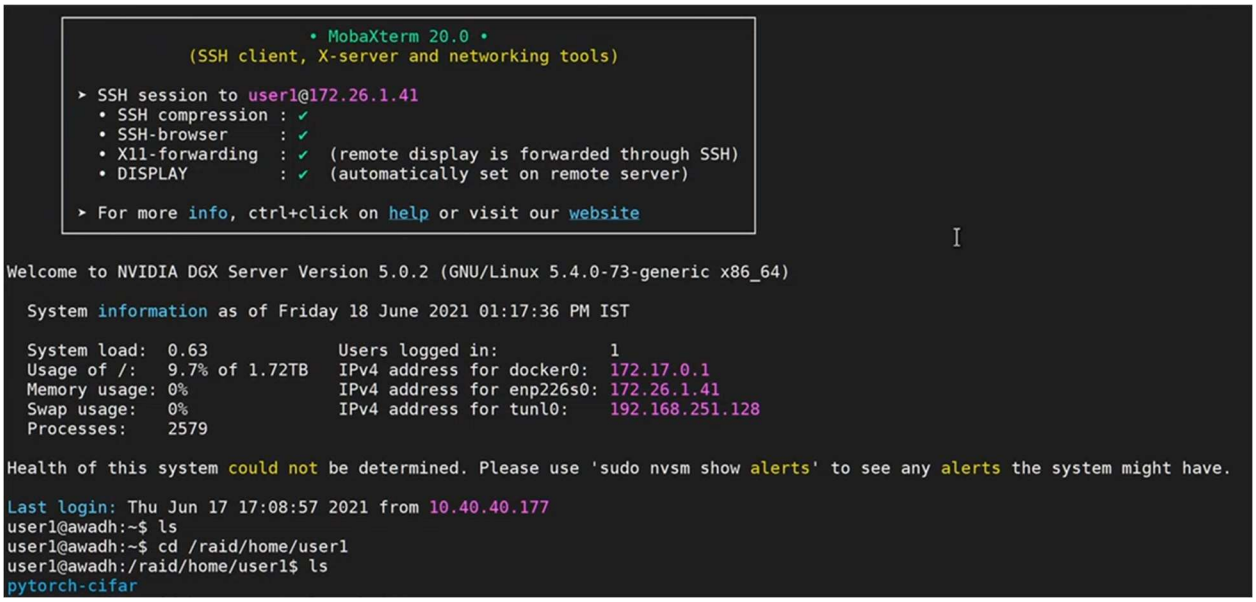
User guide

kubernetes

1. Login to the user account



2. Check your present directory

   $ pwd

3. Launch jupyter notebook

   $ launch-jupyter-mig

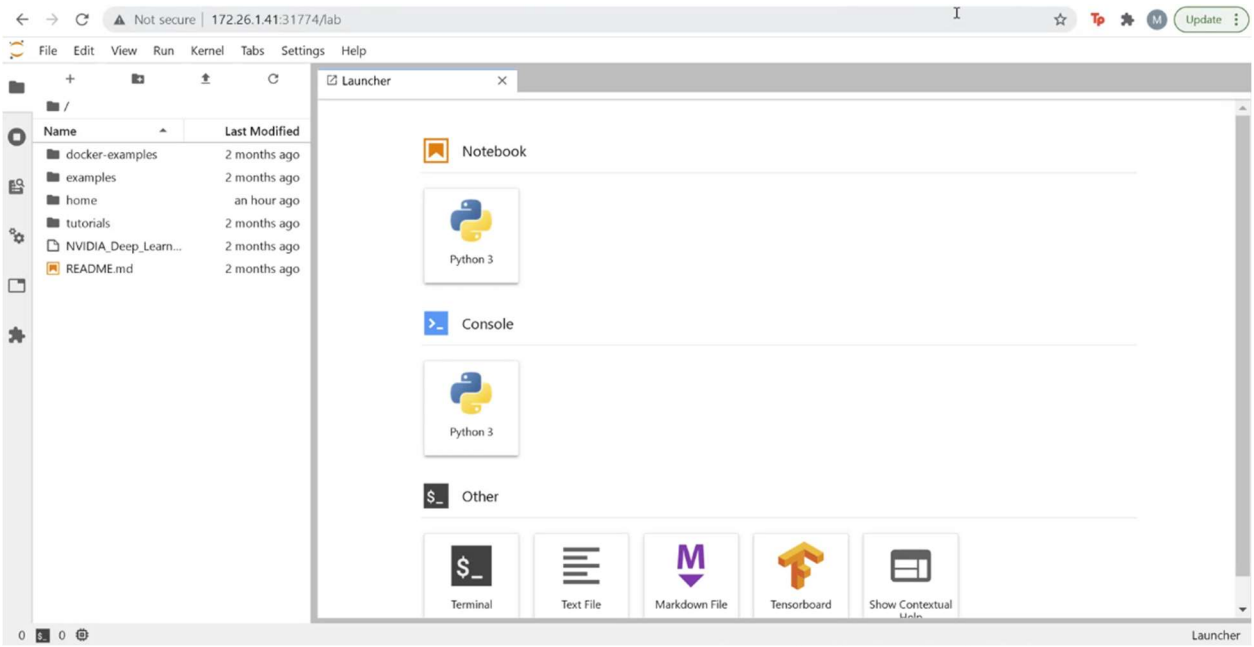
```
user1@awadh:~$ launch-jupyter-mig
Enter Docker Image
nvcr.io/nvidia/pytorch:21.05-py3
Enter MIG Instance
A = 1g.5gb
B = 2g.10gb
C = 3g.20gb
D = 4g.20gb
E = 7g.40gb
A
Enter Instance Name
pytorch
1
deployment.apps/pytorch created
service/pytorch created
[{"status" : "Successful", "Host IP Link" : "http://172.26.1.41:31774/?token=6ed45582c72ae329aff1c14f5e1dd5999d2de78f1829d5e7"}]
user1@awadh:~$
```

4. Get the url to access jupyter notebook

   $ cat jupyter-login-<instance-name>.txt

```
user1@awadh:~$ ls
jupyter-login-pytorch.txt
user1@awadh:~$ cat jupyter-login-pytorch.txt
http://172.26.1.41:31774/?token=6ed45582c72ae329aff1c14f5e1dd5999d2de78f1829d5e7
user1@awadh:~$
```

5. Launch jupyterlab in browser



- Copy and paste the url of the instance in the browser.

6. Launch the batch job

   $ launch-job

```
user1@awadh:~$ launch-job
Enter Docker Image
nvcr.io/nvidia/pytorch:21.05-py3
Enter MIG Instance
A = 1g.5gb
B = 2g.10gb
C = 3g.20gb
D = 4g.20gb
E = 7g.40gb
A
Enter Job Name
pytorch
Enter Command
python3
Enter Arguments
/workspace/home/pytorch-cifar/main.py
1
job.batch/pytorch created
user1@awadh:~$ kubectl get pods
NAME            READY   STATUS    RESTARTS   AGE
