



TREKDAY BASECAMP

AWS Essentials for Windows Admins



SESSION WORKBOOK



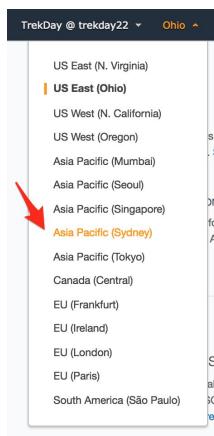
Session 1 - Introduction

In this session we will get introduced to AWS and create our first virtual server.

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

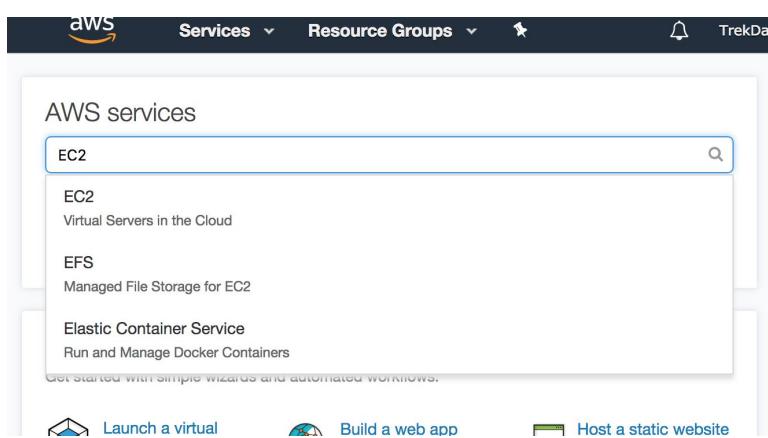
Getting Started

- Log into the AWS console using the details provided on your Credentials Note
- Set the region to Sydney (stay in this region today, check from time to time)



Create a Virtual Server - EC2 Instance

- Navigate to EC2



- Click "Launch Instance"

Resources

You are using the following Amazon EC2 resources in the Asia Pacific (Sydney) region:

0 Running Instances	0 Elastic IPs
0 Dedicated Hosts	0 Snapshots
0 Volumes	0 Load Balancers
0 Key Pairs	1 Security Groups
0 Placement Groups	

Learn more about the latest in AWS Compute from AWS re:Invent 2017 by viewing the [EC2 Videos](#).
 X

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Launch Instance ▼

Note: Your instances will launch in the Asia Pacific (Sydney) region

- Step 1: Select an Amazon Machine Image (AMI)

Take a look at all the different Amazon Machine Images that are available. There are many variants of Windows and Linux.

- Select "Microsoft Windows Server 2016 Base"

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 1: Choose an Amazon Machine Image (AMI)

Free tier eligible Support available from Canonical (<http://www.ubuntu.com/cloud/services>). Cancel and Exit

Root device type: ebs Virtualization type: hvm

Are you launching a database instance? Try Amazon RDS. Hide

Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale your database on AWS by automating time-consuming database management tasks. With RDS, you can easily deploy **Amazon Aurora, MariaDB, MySQL, Oracle, PostgreSQL, and SQL Server** databases on AWS. **Aurora** is a MySQL- and PostgreSQL-compatible, enterprise-class database at 1/10th the cost of commercial databases. [Learn more about RDS](#)

Launch a database using RDS

 Windows Free tier eligible	<p>Microsoft Windows Server 2016 Base - ami-48d6122a</p> <p>Microsoft Windows 2016 Datacenter edition. [English]</p> <p>Root device type: ebs Virtualization type: hvm</p> <p>Select 64-bit</p>	
 Deep Learning AMI (Ubuntu) Version 4.0 - ami-e723985 Free tier eligible	<p>Latest versions of deep learning frameworks pre-installed in separate virtual environments: MXNet, TensorFlow, Caffe, Caffe2, PyTorch, Theano, CNTK, Keras</p> <p>Root device type: ebs Virtualization type: hvm</p> <p>Select 64-bit</p>	
 Deep Learning AMI (Amazon Linux) Version 4.0 - ami-46c23924 Free tier eligible	<p>Latest versions of deep learning frameworks pre-installed in separate virtual environments: MXNet, TensorFlow, Caffe, Caffe2, PyTorch, Theano, CNTK, Keras</p> <p>Root device type: ebs Virtualization type: hvm</p> <p>Select 64-bit</p>	

- Step 2: Choose an Instance Type

Take a look at all the different Instance Types available. There are sizes for almost any workload.

- Select "t2.micro"

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
General purpose	t2.micro <small>Free tier eligible</small>	1	1	EBS only	-	Low to Moderate	Yes
General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
General purpose	m5.large	2	8	EBS only	Yes	Up to 10 Gigabit	Yes
General purpose	m5.xlarge	4	16	EBS only	Yes	Up to 10 Gigabit	Yes

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Instance Details](#)

- Select “Review and Launch”, then “Launch”

Step 7: Review Instance Launch

[Edit AMI](#)

Microsoft Windows Server 2016 Base - ami-48d6122a

Free tier eligible Microsoft Windows 2016 Datacenter edition, [English]
Root Device Type: ebs Virtualization type: hvm

Instance Type [Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups [Edit security groups](#)

Security group name: launch-wizard-1
Description: launch-wizard-1 created 2018-02-23T09:01:22.258+10:00

Type	Protocol	Port Range	Source	Description
<i>This security group has no rules</i>				

Instance Details [Edit instance details](#)

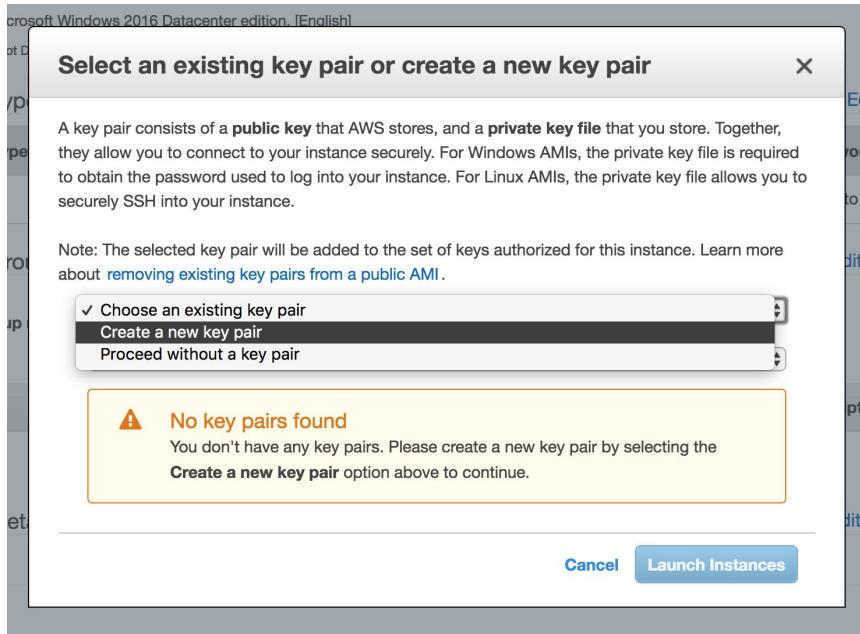
Storage [Edit storage](#)

Tags [Edit tags](#)

[Cancel](#) [Previous](#) [Launch](#)

- Popup: "Select an existing key pair or create a new key pair"

- Select: "Create a new key pair"



- Provide: Type a name, then "Download Key Pair" and keep it safe, we will use this a couple of times today.

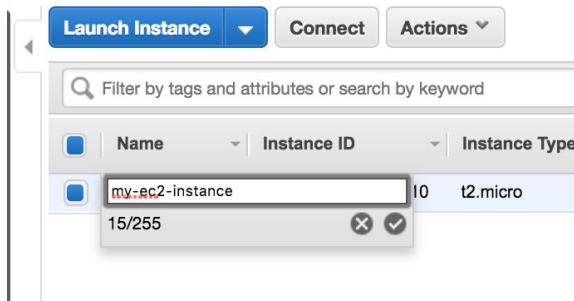
- Select: "Launch instances"

- Scroll down and select "View Instances"

- Review the "Instances" page.

This is where you will see all the instances you have launched. We will be coming back to this list several times today.

- Set the name of the instance, by clicking the pencil in the Name column. Set the name to "my-ec2-instance".



Tip: Make sure you select the 'tick' when changing the name, else it won't take.

- Review the "Description" tab for the running instance.
- Look at the "Tags" tab, notice that the name is set as a tag.



The screenshot shows the 'Tags' tab selected in a navigation bar. Below the bar is a button labeled 'Add/Edit Tags'. A table displays one tag entry:

Key	Value	Actions
Name	my-ec2-instance	Edit Delete Hide Column

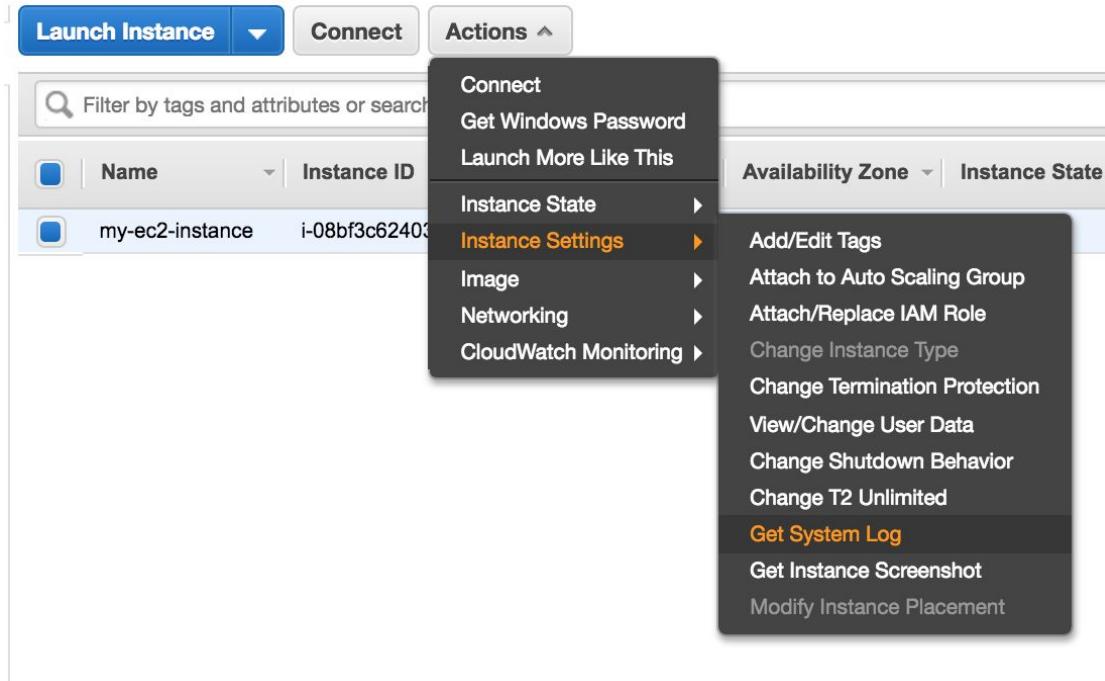
Connect to the Virtual Server - EC2 Instance

- Wait for the "Status Checks" 2/2. This means that the host and guest OS's are passing status checks.

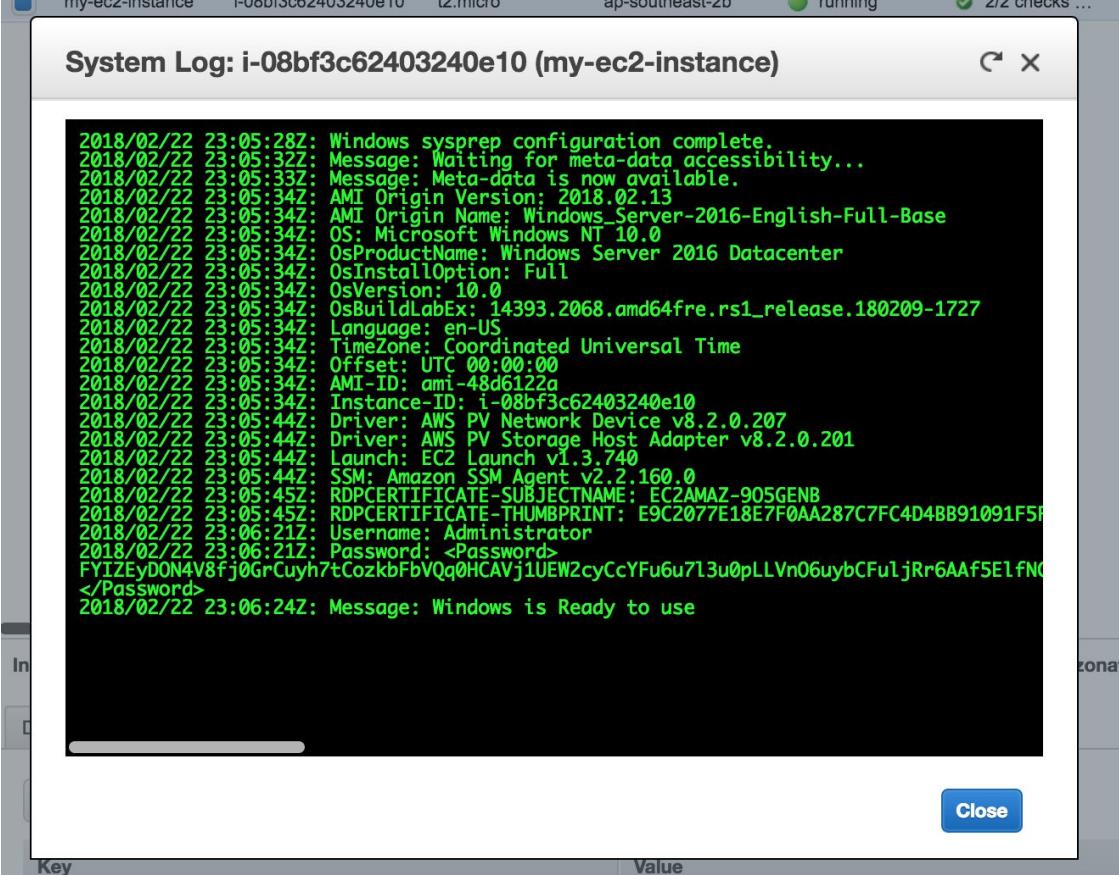


- Let's check that the Windows server is up and running:

- With the instance selected, select "Actions", "Instance Settings", "Get System Log"



- You should be able to see system logs sent from the server.

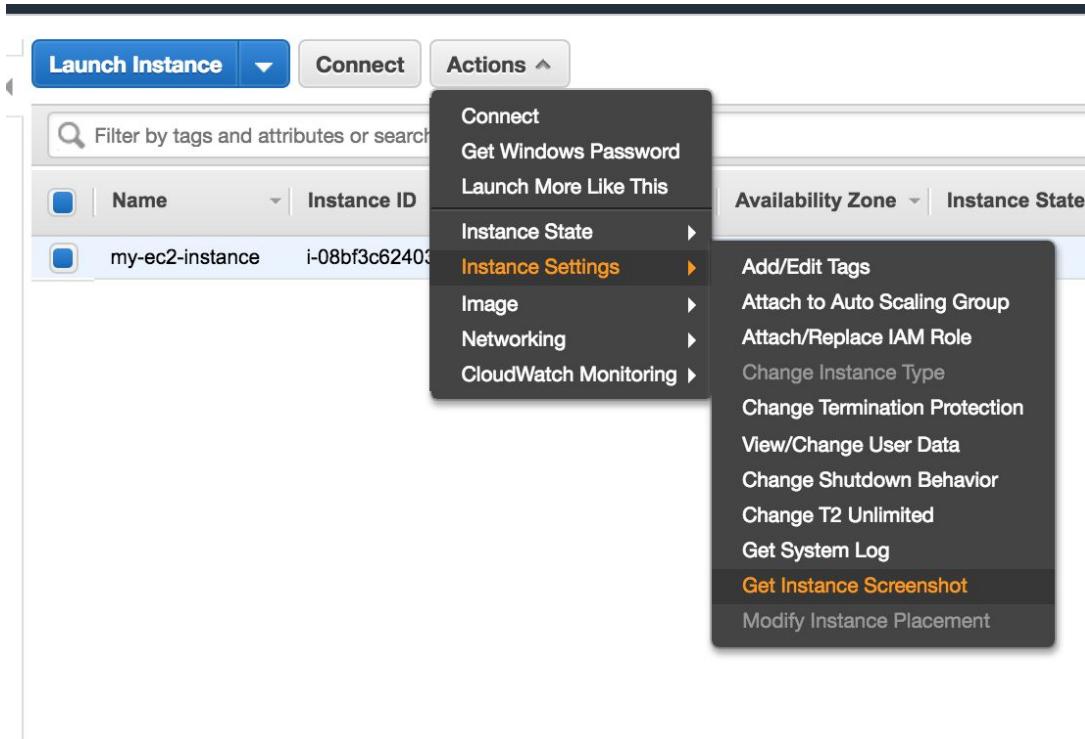


System Log: i-08bf3c62403240e10 (my-ec2-instance)

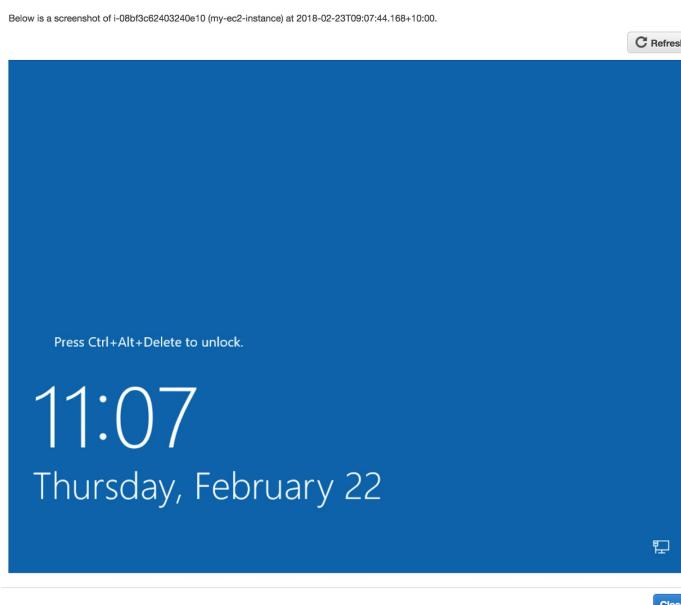
```
2018/02/22 23:05:28Z: Windows sysprep configuration complete.
2018/02/22 23:05:32Z: Message: Waiting for meta-data accessibility...
2018/02/22 23:05:33Z: Message: Meta-data is now available.
2018/02/22 23:05:34Z: AMI Origin Version: 2018.02.13
2018/02/22 23:05:34Z: AMI Origin Name: Windows_Server-2016-English-Full-Base
2018/02/22 23:05:34Z: OS: Microsoft Windows NT 10.0
2018/02/22 23:05:34Z: OsProductName: Windows Server 2016 Datacenter
2018/02/22 23:05:34Z: OsInstallOption: Full
2018/02/22 23:05:34Z: OsVersion: 10.0
2018/02/22 23:05:34Z: OsBuildLabEx: 14393.2068.amd64fre.rs1_release.180209-1727
2018/02/22 23:05:34Z: Language: en-US
2018/02/22 23:05:34Z: TimeZone: Coordinated Universal Time
2018/02/22 23:05:34Z: Offset: UTC 00:00:00
2018/02/22 23:05:34Z: AMI-ID: ami-48d6122a
2018/02/22 23:05:34Z: Instance-ID: i-08bf3c62403240e10
2018/02/22 23:05:44Z: Driver: AWS PV Network Device v8.2.0.207
2018/02/22 23:05:44Z: Driver: AWS PV Storage Host Adapter v8.2.0.201
2018/02/22 23:05:44Z: Launch: EC2 Launch v1.3.740
2018/02/22 23:05:44Z: SSM: Amazon SSM Agent v2.2.160.0
2018/02/22 23:05:45Z: RDPCERTIFICATE-SUBJECTNAME: EC2AMAZ-905GENB
2018/02/22 23:05:45Z: RDPCERTIFICATE-THUMBPRINT: E9C2077E18E7F0AA287C7FC4D4BB91091F5F
2018/02/22 23:06:21Z: Username: Administrator
2018/02/22 23:06:21Z: Password: <Password>
FYIzEyDON4V8fj0GrCuyh7tCozkBFBvQq0HCAVj1UEW2cyCcYFu6u7l3u0pLLVn06uybCFuljRr6AAf5ElfNC
</Password>
2018/02/22 23:06:24Z: Message: Windows is Ready to use
```

- Notice the Password field is encrypted
- Is there a line that says: "Message: Windows is Ready to use"?
- Select "Close"

- With the instance selected, select "Actions", "Instance Settings", "Get Instance Screenshot":



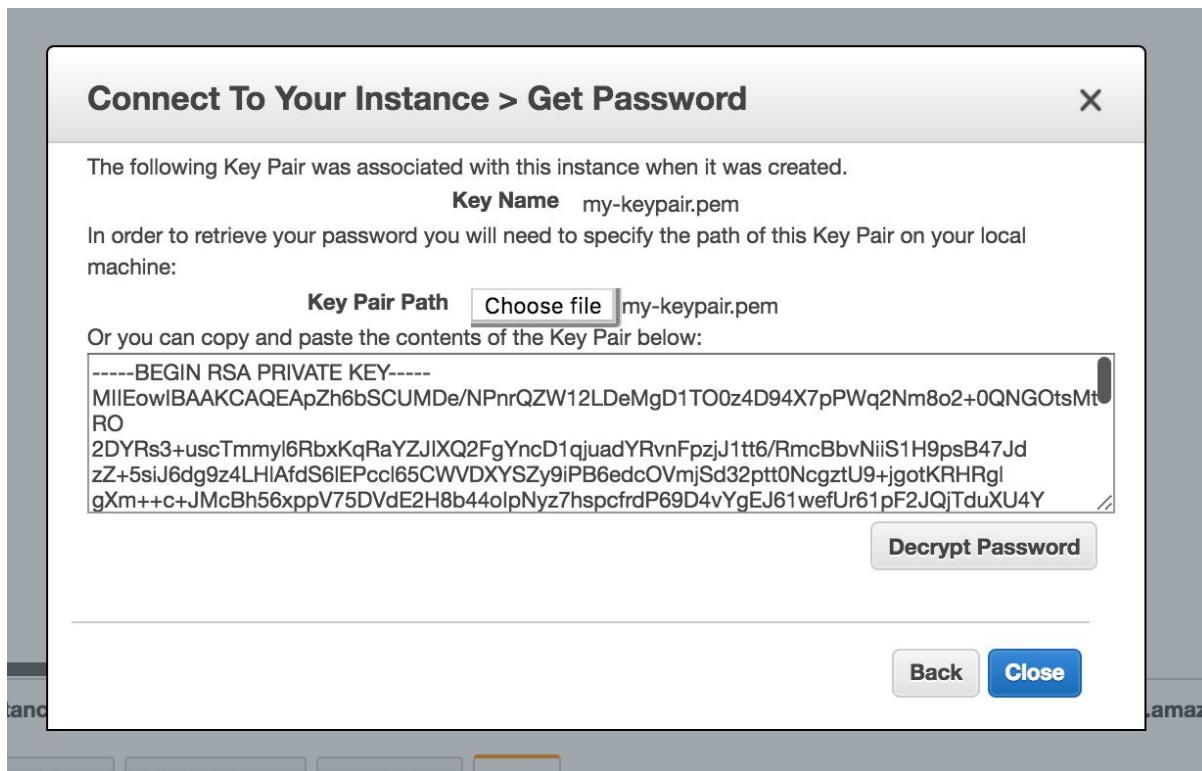
- You should see an image of the screen output of the server.



