

Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College of Arts, Science & Commerce
(Empowered Autonomous College)



**Affiliated to
UNIVERSITY OF MUMBAI**

**DEPARTMENT OF INFORMATION TECHNOLOGY
2025 - 2026**

M.Sc. (IT) PART 2 - SEM IV

RJSPIT301P – Cloud Solution Architecture

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Roll No: 6709

Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College of Arts, Science & Commerce
(Empowered Autonomous College)

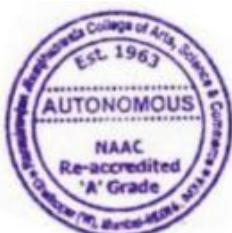
Certificate



This is to certify that Mr. Vishwakarma Shivam Suresh Suhila Roll No 6709 of M.Sc.(I.T.) Part-1 class has completed the required number of experiments in the subject of Cloud Solution Architecture in the Department of Information Technology during the academic year 2025 - 2026 .

Professor In-Charge

Co-ordinator of IT Department



College Seal & Date

Examiner

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Practical 1: Introduction to AWS Educate

Jul 9, 2025

A. Creating AWS Educate Account

1. Register → <https://aws.amazon.com/education/awseducate/>

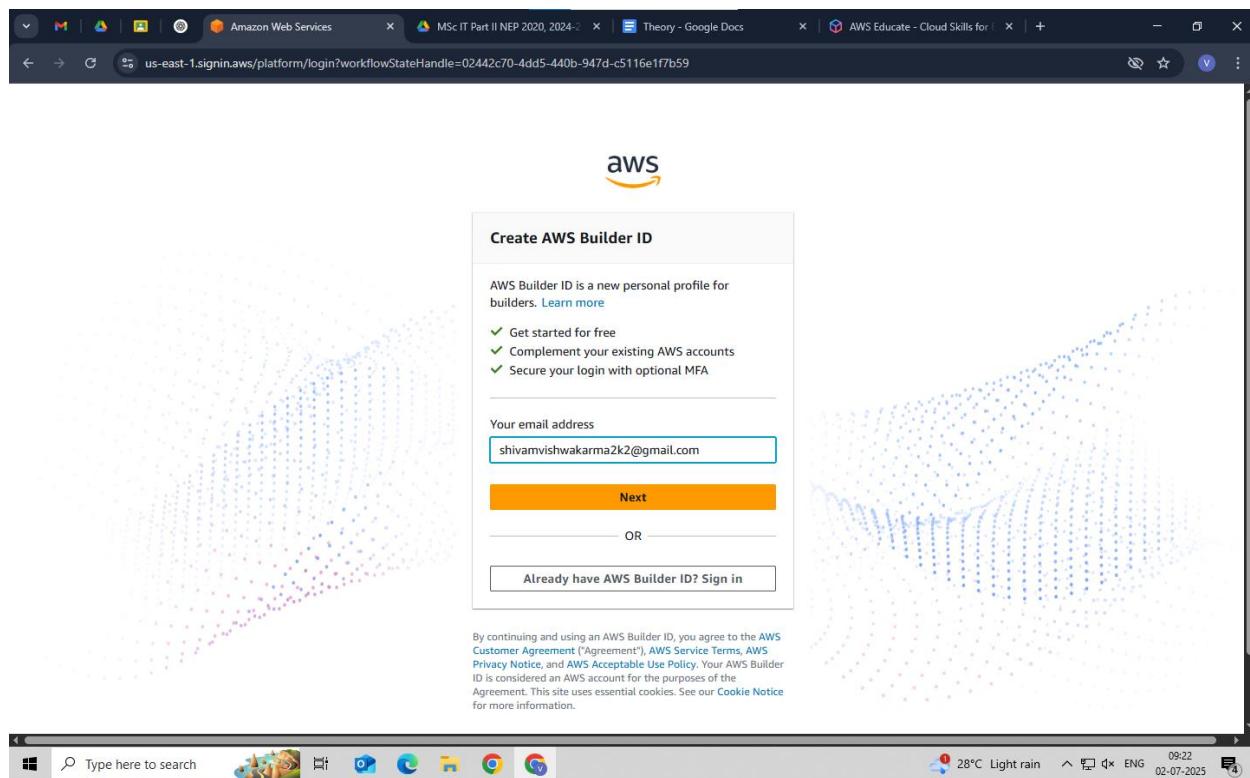
The screenshot shows a web browser window with the AWS Educate registration page open. The URL in the address bar is awseducate.com/registration/s/registration-detail?language=en_US&promocode=EducateLP. The page has a dark teal header with the AWS Educate logo and a navigation bar with links for 'FAQ', 'Contact us', and 'Cookie preferences'. Below the header, there's a section titled 'Learn cloud skills at no cost with AWS Educate' with four bullet points: 'Register with just an email address, no credit card required', 'Content and resources designed for beginners like you', 'Explore, search for, and apply for jobs through the [AWS Educate Job Board](#)', and 'Gain access to the [AWS Emerging Talent Community](#) when you earn digital badges'. To the right of these points is a 'Create your account' form. The form fields are as follows:

First name	Shivam
Middle name - <i>optional</i>	
Last name	Vishwakarma
Country	India
State or province	Maharashtra
City	Mumbai
Birth month	December
Birth year	

At the bottom of the page, there are links for '© 2025, Amazon Web Services, Inc. or its affiliates.', 'Privacy', and 'Site terms'. The status bar at the bottom of the browser shows '09:20 02-07-2025'.

2. Verify email id

3. Then create AWS Builder ID



4. Verify builder ID

5. Set password

Direct login: <https://www.awseducate.com/student/s/content>

B. Getting Familiarized With The Aws Console

The screenshot shows the AWS Educate website. At the top, there's a search bar with the query "Introduction to the AWS Management Console". Below it, a large banner says "Your cloud journey starts here" with the subtext "No matter your goal, we've gathered the most useful content to build your cloud skills." To the left, there are filters for Course Features, Skills, Level, Duration, and Language. The main area displays a result titled "Introduction to the AWS Management Console" with a progress bar at 50%, labeled as Foundational | 1 hour(s) and Cloud Computing.

This screenshot shows the detailed view of the "Introduction to the AWS Management Console" course on AWS Educate. The course title is prominently displayed. On the left is a sidebar with navigation links: Home, Modules, Lucid (Whiteboard), Courses, History, and Help. The main content area includes a brief introduction, course objectives, and a list of learning outcomes. On the right, there are sections for "View Course Stream", "View Course Calendar", "View Course Notifications", "To Do" (with a note "Nothing for now"), and "Recent Feedback" (with a note "Nothing for now").

The screenshot shows a web browser window displaying a pre-course survey titled "Pre-Course Survey" from the course "EDINCOv1EN-US". The survey has 6 questions and is available after June 12, 2023, at 4pm. The time limit is set to none. The submission details indicate a time of 2 minutes. On the left, there is a sidebar with various navigation links including Home, Modules, Lucid (Whiteboard), Courses, History, and Help. A message at the bottom of the page states that quiz results are protected and not visible to students. A note also mentions that correct answers are hidden. The browser taskbar at the bottom shows the Windows Start button, a search bar with "Type here to search", and several pinned icons.

Practical 2: Getting Started with Security: Introduction to IAM

Jul 9, 2025

- A. Create a custom managed policy
- B. Create users and groups
- C. Add users to groups
 - Add user-1 to the S3-Support group
 - Add user-2 to the EC2-Support group
 - Add user-3 to the EC2-Admin group
- D. Sign in and test users
 - Test user-1 permissions
 - Test user-2 permissions
 - Test user-3 permissions

The screenshot shows a browser window with multiple tabs open. The active tab is 'awseducate.com/student/s/content?keyword=started%20with%20secu'. The page title is 'Your cloud journey starts here'.

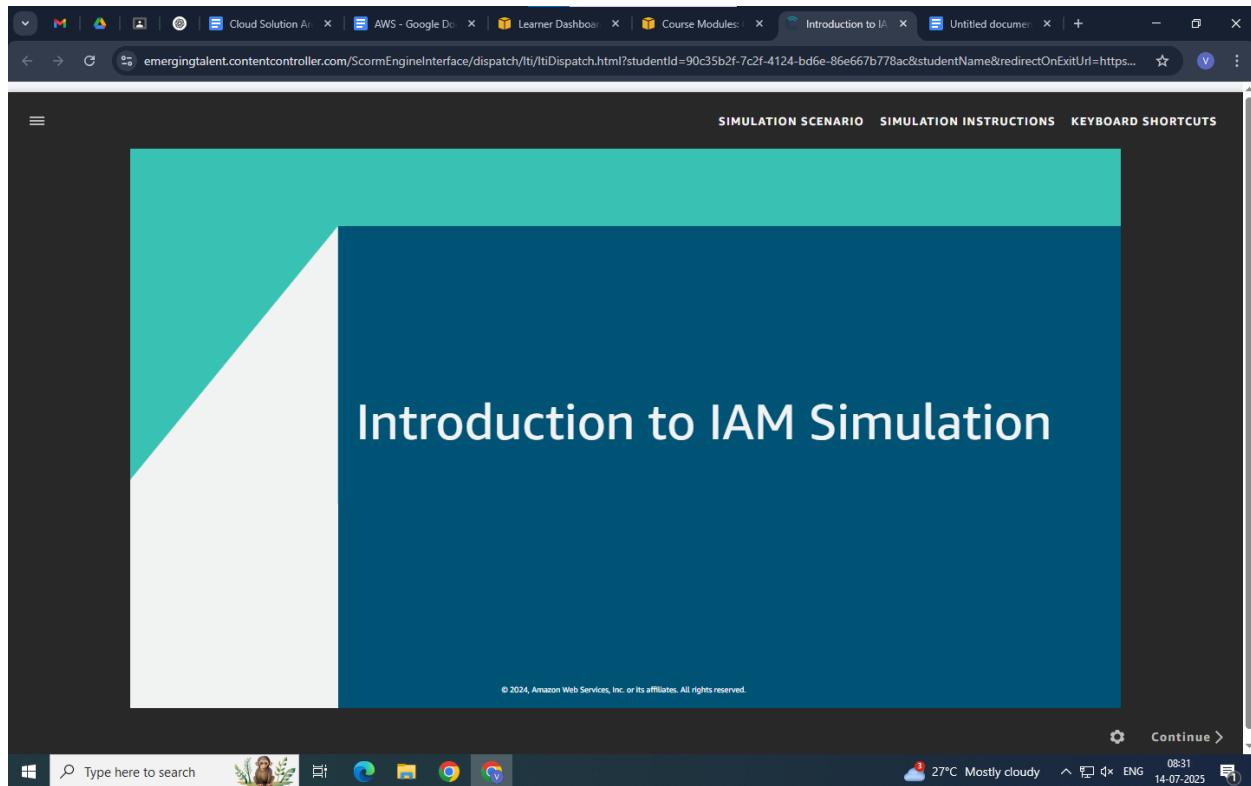
On the left, there's a sidebar with 'Filters' (Course Features, Skills, Level, Duration, Language) and a search bar containing 'started with secu'. The main content area shows 'Results (1)' for a course titled 'Getting Started with Security'. The course card includes a shield icon, a progress bar at 0%, 'Foundational | 2 hour(s)', and a 'Security' tag.

On the right, there's an 'Explore' sidebar with sections for 'Learn more from AWS', 'We want to hear from you!', 'Share your feedback now', 'Fast-track your future.', 'Interested in building your AI skills?', 'Visit this AWS T&C blog to learn more!', and 'Interested in learning about GenAI or cloud basics from an instructor? AWS offers free, live Instructor-led training'.

At the bottom, there's a navigation bar with links for 'FAQ', 'Contact us', 'Cookie preferences', a search bar, and system status indicators like '1 cm of rain Thu', 'ENG', and '14-07-2025'.

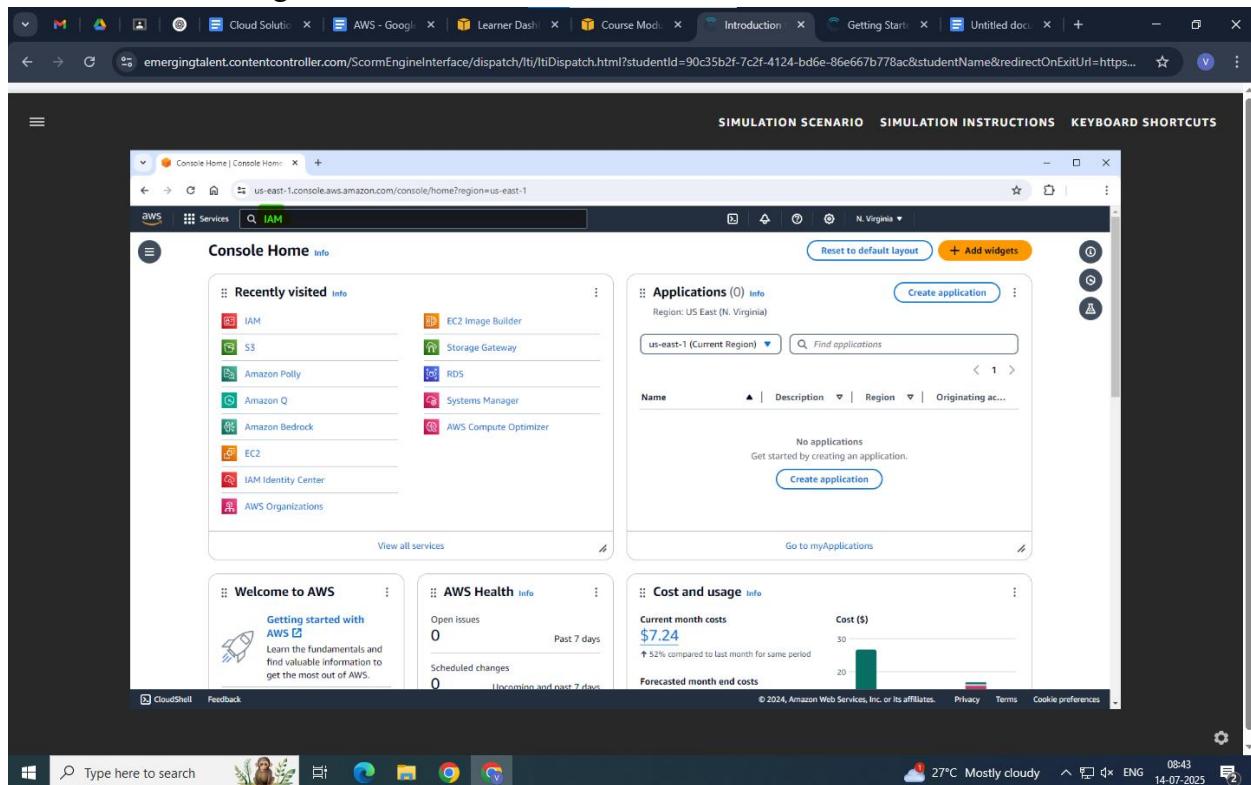
The screenshot shows the AWS Educate course page for 'Getting Started with Security'. The left sidebar has a dark theme with icons for Account, Dashboard, Courses, History, and Help. The main content area has a light background. At the top, it says 'EDSECUv1EN-US' and 'Getting Started with Security'. Below that is a detailed description of AWS Identity and Access Management (IAM). To the right, there are sections for 'View Course Stream', 'View Course Calendar', and 'View Course Notifications'. Under 'To Do', it says 'Nothing for now'. Under 'Recent Feedback', it also says 'Nothing for now'. At the bottom, there's a 'Course level' section describing the course for beginners and a 'Course Objectives' section listing 'AWS Educate Introduction to the AWS Management Console' and 'AWS Educate Introduction to Cloud 101'. The taskbar at the bottom shows various open windows like 'Cloud Solution Architect', 'AWS - Google Docs', 'Learner Dashboard Page', 'Getting Started with Sec...', and 'Untitled document - Go...'. The system tray shows the date as 14-07-2025.

The screenshot shows the AWS Educate module page for 'Introduction to IAM Simulation'. The left sidebar has a dark theme with icons for Account, Dashboard, Courses, History, and Help. The main content area has a light background. It shows a list of modules under 'EDSECUv1EN-US > Modules'. The 'Getting Started with Security' module is expanded, showing 'Pre-Course Survey', 'Getting Started with Security' (Viewed), and 'Introduction to IAM Simulation' (highlighted in yellow). The 'Final Assessment' module is also listed with 'Final Assessment' and 'End of Course Feedback Survey - Labs (New)'. The taskbar at the bottom shows various open windows like 'Cloud Solution Architect', 'AWS - Google Docs', 'Learner Dashboard Page', 'Course Modules', 'Introduction to IA...', and 'Untitled document - Go...'. The system tray shows the date as 14-07-2025.

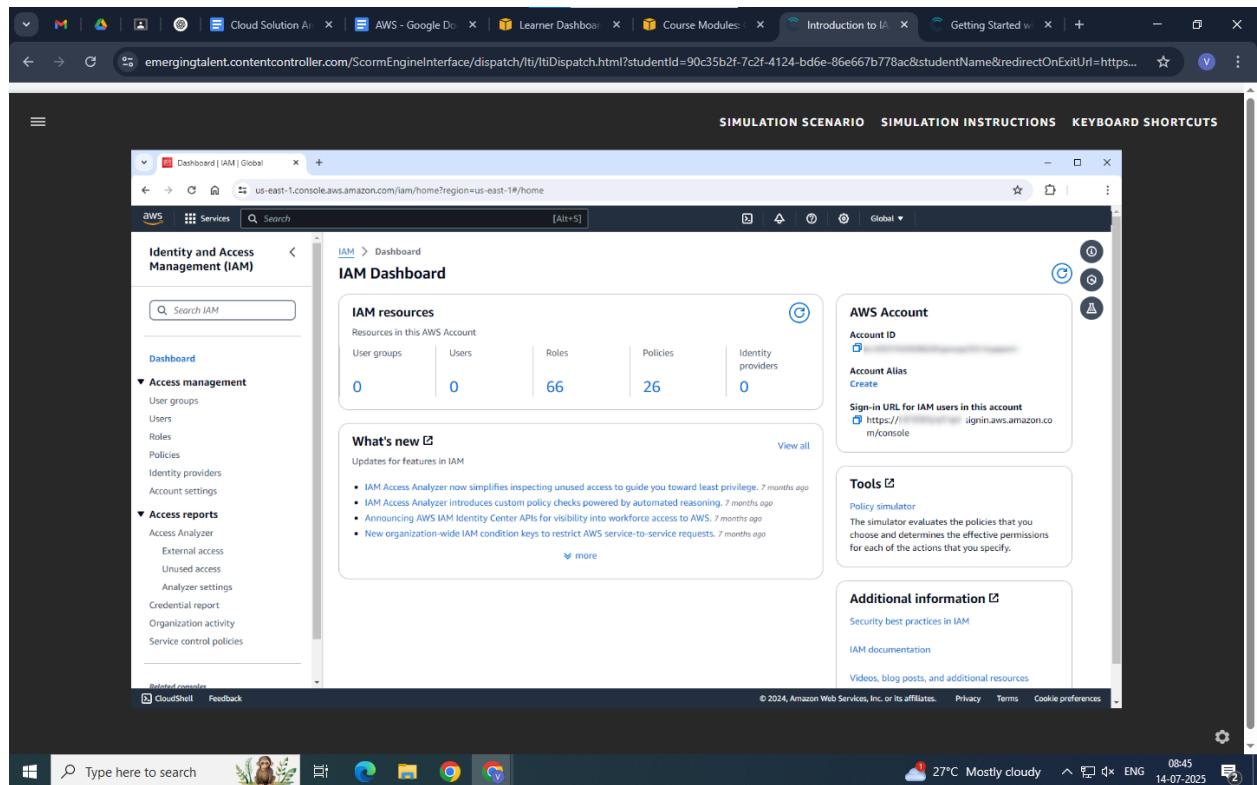
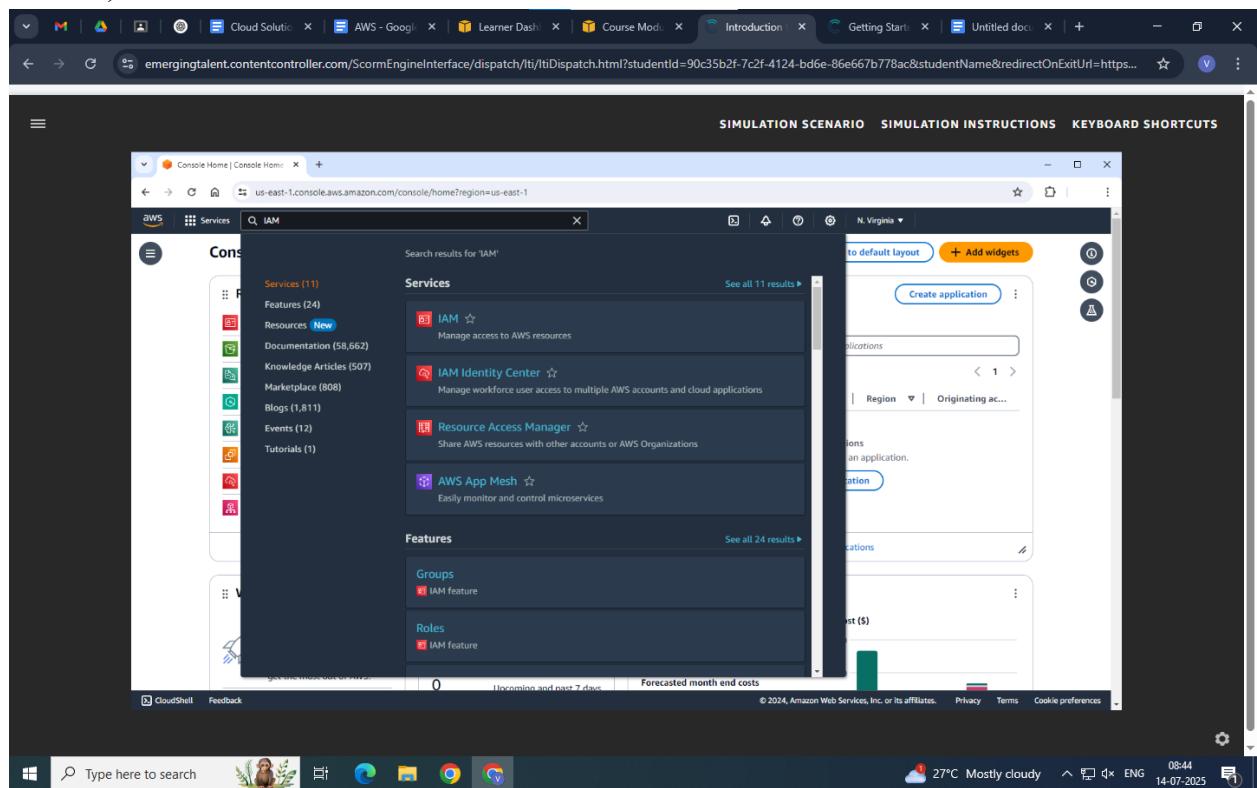


Task 1: Creating a custom IAM policy

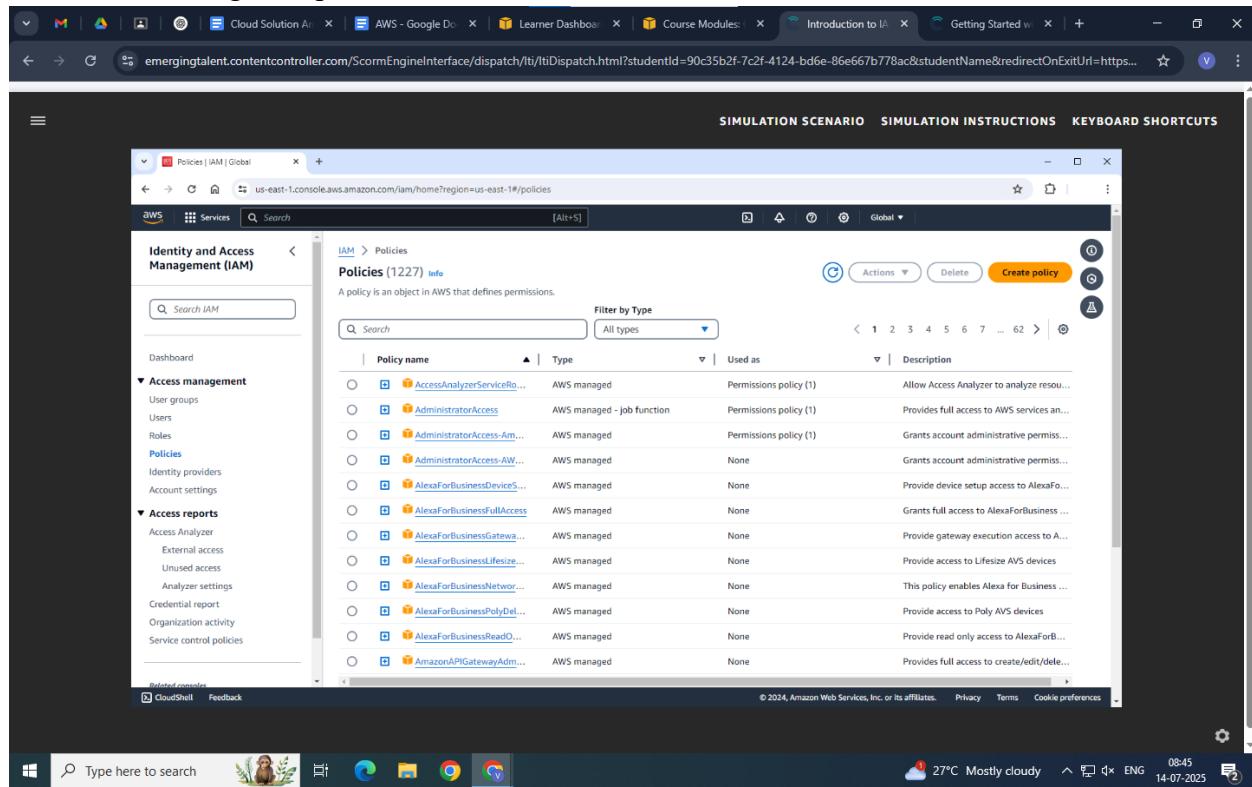
1. In the AWS Management Console, enter IAM in the search field



