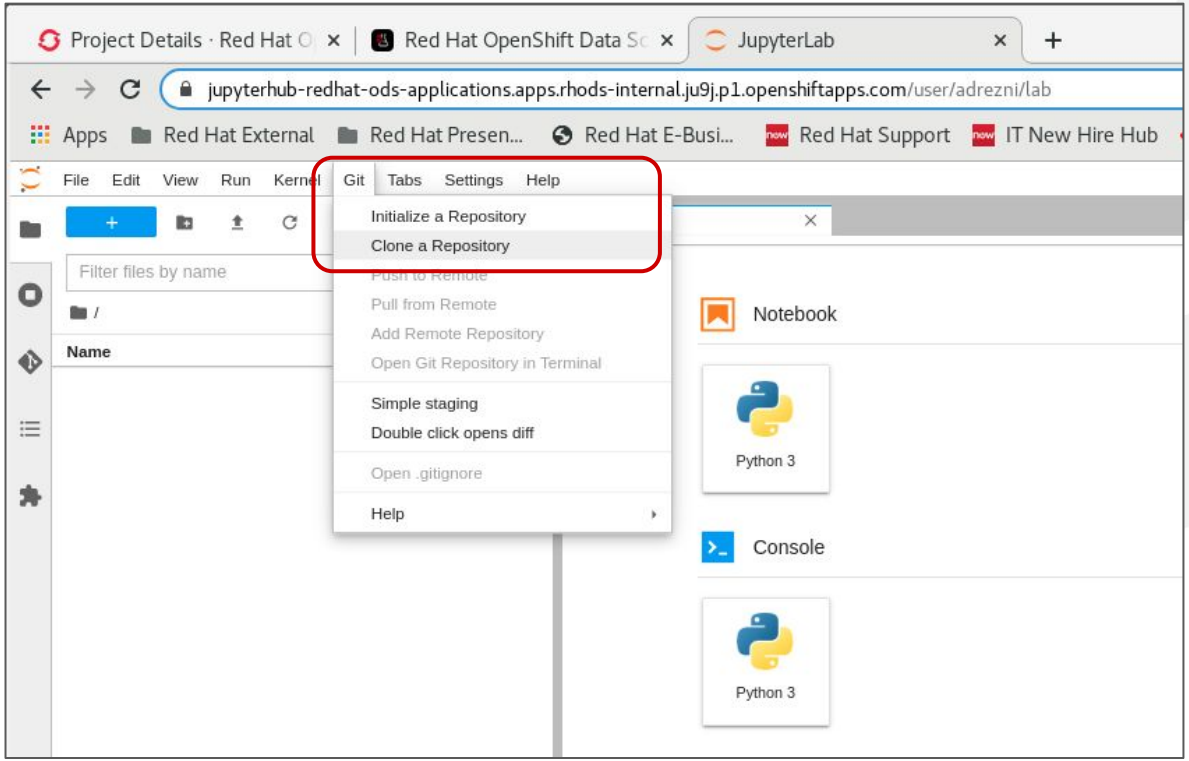
Server Start up...



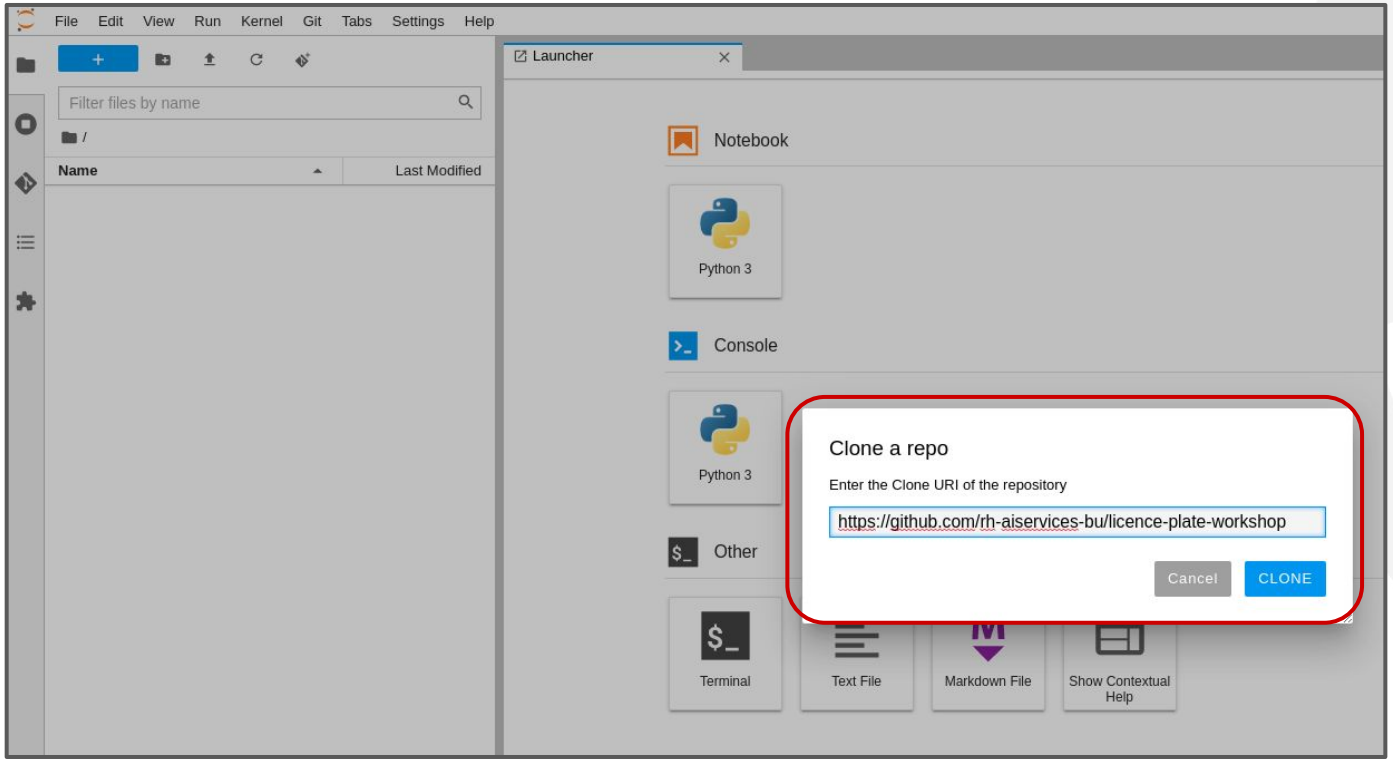
Welcome to JupyterLab!