pytorch-ghzdm   1/1     Running   0          4s
user1@awadh:~$
```

Note

- Check the log of job
  $ logs <pod-name>

```
user1@awadh:~$ kubectl logs pytorch-ghzdm
170499072it [03:31, 805402.37it/s]                              s]
==> Preparing data..
Downloading https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz to ./data/cifar-10-python.tar.gz
Extracting ./data/cifar-10-python.tar.gz to ./data
Files already downloaded and verified
==> Building model..

Epoch: 0
user1@awadh:~$ kubectl logs pytorch-ghzdm
170499072it [03:31, 805402.37it/s]                              s]
==> Preparing data..
Downloading https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz to ./data/cifar-10-python.tar.gz
Extracting ./data/cifar-10-python.tar.gz to ./data
Files already downloaded and verified
==> Building model..

Epoch: 0
 [========>.....................................................]  Step: 92ms | Tot: 4s925ms | user1@awadh:~$ kubectl logs pytorch-ghzdm
170499072it [03:31, 805402.37it/s]                              s]
==> Preparing data..
Downloading https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz to ./data/cifar-10-python.tar.gz
Extracting ./data/cifar-10-python.tar.gz to ./data
Files already downloaded and verified
==> Building model..

Epoch: 0
[========================== 268/391 =======>...................]  Step: 92ms | Tot: 24s773ms | Loss: 1.972 | Acc: 29.032% (9959/34304)
```

