

LTRSEC-2000

ISE Deployments in the Cloud - Automate ISE Deployments in AWS and Integrate Them with Azure Active Directory

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Learning Objectives or Table of Contents

Upon completion of this lab, you will be able to:

- Provision an Ubuntu Linux machine with Ansible to automate configurations.
- Automatically provision AWS VPC's, Subnets, Routes, and Transit Gateway Attachment via Ansible.
- Provision ISE using a CloudFormation template.
- Provision ISE programmatically into the AWS cloud with your own credentials.
- Configure network device groups, network access devices, users and roles via Ansible configuration scripts.
- Create the ODBC object for provision of Azure Active Directory.

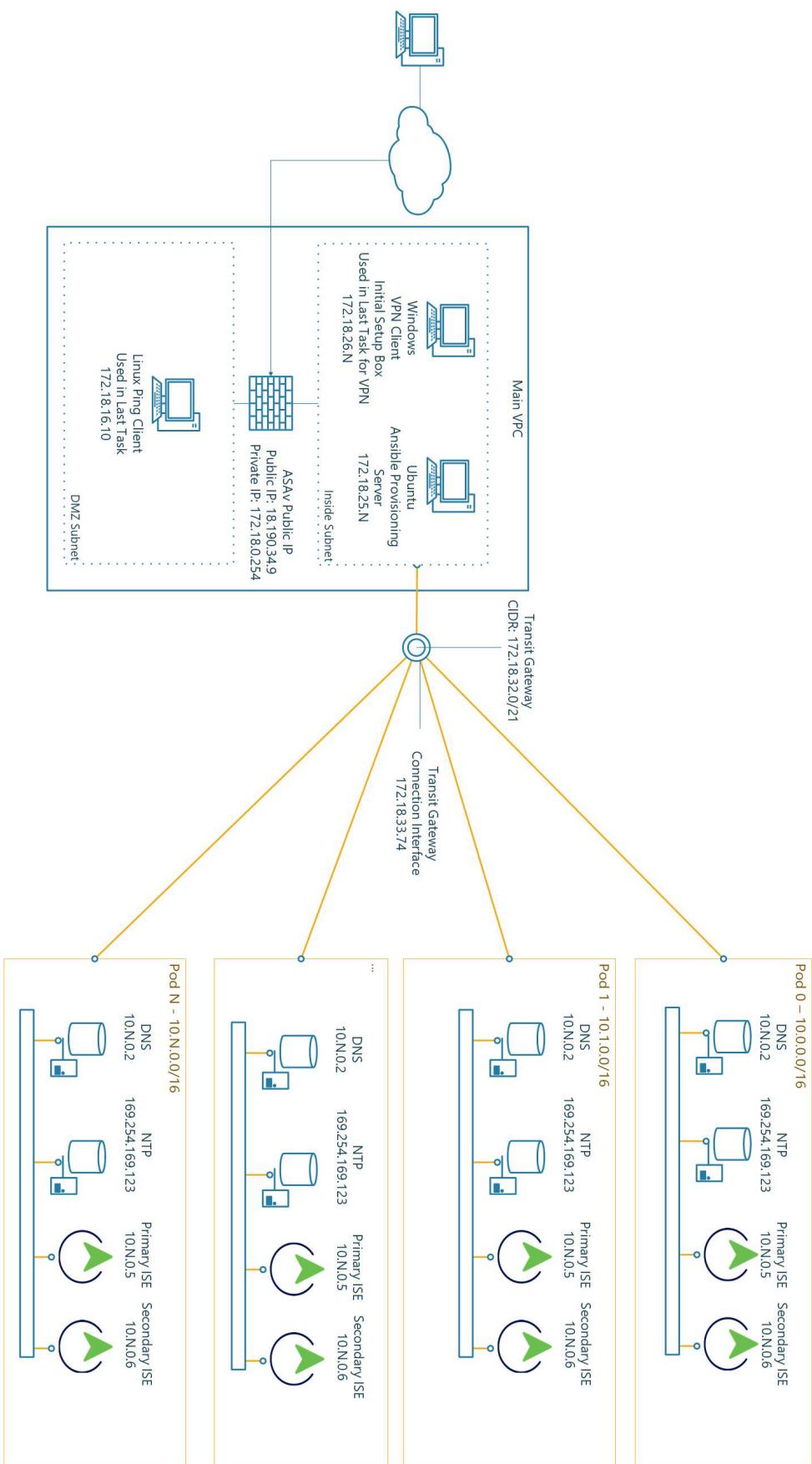
Scenario

In this lab activity, you will learn how to utilize an Ubuntu Linux machine to deploy ISE into an AWS environment, which is dynamically allocated via Ansible. The ansible script, found on github.com for later consumption, will be used to provision the VPC, subnet, routing table, and internet gateway into an AWS tenant already created. It will then deploy ISE within the VPC with a specified private IP address which will then be used to provision network device groups, network access devices, user roles, and users. You will then provision the Azure Active Directory connector, which requires manual intervention to join to Azure Active Directory.

Recommended Equipment

1. A laptop with VMWare workstation installed.
2. A virtual image you are familiar with.
3. AnyConnect on the virtual image. If you do not have AnyConnect, reach out to your lab proctor.
4. A cell phone with Google Authenticator Installed
5. Internet Connectivity.

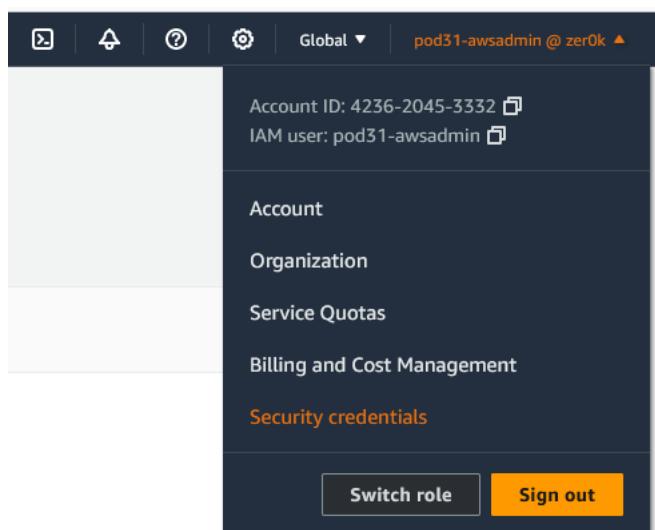
Network Diagram



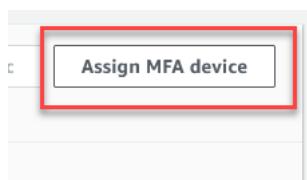
Task 1: Set Up Two Factor Authentication

Each pod used within this lab has administrative access to the test deployment. Therefore, it is required that two factor authentication be set up for the administrative user. Your user account should already be logged into the Firefox browser, providing access to the AWS console. If you get logged out of AWS for any reason, inquire with your lab proctor to obtain a new MFA key for login.

If attempting the lab outside of the offered time, navigate to your username on the top right of the AWS Console > Security Credentials.



Scroll down to “Multi-factor authentication (MFA)” and click “Assign MFA Device”.



Enter a name for the device and select the preferred method of “Authenticator App”. Using Google Authenticator, scan the QR code and confirm the next two MFA codes.

Select MFA device Info

MFA device name

Device name

Enter a meaningful name to identify this device.

MyCellPhone

Maximum 128 characters. Use alphanumeric and '+ = , . @ - _' characters.

MFA device

Select an MFA device to use, in addition to your username and password, whenever you need to authenticate.



Authenticator app

Authenticate using a code generated by an app installed on your mobile device or computer.

Logout of the console and log in with the user to which you assigned the MFA device.

Task 2: Initial Connectivity

Each pod is accessible via VPN with a provisioning machine on the required subnet. From this provisioning machine, you'll execute tasks allowing you to deploy AWS and ISE components and configurations. Access your pod based on the pod number assigned to you by the instructors:

Table 1-1

Pod Number	Windows Provisioning Host	Ubuntu Ansible Host	AWS Username	RAVPN Username
1	172.18.26.1	172.18.25.1	pod1-awsadmin	pod1-ravpn
2	172.18.26.2	172.18.25.2	pod2-awsadmin	pod2-ravpn
3	172.18.26.3	172.18.25.3	pod3-awsadmin	pod3-ravpn
4	172.18.26.4	172.18.25.4	pod4-awsadmin	pod4-ravpn
5	172.18.26.5	172.18.25.5	pod5-awsadmin	pod5-ravpn
6	172.18.26.6	172.18.25.6	pod6-awsadmin	pod6-ravpn
7	172.18.26.7	172.18.25.7	pod7-awsadmin	pod7-ravpn
8	172.18.26.8	172.18.25.8	pod8-awsadmin	pod8-ravpn

9	172.18.26.9	172.18.25.9	pod9-awsadmin	pod9-ravpn
10	172.18.26.10	172.18.25.10	pod10-awsadmin	pod10-ravpn
11	172.18.26.11	172.18.25.11	pod11-awsadmin	pod11-ravpn
12	172.18.26.12	172.18.25.12	pod12-awsadmin	pod12-ravpn
13	172.18.26.13	172.18.25.13	pod13-awsadmin	pod13-ravpn
14	172.18.26.14	172.18.25.14	pod14-awsadmin	pod14-ravpn
15	172.18.26.15	172.18.25.15	pod15-awsadmin	pod15-ravpn
16	172.18.26.16	172.18.25.16	pod16-awsadmin	pod16-ravpn
17	172.18.26.17	172.18.25.17	pod17-awsadmin	pod17-ravpn
18	172.18.26.18	172.18.25.18	pod18-awsadmin	pod18-ravpn
19	172.18.26.19	172.18.25.19	pod19-awsadmin	pod19-ravpn
20	172.18.26.20	172.18.25.20	pod20-awsadmin	pod20-ravpn
21	172.18.26.21	172.18.25.21	pod21-awsadmin	pod21-ravpn
22	172.18.26.22	172.18.25.22	pod22-awsadmin	pod22-ravpn
23	172.18.26.23	172.18.25.23	pod23-awsadmin	pod23-ravpn
24	172.18.26.24	172.18.25.24	pod24-awsadmin	pod24-ravpn
25	172.18.26.25	172.18.25.25	pod25-awsadmin	pod25-ravpn
26	172.18.26.26	172.18.25.26	pod26-awsadmin	pod26-ravpn
27	172.18.26.27	172.18.25.27	pod27-awsadmin	pod27-ravpn
28	172.18.26.28	172.18.25.28	pod28-awsadmin	pod28-ravpn
29	172.18.26.29	172.18.25.29	pod29-awsadmin	pod29-ravpn
30	172.18.26.30	172.18.25.30	pod30-awsadmin	pod30-ravpn

Step 1: Connect to the Lab VPN

Using AnyConnect VPN, connect to the ASA v to gain access to the inside network. Connect to IP **18.190.34.9**. Choose the group “RA_VPN” and login with the username (**podX-ravpn**) assigned to your pod in table 1-1 above. *At this time, do not log into your “PODXX_VPN” tunnel group.* The password for the account is provided by your proctor. Ignore any certificate warnings presented on connection. There is no public IP access to any of the machines in the pods. When trying to connect to any of the lab machines, ensure VPN is active.

If you do not have the AnyConnect client, browse to <https://18.190.34.9/> and authenticate with the information above. The AnyConnect client will be provisioned during the initial connection process.

Step 2: Establish RDP Session to Windows Provisioning Host

Establish a remote desktop connection to the Windows provisioning host associated with your pod. User credentials for this machine are username **Administrator**, password **is provided by your proctor**. This will be the host which provisions Ubuntu and provides the SSH key to be used for connectivity. Verify two files exist on the desktop:

- A shortcut to putty for connectivity: Putty will be used to establish an SSH session to Ubuntu where ansible and other tasks will be performed.
- A Pod Important Information Document: The Important information document contains the environmental variables for Ansible. These will be used in future steps.

Step 3: Connect to AWS

Open the Firefox web browser on the desktop of the windows provisioning machine and utilize the link **AWS Sign In** on the bookmarks toolbar to connect to the AWS cloud under the zer0k account. If this is not shown or is unavailable, navigate to <https://zer0k.signin.aws.amazon.com/console>. Use

to your pod in table 1-1 above (**podX-awsadmin**). The password for the account is **is provided by your proctor**. You may be prompted to switch to the new AWS home experience, select “Switch to the new Console Home”. Anytime you are prompted to use the new AWS experience select to do so as the lab guide is written based on this.



Sign in as IAM user

Account ID (12 digits) or account alias

zer0k

IAM user name

pod13-awsadmin

Password

••••••••••••|

Remember this account

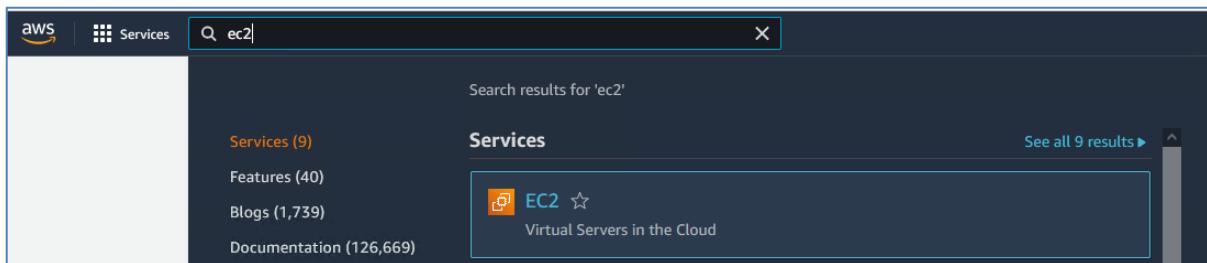
Sign in

[Sign in using root user email](#)

[Forgot password?](#)

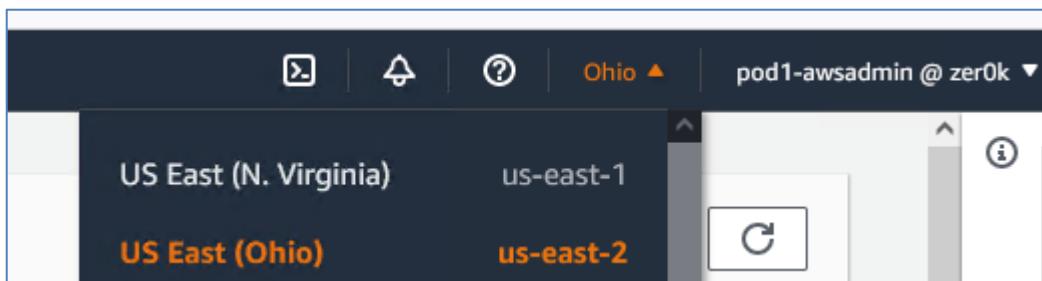
Step 4: EC2

Navigate to the EC2 area of AWS to access available virtual machines and virtual machine settings. In the search box at the top of the screen, type “EC2” and use the EC2 service link. Please do not access any virtual resources not associated with your pod number. Consult a lab proctor for assistance if you are unsure if a resource is one assigned to you or is one that you created.



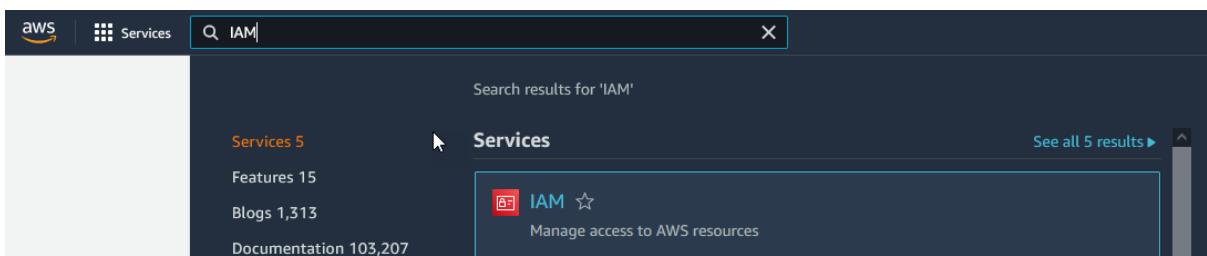
Step 5: Change AWS Regions

The Ansible lab is built within the EAST-2 Ohio region, which is required for connectivity to work between machines. In the EC2 dashboard, ensure that the region, located on the top right of the page, is EAST-2, or "Ohio".



Step 6: Generate your AWS Access and Secret Key

From the top search bar in AWS, type IAM to navigate to Identity and Access Management. Click IAM.



From the left bar, click "Users" and select your pod username.

Note: You may need to navigate to the second page of credentials or use the search box on this page depending on display settings

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

User name	Groups
automation	None
pod0-awsadmin	LabAdmin
pod1-awsadmin	LabAdmin

Warning: Common mistake area!

Select “Security Credentials” and under Access Keys, select “Create Access Key”.

IAM > Users > pod31-awsadmin

Summary

ARN arn:aws:iam::42362045332:user/pod31-awsadmin	Console access ⚠ Enabled without MFA	Access key 1 Not enabled
Created January 19, 2023, 21:13 (UTC)	Last console sign-in Today	Access key 2 Not enabled

Permissions | Groups (1) | Tags | **Security credentials** | Access Advisor

You will use this access key for your environmental variables used in future steps so that ansible is able to access your AWS account. When presented with the “Access key best practices & alternatives” select “Local Code” for your use case. Check the box at the bottom of the page for “I understand the above recommendation and want to process to create an access key”.