2. Then, choose IAM from search results.

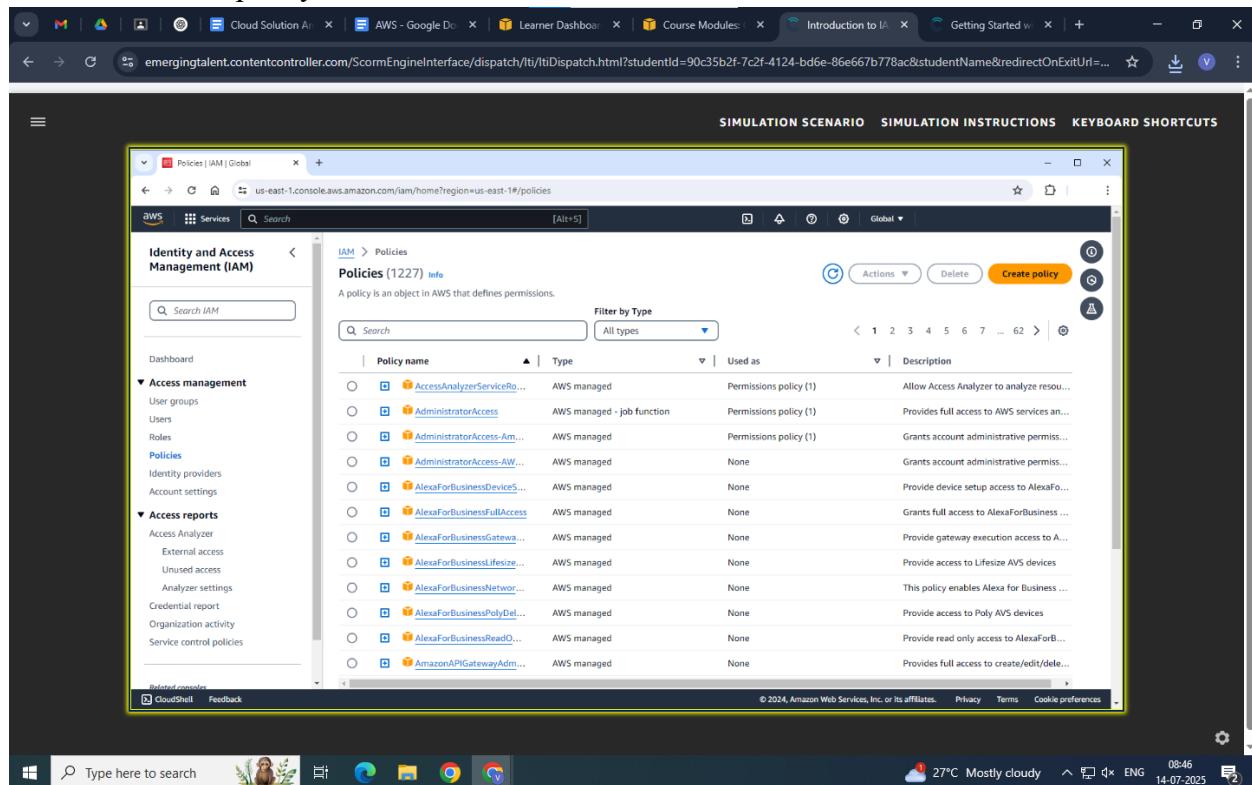


3. In the left navigation pane, choose Policies.



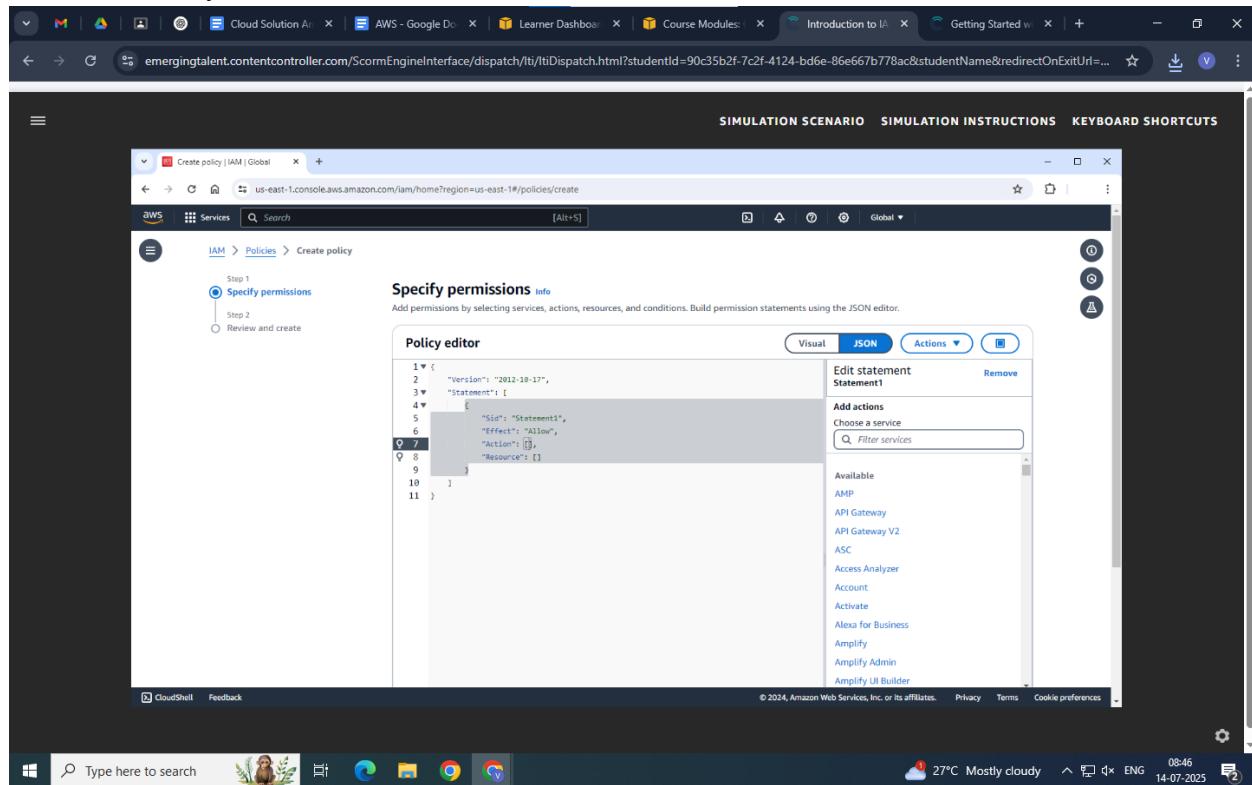
The screenshot shows the AWS IAM Policies page. The left sidebar has 'Policies' selected under 'Access management'. The main area displays a table of 1227 policies, each with a preview icon, policy name, type (AWS managed or managed - job function), used as (Permissions policy, None, or AWS resource), and a brief description. The table includes columns for Policy name, Type, Used as, and Description. A 'Create policy' button is visible at the top right. The browser address bar shows a URL related to a simulation scenario.

4. Choose Create policy.



This screenshot is identical to the one above, showing the AWS IAM Policies page. However, the 'Create policy' button at the top right is now highlighted with a yellow box, indicating it is the next step to take.

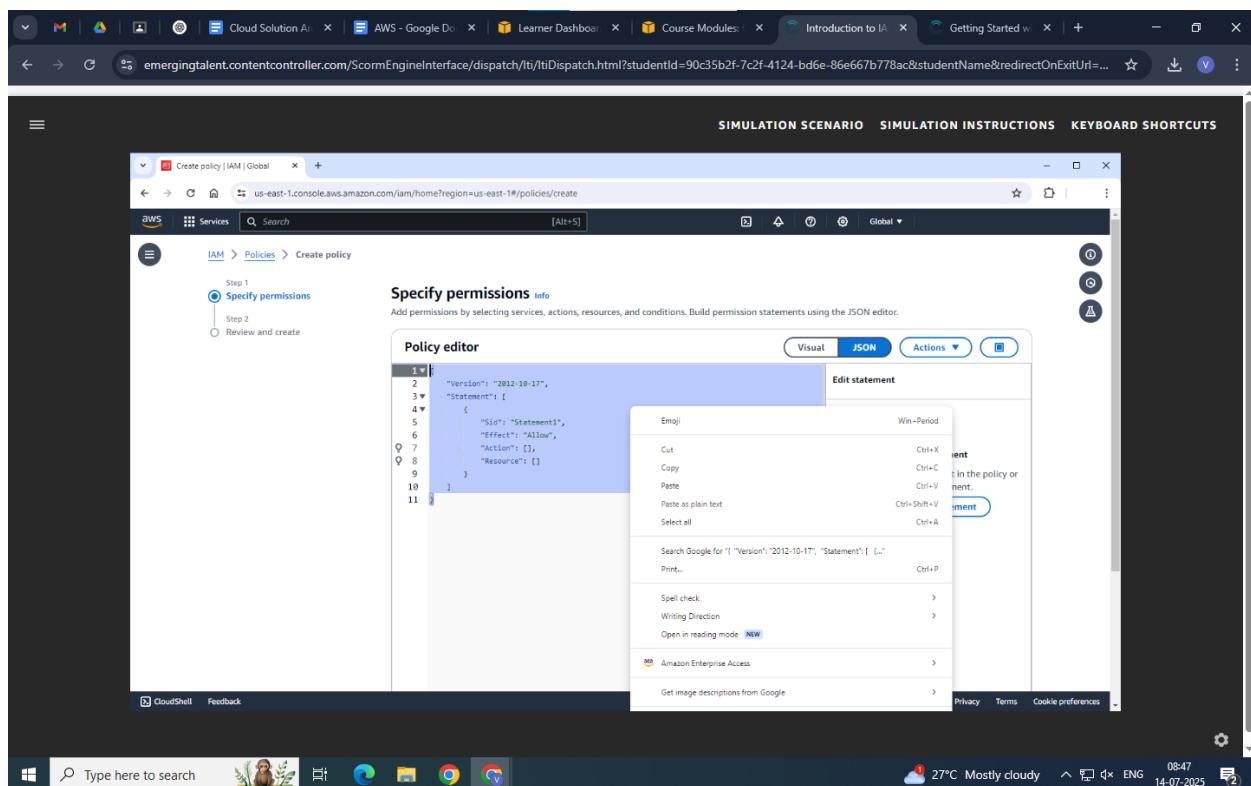
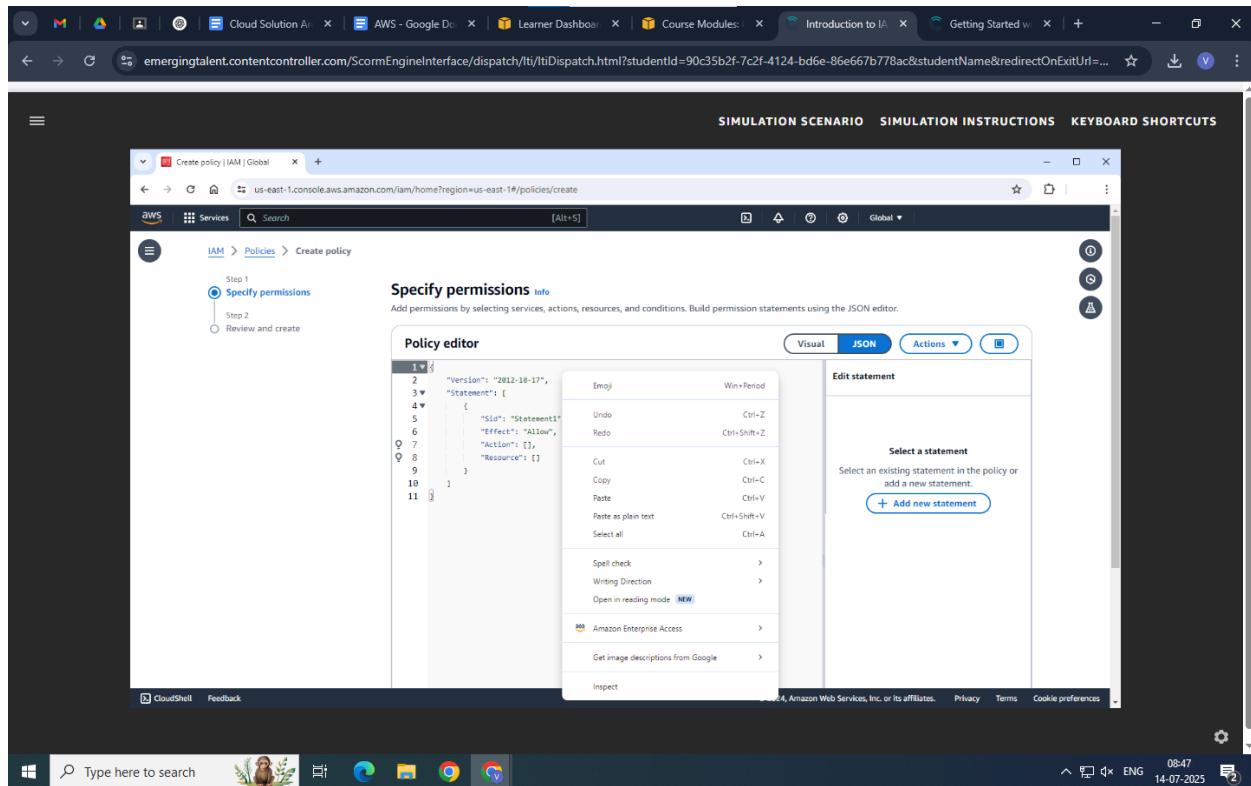
5. For the Policy editor, choose JSON.

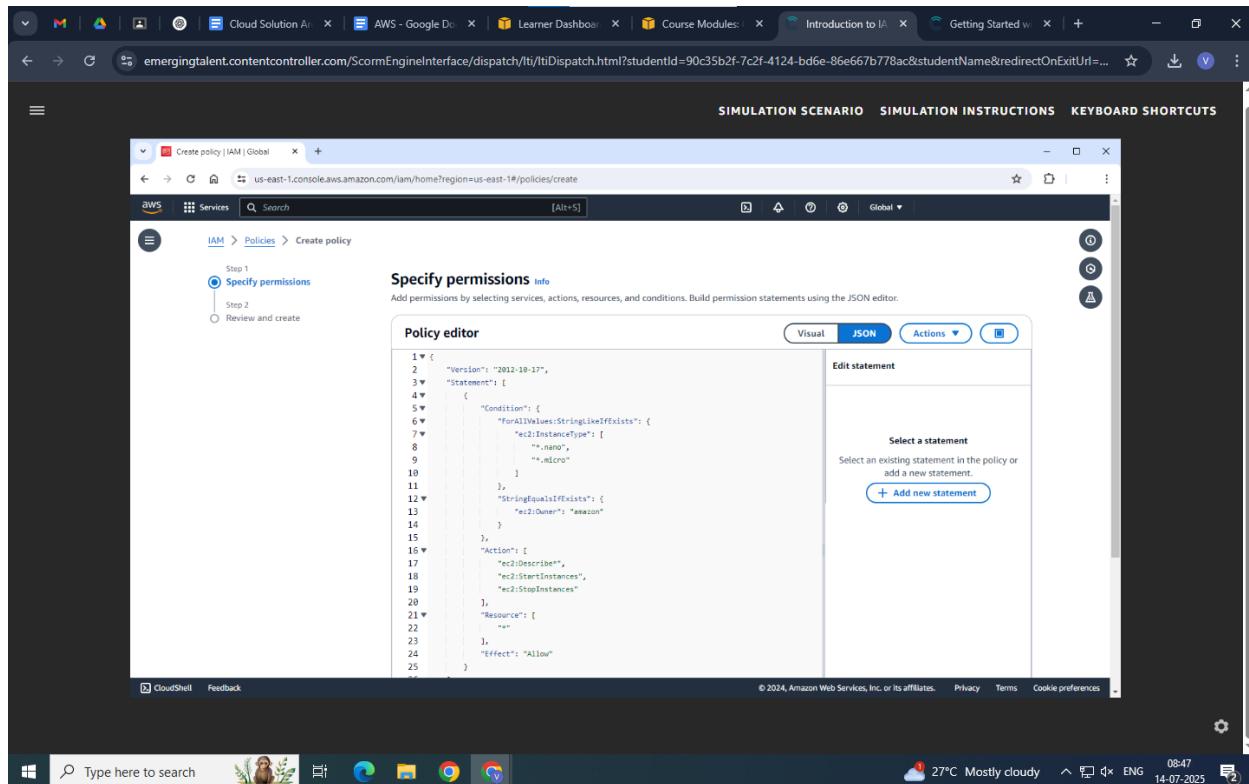


6. Copy and paste the preceding code into the policy editor field.

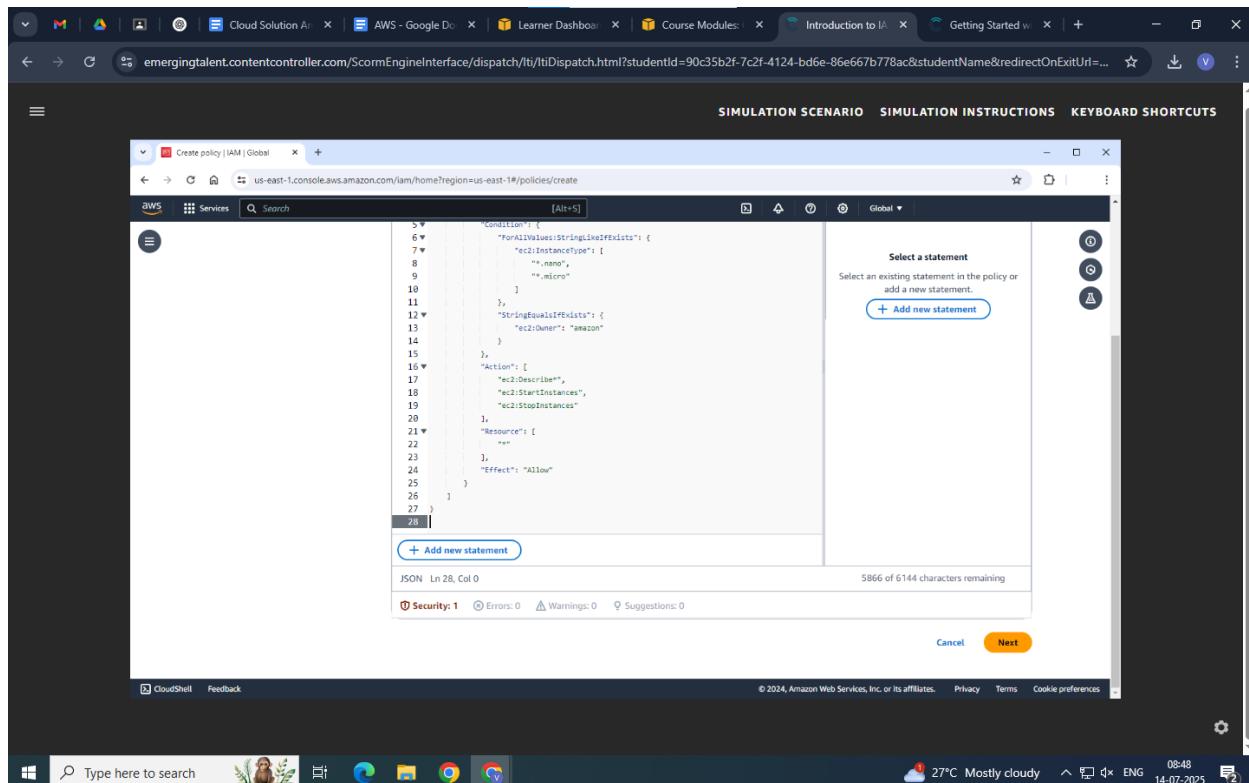
NOTE: Keyboard shortcuts won't work for this simulation. To simulate replacing the existing code with the preceding code, follow these specific steps:

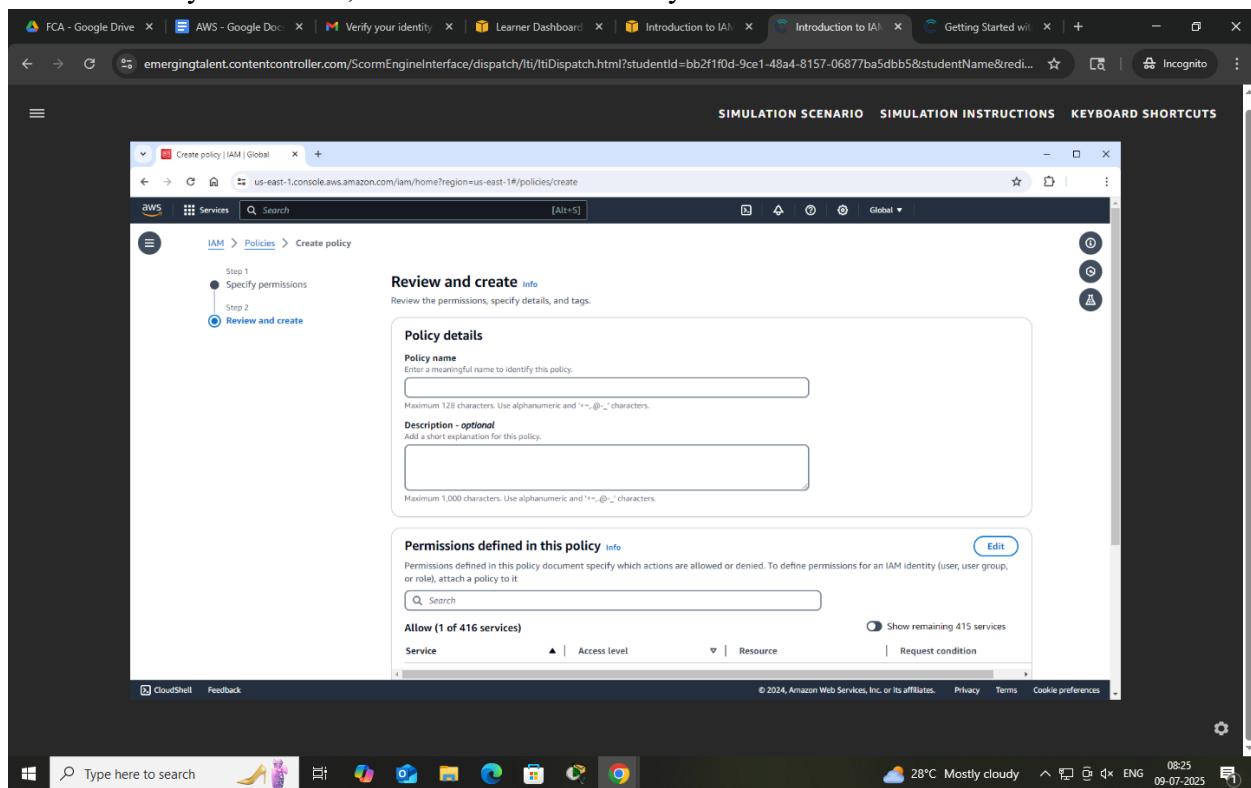
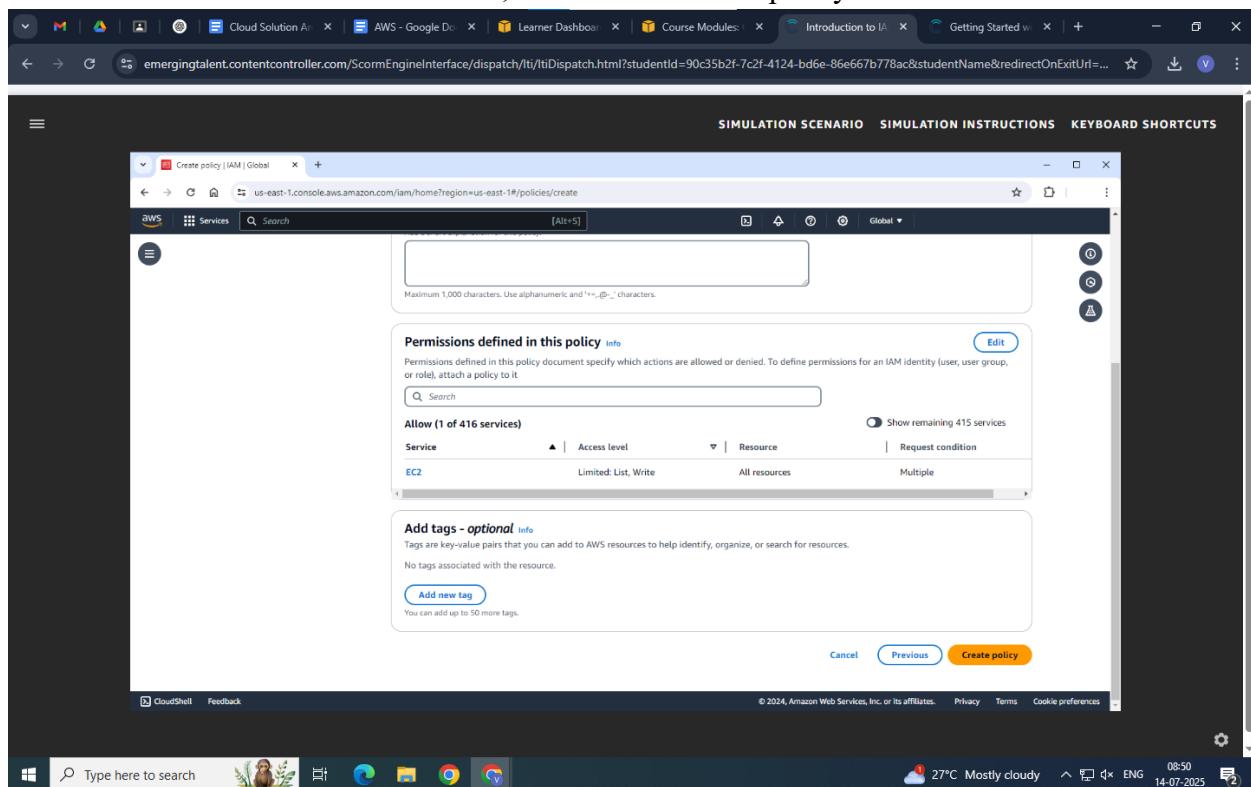
- o Open the context (right-click) menu for the policy editor field.
- o From the menu, choose Select all.
- o Open the context (right-click) menu for the highlighted text.
- o From the menu, choose Paste.





7. Choose the scroll bar to scroll down, then choose Next.



8. In the Policy name field, enter EC2-Admin-Policy**9. Choose the scroll bar to scroll down, then choose Create policy**

The screenshot shows the AWS Identity and Access Management (IAM) console. The left sidebar has 'Access management' expanded, showing 'User groups', 'Users', 'Roles', and 'Policies'. The main content area displays a list of policies under 'Policies (1228)'. A new policy, 'EC2-Admin-Policy', is highlighted with a green banner at the top stating 'Policy EC2-Admin-Policy created.' Below the banner, a message says 'This completes Task 1: Creating a custom IAM policy. Choose Continue.' The table lists various policies with columns for Policy name, Type, Used as, and Description.

Policy name	Type	Used as	Description
AccessAnalyzerServiceRole...	AWS managed	Permissions policy (1)	Allow Access Analyzer to analyze resou...
AdministratorAccess	AWS managed - job function	Permissions policy (1)	Provides full access to AWS services an...
AdministratorAccess-Am...	AWS managed	Permissions policy (1)	Grants account administrative permis...
AdministratorAccess-AW...	AWS managed	None	Grants account administrative permis...
AlexaForBusinessDeviceS...	AWS managed	None	Provide device setup access to AlexaFo...
AlexaForBusinessFullAccess	AWS managed	None	Grants full access to AlexaForBusiness ...
AlexaForBusinessGateway...	AWS managed	None	Provide gateway execution access to A...
AlexaForBusinessLifesize...	AWS managed	None	Provide access to Lifesize AVS devices
AlexaForBusinessNetwork...	AWS managed	None	This policy enables Alexa for Business ...