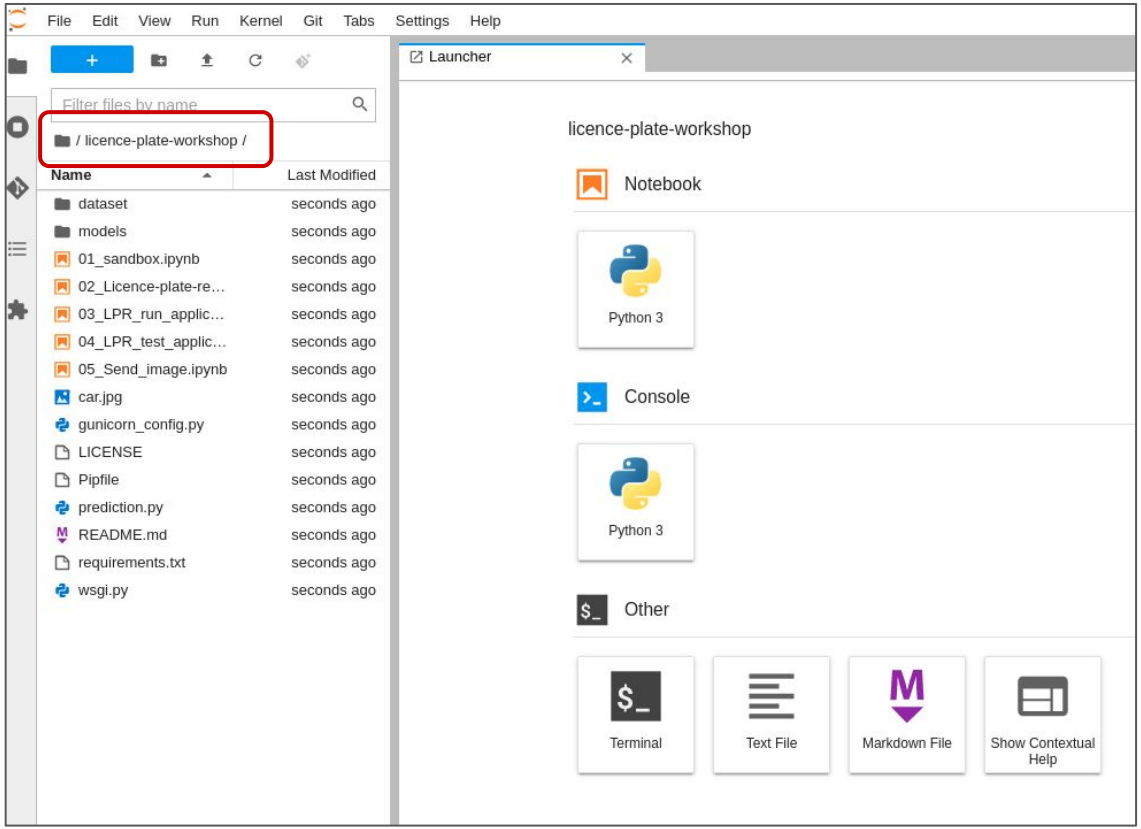
Choose “Clone a Repository” from the “Git” menu



Clone license plate GIT repo



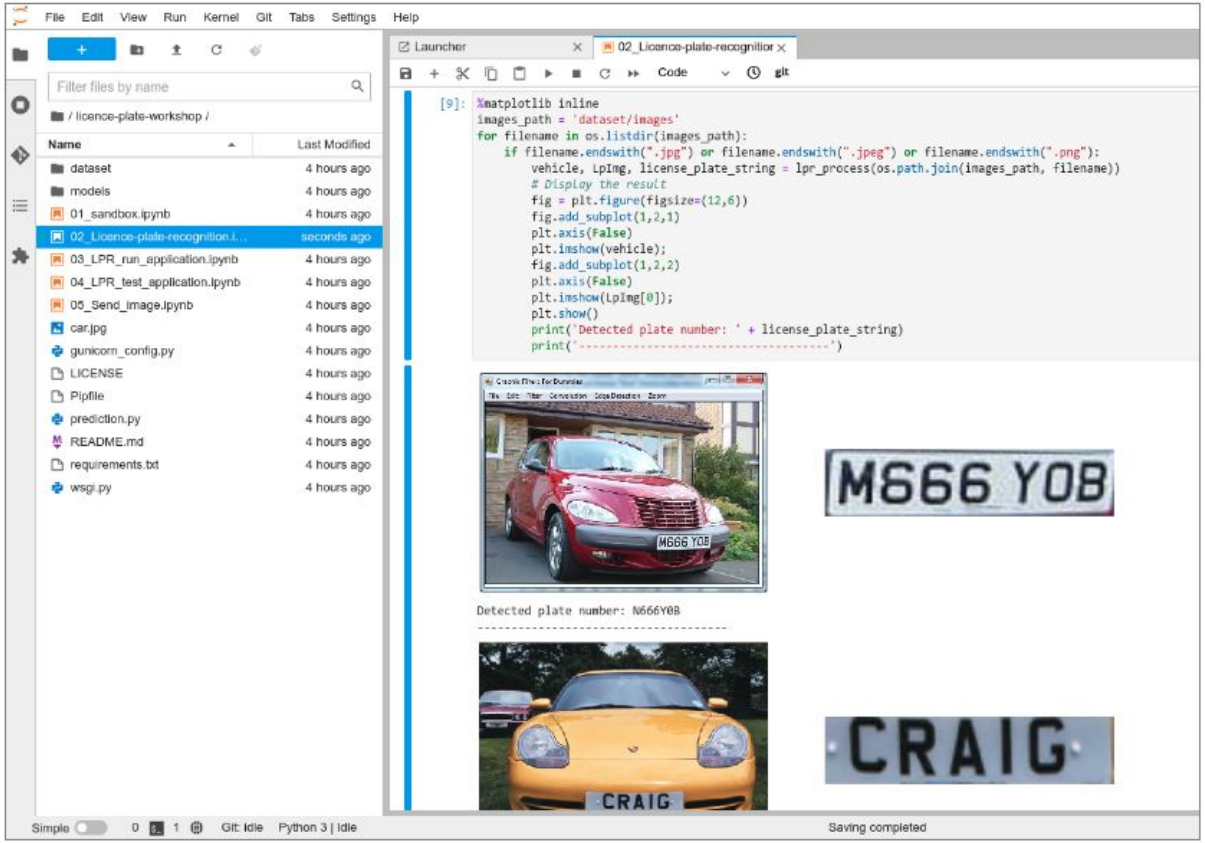
License plate repo



The '**license-plate-workshop**' repo files will appear under the "**Name**" pane.

