

Task 8.1p

Task 1: Deploying a Networking Layer

Steps:

1. Download the **lab-network.yaml** template (defines VPC + public subnet).
2. Open **CloudFormation** → Create Stack → Upload the template.
3. Add Tag:
 - Key: application
 - Value: inventory.
4. Deploy and wait for **CREATE_COMPLETE** status.
5. Check:
 - **Resources Tab:** View created VPC and subnet.
 - **Outputs Tab:** View exported values like VPC ID and Subnet ID (used in next task)

The screenshot shows the AWS CloudFormation console interface. On the left, there's a navigation sidebar with options like 'CloudFormation', 'Stacks', 'Exports', 'Infrastructure Composer', 'IaC generator', 'Hooks overview', 'Hooks', 'Registry', 'Public extensions', 'Activated extensions', 'Publisher', and 'Spotlight'. The main area is titled 'Stacks (1)' and displays a table with one row. The table columns are 'Stack name', 'Status', 'Created time', and 'Description'. The single entry is 'c144539a373692710102869t1w21190' with a status of 'CREATE_COMPLETE', created on '2025-04-26 03:24:24 UTC+1000', and a description 'new bucket'. At the top right of the main area, there are buttons for 'Delete', 'Update stack', 'Stack actions', and 'Create stack'. Below the table, there are filters for 'Filter by stack name' and 'Filter status' (set to 'Active'). The bottom of the screen shows the Windows taskbar with various icons and the date/time '26-04-2025 03:27'.

Screenshot of the AWS CloudFormation 'Create stack' wizard Step 1: Prerequisite - Prepare template.

The 'Choose an existing template' option is selected. The URL `https://` is entered into the 'Amazon S3 URL' field.

Screenshot of the AWS CloudFormation 'Create stack' wizard Step 1: Prerequisite - Prepare template.

The 'Choose an existing template' option is selected. The file `lab-network.yaml` is uploaded from the local file system.

Screenshot of the AWS CloudFormation 'Create stack' wizard Step 2: Specify stack details.

Specify stack details

Provide a stack name

Stack name: lab-network

Stack name must contain only letters (a-z, A-Z), numbers (0-9), and hyphens (-) and start with a letter. Max 128 characters. Character count: 11/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

No parameters

There are no parameters defined in your template

Buttons: Cancel, Previous, Next

Screenshot of the AWS CloudFormation 'Create stack' wizard Step 3: Configure stack options.

Configure stack options

Tags - optional

Tags (key-value pairs) are used to apply metadata to AWS resources, which can help in organizing, identifying, and categorizing those resources. You can add up to 50 unique tags for each stack.

Key: application

Value - Tags - optional: inventory

Add new tag

You can add 49 more tag(s)

Permissions - optional

Specify an existing AWS Identity and Access Management (IAM) service role that CloudFormation can assume.

IAM role - optional

Choose the IAM role for CloudFormation to use for all operations performed on the stack.

IAM role name: Sample-role-name

Buttons: Remove, Create

Stack failure options

The screenshot shows the AWS CloudFormation console with the 'lab-network' stack selected. The left sidebar includes links for Stack details, Drifts, StackSets, Exports, Infrastructure Composer, and Registry. The main area displays the 'Stacks' section with two stacks: 'lab-network' (status: CREATE_IN_PROGRESS) and another unnamed stack (status: CREATE_COMPLETE). The 'Events' tab is active, showing one event: 'CREATE_IN_PROGRESS' at 2025-04-26 03:32:23 UTC+1000. The 'Stack info' tab is also visible.

This screenshot is identical to the one above, but the 'Stack info' tab is now expanded. It provides detailed information about the stack, including:

- Stack ID:** arn:aws:cloudformation:us-east-1:211906116156:stack/lab-network/3fc2e310-21fb-11f0-a928-0ed181aeef3bf
- Description:** Network Template: Sample template that creates a VPC with DNS and public IPs enabled.
- Status:** CREATE_COMPLETE
- Detailed status:** -
- Status reason:** User Initiated
- Root stack:** -
- Created time:** 2025-04-26 03:32:23 UTC+1000
- Updated time:** -
- Deleted time:** -
- Drift status:** NOT_CHECKED

Screenshot of the AWS CloudFormation console showing the 'lab-network' stack details.