The screenshot shows the AWS IAM Access Key creation process. On the left, a sidebar lists steps: Step 1 (Access key best practices & alternatives), Step 2 - optional (Set description tag), and Step 3 (Retrieve access keys). The main content area is titled "Access key best practices & alternatives" and includes a note about avoiding long-term credentials. It lists several use cases with radio buttons:

- Command Line Interface (CLI)
You plan to use this access key to enable the AWS CLI to access your AWS account.
- Local code
You plan to use this access key to enable application code in a local development environment to access your AWS account.
- Application running on an AWS compute service
You plan to use this access key to enable application code running on an AWS compute service like Amazon EC2, Amazon ECS, or AWS Lambda to access your AWS account.
- Third-party service
You plan to use this access key to enable access for a third-party application or service that monitors or manages your AWS resources.
- Application running outside AWS
You plan to use this access key to enable an application running on an on-premises host, or to use a local AWS client or third-party AWS plugin.
- Other
Your use case is not listed here.

A red warning icon is present next to the "Alternative recommended" section, which advises using an IDE with the AWS Toolkit for IAM authentication. A checkbox at the bottom indicates agreement with the recommendation.

Click Next.

For the tag description enter “Pod X local code access key” where pod X is your pod number.

Click “Create Access Code”

Click “Show” to show this secret key. **Ensure you copy the secret key, as it will not be available again. We recommend placing this in your “Pod<#> - Important Information” file.**

In addition, you can download a CSV file with the access and security keys contained within it.

The screenshot shows the AWS IAM Access Keys page. A red box highlights the 'Access keys' section, and another red box highlights the 'Create access key' button. To the right, a modal window titled 'Create access key' is open. It contains a 'Warning' section (red background) stating: 'Never post your secret access key on public platforms, such as GitHub. This can compromise your account security.' Below it is a 'Success' section (green background) stating: 'This is the **only** time that the secret access keys can be viewed or downloaded. You cannot recover them later. However, you can create new access keys at any time.' A 'Download .csv file' button is at the top left of the modal. At the bottom, there's a table with columns 'Access key ID' and 'Secret access key'. The 'Access key ID' row for the newly created key is AKIAWFIN7EPKAQ5BZDPW. The 'Secret access key' row is highlighted with a red box and contains the value: qxp6D0clwFLPY+znJwpQNHOY+ONulBpbXLV2RzW4. A 'Hide' link is next to the secret key. A 'Close' button is at the bottom right.

Task 3: Deploy Ubuntu Provisioning Machine / Building Blocks

There are many ways to create an instance in AWS without creating each object ahead of time, but it is helpful to understand each object when CloudFormation templates and scripts are used later in the lab. It is also helpful to know where each of these objects resides when troubleshooting connectivity problems.

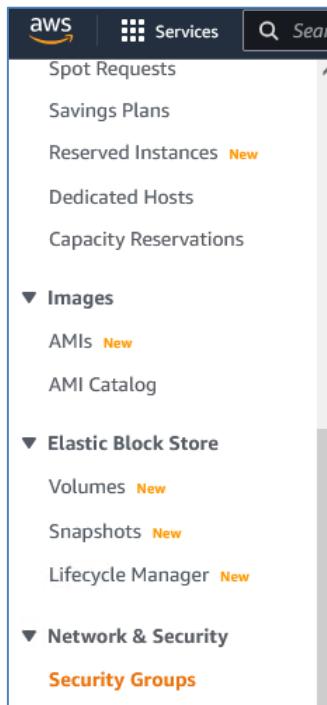
Step 1: Create Security Group

Security Groups are AWS ACLs that control network traffic, by default all outbound network traffic from a security group is permitted as well as the return traffic from that outbound connection (stateful).

1. Navigate back to EC2 using the search bar at the top of the page.

The screenshot shows the AWS search results for 'ec2'. A search bar at the top contains 'ec2'. Below it, a sidebar lists categories: Services (12), Features (51), Resources (New), and Blogs (1,889). The main area is titled 'Services' and shows a card for 'EC2' with the subtext 'Virtual Servers in the Cloud'. A 'See all 12 results' link is at the top right of the services list.

2. In the left navigation panel within the EC2 dashboard, Browse to Network & Security -> Security Groups.



3. Select “Create Security Group” from the upper right-hand side of the page.
4. Name the security group podX-management where X is your assigned pod number, add a required description, we recommend “Management security group for pod <X>”. See the screenshot in step 6 for verification.
5. Make sure the VPC is set to vpc-0a61b7f1d92102ad6 (zer0k-main-vpc) since this is where the provisioning of additional VPCs will be done from.

Note: You should be able to delete the current VPC name and begin typing “zer0k” to show available VPC’s.

EC2 > Security Groups > Create security group

Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name Info
 Name cannot be edited after creation.

Description Info

VPC Info

6. Add an inbound rule allowing ICMPv4 traffic from all IPs.

Inbound rules Info				
Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
All ICMP - IPv4 ▼	ICMP ▼	All	Anywh... ▼ <input type="text"/> 🔍	ICMP from Anywhere X

Note: Ensure you added this rule under the **inbound** rules header.

7. Do not add any other rules at this time.
8. Under Tags, add a new tag. Enter “Name” under Key and podX-management under value where X is your pod number.
9. Under Tags, add a second tag. Enter “event” under Key and “CLEMEA2024” under value.
10. Under Tags, add a third tag. Enter “Project Name” under Key and “ISEinAWS-podX” under value, where X is your pod number.
11. Under Tags, add a final tag. Enter “Pod” under Key and “True” under value.

Tip – AWS does not name anything by default, always add a “Name” tag to easily find the object later.

Tags - optional

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value - optional
<input type="text"/> Name X	<input type="text"/> pod10-management X Remove

[Add new tag](#)

12. Create the security group.

Step 2: Create a Key Pair

Key pairs are used to connect to instances after creation and can be used for other tasks in AWS such as decrypting Windows passwords.

Note: For the following step, the private key created is NEVER available for download again, if it is lost a new key pair must be created.

1. In the EC2 service, navigate in the left bar to Network & Security -> Key Pairs.



2. Select “Create Key Pair”.
3. Name your keypair podX-keypair where X is your pod number. Leave the default value of RSA and ensure .pem (For use with OpenSSH) is used. In this case the AWS UI populates the Name tag as an option, so no tags are required.

The screenshot shows the "Create key pair" wizard in the AWS EC2 console. The steps are:

- Key pair**: A key pair, consisting of a private key and a public key, is a set of security credentials that you use to prove your identity when connecting to an instance.
- Name**: pod1-keypair
- Key pair type**: RSA
- Private key file format**: .pem (For use with OpenSSH)
- Tags (Optional)**: No tags associated with the resource.
- Add tag**
- Note**: You can add up to 50 more tags.
- Cancel**
- Create key pair**

4. Select “Create key pair” and ensure the .pem file is saved to your Windows Provisioning Machine. Downloading the file as .pem will allow it to be used from a Linux or Mac host and can be converted later for use in Putty. This should happen automatically.

This private key is never available for download again, if it is lost a new key pair must be created.

Step 3: Create Network Interface

Double check that the Ohio region is chosen in the top right of the AWS console.

1. In the EC2 service, browse to Network & Security -> Network Interfaces.



2. Select “Create network interface”.
3. Enter a description of “podX-Ubuntu-Ansible” with X being your pod number
4. Under subnet, choose subnet-0cf86b138b53ba3c9 (zer0k-inside-subnet).

Note: You should be able to delete the current VPC name and begin typing “zer0k” to show available Subnets.

The screenshot shows the 'Details' tab of the 'Create Network Interface' wizard. It includes fields for 'Description - optional' (containing 'pod10-Ubuntu-Ansible'), 'Subnet' (with a search bar containing 'ins' and a dropdown showing 'subnet-0cf86b138b53ba3c9 us-east-2a'), and other optional fields like 'Name' and 'Tags'.

5. Under Private IPv4 address, choose custom and enter the IP address of the Ubuntu Ansible Host from table 1-1 above from your assigned pod. It will be 172.18.25.X where X is your assigned pod number.

Details [Info](#)

Description - *optional*
A descriptive name for the network interface.

Subnet
The subnet in which to create the network interface.

Private IPv4 address
The private IPv4 address to assign to the network interface.
 Auto-assign
 Custom
IPv4 address

Elastic Fabric Adapter
 Enable

[► Advanced settings](#)

- Under Security Groups choose the security group created in step 1 of this task above, it should be podX-management where X is your pod number. The filter box can be used to find security groups with your pod number in the name.

Security groups (1/13) [Info](#)

<input checked="" type="checkbox"/> Group ID	Group name	Description
<input checked="" type="checkbox"/> sg-0cd7f88ae208a10ae	pod10-management	Management security group f...

Note: There are multiple pages in the security groups table. Navigate through them using the arrows next to the search bar, or search for the proper security group.

- Under Tags, add a new tag with a key of “Name” and a value of “podX-Ubuntu-Ansible” where X is the number of your assigned pod.
- Under Tags, add a new tag with a key of “Event” and a value of “CLEMEA2024”.
- Under Tags, add a third tag. Enter “Project Name” under Key and “ISEinAWS-podX” under value, where X is your pod number.
- Under Tags, add a final tag. Enter “Pod” under Key and “True” under value.
- Select “Create network interface” to finish the configuration.

Step 4: Deploy Ubuntu Provisioning Machine

All of the building blocks are in place from a networking standpoint to create an Ubuntu Linux instance. The only piece not pre-created is an EBS volume (storage) which will be created as part of the current step.



- From the Left Navigation bar, navigate to Instances -> Instances.
- Select “Launch instances” from the upper right corner.

- Under Name enter “podX-Ubuntu-Ansible” where X is the number of your assigned pod.
- Under Application and OS Images, choose Ubuntu under quick start and leave the rest default. There should be a Free Tier Eligible Ubuntu instance chosen.

pod1-Ubuntu-Ansible Add additional tags

Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Recents Quick Start

Amazon Linux aws

Ubuntu ubuntu Ubuntu Server 22.04 LTS (HVM), SSD Volume Type Free tier eligible

Windows Microsoft

Red Hat Red Hat

SUSE Linux SUSE

Search icon Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Description
Canonical, Ubuntu, 22.04 LTS, amd64 jammy image build on 2022-04-20

Architecture 64-bit (x86) **AMI ID** ami-0aeb7c931a5a61206

- Under Instance Type leave it as default t2.micro.
- Under Key pair, choose the key pair you created under Step 2 of this task. This is the key pair you have downloaded to your local machine. It should have been named “podX-keypair” where X is your assigned pod number.

▼ Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

Select

pod10

[Create new key pair](#)

Proceed without a key pair (Not recommended)

Default value

Pod10_Windows_Keypair

Type: rsa

pod10-keypair

Type: rsa

[Edit](#)

7. Under Network Settings click "Edit".
8. Set the VPC to vpc-0a61b7f1d92102ad6 (zer0k-main-vpc).
9. Set the Subnet to subnet-0cf86b138b53ba3c9 (zer0k-inside-subnet).
10. Leave Auto Assign Public IP disabled as there is no direct internet access from this subnet.

▼ Network settings

VPC - *required* [Info](#)

vpc-0a61b7f1d92102ad6 (zer0k-main-vpc)
172.18.0.0/16

[Edit](#)

Subnet [Info](#)

subnet-0cf86b138b53ba3c9
VPC: vpc-0a61b7f1d92102ad6 Owner: 423620453332
Availability Zone: us-east-2a IP addresses available: 2030

zer0k-inside-subnet

[Edit](#) [Create new subnet](#)

Auto-assign public IP [Info](#)

Disable

[Edit](#)

Warning: Common mistake area!

11. Choose Select existing security group but do not select a security group. This was already set under the interface in step 3! This is a quirk of AWS since normally it would just be created or selected here instead of the previously created interface.

Firewall (security groups) [Info](#)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

[Create security group](#)

[Select existing security group](#)

Common security groups [Info](#)

[Select security groups](#)

[Compare security group rules](#)

Security groups that you add or remove here will be added to or removed from all your network interfaces.

12. Expand “Advanced network configuration”.
13. Under the Network Interface, select the network interface created in step 3 of this task. It should have been named podX-Ubuntu-Ansible, and the box should allow for searching on that name.

You can filter for the appropriate interface by typing podX- in the box and select the interface accordingly.

Advanced network configuration

Network interface 1

Device index Info: 0

Network interface Info: eni-0560f4271a6e6ea1c

Description Info: (empty)

Remove

Subnet Info: Select

Security groups Info: Select security groups ▾

Primary IP Info: (empty)

Secondary IP Info: Select

IPv6 IPs Info: Select

IPv4 Prefixes Info: Select

IPv6 Prefixes Info: Select

Delete on termination Info: Select

Elastic Fabric Adapter Info: Enable
EFA is only compatible with certain instance types.

Network card index Info: Select

The selected instance type does not support multiple network cards.

Add network interface

14. Leave the options under Configure storage and Advanced details as defaults.
15. Select “Launch instance” on the bottom right of the page.
16. If the creation of the instance is successful, click on “View all instances” to go back to the instance list. Otherwise, notify a proctor.
17. In the EC2 service, browse to Instances -> Instances.
18. Verify that the status check for your podX-Ubuntu-Ansible machine is showing **2/2 checks passed**. If it isn’t, refresh the page until the status is **2/2 checks passed** or you see a red status. It will have to be troubleshooted if red, move on once it is **2/2 checks passed**.

pod10-Ubuntu-Ansible	i-0f701170fbbe76fa1	🕒 Running	🕒	t2.micro	🕒 2/2 checks passed
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Step 5: Convert PEM to PPK format for dual use

The PEM file downloaded for use as a keypair within AWS will both serve as the keypair within AWS, as well as the connectivity file used for Putty. To use this file within Putty, it must be in PPK format.

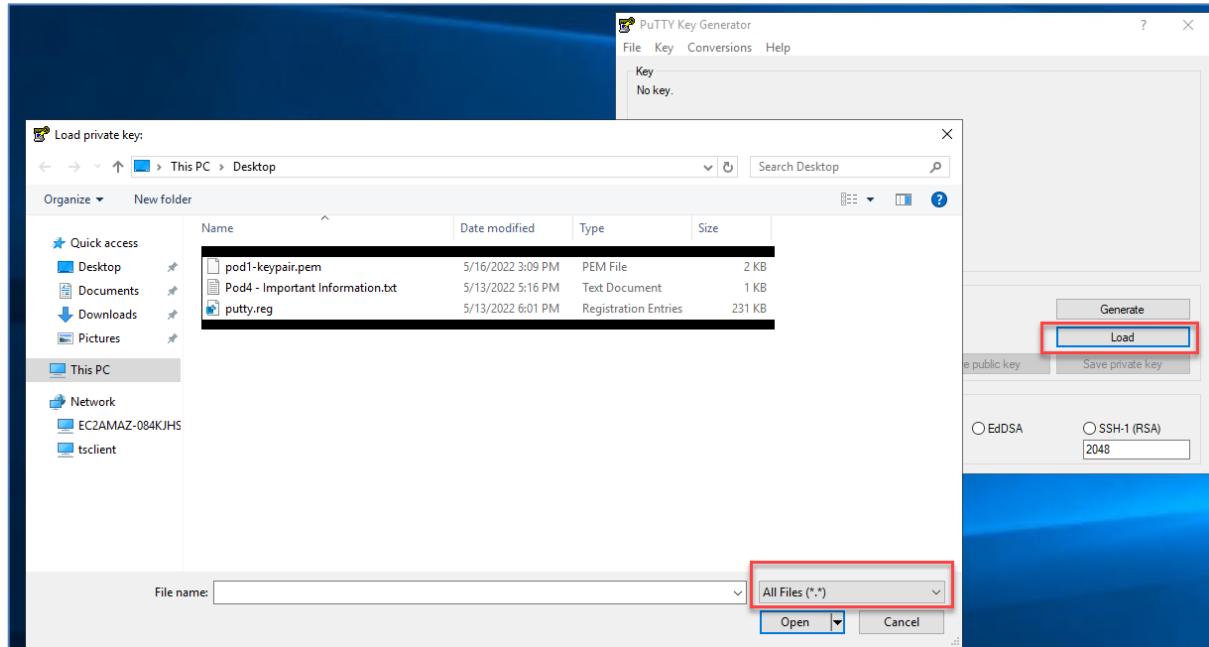
Locate the PEM file on the Windows Provisioning Machine, it is recommended

you move it to the desktop for easy retrieval. By default, Firefox will put it in the Downloads folder.