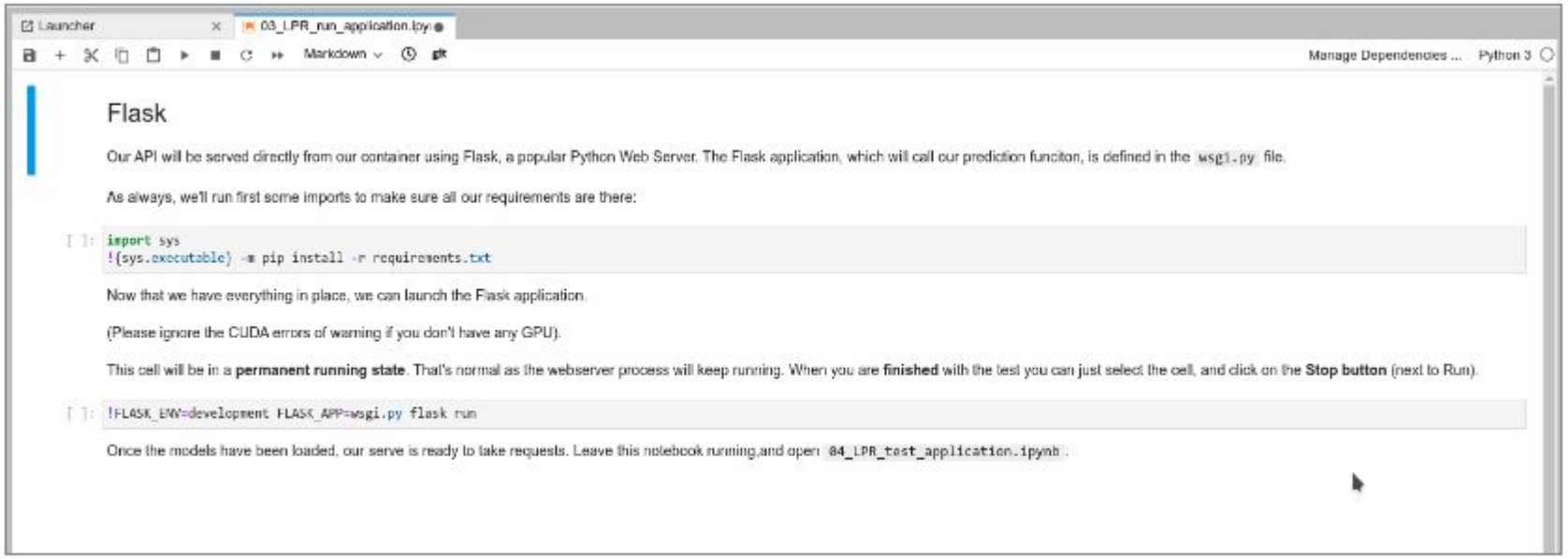
Red Hat OpenShift

Ready to Experiment using a Jupyter Notebook

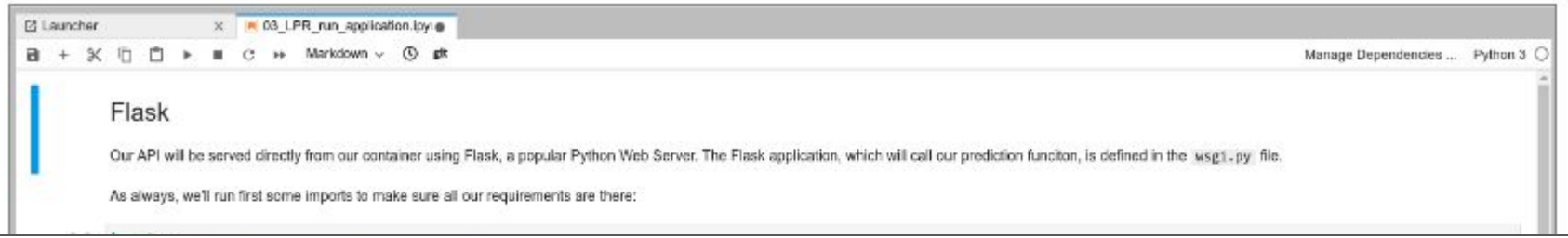


Red Hat OpenShift

Package the Model as an API



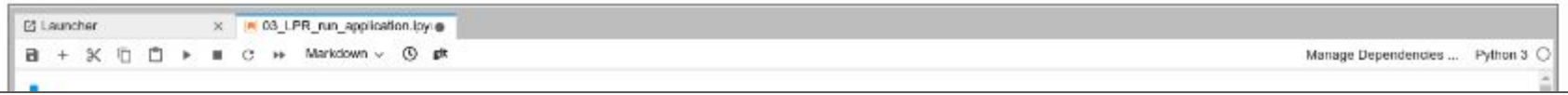
Package the Model as an API



You'll first launch the Server:

```
!FLASK_ENV=development FLASK_APP=wsgi.py flask run
 * Serving Flask app "wsgi.py" (lazy loading)
 * Environment: development
 * Debug mode: on
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
 * Restarting with stat
```

Package the Model as an API



Then query the API:

Test Flask App

From the other notebook, `03_LPR_run_application.ipynb`, the flask app is running and ready to serve requests using python http or `curl` statements.

We can start by testing that the server is indeed running:

```
[1]: !curl http://localhost:5000/status
```