- Destroy the running instances
  $ destroy-jupyter -d <instance-name>
  $ destroy-job -d <instance-name>

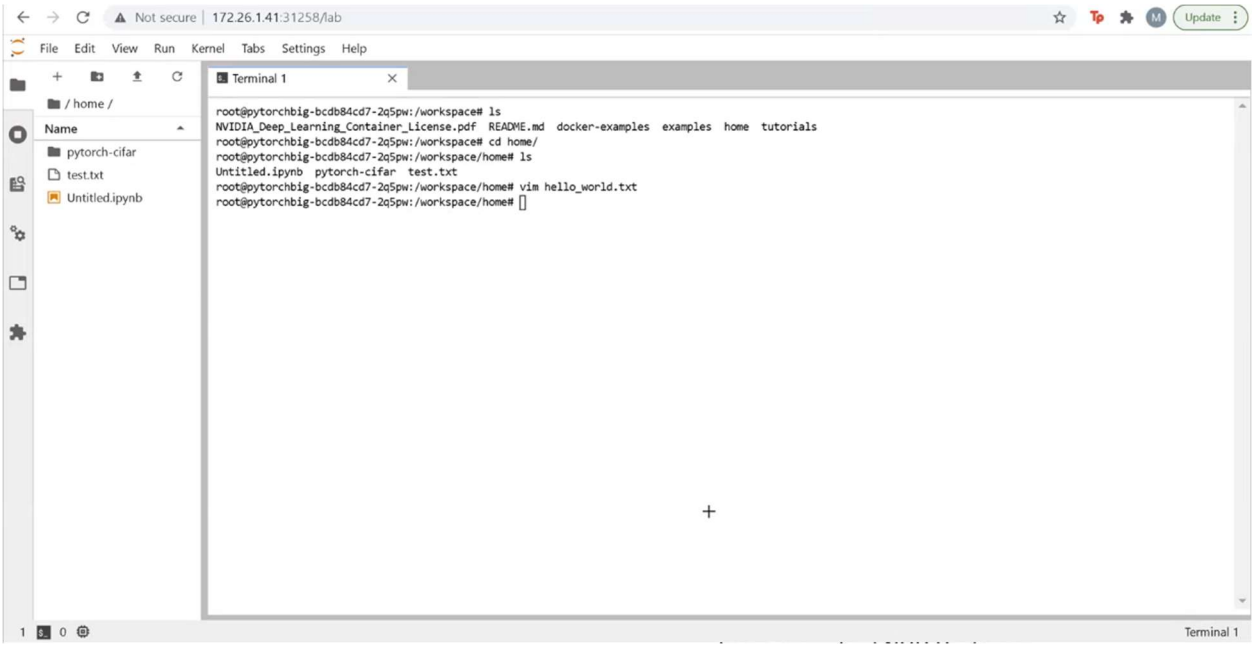
```
user1@awadh:~$ ls
jupyter-login-pytorchbig.txt  jupyter-login-pytorch.txt
user1@awadh:~$ destroy-jupyter -d pytorch
Enter the command in the format destroy-deployment -d 'Instance Name'
deployment.apps "pytorch" deleted
service "pytorch" deleted
user1@awadh:~$ destroy-jupyter -d pytorchbig
Enter the command in the format destroy-deployment -d 'Instance Name'
deployment.apps "pytorchbig" deleted
service "pytorchbig" deleted
user1@awadh:~$ kubectl get pods
NAME                       READY   STATUS        RESTARTS   AGE
pytorch-7cf657c5c4-zzcsc   0/1     Terminating   0          20m
user1@awadh:~$ kubectl get pods
NAME                       READY   STATUS        RESTARTS   AGE
pytorch-7cf657c5c4-zzcsc   0/1     Terminating   0          20m
user1@awadh:~$ kubectl get pods
No resources found in user1 namespace.
user1@awadh:~$ kubectl get pods
No resources found in user1 namespace.
user1@awadh:~$
```

```
user1@awadh:~$ destroy-j
destroy-job      destroy-jupyter
user1@awadh:~$ destroy-j
destroy-job      destroy-jupyter
user1@awadh:~$ destroy-j
destroy-job      destroy-jupyter
user1@awadh:~$ destroy-job -d pytorch
Enter the command in the format destroy-job -d 'Instance Name'
job.batch "pytorch" deleted
user1@awadh:~$ destroy-jupyter -d ^C
user1@awadh:~$
```