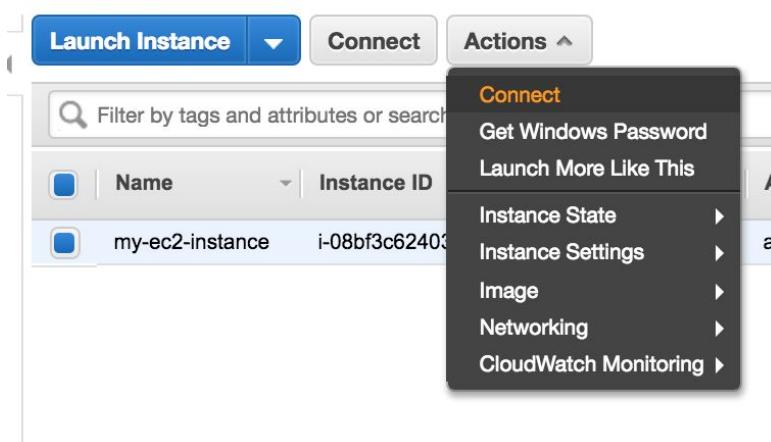
- You can't interact with this image, so lets log in to the server.

- Select "Close"

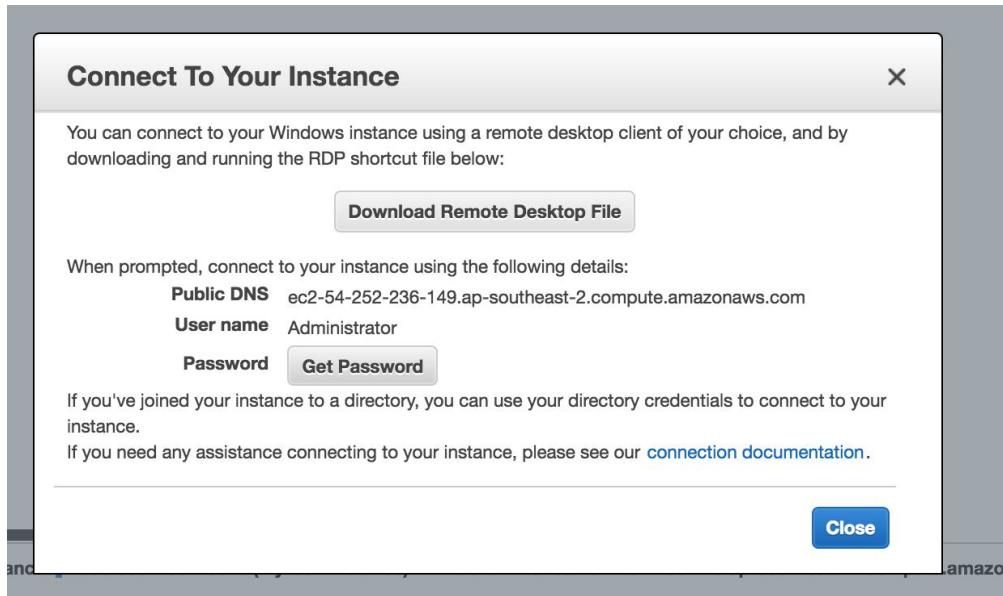
- Let's decrypt the Windows Administrator password:
- With the instance selected, select "Actions", "Get Windows Password"
- Select “Choose file” and browse to the key file you downloaded earlier in this section.
- Select "Decrypt Password"



- Keep the details safe somewhere.
- Again with the instance selected, click "Actions" and select "Connect"



- Popup: "Connect To Your Instance" select "Download Remote Desktop File"



- This should download, automatically open, and configure a Remote Desktop Protocol client to connect to your instance.

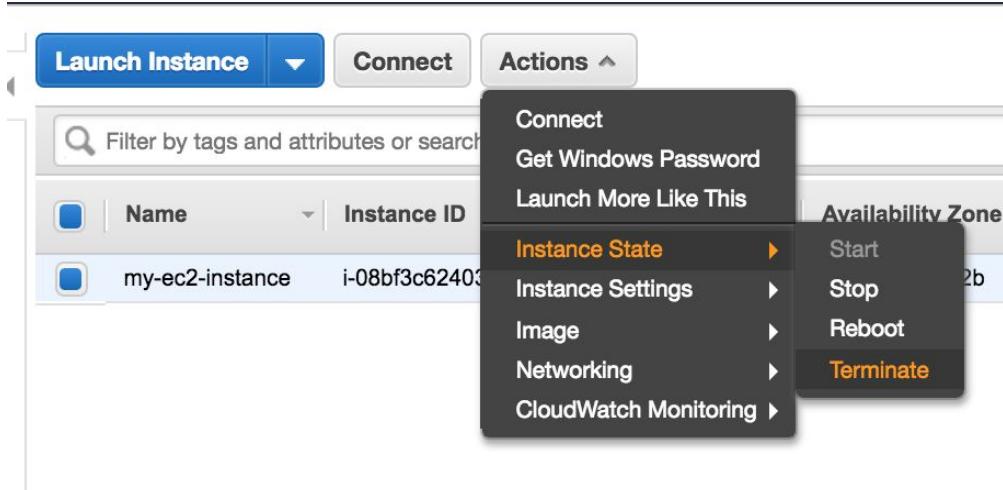
If clicking the "Download Remote Desktop File" didn't work for you:

- Open your RDP client, enter the DNS value into the address field
- When prompted enter the username and password.

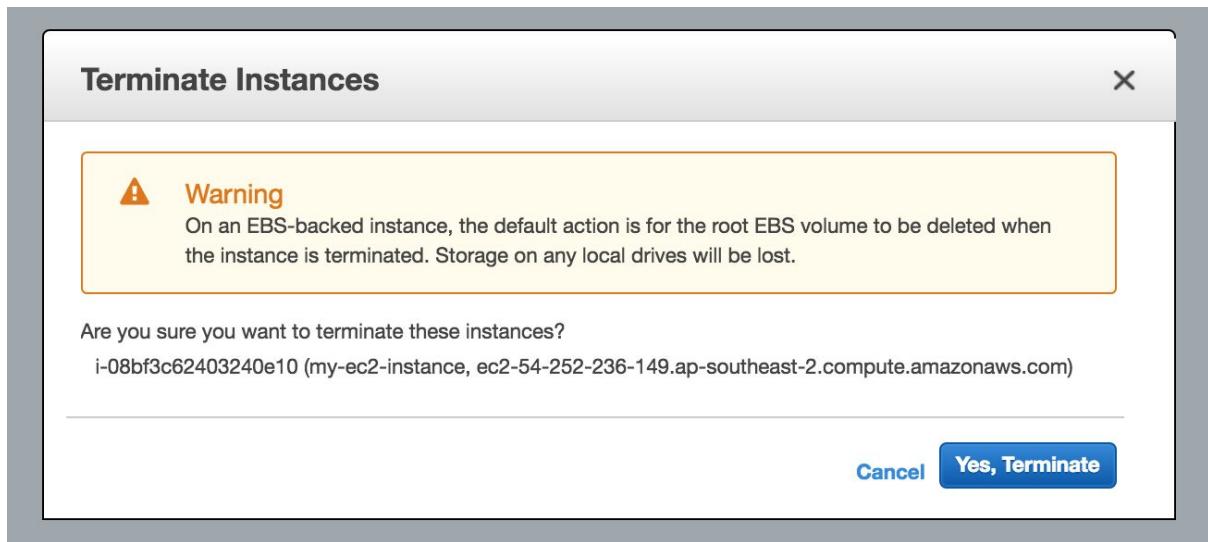
- Note: when you connect you may be prompted by security warnings. This is not a production environment, these warnings are ok.

- Now let's clean up. We don't need this server anymore:

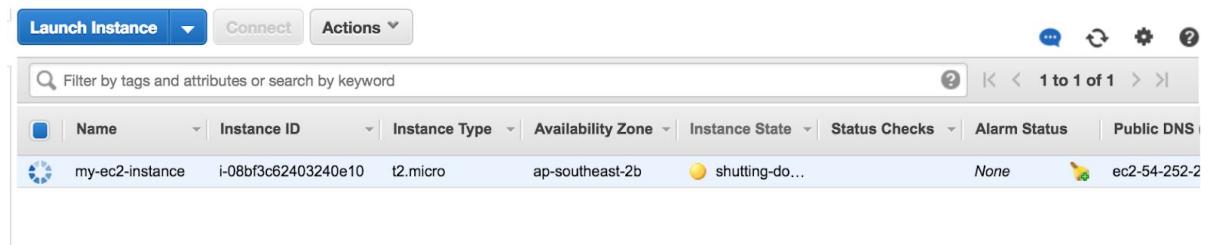
- With the instance selected, select "Actions", "Instance State", "Terminate"



- Review the warning to make sure you are terminating the right instance, if so, select "Yes, Terminate"



- Note the Key Pair is still in the account (along with some other stuff), but that's ok we will use it later.



- Return to the "EC2 Dashboard", you should have 0 (Zero) running instances.



END

Session 2 - CloudFormation

In this session we will get introduced to AWS CloudFormation.

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Steps

- Lets create a CloudFormation template

- Open your favorite text editor (e.g. VSCode) and create a new YAML file.
- File new
- Save as "my-template.yaml"

Build a CloudFormation Template

- Now let's build the template

- First we add the template version:

```
AWSTemplateFormatVersion: 2010-09-09
```

- In this simple template we are only going to use the 'Resources' section:

- In the Resources section we will add an entry for each resource we are going to create. In this case that is one EC2 Instance

- (As we build the YAML file, look to ensure the tab (spaces) are correct)

```
Resources:  
  myInstance:  
    Type: "AWS::EC2::Instance"
```

- The "myInstance" element is used to refer to our instance elsewhere in the template.
That's not of much use in this template, but will be useful in more complex templates later.

- Notice that we have used an AWS specific Type of "AWS::EC2::Instance". This is where we set that we are creating an EC2 Instance

- Lets configure the instance with some properties. Create the following lines, read for some values:

Properties:

ImageId:

InstanceType:

KeyName:

- Let's find the Image Id. When we created the image 'by hand' this was listed during Step 1.

- While we are creating this template, open a browser tab, in the EC2 Dashboard, and select "Launch instance"

- In "Step 1" look at the OS/Images, scroll to "Microsoft Windows Server 2016 Base"

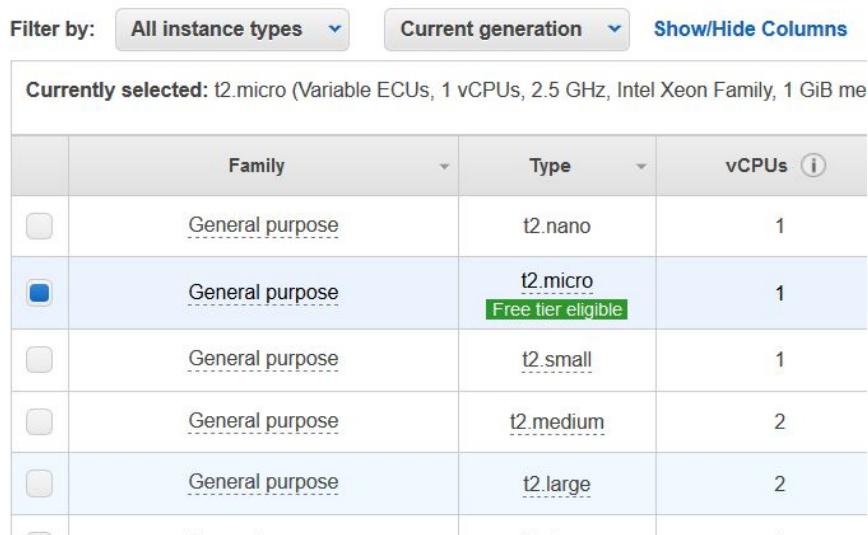


The screenshot shows the AWS EC2 Launch Wizard. At the top, there is a button labeled "Launch a database using RDS". Below it, there are two entries in a list:

- Microsoft Windows Server 2016 Base - ami-48d6122a**: This entry includes a Windows icon, the text "Windows Free tier eligible", and details about the edition (Microsoft Windows 2016 Datacenter edition. [English]), root device type (ebs), and virtualization type (hvm).
- Deep Learning AMI (Ubuntu) Version 4.0 - ami-e7c23985**: This entry includes a Deep Learning icon.

- See the Amazon Machine Image ID (ami-xxxxxxx) written next to the AMI name.
- Make a note of this value.

- Let's find the InstanceType.
- Select the AMI in the wizard to see "Step 2"

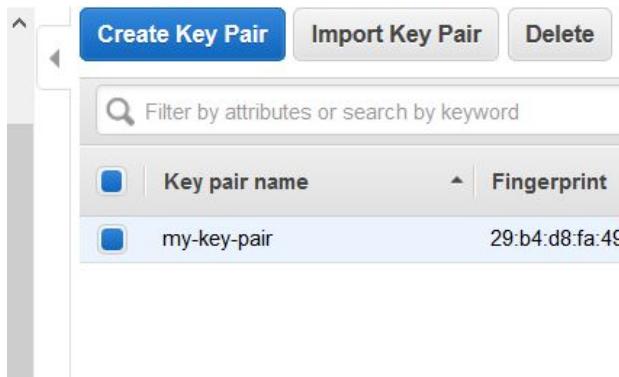


The screenshot shows the AWS EC2 Instances page. At the top, there are filters: "Filter by: All instance types" and "Current generation". Below that, a message says "Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB me". The main table lists various instance types:

	Family	Type	vCPUs
<input type="checkbox"/>	General purpose	t2.nano	1
<input checked="" type="checkbox"/>	General purpose	t2.micro Free tier eligible	1
<input type="checkbox"/>	General purpose	t2.small	1
<input type="checkbox"/>	General purpose	t2.medium	2
<input type="checkbox"/>	General purpose	t2.large	2
<input type="checkbox"/>	General purpose	t2.xlarge	4

- In "Step 2" look at the Type we used. It was "t2.micro"

- Make a note of this value.
- Finally lets find the name of a Key Pair we can use.
- We created a Key Pair in the first session today. Let's find its name.
- Cancel the "Launch Instance" wizard.
- On the left hand side, scroll down to "Key Pairs"



- You should have one Key pair name in here. Make a note of this value. It should be the same name as the PEM file your downloaded in Session 1 (that's another way to find the name)
- Back in the CloudFormation template, enter the values we found into the relevant lines:

Properties:

```
ImageId: ami-82a458e0
InstanceType: t2.micro
KeyName: my-key-pair
```

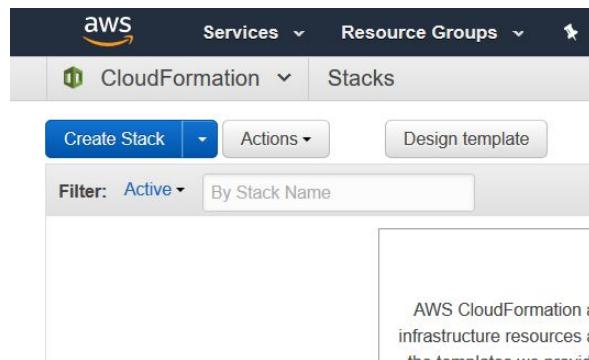
- The complete file should now look like something like this:

```
AWSTemplateFormatVersion: 2010-09-09
Resources:
myInstance:
  Type: "AWS::EC2::Instance"
  Properties:
    ImageId: ami-82a458e0
    InstanceType: t2.micro
    KeyName: my-key-pair
```

- Save your YAML CloudFormation template somewhere on your computer.

Build a CloudFormation Stack

- Let's use the template to create a CloudFormation Stack
- Log into the AWS console
- Set the region to Sydney (stay in this region today, check from time to time)
- Navigate to CloudFormation



- Select "Create Stack"
- From the next screen, select "Upload a template to Amazon S3" and click "Browse" and select the CloudFormation template you created earlier in this session.

Choose a template A template is a JSON/YAML-formatted text file that describes your stack's resources and their properties. [Learn more](#).

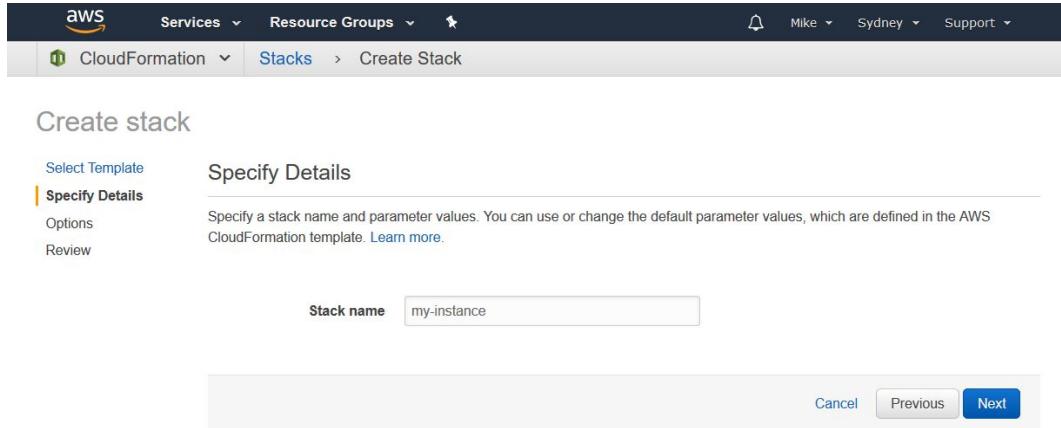
Select a sample template
 Upload a template to Amazon S3
 Specify an Amazon S3 template URL

Browse... No file selected.

- Select "Next"

- If you are shown a validation error at this point, check that your YAML file looks like the example above. Are the spaces correct?

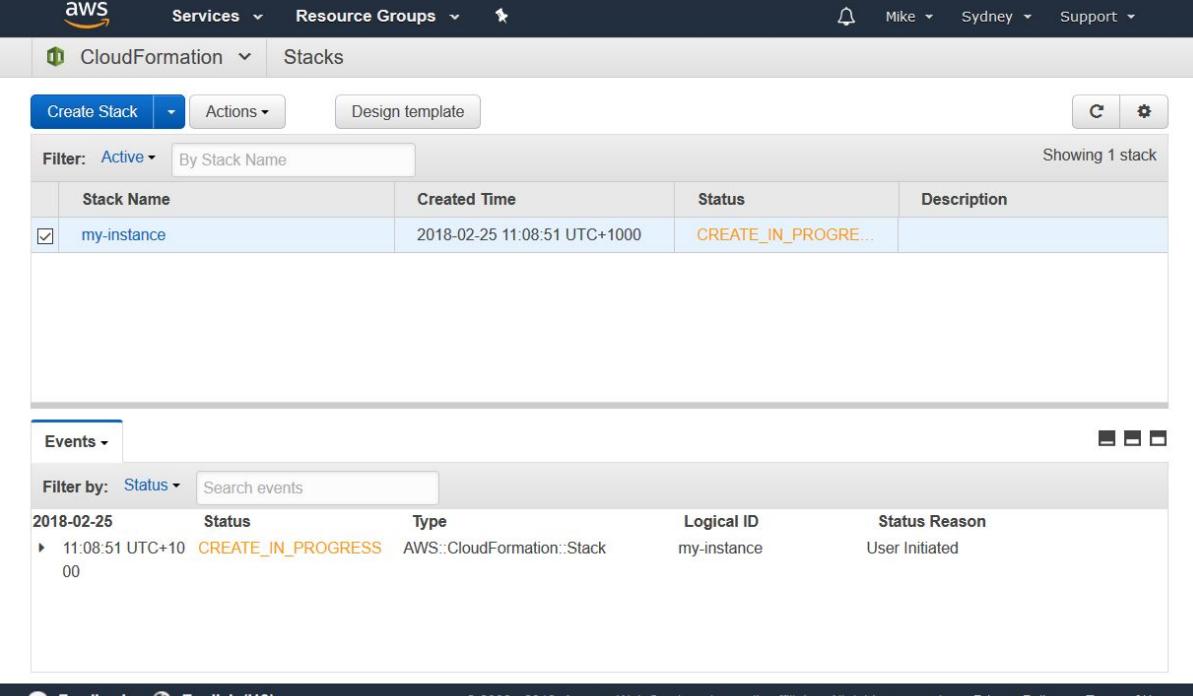
- Enter a name for your CloudFormation Stack. Enter "my-instance".



- Select "Next"

- The next screen provides some more advanced options for your stack. For now, scroll to the bottom of this page and select "Next"

- The next page shows a 'Review' or summary page. Scroll to the bottom of this page and select "Create"



The screenshot shows the AWS CloudFormation Stacks page. At the top, there are buttons for 'Create Stack', 'Actions', and 'Design template'. A filter bar shows 'Active' and 'By Stack Name'. Below the table, an 'Events' section displays a log entry for the creation of the stack.

Stack Name	Created Time	Status	Description
my-instance	2018-02-25 11:08:51 UTC+1000	CREATE_IN_PROGRESS...	

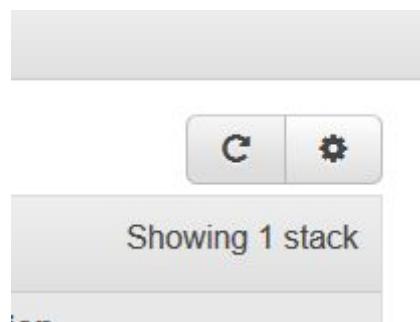
2018-02-25	Status	Type	Logical ID	Status Reason
11:08:51 UTC+10	CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	my-instance	User Initiated 00

Feedback English (US) © 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved Privacy Policy Terms of Use

- You should now be taken to the CloudFormation stacks page. You can watch your stack being created.

- With your stack selected:

- Click the refresh button (within the page, NOT the main browser refresh button) from time to time, this will update all the information about the stack build.



- Review the "Events" tab, this shows you the steps being taken by the Cloudformation build engine.