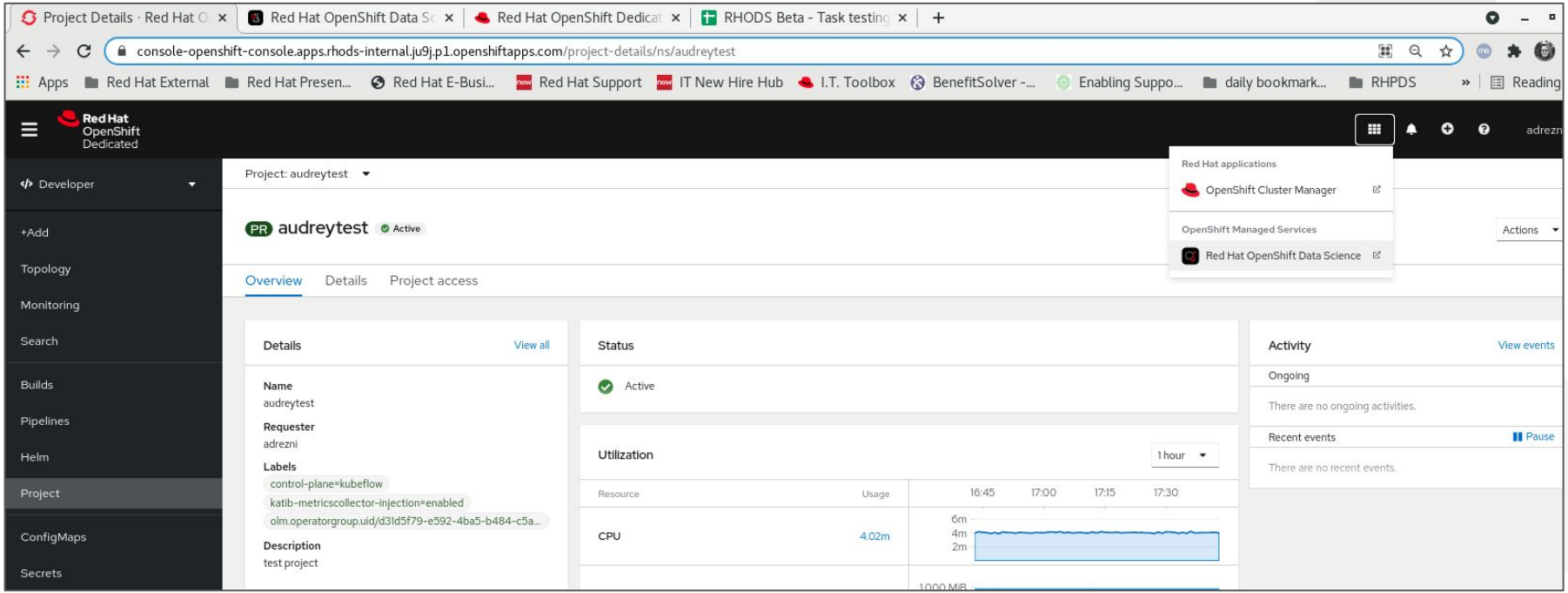
```
{
  "status": "ok"
}
```

Now we can use curl to send the name of an image, and wait for the result:

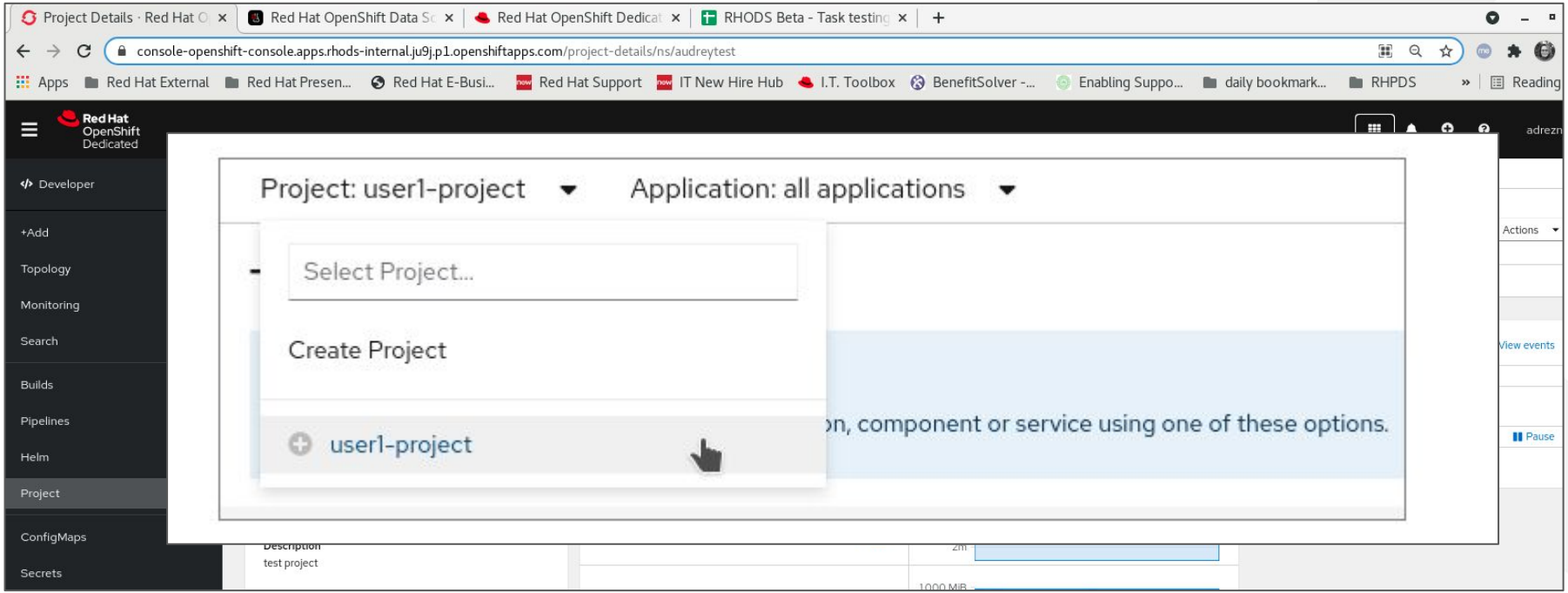
```
[2]: !curl -X POST -H "Content-Type: application/json" --data '{"data": "Cars374.png"}' http://localhost:5000/predictions
```

```
{
  "prediction": "S7JDV"
}
```

