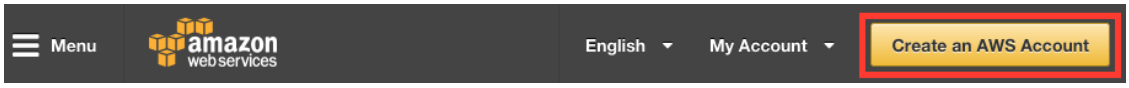
An NVIDIA GPU.

In this concept, you will learn how to launch a GPU-enabled server on which to train your neural networks!

Earlier in this lesson, you set up an AWS account for deep learning by following Steps 1-4 below. If you haven't already, please complete these steps now.

1. Create an AWS Account

Visit aws.amazon.com and click on the "Create an AWS Account" button.



If you have an AWS account already, sign in.

If you do not have an AWS account, sign up.

Furthermore, when you sign up, you will also need to choose a support plan. You can choose the free Basic Support Plan.

Once you finish signing up, wait a few minutes to receive your AWS account confirmation email. Then return to **aws.amazon.com** and sign in.

2. View Your Limit

View your EC2 Service Limit report at: **https://console.aws.amazon.com/ec2/v2/home?#Limits**

Find your "Current Limit" for the p2.xlarge instance type.

Note: Not every AWS region supports GPU instances. If the region you've chosen does not support GPU instances, but you would like to use a GPU instance, then change your AWS region.

Running On-Demand p2.16xlarge instances	0	Request limit increase
Running On-Demand p2.8xlarge instances	0	Request limit increase
Running On-Demand p2.xlarge instances	0	Request limit increase

Amazon Web Services has a service called **Elastic Compute Cloud (EC2)**, which allows you to launch virtual servers (or “instances”), including instances with attached GPUs. The specific type of GPU instance you should launch for this tutorial is called “p2.xlarge”.

By default, however, AWS sets a limit of 0 on the number of p2.xlarge instances a user can run, which effectively prevents you from launching this instance.

3. Submit a Limit Increase Request

From the EC2 Service Limits page, click on “Request limit increase” next to “p2.xlarge”.

You will not be charged for requesting a limit increase. You will only be charged once you actually launch an instance.

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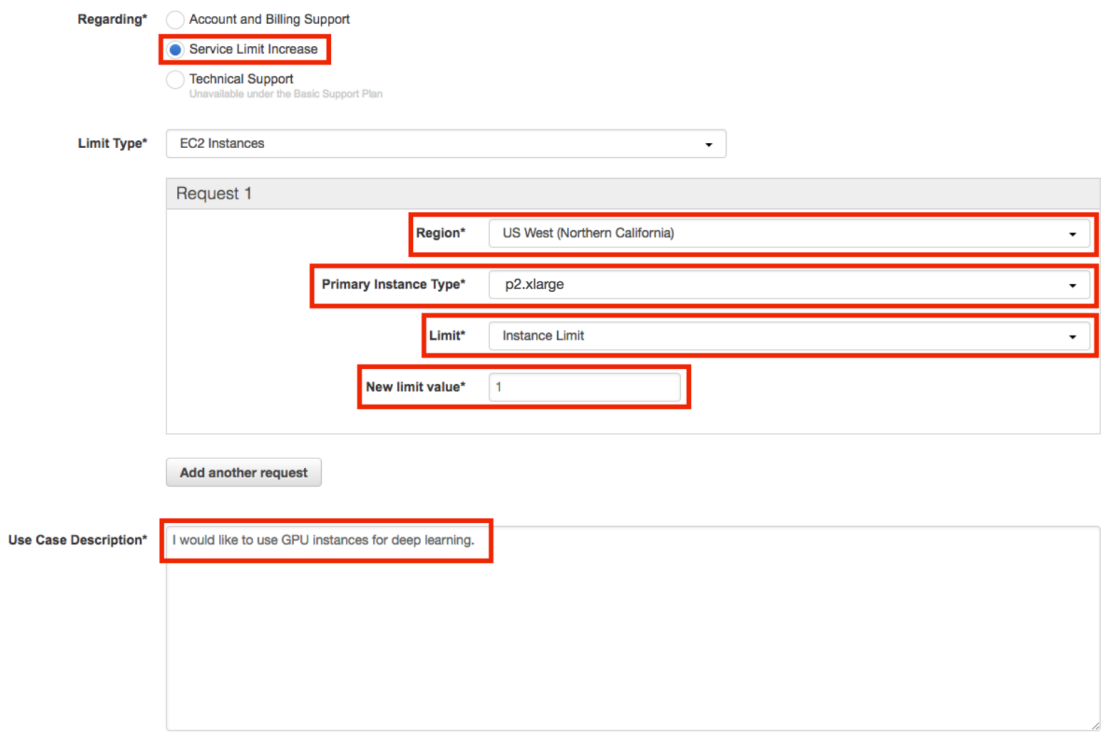
On the service request form, you will need to complete several fields.