Task 2: Creating user groups with permissions

Create the EC2-Admin user group

10. In the left navigation pane, choose User groups.

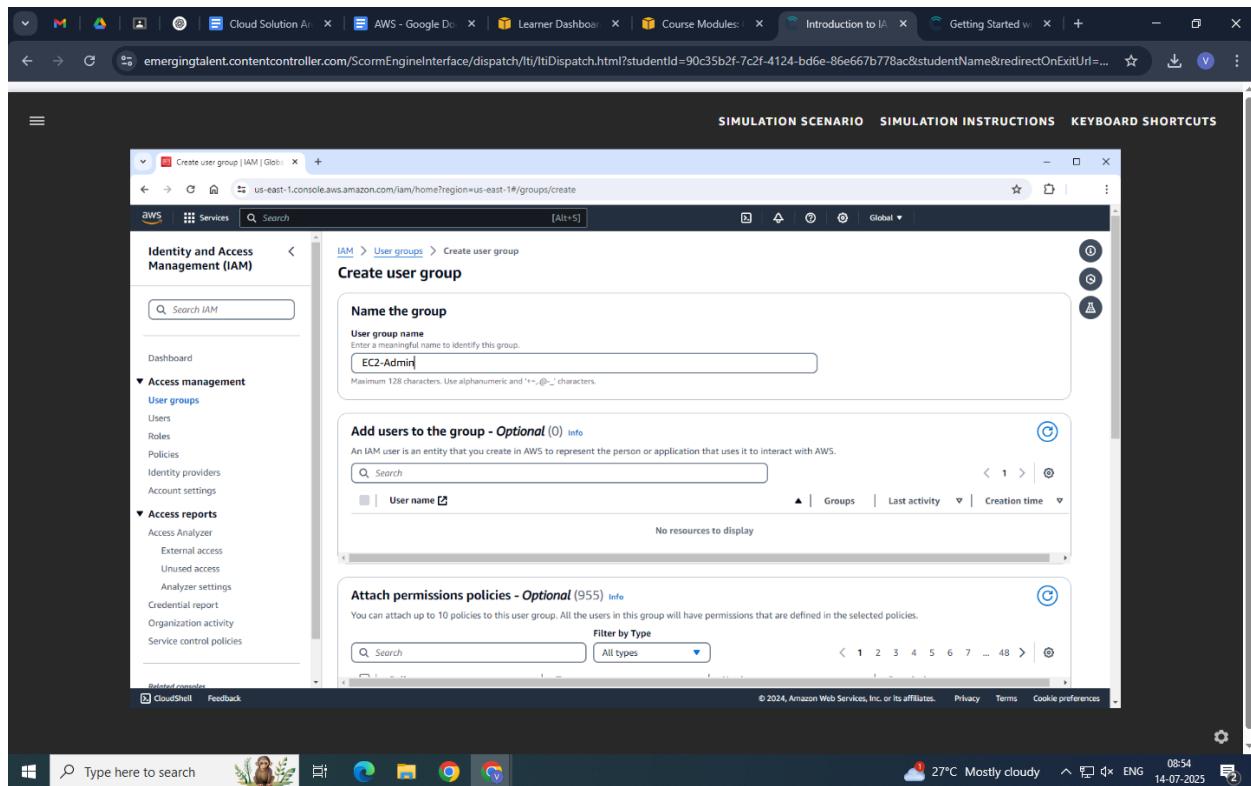
The screenshot shows the AWS IAM User Groups page. The left sidebar has 'User groups' selected under 'Access management'. The main content area shows a table with one row: 'No resources to display'. At the top right, there are 'Create group' and 'Delete' buttons. The browser address bar shows a URL related to a Scorm Engine interface.

11. Choose Create group.

The screenshot is identical to the previous one, but the 'Create group' button at the top right is highlighted with a yellow box. The rest of the interface and browser state are the same.

12. In the User group name field, enter EC2-Admin.

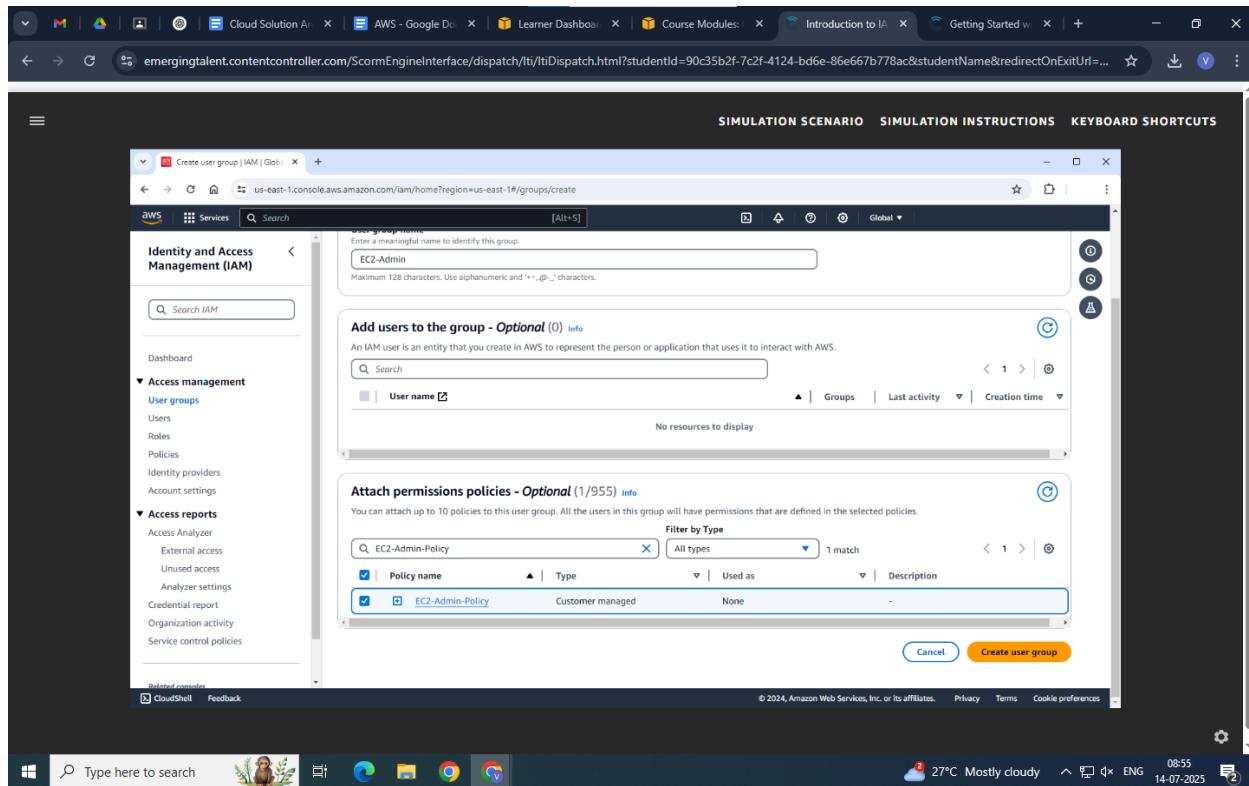
Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.



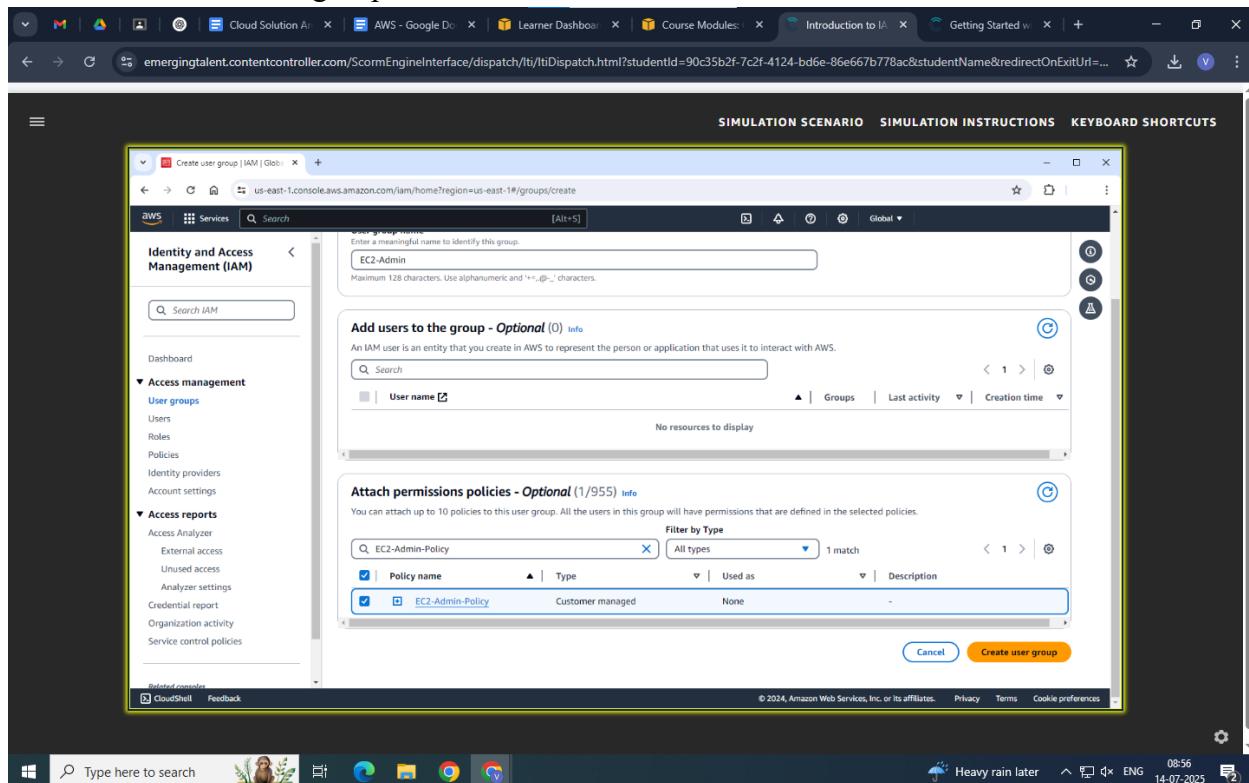
13. Choose the scroll bar to scroll down.

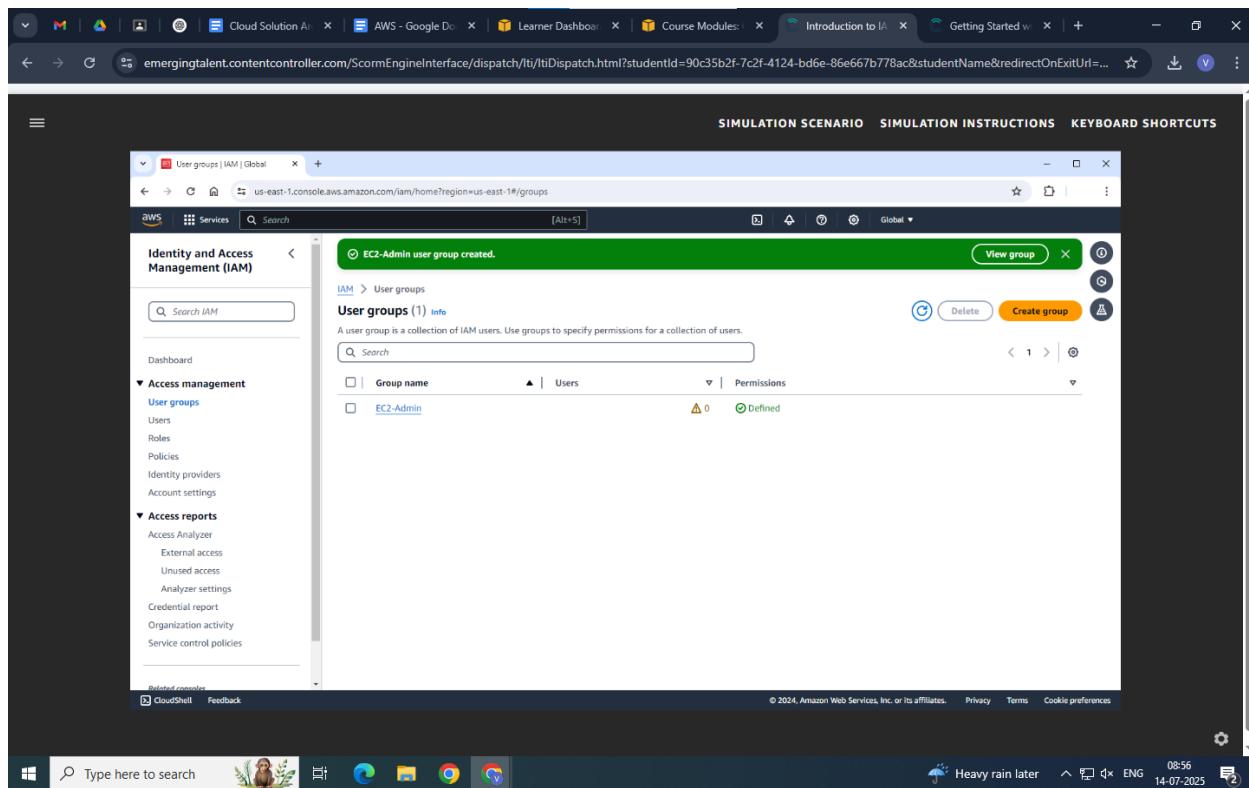
14. In the Attach permissions policies search field, enter EC2-Admin-Policy. o Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field. This is the policy that you created in task 1.

15. Select the EC2-Admin-Policy check box.



16. Choose Create user group.





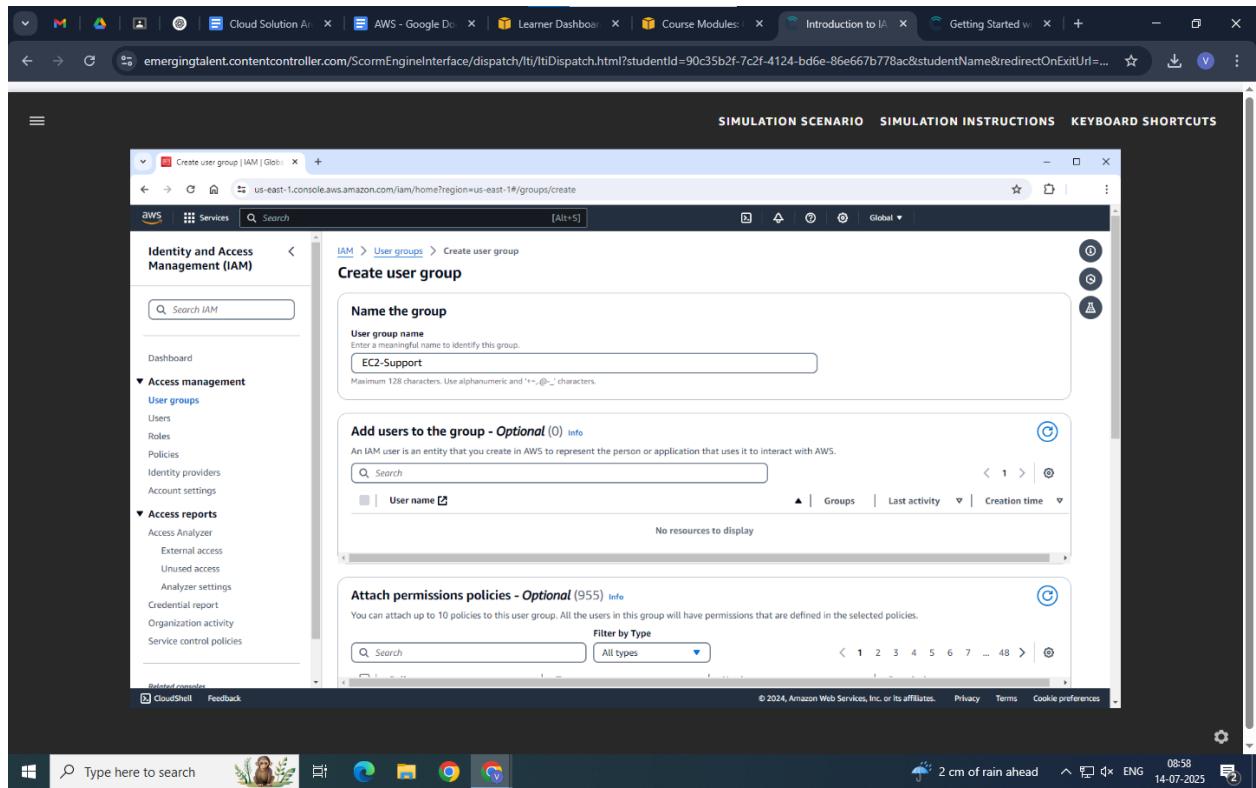
Create the EC2-Support group

17. Use what you learned from the previous steps to create the EC2-Support group. For the name of the group, use EC2-Support. For the policy, use AmazonEC2ReadOnlyAccess. If you need assistance, use the following steps:

Choose Create group.

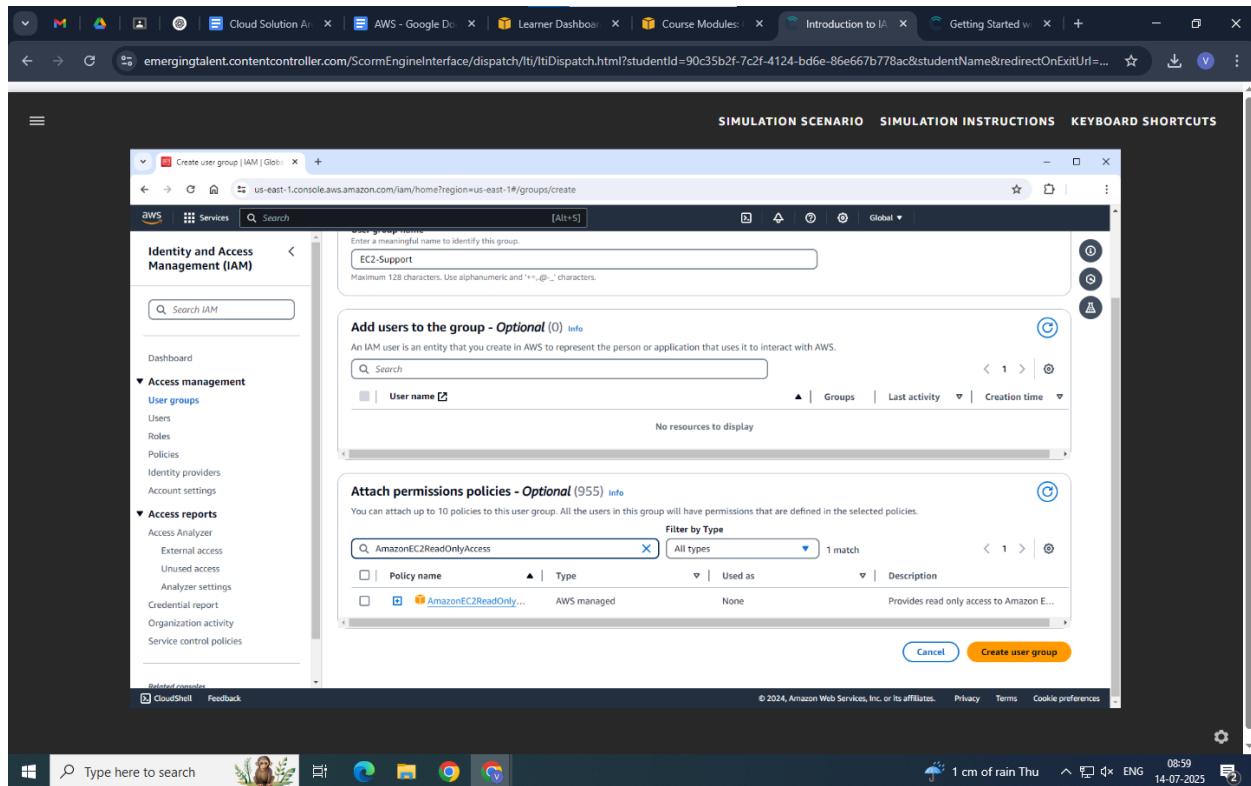
In the User group name field, enter EC2-Support.

- Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field. o Choose the scroll bar to scroll down.

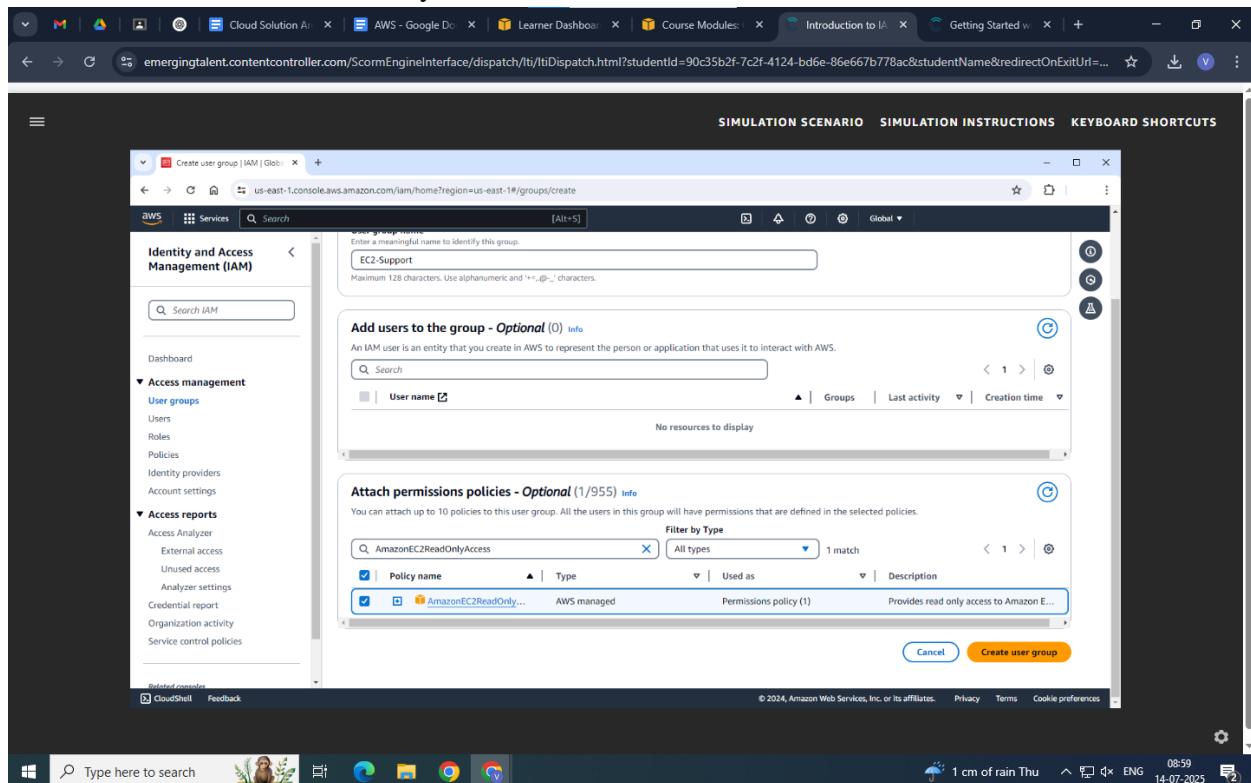


In the Attach permissions policies search field, enter AmazonEC2ReadOnlyAccess.

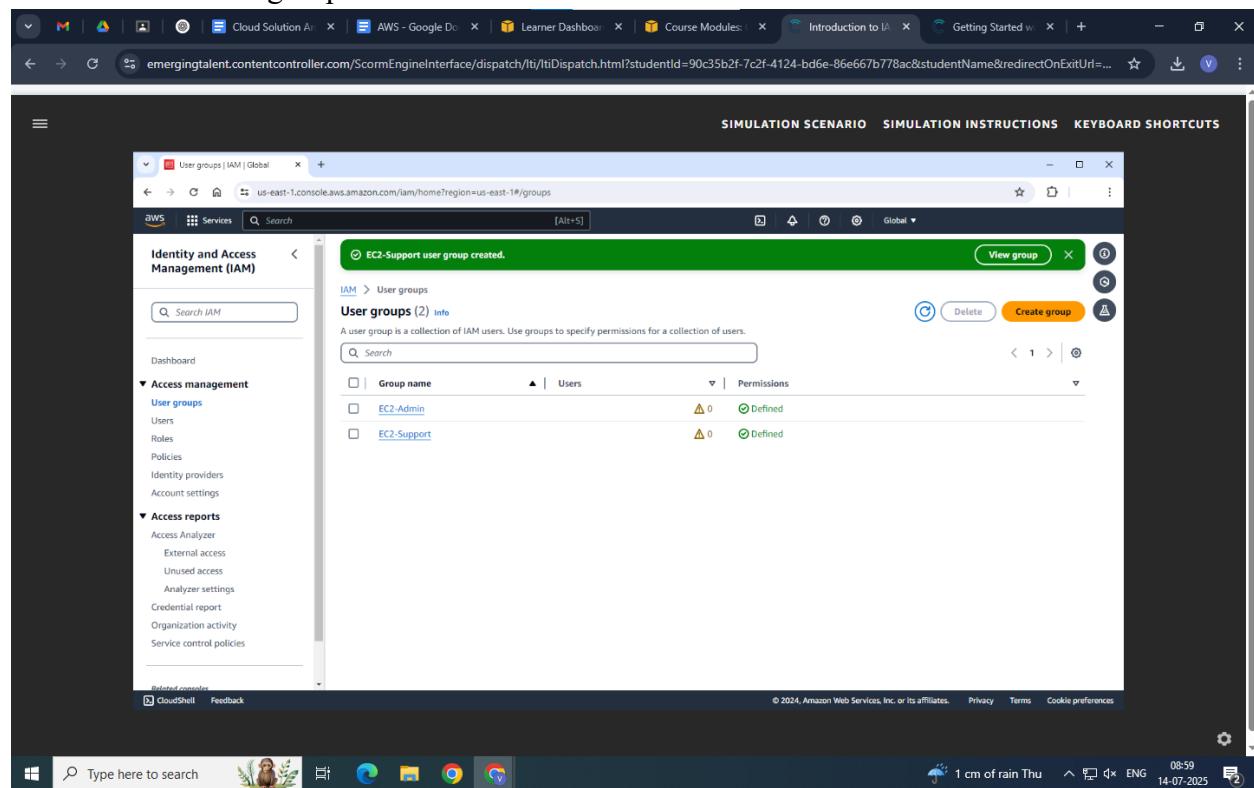
- Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.



Select the AmazonEC2ReadOnlyAccess check box.



Choose Create user group.



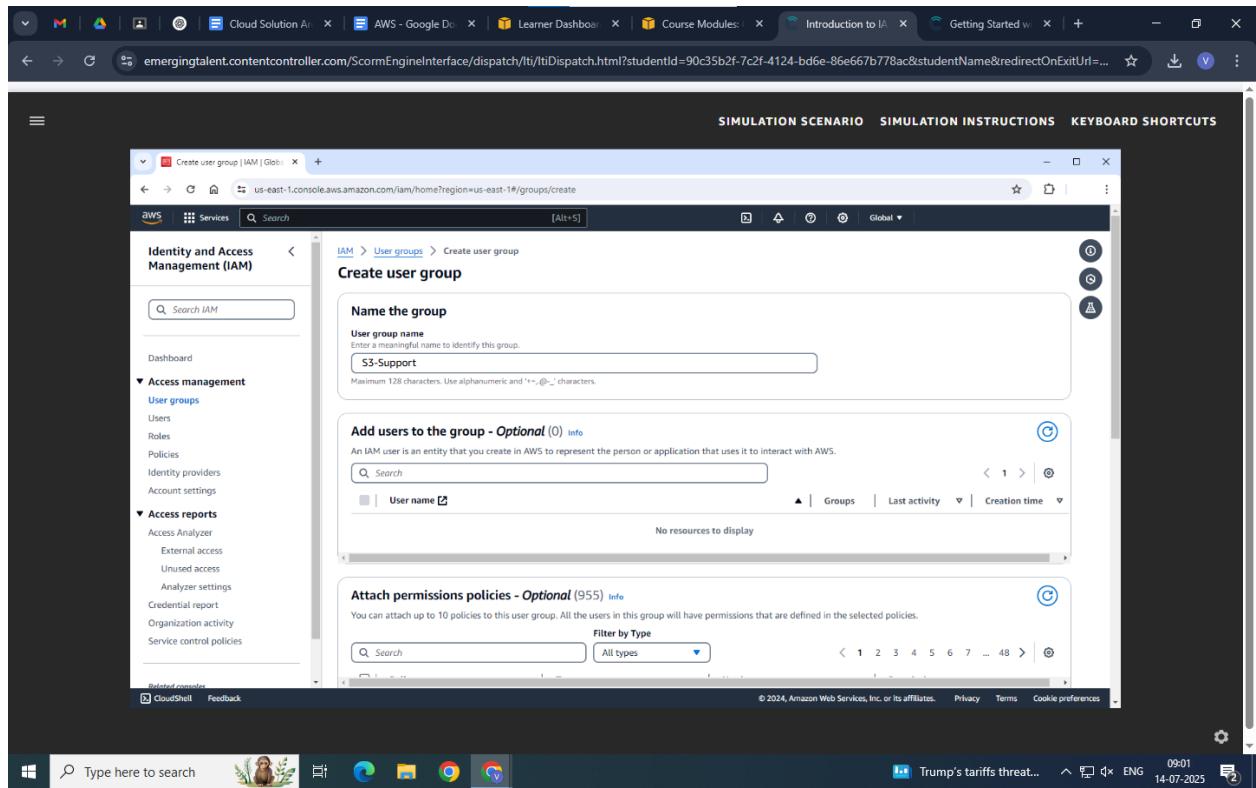
Create the S3-Support group

18. Use what you learned from the previous steps to create the S3-Support group. For the name of the group use S3-Support and for the policy use AmazonS3ReadOnlyAccess. If you need assistance, use the following steps:

Choose Create group.