Stacks (2)

- lab-network** (Active) - CREATE_COMPLETE
- 2025-04-26 03:32:23 UTC+1000
c144539a3736927110102869t1w21
1906116156
- 2025-04-26 03:24:24 UTC+1000
CREATE_COMPLETE

Resources (8)

Logical ID	Physical ID	Type	Status
InternetGateway	igw-0936b907bceafeabf	AWS::EC2::InternetGateway	CREATE_COMPLETE
PublicRoute	rtb-036cc6c734d093d04 0.0/0.0/0	AWS::EC2::Route	CREATE_COMPLETE
PublicRouteTable	rtb-036cc6c734d093d04	AWS::EC2::RouteTable	CREATE_COMPLETE
PublicSubnet	subnet-07dac707fac6d344b	AWS::EC2::Subnet	CREATE_COMPLETE
PublicSubnetNetworkAclAssociation	aclassoc-0dd729300a18ebabf	AWS::EC2::SubnetNetworkAclAssociation	CREATE_COMPLETE

Screenshot of the AWS CloudFormation console showing the 'lab-network' stack events.

Events (28)

Timestamp	Logical ID	Status	Detailed status
2025-04-26 03:33:04 UTC+1000	lab-network	CREATE_COMPLETE	-
2025-04-26 03:33:03 UTC+1000	PublicSubnetNetworkAclAssociation	CREATE_COMPLETE	-
2025-04-26 03:32:54 UTC+1000	PublicRoute	CREATE_COMPLETE	-
2025-04-26 03:32:53 UTC+1000	PublicRoute	CREATE_IN_PROGRESS	-

Outputs (2)

Key	Value	Description	Export name
PublicSubnet	subnet-07dac70fac6d344b	The subnet ID to use for public web servers	lab-network-SubnetID
VPC	vpc-0e87c0afc2ce9748	VPC ID	lab-network-VPCID

Template

```

AWSTemplateFormatVersion: 2010-09-09
Description: >
  Network Template: Sample template that creates a VPC with DNS and public IPs enabled.

# This template creates:
#   VPC
#   Internet Gateway
#   Public Route Table
#   Public Subnet

#####
# Resources section
#####

Resources:

## VPC

```

Task 2: Deploying an Application Layer

Steps:

1. Download the **lab-application.yaml** template.
2. Create a new stack → Upload the template.
3. Specify NetworkStackName = lab-network (to use outputs from Task 1).
4. Add same Tag (application = inventory).
5. Wait for **CREATE_COMPLETE**.
6. Check:

- **Outputs Tab:** Copy the application URL → Open in browser to verify the EC2 web server.

Key Concept:

Cross-stack reference — Application stack uses values (like VPC ID, Subnet ID) from the network stack.

The screenshot shows the 'Create stack' wizard in the AWS CloudFormation console. The left sidebar shows navigation links for Stacks, StackSets, Exports, Infrastructure Composer, IaC generator, Hooks overview, and Registry. The main panel is titled 'Create stack' and is currently on 'Prerequisite - Prepare template'. It displays three options: 'Choose an existing template' (selected), 'Build from Infrastructure Composer', and 'Sync from Git'. Below these options, there's a section for 'Specify template' with a sample GitHub repository link. The status bar at the bottom indicates the user is in the United States (N. Virginia) region, has a session ID, and the date is 26-04-2025.

The screenshot shows the 'Specify template' step of the 'Create stack' wizard. The 'Amazon S3 URL' field contains a sample URL. The 'Upload a template file' field shows a selected file named 'lab-application.yaml'. The status bar at the bottom indicates the user is in the United States (N. Virginia) region, has a session ID, and the date is 26-04-2025.

The screenshot shows the 'Specify template' step of the 'Create stack' wizard. The 'Upload a template file' field shows the file 'lab-application.yaml' has been uploaded. The 'S3 URL' field shows the generated URL. The 'View in Infrastructure Composer' button is visible. At the bottom right, there are 'Cancel' and 'Next Step' buttons. The status bar at the bottom indicates the user is in the United States (N. Virginia) region, has a session ID, and the date is 26-04-2025.

CloudFormation - Create Stack

us-east-1.console.aws.amazon.com/cloudformation/home?region=us-east-1#/stacks/create

CloudFormation > Stacks > Create stack

Specify stack details

Provide a stack name

Stack name: lab-application

Stack name must contain only letters (a-z, A-Z), numbers (0-9), and hyphens (-) and start with a letter. Max 128 characters. Character count: 15/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

AmazonLinuxAMIID: /aws/service/ami-amazon-linux-latest/amzn2-ami-hvm-x86_64-gp2

NetworkStackName: Name of an active CloudFormation stack that contains the networking resources, such as the VPC and subnet that will be used in this stack.

lab-network

Cancel Previous Next

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CloudFormation - Create Stack

us-east-1.console.aws.amazon.com/cloudformation/home?region=us-east-1#/stacks/create

CloudFormation > Stacks > Create stack

Configure stack options

Tags - optional

Tags (key-value pairs) are used to apply metadata to AWS resources, which can help in organizing, identifying, and categorizing those resources. You can add up to 50 unique tags for each stack.