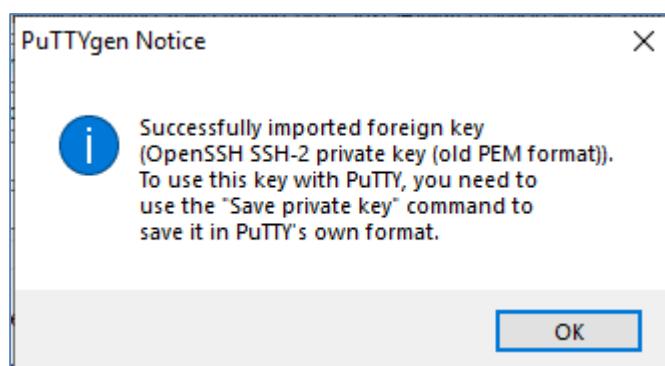
Putty on Windows:

PUTTY is installed on the Windows Provisioning Host and is recommended to be used, however it can be downloaded if doing this on an alternative machine. If you don't already have PutTY and PuTTYgen, download them from here: <https://www.chiark.greenend.org.uk/~sgtatham/putty/>

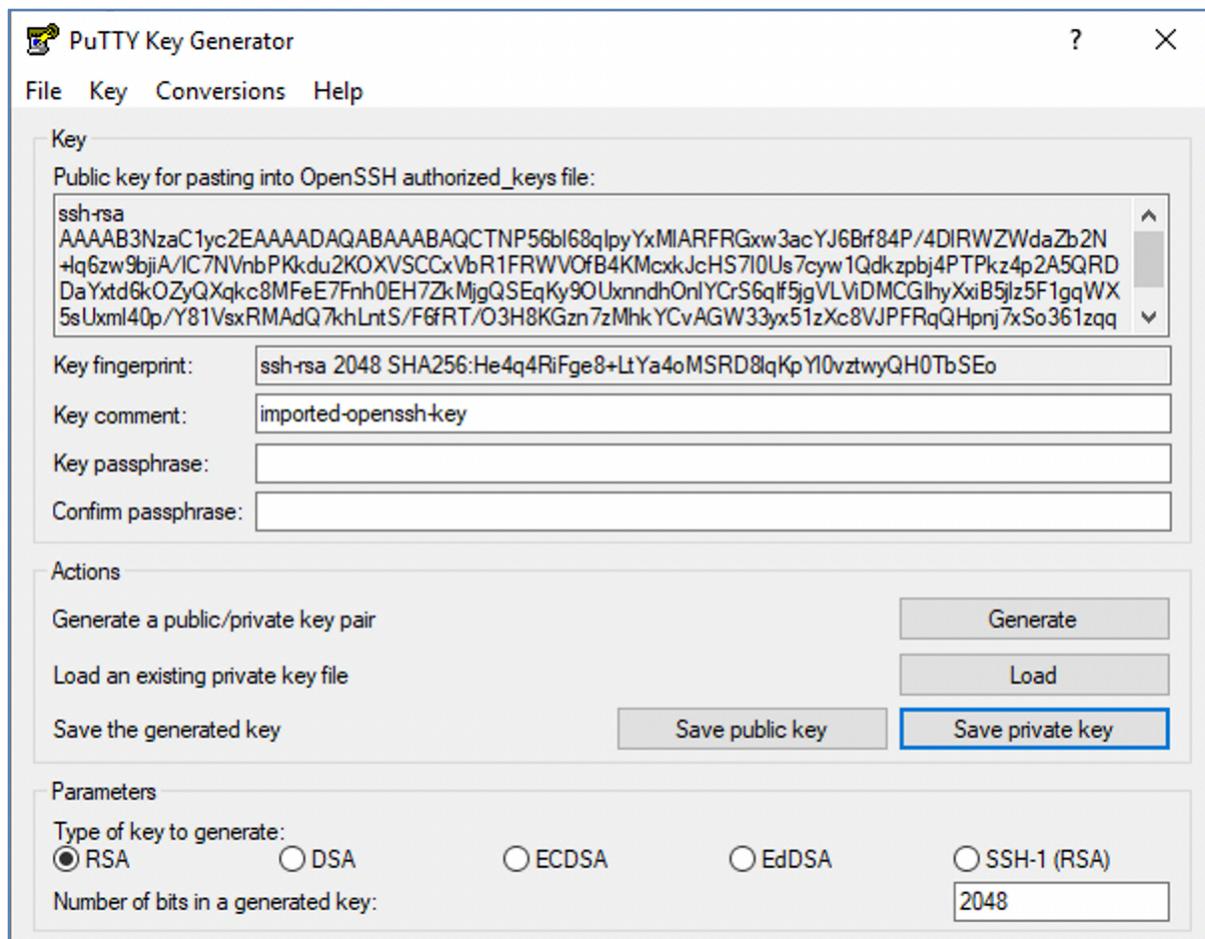
1. In the start menu of the Windows Provisioning Machine, navigate to PuTTY -> PuTTYgen and open PuTTYgen.
2. Click "Load" and change the file type to "All Files (*.*)" to select the PEM keypair you created in the last task, it should have been named podX-keypair.pem where X is your assigned pod number.



3. The selection of the keypair should result in a successful imported foreign key dialog.



4. Leave RSA chosen as the default key type under parameters. Save the **private key** without passphrase to the same location as the PEM file. Name this keypair “podX-keypair.ppk” where X is your assigned pod number.

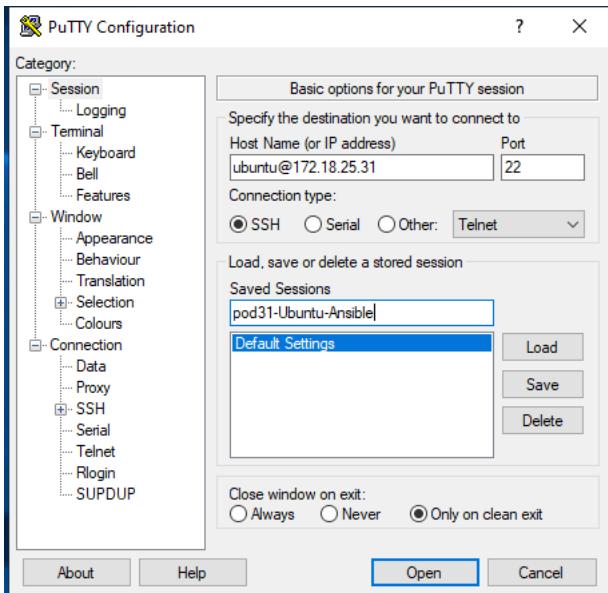


5. Close PuTTYgen.
6. This converted key will be used later in the next step.

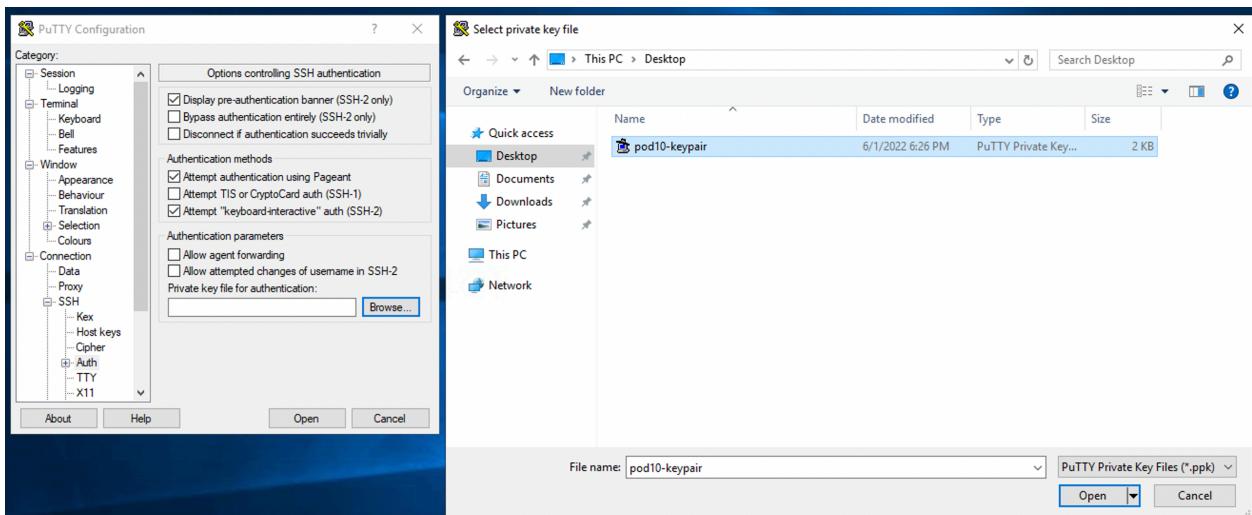
Step 6: Configure Putty for SSH on Local Machine

In this section the SSH client is just being setup, SSH will not work until Step 6 is completed.

1. On the Windows provisioning host, navigate back to the desktop and open Putty from the shortcut.
2. The default screen is Session, set the Hostname to “ubuntu@172.18.25.X” and Saved Sessions as “podX-Ubuntu-Ansible” where X is your assigned pod number. Click the save button.



3. Navigate to Connection -> SSH -> Auth -> Credentials. In the “Private key file for authentication” box at the bottom of the screen, select the private key created from the PEM file in step 3. It should have been named podX-keypair.ppk located on the desktop from the previous preparation step.



4. Optional: Navigate to Session -> Logging, select “All Session Output”, browse, and place the log file in the desktop. This is strictly for future troubleshooting if desired.
5. Do not change any additional settings.
6. Go back to Session and save again.

If using Linux/Mac Command Line

The permissions of the key file must be changed to 400 for the command line ssh client to use the key:

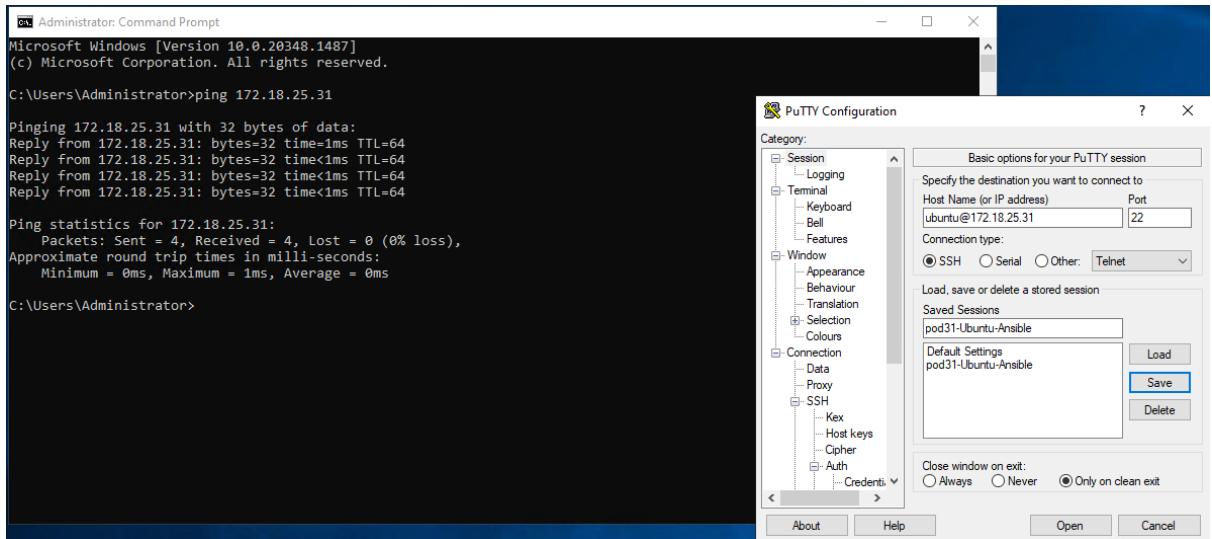
```
> chmod 400 <keyfile>
```

To use the private key file use ssh -i

```
> ssh -i <keyfile> <username>@<host>
```

Step 7: Verify Connectivity

- From your Windows provisioning machine, ping your podX-Ubuntu-Ansible server, remember the IP is 172.18.25.X. This should be successful. If it isn't, recheck your security group. The following steps will also help to troubleshoot.



- Attempt to SSH to your podX-Ubuntu-Ansible machine from your Windows host using the previously set up profile. It timed out!
- On the AWS EC2 console -> Instances, select your podX-Ubuntu-Ansible machine and click on the networking tab below. There should be a message to run the Reachability Analyzer, select this. If you don't see the option, use the search feature to search for VPC Reachability Analyzer, click Create and analyze path.
- Name it "VPNtoPodX-Ubuntu" where X is the pod number you were assigned.
- Set the source type to "Instances" and locate the instance named "PodX_Provisioning-Server", enter the IP address as 172.18.26.X which is your Windows Provisioning host after expanding "Additional packet header configurations at source – optional."
- Set the destination type to "Network Interfaces" and locate the network interface named "podX-Ubuntu-Ansible" where X is your pod number. Also leave the IP blank.
- Set the destination port to "22" for SSH and the protocol as TCP after expanding "Additional packet header configurations at source – optional."

Path configuration

Name tag - *optional*
Creates a tag with a key of 'Name' and a value that you specify.

VPNtoPod10-Ubuntu

Source type	Source	Source IP address - <i>optional</i>
Instances	i-0ef82f123d2bdb649	172.18.26.10
Destination type	Destination	Destination IP address - <i>optional</i>
Network Interfaces	eni-018749fae055d3c69	192.0.2.1
Destination port - <i>optional</i>		
22		
Number must be between 0 and 65535		
Protocol Use the appropriate protocol		
TCP		

- Select Create and analyze path in the bottom right.
- You will see the Analyses as pending, refresh the page until you see success. The reachability status should be **Not Reachable**.

Analysis ID	Analysis run date	Reachability status	Intermediate comp...	State
nia-0d15960615ec989b0	Sun May 08 2022 20:5...	☒ Not reachable	-	☑ Succeeded

10. Check under Explanations to see why AWS thinks your instance isn't reachable on port 22. It should be because of a missing security group rule.

Explanations

None of the ingress rules in the following security groups apply: [sg-0a35a35a7327b7fb6](#).

11. Click on the link to the security group and add another inbound entry for SSH from anywhere, all hosts are behind the ASA firewall already so allowing from anywhere is fine for this lab.



12. Go back to the VPC Reachability Analyzer using the search bar, and select the radio button for your path analysis. From the Actions menu select Analyze Path, click confirm.

13. There will be a new entry pending under Analysis, click refresh until it succeeds. The Reachability status should now be reachable. If it is not, view the Explanations.
 14. From your Windows machine, attempt to SSH to your provisioning machine, it should succeed this time and you should be at an ubuntu command prompt.

```
ubuntu@ip-172-18-25-31: ~
Usage of /: 19.9% of 7.57GB Users logged in: 0
Memory usage: 21% IPv4 address for eth0: 172.18.25.31
Swap usage: 0%
0 updates can be applied immediately.

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-18-25-31: ~$ sudo apt update
[...]
ubuntu@ip-172-18-25-31: ~$
```

Task 4: Configure DNS in Route 53

ISE requires DNS for many operations including initial database priming and any internode operations.

Figure 4-1

Pod	Primary Hostname	Primary IP Address	Secondary Hostname	Secondary IP Address
Pod 1	pod1-ise1	10.1.0.5	pod1-ise2	10.1.0.6
Pod 2	pod2-ise1	10.2.0.5	pod2-ise2	10.2.0.6
Pod 3	pod3-ise1	10.3.0.5	pod3-ise2	10.3.0.6
Pod 4	pod4-ise1	10.4.0.5	pod4-ise2	10.4.0.6
Pod 5	pod5-ise1	10.5.0.5	pod5-ise2	10.5.0.6
Pod 6	pod6-ise1	10.6.0.5	pod6-ise2	10.6.0.6
Pod 7	pod7-ise1	10.7.0.5	pod7-ise2	10.7.0.6
Pod 8	pod8-ise1	10.8.0.5	pod8-ise2	10.8.0.6
Pod 9	pod9-ise1	10.9.0.5	pod9-ise2	10.9.0.6
Pod 10	pod10-ise1	10.10.0.5	pod10-ise2	10.10.0.6
Pod 11	pod11-ise1	10.11.0.5	pod11-ise2	10.11.0.6
Pod 12	pod12-ise1	10.12.0.5	pod12-ise2	10.12.0.6
Pod 13	pod13-ise1	10.13.0.5	pod13-ise2	10.13.0.6
Pod 14	pod14-ise1	10.14.0.5	pod14-ise2	10.14.0.6
Pod 15	pod15-ise1	10.15.0.5	pod15-ise2	10.15.0.6
Pod 16	pod16-ise1	10.16.0.5	pod16-ise2	10.16.0.6
Pod 17	pod17-ise1	10.17.0.5	pod17-ise2	10.17.0.6
Pod 18	pod18-ise1	10.18.0.5	pod18-ise2	10.18.0.6
Pod 19	pod19-ise1	10.19.0.5	pod19-ise2	10.19.0.6
Pod 20	pod20-ise1	10.20.0.5	pod20-ise2	10.20.0.6
Pod 21	pod21-ise1	10.21.0.5	pod21-ise2	10.21.0.6
Pod 22	pod22-ise1	10.22.0.5	pod22-ise2	10.22.0.6
Pod 23	pod23-ise1	10.23.0.5	pod23-ise2	10.23.0.6
Pod 24	pod24-ise1	10.24.0.5	pod24-ise2	10.24.0.6
Pod 25	pod25-ise1	10.25.0.5	pod25-ise2	10.25.0.6
Pod 26	pod26-ise1	10.26.0.5	pod26-ise2	10.26.0.6
Pod 27	pod27-ise1	10.27.0.5	pod27-ise2	10.27.0.6
Pod 28	pod28-ise1	10.28.0.5	pod28-ise2	10.28.0.6
Pod 29	pod29-ise1	10.29.0.5	pod29-ise2	10.29.0.6
Pod 30	pod30-ise1	10.30.0.5	pod30-ise2	10.30.0.6

1. Search for “Route 53” in the AWS Console.
2. Under DNS Management, choose “Hosted zones”
3. Zer0k has already been registered so click on zer0k.org.

The screenshot shows the AWS Route 53 'Hosted zones' page. At the top, it says 'Route 53 > Hosted zones'. Below that, it displays 'Hosted zones (1)'. A note says 'Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.' There are buttons for 'View details', 'Edit', 'Delete', and a prominent orange 'Create hosted zone' button. A search bar with the placeholder 'Filter hosted zones by property or value' is present. A table lists the hosted zone with columns: Hosted zone name, Type, Created by, and Record count. The entry is 'zer0k.org' (Type: Private, Created by: Route 53, Record count: 2).

4. As part of the ISE provisioning, the Primary ISE node in your pod (10.x.0.5) will be provisioned into Route53. To help understand the task done via script, you will register the second node manually.
5. Click “Create record” and enter the following information (replace X with your pod number):
 - a. Record name – podX-ise2
 - b. Value – 10.X.0.6
6. Leave the rest of the values as default then click “Create records”.