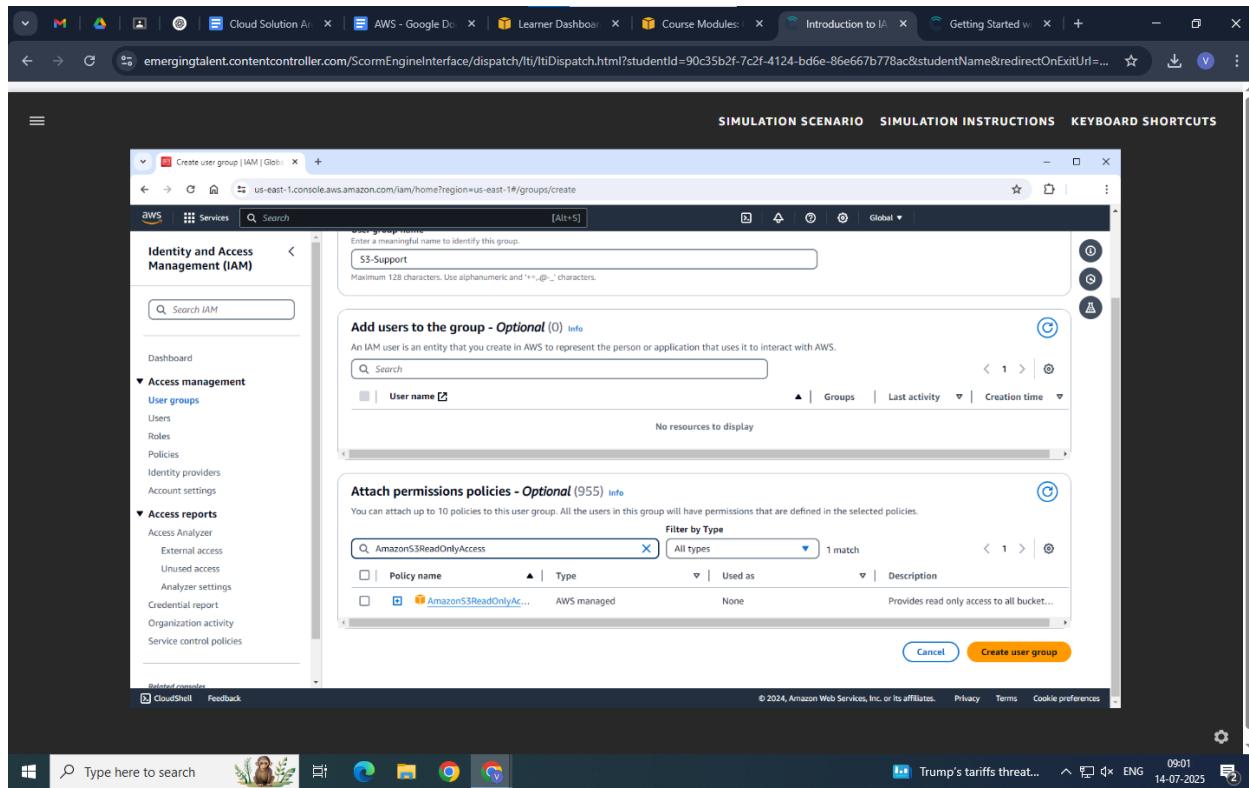
In the User group name field, enter S3-Support.

Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.
o Choose the scroll bar to scroll down.

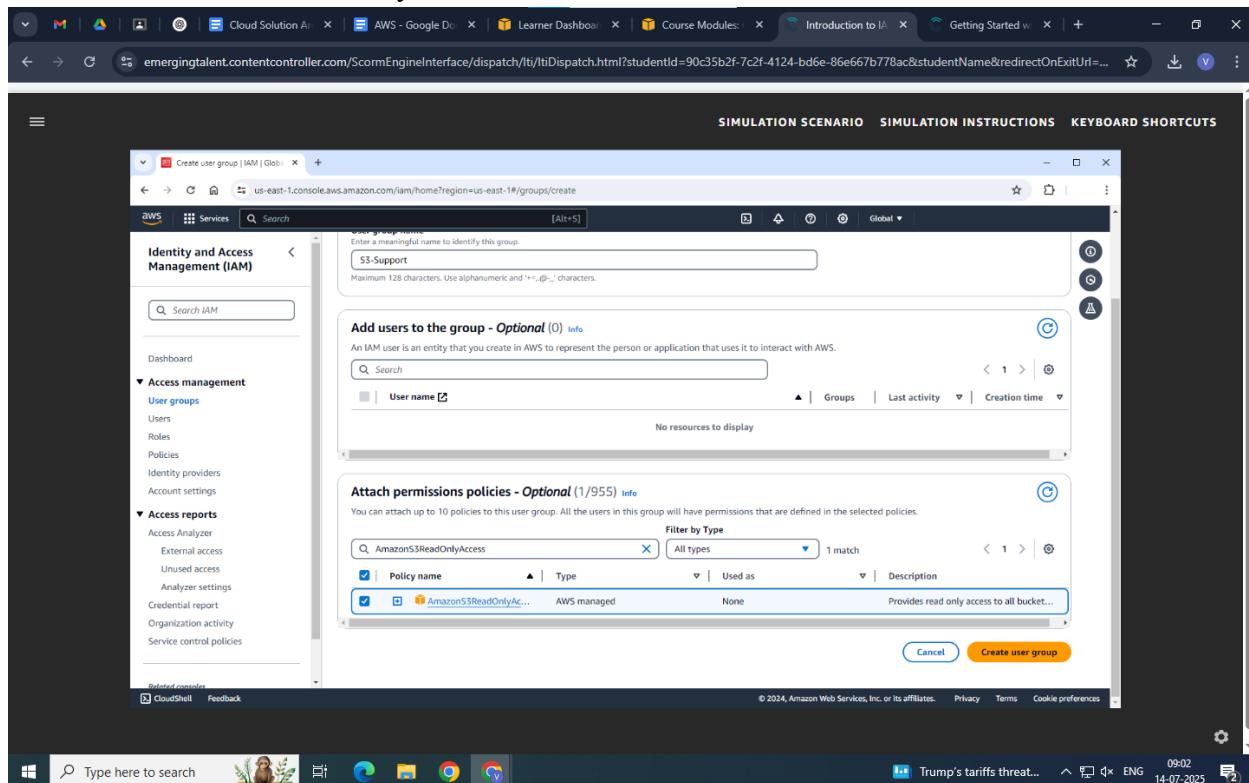


In the Attach permissions policies search field, enter AmazonS3ReadOnlyAccess.

Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.



Select the AmazonS3ReadOnlyAccess check box.



Choose Create user group

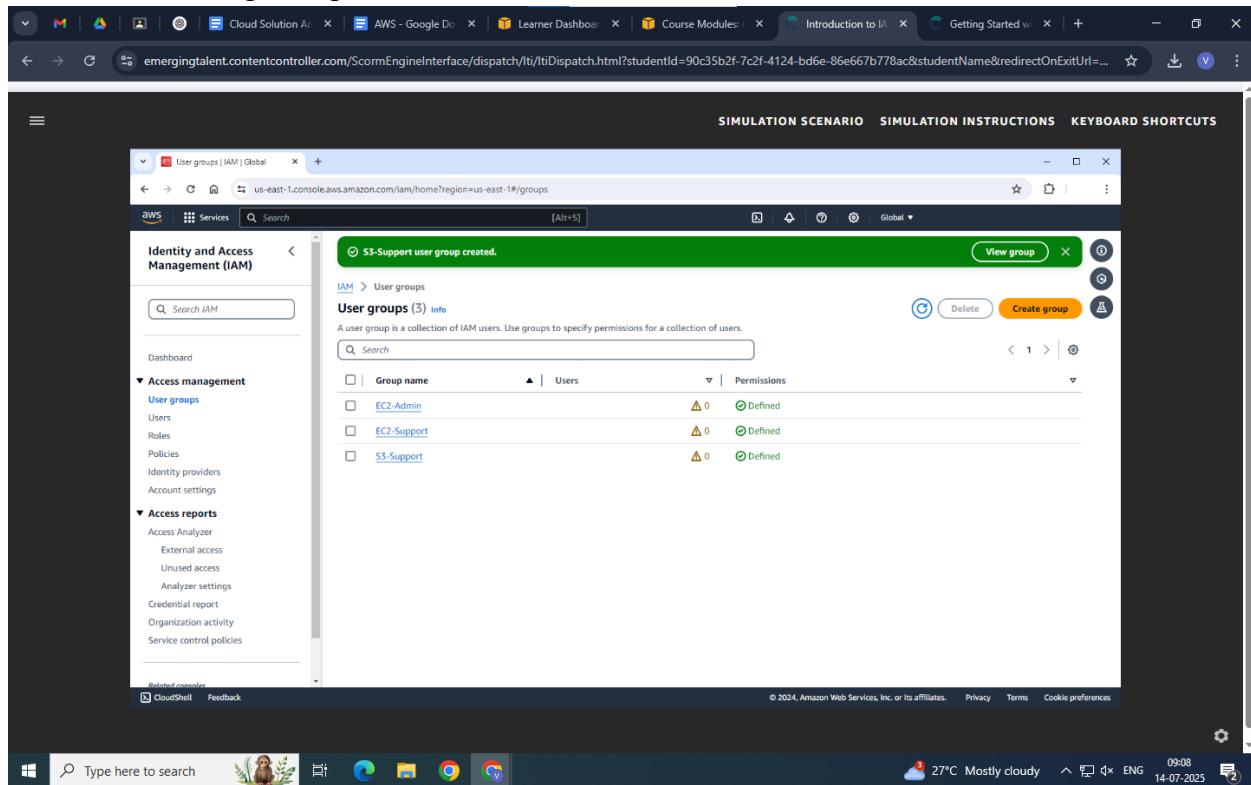
The screenshot shows the AWS IAM User Groups page. On the left, the navigation menu includes 'Identity and Access Management (IAM)', 'Access management' (with 'User groups' selected), and 'Access reports'. The main content area displays a table of user groups:

Group name	Users	Permissions
EC2-Admin	0	Defined
EC2-Support	0	Defined
S3-Support	0	Defined

A green banner at the top right says 'S3-Support user group created.' A pink banner at the bottom center says 'This completes Task 2: Creating user groups with permissions. Choose Continue.'

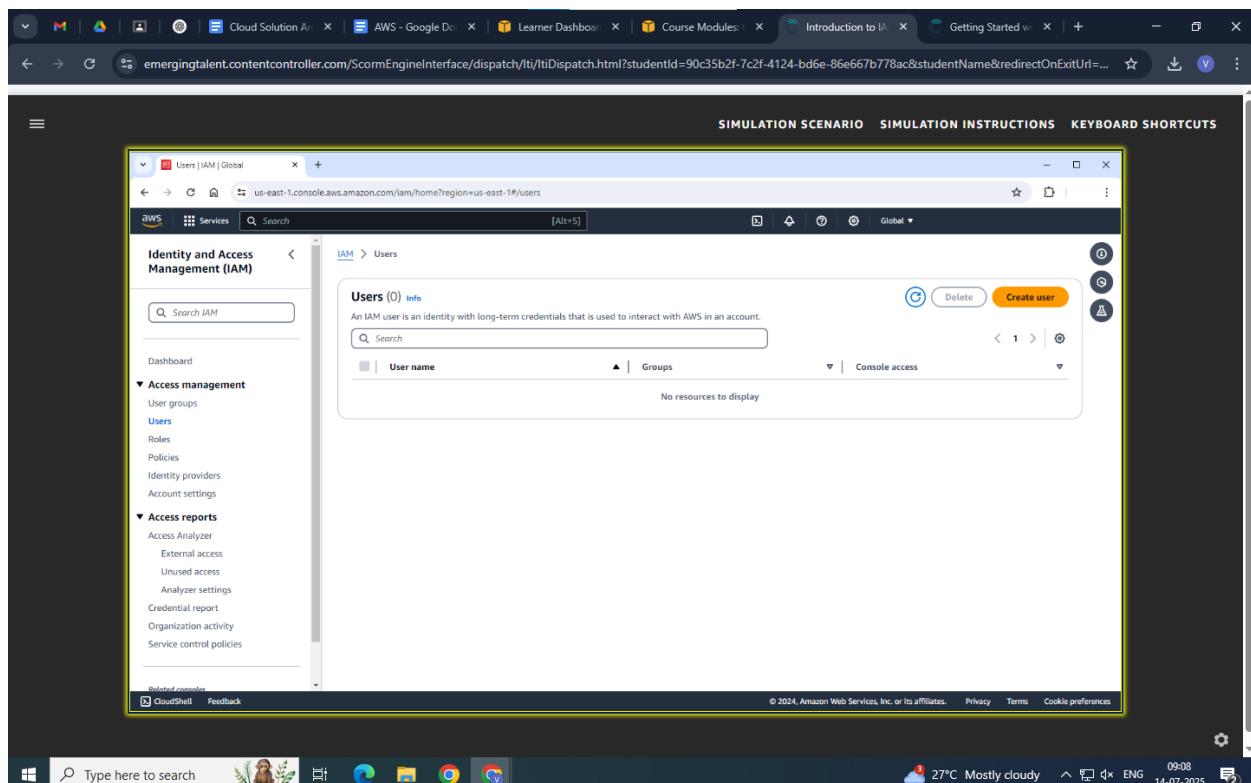
Task 3: Creating users and adding them to groups

Create user-1 and add to the S3-Support user group

19. In the left navigation pane, choose Users.

The screenshot shows the AWS Identity and Access Management (IAM) console. The left sidebar is collapsed. The main content area displays the 'User groups' section under the 'Access management' category. A green banner at the top indicates 'S3-Support user group created.' Below the banner, there is a table listing three user groups:

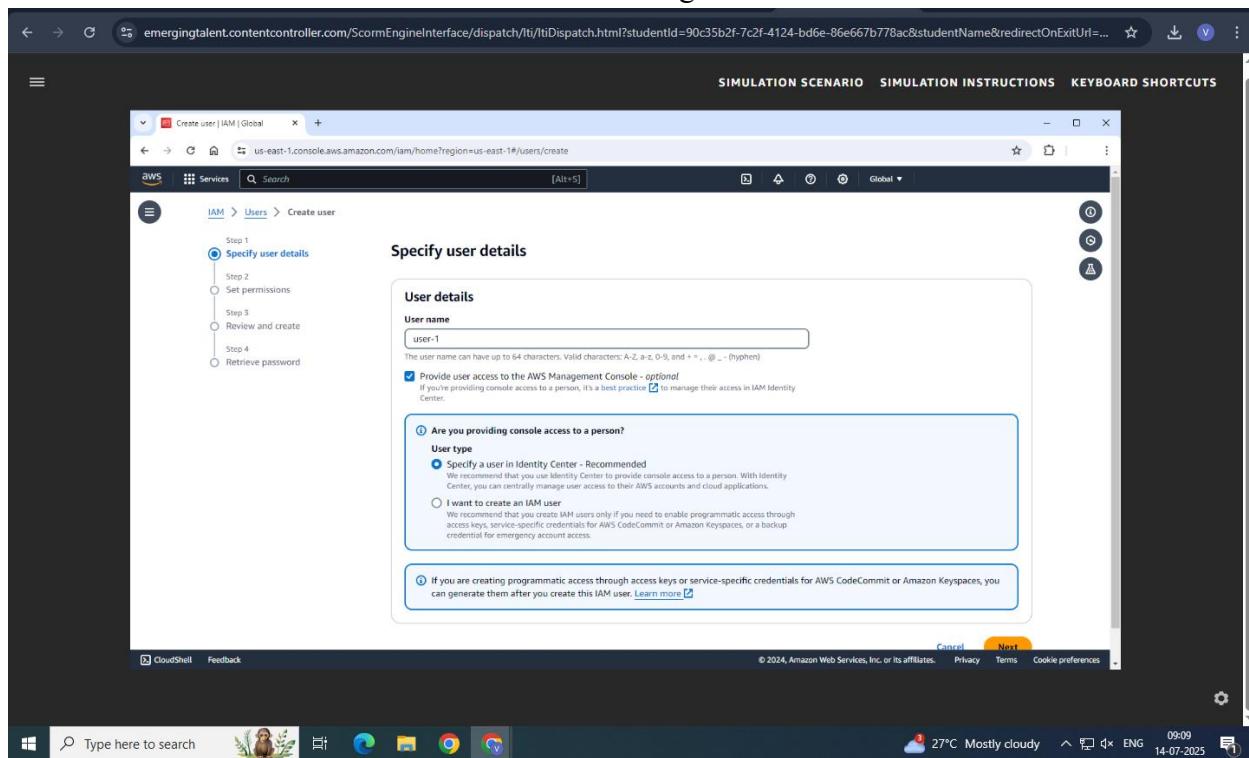
Group name	Users	Permissions
EC2-Admin	0	Defined
EC2-Support	0	Defined
S3-Support	0	Defined

20. Choose Create user.

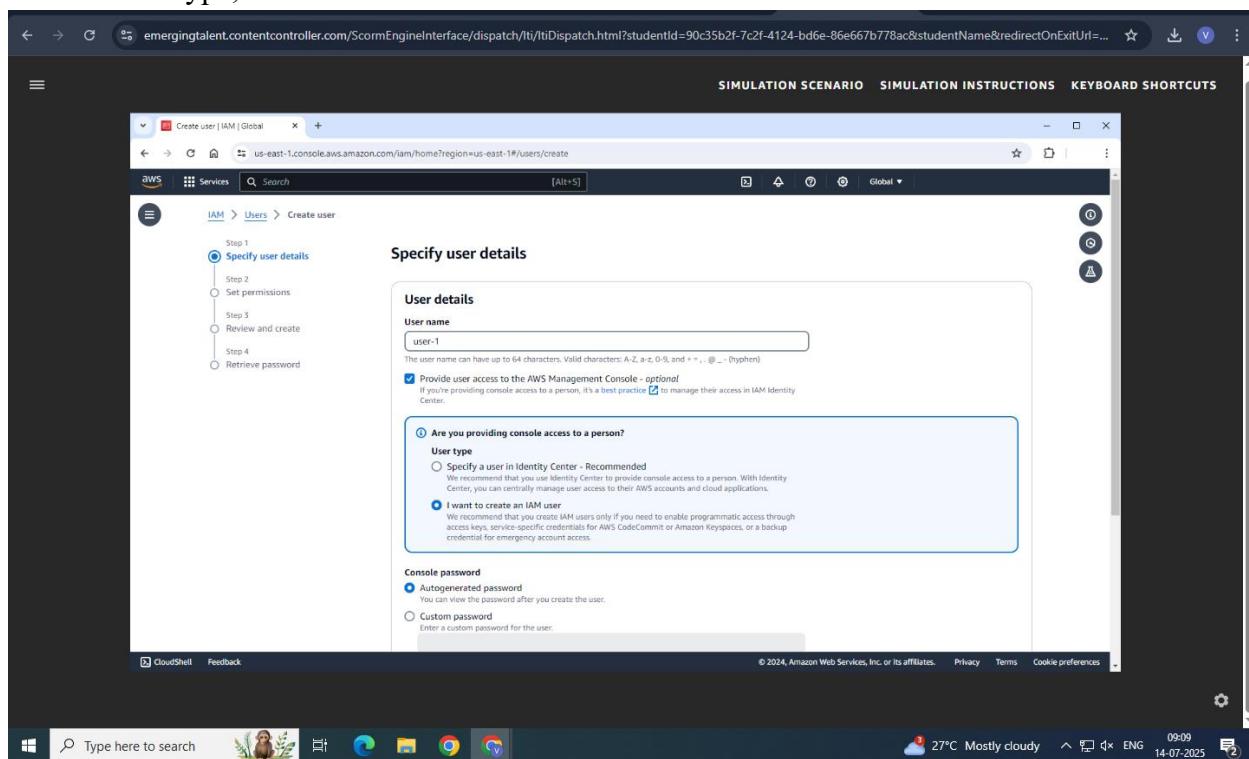
The screenshot shows the AWS Identity and Access Management (IAM) console. The left sidebar is collapsed. The main content area displays the 'Users' section under the 'Access management' category. A green banner at the top indicates 'Users (0) info'. Below the banner, there is a table with one row, which is currently empty. A yellow box highlights the 'Create user' button in the top right corner of the main content area.

21. In the User name field, enter user-1.

22. Select the Provide user access to the AWS Management Console check box.



23. For User type, choose I want to create an IAM user.



24. Choose the scroll bar and scroll down. Then, for Console password, choose Custom password.

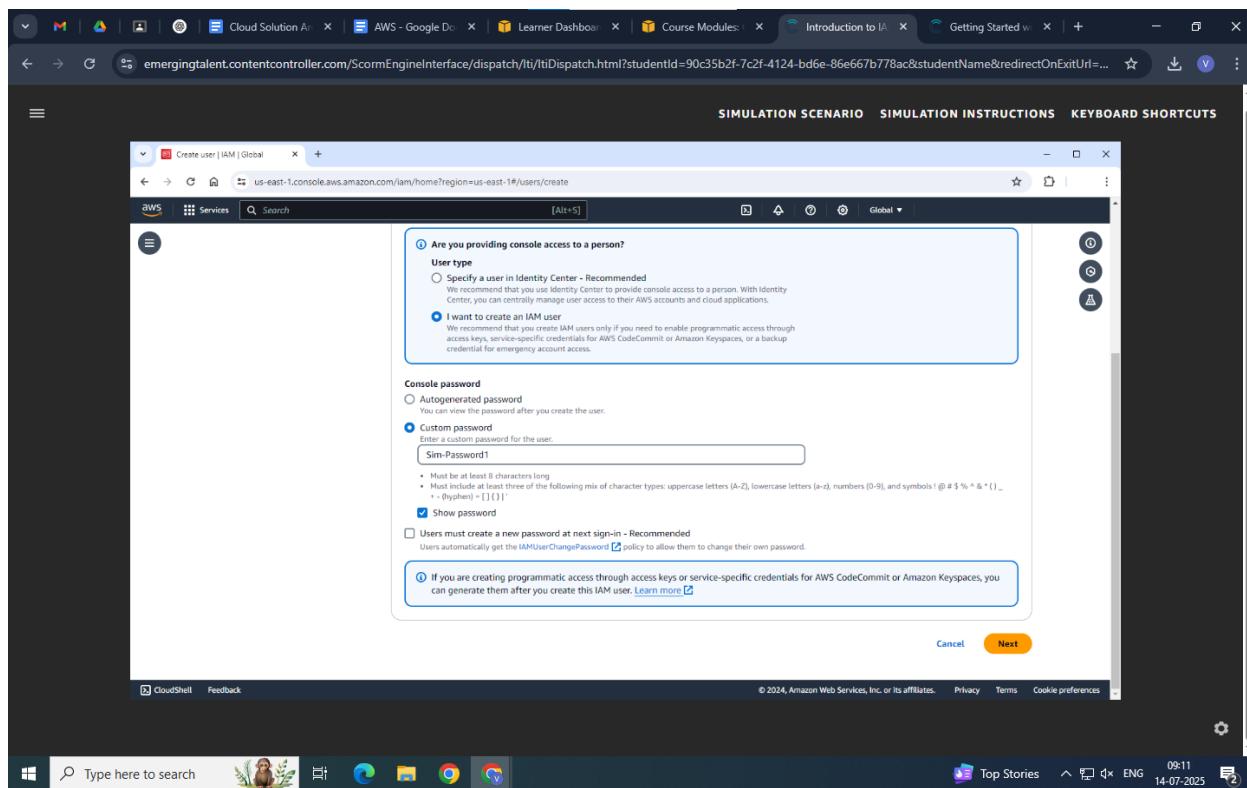
25. Select the Show password check box.

26. In the Custom password field, enter Sim-Password1.

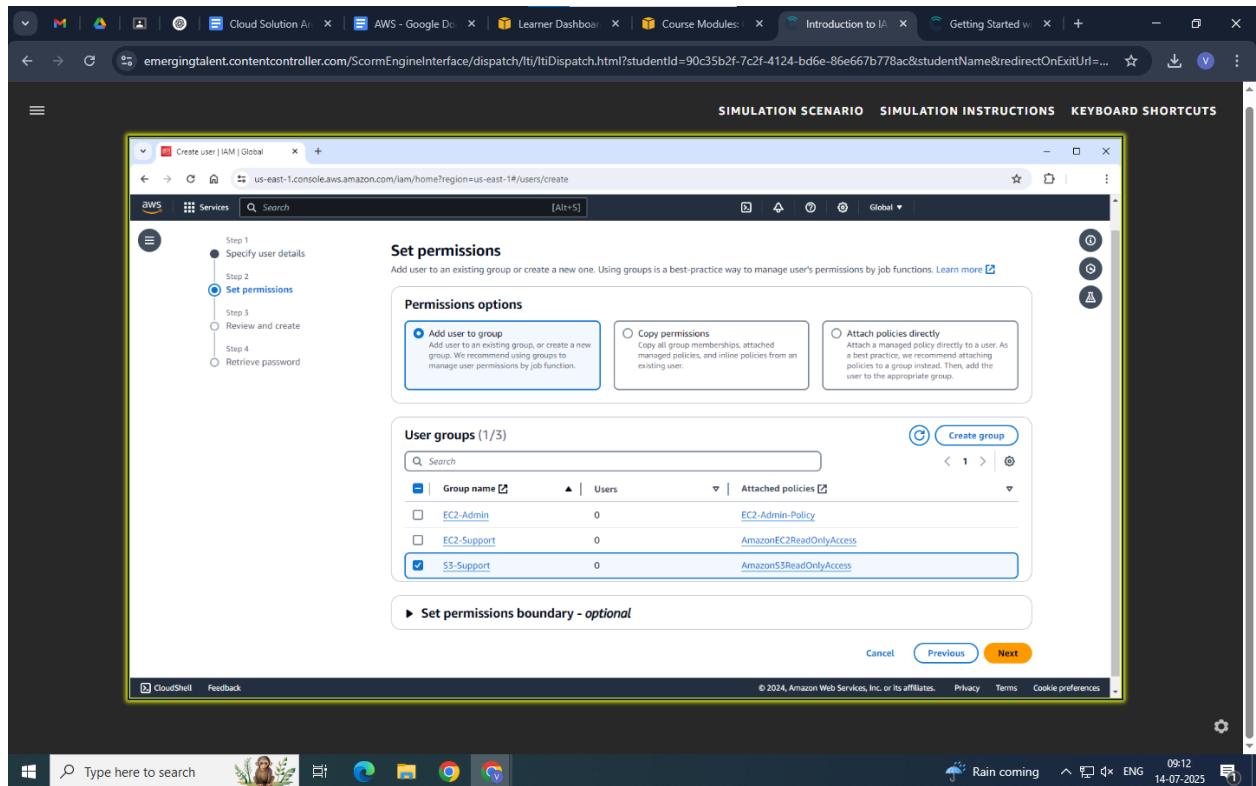
o Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.