Key: application Value - Tags - optional: inventory

Add new tag Remove Use 'inventory'

You can add 49 more tag(s)

Permissions - optional

Specify an existing AWS Identity and Access Management (IAM) service role that CloudFormation can assume.

IAM role - optional

Choose the IAM role for CloudFormation to use for all operations performed on the stack.

IAM role name: Sample-role-name Remove

Stack failure options

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Congratulations, you have successfully launched the AWS CloudFormation sample.



Task 3: Updating a Stack

Steps:

1. Check current **inbound rules** (only HTTP allowed).
2. Download **lab-application2.yaml** (includes HTTPS rule).
3. Update the application stack:
 - o Choose **Replace current template** → Upload new file.
4. Review **Change Set Preview** (shows what resources will be modified).
5. Wait for **UPDATE_COMPLETE**.

6. Verify in EC2 → Security Groups → Inbound rules (now includes HTTPS rule).

Security Groups (1/3) Info

Name	Security group ID	Security group name	VPC ID	Description
-	sg-0dcf26d746b0678c1	default	vpc-0274468061026190d	default VPC secur
-	sg-094dbe5385bbe6de	default	vpc-0e87c0afc2ece9748	default VPC secur
Web Server Security ...	sg-076efc2e46e821290	lab-application-WebServerSecurityGrou...	vpc-0e87c0afc2ece9748	Enable HTTP ingre

sg-076efc2e46e821290 - lab-application-WebServerSecurityGroup-vEEos5ofaFUs

Inbound rules

Name	Security group rule ID	IP version	Type	Protocol	Port range
-	sgr-088b766b9b0334e56	IPv4	HTTP	TCP	80

Security Groups (1/3) Info

Name	Security group ID	Security group name	VPC ID	Description
-	sg-0dcf26d746b0678c1	default	vpc-0274468061026190d	default VPC secur
-	sg-094dbe5385bbe6de	default	vpc-0e87c0afc2ece9748	default VPC secur
Web Server Security ...	sg-076efc2e46e821290	lab-application-WebServerSecurityGrou...	vpc-0e87c0afc2ece9748	Enable HTTP ingre

sg-076efc2e46e821290 - lab-application-WebServerSecurityGroup-vEEos5ofaFUs

Inbound rules (1)

Name	Security group rule ID	IP version	Type	Protocol	Port range
-	sgr-088b766b9b0334e56	IPv4	HTTP	TCP	80

Screenshot of the AWS CloudFormation console showing the Stacks page.

The left sidebar shows:

- CloudFormation** (selected)
- Stacks**
 - Stack details
 - Drifts
 - StackSets
 - Exports
- Infrastructure Composer
- IaC generator
- Hooks overview
- Hooks
- Registry**
 - Public extensions
 - Activated extensions
 - Publisher
- Spotlight

The main content area displays the "Stacks (3)" table:

Stack name	Status	Created time	Description
lab-application	CREATE_COMPLETE	2025-04-26 03:39:24 UTC+1000	Application Template: Demonstrates how to reference resources from a different stack. This template provisions an EC2 instance in a VPC Subnet provisioned in a different stack.
lab-network	CREATE_COMPLETE	2025-04-26 03:32:23 UTC+1000	Network Template: Sample template that creates a VPC with DNS and public IPs enabled.
c144539a3736927110102869t1w21190_6116156	CREATE_COMPLETE	2025-04-26 03:24:24 UTC+1000	new bucket

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Screenshot of the AWS CloudFormation console showing the "Create change set" step.

The left sidebar shows:

- CloudFormation** (selected)
- Stacks**
 - Stack details** (selected)
 - Drifts
 - StackSets
 - Exports
- Infrastructure Composer
- IaC generator
- Hooks overview
- Hooks
- Registry**
 - Public extensions
 - Activated extensions
 - Publisher
- Spotlight

The main content area shows the "Configure change set options" step:

Step 4 Review lab-application

Prepare template
Every stack is based on a template. A template is a JSON or YAML file that contains configuration information about the AWS resources you want to include in the stack.