The screenshot shows the AWS Route 53 'Records' page. It displays 'Records (3)' with an 'Info' link. A note says 'Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.' There are buttons for 'Delete record', 'Import zone file', and a prominent orange 'Create record' button. A search bar with the placeholder 'Filter records by property or value' is present. Filter dropdowns for 'Type' and 'Routing policy' are shown. A table lists the records with columns: Record name, Type, and Routing policy. The entries are 'zer0k.org' (Type: NS, Routing policy: Simple), 'zer0k.org' (Type: SOA, Routing policy: Simple), and 'pod31-ise2.zer0k.org' (Type: A, Routing policy: Simple).

Task 5: VPC Automation

Step 1: Deploy Ansible

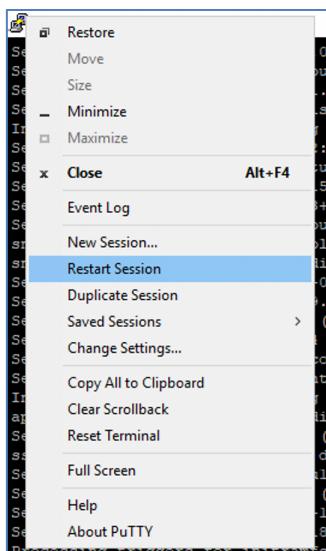
First the ansible/python environment needs to be set up on the Ubuntu server. If you are not connected to your pod's Ubuntu server, do that now. The private key currently only exists on the Windows Provisioning machine so use the previously setup putty profile to connect.

1. Open PuTTY and load the saved session created previously.

2. Ubuntu uses apt for its package manager, first apt needs to be updated to get the most current package and version list from the default package repository: ***sudo apt-get update***.
3. Upgrade the packages on the system to the most current versions: ***sudo apt-get upgrade***. Answer “Y” when shown how much space the upgrades will take.
4. You will be prompted to restart services that are using some of the packages that were updated. Leave the defaults selected and select (tab, enter) OK.
5. There are some services that cannot be restarted individually so restart the system to get those services using the latest package versions: ***sudo shutdown -r now***. This will prevent further restart messages in the future.

Note: Now is the perfect time to stretch and get some water. It'll take up to 2 minutes for the virtual machine to start. In the meantime, you'll receive a “Connection Refused” error.

6. Restart the putty session by right clicking the putty icon on the window and selecting Restart Session. If it times out, try again until it connects, it could take a couple of minutes.



7. This lab will use a python virtual environment. Venv is not installed by default so install it: ***sudo apt install python3.10-venv***. A virtual python environment allows for different projects on the same machine to use different versions of shared python libraries. Accept any prompts presented.
8. Create a venv for this lab, this will create a new folder in the /home/ubuntu directory: ***python3 -m venv ISEonAWS***.
9. Activate the newly created ISEonAWS virtual environment by running the activation script: ***source ISEonAWS/bin/activate***. This script sets up environment variables on the system to use the activated virtual environment. You should see the linux prompt prepended with (ISEonAWS) at this time.
10. Install the python packages required to run ansible for ISE: ***python3 -m pip install ansible boto boto3 botocore ciscoisesdk jmespath***. This step will take a few minutes.
11. Add the ISE collection to ansible: ***ansible-galaxy collection install cisco.ise***.

Step 2: Clone the GIT Repository for Script Execution

Clone the scripts to be used for execution from GIT into the production provisioning machine. These will be used to execute all tasks for the remainder of the lab. There isn't enough time in the lab for you to write the scripts but as you go through and execute them, take some time to read over the scripts first.

1. Download (Clone) the GIT repository to the local machine. Execute the command:

```
git clone https://github.com/plloyd44/CiscoLive_ISE_in_AWS.git
```

```
Cloning into 'CiscoLive_ISE_in_AWS'...
```

```
...
```

```
Receiving objects: 100% (191/191), 25.50 MiB | 24.56 MiB/s, done.
```

```
Resolving deltas: 100% (103/103), done.
```

2. There should be 2 directories in your home directory at this point, run `ls -l` to verify.

```
(ISEonAWS) ubuntu@ip-172-18-25-10:~$ ls -l
total 8
drwxrwxr-x 7 ubuntu ubuntu 4096 Jun  1 20:33 CiscoLive_ISE_in_AWS
drwxrwxr-x 5 ubuntu ubuntu 4096 Jun  1 20:27 ISEonAWS
(ISEonAWS) ubuntu@ip-172-18-25-10:~$ █
```

Step 3: Configure the Environmental Variables to be Used

As part of the deployment process, multiple variables are used to ensure configurations are populated and access keys are available to the Python virtual environment running Ansible. There are two areas where variables are stored for the script to work, the first is locally in the vars/main.yaml file, the second is as deployed into the environment via export statements.

The following is to be done within the SSH session to Ubuntu:

1. Edit the vars/main.yaml file to update your pod number, which will be utilized throughout the lab. Execute the commands:

```
cd CiscoLive_ISE_in_AWS
```

```
cd vars
```

```
nano main.yaml
```

2. Edit the line in main.yaml **pod_id:** to match your pod number.

Note: Update the pod_id: to only have the pod number in it, as seen in the following screenshot. This is a variable used throughout the lab, and only takes in a numerical value.

```

ubuntu@ip-172-18-25-31: ~/CiscoLive_ISE_in_AWS/vars
GNU nano 6.2                               main.yaml
-----
pod_id: 31
#set this to your ip used to access ise, or
#called in tasks/radius_probes.create.yaml

```

3. Scroll down in main.yaml to ensure the “ise_username” variable is set to ***iseadmin***. If it is not, edit it.
4. Exit and save from nano utilizing the key sequence “Ctrl-X, Y, <enter>”
5. Once back at the Ubuntu command line, replace the access key and secret key with the one you created in Task 1, Step 6 in the file “PodX Important Information.txt” on the Windows desktop. It should look like the following:

```

export ise_username=iseadmin

export ise_password=<Provided by your administrator>

export AWS_REGION=us-east-2

export AWS_ACCESS_KEY= XXXXXXXXXXXXXXXXXXXX <----Your Access Key Here

export AWS_SECRET_KEY= YYYYYYYYYYYYYYYYYYYYY <----Your Secret Key Here

export ise_verify=false

```

6. Paste the export commands block of text into the Ubuntu CLI, line by line.

Note:

- Right click in PuTTY will paste commands, do not use ctrl+v.
- Do not paste the entire block, paste line by line to ensure no spaces are added.
- Ensure there are no spaces after any of the variable names.

```

(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export
ise_password=CLUS2023Party!
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export
AWS_ACCESS_KEY=AKIAWFN7EPKL7WJFYMQ
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export
AWS_SECRET_KEY=qTsF/Oj2JyKEy6tQScZdyUhEABhOA8FWpVqLD1nW
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export
ise_username=admin
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export
AWS_REGION=us-east-2
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ export ise_verify=false

```

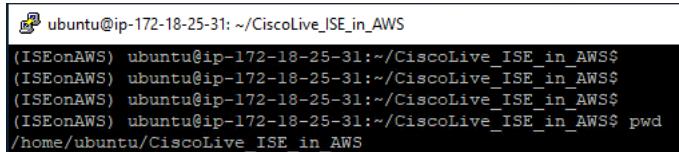
7. Verify by running the ***env*** command:

```
(ubuntu) root@ip-10-0-1-217:/home/ubuntu# env
...
ise_password=CLEMEA2023Party!
AWS_ACCESS_KEY=XXXXXXXXXXXXXXXXXXXXXX
AWS_SECRET_KEY=YYYYYYYYYYYYYYYYYYYYYYYY
ise_username=admin
...
AWS_REGION=us-east-2
...
ise_verify=false
```

Step 4: Deploy the AWS Network Environment and Primary ISE Node

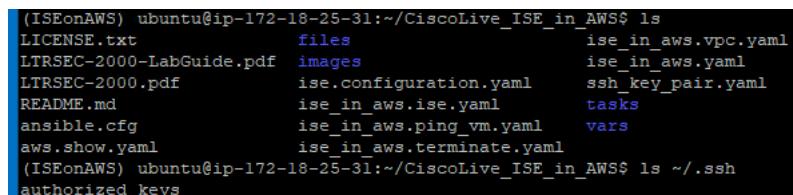
Configure the AWS environment to create a network into which ISE will get deployed.

1. View the playbook that will create the ssh key pair ansible will use to install and connect to ISE. This task will generate a new key and save it for use later locally.
`cd /home/ubuntu/CiscoLive_ISE_in_AWS/
cat ssh_key_pair.yaml`
2. Ensure you are in the ~/CiscoLive_ISE_in_AWS directory of your Ubuntu server, use “cd ..” to back up one directory if need be. Verify your currently working directory by using the command “pwd”.



```
ubuntu@ip-172-18-25-31: ~/CiscoLive_ISE_in_AWS
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ pwd
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ /home/ubuntu/CiscoLive_ISE_in_AWS
```

3. Verify there are no ssh keys already generated for your pod by running “ls ~/.ssh”



```
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ ls
LICENSE.txt          files           ise_in_aws.vpc.yaml
LTRSEC-2000-LabGuide.pdf   images        ise_in_aws.yaml
LTRSEC-2000.pdf       ise.configuration.yaml  ssh_key_pair.yaml
README.md            ise_in_aws.ise.yaml    tasks
ansible.cfg          ise_in_aws.ping_vm.yaml  vars
aws.show.yaml         ise_in_aws.terminate.yaml
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ ls ~/.ssh
authorized_keys
```

4. Generate the SSH Key to be used from the provisioning machine to access all nodes within the AWS environment. Execute the following command:

`ansible-playbook ssh_key_pair.yaml`

Expected Output:

PLAY [Cisco Live - AWS VPC with Cisco ISE]

TASK [Gathering Facts]

```

TASK [Check for existing keypair]
*****
ok: [localhost]

TASK [Create EC2 SSH Key Pair]
*****
ok: [localhost]

TASK [Show key_pair]
*****
ok: [localhost] =>
key_pair:
  changed: false
  failed: false
  key:
    fingerprint: f9:69:e4:b7:e1:b8:b9:12:a0:52:a4:b7:75:20:f1:29:cd:7d:d9:81
    id: key-0ed33cd27e4d39945
    name: ISEinAWS-pod31
    tags: {}
    type: rsa
  msg: key pair already exists

TASK [Save Private Key Locally]
*****
skipping: [localhost]

PLAY RECAP
*****
localhost : ok=5    changed=2    unreachable=0    failed=0
skipped=0   rescued=0   ignored=0

```

5. Verify that there are no skipped or failed steps in the play recap. If so, determine which step needs to be followed to remediate.

Note: If the private key is not displayed, or the task is marked as “skipped”, contact a lab proctor.

6. To verify a private key was generated use the command “ls ~/.ssh”. A .pem extension private key should exist in this directory, which can be viewed with the command “cat ~/.ssh/ISEinAWS-podX.pem” where X is your pod number.

```
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ ls ~/.ssh
ISEinAWS-pod31.pem authorized_keys
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ cat ~/.ssh/ISEinAWS-po
d31.pem
-----BEGIN RSA PRIVATE KEY-----
MIIEowIBAAKCAQEApY9tjPIPQwjpEbbgZw025j4cvVeSgZU8bPKTE3jOI5taJT/b
OnSgTScfSunBqEl4OJZ0AxqGjoxvhIOqglBkMwDzxOxT4sxSvQfombHR691R
//CfhMCQN2d/Uia13j6Xu8EYILJkk0YewlNCHFUKwQF3iMbJnKYxw/6Oxo02Y0KR
d3aE7ykh1mColUCzsXqd/iI94NN/e15RLAc1+50ZjdczTyBvEDMwT77T5tutsHD
IyJGKmgVGbxzCc/z5/9gGrGn2NYhY+ojCt+AQbp2j5ZK5kk1Xuw0p7cHFEVWBrI
N132THDJUYltz8/OgJ/xN4qX/hjRZqLx/DSChIDAQABAcIAOCU2XBbKX5DPL2f
aZYz0JotSea47QUrcEVVhnppJVHgfYn8t364/aP9y728spGkaZJ0/iXrrJSEiBG
029VyIhMoZe+CYYxG9FF2jdD/lpG5LhpgbUvdgNmLuQtIKqKb+Ewy3UZnT04K7A
ImkCH9budjaHOHRqCp+IMU7I8hMXuugI9bCcyI1823WocTCdEAAt/kPqlSuDfMatI
1adAu6D6qYmFlHExDUo/ykBaqlitRh9jD0+dbOdxCwnXZ7QnGEQFbfReh5fIY
W8w8z48cfFghw7w7BjkQ2le8eKhJdkhoswCk+Gu14yuzzZw2+sDm3X0QNxM92Ms
021zyViAaGBANIUi1eTBKkvxDGu3ij5UOf/WLT6RcFkWNQdmSbsHc1+PsWx06c3
xCS7gW01SqaDzjUJdhnyv3M16Nq2HaEWGVauVb08Dm6Gu9LCdj+wkoBlpkZB20J
7kGEia/ONG1jJdBCbjxuafbvIH5/7X+Ietn0+R23PiNS6v8OxuJ+jNzJAoGBAMm/
rgjYlOM7skepr00U7EpYJyXTktzNieHSVboqeGYKqYnHPQkNBQbjtCEde61GZH6f
14VFfHqmqmEXFpkWdInJeYiCr5eABDsHUur9otJFR0z/1+4Q1o2gDqmegY+vGJTm
o2UR1bz3kLV/LGowFrKtqasyBDuggVRGeWcwyYzAoGAOpCbn9hOb1Pp7xfOuyF2
hBW9RwaWN6mf3v552bTtPt9XIMed2Nt2FT3Xa31N/dto9MS53WzOYiR947D4cp
1WFt2CNL6qg16GUj0Ktzcm1pwFOUwsxtjXvf3PIH1Yq91SaeGRt628kz7ipgj
J+jxIcWzvwM4J9XYv+DiXECgYAYWaBBxRn8yy7a1lMnCfg2T7wW9bv+4bW0LI0
JAggGM12qch+HSosKLoHA633vfVHKzexj0XVr+QEj+rUUleBgeW/SjazTG02Ta3+
WtqaEm49RK1v0fL2Z2VpqHwm6uV3Th/bGW1xyOaJF1R+7foYsskltnW4VKhHaPI
iOEs7QKBgGFwmV/S051Ym4wbcv9c3ZDm9cnJ1781ThzfMSNZ+vxH2D1C5eBEmrz
JZYSVN2hRpUf6T1CpnS6sloHCda7o/SWvvC5LCA3HJMx6fwyF8olZvGOn4Edon
/qyTGiCNUjhai+tnzjk3My2mrXy16YRQS3K6dpXEnv4Vn7VrHvPf
-----END RSA PRIVATE KEY----- (ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_i
n_AWS$
```

7. This key corresponds to a key created via API in AWS. Navigate to **EC2 > Network & Security > Key Pairs** to verify a keypair has been created.
8. Deploy the VPC, Subnet, Routing Table, and Internet gateway for the ISE environment. This will deploy your pod VPC as shown in the initial network diagram. Execute the command:

ansible-playbook ise_in_aws.vpc.yaml

Expected Output:

```
PLAY [AWS VPC with Cisco ISE and Meraki vMX]
***
```

```
TASK [Gathering Facts]
```

```
***
```

```
ok: [localhost]
```

```
TASK [Create VPC]
```

```
***
```

```
changed: [localhost]
```

```
TASK [Create an Internet Gateway to connect VPC to Internet]
```

```
***
```

```
changed: [localhost]
```

```
TASK [Create Public_Subnet]
```

```
***
```

```
changed: [localhost]
```

```

***  

changed: [localhost]  
  

TASK [Create Public Route Table; Add Route from VPC to Internet Gateway]  

***  

changed: [localhost]  
  

TASK [Create Private Route Table]  

***  

changed: [localhost]  
  

TASK [Show VPC(s)]  

***  
  

ok: [localhost]  
  

TASK [Create SG-ISE Security Group]  

***  
  

changed: [localhost] PLAY RECAP  

*****
localhost : ok=9    changed=4    unreachable=0    failed=0  

skipped=0   rescued=0   ignored=0

```

8. Deploy the ISE primary node into the ISE environment. Execute the command:

```
ansible-playbook ise_in_aws.ise.yaml
```

Expected Output:

```
PLAY [AWS VPC with Cisco ISE and Meraki vMX]
```

```
TASK [Create ISE 3.1 Instance in AWS]  
***
```

```
changed: [localhost] => (item={'name': 'ise', 'instance_type': 'c5.4xlarge',  
'public_dns_name': 'ise.zer0k.org', 'private_dns_name': 'ise.zer0k.org',  
'dns_alias': 'ise.zer0k.org', 'private_ip': '10.0.0.5', 'role': 'Primary', 'personas':  
['Standalone']})
```

```
TASK [Show SSH Commands for ISE Instances]  
***
```

```
ok: [localhost] => (item={'name': 'ise', 'instance_type': 'c5.4xlarge',  
'public_dns_name': 'ise.zer0k.org', 'private_dns_name':
```

```
'ise.zer0k.org', 'dns_alias': 'ise.zer0k.org', 'private_ip': '10.0.0.5', 'role': 'Primary', 'personas': ['Standalone'])} =>
msg:
- ping 10.192.168.44
- ssh -i ~/.ssh/ISEinAWS-palloyd.pem admin@10.0.0.5
- ping ise.zer0k.org
- ssh -i ~/.ssh/ISEinAWS-palloyd.pem admin@ise.zer0k.org
```

PLAY RECAP

```
localhost: ok=11  changed=8  unreachable=0  failed=0  skipped=0
rescued=0  ignored=0
```

Step 5: Visit the AWS Environment to Ensure the Network Environment Was Provisioned

With the scripts being successfully run it is time to verify that they created and configured the environment as expected.