Overview	Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change Sets	Rollback Triggers						
Filter by: Status ▾ Search events															
2018-02-25	Status	Type	Logical ID	Status Reason											
▶ 11:09:30 UTC+1000	CREATE_COMPLETE	AWS::CloudFormation::Stack	my-instance												
▶ 11:09:28 UTC+1000	CREATE_COMPLETE	AWS::EC2::Instance	myInstance												
▶ 11:08:55 UTC+1000	CREATE_IN_PROGRESS	AWS::EC2::Instance	myInstance	Resource creation Initiated											
▶ 11:08:54 UTC+1000	CREATE_IN_PROGRESS	AWS::EC2::Instance	myInstance												
▶ 11:08:51 UTC+1000	CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	my-instance	User Initiated											

- If there are any errors during the build, they will be shown here.
- Review the "Resources" tab, this shows the resources built in this stack. In this case you should see just one EC2 Instance.

Overview	Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change Sets	Rollback Triggers			
Logical ID	Physical ID	Type	Status	Status	Status	Status						
myInstance	i-0ecd6f05e7e49f4d9	AWS::EC2::Instance	CREATE_COMPLETE	CREATE_COMPLETE	CREATE_COMPLETE	CREATE_COMPLETE						

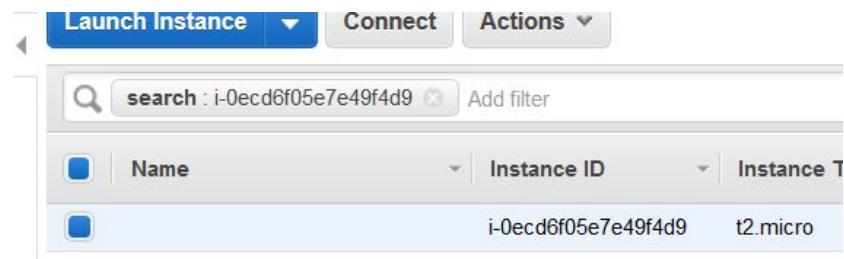
- When the stack has built, with no errors, you should see the status as "CREATE_COMPLETE"

- Not seeing "CREATE_COMPLETE"? If the build has failed, see if you can see why from the "Events" tab. If you need help please ask :)
- With your stack selected, from the "Resources" tab click the "Physical ID" of the instance that the strack created.

Outputs	Resources	Events	Template
	Physical ID		
▶	i-0ecd6f05e7e49f4d9		

- This will take you to the EC2 Instance list. Note the list of instances is now filtered to just the instance you created (which is your only instance)

- See that the Instance does not have a Name tag. Let's fix that... not in the console, but in the CloudFormation template.



The screenshot shows the AWS EC2 Instances list. At the top, there are buttons for 'Launch Instance', 'Connect', and 'Actions'. Below that is a search bar with the placeholder 'search : i-0ecd6f05e7e49f4d9' and a 'Add filter' button. The main table has columns for 'Name', 'Instance ID', and 'Instance Type'. One instance is listed: 'i-0ecd6f05e7e49f4d9' of type 't2.micro'. The 'Name' column for this instance is empty.

Name	Instance ID	Instance Type
	i-0ecd6f05e7e49f4d9	t2.micro

Update a CloudFormation Stack

- Back in your text editor, with your CloudFormation YAML file loaded, add a Name tag to your instance. Under KeyName, and on the same level as KeyName, add:

Tags :

-

Key: Name
Value: my-ec2-instance

- Again make sure the spacing is correct, your template should now look something like this:

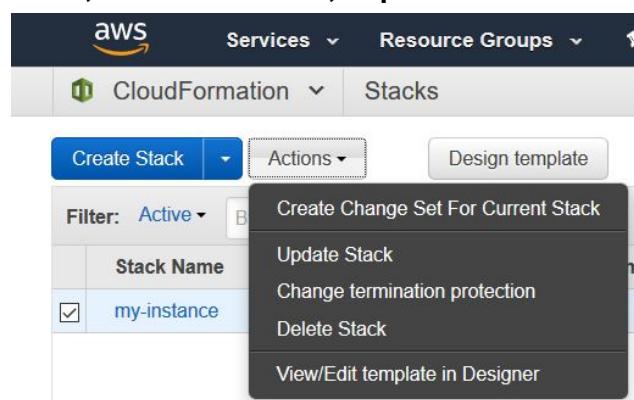
```
AWSTemplateFormatVersion: 2010-09-09
Resources:
myInstance:
  Type: "AWS::EC2::Instance"
  Properties:
    ImageId: ami-82a458e0
    InstanceType: t2.micro
    KeyName: mykey
  Tags:
  -
    Key: Name
    Value: my-ec2-instance
```

- Save your updated template.

- Now, let's update the stack so the changes take effect.

- Navigate to CloudFormation

- With your stack selected, select "Actions", "Update Stack"



- From the next screen, select "Upload a template to Amazon S3" and click "Browse" and select your updated CloudFormation template.

Choose a template A template is a JSON/YAML-formatted text file that describes your stack's resources.

Use current template

Upload a template to Amazon S3

test.yaml

Specify an Amazon S3 template URL

- Select "Next"

- If you are shown a validation error at this point, check that your YAML file looks like the example above. Are the spaces correct?

- There should be nothing to change on the next screen, select "Next"

Update my-instance stack

Select Template Specify Details

Specify Details

Specify parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more](#).

Stack name

[Cancel](#) [Previous](#) [Next](#)

- The next screen provides some more advanced options for your stack. For now, scroll to the bottom of this page and select "Next"

- The next page shows a 'Review' or summary page.

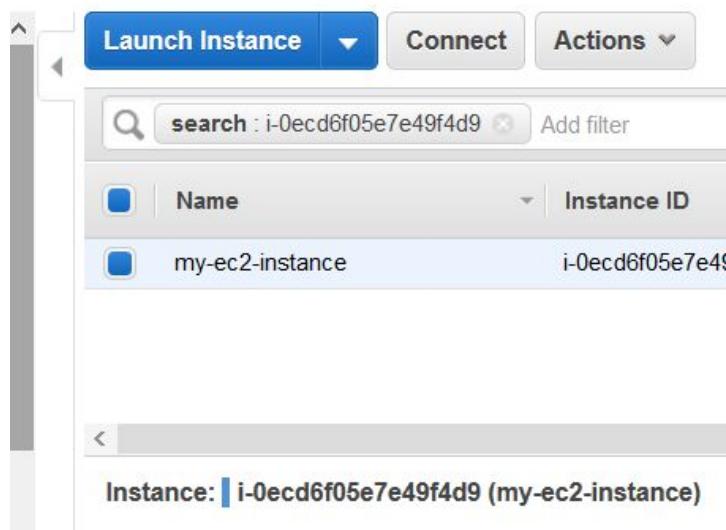
- Notice the "Preview your changes" section, this gives you a very high level summary of what will change in the stack.

Preview your changes

Based on your input, CloudFormation will change the following resources. For more information, choose [View change set details](#).

Action	Logical ID	Physical ID	Resource type	Replacement
Modify	myInstance	i-0ecd6f05e7e49f4d9	AWS::EC2::Instance	False

- Notice that while the EC2 Instance will be updated, it will not get replaced, so the instance will remain running.
- Select "Update"
- As before watch CloudFormation do its work, refresh, and review the "Events" tab.
- When the stack status shows as "UPDATE_COMPLETE", follow the link from the "Resources" tab to the instance view.
- Notice that the instance is now Named.

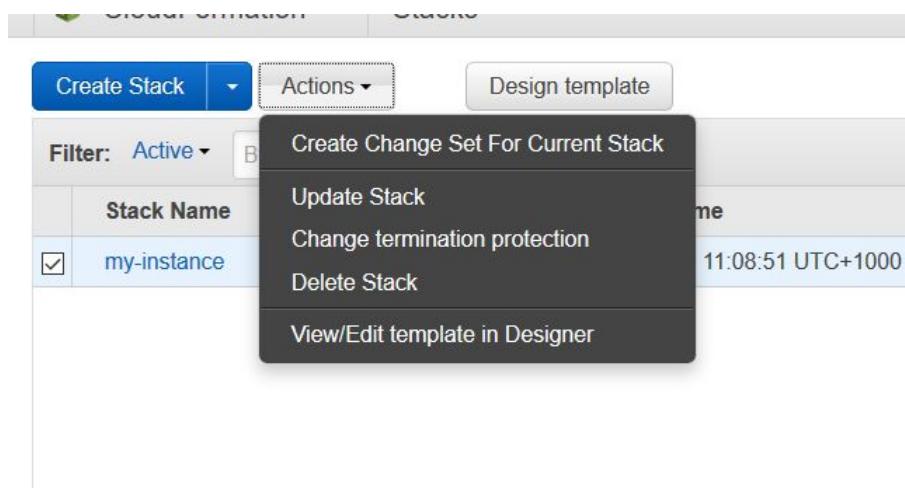


- If you have time you can connect to the server via RDP if you wish. When you're finished...
- We don't need this server anymore, let's clean up.

Delete a CloudFormation Stack

- Cleaning up the CloudFormation stack is super easy, and super clean. The instance and all related configurations (but not the Key Pair as this wasn't created in the stack) are gone in one action:

- Navigate to CloudFormation
- With your stack selected, select "Actions", "Delete Stack"



- Review the warning and, if you are ready select "Yes, Delete"
- Monitor as the stack is deleted.
- Want to build the server again, name tag and all? Just build a new stack with your saved template!

END

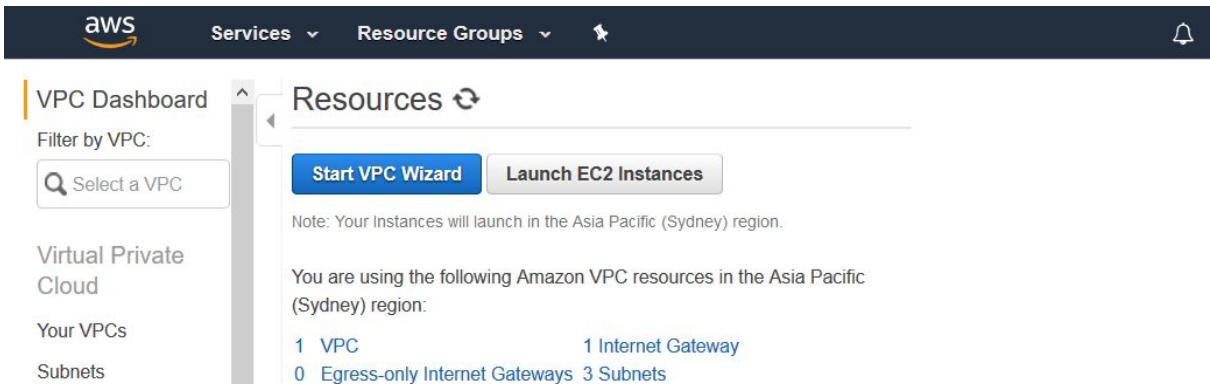
Session 3 - Virtual Private Cloud

In this session we will get introduced to AWS VPC.

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Steps

- Log into the AWS console
- Set the region to Sydney (stay in this region today, check from time to time)
- Navigate to VPC



The screenshot shows the AWS VPC Dashboard. On the left sidebar, there are links for 'VPC Dashboard', 'Filter by VPC:', 'Select a VPC' (button), 'Virtual Private Cloud', 'Your VPCs' (with 1 item), and 'Subnets'. The main content area is titled 'Resources' with a 'Start VPC Wizard' and 'Launch EC2 Instances' button. A note says: 'Note: Your Instances will launch in the Asia Pacific (Sydney) region.' Below it, it says: 'You are using the following Amazon VPC resources in the Asia Pacific (Sydney) region:' followed by a table:

1 VPC	1 Internet Gateway
0 Egress-only Internet Gateways	3 Subnets

- We need to create an Elastic IP address for our NAT gateway
- From the menu on the left hand side, select "Elastic IPs"
- Select "Allocate new address"

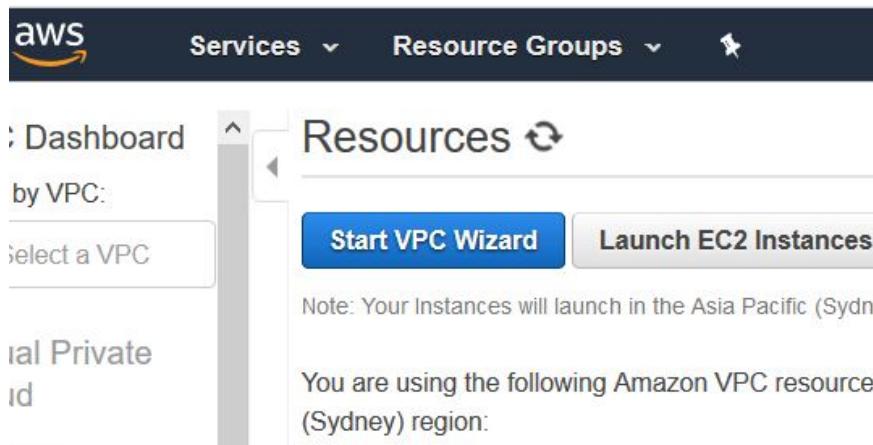


The screenshot shows the AWS Addresses page. The top navigation bar includes 'Services', 'Resource Groups', and user information ('Mike', 'Sydney', 'Support'). The main content area is titled 'Allocate new address' with a sub-section 'Allocate new address'. It says: 'Allocate a new Elastic IP address by selecting the scope in which it will be used'. At the bottom right are 'Cancel' and 'Allocate' buttons.

- Select "Allocate"
- Return to the "VPC Dashboard"

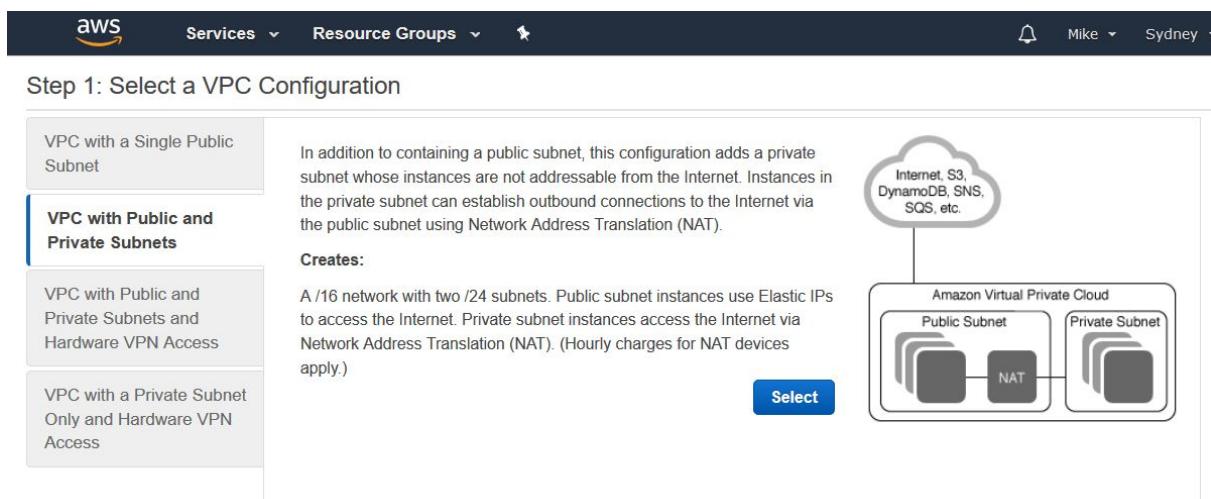
Create a Virtual Private Cloud (VPC)

- Select "Start VPC Wizard"



- In "Step 1: Select a VPC Configuration":

- From the options on the left hand side select "VPC with Public and Private Subnets"
- Select "Select"



- In "Step 2: VPC with Public and Private Subnets":

- Enter a VPC name "my-test-vpc"
- See that the wizard has entered names and CIDR ranges for your subnets

Step 2: VPC with Public and Private Subnets

IPv4 CIDR block: (65531 IP addresses available)

IPv6 CIDR block: No IPv6 CIDR Block
 Amazon provided IPv6 CIDR block

VPC name:

Public subnet's IPv4 CIDR: (251 IP addresses available)

Availability Zone:

Public subnet name:

Private subnet's IPv4 CIDR: (251 IP addresses available)

Availability Zone:

Private subnet name:

You can add more subnets after AWS creates the VPC.

Specify the details of your NAT gateway ([NAT gateway rates apply](#)).

Elastic IP Allocation ID:

Service endpoints	Allocation ID	Elastic IP Address
	eipalloc-a3734c99	13.54.211.243

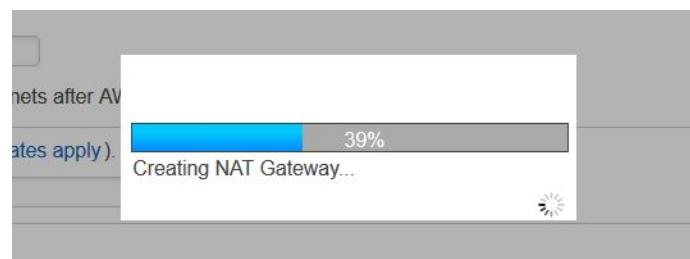
- In "Elastic IP Allocation ID" click into the text box, and select the Elastic IP that you created earlier.

- All the other default settings are fine

- Select "Create VPC"



- The wizard will work (this may take a few minutes), and then display "VPC Successfully Created"



- Select "OK"

VPC Successfully Created

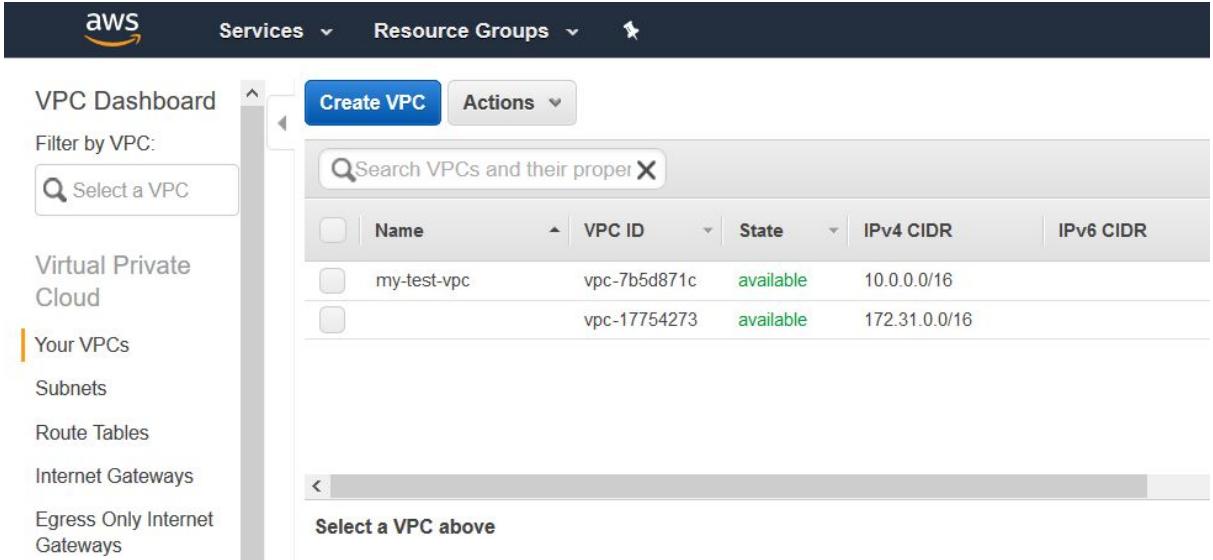
Your VPC has been successfully created.

You can launch instances into the subnets of your VPC. For more information, see [Launching an Instance into Your Subnet](#).

OK

- You will now be taken to the VPC list for your account.

- Take a look at the VPC you created.



The screenshot shows the AWS VPC Dashboard. At the top, there's a navigation bar with the AWS logo, 'Services' dropdown, 'Resource Groups' dropdown, and a star icon. Below the navigation is a search bar labeled 'Search VPCs and their properties' with a magnifying glass icon and a clear 'X'. Underneath the search bar is a table with the following columns: Name, VPC ID, State, IPv4 CIDR, and IPv6 CIDR. There are two rows of data:

	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	my-test-vpc	vpc-7b5d871c	available	10.0.0.0/16	
<input type="checkbox"/>		vpc-17754273	available	172.31.0.0/16	

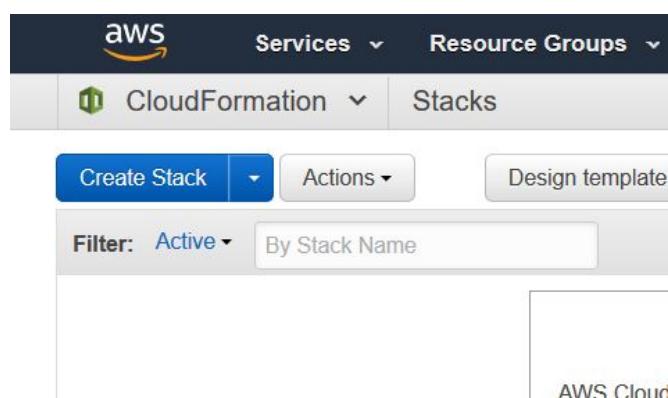
At the bottom of the table area, there's a message: 'Select a VPC above'.

- Notice that this is not the only VPC in your account. You should also see an (unnamed) 'default' VPC.

- We have now created a VPC with two subnets, one is public (in that it can be routed to from the Internet) and one subnet is private.

Testing the Virtual Private Cloud (VPC)

- Now let's create a couple of EC2 Instances to test with.
- First we will create an EC2 instance in the public subnet.
- Navigate to CloudFormation
- Select "Create Stack"



- Select "Upload a template to Amazon S3" and "Browse"...
- In the resources provided for this workshop, in the folder "Session 3" select the template: "ec2-instance-for-subnet.yaml"

Choose a template A template is a JSON/YAML-formatted text file that describes your stack's resources.

Select a sample template

Upload a template to Amazon S3

Browse... ec2-instance-for-subnet.yaml

Specify an Amazon S3 template URL

- Select "Next"

- This template has been created to prompt you for parameters before the stack is built.

- Enter a name for the stack "my-public-instance-stack" (this is not the name that will be given to the instance)
- The Key parameter is now a dropdown box. Select a key that you have on your machine.
- Enter a server name "my-demo-server-public"
- In the subnet dropdown menu you will have a few options. Select the subnet that has "(Public subnet)"
- Note that we set the name "Public subnet" when we created the subnet in the VPC wizard.

Specify Details

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more](#).

Stack name

Parameters

key	<input type="text" value="my-key-pair"/>	Enter a valid EC2 Key
serverName	<input type="text" value="my-demo-server-public"/>	Enter the name for the server. (This is not a hostname)
subnet	<input type="text" value="subnet-be2b4bd9 (10.0.0.0/24) (Public s..."/>	Select a subnet for this instance.

[Cancel](#) [Previous](#) [Next](#)

- Select "Next"
- Leave all the settings on the next screen.
- Scroll to the bottom and select "Next"
- Scroll to the bottom of the Review page and select "Create"
- We won't wait for this stack to create, let's create another EC2 Instance in the private subnet.
- Select "Create Stack" and follow the same process, but this time:

- Enter a name for the stack "my-private-instance-stack"
- Enter a server name "my-demo-server-private"
- Select the subnet with "(Private subnet)"

Specify Details

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more](#).