Use existing template
Proceed with the template you are already using for this stack.

Replace existing template
Replace your existing template with a new template.

Edit in Infrastructure Composer
Edit your template in a visual builder.

Specify template
This GitHub repository [contains sample CloudFormation templates that can help you get started on new infrastructure projects.](#) Learn more [\[?\]](#)

Template source
Selecting a template generates an Amazon S3 URL where it will be stored. A template is a JSON or YAML file that describes your stack's resources and properties.

Amazon S3 URL

Upload a template file

Upload a template file
[Choose file](#)
lab-application2.yaml

JSON or YAML formatted file

S3 URL: <https://s3.us-east-1.amazonaws.com/cf-templates-4e02hnckz7bn-us-east-1/2025-04-25T174558.8632ybg-lab-application2.yaml>
[View in Infrastructure Composer](#)

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Screenshot of the AWS CloudFormation console showing the details of a stack named "lab-application".

Stack Details:

- Change set ID:** arn:aws:cloudformation:us-east-1:211906116156:changeSet/lab-application-byo02gokzz-lmhxwhnfmhc/1d5b10d-e347-4152-a575-149b5f9021fa
- Created time:** 2025-04-26 03:47:46 UTC+1000
- Description:** Application Template: Demonstrates how to reference resources from a different stack. This template provisions an EC2 instance in a VPC Subnet provisioned in a different stack.
- Status:** CREATE_PENDING
- Status reason:** -
- Execution status:** UNAVAILABLE

Changes: Preview property-level changes for each resource. The Property-level changes column provides insights into the precise changes in property values for a resource. [Learn more](#)

Changes (1): Preview how proposed changes to a stack will impact running resources. Click on "View details" to preview the impact on property values for a resource.

Action	Logical ID	Resource type	Replacement	Property-level changes	Policy action
Modify	WebServerSecurityGroup	AWS::EC2::SecurityGroup	False	View details	-

Screenshot of the AWS CloudFormation console showing the overview of the "lab-application" stack.

Stacks (3):

- lab-application:** Status: UPDATE_COMPLETE (2025-04-26 03:39:24 UTC+1000)
- lab-network:** Status: CREATE_COMPLETE (2025-04-26 03:32:23 UTC+1000)
- c144539a373692710102869t1w211906116156:** Status: CREATE_COMPLETE (2025-04-26 03:24:24 UTC+1000)

lab-application Overview:

- Stack ID:** arn:aws:cloudformation:us-east-1:211906116156:stack/lab-application/3a7b4e0-21fc-11f0-90ef-1274fedafe9
- Description:** Application Template: Demonstrates how to reference resources from a different stack. This template provisions an EC2 instance in a VPC Subnet provisioned in a different stack.
- Status:** UPDATE_COMPLETE
- Status reason:** User Initiated
- Parent stack:** -
- Created time:** 2025-04-26 03:39:24 UTC+1000
- Updated time:** 2025-04-26 03:54:09 UTC+1000
- Deleted time:** -
- Drift status:** NOT_CHECKED