- Verify the VPC was deployed. Navigate to the search bar in AWS, type VPC. Click VPC in the results, the VPC should be named ISEinAWS-podX where X is your assigned pod number.

<input type="checkbox"/>	zer0k-pod0	vpc-0105fb3ba3f6cbec3	Available	10.0.0.0/16
<input type="checkbox"/>	ISEinAWS-pod9	vpc-0dbba522e2e80f740	Available	10.9.0.0/16
<input checked="" type="checkbox"/>	ISEinAWS-pod10	vpc-06c27a7f1c1c05e39	Available	10.10.0.0/16
<input type="checkbox"/>	zer0k-main-vpc	vpc-0a61b7f1d92102ad6	Available	172.18.0.0/16

- Navigate to Subnets in the left menu. Verify the Private subnet is deployed in accordance with your pod. It should be named zer0k_podX_Private_Subnet where X is your assigned pod number.

<input type="checkbox"/>	zer0k-public-subnet	subnet-0653589a8ba2fa824	Available	vpc-0a61b7f1d92102ad6 zer...	172.18.0.0/21
<input type="checkbox"/>	zer0k-private-subnet	subnet-059dc621173c4d170	Available	vpc-0a61b7f1d92102ad6 zer...	172.18.16.0/21
<input type="checkbox"/>	zer0k-inside-subnet	subnet-0cf86b138b53ba3c9	Available	vpc-0a61b7f1d92102ad6 zer...	172.18.24.0/21
<input checked="" type="checkbox"/>	zer0k_pod10_Private_Su...	subnet-029c6bc2fea840f4c	Available	vpc-06c27a7f1c1c05e39 ISEi...	10.10.0.0/24

- Navigate to Route Tables in the left menu. Verify a routing table was provisioned for your pod. It should be named zer0k_podX_Private_Subnet where X is your assigned pod number.

<input type="checkbox"/>	zer0k-pod0-routes	rtb-0a3688c11d7f9d1e5	-	-	Yes
<input type="checkbox"/>	-	rtb-087124f0d6b64d4e9	-	-	Yes
<input checked="" type="checkbox"/>	zer0k_pod10_RT_Private	rtb-0c9efdacacd157476	subnet-029c6bc2fea840...	-	No

Step 6: Add Transit Gateway Attachment and Route

The lab is routing all traffic through the main VPC through the ASA. To get traffic to the main VPC from the Pod VPC a transit gateway is needed. As of the writing of this lab the ansible collection does not include the ability to attach to a transit gateway so that will be done in this step manually. The Transit gateway has already been created so all that is left is to attach to the transit gateway then update the routing in the Pod VPC to route traffic to the transit gateway.

- In the AWS console go to the Search bar -> VPC -> Transit Gateways -> Transit Gateway Attachments

Note: There are two options which are commonly mistaken here: Transit Gateway Attachments and Transit Gateways. Please choose Transit Gateway Attachments!

2. Click Create transit gateway attachment on the top right of the page.
3. Name it podX-transit-attach where X is your assigned pod number.
4. Choose the “zer0k-transit-gateway” under the Transit gateway ID, it should be the only entry.
5. Leave the Attachment type as VPC since you are attaching to another VPC.

The screenshot shows a configuration form with the following fields:

- Name tag - optional**: A text input field containing "pod10-transit-attach".
- Transit gateway ID**: A dropdown menu showing "tgw-00ecf6a9a26ff37cf (zer0k-transit-gateway)".
- Attachment type**: A dropdown menu showing "VPC".

6. Under VPC attachment, leave DNS support enabled and select your VPC from the list of VPC IDs. It will be named ISEinAWS-podX where X is your assigned pod.
7. A list of subnets will be shown, select the zer0k_podX_Private_Subnet. It should be the only entry available as the VPC setup script only created a single subnet.

The screenshot shows a configuration form with the following sections:

- VPC attachment**: A section with the sub-instruction "Select and configure your VPC attachment." It contains three checkboxes:
 - DNS support [Info](#)
 - IPv6 support [Info](#)
 - Appliance Mode support [Info](#)
- VPC ID**: A section with the sub-instruction "Select the VPC to attach to the transit gateway." It shows a dropdown menu with two entries:
 - vpc-0796f757896d629d1
 - vpc-0796f757896d629d1 (ISEinAWS-pod31) 10.31.0.0/16
 - vpc-0a61b7f1d92102ad6 (zer0k-main-vpc) 172.18.0.0/16
- Subnet Selection**: A section showing a list of subnets:
 - us-east-2c No subnet available
 - subnet-0f172387ab1bf720a [X](#)

8. The Name tag should already be filled out from above.
9. Create an additional tag of “Project” with Value “ISEinAWS-podX”
10. Create a final tag of “Pod” with Value “True”
11. Select Create transit gateway attachment.
12. Next browse to Virtual Private Cloud -> Route Tables and find your pod VPC routing table. It is named zer0k_podX_RT_Private where X is your assigned pod number.

Check the box next to the name of the Route Table.

13. The bottom half of the screen will load the Route table details, select the Routes tab and then select Edit routes.

Destination	Target	Status
10.10.0.0/16	local	<input checked="" type="checkbox"/> Active
0.0.0.0/0	tgw-00ecf6a9a26ff37cf	-

14. Add a default route pointing to the transit gateway by selecting 0.0.0.0/0 under the Destination and by selecting Transit Gateway -> podX-transit-attach under Target where X is your assigned pod number.

Destination	Target	Status
10.10.0.0/16	local	<input checked="" type="checkbox"/> Active
0.0.0.0/0	tgw-00ecf6a9a26ff37cf	-

Note: Depending on how quickly you get to this page, the Transit Gateway may not have had time to initialize. This can take up to 3 minutes. If your transit gateway does not immediately show up, navigate back to Transit Gateways -> Transit Gateway Attachments, verify the attachment exists, and navigate back to Virtual Private Cloud -> Route Tables to repeat this step.

15. Save the changes.

Step 7: Establish an SSH session with ISE

Note: ISE will need to initialize and can take up to 30 minutes to fully deploy. You can verify the status of your ISE instance in EC2 -> Instances. In the Status check header in the EC2 dashboard, the status for ISE must have all checks passed, as opposed to "initializing"

pod10-ise1	i-0e38dab8285aeaaa7	<input checked="" type="checkbox"/> Running	c5.4xlarge	<input checked="" type="checkbox"/> 2/2 checks passed
------------	---------------------	---	------------	---

- Establish an SSH session with ISE to verify services transition through a Not Running -> Initializing -> Running cycle. This should be done from the Ubuntu machine.

NOTE: SSH will fail until ISE is fully provisioned and running. Within this process the ISE server is provisioned, the database primed, the ISE node restarted, and only then is the application server and SSH process available. This can take up to **30 minutes**. Progress can be monitored in the AWS console within the EC2 Instances area. This will manifest itself as:

`(ISEonAWS) ubuntu@ip-172-18-25-4:~/ssh$ ssh -i ISEinAWS-pod4.pem iseadmin@10.4.0.5
admin@10.4.0.5: Permission denied (publickey).`

- Execute the following command:

`ssh -i ~/ssh/ISeinAWS-podX.pem iseadmin@10.X.0.5` where X is your pod number.

3. **Optional:** If you would like to see the ongoing status of the ISE deployment you can connect through the virtual serial. In your Web Browser, click the instance name and click the “Connect” button on the top left.

Instances (1/1) Info												
Clear filters												
Instance state = running	Name = pod31-ise1	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	
	pod31-ise1	i-02a12ad94e67f68ba	Running	c5.4xlarge	2/2 checks passed	View alarms +	us-east-2a	-	-	-	-	

4. **Optional:** Select EC2 Serial Console, and connect

EC2 > Instances > i-02a12ad94e67f68ba > Connect to instance

Connect to instance [Info](#)

Connect to your instance i-02a12ad94e67f68ba (pod31-ise1) using any of these options

EC2 Instance Connect Session Manager SSH client **EC2 serial console**

Instance ID: [i-02a12ad94e67f68ba \(pod31-ise1\)](#) Serial port: [ttyS0](#)

Cancel **Connect**

5. **Optional:** Run the following command:

```
podXX-ise/admin# show application status ise
```

ISE PROCESS NAME	STATE	PROCESS ID
Database Listener	running	32895
Database Server	running	85 PROCESSES
Application Server	not running	
...		
Application Server	initializing	49728
...		
Application Server	running	

6. On the CLI where the ssh command was run, you will be prompted to accept the ssh fingerprint of the ISE server. Enter yes.
7. Run the following command:

```
podXX-ise/admin# show application status ise
```

ISE PROCESS NAME	STATE	PROCESS ID
CISCO Live!		

Database Listener	running	32895
Database Server	running	85 PROCESSES
Application Server	not running	
...		
Application Server	initializing	49728
...		
Application Server	running	

- Once the Application Server shows as “running” move on to the next step.

Step 8: Verify the running configuration of ISE to align with your Pod

Verify the running configuration, including IP address for the private facing interface, aligns with expected IP’s for your pod. Also verify DNS is provisioned to the correct server.

Execute the command: ise/admin# **show run**

Expected Output:

Generating configuration...

```
!
hostname ise
ip domain-name zer0k.org
interface GigabitEthernet 0
  ip address 10.X.0.5 255.255.255.0
!
ip name-server 169.254.169.253
ip default-gateway 10.X.0.1
clock timezone EST5EDT
!
```

Step 9: Reset the ISE Password

ISE forces the user to change their password on first login. Default settings of requiring complex passwords prevent the user from resetting their password back to the same password used. The password therefore needs to change in both the variables file as well as in the ISE GUI. Execute the following before logging into the ISE GUI.

1. Exit from the SSH Session within the putty window. You should be back in the CiscoLive_ISE_in_AWS directory within the ISEonAWS virtual environment. You can verify this location with the **pwd** command:

Expected Output:

```
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS $ pwd  
/home/ubuntu/CiscoLive_ISE_in_AWS
```

2. Change directory into the vars folder, where variables used for tasks are pulled from.

Expected Output:

```
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS$ cd vars  
(ISEonAWS) ubuntu@ip-172-18-25-31:~/CiscoLive_ISE_in_AWS/vars$ ls  
endpoint_groups.yaml internal_users.thomas.yaml network_device_groups.yaml  
endpoints.yaml      main.yaml          network_devices.thomas.yaml
```

3. Edit the main.yaml variables file with command **sudo nano main.yaml**
4. Scroll down in the file until you find the “ise_password” variable

Expected Output:

```
ise_base_hostname: ise  
ise_username: iseadmin  
ise_password: CLUS2023Party!
```

6. Change this password to CLEMEA2024Party!

Expected Output:

```
ise_base_hostname: ise  
ise_username: iseadmin  
ise_password: CLEMEA2024Party!
```

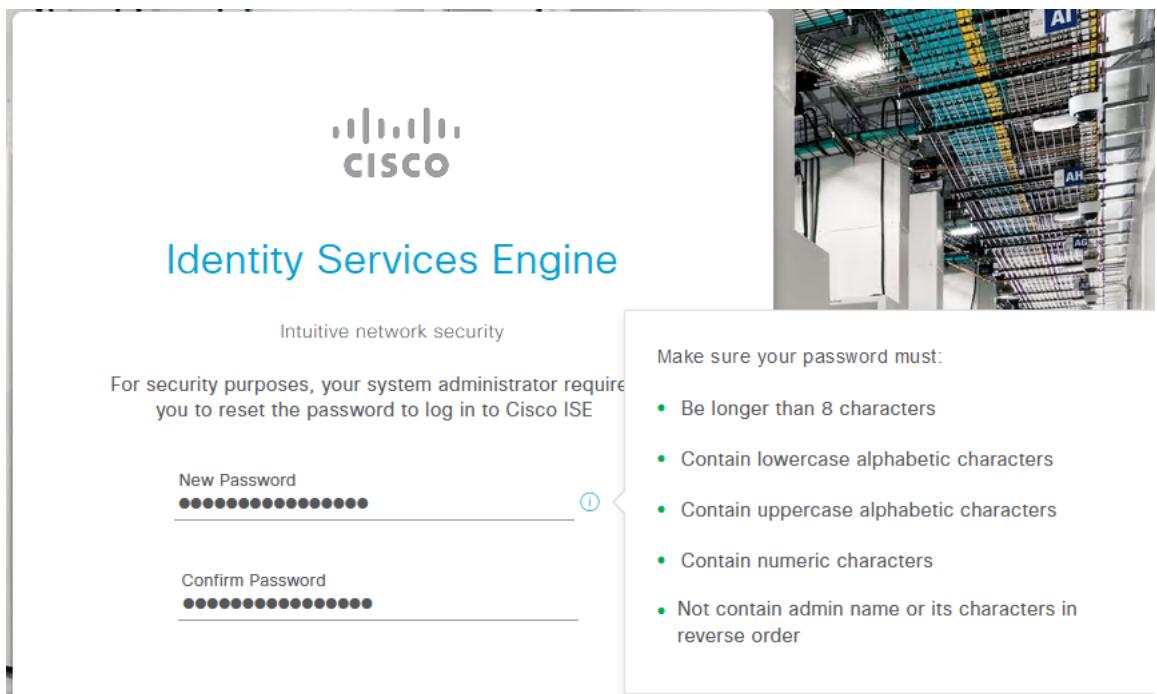
Step 10: Launch ISE from a Web Browser

Launch a web browser to ISE from your Windows Provisioning machine, ignoring any certificate errors. Reset the password as prompted to the

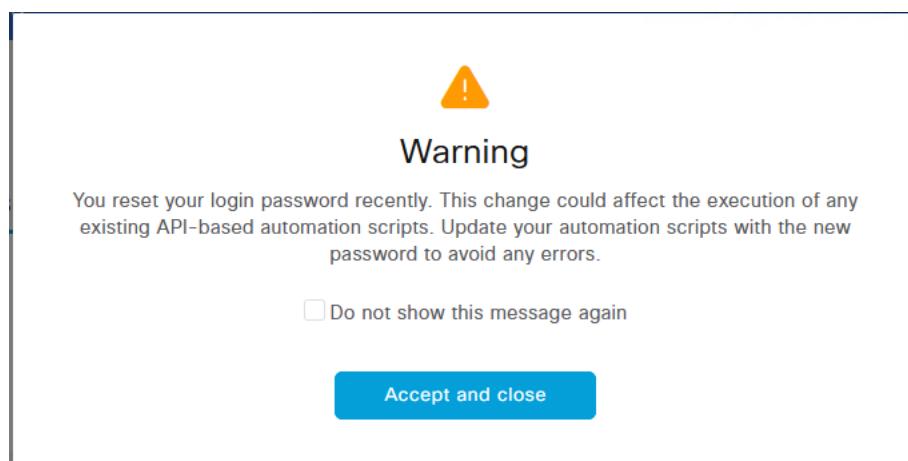


updated password of “**CLEMEA2024Party!**” Ensure login to the GUI is successful, and that no configurations are currently present in the Users, Roles, Network Devices or Network Device Groups areas.

1. Log into ISE using the administrative username **iseadmin**, using the initial password **provided by your lab proctor**.
2. You will be prompted to reset the password on login. Utilize the same password used in the variable file in Step 9, in this case a password of “**CLEMEA2024Party!**”



3. Relogin to ISE using **iseadmin** and the **CLEMEA2024Party!** password.
4. Accept the warning about resetting the password, noting this would be a concern for this lab.



5. Using the hamburger menu on the top left of the screen, navigate to Administration -> Identity Management -> Groups -> User Identity Groups
6. Verify only default ISE groups are populated, including **OWN_ACCOUNTS**, **ALL_ACCOUNTS**

<input type="checkbox"/>	ALL_ACCOUNTS (default)	Default ALL_ACCOUNTS (default) User Group
<input type="checkbox"/>	Employee	Default Employee User Group
<input type="checkbox"/>	GROUP_ACCOUNTS (default)	Default GROUP_ACCOUNTS (default) User Group
<input type="checkbox"/>	GuestType_Contractor (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_Daily (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_SocialLogin (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_Weekly (default)	Identity group mirroring the guest type
<input type="checkbox"/>	OWN_ACCOUNTS (default)	Default OWN_ACCOUNTS (default) User Group

7. Navigate to Administration -> Identity -> Identities
8. Verify there are no users present in the identity store
9. Navigate to Administration -> Network Device Groups
10. Verify only default ISE NDG's are present.

<input type="checkbox"/>	All Device Types	All Device Types
<input type="checkbox"/>	All Locations	All Locations
<input type="checkbox"/>	> Is IPSEC Device	Is this a RADIUS over IPSEC Device

11. Navigate to Administration -> Network Devices
12. Verify no Network Devices are currently present.

Step 11: Configure ISE Programmatically

Note: Should the following steps be performed outside of the lab or across regions, ensure that the correct IP is used for the ise.configuration.yaml script. If not, the script will perform 1000 pings before timing out.

If this happens it can be interrupted with **ctrl+c**.

1. Navigate back to the CiscoLive_ISE_in_AWS folder by issuing the command **cd /home/ubuntu/CiscoLive_ISE_in_AWS**
2. Configure ISE from the Ansible virtual environment, to populate the Network Device Groups, Network Devices, User Roles, and Users. Run these commands from the Ubuntu-Ansible machine.

Execute the command: **ansible-playbook ise.configuration.yaml**

Expected Output:

PLAY [ISE Configuration Playbook]



TASK [Query for ISE instances in project "ISEinAWS-palloyd"] ...

TASK [Show instances] ...

TASK [Test for ISE Application Server Initialization] ...

TASK [Ping 10.X.0.5] ...

TASK [Wait for <private_IP> App Server (GUI)] ...

TASK [Show <private_IP> Initialized] ...

TASK [Enable ISE ERS & OpenAPIs] ...