27. Clear the User must create a new password at next sign-in check box

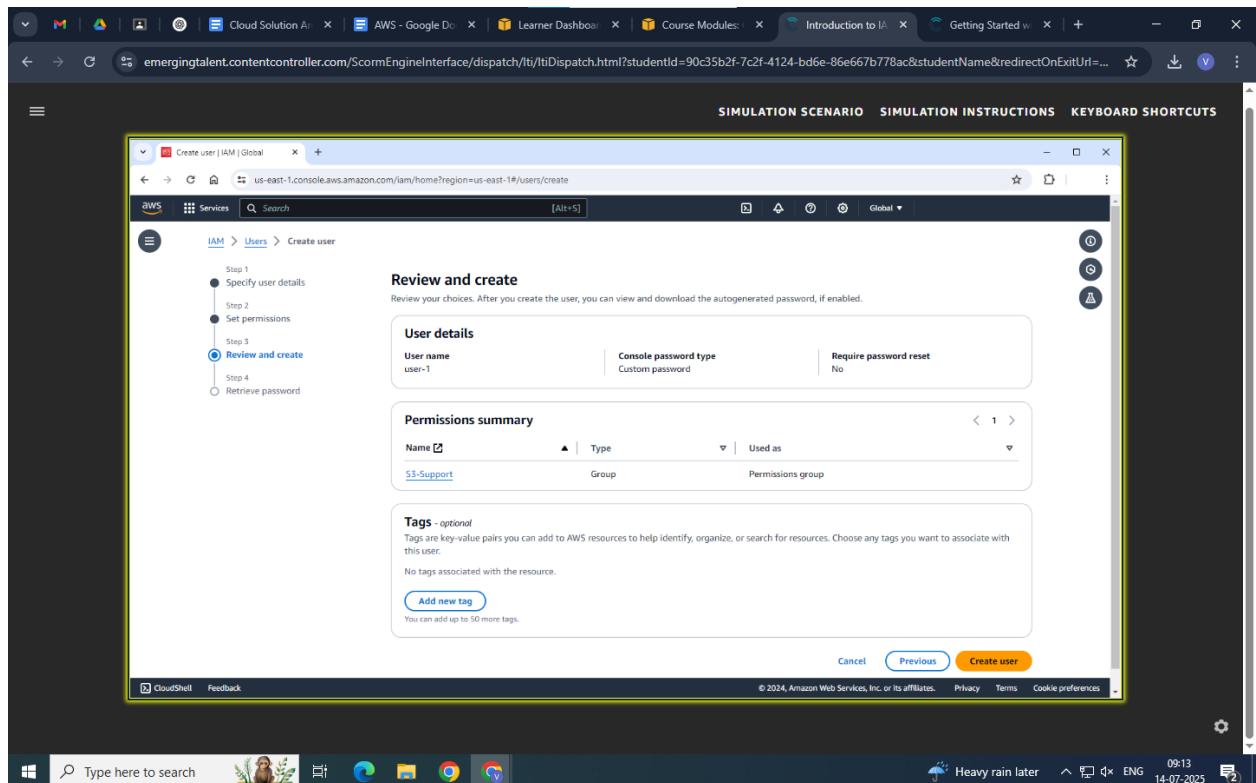
28. Choose Next.



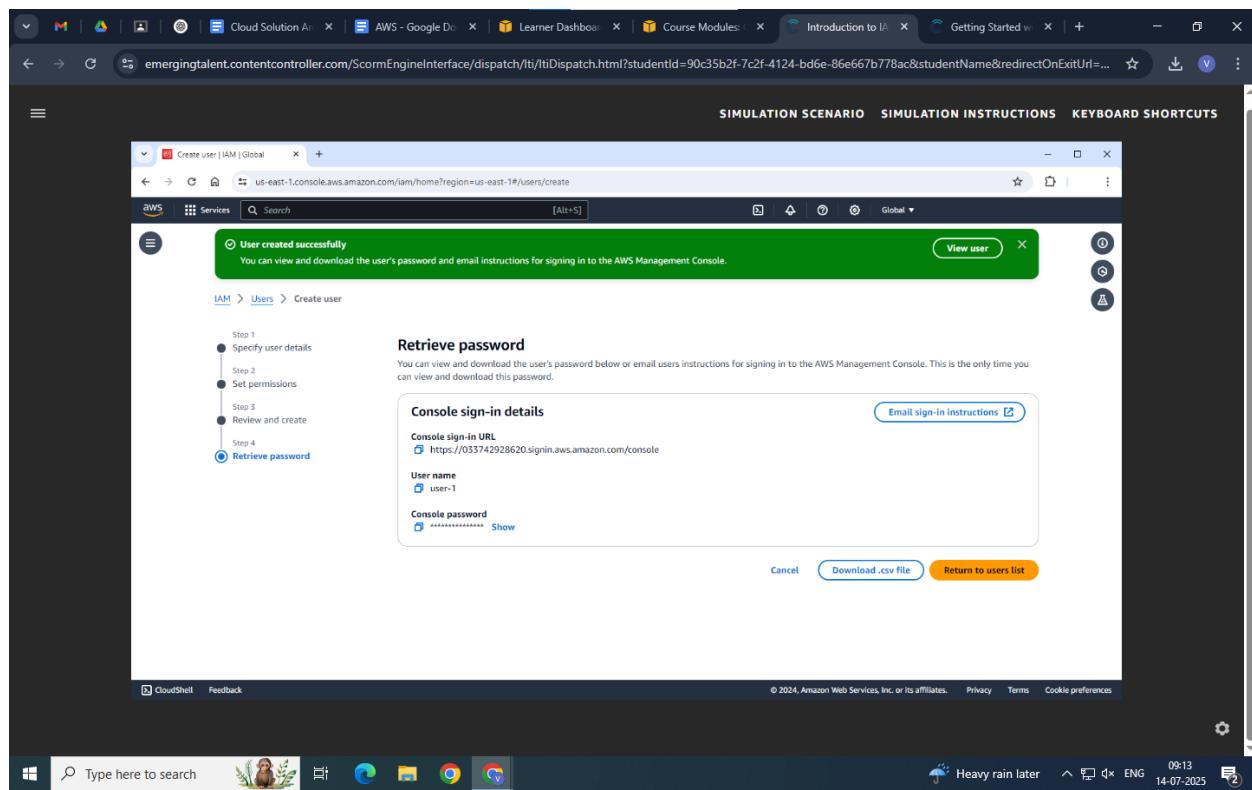
29. Keep the Permissions options default setting Add user to group selected. In the User groups list, select the S3-Support check box.



30. Choose Next. Take a moment to review the user details.

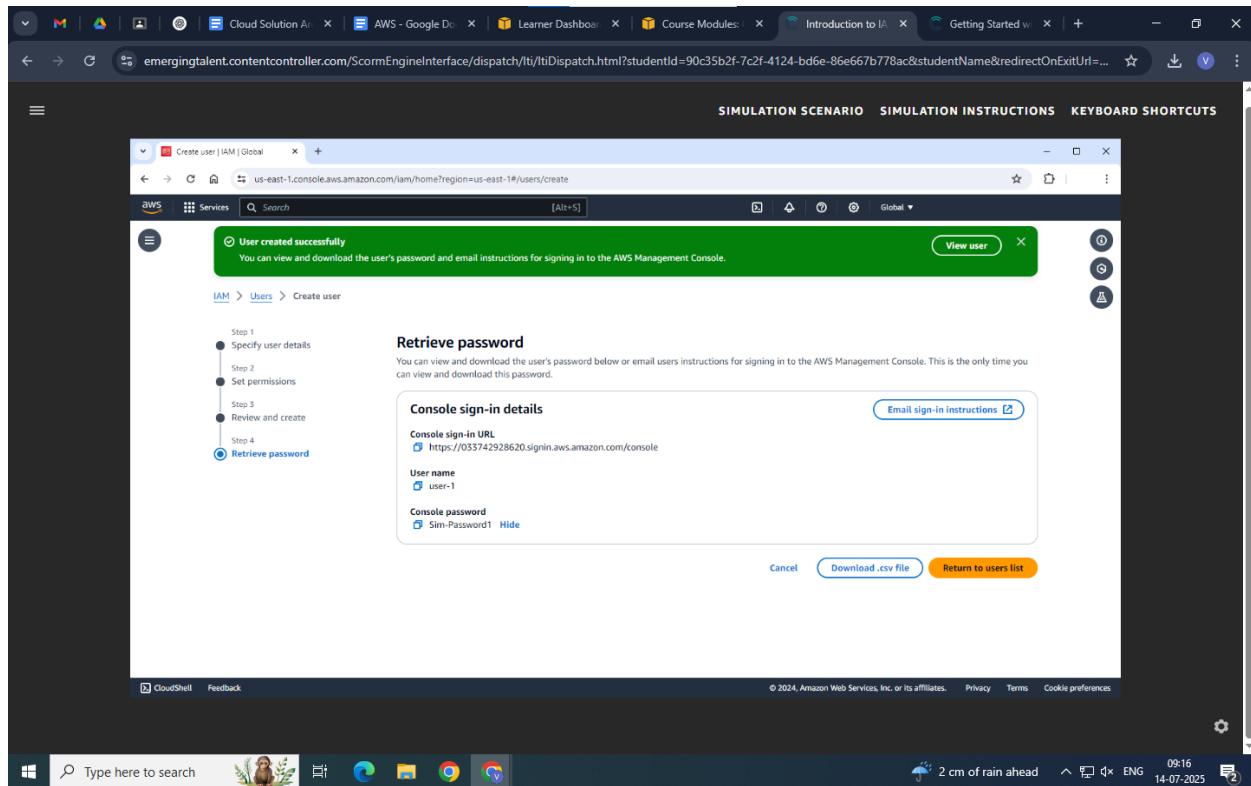


31. Choose Create User.

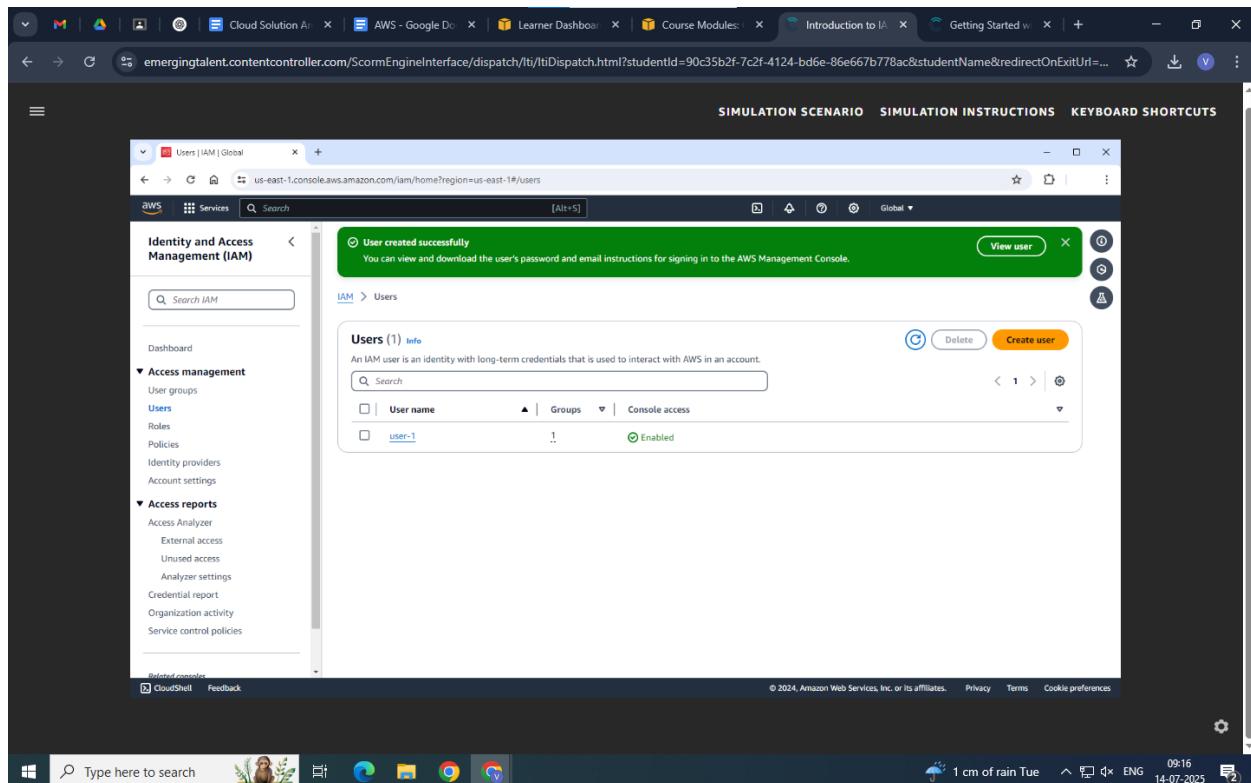


Now that the user is created, you are provided with an opportunity to review the Console password and to email sign-in instructions to the user.

32. On the Console sign-in details panel, choose Show to review the Console password.



33. Choose Return to users list.



Create user-2 and add to the S3-Support user group

34. Choose Create user.

35. In the User name field, enter user-2.

Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.

36. Select the Provide user access to the AWS Management Console check box.

37. For User type, choose I want to create an IAM user.

38. Choose the scroll bar and scroll down. Then for Console password, choose Custom password.

39. Select the Show password check box.

40. In the Custom password field, enter Sim-Password2.

o Note: To record your entry, press Enter on your keyboard or choose any place outside of the entry field.

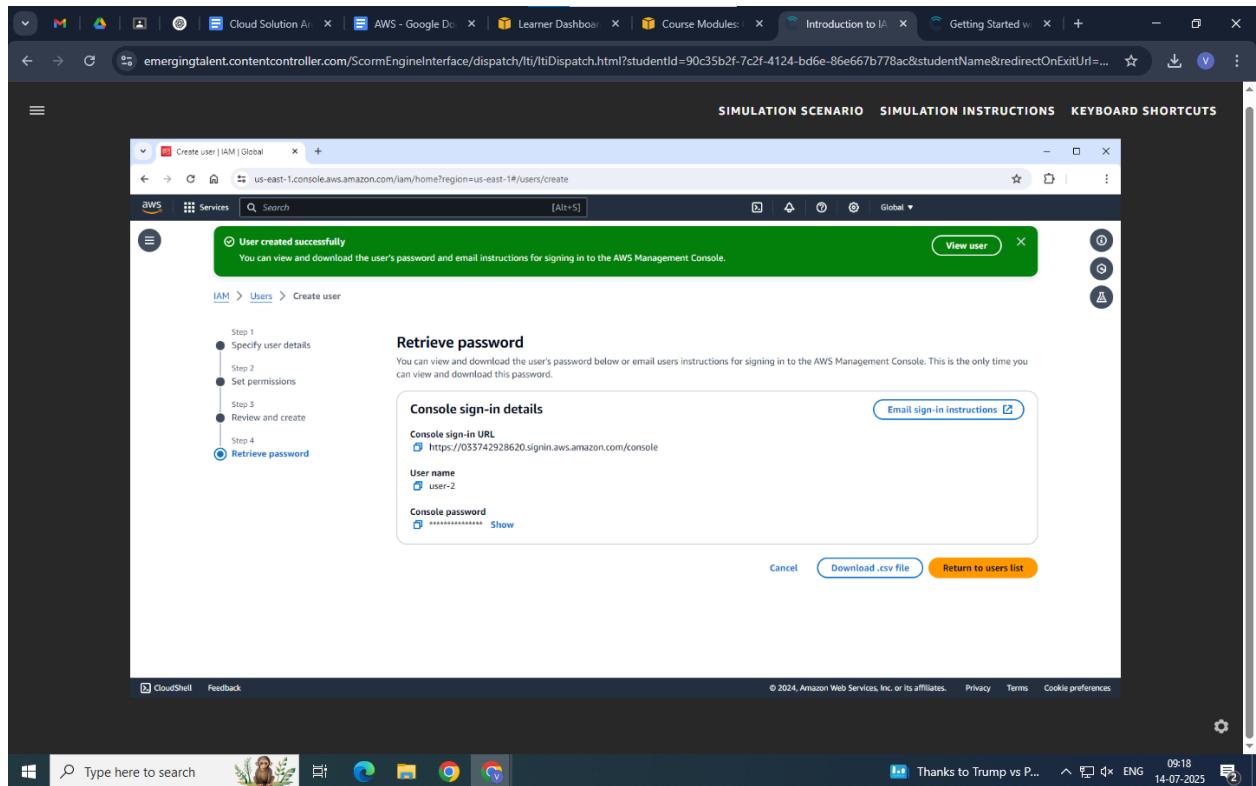
41. Clear the User must create a new password at next sign-in check box.

42. Choose Next.

43. Keep the Permissions options default setting Add user to group selected. 44. In the User groups list, select the EC2-Support check box.

45. Choose Next.

46. Choose Create User.



47. Choose Return to users list. You didn't receive this warning for user-1, because you reviewed the password by choosing Show. But you are confident that you know the password, so you continue to the user lists.

48. On the Continue without viewing or downloading console password pop-up box, choose Continue.

The screenshot shows the AWS IAM 'Create user' wizard in progress. The current step is 'Retrieve password'. A modal dialog box is displayed, asking if the user wants to 'Continue without viewing or downloading console password?'. The dialog includes a warning message: '⚠ You haven't viewed or downloaded this user's password. If you continue, you cannot retrieve the password in the future. Instead you must create a new password for the user.' There are 'Cancel' and 'Continue' buttons. In the background, the IAM console lists two users: 'user-1' and 'user-2', both of whom have 'Enabled' status under 'Console access'.

Create user-3 without adding the user to a group

you will not select a group to add user-3 to at this point

The screenshot shows the 'Create user' wizard in the AWS Management Console. The current step is 'Step 4: Retrieve password'. A green success message at the top states 'User created successfully'. Below it, instructions say 'You can view and download the user's password and email users instructions for signing in to the AWS Management Console. This is the only time you can view and download this password.' A 'View user' button is available. On the left, a sidebar shows the creation progress: Step 1 (Specify user details), Step 2 (Set permissions), Step 3 (Review and create), and Step 4 (Retrieve password). The 'Console sign-in details' section displays the 'Console sign-in URL' (https://033742928620.signin.aws.amazon.com/console), 'User name' (user-3), and 'Console password' (which is obscured). Buttons for 'Download .csv file' and 'Return to users list' are at the bottom.

The screenshot shows the 'Users' page in the AWS IAM console. The left sidebar includes 'Identity and Access Management (IAM)', 'Access management' (with 'Users' selected), and 'Access reports'. The main area displays a table of users:

User name	Groups	Console access
user-1	1	Enabled
user-2	1	Enabled
user-3	0	Enabled

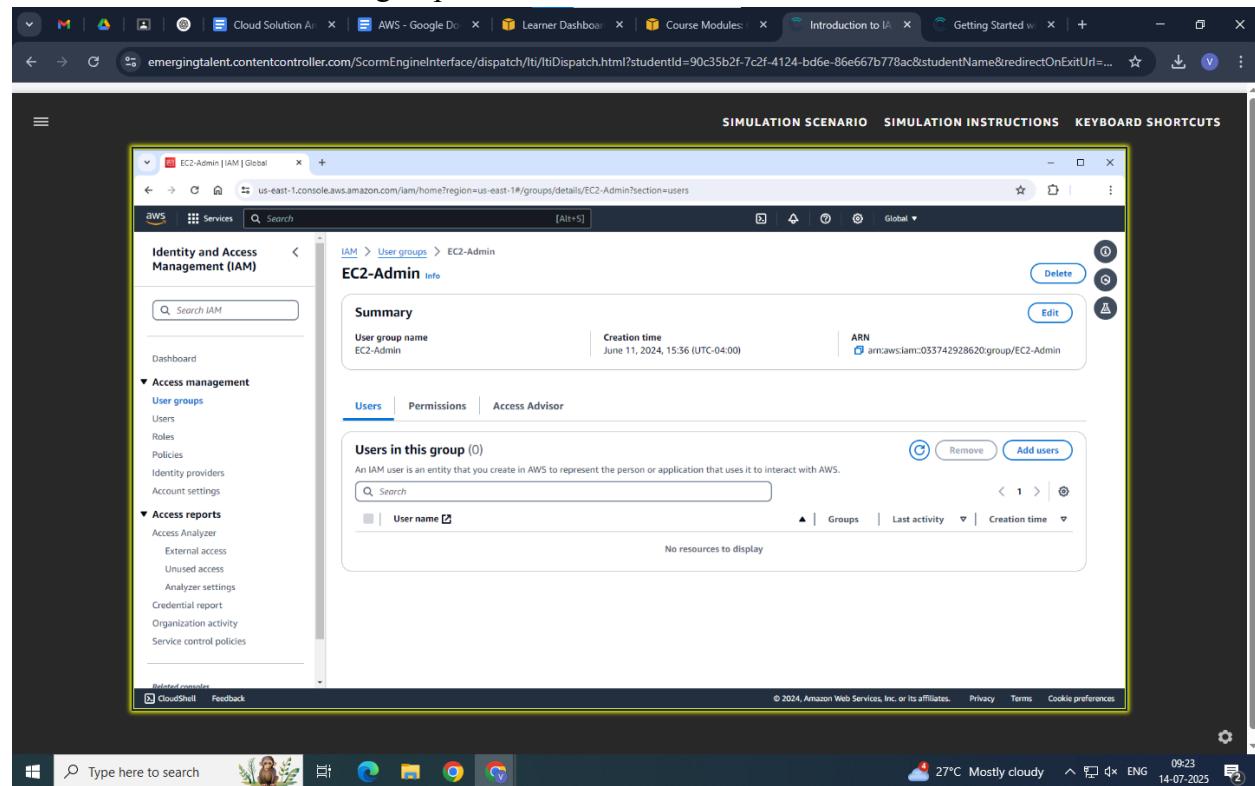
A pink banner at the bottom of the page reads: 'This completes Task 3: Creating users and adding them to user groups. Choose Continue.' A 'Continue' button is located at the bottom right.

Task 4: Using the user group to add users

An alternative way to add users to groups is to go into the group and add users. You will do this with our user-3 user.

62. In the left navigation pane, choose User groups.

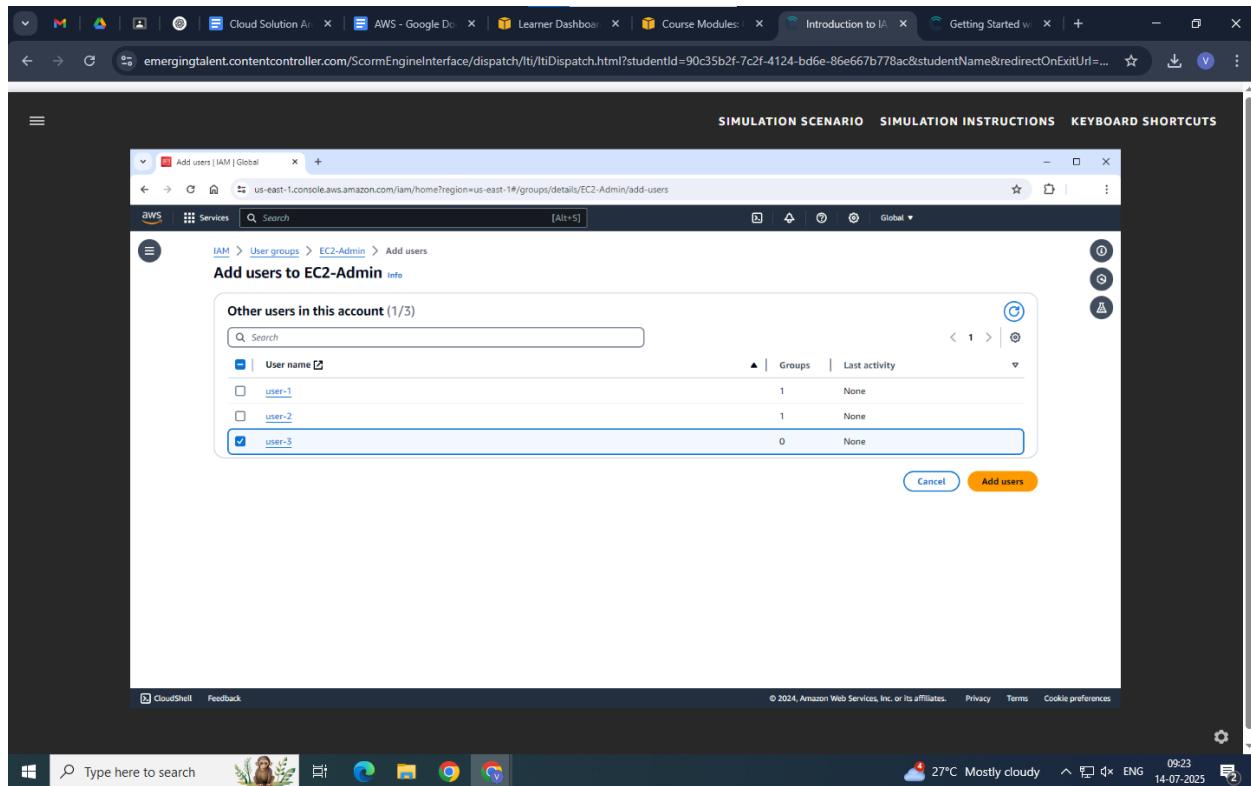
63. Choose the EC2-Admin group name.



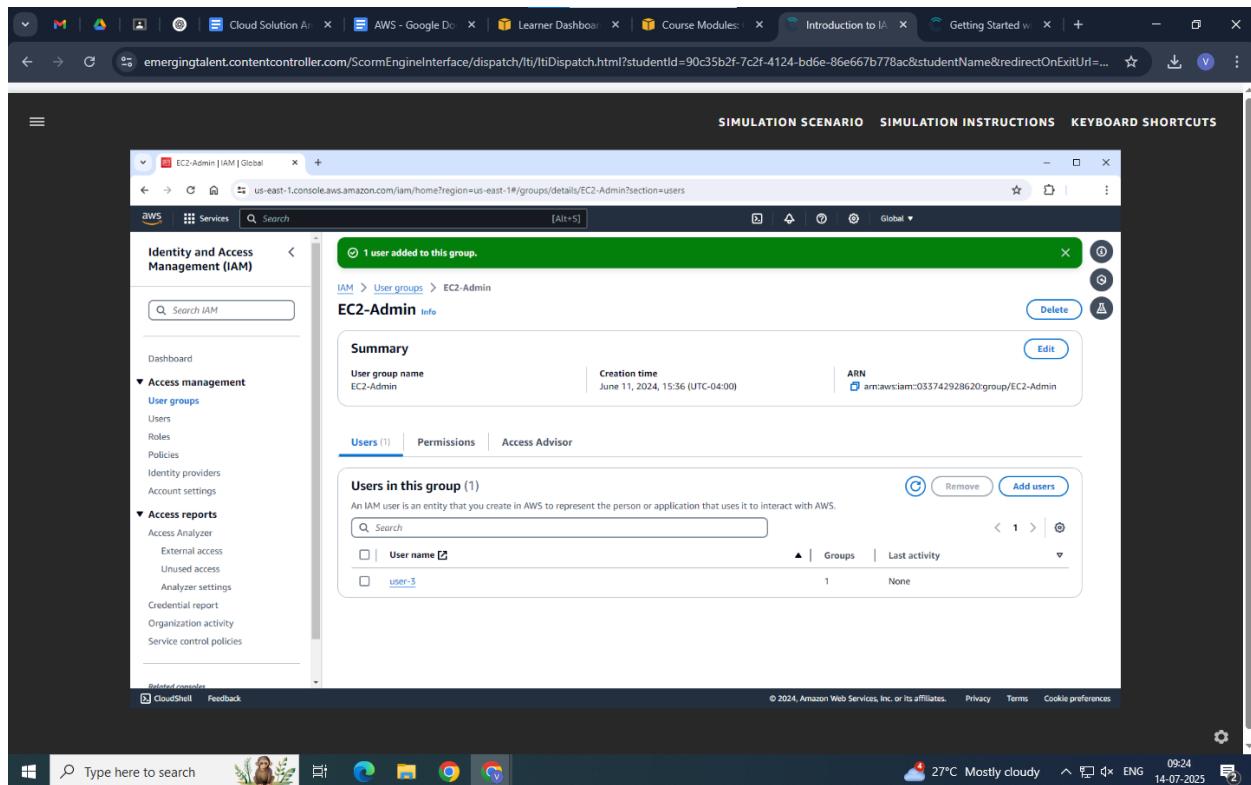
64. Choose Add users.