FAQs

1. Where to store the data?

- The data should be stored in the home directory. So even when you log out of the container, your data will be persistent if stored in the /workspace/home/ directory in the jupyter instance.

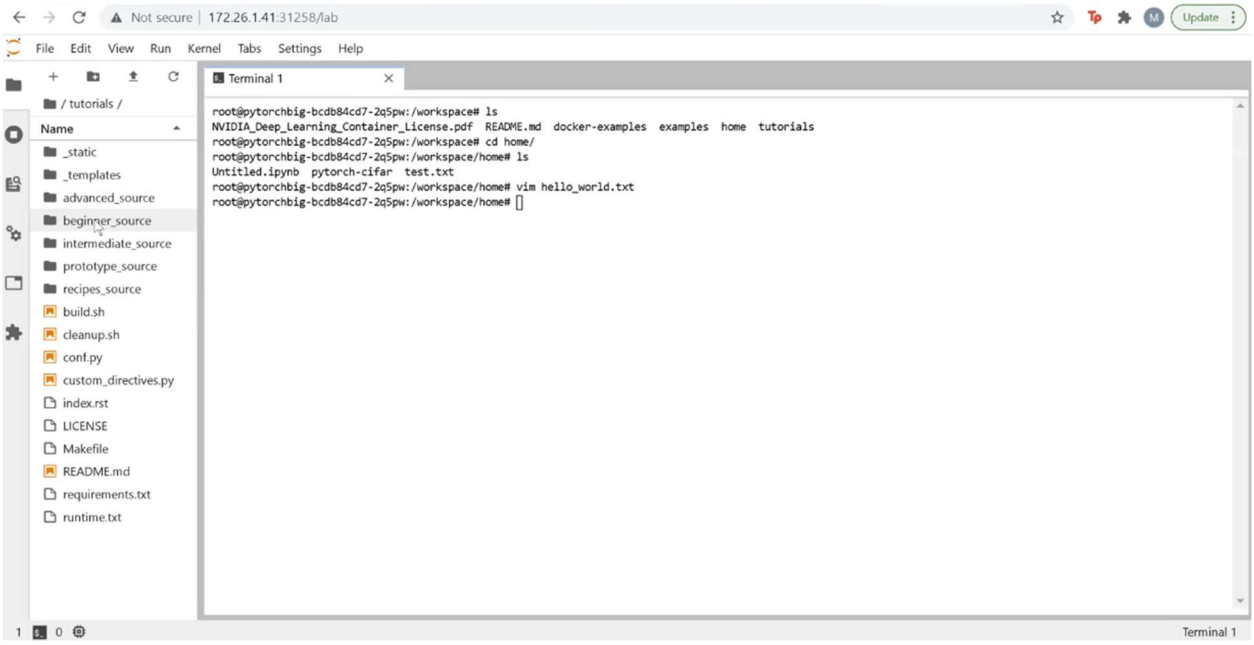


2. How to access one's data?

```
user1@awadh:~$ cd /raid/home/user1
user1@awadh:/raid/home/user1$ ls
pytorch-cifar  test.txt  Untitled.ipynb
user1@awadh:/raid/home/user1$
```