TASK [Enable ISE OpenAPIs (ISE 3.1+)] ...

TASK [Show ISE OpenAPIs Enabled Status] ...

TASK [Show ISE OpenAPIs Disabled Status] ...

TASK [Get ISE ERS APIs Status] ...

TASK [Enable ise.zer0k.org ERS APIs] ...

TASK [Show ise.zer0k.org ERS Enabled Status] ...

TASK [Show ise.zer0k.org ERS Disabled Status] ...

TASK [Create RADIUS Probes - identity_group and internal_users] ...

TASK [Create `RADIUS_Probes` identity group] ...

TASK [Create Internal Users] ...

TASK [Create Internal User Accounts] ...

TASK [Create Network Device Groups] ...

TASK [Create demo network_devices] ...

TASK [Include Endpoints] ...

TASK [Create Endpoints] ...

PLAY RECAP

```
localhost      : ok=39  changed=6  unreachable=0  failed=0  skipped=4  rescued=0
ignored=0
```

Step 12: Verify Newly Configured Users, Groups, and Network Access Devices

1. On your Ubuntu provisioning machine, navigate to ~/CiscoLive_ISE_in_AWS/vars.
2. Execute a more on each file to explore what is expected to be configured, including users, groups, network device groups, and network devices.
3. Using the hamburger menu on the top left of the screen, navigate to Administration ->

Identity Management -> Groups -> User Identity Groups



4. Verify the RADIUS_Probes group has been created as a group to assign users to.

User Identity Groups

	Name	Description
<input type="checkbox"/>	ALL_ACCOUNTS (default)	Default ALL_ACCOUNTS (default) User Group
<input type="checkbox"/>	Employee	Default Employee User Group
<input type="checkbox"/>	GROUP_ACCOUNTS (default)	Default GROUP_ACCOUNTS (default) User Group
<input type="checkbox"/>	GuestType_Contractor (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_Daily (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_SocialLogin (default)	Identity group mirroring the guest type
<input type="checkbox"/>	GuestType_Weekly (default)	Identity group mirroring the guest type
<input type="checkbox"/>	OWN_ACCOUNTS (default)	Default OWN_ACCOUNTS (default) User Group
<input type="checkbox"/>	RADIUS_Probes	Group for RADIUS probe internal users

5. Navigate to Administration -> Identity -> Identities
6. Verify the users found in the “internal_users.thomas.yaml” are configured as expected.

The screenshot shows the Cisco ISE Identity Sources interface. The top navigation bar includes tabs for Identities, Groups, External Identity Sources, Identity Source Sequences, and Setting. The Identities tab is selected, indicated by a blue underline. On the left sidebar, under the 'Users' section, there is a link to 'Latest Manual Network Scan Res...'. The main content area is titled 'Network Access Users'. It features a toolbar with icons for Edit, Add, Change Status, Import, and Export. A table lists eight users with the following data:

Status	Username	Description
<input type="checkbox"/>	Enabled chmula	
<input type="checkbox"/>	Enabled cocarson	
<input type="checkbox"/>	Enabled elparis	
<input type="checkbox"/>	Enabled jedubois	
<input type="checkbox"/>	Enabled meraki_8021x_test	
<input type="checkbox"/>	Enabled palloyd	
<input type="checkbox"/>	Enabled radius-probe	
<input type="checkbox"/>	Enabled thomas	
<input type="checkbox"/>	Enabled vibobrov	

7. Navigate to Administration -> Network Devices
8. Verify only one network device, the ASA Headend, was configured.

Network Devices

The screenshot shows the Cisco ISE Network Devices interface. The top toolbar includes Edit, Add, Duplicate, Import, Export, Generate PAC, and Delete. A table displays a single network device entry:

	Name	IP/Mask	Profile Name	Location	Type	Description
<input type="checkbox"/>	ASA_Headend	172.18.24.254/32	Cisco	AMER	VPN_Headend#ASA	ASA_Headend

Task 6: Entra ID integration via ROPC for Remote Access VPN

This task will have you create the basics needed for ISE integration with Azure Active Directory for VPN authentication.

Step 1: Log into Azure and Configure Users/Groups

1. Log into <https://portal.azure.com> with the pod administrator: **podX-admin@zer0k.onmicrosoft.com** where X is the number of your pod and the password is provided by your proctor
2. Using the search bar, search for “groups” and add a new group of type Security. This will be used on ISE to determine which users are allowed to log into the VPN.
3. Name the group **podX-vpn-users** where X is your pod number, give it a description for users who will be allowed to log into VPN later.

Group type * ⓘ

Security

Group name * ⓘ

pod10-vpn-users

Group description ⓘ

Pod 10's VPN Users

Membership type ⓘ

Assigned

Note: It may take a minute before the group shows up in the All Groups area of Azure Active Directory. Please be patient and hit refresh.

- Using the search bar at the top of the page, search for “users” and add a new user. Name it **podX-vpn-user** where X is your pod number and give it a name.

- Complete the basic information for a user, utilizing the @zer0k.onmicrosoft.com domain:

6. Click Next to advance to Properties. No information is required in this tab. Click Next to advance to Assignments.
7. Click “Add Group” at the top of the page to be presented with the “Select Group” pop out.

Home > Users >

Create new user

Create a new internal user in your organization

Basics Properties **Assignments** Review + create

Make up to 20 group or role assignments. You can only add a user to a maximum of 1 administrative unit.

+ Add administrative unit + Add group + Add role

No assignments to display.

Review + create < Previous Next: Review + create >

8. Under “Select Group”, check the box next to the group you created in the prior step, click “Select”.

Select group

X

The screenshot shows a search interface for selecting a group. A search bar at the top contains the placeholder text "Try changing or adding filters if you don't see what you're looking for.". Below the search bar is a search result section with a "Search" input field containing a magnifying glass icon and the text "1 result found". Underneath are two tabs: "All" and "Groups", with "Groups" being the active tab. A table below lists one result: "Name" (pod31-vpn-users), "Type" (Group), and a small blue icon representing users. To the right, a "Selected (1)" panel shows the selected item "pod31-vpn-users" with a delete icon. At the bottom left is a "Select" button.

9. Click the Next button to advance to “Review + Create”. Create the user.

Home > Users >
Create new user ...
Create a new internal user in your organization

Basics Properties Assignments **Review + create**

Basics

User principal name Pod99-vpn-user@zer0k.onmicrosoft.com

Display name Pod99-vpn-user

Mail nickname Pod99-vpn-user

Password CLUS2023Party!

Account enabled Yes

Properties

User type Member

Assignments

Administrative units

Groups pod31-vpn-users

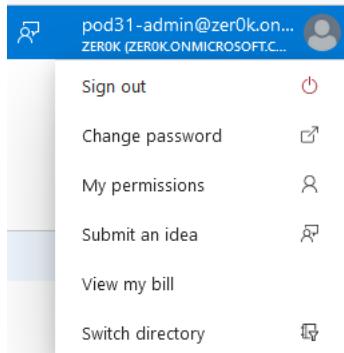
Roles

Create

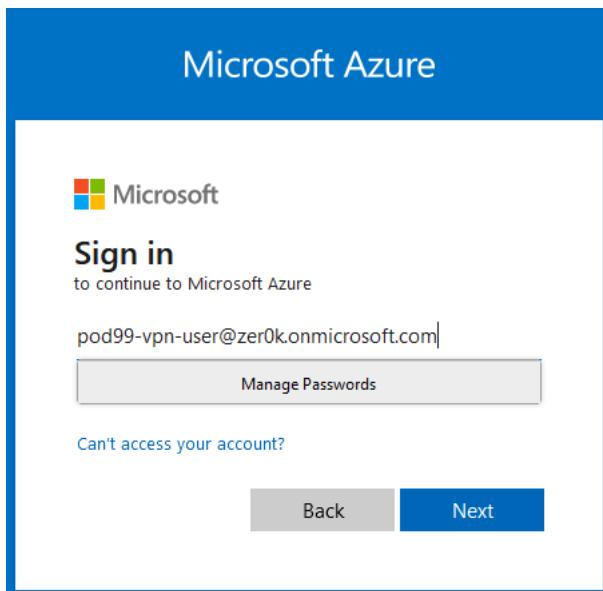
< Previous

Next >

10. Azure requires the password to be reset before authentication can be done to that user. This cannot be done through the VPN auth so click your username at the top right of the screen and “sign out”



11. Sign in with the user you just created (the @zer0k.onmicrosoft.com suffix is required).



12. You will be prompted to reset your password. Use the CLEMEA2024Party! Password as your new password.



pod99-vpn-user@zer0k.onmicrosoft.com

Update your password

You need to update your password because this is the first time you are signing in, or because your password has expired.

••••••••••••••

••••••••••••••

••••••••••••|

Sign in

- When asked to configure the Microsoft Authenticator app, click “Ask Later”



pod99-vpn-user@zer0k.onmicrosoft.com

Action Required

Your organization requires additional security information. Follow the prompts to download and set up the Microsoft Authenticator app.

[Use a different account](#)

[Learn more about the Microsoft Authenticator app](#)

You have 14 days until this is required.

Ask later

Next

- Once you successfully log in, Switch back to the pod admin user.



Sign in with a different account

Step 2: Configure application integration in Azure

- Search for App Registrations and choose “New registration”

Microsoft Azure

Home > App registrations

+ New registration Endpoints Troubleshooting Refresh Download Preview features

Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and...

All applications **Owned applications** Deleted applications

Start typing a display name or application (client) ID to filter these ... Add filters

2. Name the app **podX-ise-integration** where X is your assigned pod number, and leave the Support account types as “Accounts in this organizational directory only”. This application will not need a redirect URI.

* Name
The user-facing display name for this application (this can be changed later).
pod10-ise-integration

Supported account types
Who can use this application or access this API?
 Accounts in this organizational directory only (Zer0k only - Single tenant)
 Accounts in any organizational directory (Any Azure AD directory - Multitenant)
 Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
 Personal Microsoft accounts only
[Help me choose...](#)

Redirect URI (optional)
We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.
Select a platform e.g. https://example.com/auth

3. Click Register.
4. On the overview screen now presented, copy out the “Essentials” displayed at the top of the page. You will need the client ID and tenant ID later.

The screenshot shows the 'Overview' tab of an Azure App registration. The application name is 'pod31-ise-integration'. Key details shown include:

- Display name:** pod31-ise-integration
- Application (client) ID:** d33c1680-7666-458b-ab09-65e1cb437df5
- Object ID:** 64f522ea-9f56-4165-b79c-a77d14fe649e
- Directory (tenant) ID:** 6d92df37-cb73-4152-bfd5-54c7828c09c4
- Client credentials:** Add a certificate or secret
- Redirect URIs:** Add a Redirect URI
- Application ID URI:** Add an Application ID URI
- Managed application in I...**: pod31-ise-integration
- Supported account types:** My organization only

5. On the left menu bar, select “Certificates & secrets”. This is the OAuth secret key that will be used to integrate ISE with Azure. Click “New Client Secret” and enter a description of “podX-ISE” where X is your pod number. Click Add at the bottom of the dialog box.
6. Copy the secret value to a notepad before leaving the page!

Warning: This value cannot be viewed again after leaving the page. If you forget this step, delete the client secret and create a new one. It is **highly** recommended that you label the ID and value separately in the notepad document.

The screenshot shows the 'Client secrets' tab with one entry:

Description	Expires	Value	Actions
Secret for ISE Integration	12/3/2022	Stm8Q~b8ft_lul29HAdBEVZbtnJXrLDRo4... (Copy to clipboard)	Get ID Delete

7. Configure the application for ROPC by going to the Authentication tab on the left menu. ISE does not use a URI based redirect flow, therefore scroll down to Advanced Settings and set the “Allow public client flows” setting to Yes. Click Save.

Advanced settings

Allow public client flows ①

Enable the following mobile and desktop flows:

Yes

No

- App collects plaintext password (Resource Owner Password Credential Flow) [Learn more](#)
- No keyboard (Device Code Flow) [Learn more](#)
- SSO for domain-joined Windows (Windows Integrated Auth Flow) [Learn more](#)

8. On the left menu, click Token Configuration
 9. Under Token Configuration in the left menu, add a groups claim so that you can later create ISE policies that refer to groups in Azure. The groups claim should allow access to the following group types:
 - Security Groups
 - Directory Roles
 - All Groups
- Click Add.

Select group types to include in Access, ID, and SAML tokens.

- Security groups
- Directory roles
- All groups (includes distribution lists but not groups assigned to the application)
- Groups assigned to the application

10. Add API permission for the groups graph API. In the left menu select “API permissions” then click Add a permission. In the window that pops up choose “Microsoft Graph” then “Application Permissions”.
11. Search for “group” then under the group drawer, select Group.Read.All, notice that Admin consent required is shown as Yes. Select Add Permissions at the bottom of the screen.

Select permissions		
	Permission	Admin consent required
> Calls		
▽ Group (1)		
<input type="checkbox"/> Group.Create ⓘ Create groups		Yes
<input checked="" type="checkbox"/> Group.Read.All ⓘ Read all groups		Yes
<input type="checkbox"/> Group.ReadWrite.All ⓘ Read and write all groups		Yes

12. Before moving on ask your lab proctor to provide consent for your new API Permission.
13. Open the overview page for the application, that information will be needed in the next steps.

Step 3: Enable the ROPC feature in ISE

1. Go to Administration -> Identity Management -> Settings -> REST ID Store Settings and enable the feature. This is required as of ISE 3.1 since the feature is currently a beta feature.

Identities	Groups	External Identity Sources	Identity Source Sequences	Settings
User Custom Attributes				
User Authentication Settings				
Endpoint Purge				
Endpoint Custom Attributes				
REST ID Store Settings				
				<div style="display: flex; justify-content: space-between;"> Status <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled Save </div>

Step 4: Register ISE with Azure

1. In ISE, browse to Administration -> Identity Management -> External Identity Sources from the hamburger menu icon at the top left of the ISE UI.
2. From the REST (ROPC) option, add a new entry.
3. Name it **zer0k_azure** and fill in the information obtained from the overview page under the application created in Step 2 from Azure. The client

secret (Secret Value) should have been saved to a notepad. The username suffix for this lab is [@zer0k.onmicrosoft.com](#).

^ Essentials

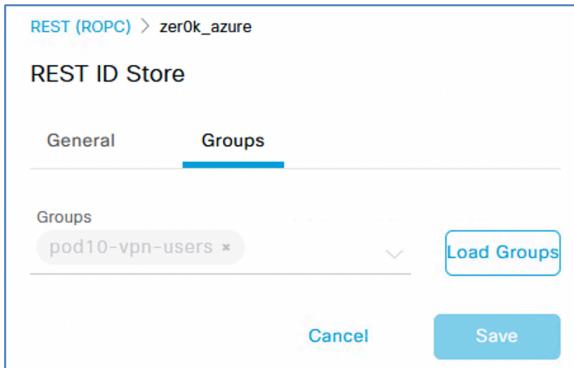
Display name : [pod10-ise-integration](#)
Application (client) ID : 6846a86b-36b5-4e7c-bc96-7e98b5dda0a8
Object ID : 89de3286-75f2-46f9-9d3c-318164d42ad0
Directory (tenant) ID : 6d92df37-cb73-4152-bfd5-54c7828c09c4
Supported account types : [My organization only](#)

Note: You'll need BOTH the secret value and the Client ID from two separate screens in this step. Both should be contained in a notepad document. In the Azure overview, the Client ID is the "Application (client) ID" and the tenant ID is the "Directory (tenant) ID".

The screenshot shows the 'General' tab of the Azure portal's application configuration screen. The 'Name' field contains 'zer0k_azure'. The 'Description' field is empty. Under 'REST Identity Provider', 'Azure Identity Store' is selected. The 'Client ID' field contains '6846a86b-36b5-4e7c-bc96-7e98b5dc'. The 'Client Secret' field contains five asterisks ('*****'). The 'Tenant ID' field contains '6d92df37-cb73-4152-bfd5-54c7828c'. A blue 'Test connection' button is visible next to the tenant ID field. The 'Username Suffix' field contains '@zer0k.onmicrosoft.com'.

4. Test the connection, if it is successful go to the groups tab and select the **podX-vpn-users** group you created earlier.

- In order to use groups in policy they need to be selected here in the ROPC connection. Click in the drop down to select the group you created in earlier steps. You only have to hit the Load Button once to get groups to populate into the dropdown.



- Save the connection.

Step 5: Configure ISE Policy for VPN Authentication

- Go to the ISE menu -> Policy -> Policy Sets and select the "+" in the top left to add a new policy set.
- Give the policy set a name of "PodX-VPN-Policy" where X is your pod number, and select "Default Network Access" under Allowed Protocols / Server Sequence.

A screenshot of a table titled 'Policy Sets'. The columns are 'Status', 'Policy Set Name', 'Description', 'Conditions', and 'Allowed Protocols / Server Sequence'. A search bar at the top says 'Search'. A new row is being added with a green checkmark, 'Pod4-VPN-Policy', and '+'. Under 'Allowed Protocols / Server Sequence', 'Default Network Access' is selected.

- Click the "+" under conditions which will launch the conditions studio.
- The network device and network device group were created by the initial configuration ansible scripts. They will be used here to match authentication from the VPN headend.
 - "click to add an attribute" and use the "network device" filter icon:

Conditions Studio

A screenshot of the 'Conditions Studio'. It has two tabs: 'Library' and 'Editor'. The 'Library' tab shows a sidebar with icons for location, network, and user. The 'Editor' tab shows a 'Click to add an attribute' input field and a 'Select attribute for condition' dialog. The dialog lists attributes like 'Dictionary', 'Attribute', 'ID', and 'Info'. It shows 'All Dictionaries' selected for 'Dictionary', 'Attribute' selected for 'Attribute', and 'ID' selected for 'ID'. Below this, it shows 'DEVICE' selected for 'Dictionary' and 'Device Type' for 'Attribute'.