For the “Region” field, select the region closest to you.

For the “New limit value”, enter a value of 1 (or more, if you wish).



Note: If you have never launched an instance of any type on AWS, you might receive an email from AWS Support asking you to initialize your account by creating an instance before they approve the limit increase.

4. Wait for Approval

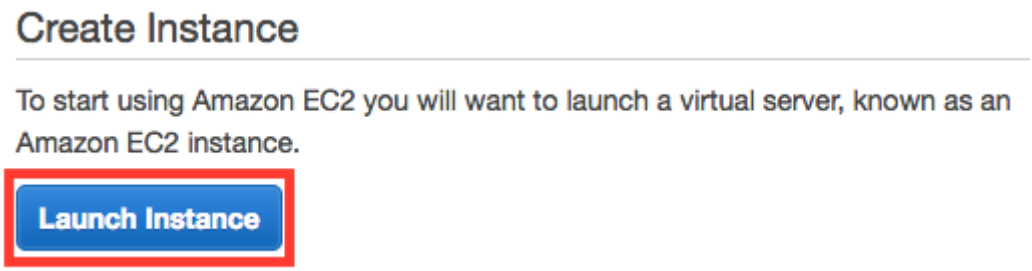
You must wait until AWS approves your Limit Increase Request. AWS typically approves these requests within 48 hours.

5. Launch an Instance

Once AWS approves your Limit Increase Request, you can start the process of launching your instance.

Visit the EC2 Management Console: https://console.aws.amazon.com/ec2/v2/home

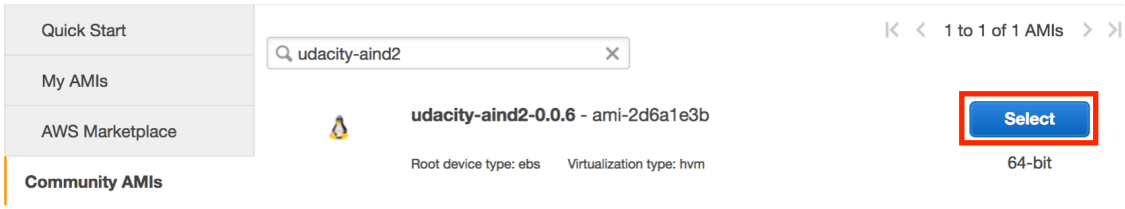
Click on the “Launch Instance” button.



software.

We've created an AMI for you!

Click on "Community AMIs", and search for the "udacity-aind2" AMI.

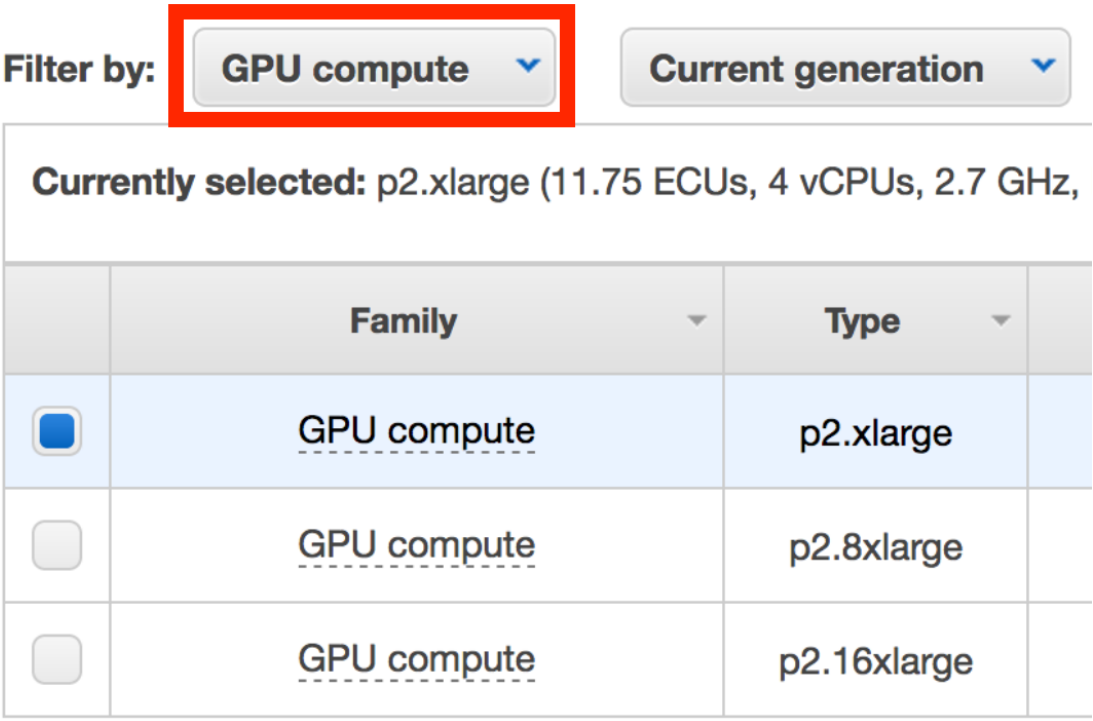


Click on the "Select" button.