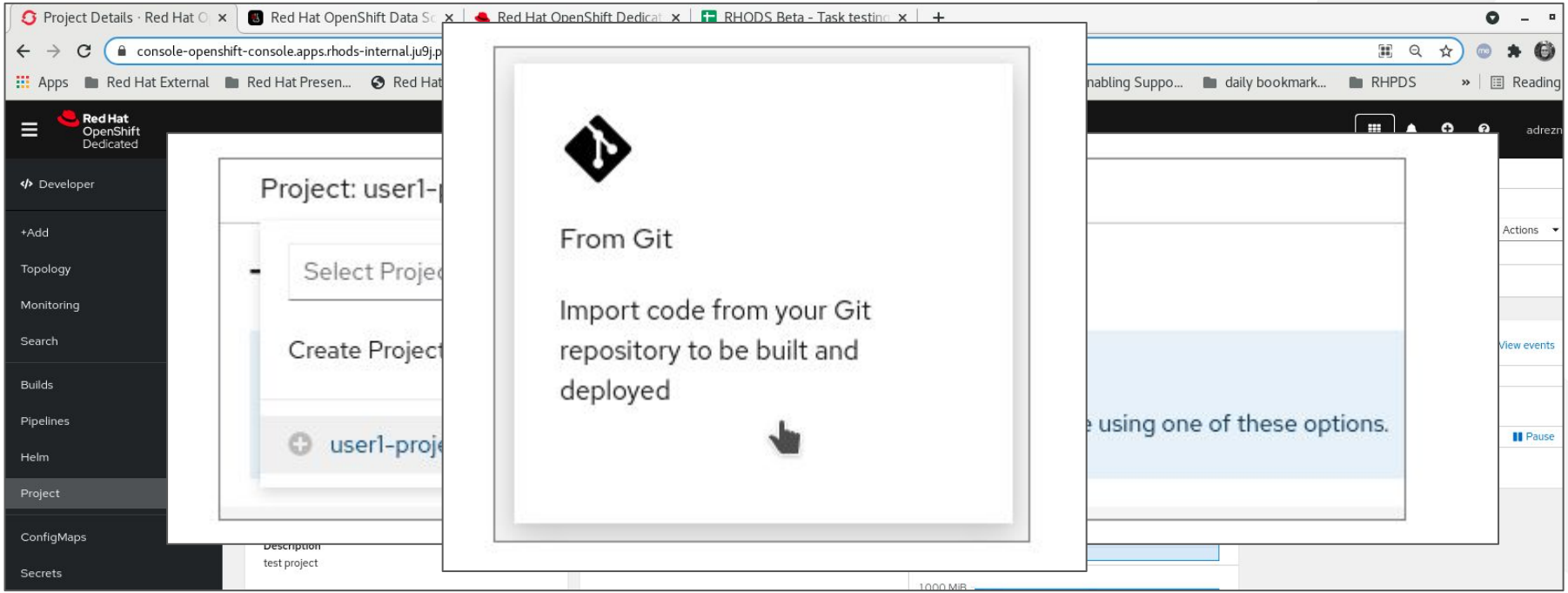
Build the application inside OpenShift



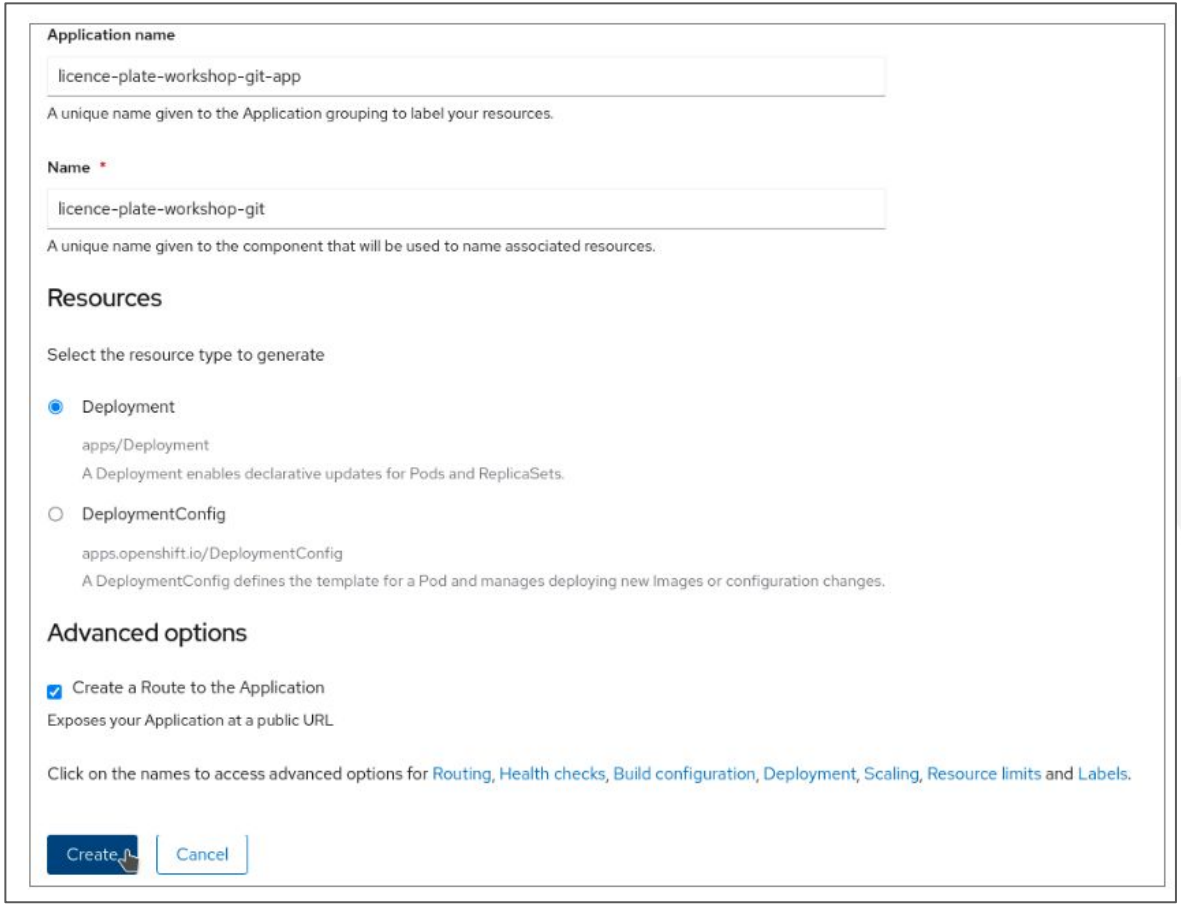
Build the application inside OpenShift



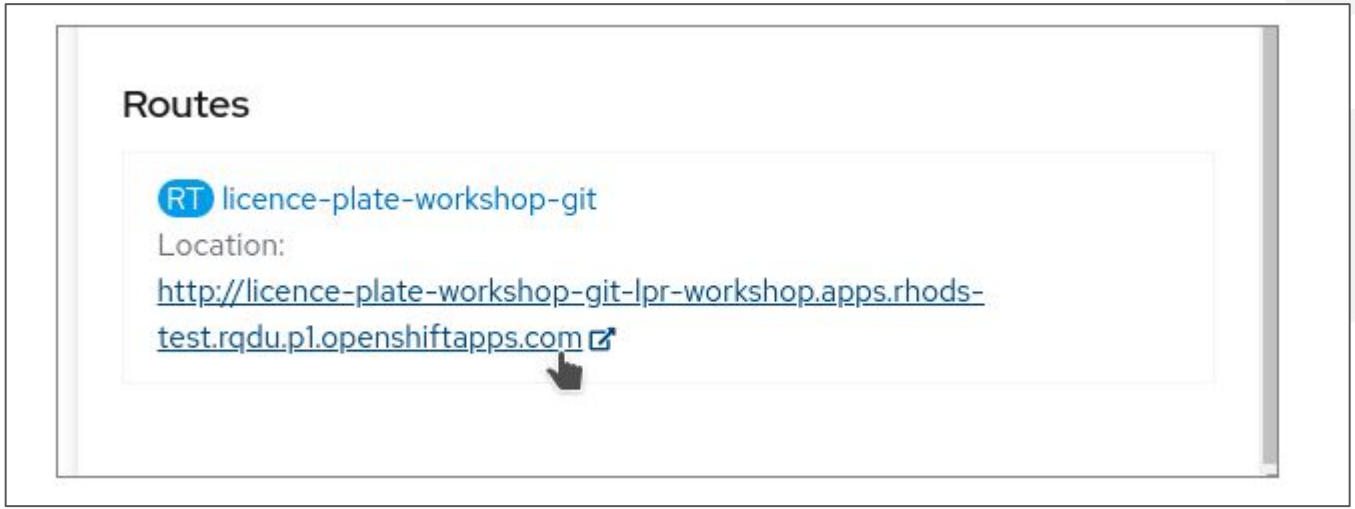
Build the application inside OpenShift



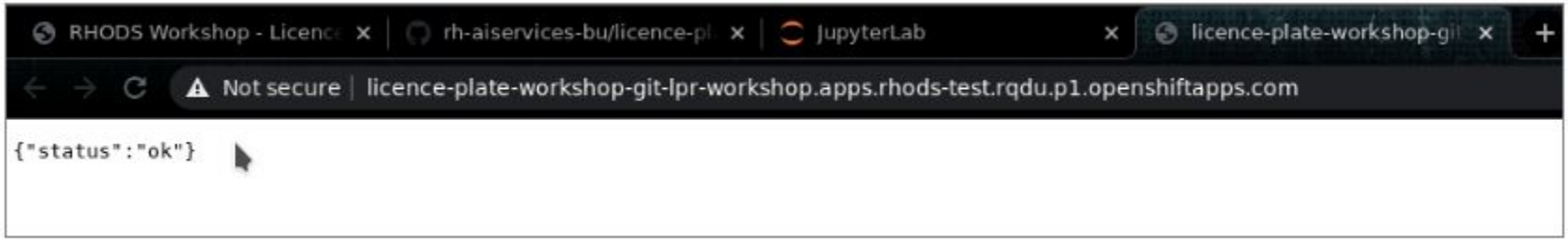
Build the application inside OpenShift



Build the application inside OpenShift



Test our Deployed AIML Application



Test our Deployed AIML Application

CURL on Linux or Mac with bash/zsh