- You can access via terminal by:
  $ cd /raid/home/<user-name>

3. When you are starting with any framework, you can also refer to the tutorials for your reference.

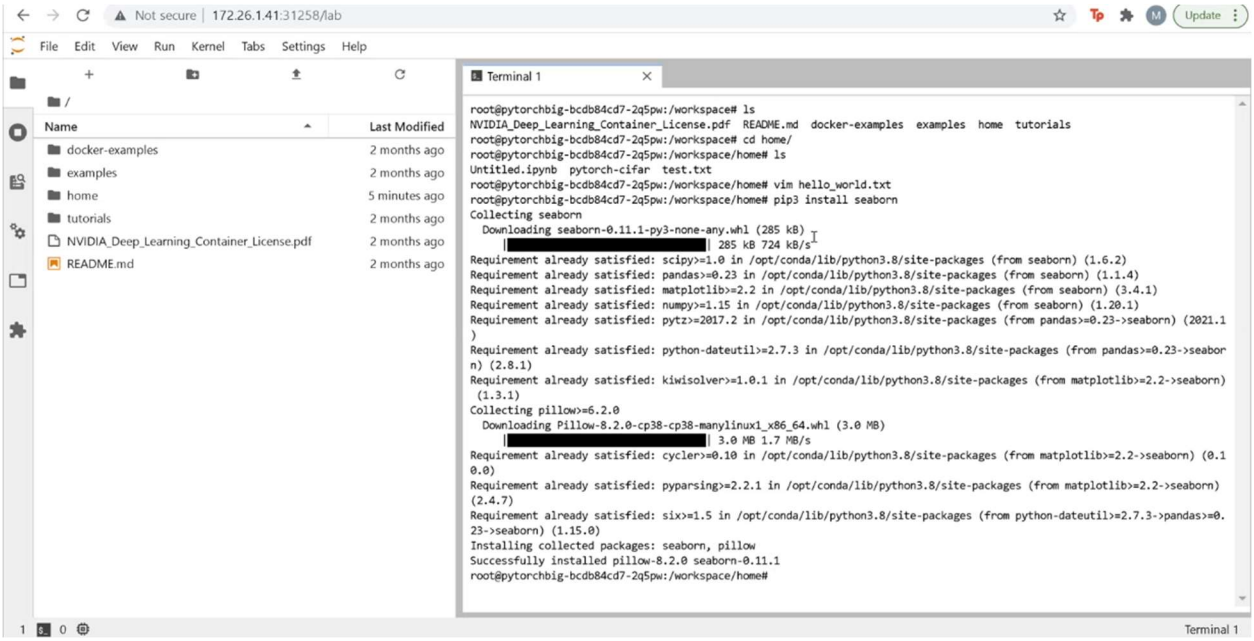


4. When we exit from the ssh session, will the jupyter instance exist or not?

- When a user exits from an ssh session, it will not break the instance. You should keep in mind that jupyter should be used for quick prototyping. It's not meant to run large scale jobs.
- It's possible that you may not have access all the time. A lot of times, GPUs are allocated to other users. You may not find a jupyter instance ready. Running a batch job is more appropriate as it will launch the job, put it into queue and as soon as resources are available, it'll launch the job.

5. Can we download any external libraries in the jupyter instance and will it persist?

- We can download external libraries in the terminal using pip install.
  $ pip install <library-name>