6. Select the Instance Type

You must next choose an instance type, which is the hardware on which the AMI will run.

Filter the instance list to only show "GPU compute":



Select the p2.xlarge instance type:

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)
☑	GPU compute	p2.xlarge	4	61	EBS only
☐	GPU compute	p2.8xlarge	32	488	EBS only
☐	GPU compute	p2.16xlarge	64	732	EBS only

Finally, click on the “Review and Launch” button:

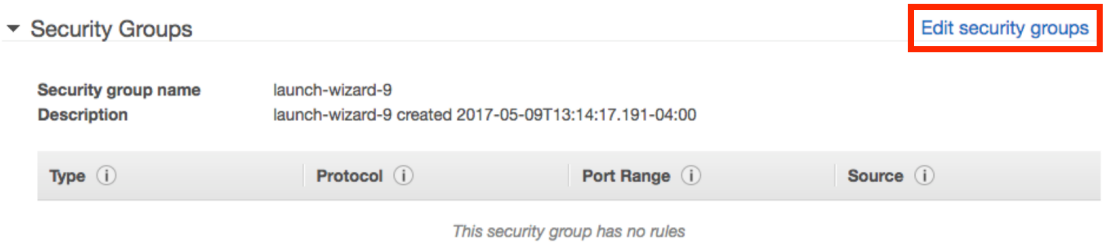
7. Configure the Security Group

Your instance is now configured and ready for launch, but running and accessing a Jupyter notebook from AWS requires special configurations.

Most of these configurations are already set up on the `udacity-aind2` AMI. However, you must also configure the security group correctly when you launch the instance.

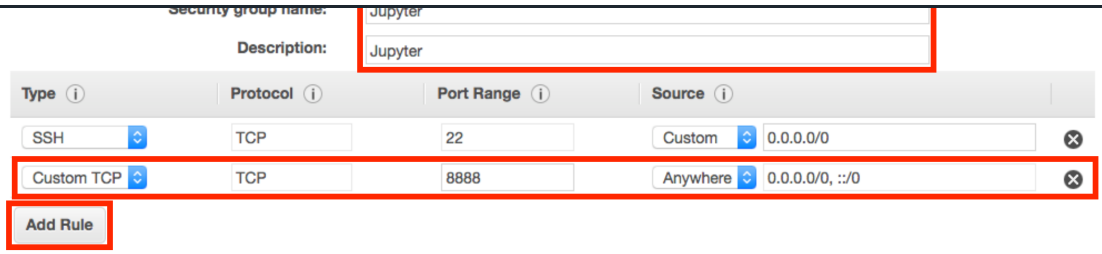
By default, AWS restricts access to most ports on an EC2 instance. In order to access the Jupyter notebook, you must configure the AWS Security Group to allow access to port 8888.

Click on "Edit security groups".



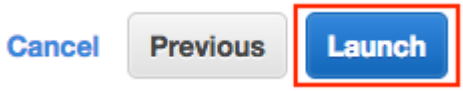
On the "Configure Security Group" page:

1. Select "Create a **new** security group"
2. Set the "Security group name" to "Jupyter"
3. Set the "Description" to "Jupyter"
4. Click "Add Rule"
5. Set a "Custom TCP Rule"
    1. Set the "Port Range" to "8888"
    2. Select "Anywhere" as the "Source"
6. Click "Review and Launch" (again)



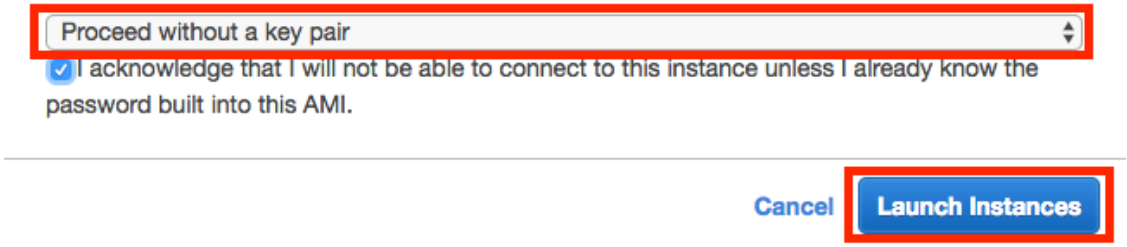
8. Launch the Instance

Click on the "Launch" button to launch your GPU instance!