65. From the list of users, select the user-3 check box.

Adding users in this way can save a lot of time because you can add many users at once, instead of going into each user one by one. From here, you can also remove multiple users from a group at once.



66. Choose Add users.



67. In the left navigation pane, choose Users.

Notice that user-3 is now showing a 1 in the Groups column. This confirms that the user is now in a group.

The screenshot shows the AWS IAM service in the AWS Management Console. The left sidebar has 'Identity and Access Management (IAM)' selected. The main content area shows a table titled 'Users (3) Info' with columns for 'User name', 'Groups', and 'Enabled'. The table contains three rows: 'user-1' (Groups: 1, Enabled), 'user-2' (Groups: 1, Enabled), and 'user-3' (Groups: 1, Enabled). Above the table, a green banner displays the message '1 user added to this group.' At the bottom of the page, a pink box contains the text 'This completes Task 4: Using the user group to add users. Choose Continue.' The status bar at the bottom right shows the date and time as '14-07-2025 09:24'.

Task 5: Reviewing policies attached to a user

If you need to confirm access that any user has, you can review the policies attached to a user. Next, you will review the permission for user-2.

68. On the Users page, choose user-2 from the User name column.

The Permissions policy pane lists all of the policies that are attached to the user in the Policy name section. Policies that are directly attached to a user and policies that are inherited from the user belonging to a group will appear here.

The screenshot shows the AWS IAM User details page for 'user-2'. The 'Permissions' tab is selected, displaying the attached policies. One policy, 'AmazonEC2ReadOnlyAccess', is listed. The policy details show it's an AWS managed policy created on February 06, 2015.

69. In the Policy name section, choose AmazonEC2ReadOnlyAccess.

A new tab opens displaying the AmazonEC2ReadOnlyAccess information page.

The screenshot shows the AWS IAM Policy details page for 'AmazonEC2ReadOnlyAccess'. The 'Permissions defined in this policy' section lists the following actions:

Service	Access level	Resource	Request condition
CloudWatch	Limited: List, Read	All resources	None
EC2	Limited: List	All resources	None
EC2 Auto Scaling	Full: Read Limited: List	All resources	None
ELB	Full: List, Read	All resources	None

70. On the Permissions defined in this policy pane, choose JSON.

71. Choose the scroll bar to scroll down. From here, you can review the permission that this AWS managed policy grants to the user.

72. Close the AmazonEC2ReadOnlyAccess browser tab.

The screenshot shows the AWS IAM Policy Details page for the 'AmazonEC2ReadOnlyAccess' policy. The policy is an AWS managed policy. The 'Permissions' tab is selected, displaying the JSON document:

```
1: {
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "ec2:Describe",
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": "elasticloadbalancing:Describe",
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": [
        "cloudwatch:ListMetrics",
        "cloudwatch:GetMetricStatistics",
        "cloudwatch:Describe"
      ],
      "Resource": "*"
    }
  ]
}
```

At the bottom of the JSON document, there are 'Copy', 'Summary', and 'JSON' buttons. The 'JSON' button is highlighted. The browser's address bar shows the URL of the policy details page.

73. In the navigation pane on the left, choose Users.

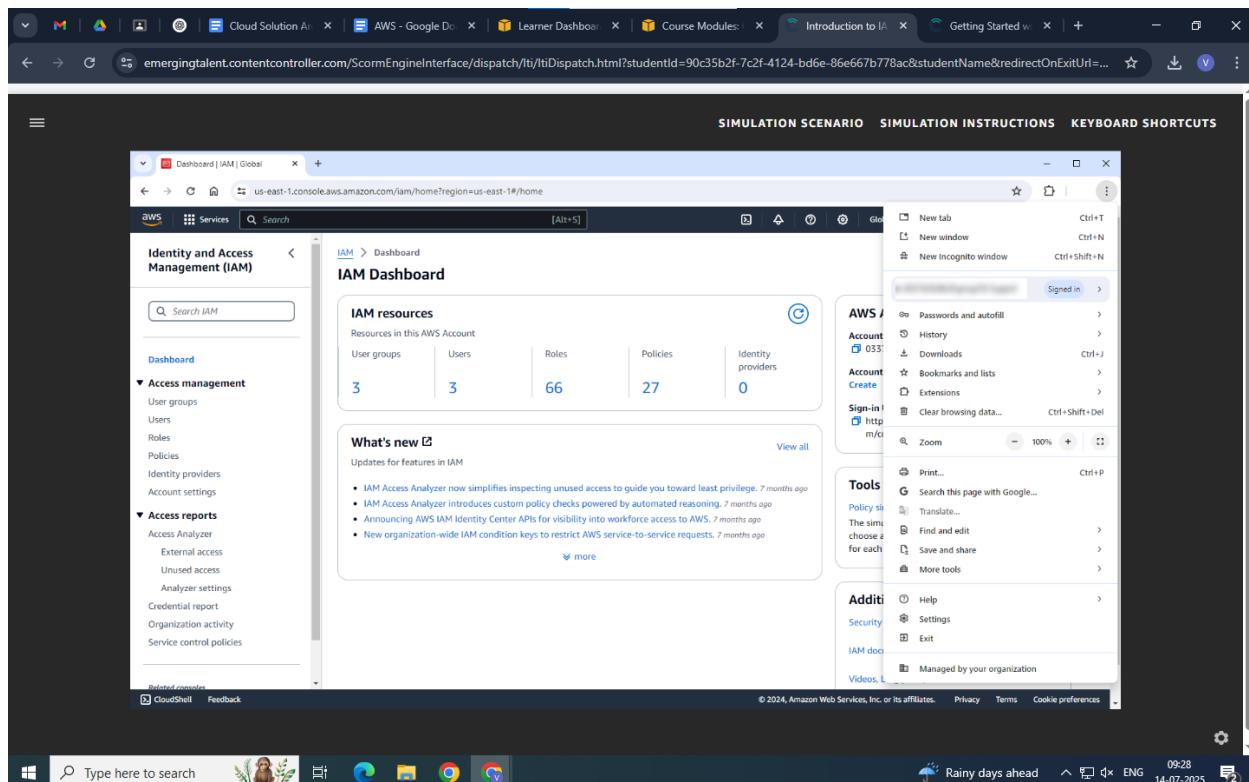
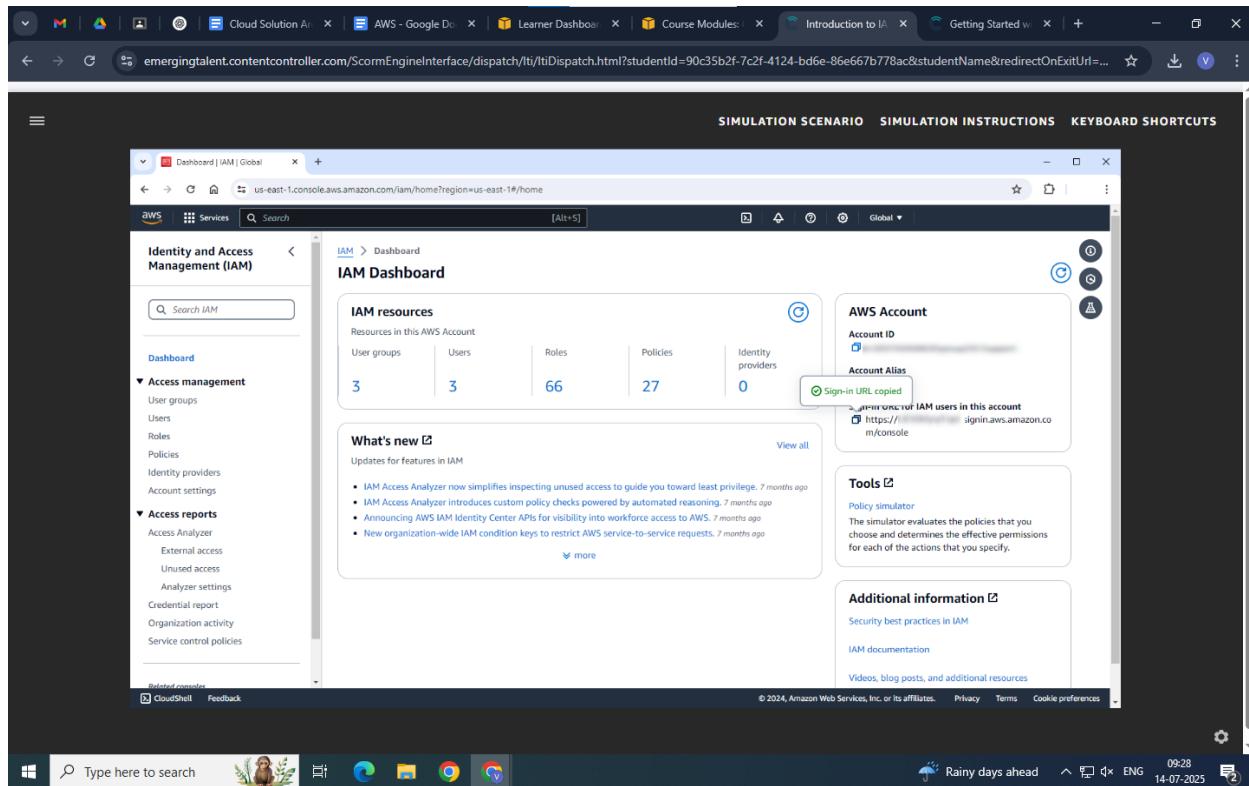
The screenshot shows the AWS Identity and Access Management (IAM) service in the AWS Management Console. The left sidebar navigation pane includes 'Identity and Access Management (IAM)', 'Dashboard', 'Access management' (with 'Users' selected), 'Roles', 'Policies', 'Identity providers', and 'Account settings'. The main content area displays the 'Users (3) Info' section. It lists three IAM users: 'user-1', 'user-2', and 'user-3'. Each user has 1 role and is marked as 'Enabled'. The table has columns for 'User name', 'Groups', and 'Console access'. At the bottom of the page, a pink banner states: 'This completes Task 5: Reviewing policies attached to a user. Choose Continue.' The browser's address bar shows the URL: 'emergingtalent.contentcontroller.com/ScormEngineInterface/dispatch/lti/ltiDispatch.html?studentId=90c35b2f-7c2f-4124-bd6e-86e667b778ac&studentName&redirectOnExitUrl='.

Task 6: Testing the access of user-1

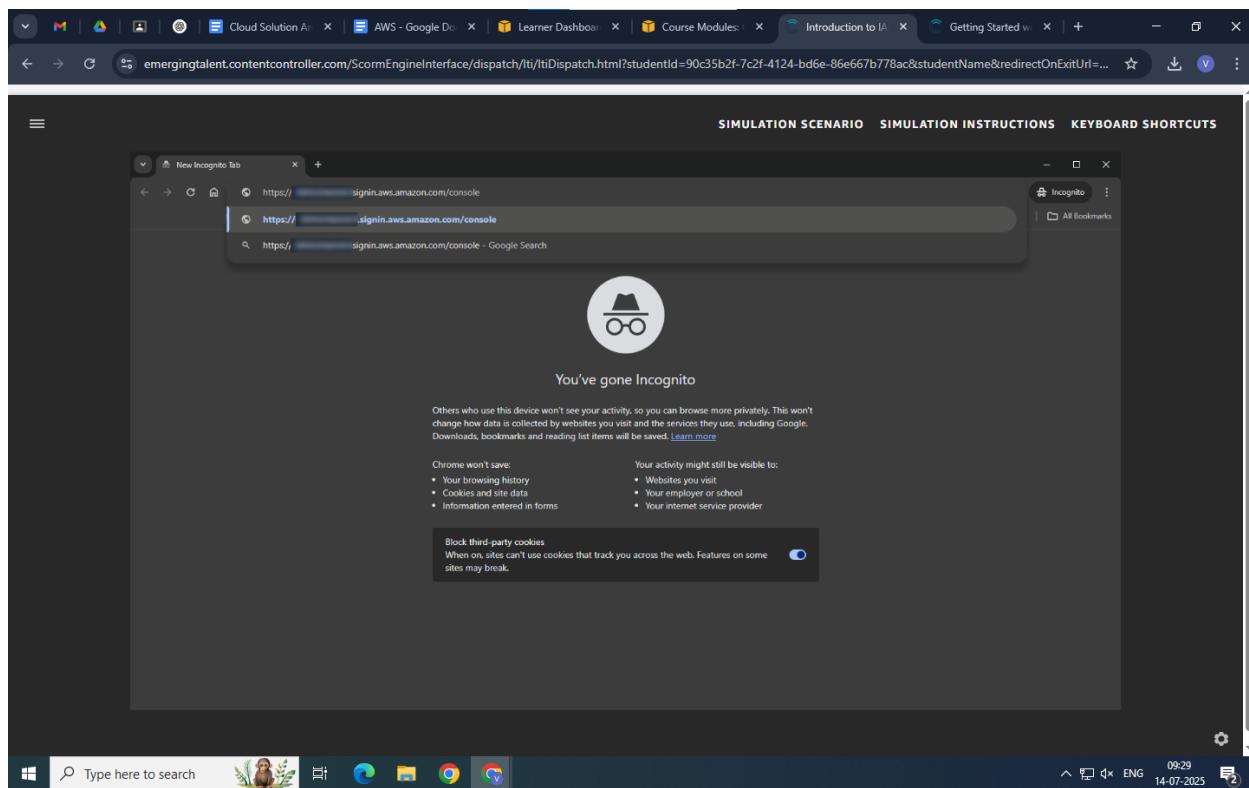
In this task, you will log in to the AWS Management Console as user-1 and test the permissions. User-1 is in the S3-Support group.

The S3-Support group has the AmazonS3ReadOnlyAccess policy attached to it. Therefore, user-1 should be able to go to the S3 console page and view buckets and content in the buckets. However, the user should not be able to upload or delete objects.

74. In the left navigation pane, choose Dashboard.
75. On the AWS Account pane, choose the copy icon for Sign-in URL for IAM users in this account to copy the link.



Open incognito window



Duplicate the tabs

Test user-1 permissions

82. Sign in with the following credentials: o IAM user name: user-1 o Password: Sim-Password1

The screenshot shows a web browser window with multiple tabs open. The active tab is a sign-in page for AWS Skill Builder. The URL in the address bar is https://us-east-2.signin.aws.amazon.com/oauth?client_id=arn%3aws%3signin%3A%3Aconsole%2Fcanvas&code_challenge=klEEDmaqDcfLkANsGUah83TYuYBvDuHyp49wPrJMMxM&co.... The page title is "Sign in as IAM user". It includes fields for "Account ID (12 digits) or account alias", "IAM user name" (with a value of "user-1" highlighted), "Password" (with a value of "*****" highlighted), and a "Remember this account" checkbox. Below these fields is a "Sign in" button. At the bottom of the form, there are links for "Sign in using root user email" and "Forgot password?". To the right of the form, there is a dark blue promotional banner for "AWS Skill Builder" with the text "Your new learning center to access 500+ free digital courses" and a "GET STARTED" button. The banner features a stylized 3D cube icon. The browser interface includes a top navigation bar with tabs for "SIMULATION SCENARIO", "SIMULATION INSTRUCTIONS", and "KEYBOARD SHORTCUTS". The status bar at the bottom of the screen shows system information like "2 cm of rain ahead", the date "14-07-2025", and the time "09:29".

The screenshot shows the AWS Console Home page. In the 'Recently visited' section, 'S3' is listed. On the right, under 'Applications', there is a table with one row:

Name	Description	Region	Originating account
Access denied			

Below the table, it says 'Cost and usage' and shows 'Access denied' for current month costs and cost breakdown.

83. In the Recently visited section, choose S3.

84. Choose the sim-website bucket

The screenshot shows the AWS S3 buckets page. On the left, the navigation pane includes 'Amazon S3' and 'Storage Lens'. The main area shows a table of buckets:

Name	AWS Region	IAM Access Analyzer	Creation date
cloudtrail-awslogs-033742928620-vgaiwt4-lsengard-do-not-delete	US East (N. Virginia) us-east-1	View analyzer for us-east-1	March 18, 2021, 14:54:43 (UTC-04:00)
do-not-delete-gatedrgarden-audit-033742928620	US West (Oregon) us-west-2	View analyzer for us-west-2	April 1, 2021, 07:00:01 (UTC-04:00)
sagemaker-us-east-1-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 22, 2021, 11:12:16 (UTC-04:00)
sim-website	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 4, 2024, 15:53:27 (UTC-04:00)

The screenshot shows the AWS S3 console with the 'Objects' tab selected. The bucket 'sim-website' contains the following objects:

Name	Type	Last modified	Size	Storage class
index.html	html	June 5, 2024, 12:27:06 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

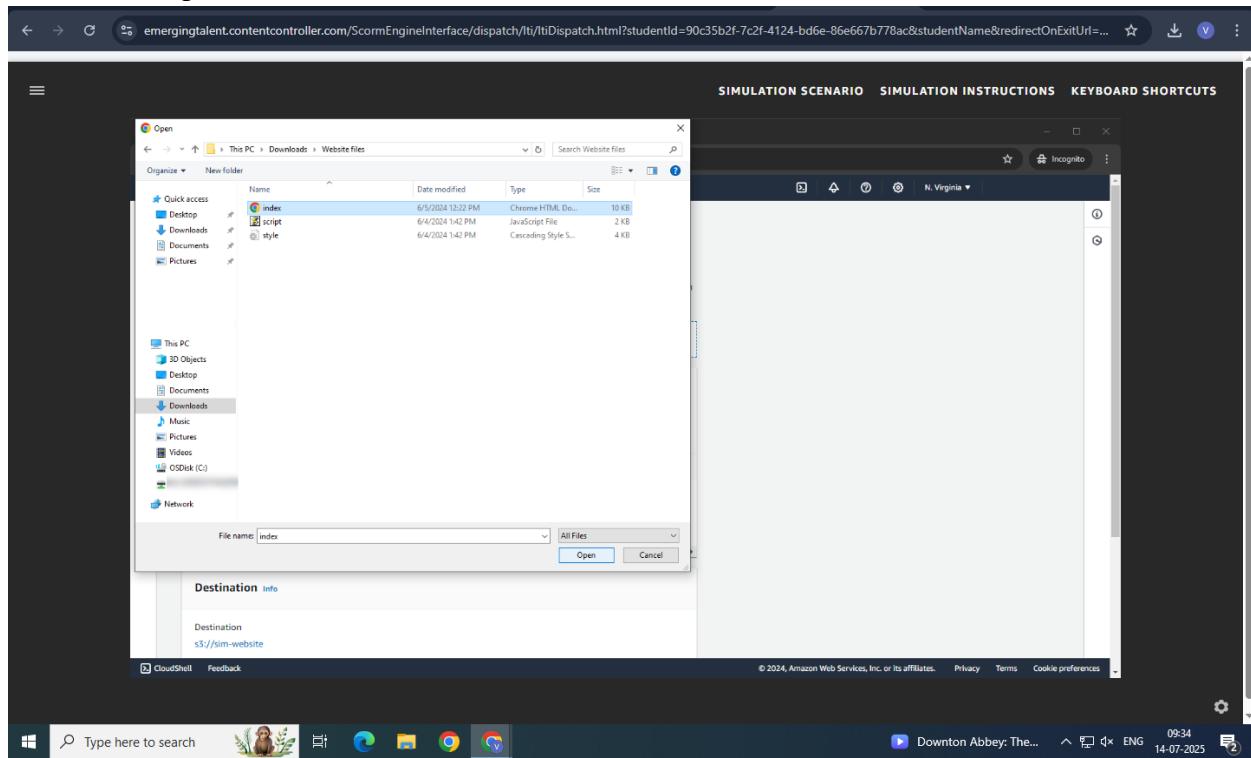
85. Choose Upload.

The screenshot shows the AWS S3 console with the 'Upload' page selected. The 'Destination' is set to 's3://sim-website'. The 'Add files or Add folder' button is highlighted.

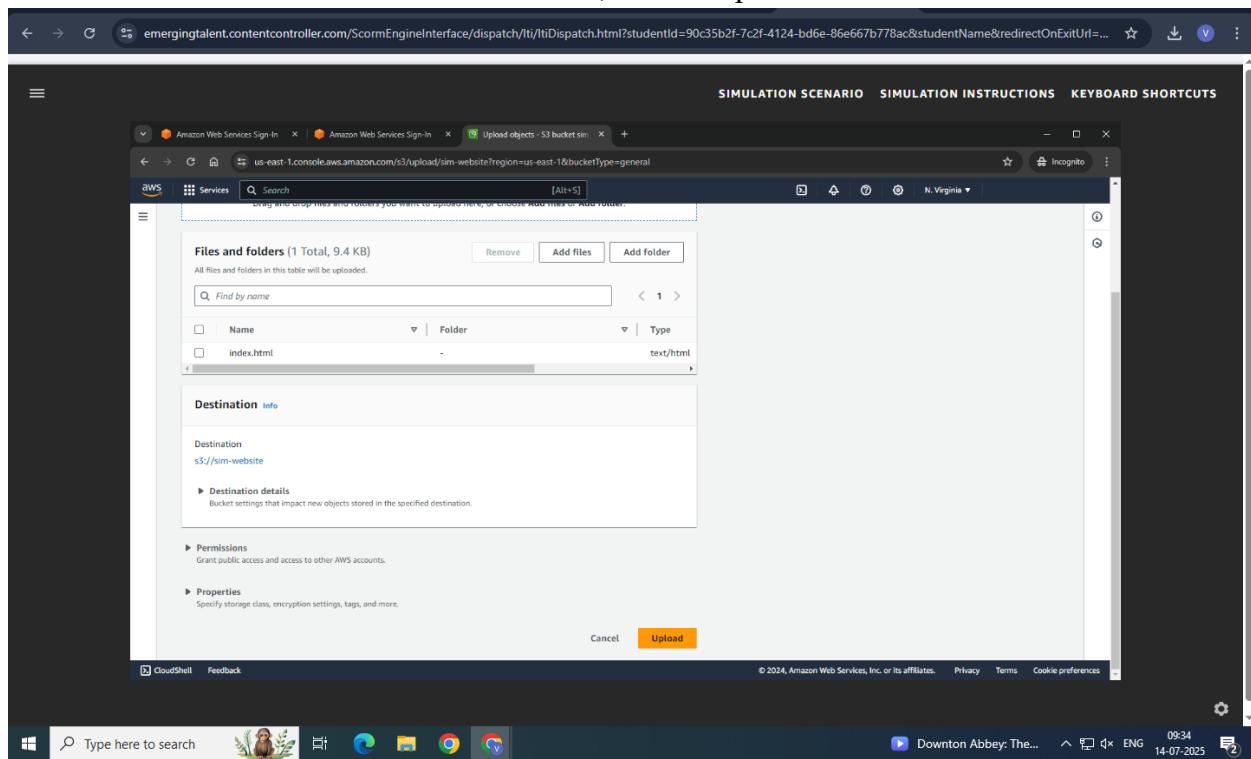
86. Choose Add files.

87. Select the Index.html file.

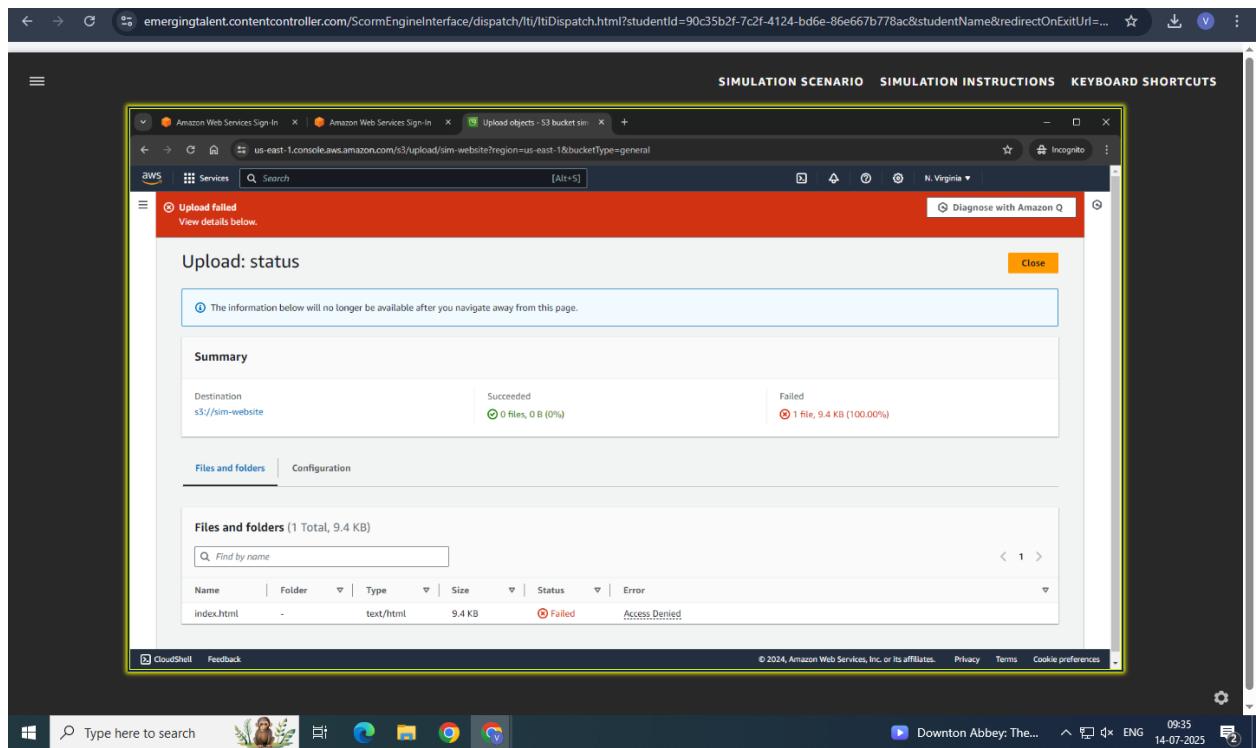
88. Choose Open.