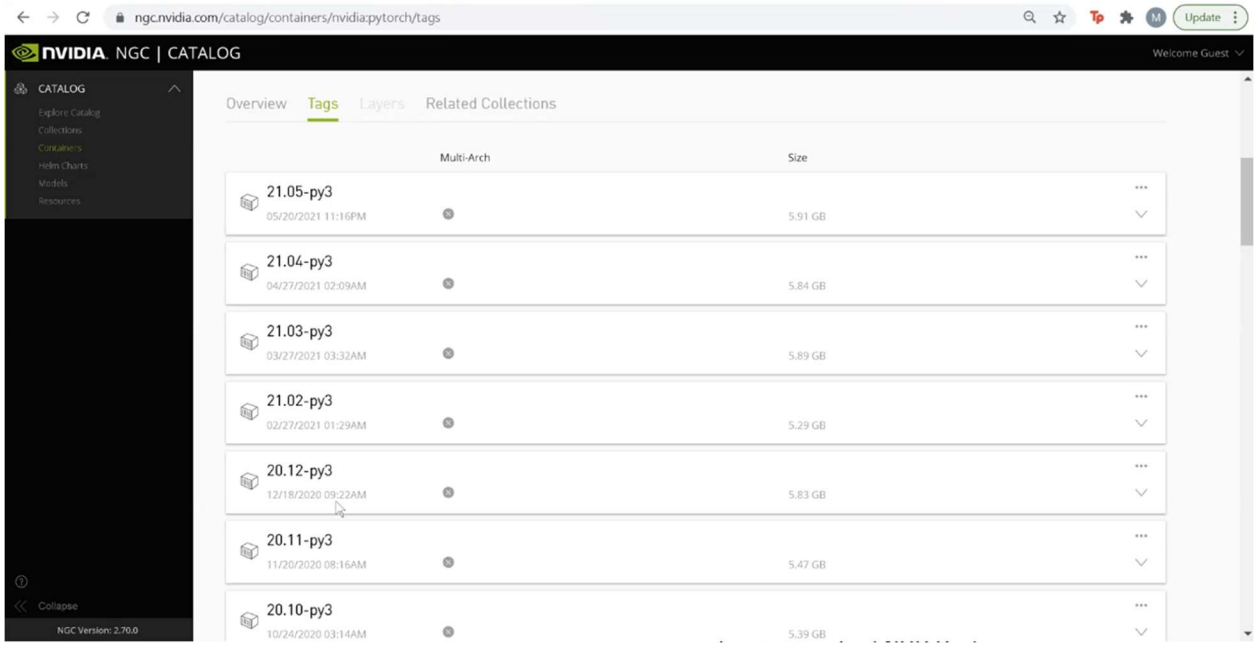
- It will not persist in the jupyter instance, so it's recommended to keep a requirements.txt file. Put all the libraries and install them using pip3 install of the requirement file as you create your new instance.

6. Can we create a virtual environment inside the container?

- It's not recommended as the container has most of the dependencies inside it, also it will not persist.

7. How to get different versions of tensorflow and pytorch?

- You can get them from the NGC site. And you can map the version of framework DL_Framework_SupportMatrix .



8. GPU memory allocation for a container is shared or exclusive to the user?

- GPU memory allocation for a container is exclusive to the user. It is one of the reasons for recommending batch jobs.