From anywhere you have an example image like `car.jpg` (replace with the right name in the command, as well as the Route with `/predictions` at the end):

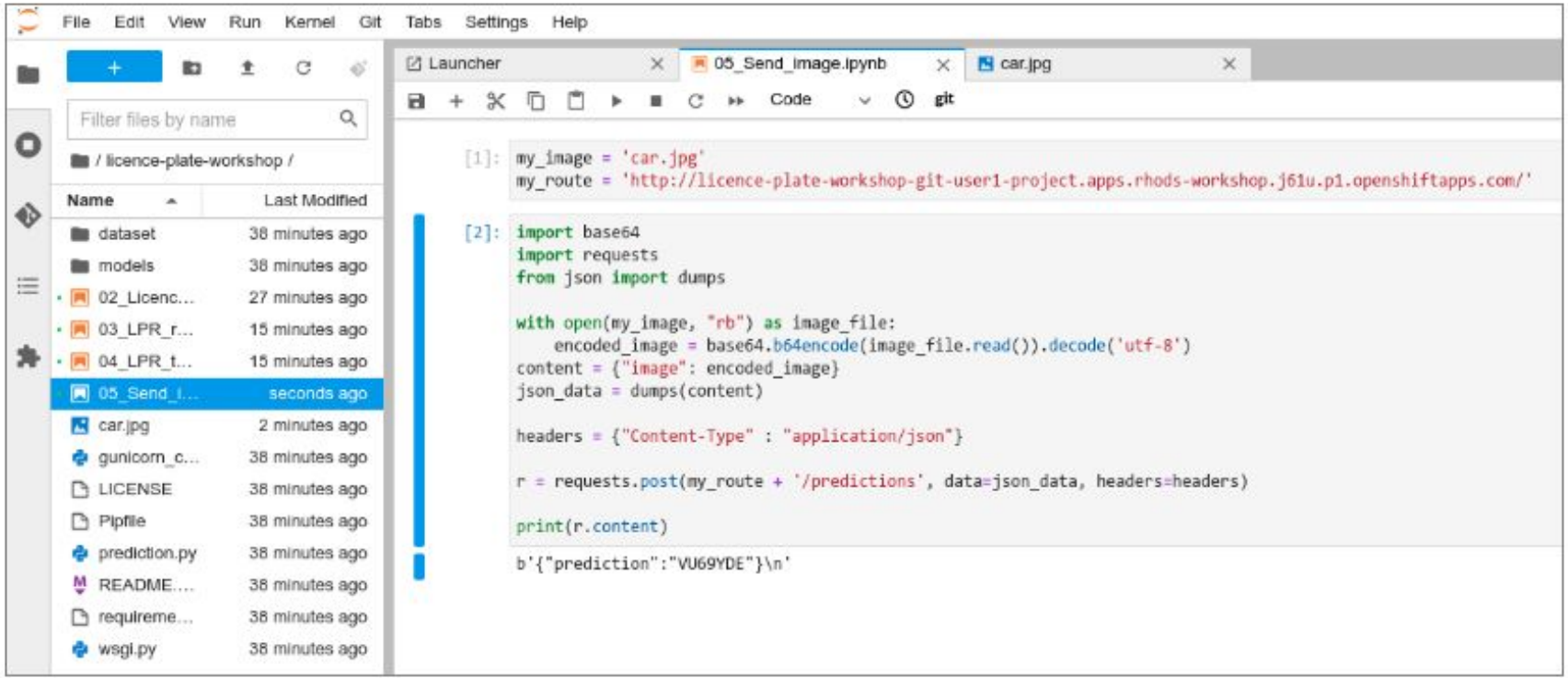
```
(echo -n '{"image": "'; base64 car.jpg; echo '"}') | curl -H "Content-Type: application/json" -
```

Invoke-WebRequest on Windows with Powershell

From anywhere you have an example image like `car.jpg` (replace with the complete path and name in the command, as well as the Route with `/predictions` at the end):

```
Write-Output ('{"image": "' + ([Convert]::ToBase64String([IO.File]::ReadAllBytes('C:\Users\Guil
```