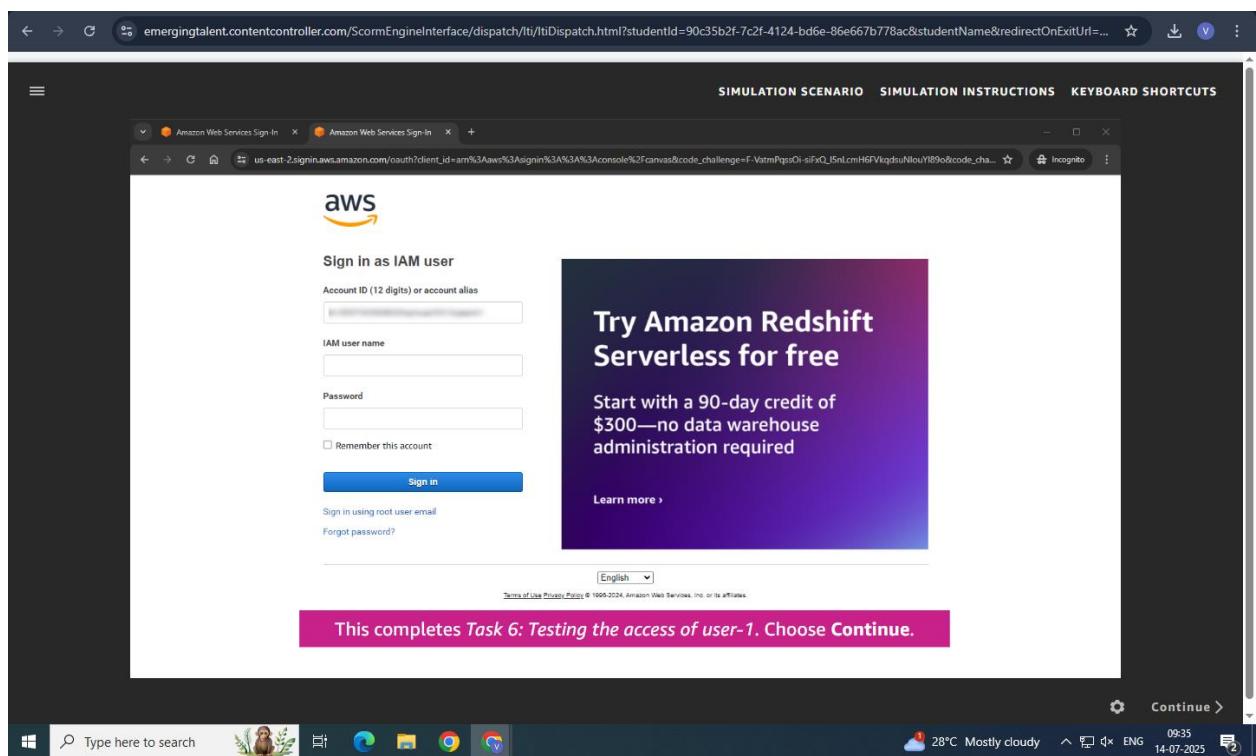
89. Choose the scroll bar to scroll down. Then, choose Upload.



The failed upload message confirms that the user's permissions are working as expected.



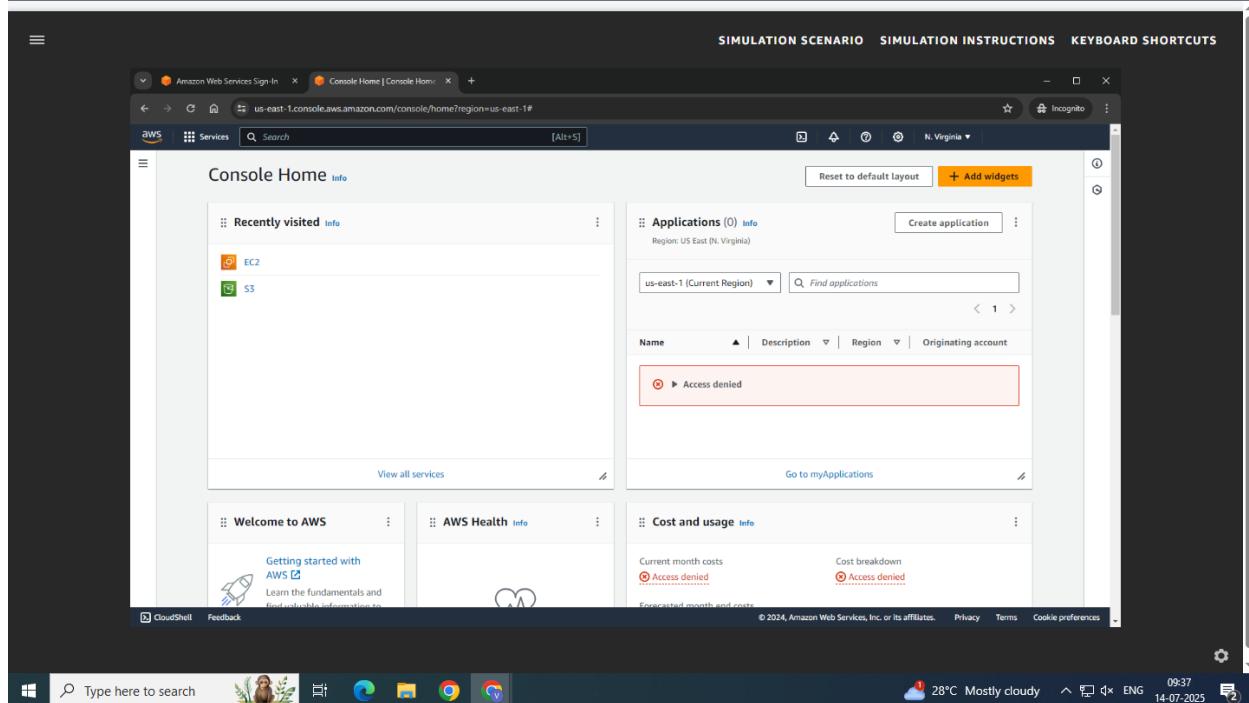
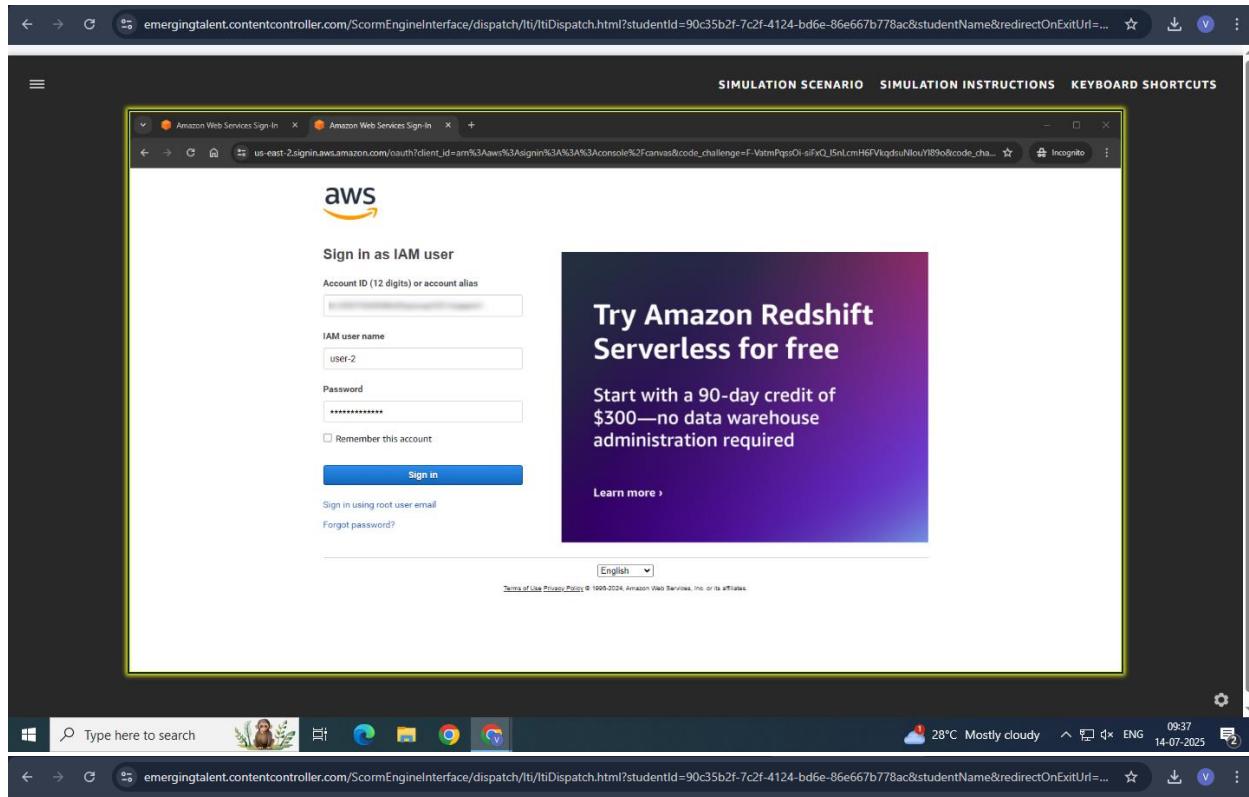
90. Close the browser tab.



Task 7: Testing the access of user-2

91. Sign in with the following credentials:

- o IAM user name: user-2
- o Password: Sim-Password2



92. In the Recently visited section, choose EC2.

93. In the left navigation pane, choose Instances.

You can see two EC2 instances. However, you cannot make any changes to Amazon EC2 resources because you have read-only permissions.

The screenshot shows the AWS Management Console with the EC2 Instances page open. The left sidebar is collapsed. The main content area shows two EC2 instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Application server	i-0aeba3d612be4e6ec	Running	t2.micro	Initializing	View alarms	us-east-1c	ec2-18-206-57-2
Web server	i-07146fc8b741e6371	Running	t2.micro	Initializing	View alarms	us-east-1c	ec2-54-84-157-3

A modal window titled "Select an instance" is overlaid on the page. The status bar at the bottom right shows the date and time as 14-07-2025 09:38.

94. Select the Application server instance check box.

The screenshot shows the AWS EC2 Instances page. There are two instances listed:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Application server	i-0aeba3d612be4e6ec	Running	t2.micro	Initializing	View alarms	us-east-1c	ec2-18-206-57-2
Web server	i-07146fc8b741e6371	Running	t2.micro	Initializing	View alarms	us-east-1c	ec2-54-84-157-3

The "Application server" instance is selected. Its details are displayed in the center pane:

Details | Status and alarms | Monitoring | Security | Networking | Storage | Tags

Instance summary

Instance ID	i-0aeba3d612be4e6ec	Public IPv4 address	18.206.57.247 open address
IPv6 address	-	Instance state	Running
Hostname type	IP name: ip-172-31-93-120.ec2.internal	Private IP DNS name (IPv4 only)	ip-172-31-93-120.ec2.internal

At the bottom right of the main pane, there is a note: "© 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences".

95. Choose the Instance state menu. Then, choose Stop instance.

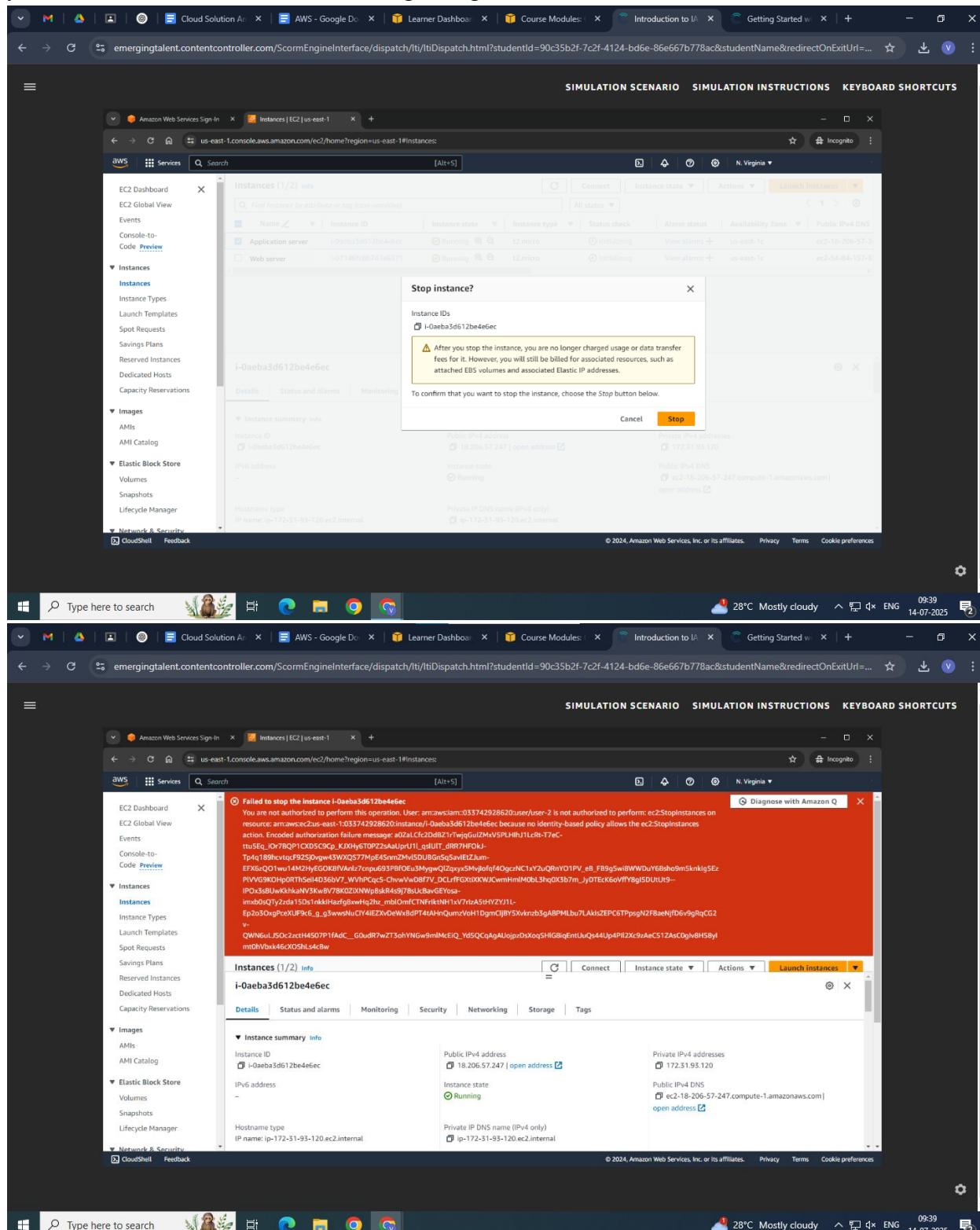
The screenshot shows the AWS EC2 Instances page with the "Actions" dropdown menu open. The "Stop instance" option is highlighted.

Actions

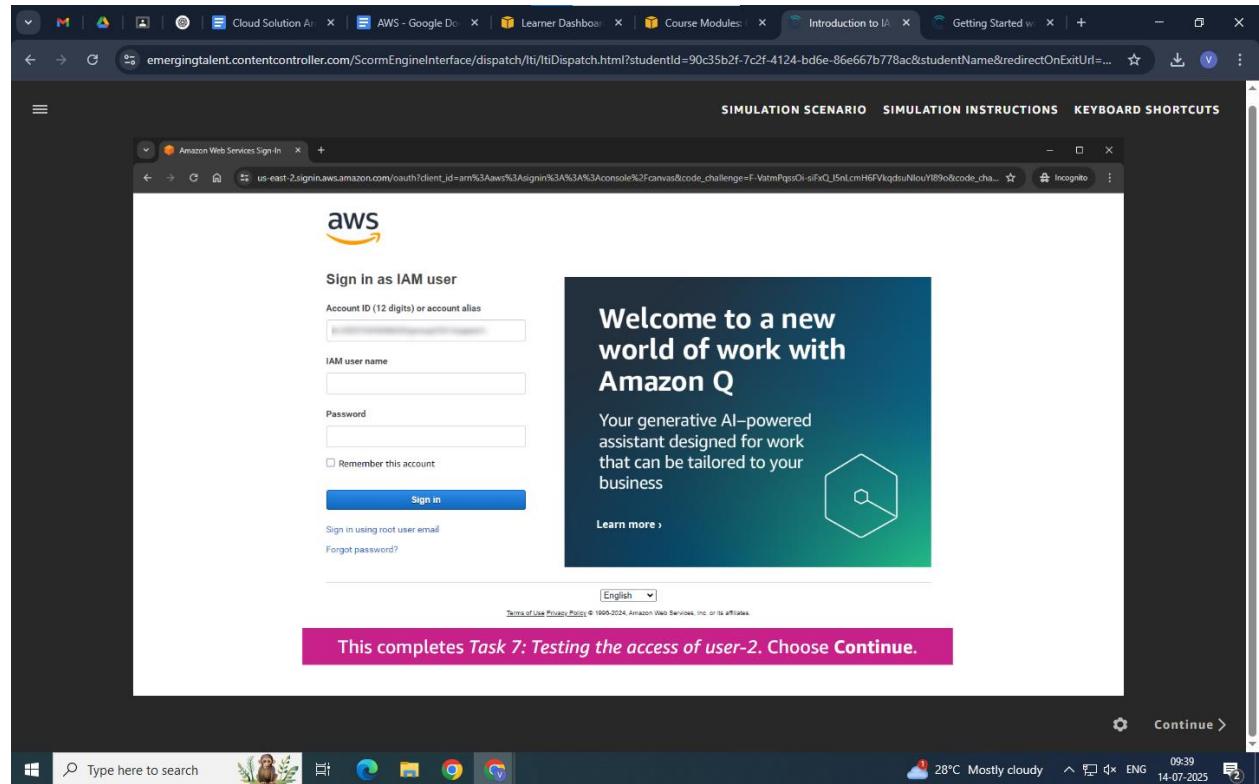
- Stop instance
- Start instance
- Reboot instance
- Hibernate Instance
- Terminate Instance

The rest of the page displays the same information as the previous screenshot, including the two running instances and their details.

96. To confirm you want to stop the instance, choose Stop. An error message appears that says, You are not authorized to perform this operation. This demonstrates that the policy only allows you to view information without making changes.



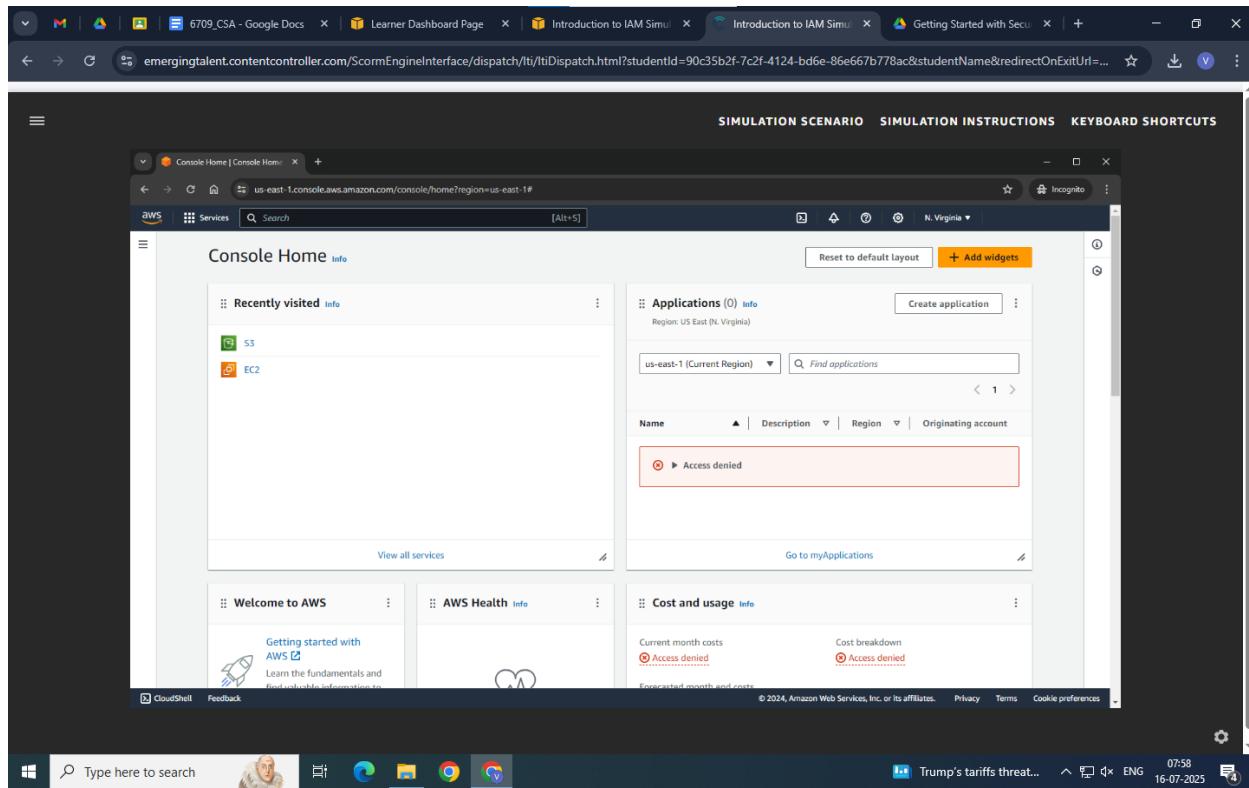
97. Close the Instances browser tab.



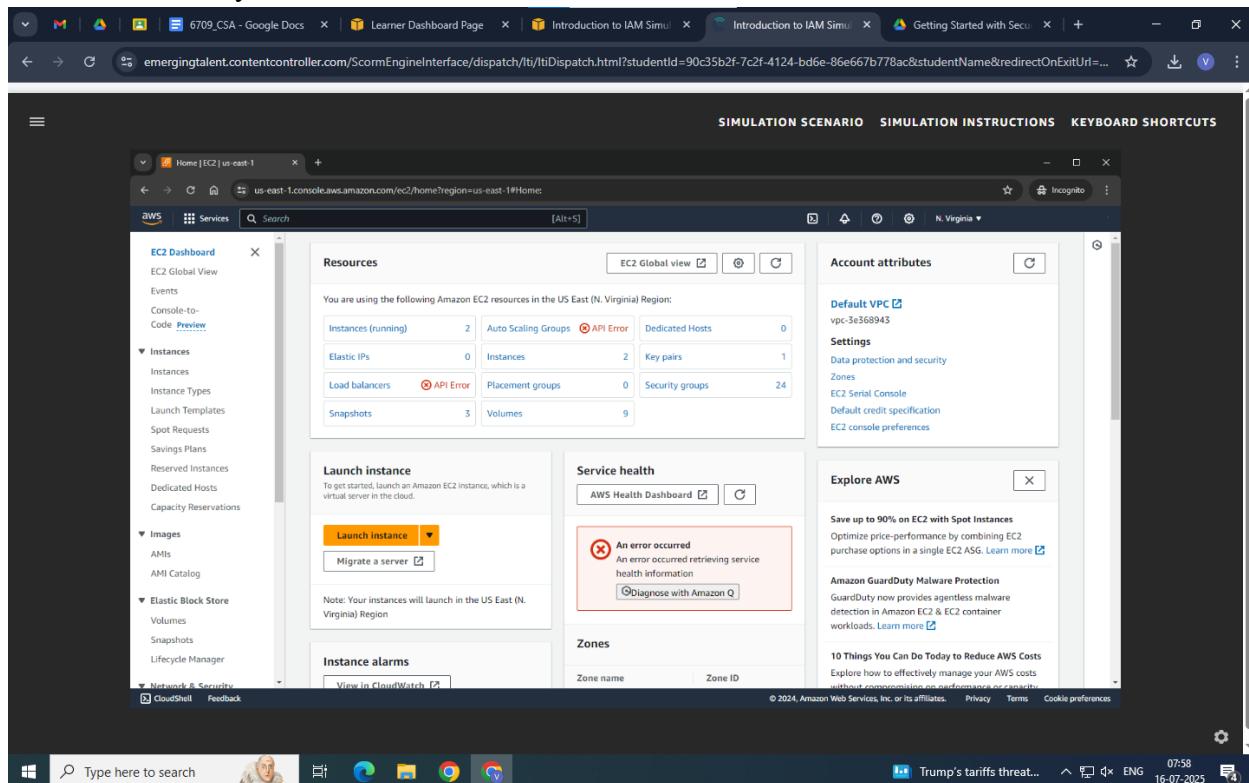
Task 8: Testing the access of user-3

98. Sign in with the following credentials:

- o IAM user name: user-3
- o Password: Sim-Password3

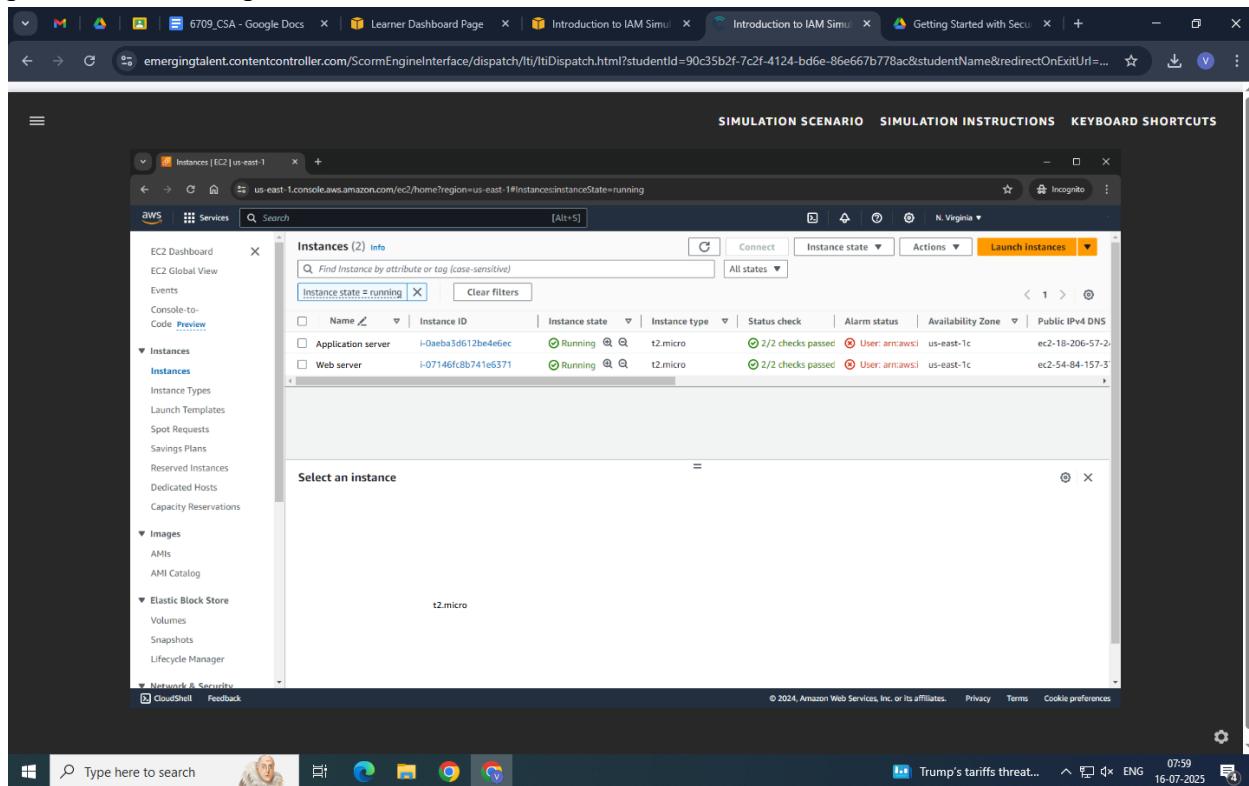


99. In the Recently visited section, choose EC2.



100. In the Resources pane, choose Instances (running).

EC2 instances are listed. As an Amazon EC2 Administrator, this user should have permissions to Stop the EC2 instance.