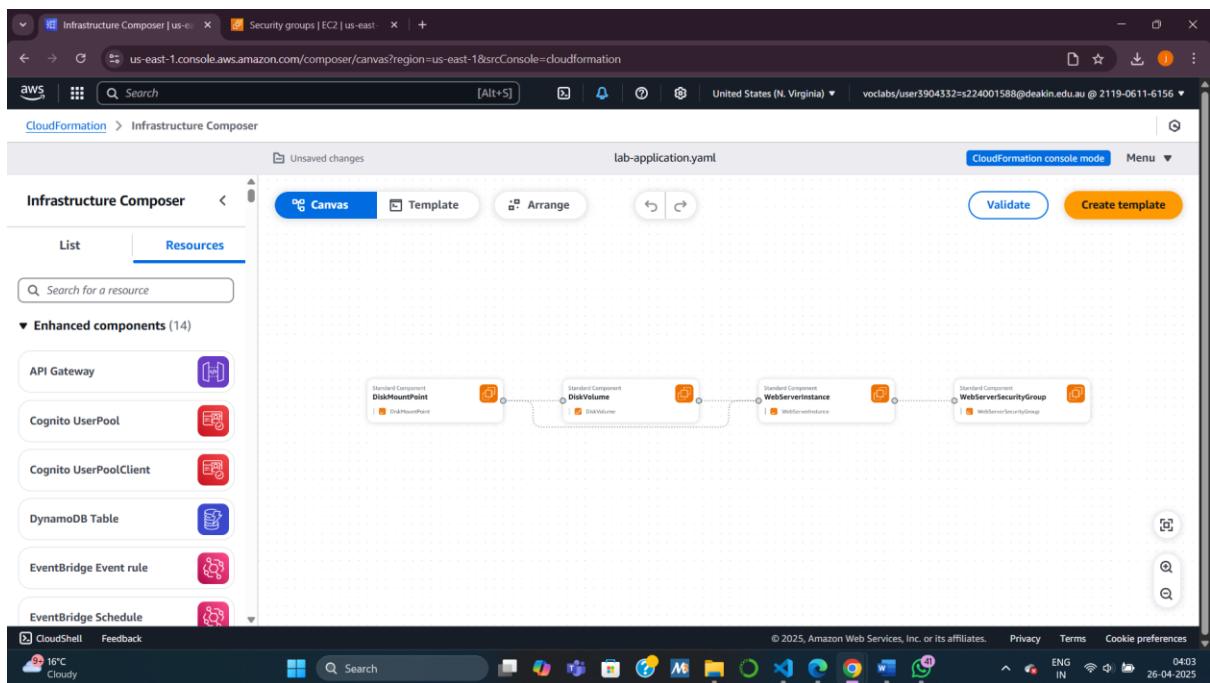
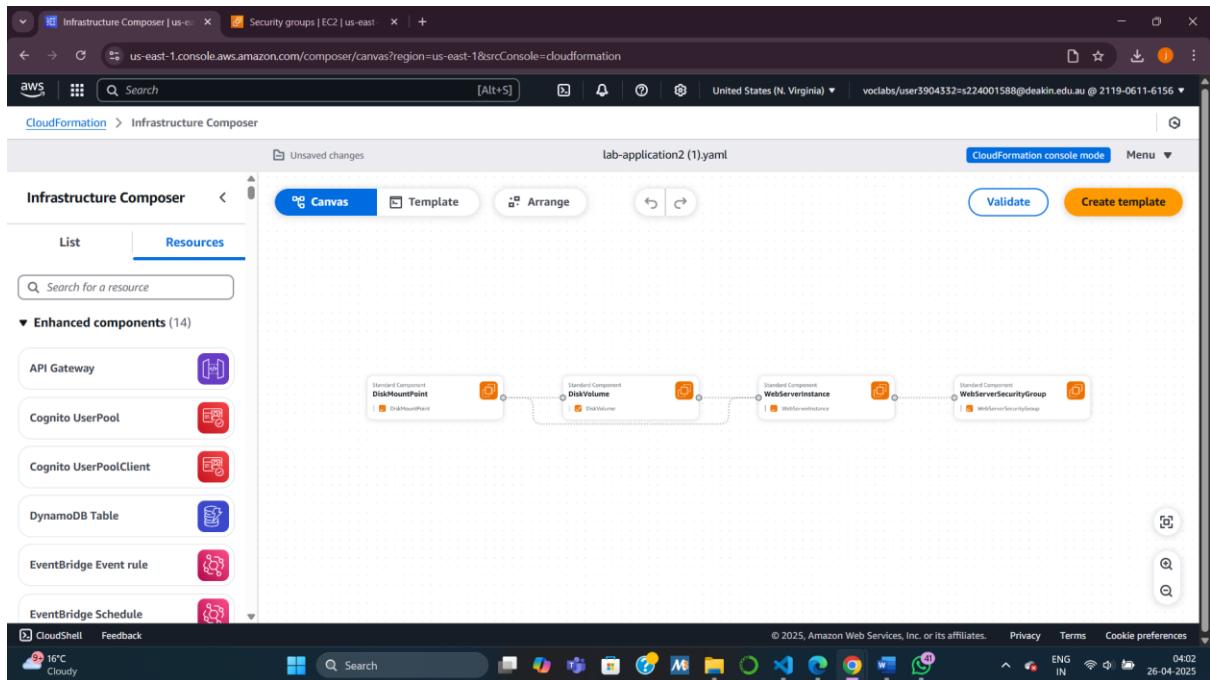
Task 4,: Exploring Templates with AWS CloudFormation Designer