Test our Deployed AIML Application



Test our Deployed AIML Application

File Edit View Run Kernel Git Tabs Settings Help

Launcher | 05_Send_image.ipynb | car.jpg

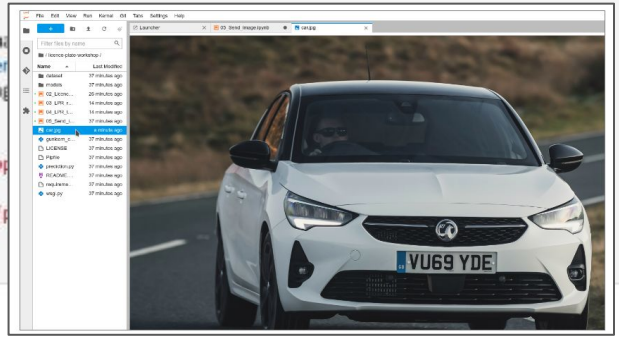
Code | git

Filter files by name

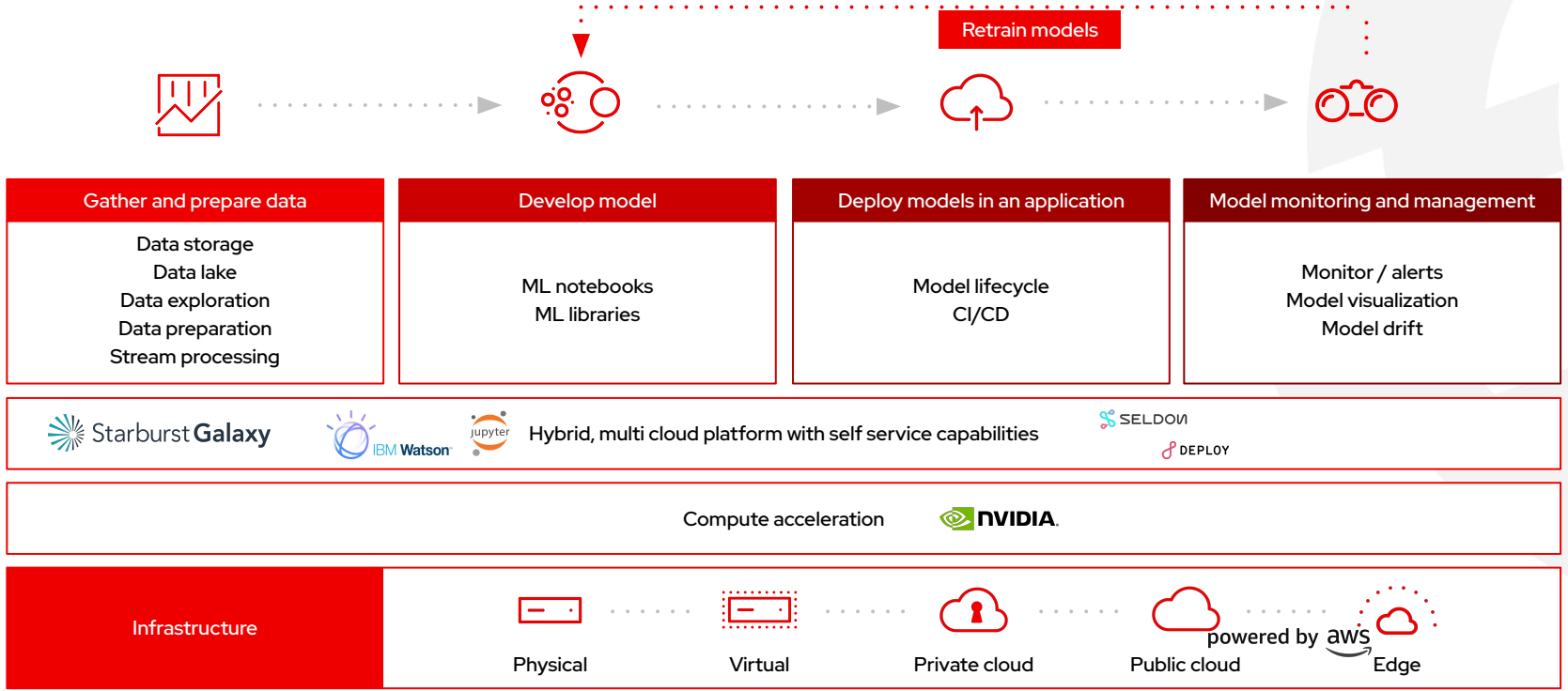
/ licence-plate-workshop /

Name	Last Modified
dataset	38 minutes ago
models	38 minutes ago
02_Licenc...	27 minutes ago
03_LPR_r...	15 minutes ago
04_LPR_t...	15 minutes ago
05_Send_i...	seconds ago
car.jpg	2 minutes ago
gunicorn_c...	38 minutes ago
LICENSE	38 minutes ago
Pipfile	38 minutes ago
prediction.py	38 minutes ago
README....	38 minutes ago
requireme...	38 minutes ago
wsgi.py	38 minutes ago

```
[1]: my_image = 'car.jpg'
     my_route = 'http://licence-plate-workshop-git-user1-project.apps.rhods-workshop.j61u.p1.openshiftapps.com/'

[2]: import base64
     import requests
     from json import dumps

     with open(my_image, "rb") as ima
         encoded_image = base64.b64en
     content = {"image": encoded_imag
     json_data = dumps(content)

     headers = {"Content-Type" : "app

     r = requests.post(my_route + '/p

     print(r.content)

     b'{"prediction":"VU69YDE"}\n'
```