9. Proceed Without a Key Pair

Oops. Before you can launch, AWS will ask if you'd like to specify an authentication key pair.



In this case the AMI has a pre-configured user account and password, so you can select "Proceed without a key pair" and click the "Launch Instances" button (for real this time!).

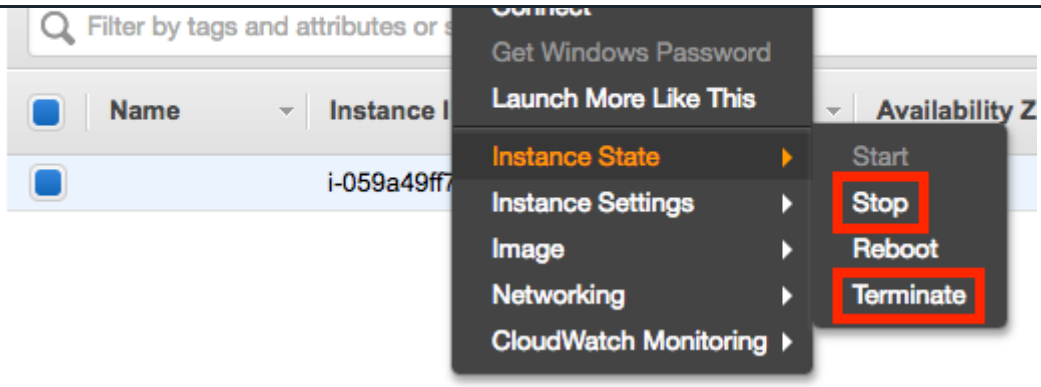
Next, click the "View Instances" button to go to the EC2 Management Console and watch your instance boot.

10. Be Careful!

From this point on, AWS will charge you for a running an EC2 instance. You can find the details on the EC2 On-Demand Pricing page.

Most importantly, remember to "stop" (i.e. shutdown) your instances when you are not using them. Otherwise, your instances might run for a day or a week or a month without you remembering, and you'll wind up with a large bill!

AWS charges primarily for running instances, so most of the charges will cease once you stop the instance. However, there are smaller storage charges that continue to accrue until you "terminate" (i.e. delete) the instance.

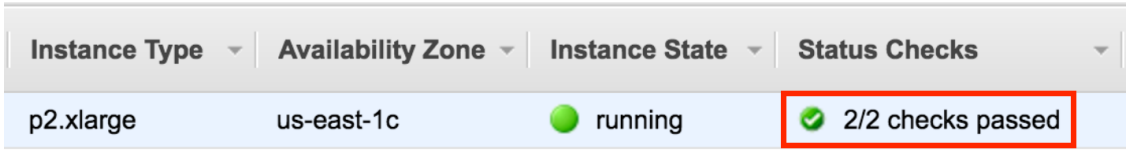


There is no way to limit AWS to only a certain budget and have it auto-shutdown when it hits that threshold. However, you can set AWS Billing Alarms.

11. Log In

After launch, your instance may take a few minutes to initialize.

Once you see “2/2 checks passed” on the EC2 Management Console, your instance is ready for you to log in.



Note the "IPv4 Public IP" address (in the format of “X.X.X.X”) on the EC2 Dashboard.

From a terminal, SSH to that address as user “aind2”:

```
ssh aind2@X.X.X.X
```

You might receive a message that asks "Are you sure you want to continue connecting (yes/no)?." Type `yes`, and hit Enter.

Authenticate with the password: **aind2**

12. Launch Jupyter

Congratulations! You now have a GPU-enabled server on which to train your neural networks.

On the EC2 instance:

1. Clone the aind2-cnn repo: `git clone https://github.com/udacity/aind2-cnn.git`
2. Enter the repo directory: `cd aind2-cnn`
3. Activate the new environment: `source activate aind2`

```
Copy/paste this URL into your browser when you connect for the first t
http://0.0.0.0:8888/?token=3156e...
```

6. Copy and paste the **complete URL** into the address bar of a web browser (Firefox, Safari, Chrome, etc). Before navigating to the URL, replace `0.0.0.0` in the URL with the "IPv4 Public IP" address from the EC2 Dashboard. Press Enter.

13. Run a Jupyter Notebook

Your browser should display a list of the folders in the repository.

You can now make sure everything is working properly by verifying that the instance can run a Jupyter notebook.

First click on **cifar10-classification**.

NEXT