- Choose Device: Device Type and choose the "All Device Types" device type with the equals operator. The save button will allow you to save the condition for later, in this case choose "Use" at the bottom of the page to use it now.

Editor

The screenshot shows the Cisco Editor interface with a policy condition configuration. The condition is set to 'DEVICE-Device Type' with the operator 'Equals' and the value 'All Device Types'. There is also an option to 'Set to 'Is not''. Below the condition, there are buttons for 'NEW', 'AND', and 'OR'. A dashed line indicates the start of a new condition block.

5. Save the policy sets.
6. Click the “View” arrow on the right side of the policy set line to enter the policy set configuration.
7. Expand “Authentication Policy” and set the default entry to what you named your ROPC connection (zer0k_azure).

The screenshot shows the Authentication Policy configuration. The 'Default' entry is selected, indicated by a green checkmark. The entry name is 'zer0k_azure'. There is a 'Options' button to the right.

8. Expand “Authorization Policy” and click the “+” on the top of the authorization policy list to add a new entry, this entry will be used to match the group created on Azure and permit access to the VPN.
 - Name the rule “VPN Authorization” then click the + under conditions to launch the condition studio and create a new condition.
 - Click “click to add an attribute” and select the groups icon to filter the attributes:

 - Choose your ROPC connection name: External Groups and then select the group you have added your user to in Azure.

Conditions Studio

Library

Search by Name

- BYOD_is_Registered
- Catalyst_Switch_Local_Web_Authentication
- Compliance_Unknown_Devices
- Compliant_Devices
- EAP-MSCHAPv2
- EAP-TLS
- Guest_Flow

Editor

Click to add an attribute

Select attribute for condition

Dictionary	Attribute	ID
All Dictionaries	Attribute	ID
CWA	CWA_ExternalGroups	
IdentityGroup	Description	
IdentityGroup	Name	
InternalUser	IdentityGroup	
PassiveID	PassiveID_Groups	
zer0k_azure	ExternalGroups	

- Leave the default as equals and choose use at the bottom of the screen to use the newly created condition.

9. Back on the Policy Set page set the Result to “Permit Access” then save.

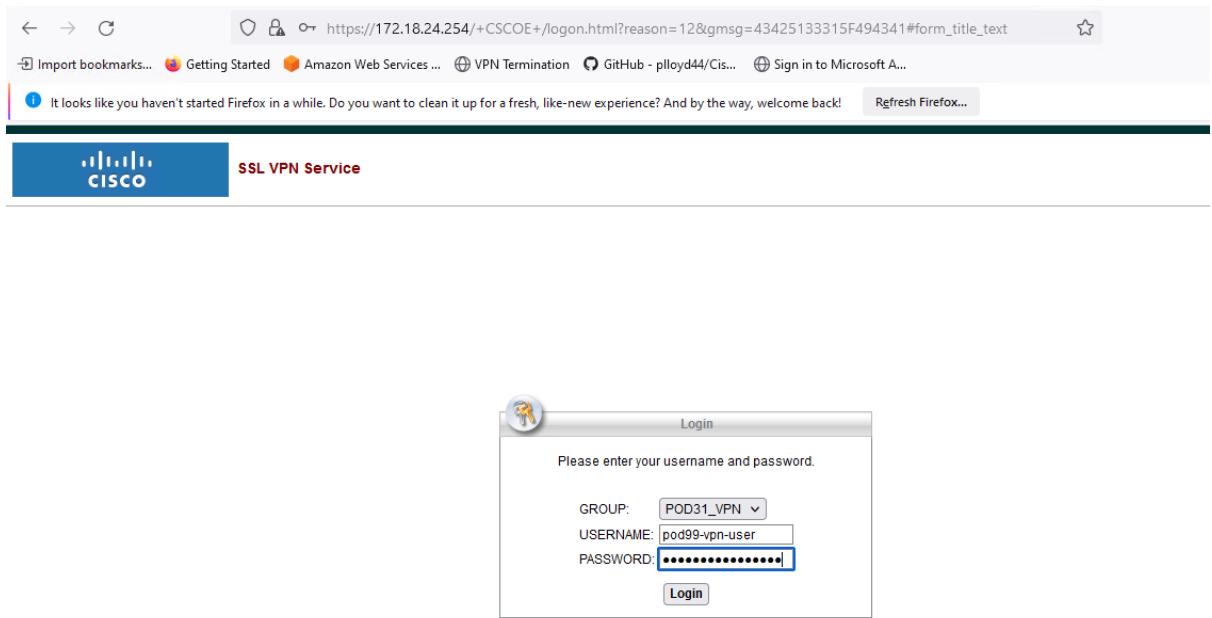
VPN Users AND zer0k_azure-ExternalGroups EQUALS pod0_users → PermitAccess → Select from list

Task 7: Test VPN Authentication

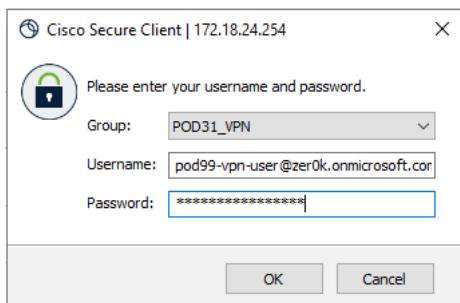
Step 1: Test VPN Authentication

- On your Windows Provisioning Machine, browse to <https://172.18.24.254>, accept any certificate errors that are presented.
 - Choose your pod number from the drop down (If authentication fails the dropdown is reset every time).
 - Log in using the Azure user previously created. The username should be **podX-vpn-user** where X is your assigned pod number.

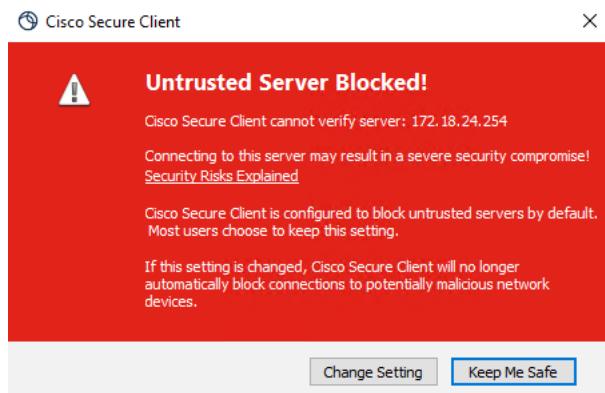
If you did not populate the user suffix in previous steps, you may need to add @zer0k.onmicrosoft.com

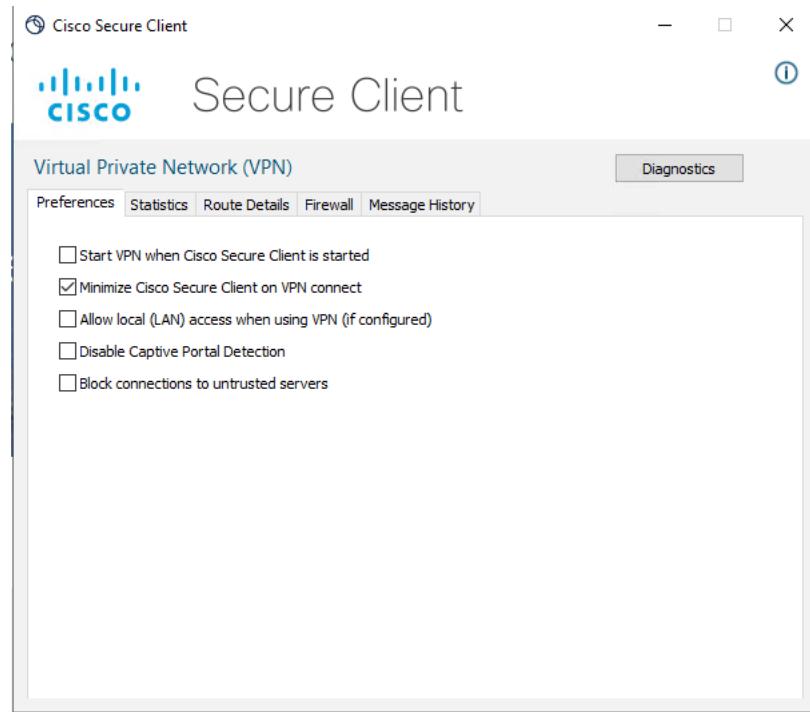


2. You will be prompted to install AnyConnect, complete the installation, accepting any errors which occur such as version or executable warnings.
3. When the install completes, launch AnyConnect from the Windows start menu and connect to 172.18.24.254. You will be prompted for the pod number and the same username/password (**podxx-vpn-user**).



4. You will get a Certificate warning - Click change settings -> De-Select Block connections to untrusted servers, Connect again -> Connect anyway.





5. After successfully connecting you should be able to ping the super secret linux server at 172.18.16.10.
6. On ISE, browse to the ISE Menu -> Operations -> Radius -> Live Logs. Here you can see the authentication attempts and successful authentications to the VPN.

Status	Details	Repea...	Identity	Endpoint ID	Endpoint...	Authenti...	Authoriz...	Authoriz...
▼		0	Identity	Endpoint ID	Endpoint Pr	Authenticat	Authorizati	Authorizati
①	0	0	pod99-vpn-user@zer0k.onmicrosoft.com	02:FE:3C:44:20:2F	Windows1...	Pod31-vp...	Pod31-vp...	PermitAcc...

7. Click the details icon on one of the successful authentications where you can see the attributes available on the authentication and the steps ISE took to authenticate the user.

Overview		Steps		
		Step ID	Description	Latency (ms)
Event	5200 Authentication succeeded	11001	Received RADIUS Access-Request	
Username	pod99-vpn-user@zer0k.onmicrosoft.com	11017	RADIUS created a new session	0
Endpoint Id	02:FE:3C:44:20:2F ⊕	15049	Evaluating Policy Group	0
Endpoint Profile		15008	Evaluating Service Selection Policy	0
Authentication Policy	Pod31-vpn-policy >> Default	15048	Queried PIP - DEVICE.Device Type	4
Authorization Policy	Pod31-vpn-policy >> VPN Authorization	15041	Evaluating Identity Policy	7
Authorization Result	PermitAccess	15013	Selected Identity Source - zer0k_Azure	2
		25103	Perform plain text password authentication in external REST ID store server - zer0k_Azure	0
		25100	Connecting to external REST ID store server - zer0k_Azure	36
		25101	Successfully connected to external REST ID store server - zer0k_Azure	240
		25104	Plain text password authentication in external REST ID store server succeeded - zer0k_Azure	0
		25107	REST ID store server respond with groups - zer0k_Azure	0
		25110	User groups inserted to session cache - zer0k_Azure	1
		22037	Authentication Passed	0
		24715	ISE has not confirmed locally previous successful machine authentication for user in Active Directory	0
		15036	Evaluating Authorization Policy	0
		24209	Looking up Endpoint in Internal Endpoints IDStore - pod99-vpn-user@zer0k.onmicrosoft.com	1
		24217	The host is not found in the internal endpoints identity store	16
		15016	Selected Authorization Profile - PermitAccess	9
		22001	***	^

Authentication Details	
Source Timestamp	2024-01-26 13:59:24.228
Received Timestamp	2024-01-26 13:59:24.228
Policy Server	pod31-ise1
Event	5200 Authentication succeeded
Username	pod99-vpn-user@zer0k.onmicrosoft.com
Endpoint Id	02:FE:3C:44:20:2F
Calling Station Id	172.18.26.31
Authentication Identity Store	zer0k_Azure

Task 8: (Bonus) Deploy Secondary ISE through AWS Marketplace from CloudFormation Template

Step 1: Subscribe to ISE in AWS Marketplace

1. Navigate to <https://zer0k.signin.aws.amazon.com/console> Use Account ID zer0k if not already populated. Login with the username assigned to your pod in table 1-1 above (**podX-awsadmin**). The password for the account **is provided by your proctor**.



Sign in as IAM user

Account ID (12 digits) or account alias

zer0k

IAM user name

pod13-awsadmin

Password

••••••••••••|

Remember this account

Sign in

[Sign in using root user email](#)

[Forgot password?](#)

2. In the AWS console search for AWS Marketplace Subscriptions.
3. Go to Discover Products on the left menu.
4. Search for ISE and click on Cisco Identity Services Engine (ISE).

Search AWS Marketplace products

cisco identity services engine

cisco identity services engine (5 results) showing 1 - 5



[Cisco Identity Services Engine \(ISE\)](#)

By [Cisco Systems, Inc.](#) | Ver 3.3.0

[10 external reviews](#)

Cisco Identity Services Engine (ISE) on AWS enables Network Access Control (NAC) service workloads on AWS, you can unify the policy management of your...

5. Click on “Continue to Subscribe” on the top right

The screenshot shows the product page for Cisco Identity Services Engine (ISE) on AWS Marketplace. At the top, there's a yellow button labeled "Continue to Subscribe". Below it are three buttons: "Request a private offer", "Save to List", and a link to "View Details". The main content area includes the Cisco logo, the product name "Cisco Identity Services Engine (ISE)", a brief description, and a "Show more" link. It also displays the provider "Cisco Systems, Inc." and the latest version "3.3.0". Below this, there's a rating section with 5 stars and 0 reviews, followed by a "BYOL" link. On the right side, there's a "Typical Total Price" section showing "\$0.68/hr" with a note about total pricing per instance.

6. Click on Continue to Configuration.
7. Under fulfilment option, select “CloudFormation Template”.

The screenshot shows the configuration page for Cisco Identity Services Engine (ISE). At the top, there's a header with the Cisco logo and the product name "Cisco Identity Services Engine (ISE)". Below the header, there are links for "Product Detail", "Subscribe", and "Configure". The main section is titled "Configure this software" and contains the instruction "Choose a fulfillment option and software version to launch this software." On the left, there's a dropdown menu labeled "Fulfillment option" with the placeholder "Select a fulfillment option". A dropdown arrow is shown above the menu. To the right, there are two options: "Amazon Machine Image" and "CloudFormation Template". The "CloudFormation Template" option is highlighted with a gray background.

8. A new drop down will be displayed, select Cisco Identity Services Engine (ISE).
9. 2 new drop downs will be presented, select 3.3.0 (July 09, 2023) and select the Region as US East (Ohio). If you don't use 3.3.0 you won't be able to join the node created by ansible earlier.
10. Click Continue to Launch on the top right.
11. Under Choose Action, select “Launch CloudFormation”, then select the Launch button.



Cisco Identity Services Engine (ISE)

[< Product Detail](#) [Subscribe](#) [Configure](#) [Launch](#)

Launch this software

Review the launch configuration details and follow the instructions to launch this software.

Configuration details

Fulfillment option	Cisco Identity Services Engine (ISE) Cisco Identity Services Engine (ISE) <i>running on c5.4xlarge</i>
Software version	3.3.0
Region	US East (Ohio)

[Usage instructions](#)

Choose Action

[Launch CloudFormation](#)

Choose this action to launch your configuration through the AWS CloudFormation console.

[Launch](#)

Step 2: CloudFormation Stack Creation

Marketplace will launch a new tab for CloudFormation with a link to the publicly available CloudFormation Template uploaded to S3.

1. Copy the Amazon S3 URL and open it in a new tab/browser and save it to your local machine. This can be used later directly in CloudFormation rather than going through the subscription as another option. This lab will not use this method unless initial Cloud Formation fails.

The screenshot shows the AWS CloudFormation 'Create stack' wizard. The current step is 'Step 2: Specify stack details'. Under 'Prerequisite - Prepare template', the 'Template is ready' option is selected, and the 'Amazon S3 URL' field contains the URL <https://s3.amazonaws.com/awsmp-fulfillment-cf-templates-prod/bedef662-aba4-427e-b523-7c93cd50111c.fdc8e997-b533-4691-866e-58856e94aa8e.template>. The 'Use a sample template' option is also available.

2. With the “Template is ready” option selected, and the Amazon S3 URL still populated, click Next.
3. The template includes all the provisioning information needed to launch an ISE instance. Fill out all the fields:
 - a. Stack Name – Since this is a single instance set this to the hostname podX-ise2 where X is your pod number.
 - b. Hostname – podX-ise2 where X is your pod number.
 - c. Instance Key Pair – Select the key pair you created in Task 1 and have already saved to your local machine.
 - d. Management Security Group – ISEinAWS-podX where X is your assigned pod number. This was created in the Ansible ISE deployment steps.
 - e. Management Network – Select the subnet in the new VPC created in Task 3, it should be zer0k_podX_Private_Subnet where X is your assigned pod number.
 - f. Management Private IP – Given in the Table above as configured in Route53. It will be 10.X.0.6 where X is your assigned pod number.
 - g. Time Zone – Etc/UTC
 - h. Instance Type – C5.4xlarge
 - i. EBS Encryption – false
 - j. Volume Size – 600
 - k. DNS Domain – zer0k.org
 - l. Name Server – 10.X.0.2 where X is the number of your assigned pod.
 - m. NTP Server - 169.254.169.123
 - n. ERS – yes
 - o. OpenAPI – yes
 - p. pxGrid – no
 - q. pxGrid Cloud – no
 - r. Password – **Provided by your proctor**

Step 1
[Create stack](#)Step 2
Specify stack detailsStep 3
Configure stack optionsStep 4
Review pod31-ise2

Specify stack details

Provide a stack name

Stack name

pod31-ise2

Stack name can include letters (A-Z and a-z), numbers (0-9), and dashes (-).