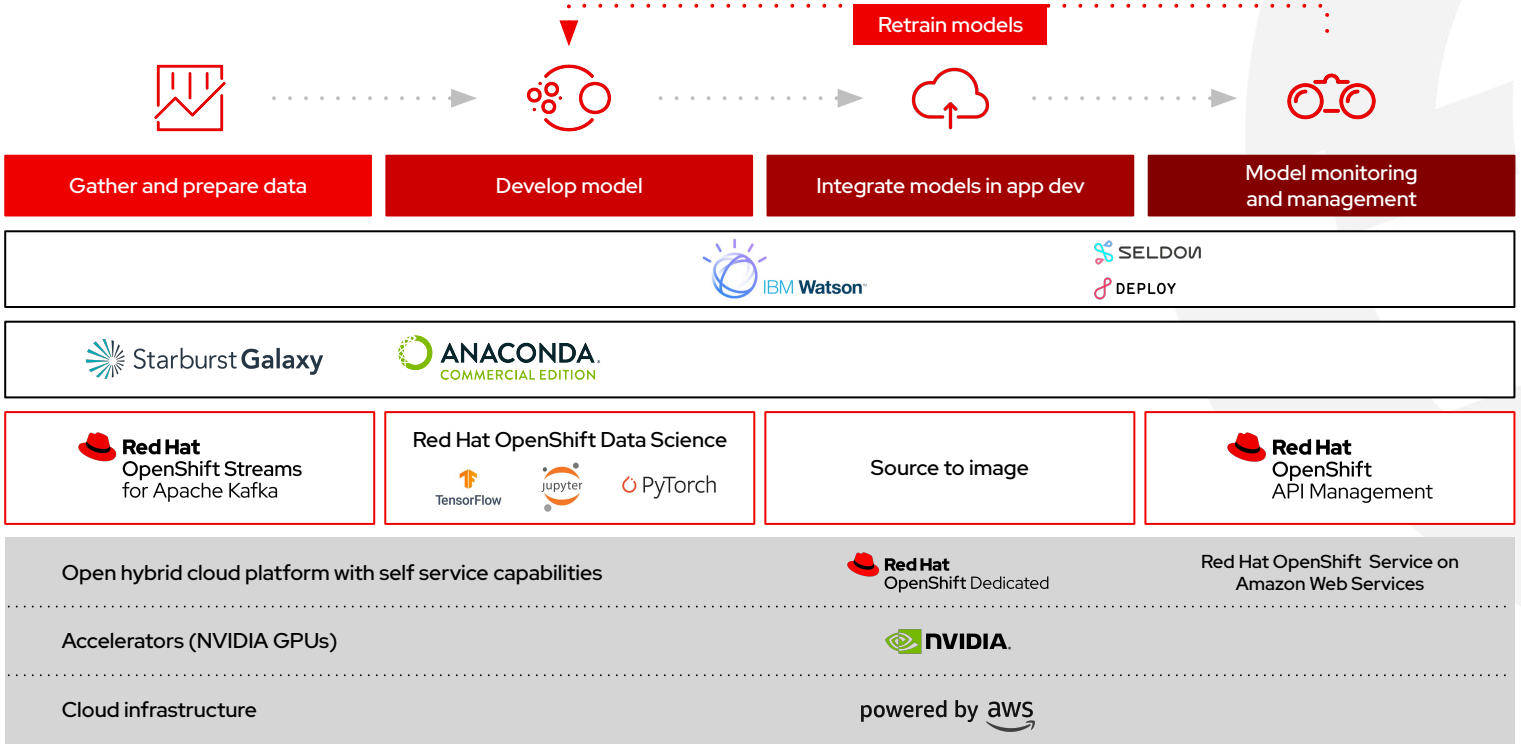


Conceptual Architecture for Managed Services and Model Delivery



Red Hat OpenShift

Red Hat OpenShift Data Science Platform



Red Hat OpenShift

What did we learn today?

1. What are Managed Services?
    a. Who cares about them?
2. Where do I find Managed Services?
    a. Public Cloud, Hybrid Cloud, onPrem
3. What do Managed Services have to do with Model Delivery?
    a. Use case
4. Are Managed Services easy to use?

Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

linkedin.com/company/red-hat

youtube.com/user/RedHatVideos

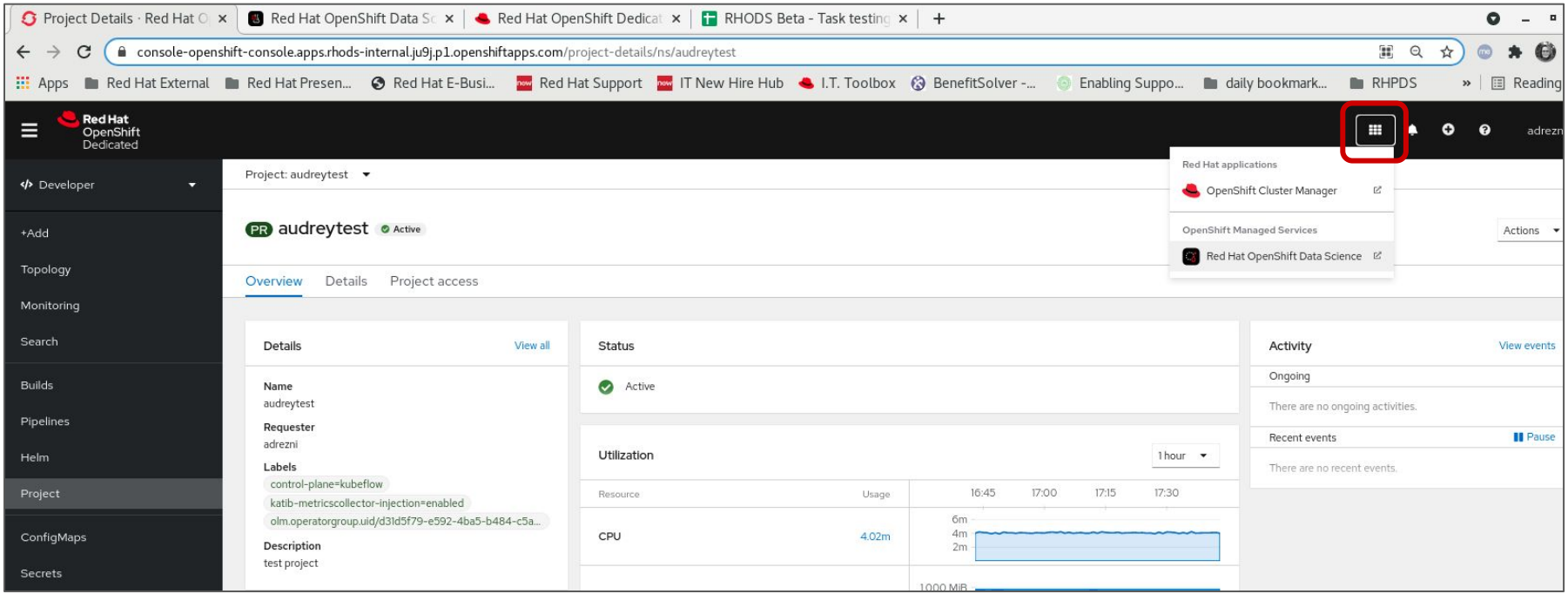
facebook.com/redhatinc

twitter.com/RedHat

Red Hat

Backup Slides

Log into our Platform

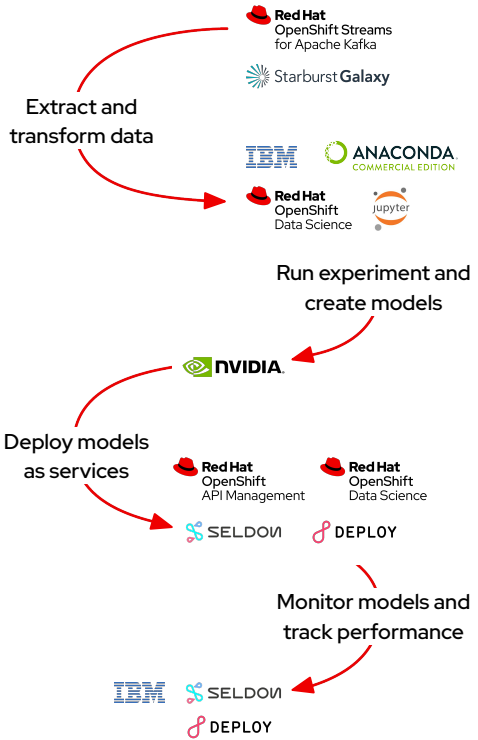


Say hello to Bob and his AIML model!

Ok I have my model working perfectly on my laptop. I just need to put this into production by 8am tomorrow for my customer demo!

$#@! %#* !*@#!!!

… and the model operationalization life cycle using RHODS



Starburst Galaxy

Unlock the value of your data by making it fast and easy to access data across hybrid cloud.

Anaconda Commercial Edition

Curated access to an extensive set of data science packages to be used in your Jupyter projects.

IBM Watson Studio

Build, run, and manage AI models at scale with Watson Machine Learning and Watson OpenScale.

NVIDIA

GPU-enabled hardware makes it easier for customers to stand up resource-intensive environments and accelerate their data science experiments.

Seldon Deploy

Simplify and accelerate the process of deploying and managing your machine learning models.