Stack name

Parameters

key

Enter a valid EC2 Key

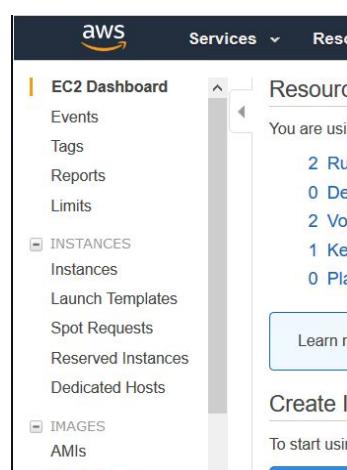
serverName Enter the name for the server. (This is not a hostname)

subnet

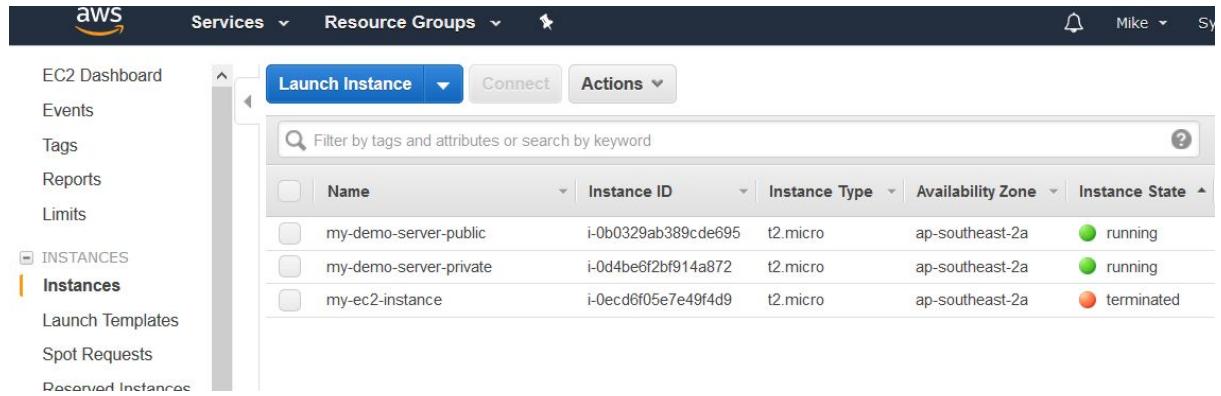
Select a subnet for this instance.

[Cancel](#) [Previous](#) [Next](#)

- Select "Next", "Next", then "Create"
- By now, our public EC2 Instance may have built. Let's connect into the server.
- Navigate to EC2
- Select "Instances" on the left hand side.



- By now, you should see two running EC2 instances, if you need to expand the Name column.



The screenshot shows the AWS EC2 Dashboard. On the left sidebar, under the 'Instances' section, 'Instances' is selected. The main area displays a table of running instances:

Name	Instance ID	Instance Type	Availability Zone	Instance State
my-demo-server-public	i-0b0329ab389cde695	t2.micro	ap-southeast-2a	running
my-demo-server-private	i-0d4be6f2bf914a872	t2.micro	ap-southeast-2a	running
my-ec2-instance	i-0ecd6f05e7e49f4d9	t2.micro	ap-southeast-2a	terminated

- Connect with RDP into the public server:

- Select the public instance, "Actions" and "Get Windows Password"
- Password not available yet? Hold on a minute, and try again.



- Try to connect to the public instance via your RDP client...

- Its not working!!



- In our VPC we have Security Groups that control the traffic that can reach our Instances.

- Both of our instances are in the 'default' security group.

- Let's create a rule in the default security group to allow access to our Instances via RDP.

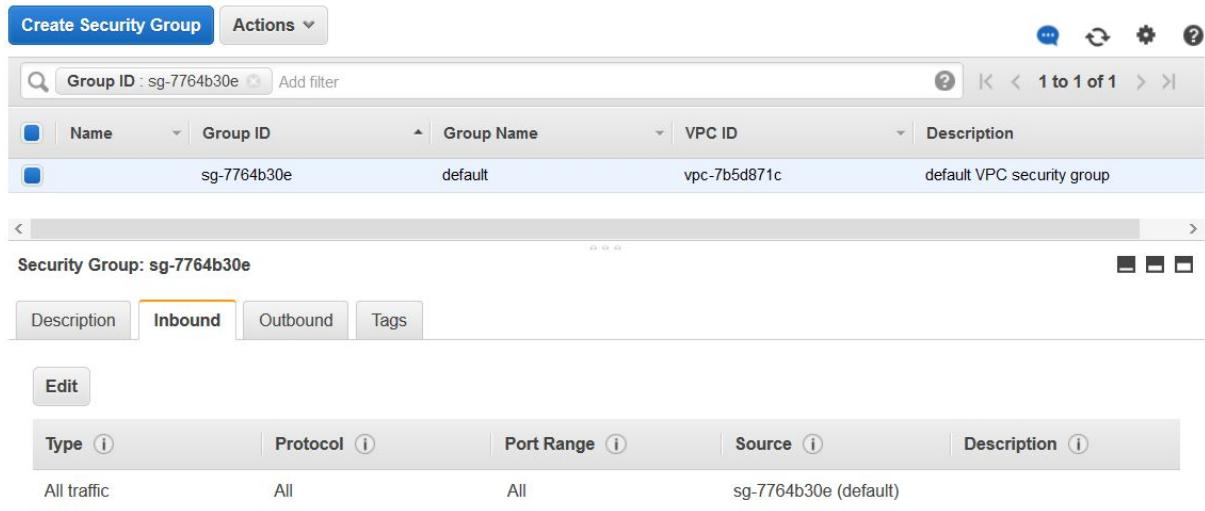
- From the EC2 list select either of the instances, look at the details section in the lower half of the screen.

- In the "Description" tab, find the "Security groups" and click on "default"

Instance ID	i-0c3729f391f788b4e
Instance state	running
Instance type	t2.micro
Elastic IPs	
Availability zone	ap-southeast-2a
Security groups	default . view inbound rules
Scheduled events	No scheduled events
AMI ID	Windows_Server-2016-English-Full-Base-2018.01.12 (ami-82a458e0)
Platform	windows
IAM role	-
Key pair name	my-key-pair

- On the following screen in the lower half, you will see the details of the security group.

- Select the "Inbound" tab.



Name	Group ID	Group Name	VPC ID	Description
sg-7764b30e	default	vpc-7b5d871c	default VPC security group	

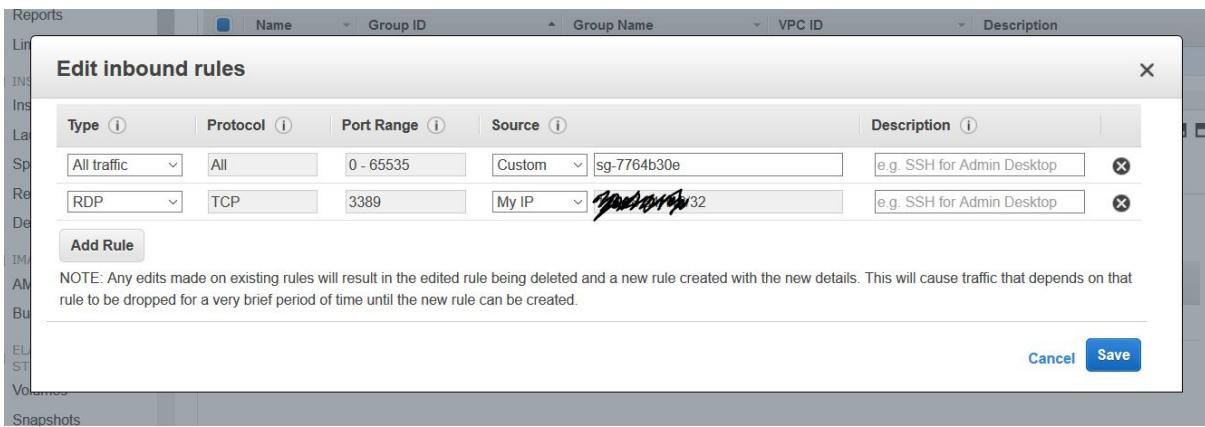
Inbound

Type	Protocol	Port Range	Source	Description
All traffic	All	All	sg-7764b30e (default)	

- Notice that currently, "All traffic" is allowed inbound to our instances, but the source is this (the same) security group.

- This means that the instances can RDP to each other, but we can't RDP from outside the network.

- Select "Edit", then "Add Rule"



Type	Protocol	Port Range	Source	Description
All traffic	All	0 - 65535	Custom sg-7764b30e	e.g. SSH for Admin Desktop
RDP	TCP	3389	My IP	e.g. SSH for Admin Desktop

Add Rule

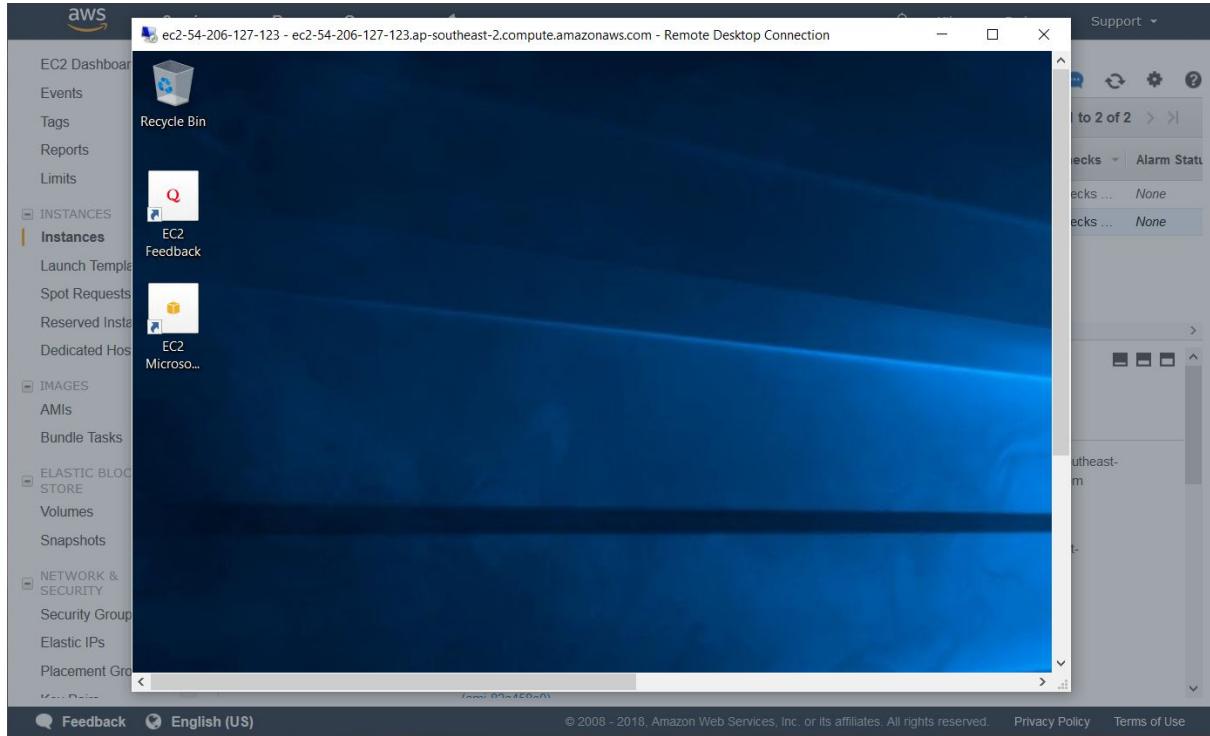
NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.

Cancel **Save**

- On the new rule, for Type select "RDP", and for Source select "My IP"

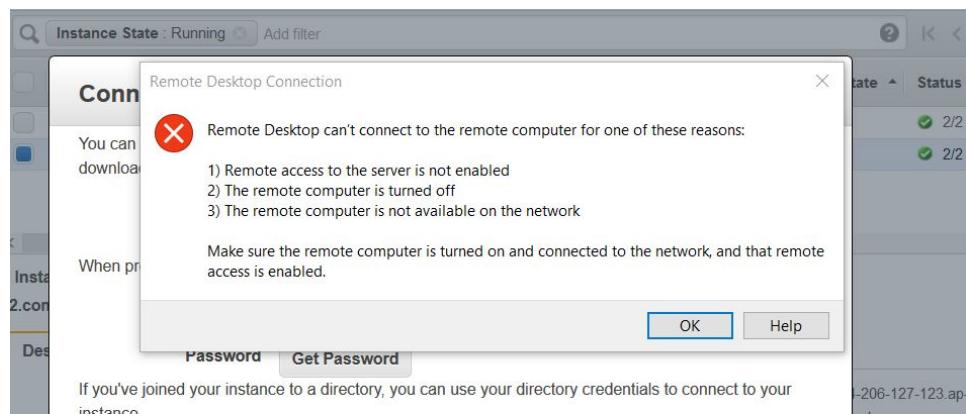
- By selecting "My IP" we restrict RDP access from the outside world to only machines using your Internet connection.

- Now, try again to RDP to your public instance.



- Yay, it works.

- OK, minimise the RDP session to the public instance. Let's see if we can RDP to the private instance:



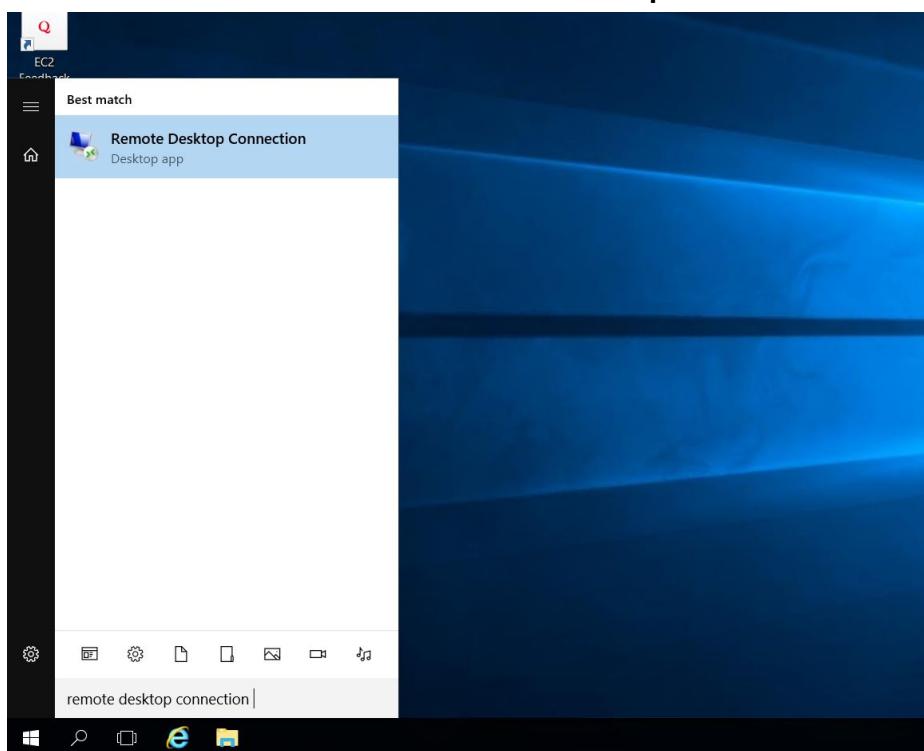
- Of course, it doesn't work. That's because, even though the instance has been allocated a public IP address, its not 'visible' to the Internet through the VPC.

- But we can still get there:

- From the EC2 Instance list, select the private server, and in the details in the bottom half of the screen find "Private IPs".

Public DNS (IPv4)	ec2-13-211-29-84.ap-southeast-2.compute.amazonaws.com
IPv4 Public IP	13.211.29.84
IPv6 IPs	-
Private DNS	ip-10-0-1-7.ap-southeast-2.compute.internal
Private IPs	10.0.1.7
Secondary private IPs	
VPC ID	vpc-7b5d871c
Subnet ID	subnet-942949f3

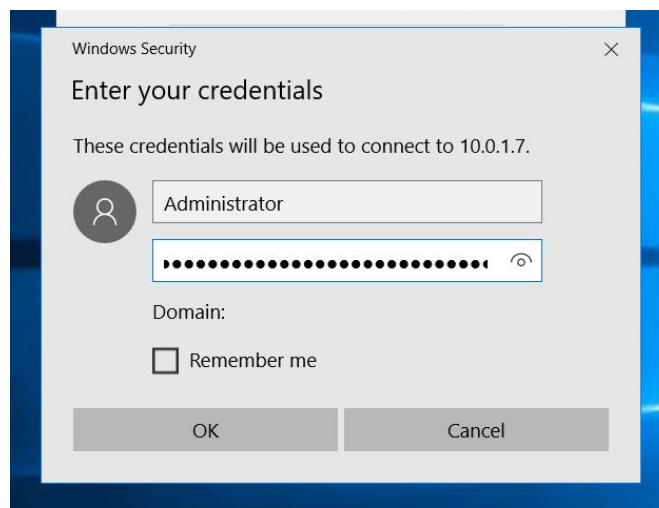
- Make a note of this address.
- Also take a moment to discover the password for this server.
- Go back to the RDP session with your 'public' instance.
- From the 'Start' menu select "Remote Desktop Connection"



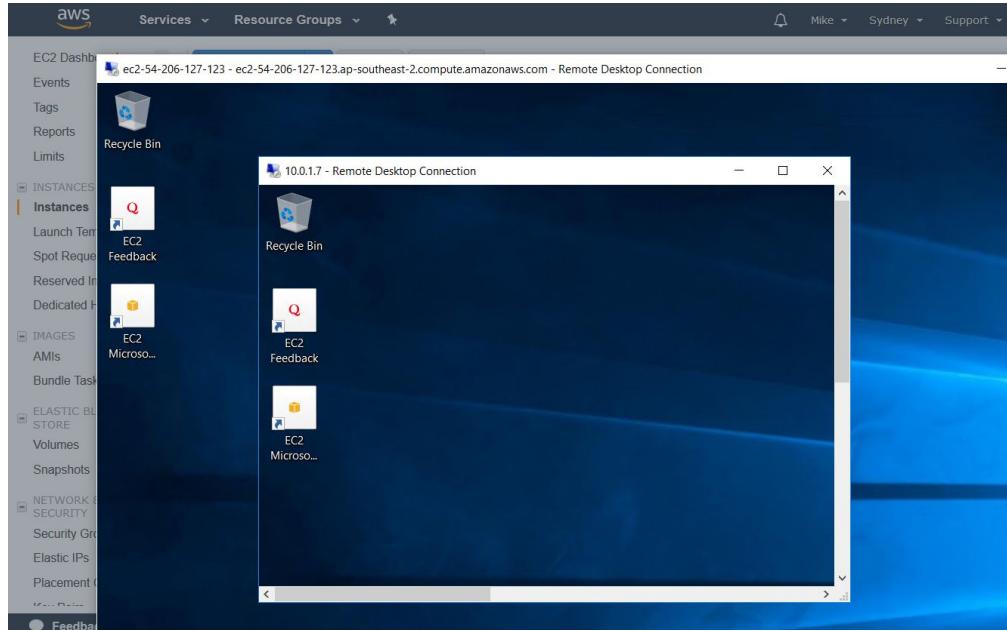
- Enter in to the "Computer" field the Private IP address of the private server that you noted down just before.



- Select "Connect"



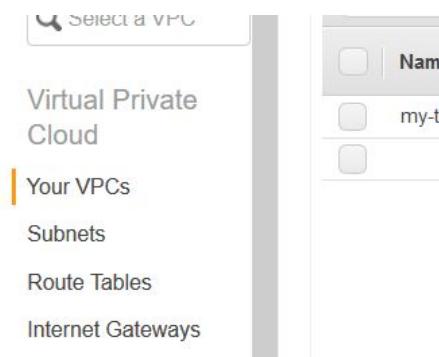
- In the credentials box, enter the User name "Administrator" and the password for the private server.



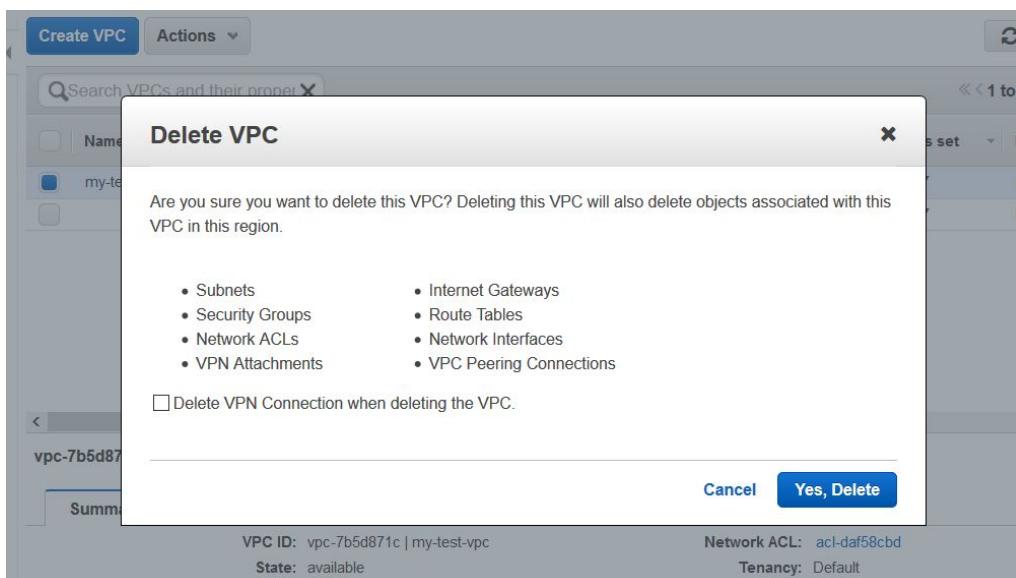
- Yay, it works.
- You have created a private server, in a private network, that is accessible via what we call a bastion host.
- Once your done experimenting with this environment its time to clean up.

Deleting your Resources

- Navigate back to CloudFormation
- Delete the stacks in turn by selecting the stack, and selecting "Actions", "Delete Stack", then "Yes, Delete"
- Make sure the stacks are fully deleted before continuing.
- Navigate back to VPC and then select "Your VPC's" from the menu on the left.

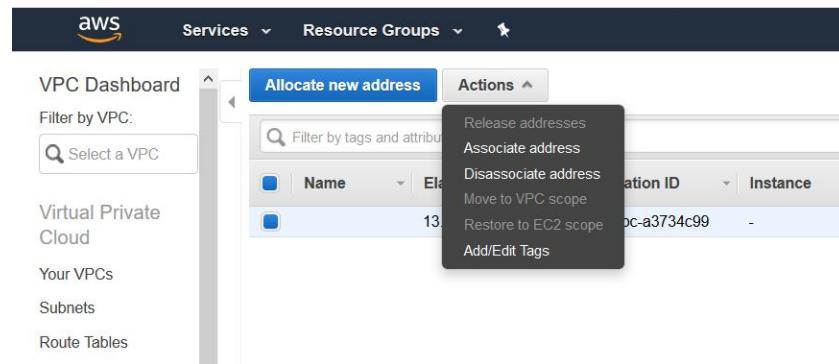


- Delete the VPC by selecting the stack, and selecting "Actions", "Delete VPC", then "Yes, Delete"



- One last thing, select "Elastic IPs" from the menu on the left.