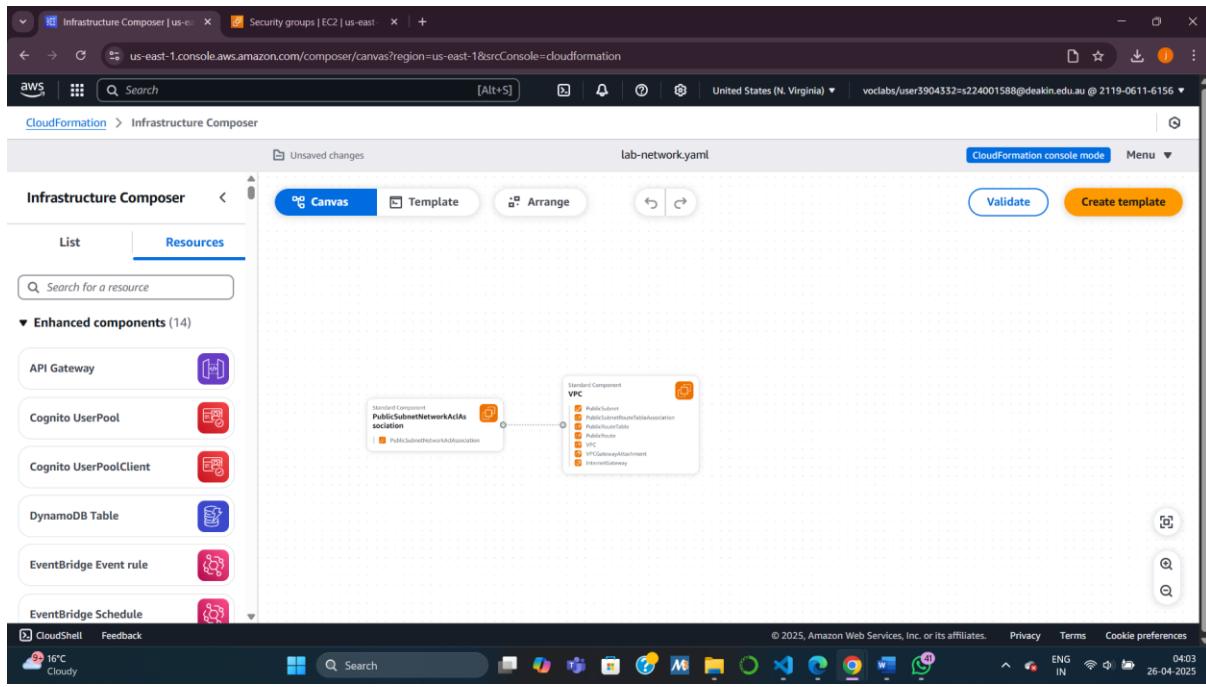
Steps:

1. Open **CloudFormation Designer**.
2. Upload **lab-application2.yaml**.
3. View graphical layout of resources and their relationships.
4. Try:
 - o Selecting resources → View their YAML/JSON definitions.
 - o Dragging new resources into the template.
 - o Connecting resources via drag-and-drop.

Key Concept:

Visual understanding of template structure helps in **modification** and **troubleshooting**.