Parameters

Parameters are defined in your template and allow you to input custom values when you

Instance Details

Hostname

Enter the hostname. This field only supports alphanumeric characters and hyphen (-). Th

pod31-ise2

Instance Key Pair

To access the Cisco ISE instance via SSH, choose the PEM file that you created in AWS for

pod31-keypair-20240126

Management Security Group

Choose the Security Group to attach to the Cisco ISE interface. Create a Security Group in

Select List<AWS::EC2::SecurityGroup::Id>

sg-076adef5f3e88a94b X

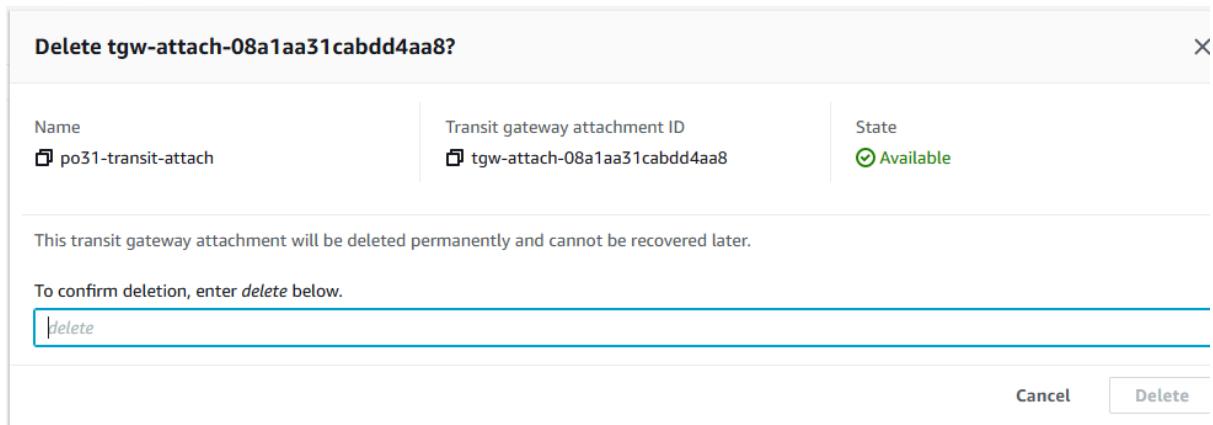
4. Click Next.
5. Under Tags add a Key “Name” with value “podX-ise2” where X is the number of your pod. CloudFormation is going to add an instance, EBS volume, and network interface that will all get named via this tag.
6. Under Tags, add a tag. Enter “Project Name” under Key and “ISEinAWS-podX” under value, where X is your pod number.
7. Leave the rest of the options default though you are welcome to browse through them to see the options AWS provides. Click Next when you are done.
8. Review the information to make sure you entered everything correctly, then click “Submit” at the bottom of the page.
9. Under events you should see “CREATE_IN_PROGRESS”, refresh the table until you see podX-ise2 with “CREATE_COMPLETE”.

Timestamp	Logical ID	Status	Status reason
2022-05-09 16:44:06 UTC-0400	pod0-ise	CREATE_COMPLETE	-
2022-05-09 16:44:04 UTC-0400	IseEc2Instance	CREATE_COMPLETE	-
2022-05-09 16:43:57 UTC-0400	IseEc2Instance	CREATE_IN_PROGRESS	Resource creation Initiated
2022-05-09 16:43:55 UTC-0400	IseEc2Instance	CREATE_IN_PROGRESS	-
2022-05-09 16:43:49 UTC-0400	pod0-ise	CREATE_IN_PROGRESS	User Initiated

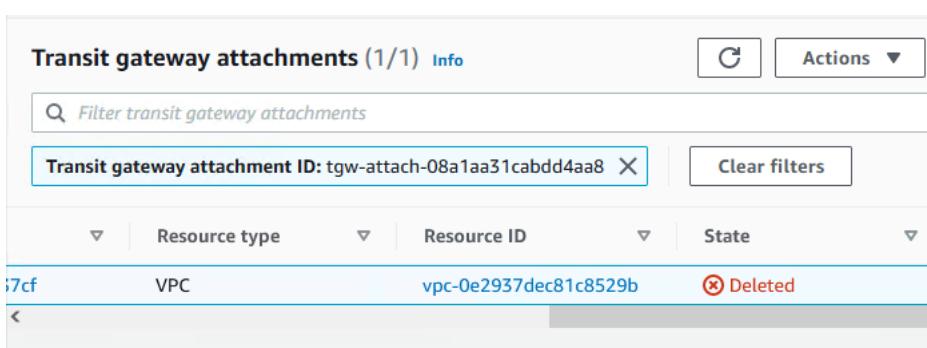
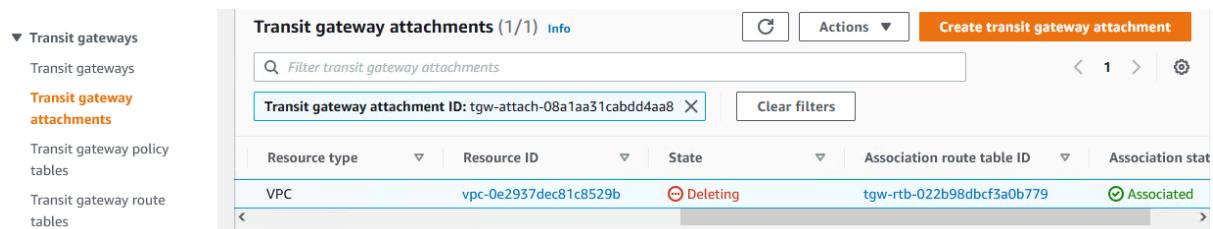
Task 9: (Bonus) Clean Up

Step 1: Detach Transit Gateway Attachment

1. If you are finished with your lab and have no further questions, a built in clean up script can help the lab proctors clean up. Navigate to the VPC service via the search bar.
2. Click Transit Gateway attachments and delete the transit gateway attachment associated with your pod. It should be named “pod<x>-transit-attach”, where X is your pod number.



3. Wait until the state of the transit gateway is “Deleted”



4. Run the command “`ansible-playbook ise_in_aws.terminate.yaml`”. Press Enter when prompted for the Project Name.

Expected Output:

```
(ISEonAWS):~/CiscoLive_ISE_in_AWS$ ansible-playbook ise_in_aws.terminate.yaml
```

```
[WARNING]: No inventory was parsed, only implicit localhost is available
```

[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'

[WARNING]: While constructing a mapping from
/home/ubuntu/CiscoLive_ISE_in_AWS/vars/main.yaml, line 3, column 1, found a duplicate dict
key (ise_verify). Using last defined value only.

Project Name [ISEinAWS-pod31]:

PLAY [Terminate AWS EC2 Instances for Project "ISEinAWS-pod31"]

TASK [Gathering Facts]

ok: [localhost]

TASK [Get all EC2 Instances with tag project:"ISEinAWS-pod31"]

ok: [localhost]

TASK [Delete all EC2 instances with tag project:"ISEinAWS-pod31"] *****

ok: [localhost]

TASK [Get all VPCs with tag project:"ISEinAWS-pod31"] *****

ok: [localhost]

TASK [Show vpcs] *****

ok: [localhost] =>

vpcs:

changed: false

CISCO Live! failed: false

```
vpcs:  
  - cidr_block: 10.31.0.0/16  
  
    cidr_block_association_set:  
      - association_id: vpc-cidr-assoc-0344c48663b0993ae  
  
        cidr_block: 10.31.0.0/16  
  
        cidr_block_state:  
          state: associated  
  
        classic_link_dns_supported: false  
  
        classic_link_enabled: false  
  
        dhcp_options_id: dopt-086ed054b34c26c91  
  
        enable_dns_hostnames: true  
  
        enable_dns_support: true  
  
        id: vpc-0e2937dec81c8529b  
  
        instance_tenancy: default  
  
        is_default: false  
  
        owner_id: '423620453332'  
  
        state: available  
  
        tags:  
          Name: ISEinAWS-pod31  
  
          project: ISEinAWS-pod31  
  
          start_date: '2023-01-26'  
  
        vpc_id: vpc-0e2937dec81c8529b
```

TASK [Find Dangling ENIs in the VPC] *****

ok: [localhost]

TASK [Show enis] *****

ok: [localhost] =>

enis:

```
changed: false  
failed: false  
network_interfaces: []
```

```
TASK [Delete all dangling ENIs] ****  
skipping: [localhost]
```

```
TASK [Get All Subnets with tag project:"ISEinAWS-pod31"] ****  
ok: [localhost]
```

```
TASK [Show subnets] ****
```

```
ok: [localhost] =>
```

```
subnets:
```

```
changed: false
```

```
failed: false
```

```
subnets:
```

```
- assign_ipv6_address_on_creation: false
```

```
availability_zone: us-east-2b
```

```
availability_zone_id: use2-az2
```

```
available_ip_address_count: 251
```

```
cidr_block: 10.31.0.0/24
```

```
default_for_az: false
```

```
enable_dns64: false
```

```
id: subnet-02fc0659508f6a720
```

```
ipv6_cidr_block_association_set: []
```

```
ipv6_native: false
```

```
map_customer_owned_ip_on_launch: false
```

```
map_public_ip_on_launch: false
```

```
owner_id: '423620453332'
```

```

private_dns_name_options_on_launch:

enable_resource_name_dns_a_record: false

enable_resource_name_dns_aaaa_record: false

hostname_type: ip-name

state: available

subnet_arn: arn:aws:ec2:us-east-2:423620453332:subnet/subnet-02fc0659508f6a720

subnet_id: subnet-02fc0659508f6a720

tags:

Name: zer0k_pod31_Private_Subnet

project: ISEinAWS-pod31

start_date: '2023-01-26'

vpc_id: vpc-0e2937dec81c8529b

```

TASK [Delete Subnets] *****

```

changed: [localhost] => (item={'availability_zone': 'us-east-2b', 'availability_zone_id': 'use2-az2',
'available_ip_address_count': 251, 'cidr_block': '10.31.0.0/24', 'default_for_az': False,
'map_public_ip_on_launch': False, 'map_customer_owned_ip_on_launch': False, 'state':
'available', 'subnet_id': 'subnet-02fc0659508f6a720', 'vpc_id': 'vpc-0e2937dec81c8529b',
'owner_id': '423620453332', 'assign_ipv6_address_on_creation': False,
'ipv6_cidr_block_association_set': [], 'tags': {'Name': 'zer0k_pod31_Private_Subnet', 'project':
'ISEinAWS-pod31', 'start_date': '2023-01-26'}, 'subnet_arn': 'arn:aws:ec2:us-east-
2:423620453332:subnet/subnet-02fc0659508f6a720', 'enable_dns64': False, 'ipv6_native': False,
'private_dns_name_options_on_launch': {'hostname_type': 'ip-name',
'enable_resource_name_dns_a_record': False, 'enable_resource_name_dns_aaaa_record': False},
'id': 'subnet-02fc0659508f6a720'})

```

TASK [Get All Route Tables with tag project:"ISEinAWS-pod31"] *****

ok: [localhost]

TASK [Show rts] *****

ok: [localhost] =>

rts:



```

changed: false

failed: false

route_tables:

- associations: []

id: rtb-03ac2a38ecabcd75a

owner_id: '423620453332'

propagating_vgws: []

route_table_id: rtb-03ac2a38ecabcd75a

routes:

- destination_cidr_block: 10.31.0.0/16

gateway_id: local

instance_id: null

interface_id: null

network_interface_id: null

origin: CreateRouteTable

state: active

tags:

Name: zer0k_pod31_RT_Private

project: ISEinAWS-pod31

start_date: '2023-01-26'

vpc_id: vpc-0e2937dec81c8529b

```

TASK [Delete Route Table] ****

```

changed: [localhost] => (item={'associations': [], 'propagating_vgws': [], 'route_table_id': 'rtb-03ac2a38ecabcd75a', 'routes': [{'destination_cidr_block': '10.31.0.0/16', 'gateway_id': 'local', 'origin': 'CreateRouteTable', 'state': 'active', 'instance_id': None, 'network_interface_id': None, 'interface_id': None}], 'vpc_id': 'vpc-0e2937dec81c8529b', 'owner_id': '423620453332', 'tags': {'project': 'ISEinAWS-pod31', 'Name': 'zer0k_pod31_RT_Private', 'start_date': '2023-01-26'}, 'id': 'rtb-03ac2a38ecabcd75a'})

```

TASK [Get All Internet Gateways with tag project:"ISEinAWS-pod31"] *****

ok: [localhost]

TASK [Show igws] *****

ok: [localhost] =>

igws:

changed: false

failed: false

internet_gateways: []

TASK [Delete Internet Gateway] *****

ok: [localhost] => (item={'cidr_block': '10.31.0.0/16', 'dhcp_options_id': 'dopt-086ed054b34c26c91', 'state': 'available', 'vpc_id': 'vpc-0e2937dec81c8529b', 'owner_id': '423620453332', 'instance_tenancy': 'default', 'cidr_block_association_set': [{'association_id': 'vpc-cidr-assoc-0344c48663b0993ae', 'cidr_block': '10.31.0.0/16', 'cidr_block_state': {'state': 'associated'}}, 'is_default': False, 'tags': {'start_date': '2023-01-26', 'project': 'ISEinAWS-pod31', 'Name': 'ISEinAWS-pod31'}, 'classic_link_enabled': False, 'classic_link_dns_supported': False, 'enable_dns_support': True, 'enable_dns_hostnames': True, 'id': 'vpc-0e2937dec81c8529b'})

TASK [Get all Security Groups with tag project:"ISEinAWS-pod31"] *****

ok: [localhost]

TASK [Show sgs] *****

ok: [localhost] =>

sgs:

changed: false

failed: false

security_groups:

- description: zer0k_pod31_SG-ISE

group_id: sg-0e2ec6c057793b79e

group_name: zer0k_pod31_SG-ISE

```
ip_permissions:  
  - ip_protocol: '-1'  
  
  ip_ranges:  
    - cidr_ip: 10.31.0.0/16  
  
      description: Allow all traffic within VPC  
  
    - cidr_ip: 172.16.0.0/12  
  
      description: Allow all traffic from on-premises  
  
  ipv6_ranges: []  
  
  prefix_list_ids: []  
  
  user_id_group_pairs: []  
  
  - from_port: 22  
  
    ip_protocol: tcp  
  
    ip_ranges:  
      - cidr_ip: 0.0.0.0/0  
  
        description: Allow SSH from anywhere  
  
    ipv6_ranges: []  
  
    prefix_list_ids: []  
  
    to_port: 22  
  
    user_id_group_pairs: []  
  
ip_permissions_egress:  
  - ip_protocol: '-1'  
  
  ip_ranges:  
    - cidr_ip: 0.0.0.0/0  
  
      description: Allow All  
  
  ipv6_ranges: []  
  
  prefix_list_ids: []  
  
  user_id_group_pairs: []
```

owner_id: '423620453332'

tags:

Name: ISEinAWS-pod31

project: ISEinAWS-pod31

vpc_id: vpc-0e2937dec81c8529b

TASK [Delete Security Groups in VPC] *****

```
changed: [localhost] => (item={'description': 'zer0k_pod31_SG-ISE', 'group_name': 'zer0k_pod31_SG-ISE', 'ip_permissions': [{'ip_protocol': '-1', 'ip_ranges': [{'cidr_ip': '10.31.0.0/16', 'description': 'Allow all traffic within VPC'}, {'cidr_ip': '172.16.0.0/12', 'description': 'Allow all traffic from on-premises'}], 'ipv6_ranges': [], 'prefix_list_ids': [], 'user_id_group_pairs': []}, {'from_port': 22, 'ip_protocol': 'tcp', 'ip_ranges': [{'cidr_ip': '0.0.0.0/0', 'description': 'Allow SSH from anywhere'}], 'ipv6_ranges': [], 'prefix_list_ids': [], 'to_port': 22, 'user_id_group_pairs': []}], 'owner_id': '423620453332', 'group_id': 'sg-0e2ec6c057793b79e', 'ip_permissions_egress': [{"ip_protocol": "-1", "ip_ranges": [{"cidr_ip": "0.0.0.0/0", "description": "Allow All"}]}, {"ip_protocol": "-1", "ip_ranges": [{"cidr_ip": "0.0.0.0/0", "description": "Allow All"}]}], 'prefix_list_ids': [], 'user_id_group_pairs': []}, 'tags': {'Name': 'ISEinAWS-pod31', 'project': 'ISEinAWS-pod31'}, 'vpc_id': 'vpc-0e2937dec81c8529b'})
```

TASK [Delete VPCs with tag project:"ISEinAWS-pod31"] *****

```
changed: [localhost] => (item={'cidr_block': '10.31.0.0/16', 'dhcp_options_id': 'dopt-086ed054b34c26c91', 'state': 'available', 'vpc_id': 'vpc-0e2937dec81c8529b', 'owner_id': '423620453332', 'instance_tenancy': 'default', 'cidr_block_association_set': [{"association_id": "vpc-cidr-assoc-0344c48663b0993ae", "cidr_block": '10.31.0.0/16', "cidr_block_state": {"state": "associated"}}], 'is_default': False, 'tags': {'start_date': '2023-01-26', 'project': 'ISEinAWS-pod31', 'Name': 'ISEinAWS-pod31'}, 'classic_link_enabled': False, 'classic_link_dns_supported': False, 'enable_dns_support': True, 'enable_dns_hostnames': True, 'id': 'vpc-0e2937dec81c8529b'})
```

TASK [Delete ISEinAWS-pod31 by Name] *****

ok: [localhost]

TASK [Delete ~/ssh/ISEinAWS-pod31.pem] *****

ok: [localhost]

PLAY RECAP *****

```
localhost : ok=23  changed=4  unreachable=0  failed=0  skipped=1  rescued=0  
ignored=0
```

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