- Select the Elastic IP entry, and select "Actions", "Release addresses", then "Release"



END

Session 4 - Bootstrapping

In this session we will get introduced to the concept of “Bootstrapping”.

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Steps

- In this session we are going to get a Windows server to do a “real job”. But we’re not going to configure it by hand.
- Log into the AWS console
- Set the region to Sydney (stay in this region today, check from time to time)
- Navigate to EC2
- First let’s use the AWS console to build a web server:

Bootstrap an Instance with the Console

- Select "Launch Instance"
- Select "Microsoft Windows Server 2016 Base"
- This time, as we will be getting the server to do some work, and we don’t want to wait too long, let’s select a bigger instance type:
- Select "t2.large"

Currently selected: t2.large (Variable ECUs, 2 vCPUs, 2.3 GHz, Intel Broadwell E5-2686v4, 8 GiB memory, EBS only)								
	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.micro	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Instance Details](#)

- Select "Next: Configure Instance Details"

- Take a look at the different settings options here.
- We will leave all the default values, but we will scroll down and expand the "Advanced Details":
- Here we see the "User data" entry.

▼ Advanced Details

User data (i)

As text As file Input is already base64 encoded

(Optional)

- Text we add to "User data" will be passed to the Instance as it boots, and if it's script, will be executed by an Administrator user automatically.
- In the resources for this session you will find user-data.txt
- Open up this file in a text editor and take a look. You will see that its some Powershell script that copies an ASPX web page, enables the IIS Web Role, and starts a website.
- Copy the text (completely) and paste it into the "User data" section of the EC2 console.

▼ Advanced Details

User data (i)

As text As file Input is already base64 encoded

```
new-websit... -name test -port 80 -physicalpath c:\inetpub\test  
-ApplicationPool " .NET v4.5" -force  
remove-website -name "Default Web Site"  
start-website -name test  
</powershell>
```

- Select "Next: Add Storage"
- We won't make any changes here, but see how we could change the size and number of disks that the server has.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/sda1	snap-049c714bc2eed31ff	30	General Purpose SSD (GP2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted
<input type="button" value="Add New Volume"/>								

- Select "Next: Add Tags"
- We want the server configuration to be named

- Select "Add Tag"
- Enter "Name" for the key (note ensure the N is capital)
- Enter "my-web-server" for the value.

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.

A copy of a tag can be applied to volumes, instances or both.

Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	(127 characters maximum)	Value	(255 characters maximum)	In
Name		my-web-server		<input checked="" type="checkbox"/>
<input type="button" value="Add another tag"/> (Up to 50 tags maximum)				

- Select "Next: Configure Security Group"
- Let's change the name of the Security Group so we can find it in the future, change the name to "web-server-group"
- Using descriptions is always a good idea in AWS, add a description so that when you look at this in the future you understand what it is
- Now we are going to allow connection on port 80 (HTTP) from the outside world
- Select "Add Rule"
- In the Type dropdown select "HTTP"
- In the "Source" dropdown select "Anywhere"

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: Create a new security group Select an existing security group

Security group name:	web-server-group			
Description:	Mike told me to write a description in here...			
Type	Protocol	Port Range	Source	Description
Custom TCP	TCP	3389	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
HTTP	TCP	80	Custom 0.0.0.0/0, ::/0	e.g. SSH for Admin Desktop

[Add Rule](#)

- Select: “Review and Launch”

- Review the details of the instance, and if all looks ok select "Launch"

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process. ^

⚠ Improve your instances' security. Your security group, web-server-group, is open to the world.
Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only. You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

⚠ Your instance configuration is not eligible for the free usage tier
To launch an instance that's eligible for the free usage tier, check your AMI selection, instance type, configuration options, or storage devices. Learn more about [free usage tier](#) eligibility and usage restrictions.

[Don't show me this again](#) [Edit AMI](#)

AMI Details

 Microsoft Windows Server 2016 Base - ami-48d6122a
 Free tier eligible Microsoft Windows 2016 Datacenter edition. [English]
 Root Device Type: ebs Virtualization type: hvm

If you plan to use this AMI for an application that benefits from Microsoft License Mobility, fill out the [License Mobility Form](#). Don't show me this again

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance

[Edit instance type](#) [Cancel](#) [Previous](#) **Launch**

- Select the Key Pair that you created earlier today

- You will need to acknowledge that you DO have the Key Pair

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair

Select a key pair

my-key-pair

I acknowledge that I have access to the selected private key file (my-key-pair.pem), and that without this file, I won't be able to log into my instance.

[Cancel](#)

[Launch Instances](#)

- Select: "Launch Instances"

- Scroll to the bottom of the screen and select "View Instances"

Bootstrap an Instance with CloudFormation

- Wow that was a lot of steps to create a server, there must be a better way?
- Well there are a few, but let's do the same thing again with CloudFormation.
- This time we have created the template for you, let's review it, you will find it in this sessions resources called "web-server-instance.yaml"

```
AWSTemplateFormatVersion: 2010-09-09
```

Description: This template creates an EC2 web server instance and allows you to select the subnet it will use. To keep it simple it only works in Sydney (ap-southeast-2).

Parameters:

```
serverName:  
  Type: String  
  Default: my-demo-server  
  Description: Enter the name for the server. (This is not a hostname)
```

```
subnet:  
  Type: AWS::EC2::Subnet::Id  
  Description: Select a subnet for this instance.
```

```
key:  
  Type: AWS::EC2::KeyPair::KeyName  
  Description: Enter a valid EC2 Key
```

Resources:

```
instance:  
  Type: "AWS::EC2::Instance"  
  Properties:  
    ImageId: ami-82a458e0  
    InstanceType: t2.large  
    KeyName: !Ref key  
    NetworkInterfaces:  
      - DeviceIndex: 0  
        SubnetId: !Ref subnet  
        AssociatePublicIpAddress: true
```

UserData:

```
Fn::Base64: !Sub |
<powershell>
mkdir c:\inetpub\test
curl https://s3-ap-southeast-2.amazonaws.com/test-aspx/default.aspx
-OutFile C:\inetpub\test\default.aspx
add-windowsfeature web-webserver -includeallsubfeature -logpath
$env:temp\webserver_addrole.log
new-website -name test -port 80 -physicalpath c:\inetpub\test
-ApplicationPool ".NET v4.5" -force
remove-website -name "Default Web Site"
start-website -name test
</powershell>
```

Tags:

```
-  
Key: Name  
Value: !Ref serverName
```

- In the template you will see a "Description", "Parameters", and "Resources" sections.
- Parameters are the inputs you're prompted for when you launch the template.
- Resources are the service instances that will be created in the stack.
- Notice that the EC2 Instance has UserData in the template, the same user data that you pasted into the console earlier.
- Go ahead and create a stack from this template. If you need a hand follow these steps:
 - Navigate to CloudFormation
 - Select "Create Stack"
 - Select "Upload a template to Amazon S3"
 - Select "Browse..." and select the template file from your computer
 - Select "Next"

Specify Details

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more](#).

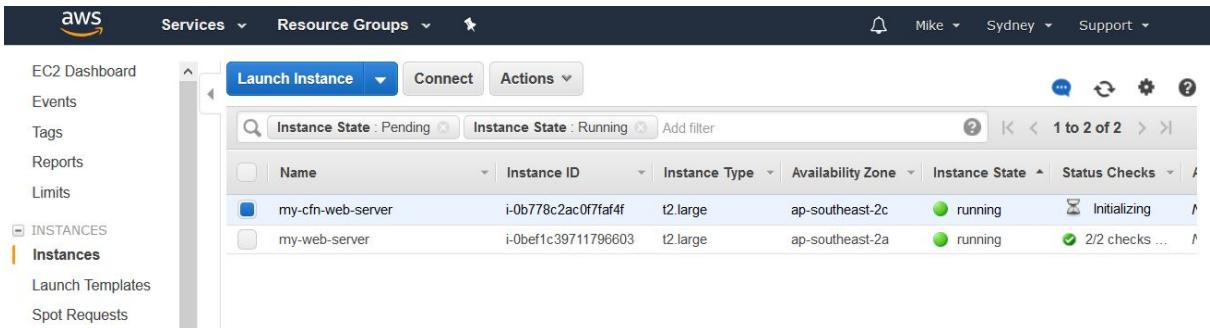
Stack name

Parameters

key	<input type="text" value="my-key-pair"/>	Enter a valid EC2 Key
serverName	<input type="text" value="my-cfn-web-server"/>	Enter the name for the server. (This is not a hostname)
subnet	<input type="text" value="subnet-9bdd84c2 (172.31.16.0/20)"/>	Select a subnet for this instance.

Cancel
Previous
Next

- Enter "my-web-server-stack" for the "Stack name"
- Select your "Key Pair" for the "key"
- Enter a "serverName", let's call this one "my-cfn-web-server"
- For "subnet" choose any subnet in the "172." range.
- Select "Next"
- Scroll down and select "Next"
- Select "Create"
- Now lets navigate back to EC2 and see how our other build is going
- By now we should see 2 EC2 Instances building.

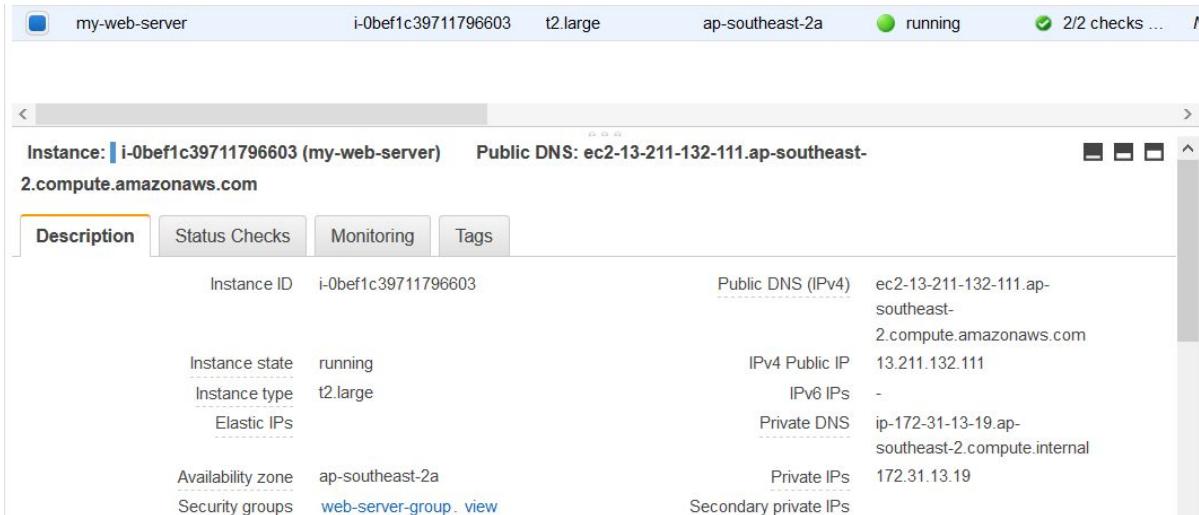


Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks
my-cfn-web-server	i-0b778c2ac0f7faf4f	t2.large	ap-southeast-2c	running	Initializing
my-web-server	i-0bef1c39711796603	t2.large	ap-southeast-2a	running	2/2 checks ...

- It can take a few mins for the servers to build. This is mainly them enabling the Web Role and setting up the website.

- Select the first server we created "my-web-server"

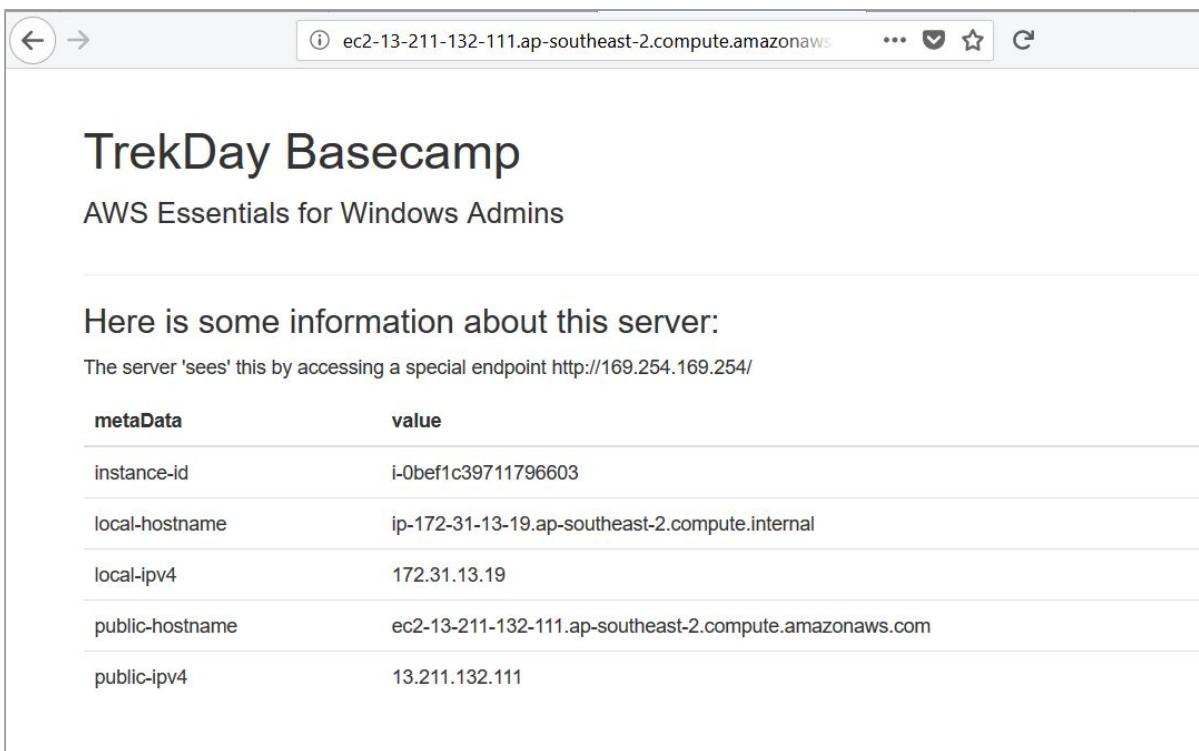
- In the details towards the bottom of the page find and copy the "Public DNS" value for the server.



Description	Status Checks	Monitoring	Tags
Instance ID	i-0bef1c39711796603		Public DNS (IPv4) ec2-13-211-132-111.ap-southeast-2.compute.amazonaws.com
Instance state	running	IPv4 Public IP	13.211.132.111
Instance type	t2.large	IPv6 IPs	-
Elastic IPs		Private DNS	ip-172-31-13-19.ap-southeast-2.compute.internal
Availability zone	ap-southeast-2a	Private IPs	172.31.13.19
Security groups	web-server-group, view	Secondary private IPs	

- Enter this value into a new tab of your web browser.

- Do you see a webpage?



metaData	value
instance-id	i-0bef1c39711796603
local-hostname	ip-172-31-13-19.ap-southeast-2.compute.internal
local-ipv4	172.31.13.19
public-hostname	ec2-13-211-132-111.ap-southeast-2.compute.amazonaws.com
public-ipv4	13.211.132.111

- No need to RDP into the server, the job is done.
- In a few minutes, do the same with your Cloudformation server.
- You should see a webpage there too.

TrekDay Basecamp

AWS Essentials for Windows Admins

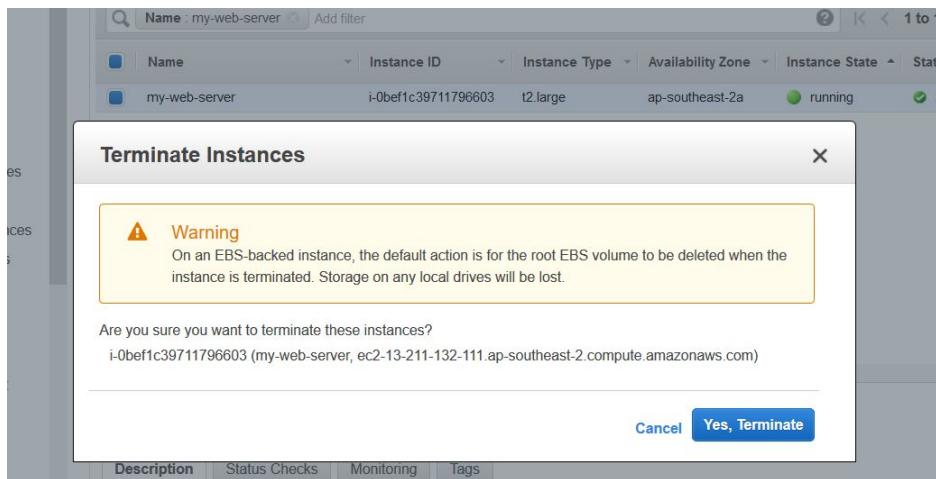
[Here is some information about this server..](#)

- Discuss: How could we get this build to be even faster?

Cleanup the Resources

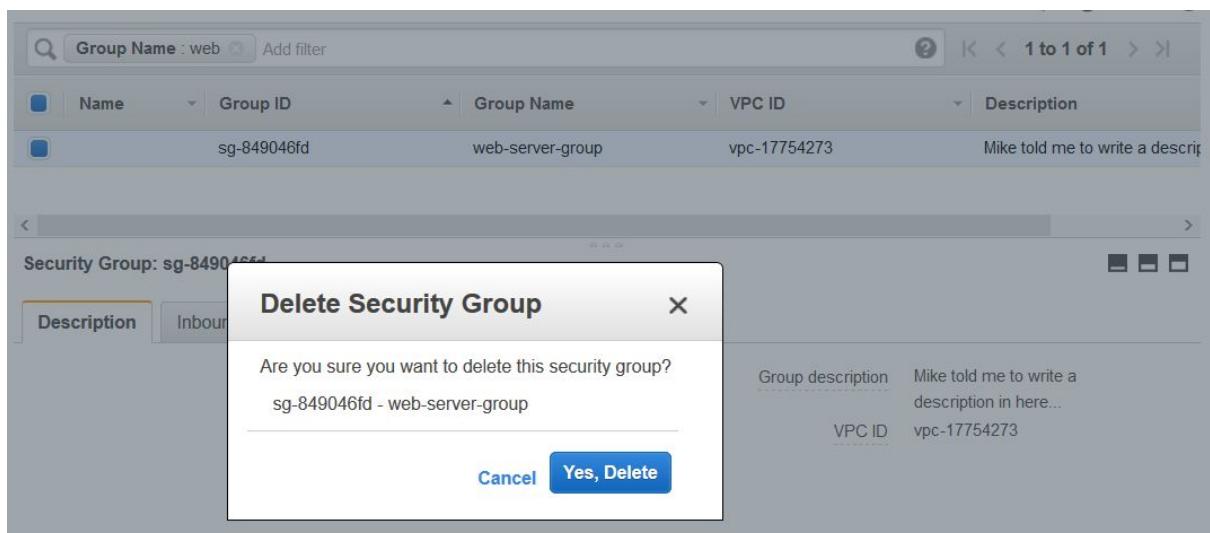
- We don't need these servers anymore. Let's clean up:

- Navigate to EC2
- Select the instance called "my-web-server"
- Select "Actions", "Instance State", "Terminate" and "Yes, Terminate"



- From the menu on the left hand side, select "Security Groups"

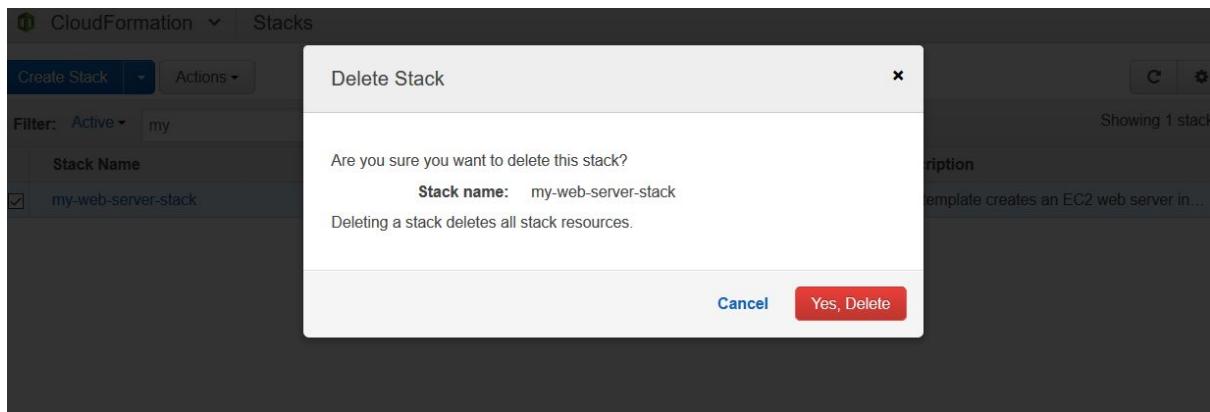
- Look for a Security Group with the GROUP NAME (note this is not the "Name" column) of "web-server-group", select "Actions", "Delete Security Group", and "Yes, Delete".



- Cleaning up the CloudFormation server/stack is much easier

- Navigate to CloudFormation

- Select your web server stack, then "Actions", "Delete Stack", "Yes, Delete"



END

Session 5 - AWS Systems Manager

In this session we will get introduced to AWS Systems Manager (SSM).

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Steps

- First we're going to set up a (small) fleet of servers to manage.
- Navigate to CloudFormation
- Select "Create Stack"
- Select "Upload a template to Amazon S3" and "Browse..."
- With the resources for this session find "three-server-instances.yaml"
- Select "Next"
- For the stack name enter "my-instance-fleet"

Specify Details

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more](#).

Stack name

[Cancel](#) [Previous](#) [Next](#)

- Select "Next"
- Scroll to the bottom and select "Next"

Capabilities

i The following resource(s) require capabilities: [AWS::IAM::Role]

This template contains Identity and Access Management (IAM) resources that might provide entities access to make changes to your AWS account. Check that you want to create each of these resources and that they have the minimum required permissions.

[Learn more.](#)

I acknowledge that AWS CloudFormation might create IAM resources.