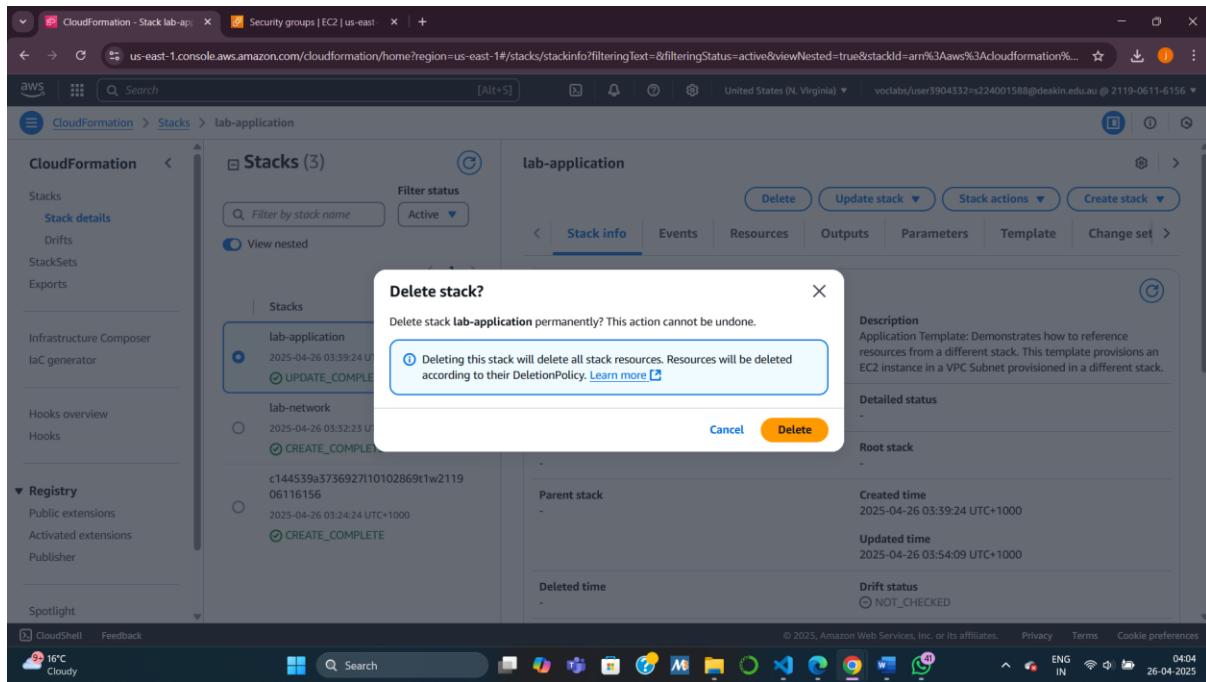




Task 5: Deleting the Stack

Steps:

1. Delete the **lab-application** stack via CloudFormation.
2. Stack removes resources **except** for the EBS snapshot (due to DeletionPolicy: Snapshot).
3. Verify:
 - o Open EC2 → Snapshots.
 - o Check for the **Web Data** snapshot (status: Completed).



Screenshot of the AWS CloudFormation console showing the Stacks page. A modal at the top indicates a stack deletion process.

Stacks (3)

Stack name	Status	Created time	Description
lab-application	DELETE_IN_PROGRESS	2025-04-26 03:39:24 UTC+1000	Application Template: Demonstrates how to reference resources from a different stack. This template provisions an EC2 instance in a VPC Subnet provisioned in a different stack.
lab-network	CREATE_COMPLETE	2025-04-26 03:32:23 UTC+1000	Network Template: Sample template that creates a VPC with DNS and public IPs enabled.
c144539a373692710102869t1w211906116156	CREATE_COMPLETE	2025-04-26 03:24:24 UTC+1000	new bucket

CloudFormation sidebar:

- Stacks
- StackSets
- Exports
- Infrastructure Composer
- IaC generator
- Hooks overview
- Hooks
- Registry
 - Public extensions
 - Activated extensions
 - Publisher
- Spotlight

Feedback bar:

- CloudShell
- Feedback

System status bar:

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- 0405
- 26-04-2025

Screenshot of the AWS CloudFormation console showing the Stacks page. A modal at the top indicates a stack deletion process.

Stacks (2)

Stack name	Status	Created time	Description
lab-network	CREATE_COMPLETE	2025-04-26 03:32:23 UTC+1000	Network Template: Sample template that creates a VPC with DNS and public IPs enabled.
c144539a373692710102869t1w211906116156	CREATE_COMPLETE	2025-04-26 03:24:24 UTC+1000	new bucket

CloudFormation sidebar:

- Stacks
- StackSets
- Exports
- Infrastructure Composer
- IaC generator
- Hooks overview
- Hooks
- Registry
 - Public extensions
 - Activated extensions
 - Publisher
- Spotlight

Feedback bar:

- CloudShell
- Feedback

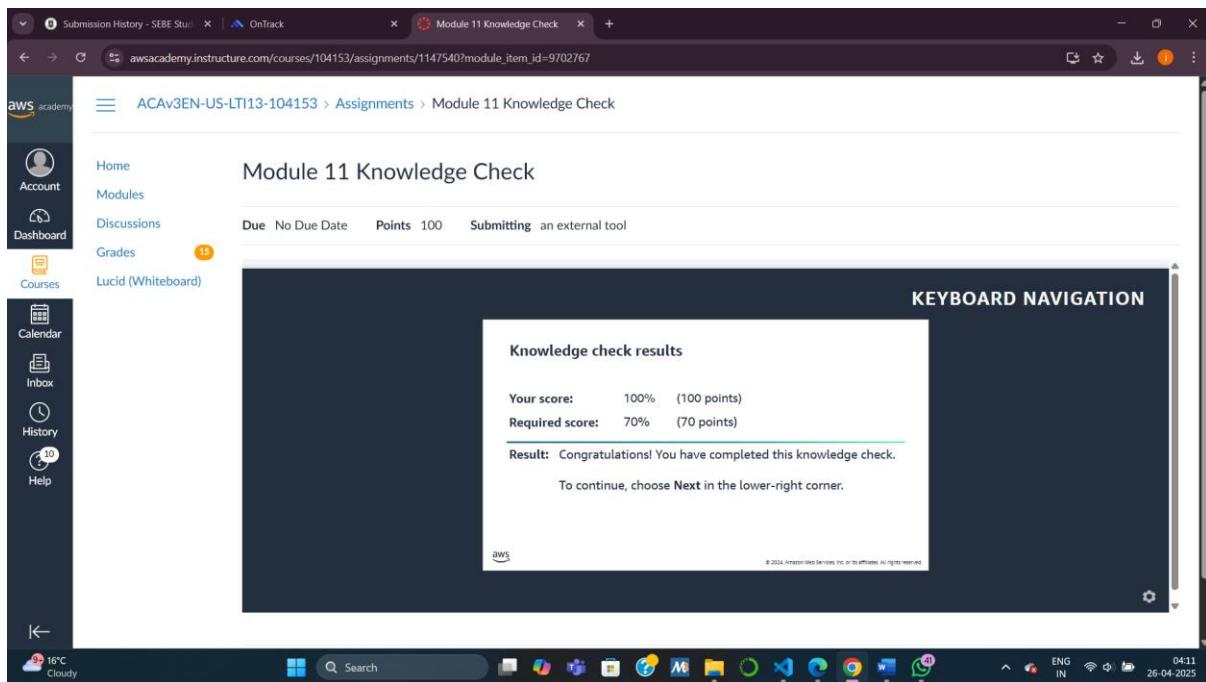
System status bar:

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- Privacy
- Terms
- Cookie preferences
- ENG IN
- 0406
- 26-04-2025

The screenshot shows the AWS CloudFormation console in the 'us-east-1' region. The left sidebar navigation includes 'AMI Catalog', 'Elastic Block Store' (selected), 'Volumes', 'Solutions', 'Lifecycle Manager', 'Network & Security' (Security Groups, Elastic IPs, Placement Groups, Key Pairs, Network Interfaces), 'Load Balancing' (Load Balancers, Target Groups, Trust Stores), and 'Auto Scaling' (Auto Scaling Groups). The main content area displays a table titled 'Snapshots (1) Info' with one entry: 'Web Data' (snap-02b61caa07119f7a2, 0 B, 100 GiB, Standard, Completed). A message at the bottom says 'Select a snapshot above.'

The screenshot shows a guided lab titled 'Guided lab: Automating Infrastructure with AWS CloudFormation' on the 'awsacademy.instructure.com' website. The left sidebar has links for 'Home', 'Modules', 'Discussions', 'Grades' (with 14 notifications), 'Lucid (Whiteboard)', 'Courses', 'Calendar', 'Inbox', 'History', and 'Help'. The main content area shows instructions for submitting work, a timer (02:18), and a summary table of scores. The table shows a total score of 20/20 across five tasks: [Task 1] Deploy Networking Stack (5/5), [Task 2] Deploy Application Stack (5/5), [Task 3] Update Application Stack (5/5), and [Task 5] Delete Application Stack (5/5). Buttons for 'Submit', 'Submission Report', and 'Grades' are visible.

Knowledge check



Task questions:

1. How do you export a value from one stack and import into another stack?

- In CloudFormation, you can export values from one stack using the Outputs section with an Export name.
- Another stack can import these values using the intrinsic function Fn::ImportValue.
- This allows stacks to share resource information like VPC IDs, Subnet IDs, or Security Group IDs across different templates securely and efficiently.

2. If you want to retain an EBS disk after deleting the CloudFormation template, what should you do?

- Use the DeletionPolicy: Snapshot attribute in the CloudFormation template for the EBS volume resource.
- This tells CloudFormation to create a snapshot of the EBS volume instead of deleting the data when the stack is removed.
- This approach ensures that your data is backed up as a snapshot, even if the stack and the EBS volume are deleted.

3. Give 2 examples of CloudFormation intrinsic functions and explain what they do.

Function	Purpose	Example
!Ref	Returns the physical ID or the value of a resource or parameter.	VpcId: !Ref MyVPC returns the ID of the VPC created in the template.
Fn::Join	Concatenates a list of strings into a single string with a specified delimiter.	Fn::Join [":", ["sg", "12345"]] → result: sg:12345. Useful for combining resource names, ARNs, etc.

Other commonly used functions include:

- **Fn::GetAtt** – gets an attribute of a resource (e.g., an instance's Public IP).
- **Fn::Sub** – substitutes variables into strings.