9. Common kubectl commands needed.

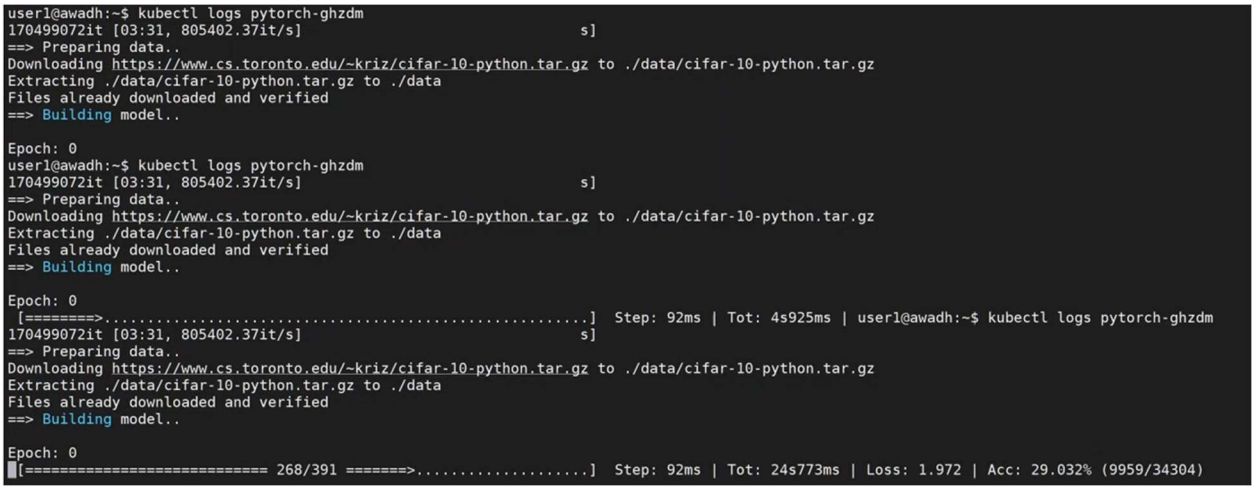
- To see the running pods.
  $kubectl get pods

```
user1@awadh:~$ kubectl get pods
NAME            READY   STATUS    RESTARTS   AGE
pytorch-69gk5   1/1     Running   0          3m53s
```

- To check the state of pod or when pod state is not successful.
  $ kubectl describe pod <pod-name>

```
user1@awadh:~$ kubectl describe pod pytorch-69gk5
Name:         pytorch-69gk5
Namespace:    user1
Priority:     0
Node:         awadh/172.26.1.41
Start Time:   Fri, 18 Jun 2021 14:40:35 +0530
Labels:       controller-uid=69e96719-be4f-499c-81a0-58af63ff134b
              job-name=pytorch
Annotations:  cni.projectcalico.org/podIP: 192.168.251.164/32
              cni.projectcalico.org/podIPs: 192.168.251.164/32
Status:       Running
IP:           192.168.251.164
IPs:
  IP:           192.168.251.164
Controlled By:  Job/pytorch
Containers:
  pytorch:
    Container ID:  docker://8975e04c6a82375a0c2a68c0f168a251a3588fe23a2b21bd44ee3ed7f0a78c50
    Image:         nvcr.io/nvidia/pytorch:21.05-py3
    Image ID:      docker-pullable://nvcr.io/nvidia/pytorch@sha256:a5986639e4cf01eb35c0c0a9ca9fb9c6f905cc1b546966b78de4f69d15b894cf
    Port:          <none>
    Host Port:     <none>
    Command:
      python3
    Args:
      /workspace/home/pytorch-cifar/main.py
    State:          Running
      Started:      Fri, 18 Jun 2021 14:40:36 +0530
    Ready:          True
    Restart Count:  0
    Limits:
      nvidia.com/mig-7g.40gb:  1
    Requests:
      nvidia.com/mig-7g.40gb:  1
    Environment:               <none>
    Environment:               <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from default-token-8nf7v (ro)
      /workspace/home from raid (rw)
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  raid:
    Type:          HostPath (bare host directory volume)
    Path:          /raid/home/user1
    HostPathType:
  default-token-8nf7v:
    Type:        Secret (a volume populated by a Secret)
    SecretName:  default-token-8nf7v
    Optional:    false
QoS Class:       BestEffort
Node-Selectors:  <none>
Tolerations:     node.kubernetes.io/not-ready:NoExecute for 300s
                 node.kubernetes.io/unreachable:NoExecute for 300s
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  4m6s  default-scheduler  Successfully assigned user1/pytorch-69gk5 to awadh
  Normal  Pulled     4m6s  kubelet            Container image "nvcr.io/nvidia/pytorch:21.05-py3" already present on machine
  Normal  Created    4m6s  kubelet            Created container pytorch
  Normal  Started    4m5s  kubelet            Started container pytorch
```

- To get the log of the current job
  $ kubectl logs <job-name>



10. Do we need docker prior to the installation of kubernetes?

- Yes, we need a container runtime(in this case docker) prior to the installation of kubernetes. There are different types of runtime, it might not be docker for others.