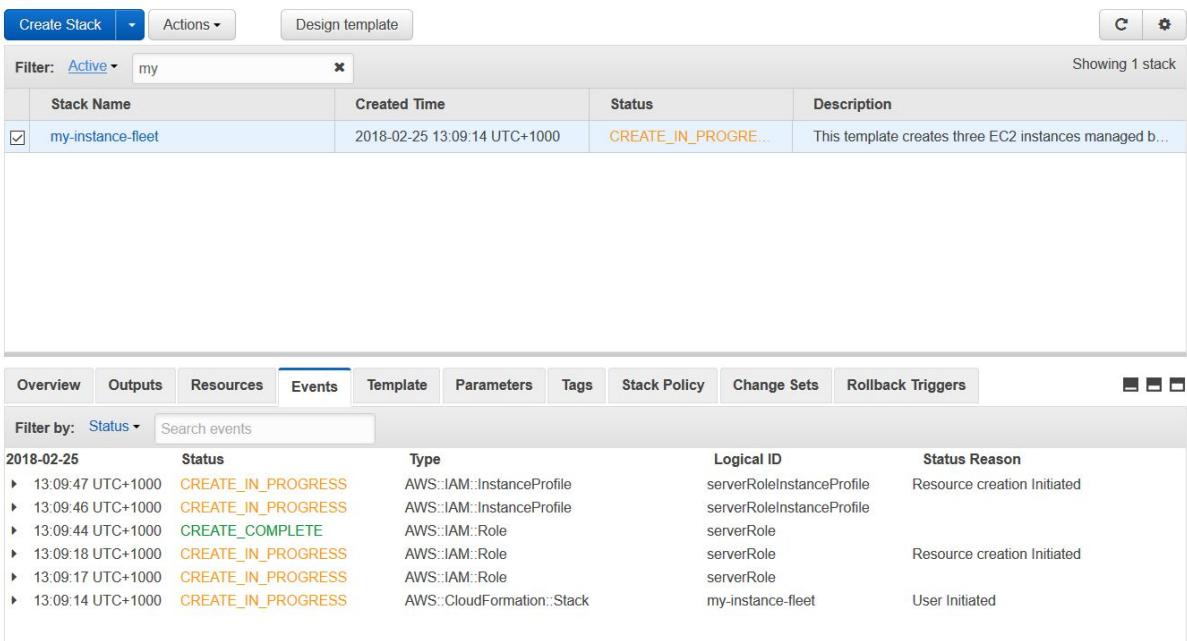
[Quick Create Stack](#) (Create stacks similar to this one, with most details auto-populated)

[Cancel](#) [Previous](#) [Create](#)

- As this template will adjust the security of your account you will now need to check the box for "I acknowledge that AWS CloudFormation might create IAM resources."

- Select "Create"

- Wait a minute or two while the instances build. You can watch them build from the "Events" tab in the CloudFormation stack page, and from the Instance list in the EC2 page.



Created Time	Status	Description
2018-02-25 13:09:14 UTC+1000	CREATE_IN_PROGRESS	This template creates three EC2 instances managed b...

Event	Status	Type	Logical ID	Status Reason
13:09:47 UTC+1000	CREATE_IN_PROGRESS	AWS::IAM::InstanceProfile	serverRoleInstanceProfile	Resource creation Initiated
13:09:46 UTC+1000	CREATE_IN_PROGRESS	AWS::IAM::InstanceProfile	serverRoleInstanceProfile	
13:09:44 UTC+1000	CREATE_COMPLETE	AWS::IAM::Role	serverRole	
13:09:18 UTC+1000	CREATE_IN_PROGRESS	AWS::IAM::Role	serverRole	Resource creation Initiated
13:09:17 UTC+1000	CREATE_IN_PROGRESS	AWS::IAM::Role	serverRole	
13:09:14 UTC+1000	CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	my-instance-fleet	User Initiated

- The stack can take longer than you might expect to create the "AWS::IAM::InstanceProfile", but things should speed along after that step is complete.

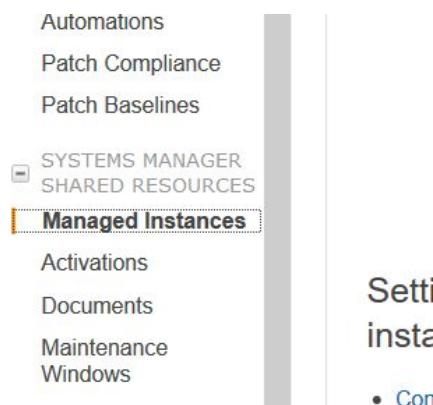
- Still waiting? Have a look at the template you are building. In some ways its more complex than other templates we've built.

...

- Now the instances are built, let's check to make sure that SSM can 'see' them.

- Navigate to EC2

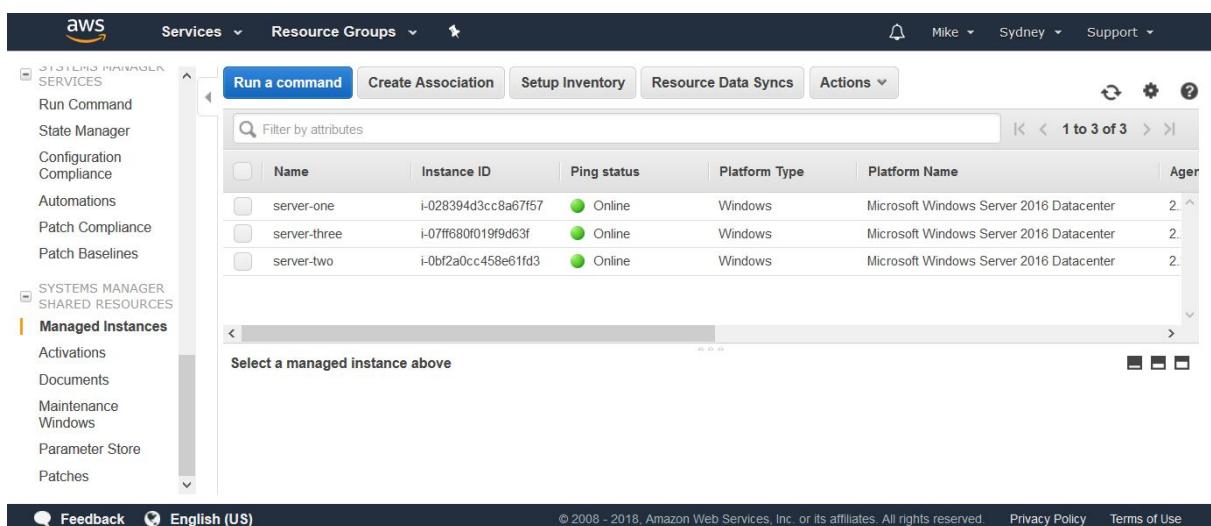
- From the menu on the left hand side, scroll down and select "Managed Instances" under the heading "SYSTEMS MANAGER SHARED RESOURCES".



- If there is nothing listed yet, the SSM service might not have discovered the Instances yet. Wait a moment.

- When we created the Instances (via CloudFormation) we gave them the security rights to communicate with SSM. We are now waiting for the SSM agent on the server to poll the services.

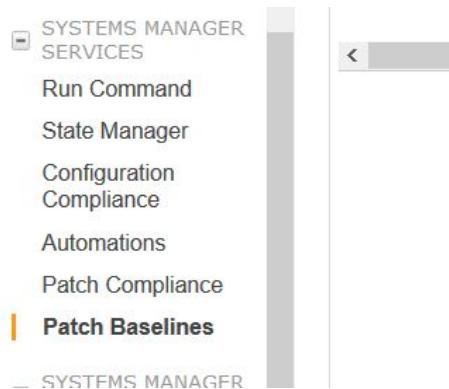
- Refresh the page (maybe a few times) until you see all three servers listed.



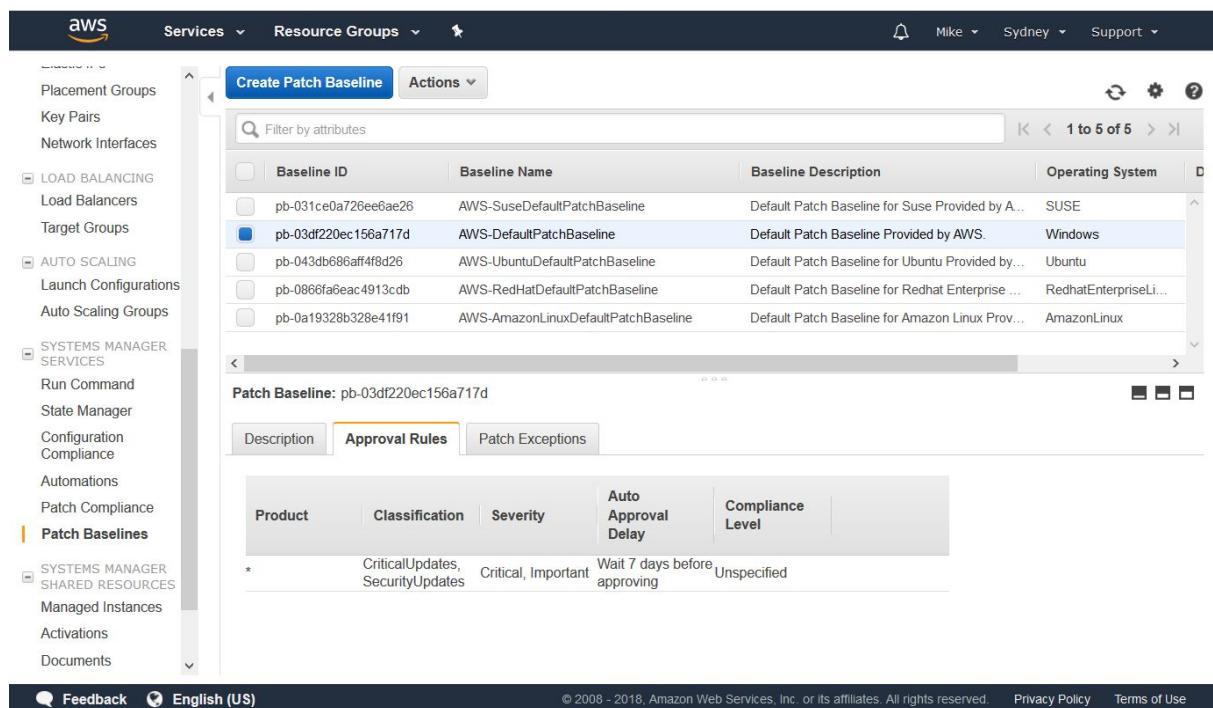
The screenshot shows the AWS Systems Manager Shared Resources - Managed Instances page. The left sidebar shows 'Run Command', 'State Manager', 'Configuration', 'Compliance', 'Automations', 'Patch Compliance', 'Patch Baselines', and 'SYSTEMS MANAGER SHARED RESOURCES'. Under 'Managed Instances', it lists 'Activations', 'Documents', 'Maintenance', 'Windows', 'Parameter Store', and 'Patches'. The main content area has a header with 'Run a command', 'Create Association', 'Setup Inventory', 'Resource Data Syncs', and 'Actions'. Below is a table with columns: Name, Instance ID, Ping status, Platform Type, and Platform Name. The table contains three rows: 'server-one' (Instance ID: i-028394d3cc8a67f57, Ping status: Online, Platform Type: Windows, Platform Name: Microsoft Windows Server 2016 Datacenter), 'server-three' (Instance ID: i-07ff680f019fd63f, Ping status: Online, Platform Type: Windows, Platform Name: Microsoft Windows Server 2016 Datacenter), and 'server-two' (Instance ID: i-0bf2a0cc458e61fd3, Ping status: Online, Platform Type: Windows, Platform Name: Microsoft Windows Server 2016 Datacenter). At the bottom, there is a note 'Select a managed instance above'.

SSM - Check server patch status

- First let's check the patch status of our Instances against the default Patch Baseline.
- To see the default baseline select "Patch Baselines" from the menu on the left hand side.



- You will see several Default Baselines provided by AWS. Select the one with the name "AWS-DefaultPatchBaseline" as this applies to Windows.



Baseline ID	Baseline Name	Baseline Description	Operating System
pb-031ce0a726ee6ae26	AWS-SuseDefaultPatchBaseline	Default Patch Baseline for Suse Provided by A...	SUSE
pb-03df220ec156a717d	AWS-DefaultPatchBaseline	Default Patch Baseline Provided by AWS.	Windows
pb-043db686aff4f8d26	AWS-UbuntuDefaultPatchBaseline	Default Patch Baseline for Ubuntu Provided by...	Ubuntu
pb-0866fa6eac4913cdb	AWS-RedHatDefaultPatchBaseline	Default Patch Baseline for Redhat Enterprise ...	RedhatEnterpriseLi...
pb-0a19328b328e41f91	AWS-AmazonLinuxDefaultPatchBaseline	Default Patch Baseline for Amazon Linux Prov...	AmazonLinux

Patch Baseline: pb-03df220ec156a717d

Description Approval Rules Patch Exceptions

Product	Classification	Severity	Auto Approval Delay	Compliance Level
*	CriticalUpdates, SecurityUpdates	Critical, Important	Wait 7 days before approving	Unspecified

- In the lower section of the screen select "Approval Rules"

- You can see that this Baseline defines all patches with:

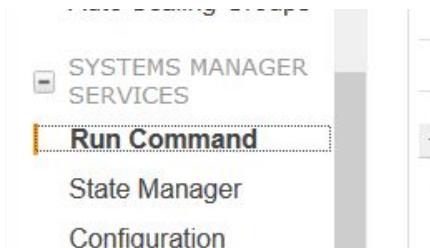
- Classification of "CriticalUpdates, SecurityUpdates"
- Severity of Critical, Important
- Older than 7 days

Description	Approval Rules	Patch Exceptions		
Product	Classification	Severity	Auto Approval Delay	Compliance Level
*	CriticalUpdates, SecurityUpdates	Critical, Important	Wait 7 days before approving	Unspecified

- Let's check our servers against this baseline.

- Normally we would do this using a "Maintenance Window", or "State Manager" that checks periodically, but today we will run a one off check using "Run Command"

- Select "Run Command" from the menu on the left hand side.



- Select "Run a command"

- Under "Command document" select "AWS-RunPatchBaseline". This is a prewritten document to check any type of instance against a Patch Baseline.

<input type="radio"/>	AWS-InstallApplication	Amazon	Windows
<input type="radio"/>	AWS-JoinDirectoryServiceDomain	Amazon	Windows
<input checked="" type="radio"/>	AWS-RunPatchBaseline	Amazon	Windows,Linux
<input type="radio"/>	AWS-InstallSpecificWindowsUpdates	Amazon	Windows
<input type="radio"/>	AWS-RunShellScript	Amazon	Linux

- Scroll down and select "Manually Selecting Instances"

Select Targets by* Manually Selecting Instances Specifying a Tag

i-028394d3cc8a67f57 i-07ff680f019f9d63f i-0bf2a0cc458e61fd3 ⓘ

Select instances ▾

Name	Instance ID	Instance State	Availability Zone	Ping Status	Last Ping Date	Agent Version
server-one	i-028394d3cc8a67f57	running	ap-southeast-2a	Online	February 25, 2018	2.2.93.0
server-three	i-07ff680f019f9d63f	running	ap-southeast-2a	Online	February 25, 2018	2.2.93.0
server-two	i-0bf2a0cc458e61fd3	running	ap-southeast-2a	Online	February 25, 2018	2.2.93.0

- Select "Select instances" and select all of your three instances.

Execute on Targets concurrently

Stop after errors

Operation* ⓘ

- Enter "3" for "Execute on", this specifies how many instances of the document should run at once across our fleet.

- Enter "1" for "Stop after" ... "errors".

- For "Operation" select "Scan". We are not going to install missing patches, but rather scan for missing patches.

Timeout (seconds) ⏱

Advanced Options

AWS Command Line Interface command

Cancel Run

- Scroll to the bottom and select "Run"

- Ensure on the next page that there are entries under "Instance IDs"

- Select "View result"

✓ Success
We are running your command against the instances listed below.

Instance IDs i-028394d3cc8a67f57, i-07ff680f019f9d63f, i-0bf2a0cc458e61fd3

Command ID 5d4fda43-82a8-45bc-8f46-08848572317f

[View result](#)

- You should see a list of commands "In Progress", the list has a refresh button on it so you can watch the progress.

[Run a command](#) [Actions ▾](#)

Filter by attributes

	Command ID	Instance ID	Document name	Status
<input type="checkbox"/>	a6fafafa84-fdc3-4a1b-...	i-07ff680f019f9d63f	AWS-RunPatchBaseline	In Progress
<input type="checkbox"/>	a6fafafa84-fdc3-4a1b-...	i-028394d3cc8a67f57	AWS-RunPatchBaseline	In Progress
<input type="checkbox"/>	5d4fda43-82a8-45b...	i-0bf2a0cc458e61fd3	AWS-RunPatchBaseline	In Progress

- When any of the commands are complete, shown as "Success" you can view the output.

- Select the command from the list, in the lower section of the screen select the "Output" tab.

[Description](#) [Output](#)

Output

Plugin name	Status	Response code	Start Time	Finish Time	Output
PatchLinux	Success	0	February 25, 2018 at 1:26:56 PM...	February 25, 2018 at 1:26:56 PM...	View Output
PatchWindows	Success	0	February 25, 2018 at 1:22:38 PM...	February 25, 2018 at 1:26:56 PM...	View Output

- In the output list you should see two entries. The command/document that we ran operates on both Windows and Linux OS's. There should be one output per OS type, and only any useful information in the Windows output.

- You will (probably) see that "Scan found no missing updates."

[Commands](#) > Output

Output for PatchWindows

```
Patch Summary for i-0bf2a0cc458e61fd3
PatchGroup      :
BaselineId      : pb-03df220ec156a717d
SnapshotId     : d4b95834-a53f-4a19-b1ef-cbb7d75f3426
OwnerInformation :
OperationType   : Scan
OperationStartTime : 2018-02-25T03:22:44.2777320Z
OperationEndTime   : 2018-02-25T03:26:53.8367563Z
InstalledCount   : 0
InstalledOtherCount : 10
FailedCount     : 0
MissingCount    : 0
NotApplicableCount : 2390

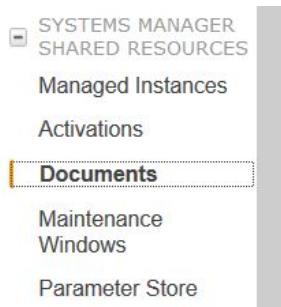
EC2AMAZ-95VG6Q9 - PatchBaselineOperations Assessment Results -
2018-02-25T03:26:56.461

Scan found no missing updates.
```

- Great.

SSM - Run our own command/document

- Now let's create our own document, and run a bigger command.
- Navigate to EC2, scroll down the left hand menu and select "Documents"



- Select "Create Document"
- Enter "myWebServerInstall" into the "Name"
- Make sure that "Document Type" is set to "Command"

Create Document

Specify the following parameters to create a document

Name*	myWebServerInstall	
Document Type	Command	

- In the resources for this session you will find a file called ""ssm-document.txt". Open this in a text editor and copy all of the content to the clipboard.
- Under "Content" delete the curly braces "{}" and paste in the contents of your clipboard.

Content*

```

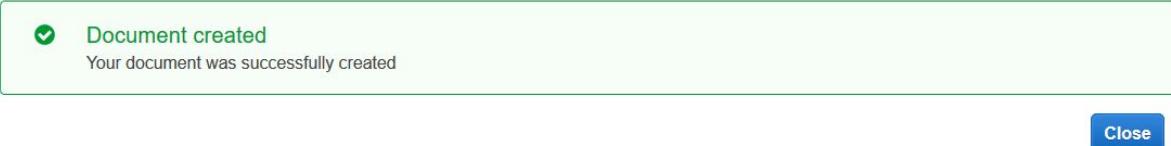
7   "name": "SetupWebsite",
8   "inputs": {
9     "timeoutSeconds": 300,
10    "runCommand": [
11      "mkdir c:\\inetpub\\test",
12      "",
13      "curl https://s3-ap-southeast-2.amazonaws.com/test-aspx/def",
14      "",
15      "add-windowsfeature web-webserver -includeallsubfeature -lo",
16      "",
17      "new-website -name test -port 80 -physicalpath c:\\inetpub\\",
18      "",
19      "remove-website -name \"Default Web Site\"",
20      "",
21      "start-website -name test"
22    ]
23  }
24
25
26

```

- There will be some time in a moment to review the document.

- Scroll down and select "Create Document", then "Close"

Create Document

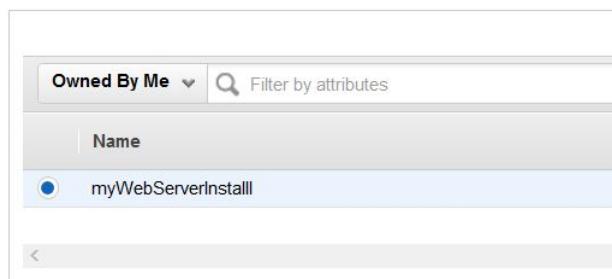


- Let's run this document as a command against our fleet.

- Select "Run Command" from the menu on the left hand side.

- Select "Run a command"

- Under "Command document" change the dropdown filter to "Owned By Me"



- Select your document "myWebServerInstall"

- Again select "Manually Selecting Instances" and select all your instances from "Select instances"

Select Targets by* Manually Selecting Instances Specifying a Tag

i-028394d3cc8a67f57 x i-07ff680f019f9d63f x i-0bf2a0cc458e61fd3 x i

Select instances ▾

	Name	Instance ID	Instance State	Availability Zone	Ping Status
<input type="checkbox"/>	server-one	i-028394d3cc8...	running	ap-southeast-2a	Online
<input type="checkbox"/>	server-three	i-07ff680f019f9...	running	ap-southeast-2a	Online
<input type="checkbox"/>	server-four	i-0bf2a0cc458e6...	running	ap-southeast-2a	Online

- Again select "3" and "1" for "Execute on" and "Stop after"

- Scroll down and select "Run", ensure the instances are listed, and select "View result"

Run a command



Success

We are running your command against the instances listed below.

Instance IDs i-028394d3cc8a67f57, i-07ff680f019f9d63f, i-0bf2a0cc458e61fd3

Command ID 6b919209-98c9-4251-b294-8aeab9a8b405

View result

- This might take a couple of minutes.

....

- Let's go and take another look at the result of the patch baseline we did.

- From the menu on the left hand side select "Patch Compliance"

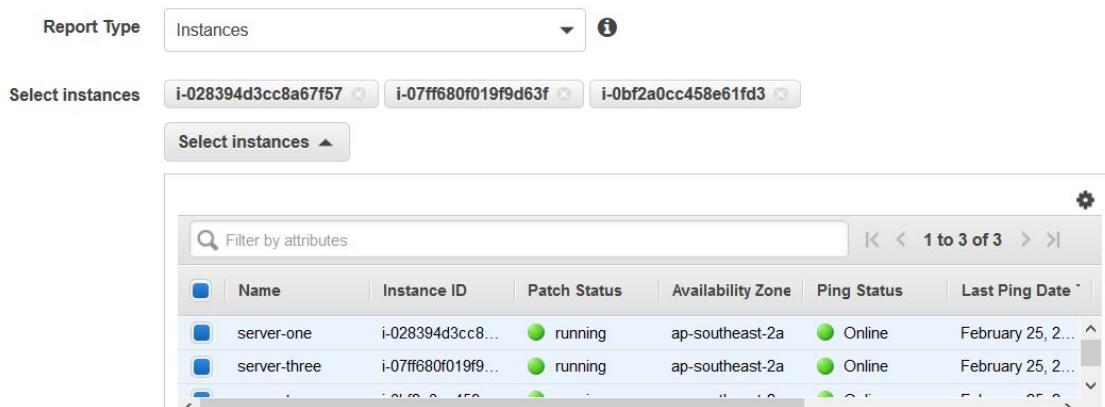


- This page will show a report on the patch compliance of our managed fleet.

- In the "Select instances" dropdown, select all our instances

Patch Compliance

Patch compliance reporting allows you to view compliance information across a number of different axis. Select the report type below to see a summary of the information that you are interested in.



The screenshot shows the 'Patch Compliance' dashboard. At the top, there is a 'Report Type' dropdown set to 'Instances'. Below it is a 'Select instances' dropdown containing three instance IDs: i-028394d3cc8a67f57, i-07ff680f019f9d63f, and i-0bf2a0cc458e61fd3. A 'Select instances' button is also present. The main area is a table with columns: Name, Instance ID, Patch Status, Availability Zone, Ping Status, and Last Ping Date. The table shows three rows: 'server-one' (Instance ID i-028394d3cc8a67f57) is running in ap-southeast-2a, online, and last pinged on February 25, 2018; 'server-three' (Instance ID i-07ff680f019f9d63f) is running in ap-southeast-2a, online, and last pinged on February 25, 2018; and a partially visible row for 'server-two' (Instance ID i-0bf2a0cc458e61fd3).

- The dashboard should update with a review of the current patch status.

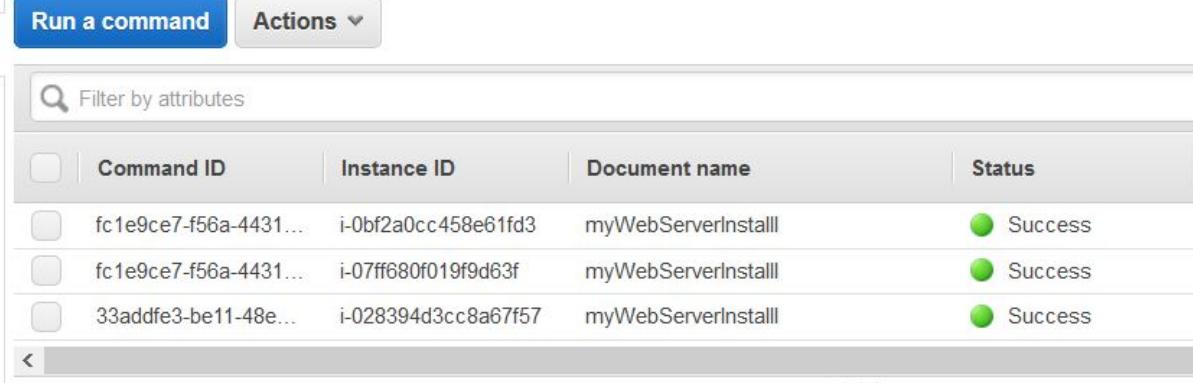
Compliance Summary



- This is a useful tool, especially if you are running "AWS-RunPatchBaseline" on a regular basis.

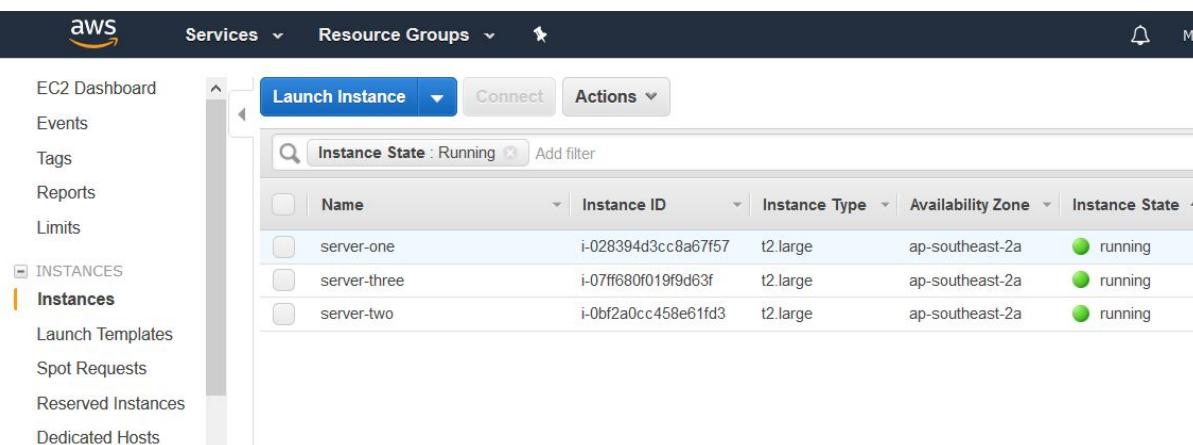
- To catch up on the status of our web server installs, select "Run Command" again from the left hand menu.

- When the commands are showing as "Success"



Command ID	Instance ID	Document name	Status
fc1e9ce7-f56a-4431...	i-0bf2a0cc458e61fd3	myWebServerInstall	Success
fc1e9ce7-f56a-4431...	i-07ff680f019f9d63f	myWebServerInstall	Success
33addfe3-be11-48e...	i-028394d3cc8a67f57	myWebServerInstall	Success

- Navigate to EC2 Instances



Name	Instance ID	Instance Type	Availability Zone	Instance State
server-one	i-028394d3cc8a67f57	t2.large	ap-southeast-2a	running
server-three	i-07ff680f019f9d63f	t2.large	ap-southeast-2a	running
server-two	i-0bf2a0cc458e61fd3	t2.large	ap-southeast-2a	running

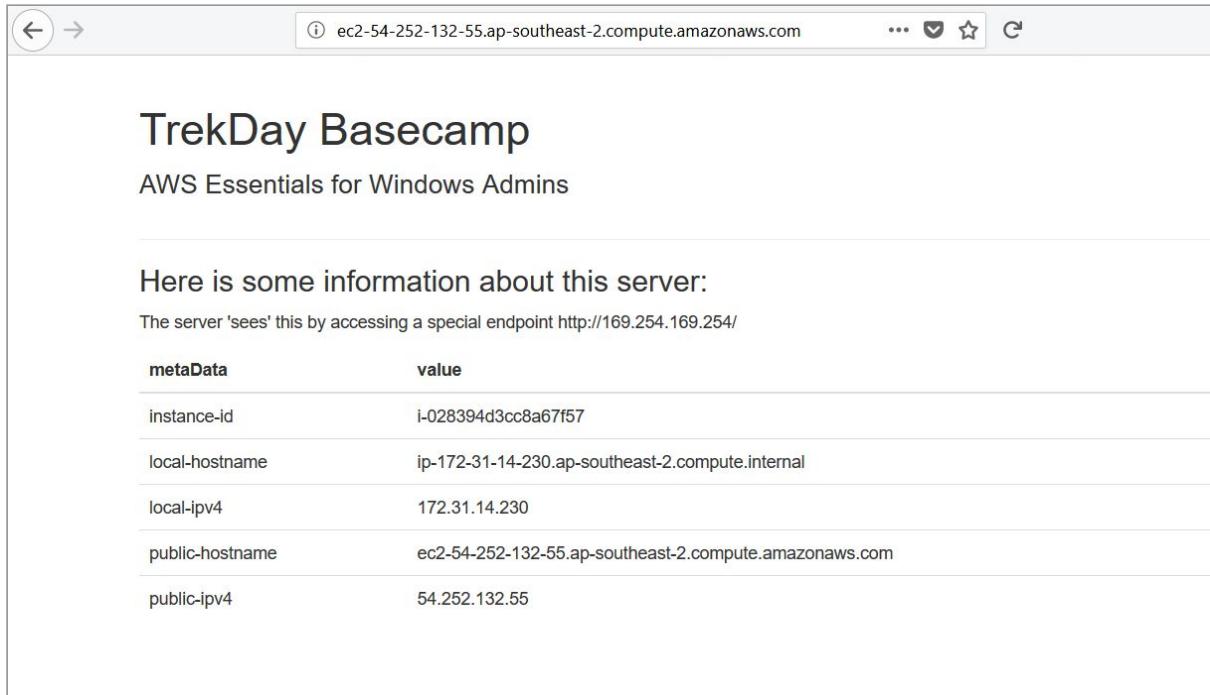
- Locate the "Public DNS" for the instances and test the website from the details section at the bottom of the screen.



Instance: i-028394d3cc8a67f57 (server-one)	Public DNS: ec2-54-252-132-55.ap-southeast-2.compute.amazonaws.com		
Description	Status Checks	Monitoring	Tags
Instance ID: i-028394d3cc8a67f57	Public DNS (IPv4): ec2-54-252-132-55.ap-southeast-2.compute.amazonaws.com		
Instance state: running	IPv4 Public IP: 54.252.132.55	IPv6 IPs: -	Private DNS: ip-172-31-14-230.ap-southeast-2.compute.internal
Instance type: t2.large	Elastic IPs:		

- You may have to wait a few moments after the command is complete before the website appears.

- Issue: Sometimes the run commands don't show in the list. Try creating them again.
- **Open a new tab in your browser and navigate to the Public DNS name of one of the instances:**



The server 'sees' this by accessing a special endpoint <http://169.254.169.254/>

metaData	value
instance-id	i-028394d3cc8a67f57
local-hostname	ip-172-31-14-230.ap-southeast-2.compute.internal
local-ipv4	172.31.14.230
public-hostname	ec2-54-252-132-55.ap-southeast-2.compute.amazonaws.com
public-ipv4	54.252.132.55

- **It's our website again.**
- **Fancy logging into the Instance via RDP? Well you can't we didn't use a Key Pair, this server is 100% not a pet.**
- **No need to clean up, leave the server fleet there, we'll be using it in the next session.**

END

Session 6 - Security

In this session we will get introduced to Amazon Inspector.

Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Steps

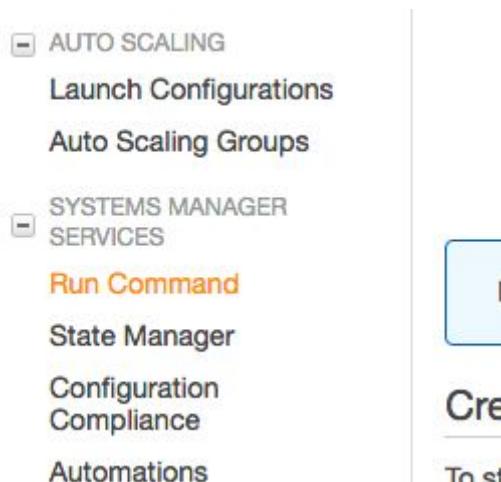
- Do you still have your small fleet of servers?
- If you deleted the stack after the SSM session, now would be a good time to recreate it!
- We're going to start this session off, back in SSM.

Run an SSM Command

- Navigate to EC2



- From the menu on the left hand side select "Run Command"



- We're going to install the "AWS Inspector" agent on our fleet.

- Select "Run a command"

Welcome to EC2 Systems Manager

Use EC2 Systems Manager to easily configure and manage your on-premises machines configured for Systems Manager.

Run Command automates common administrative tasks such as running Linux shell scripts or Windows PowerShell commands.

Before you can run a command, you must configure your targets by adding them to a group and setting up permissions as described in the Help topic for Groups. You can activate your VMs with Systems Manager using the activation process.

[Run a command](#)[More about Run Command](#)**- Select "AmazonInspector-ManageAWSAgent"**

Owned by Me or Amazon			Filter by attributes	1 to 31 of 31
Name	Owner	Platform type		
AWS-InstallSpecificWindowsUpdates	Amazon	Windows		
AWS-RunShellScript	Amazon	Linux		
AWS-ConfigureCloudWatch	Amazon	Windows		
AWS-RunPowerShellScript	Amazon	Windows,Linux		
AWS-ApplyPatchBaseline	Amazon	Windows		
AWS-UpdateEC2Config	Amazon	Windows		
AWS-InstallWindowsUpdates	Amazon	Windows		
AWS-InstallMissingWindowsUpdates	Amazon	Windows		
AWS-Support-RunEC2RescueForWindowsTool	Amazon	Windows		
AmazonInspector-ManageAWSAgent	Amazon	Windows,Linux		
AWSEC2-CreateVssSnapshot	Amazon	Windows		
AWSEC2-RunSysprep	Amazon	Windows		
AWSEC2-ManageVssIO	Amazon	Windows		
AmazonCloudWatch-MigrateCloudWatchAgent	Amazon	Windows		
AmazonCloudWatch-ManageAgent	Amazon	Windows,Linux		

- From the "Select instances" dropdown, select all your instances

Select instances ▾

Where are my instances? 

1 to 3 of 3

Filter by attributes

Name	Instance ID	Instance State	Availability Zone	Ping Status	Last Ping DateT	Agent Version	Platform Type	F
server-three	i-0499adaecea...	running	ap-southeast-2b	Online	February 25, 2...	2.2.93.0	Windows	
server-one	i-0969c84d54a...	running	ap-southeast-2b	Online	February 25, 2...	2.2.93.0	Windows	
server-two	i-0fa4c2402ae...	running	ap-southeast-2b	Online	February 25, 2...	2.2.93.0	Windows	

[Close](#)

- Enter "3" and "1" for "Execute on" and "Stop after"

- For "Operation" ensure that "Install" is selected

Execute on Targets  concurrently

Stop after errors

Operation*  

- Scroll down and select "Run", then "View result"

Run a command

 Success

We are running your command against the instances listed below.

Instance IDs i-0fa4c2402aaeae6e33, i-0969c84d54a607bb2, i-0499adaecea7df3b6

Command ID 2aa166b7-c6d8-4388-91b4-2fbe551027dc

[View result](#)

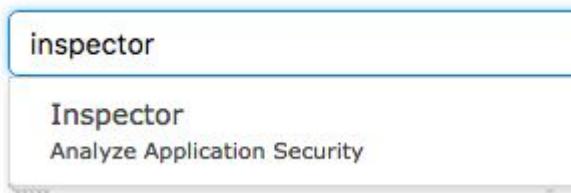
- When the command is a "Success" the Amazon Inspector Agent is installed on the instance.

Run a command Actions ▾

Filter by attributes

	Command ID	Instance ID	Document name	Status	Requested date	C
<input type="checkbox"/>	2aa166b7-c6d8-438...	i-0fa4c2402aeae6e33	AmazonInspector-M...	Success	February 25, 2018 ...	-
<input type="checkbox"/>	2aa166b7-c6d8-438...	i-0969c84d54a607bb2	AmazonInspector-M...	Success	February 25, 2018 ...	-
<input type="checkbox"/>	2aa166b7-c6d8-438...	i-0499adaecea7df3b6	AmazonInspector-M...	Success	February 25, 2018 ...	-

- Navigate to "Amazon Inspector"



inspector

Inspector
Analyze Application Security

- Select "Get Started"



A green circular icon with a white downward-pointing arrow.

Amazon Inspector

Amazon Inspector enables you to analyze the behavior of your AWS resources and helps you identify potential security issues.

[Get started](#)

- You should now see the "Get started with Amazon Inspector" page

- Notice that an IAM role will be created for us called "AWSServiceRoleForAmazonInspector", AWS creates this on our behalf.

- Select "Next"

- Under "Define an assessment target"

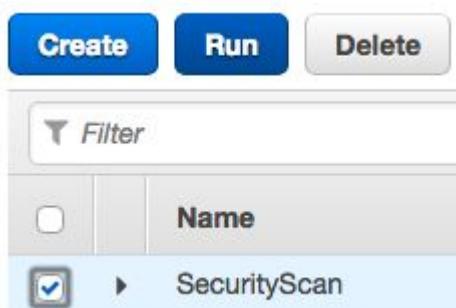
- Enter a name for the assessment "WindowsDevAssessment"
- Under Tags, select Key "Environment" and Value "dev"
- Select "Next"
- Under "Define an assessment template"
- Enter a name of "SecurityScan"
- Expand the "Rules packages" dropdown and review the types of packages that can be run.
- For now select "Common Vulnerabilities and Exposures-1.1"
- For "Duration" select "1 Hour (Recommended)"
- Select "Next" and "Create"

Define an assessment template

An assessment template allows you to specify various properties for an assessment run, including rules packages, duration, SNS notifications, and labels to label any findings. [Learn more](#).

Name*	<input type="text" value="SecurityScan"/>
Rules packages*	Common Vulnerabilities and Exposures-1.1 <input type="button" value="Select an Inspector rules package"/>
<small>Amazon Inspector runs assessments for the assessment target against selected rules package(s). Learn more</small>	
Duration*	<input type="button" value="1 Hour (Recommended)"/>
<small>The default Amazon Inspector assessment template duration is 1 hour. You can modify the duration, but longer assessment templates with longer durations can deliver fuller sets of findings.</small>	

- Now that we have defined an assessment, let's run it
- Select "SecurityScan" from the list
- Select "Run"



A screenshot of the AWS Lambda console showing the 'Run' button highlighted in blue. Below the button is a table with a single row containing the name 'SecurityScan'.

	Name
<input checked="" type="checkbox"/>	SecurityScan

- Notice that the "Last run" column shows "Collecting data"

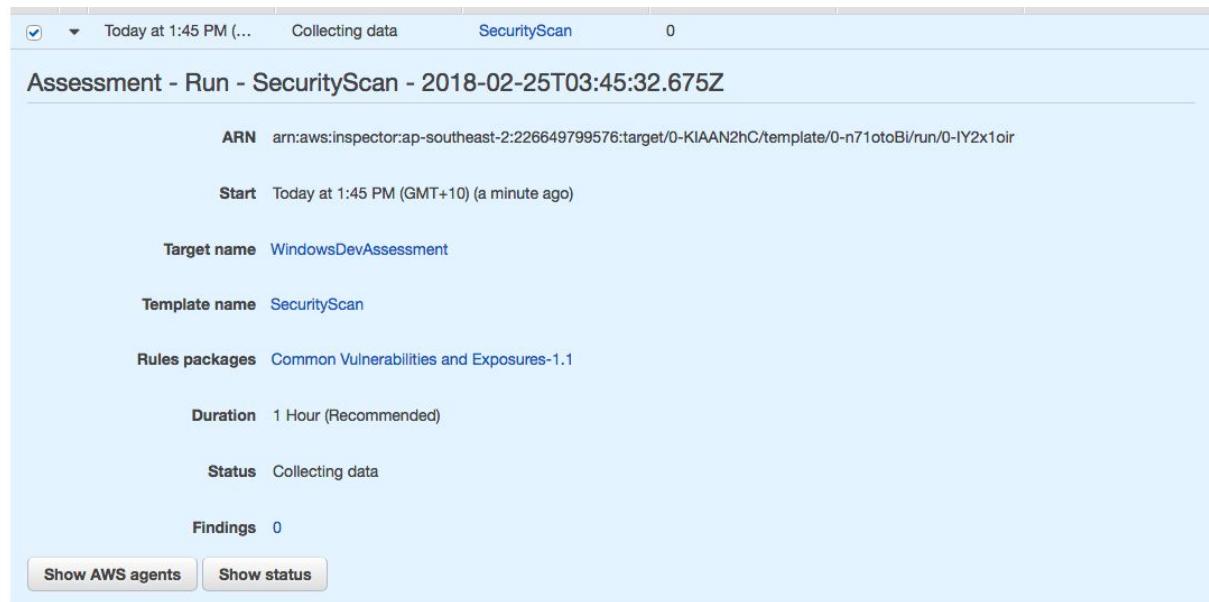
<input type="checkbox"/>	Name	Duration	Target name	Last run	All runs
<input type="checkbox"/>	SecurityScan	1 Hour	WindowsDevAssessment	Collecting data	1

- If you navigate around while the run is collecting data, and want to check on the progress navigate to "Assessment runs" on the left hand side and expand the row entry to see the "Status"



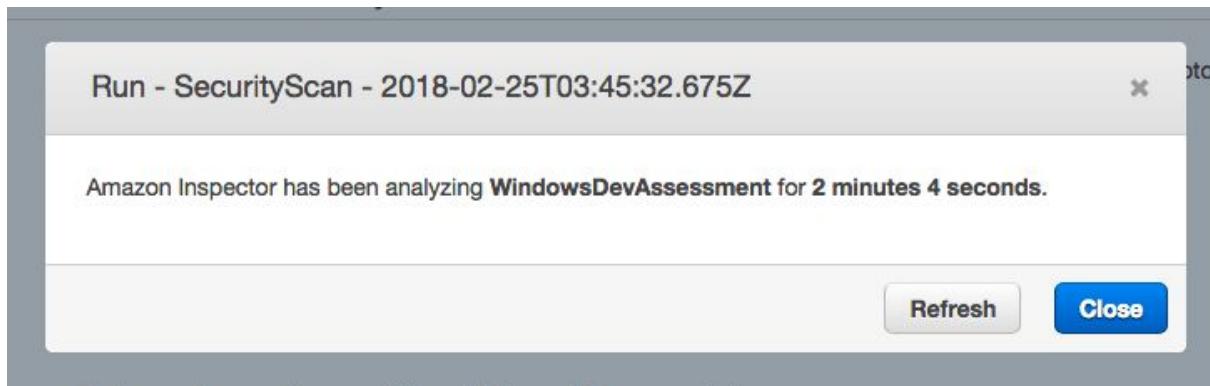
The screenshot shows a table titled 'Assessment runs' with one row. The columns are: Start time, Status, Template name, Findings, Findings by severity, and Reports. The data row is: Today at 1:45 PM (...), Collecting data, SecurityScan, 0, 0, and Reports.

- Click "Show status" for a detailed report on the scan progress.



The screenshot shows a detailed view of the 'SecurityScan' assessment run. It includes fields such as ARN, Start time, Target name, Template name, Rules packages, Duration, Status, and Findings. At the bottom are two buttons: 'Show AWS agents' and 'Show status'.

- The scan will take some time, so lets come back to this later today.



The modal window displays the title 'Run - SecurityScan - 2018-02-25T03:45:32.675Z'. Below it, a message states 'Amazon Inspector has been analyzing WindowsDevAssessment for 2 minutes 4 seconds.' At the bottom right are 'Refresh' and 'Close' buttons.

END

Session 7 - Serverless

In this session we will get introduced to the concept of “Serverless” event driven architectures.

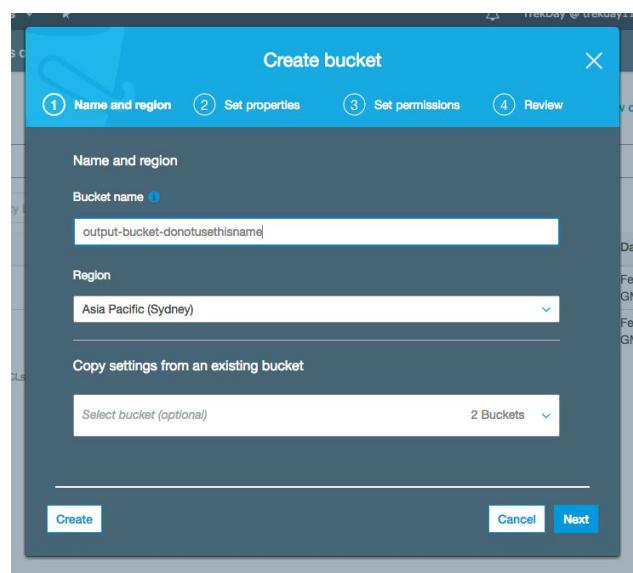
Take the following steps, one at a time. There is plenty of time to complete the session and ask any questions along the way.

Creating S3 Buckets

- For this workflow we will need a couple of S3 buckets
- Open the AWS console, make sure you are in Sydney, and navigate to S3



- Select Create bucket
- Enter a bucket name (this must be globally unique) don't use the same name as in the screenshot, and don't use the same as your neighbour!



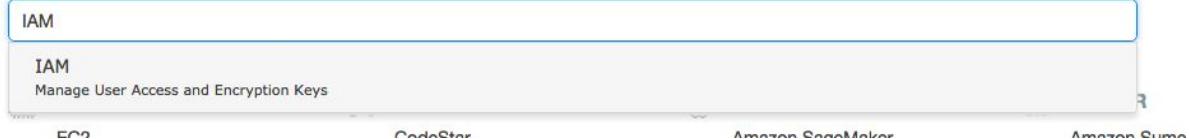
- Tip: Enter the name "input-bucket-" then add some sudo random characters by mashing the keyboard.

- The S3 console page is global, so you need to select a region to create the bucket. **Make sure this is Sydney.**
- Select "Create"
- Repeat this step and create a "output-bucket-xxxxxxxx"
- Make a note of the bucket names.

 input-bucket-donotusethisname	Not public *	Asia Pacific (Sydney)	Feb 25, 2018 11:46:33 AM GMT+1000
 output-bucket-donotusethisname	Not public *	Asia Pacific (Sydney)	Feb 25, 2018 11:46:50 AM GMT+1000

Creating an IAM Role

- Before we create our Lambda function, we need to create a security profile (called an IAM Role) that will give the function all the necessary permissions it needs to run.
- Navigate to IAM (Identity and Access Management)



- Select "Roles"



- Select "Create role"

Create role **Delete role**

Search

Role name ▾	Description
-------------	-------------

- Ensure that "AWS Service" is selected, then select "Lambda", and "Next: Permissions"

Allows AWS services to perform actions on your behalf. [Learn more](#)

Choose the service that will use this role

API Gateway	Data Pipeline	ElasticLoadBalancing	MediaConvert	Service Catalog
Auto Scaling	DeepLens	Glue	OpsWorks	Step Functions
Batch	Directory Service	Greengrass	RDS	Storage Gateway
CloudFormation	DynamoDB	GuardDuty	Redshift	
CloudHSM	EC2	Inspector	Rekognition	
CloudWatch Events	EMR	IoT	S3	
CodeBuild	ElastiCache	Kinesis	SMS	
CodeDeploy	Elastic Beanstalk	Lambda	SNS	
Config	Elastic Container Service	Lex	SWF	
DMS	Elastic Transcoder	Machine Learning	SageMaker	

* Required [Cancel](#) [Next: Permissions](#)

- In the policy type search box, type "Lambda", and scroll to "AWSLambdaExecute"

- SELECT THE CHECKBOX next to the policy name (if you select the policy name itself, you will be sent elsewhere!)

Attach permissions policies

Choose one or more policies to attach to your new role.

[Create policy](#) [Refresh](#)

Policy name		Attachments	Description
<input type="checkbox"/>	AWSLambdaENIManagementAccess	0	Provides minimum permissions for a Lambda function to ma...
<input checked="" type="checkbox"/>	AWSLambdaExecute	0	Provides Put, Get access to S3 and full access to CloudWat...

- Select "Next Review"

- Enter a name for your role "my-lambda-role"

- Select "Create role"

Create role

Review

Provide the required information below and review this role before you create it.

Role name* my-lambda-role
Maximum 64 characters. Use alphanumeric and '+-,@-_'

Role description Allows Lambda functions to call AWS services on your behalf.
Maximum 1000 characters. Use alphanumeric and '+-,@-_'

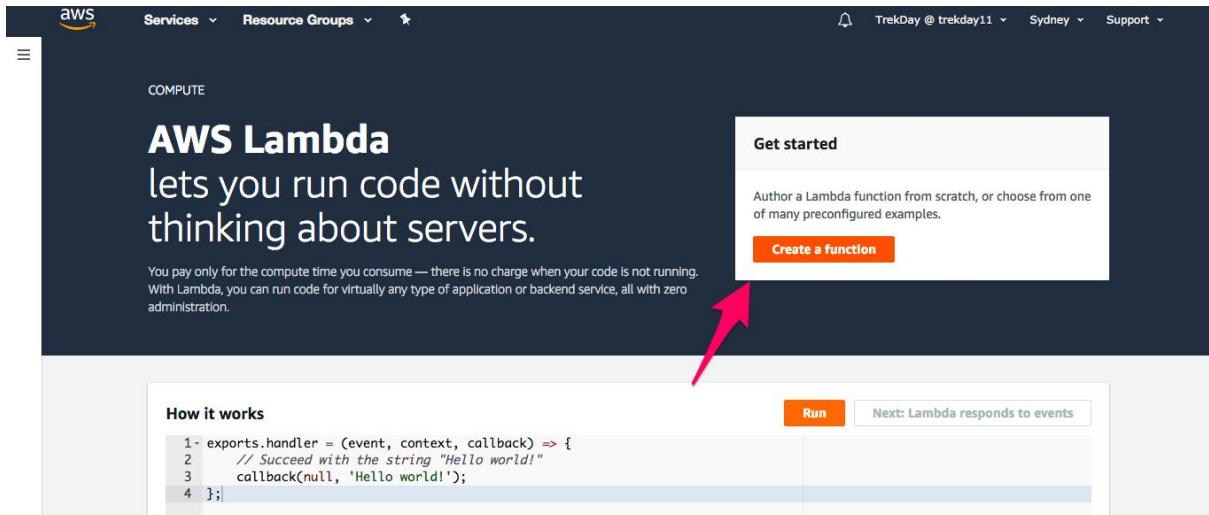
Trusted entities AWS service: lambda.amazonaws.com

Policies AWSLambdaExecute

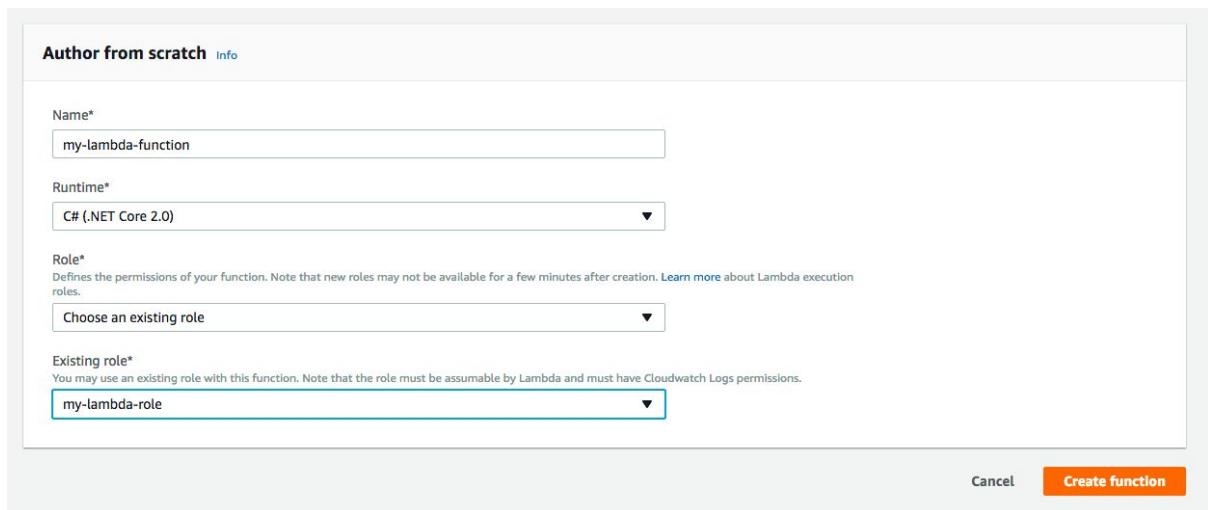
* Required [Cancel](#) [Previous](#) [Create role](#)

Create a Lambda Function

- Now lets create our Lambda function
- Navigate to Lambda
- Select "Create function"



- Make sure that "Author from scratch" is selected
- Enter a function name: "my-lambda-function"
- In the Runtime selection, select "C# (.NET Core 2.0)"
- In Role, select "Choose an existing role" and then select in the "Existing role" selection to find "my-lambda-role"
- Select "Create function"



Author from scratch Info

Name*
my-lambda-function

Runtime*
C# (.NET Core 2.0)

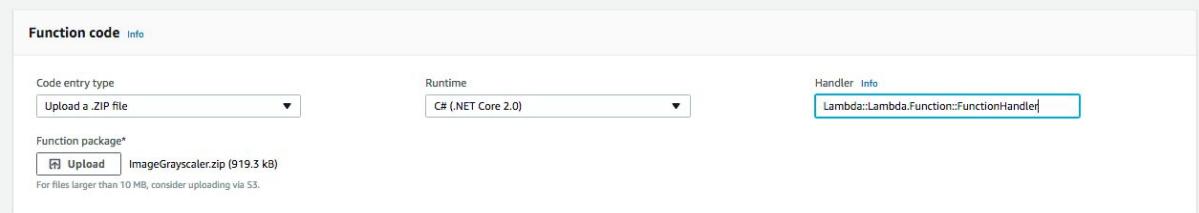
Role*
Defines the permissions of your function. Note that new roles may not be available for a few minutes after creation. [Learn more](#) about Lambda execution roles.
Choose an existing role

Existing role*
You may use an existing role with this function. Note that the role must be assumable by Lambda and must have Cloudwatch Logs permissions.
my-lambda-role

Cancel **Create function**

- You will now be taken to the main Lambda function page.
- Scroll down and find "Code entry type" where "Upload a .ZIP file" is selected, and below that select "Upload"
- In the resources supplied with this section, find, select and upload "ImageGrayscaler.zip"

- Enter: "Lambda::Lambda.Function::FunctionHandler" into the Handler text field



Function code [Info](#)

Code entry type: Upload a .ZIP file

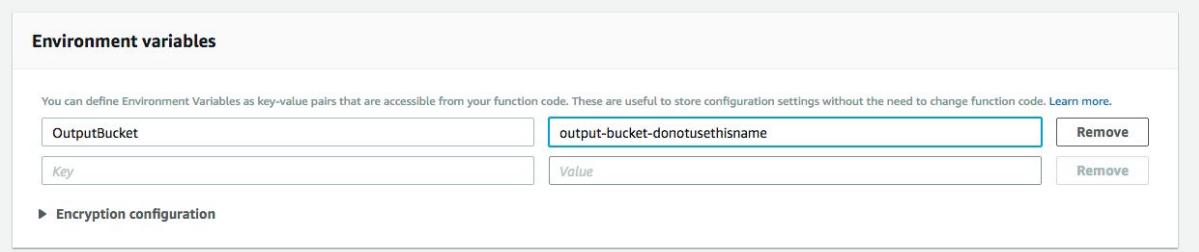
Runtime: C# (.NET Core 2.0)

Handler: `Lambda::Lambda.Function::FunctionHandler`

Function package*: [Upload](#) ImageGrayscaler.zip (919.3 kB)

For files larger than 10 MB, consider uploading via S3.

- In the "Environment variables" section enter the "Key" of "OutputBucket" and the name of YOUR output bucket "output-bucket-xxxxxx"



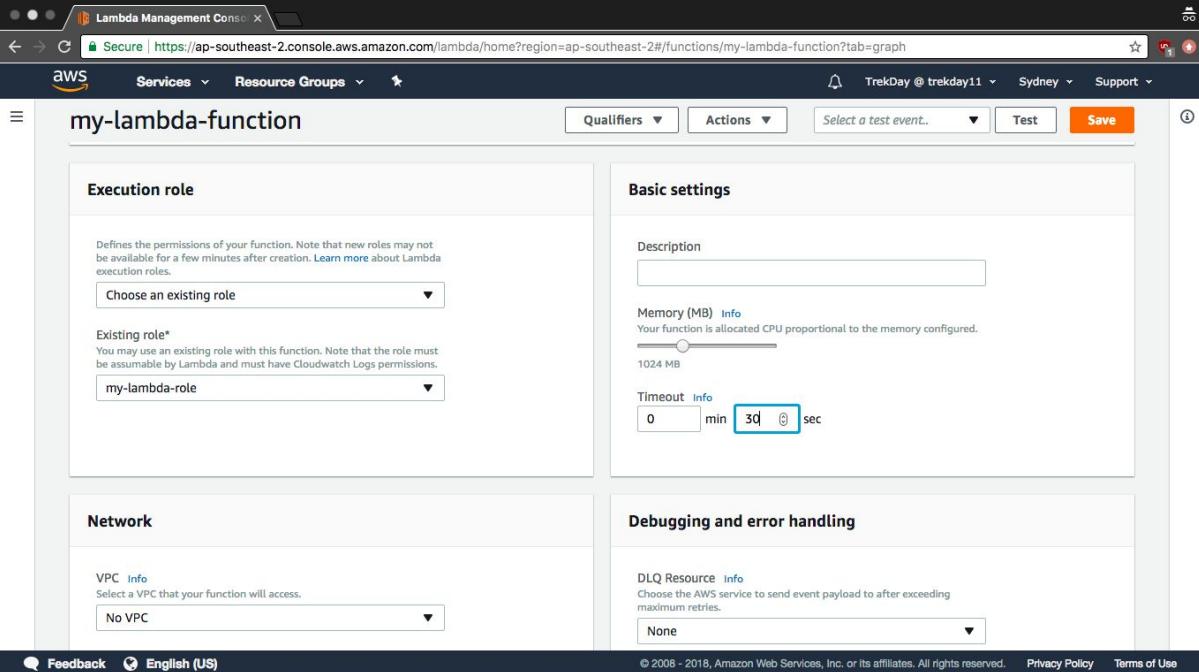
Environment variables

You can define Environment Variables as key-value pairs that are accessible from your function code. These are useful to store configuration settings without the need to change function code. [Learn more](#).

OutputBucket	output-bucket-donotusethisname	Remove
Key	Value	Remove

▶ Encryption configuration

- In the "Basic settings" section move the "Memory" slider up to "1024 MB" and the "Timeout" to "30" seconds.



Execution role

Defines the permissions of your function. Note that new roles may not be available for a few minutes after creation. [Learn more](#) about Lambda execution roles.

Choose an existing role ▾

Existing role* You may use an existing role with this function. Note that the role must be assumable by Lambda and must have Cloudwatch Logs permissions.

my-lambda-role ▾

Basic settings

Description

Memory (MB) [Info](#) Your function is allocated CPU proportional to the memory configured.

1024 MB

Timeout [Info](#) 0 min 30 0 sec

Network

VPC [Info](#) Select a VPC that your function will access.

No VPC ▾

Debugging and error handling

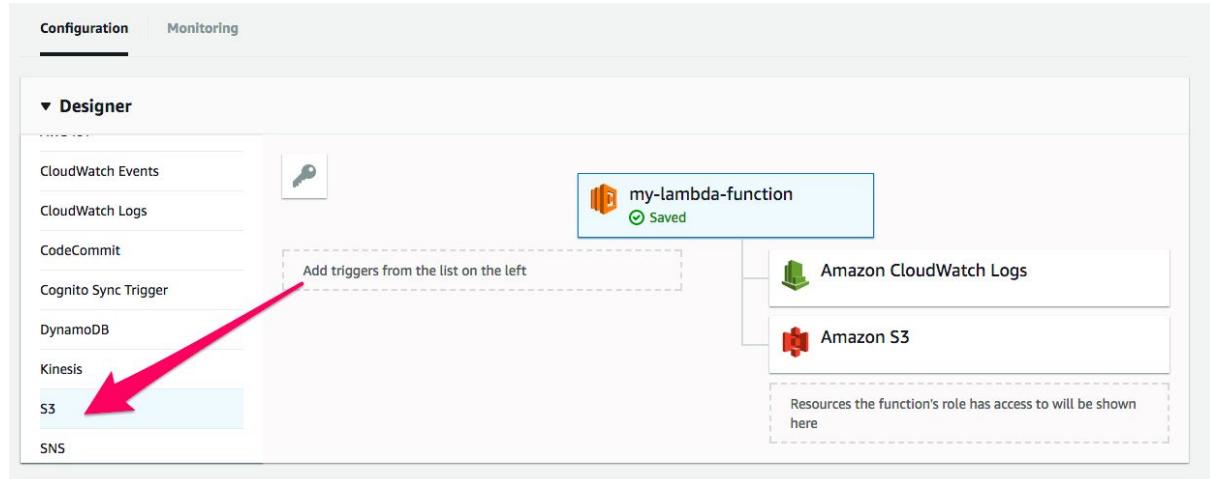
DLQ Resource [Info](#) Choose the AWS service to send event payload to after exceeding maximum retries.

None ▾

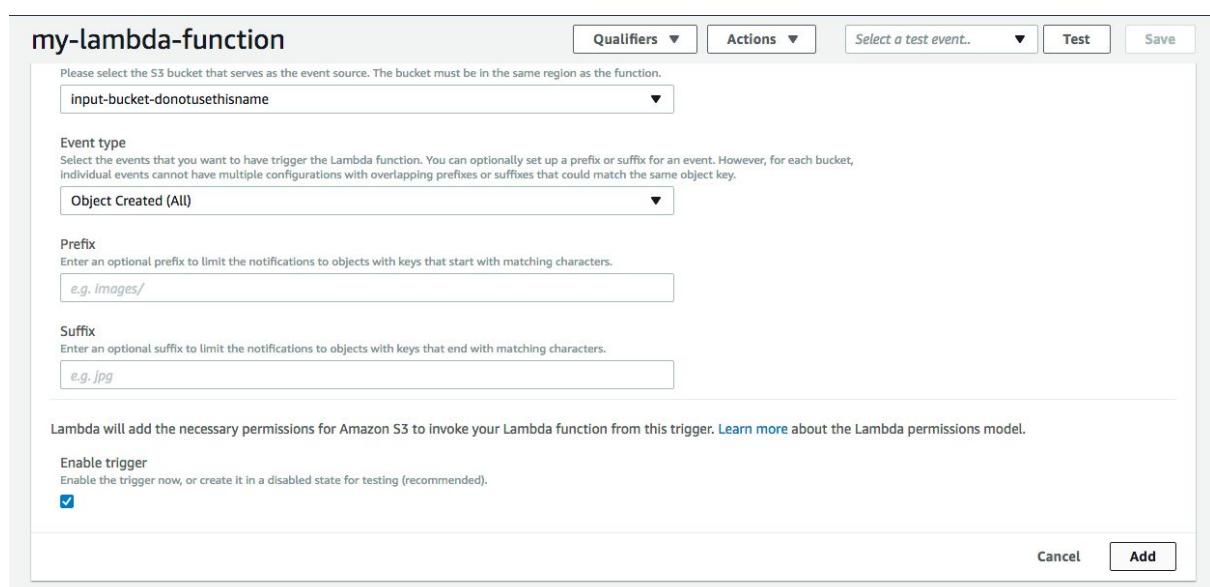
- Select "Save"

Adding A Trigger

- Scroll back up to the top of the page. In the "Designer" section, scroll under "Add triggers" until you see "S3" and select it.

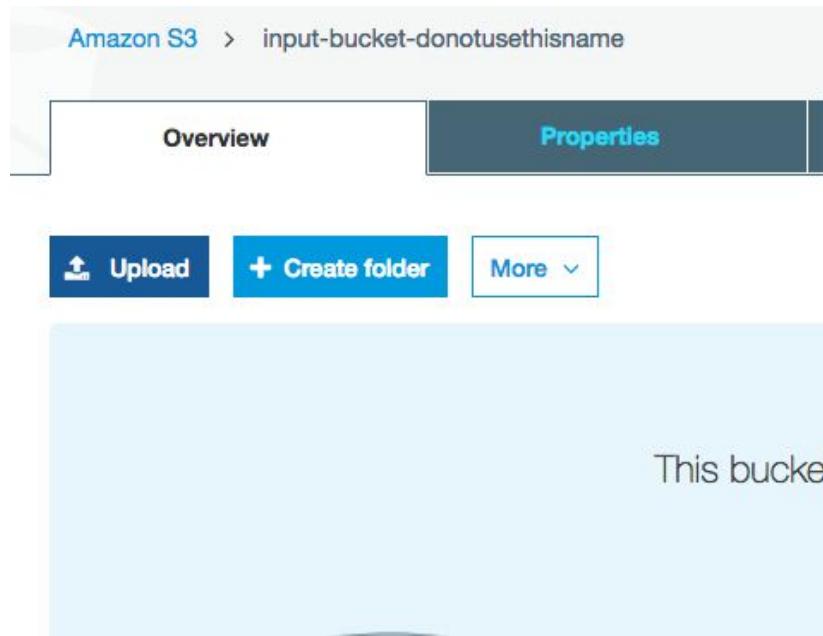


- You should now see a section called "Configure triggers"
- In the "Bucket" selection, find and select YOUR input bucket "input-bucket-xxxxxx"
- Under "Event type" select "Object Created (All)"
- Ensure the "Enable trigger" checkbox is ticked and select "Add" (in the bottom right)

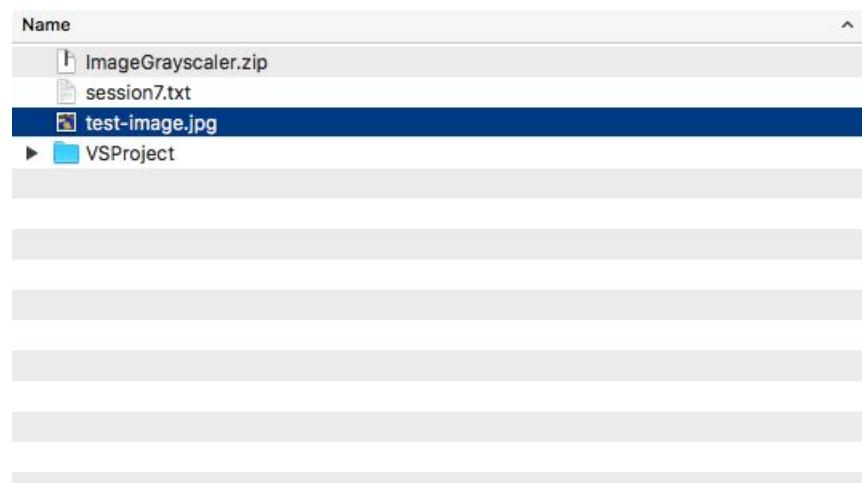


- Select "Save"

- Now it's time to test:
- Navigate to S3, and select YOUR 'input-bucket-xxxx'
- Select 'Upload'



- Within the resources for this lesson you will find a test image. But feel free to use an image of your own to upload to the bucket.



Result!



END