The screenshot shows the AWS Management Console interface for the EC2 service. The left sidebar navigation menu is visible, with 'Instances' selected under the 'EC2' category. The main content area displays a table of running EC2 instances. There are two rows: one for an 'Application server' and one for a 'Web server'. Both instances are in the 'Running' state, t2.micro instance type, and located in the 'us-east-1c' availability zone. The table includes columns for Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, and Public IPv4 DNS. A modal window titled 'Select an instance' is open at the bottom, listing the two instances. The status bar at the bottom right shows the date and time as '16-07-2025 07:59'.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Application server	i-0ebe3d612be4e6ec	Running	t2.micro	2/2 checks passed	User: arn:aws:lambda:us-east-1:123456789012:function:my-lambda-function	us-east-1c	ec2-10-206-57-2
Web server	i-07146fc0b741e5371	Running	t2.micro	2/2 checks passed	User: arn:aws:lambda:us-east-1:123456789012:function:my-lambda-function	us-east-1c	ec2-54-84-157-3

101. Select the Application server instance check box.

The screenshot shows the AWS EC2 Instances page. There are two instances listed:

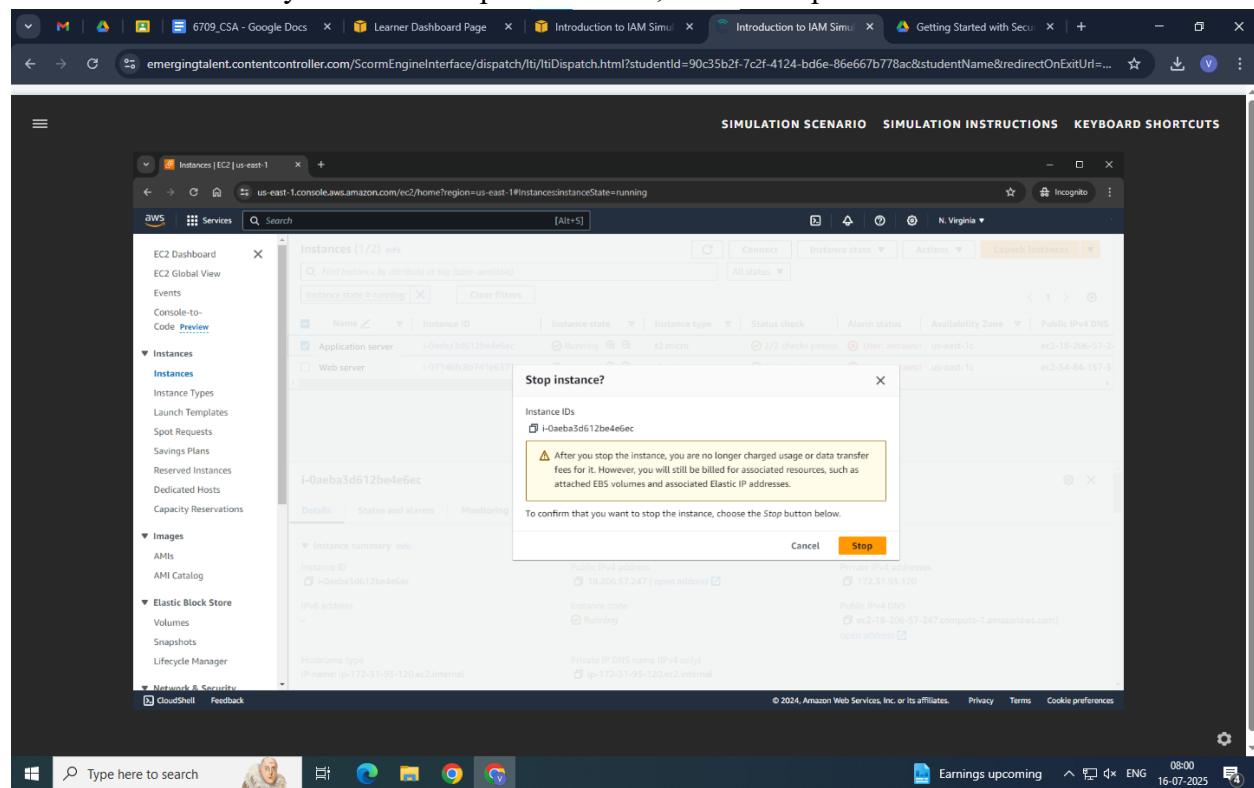
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Application server	i-0eba3d612be4e6ec	Running	t2.micro	2/2 checks passed	User: arm:aws	us-east-1c	ec2-18-206-57-2-
Web server	i-07146fc8b741e6371	Running	t2.micro	2/2 checks passed	User: arm:aws	us-east-1c	ec2-54-84-157-3

The "Actions" dropdown menu is open over the first instance, showing options: Stop instance, Start instance, Reboot instance, and Terminate instance.

102. Choose the Instance state menu. Then choose Stop instance.

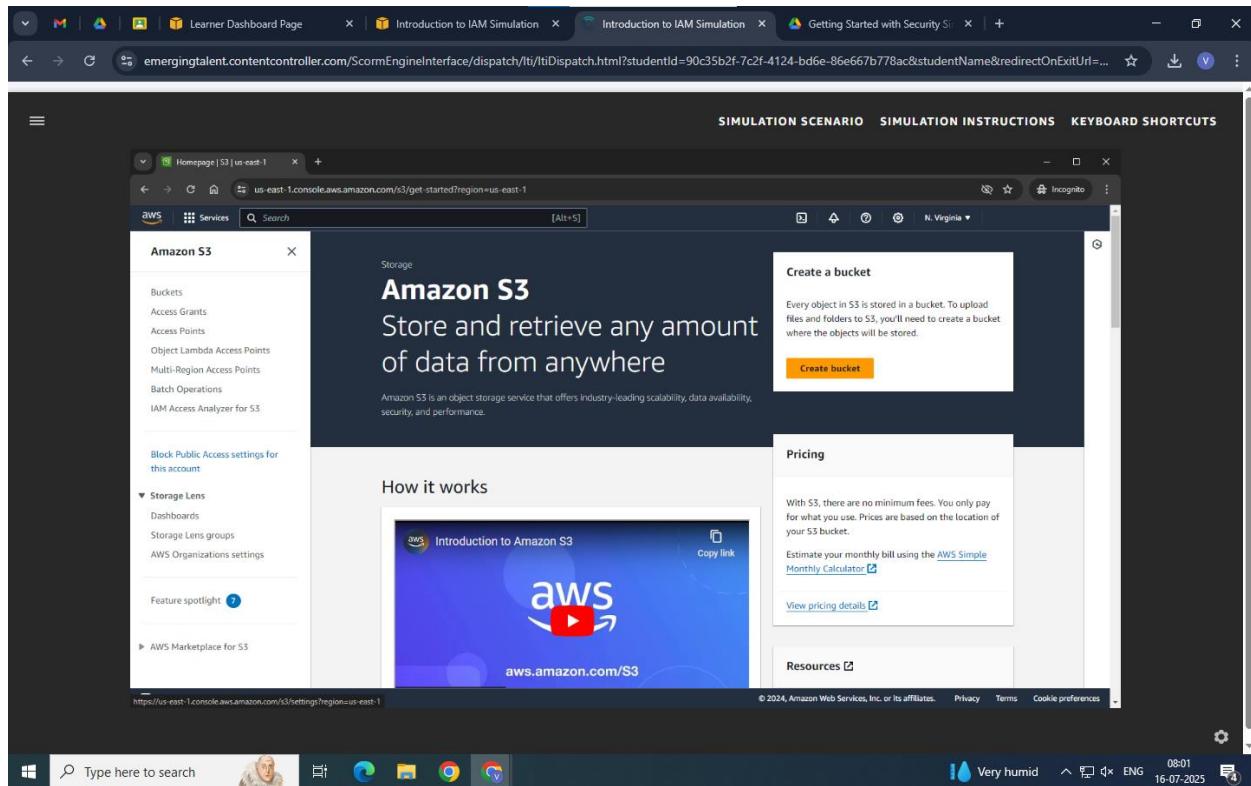
The screenshot shows the AWS EC2 Instances page. The "Actions" dropdown menu is open over the first instance, and the "Stop instance" option is highlighted.

103. To confirm that you want to stop the instance, choose Stop.

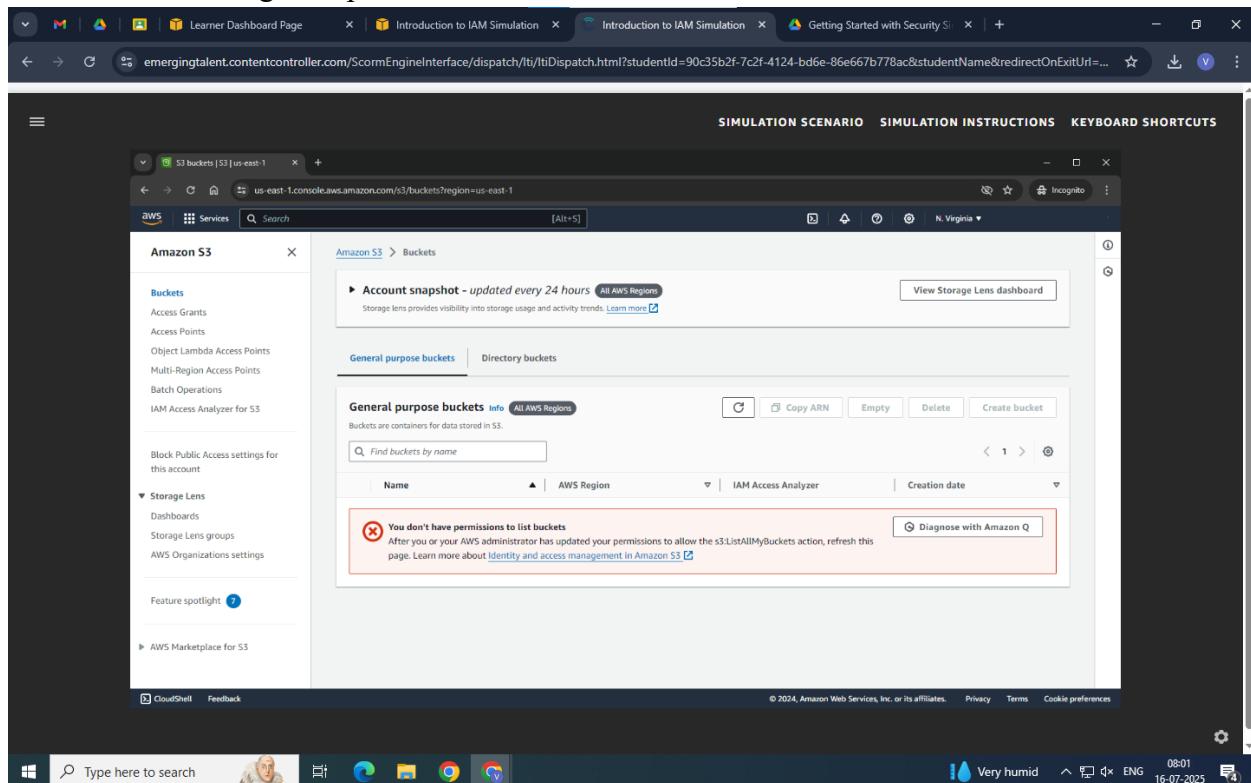


Modifying access to grant user-3 read only access to Amazon S3

104. To return to the AWS Management Console Home page, choose the AWS icon in the top left corner. In the Recently visited section, choose S3.

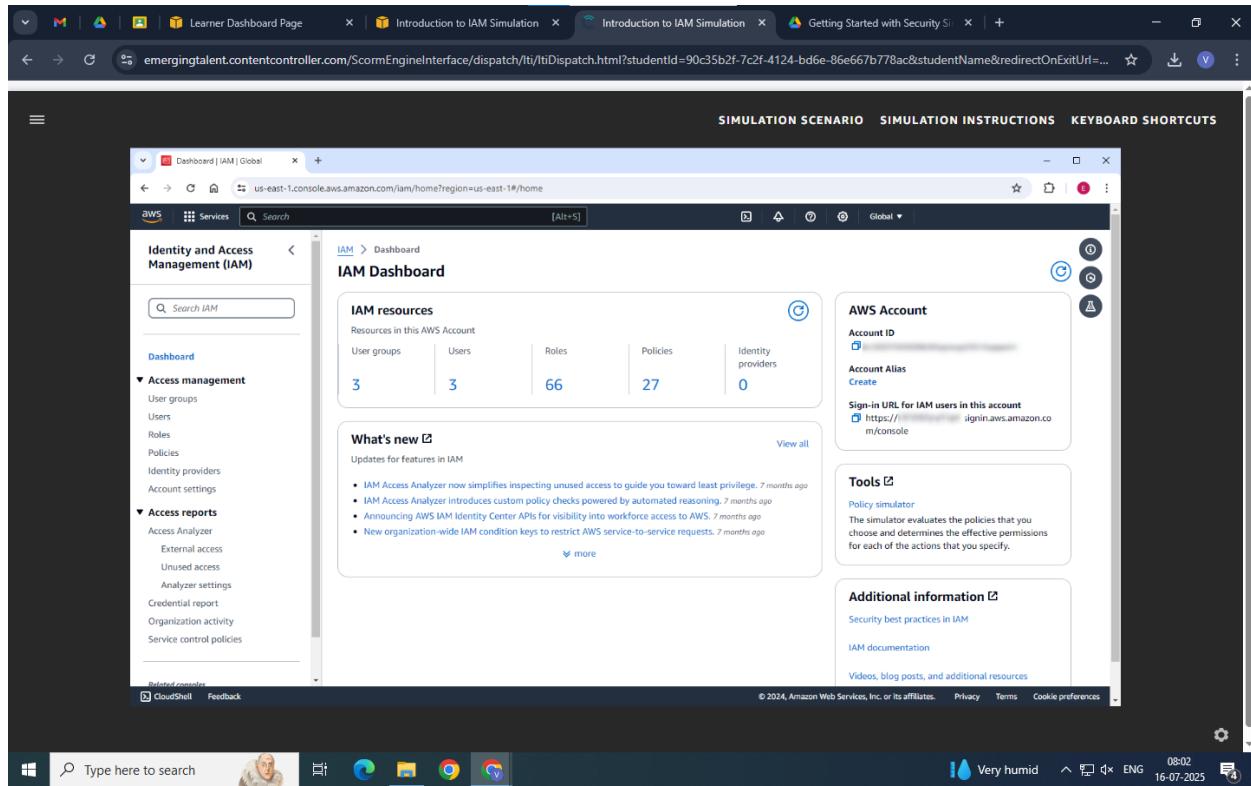


105. In the left navigation pane, choose Buckets.



106. Return to your normal browser window, where you are logged into the IAM console. To do this, do the following:

- o Hover near the bottom of the browser to bring up the task bar, then choose the Google Chrome icon.



107. Choose User groups.

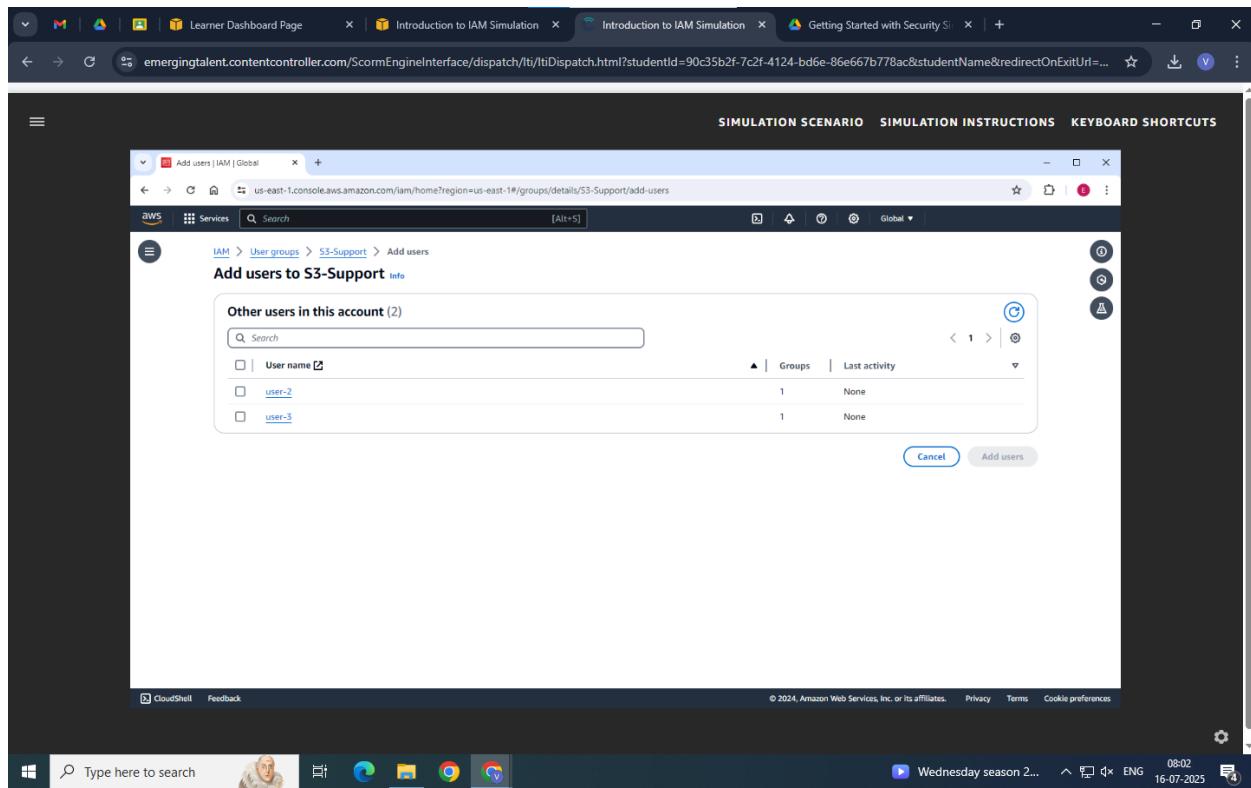
The screenshot shows the AWS Identity and Access Management (IAM) console. The left sidebar is collapsed. The main content area displays the 'User groups' section under the 'Access management' heading. It lists three user groups: 'EC2-Admin', 'EC2-Support', and 'S3-Support'. Each group has a status indicator 'Defined' and a 'Permissions' column showing a value of 1. The top navigation bar includes tabs for 'SIMULATION SCENARIO', 'SIMULATION INSTRUCTIONS', and 'KEYBOARD SHORTCUTS'. The bottom of the screen shows a Windows taskbar with various icons and system status.

108. In the list of user groups, choose S3-Support.

The screenshot shows the 'S3-Support' user group details page. The left sidebar is collapsed. The main content area shows the 'Summary' section with the user group name 'S3-Support', creation time 'June 11, 2024, 15:42 (UTC-04:00)', and ARN 'arn:aws:iam:033742928620:group/S3-Support'. Below this, the 'Users' tab is selected, showing one user named 'user-1'. The 'Permissions' and 'Access Advisor' tabs are also visible. The top navigation bar includes tabs for 'SIMULATION SCENARIO', 'SIMULATION INSTRUCTIONS', and 'KEYBOARD SHORTCUTS'. The bottom of the screen shows a Windows taskbar with various icons and system status.

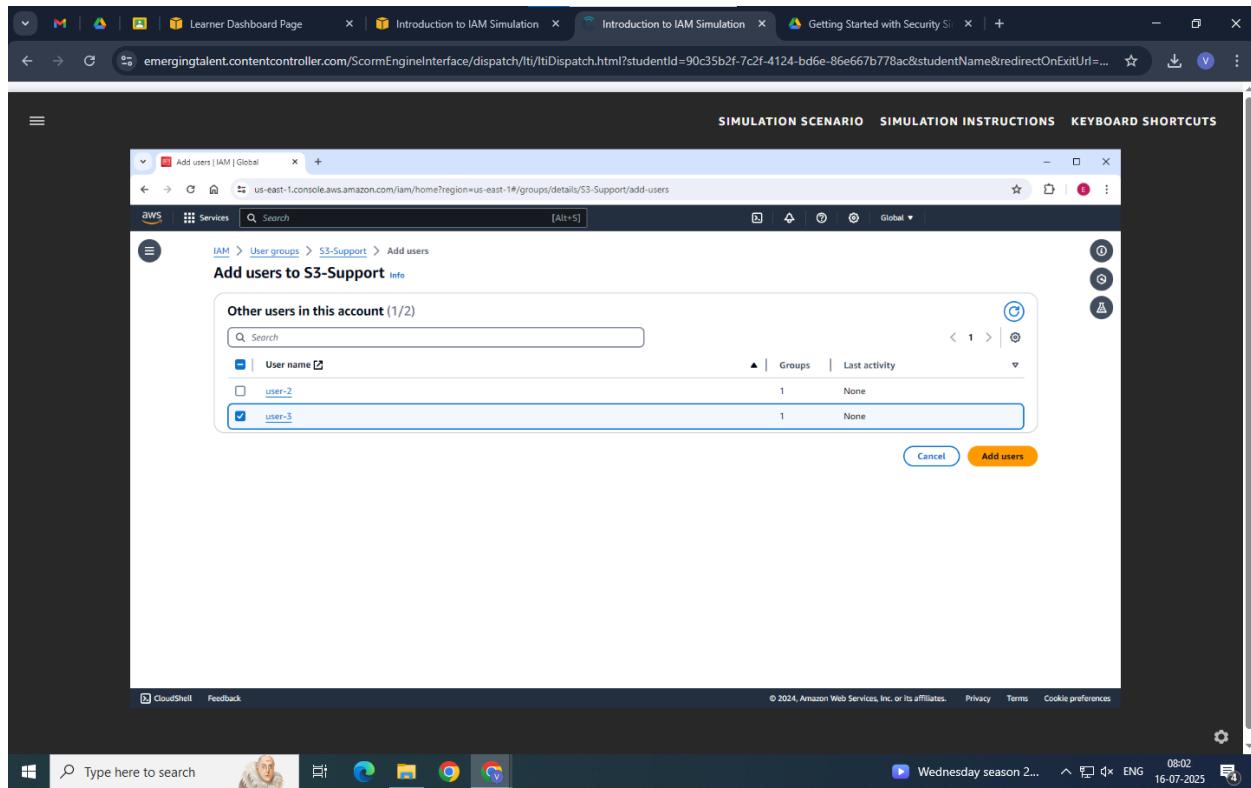
109. Choose Add users.

Notice that user-1 is not among the list of users on the Add users to S3-Support page. That is because this page does not show users that are already in the group.

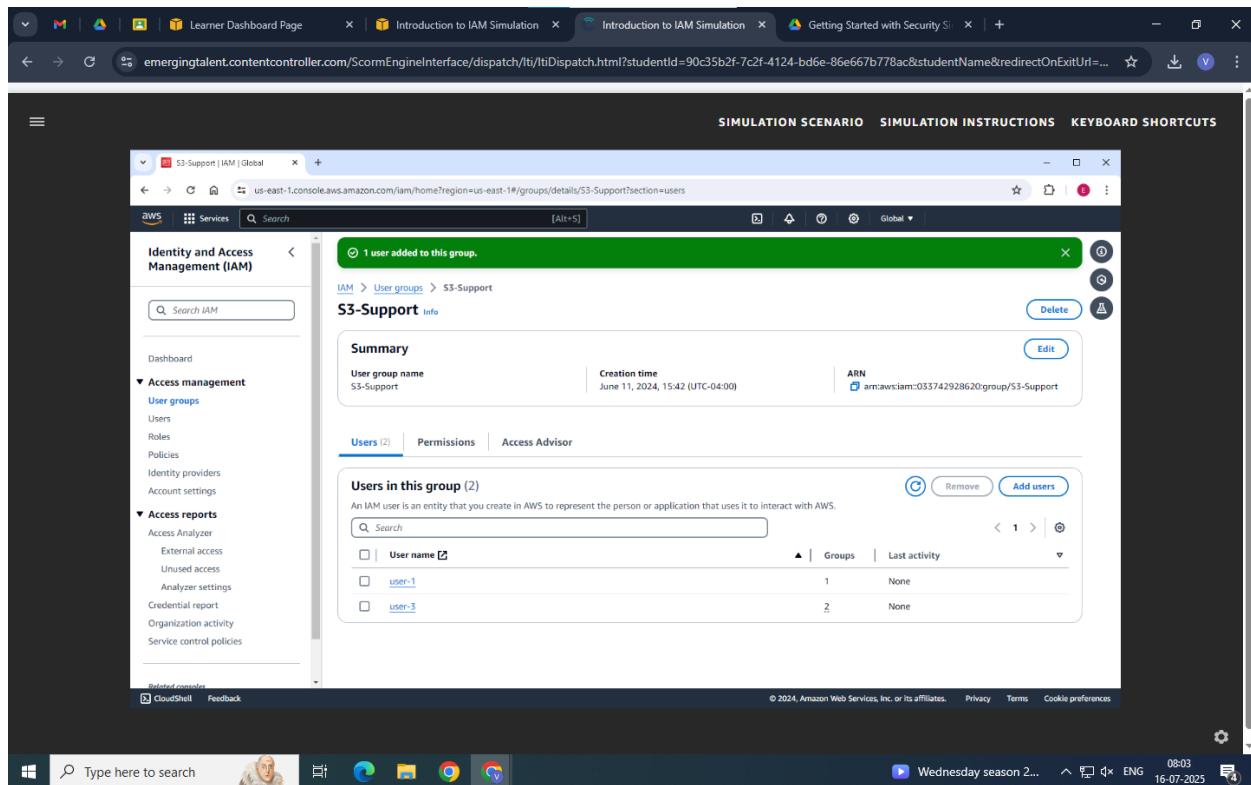


The screenshot shows a browser window with multiple tabs open. The active tab is titled 'Add users to S3-Support'. The URL in the address bar is 'us-east-1.console.aws.amazon.com/iam/home?region=us-east-1#groups/details/S3-Support/add-users'. The main content area displays a table titled 'Other users in this account (2)'. The table has three columns: 'User name', 'Groups', and 'Last activity'. It lists two users: 'user-2' and 'user-3', both of whom are currently unselected (indicated by an empty checkbox). At the bottom right of the table are 'Cancel' and 'Add users' buttons. The browser interface includes a navigation bar with tabs like 'Learner Dashboard Page', 'Introduction to IAM Simulation', and 'Getting Started with Security'. Below the tabs is a search bar and a services menu. The bottom of the screen shows a taskbar with icons for CloudShell, Feedback, and several application icons. A status bar at the bottom right shows the date 'Wednesday, 16-07-2025' and time '08:02'.

110. On the Other users in this account pane, select the user-3 check box.



111. Choose Add users.



112. Return to the incognito window, by closing the current window.

113. On the top left of your browser, choose Refresh.

The screenshot shows the AWS S3 Buckets page. The sidebar on the left includes options like Buckets, Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3, Block Public Access settings for this account, Storage Lens, Dashboards, Storage Lens groups, AWS Organizations settings, Feature spotlight, and AWS Marketplace for S3. The main content area displays an Account snapshot and a table of General purpose buckets. The table has columns for Name, AWS Region, IAM Access Analyzer, and Creation date. The buckets listed are:

Name	AWS Region	IAM Access Analyzer	Creation date
cloudtrail-awslogs-033742928620-	US East (N. Virginia) us-east-1	View analyzer for us-east-1	March 18, 2021, 14:54:43 (UTC-04:00)
vagrant4-isengard-do-not-delete	US West (Oregon) us-west-2	View analyzer for us-west-2	April 1, 2021, 07:00:01 (UTC-04:00)
do-not-delete-gatedgarden-audit-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 22, 2021, 11:12:16 (UTC-04:00)
sagemaker-us-east-1-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 4, 2024, 15:53:27 (UTC-04:00)
sim-website	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 4, 2024, 15:53:27 (UTC-04:00)

The new access is available immediately. There is no requirement for the user to log out and log back in for the changes to take effect. User-3 now has the same access to S3 that user-1 has. However, user-1 cannot access EC2.

Conclude the simulation by logging out.

114. Choose the user-3 account dropdown list.

Note: The account number 0000-0000-0000-0000 is a fictitious account number that is used for security purposes. Only share your account number with trusted sources.

115. Choose Sign out.

SIMULATION SCENARIO **SIMULATION INSTRUCTIONS** **KEYBOARD SHORTCUTS**

Amazon S3

Buckets

- Access Grants
- Access Points
- Object Lambda Access Points
- Multi-Region Access Points
- Batch Operations
- IAM Access Analyzer for S3

Storage Lens

- Dashboards
- Storage Lens groups
- AWS Organizations settings

Feature spotlight

AWS Marketplace for S3

Account snapshot - updated every 24 hours

General purpose buckets (4)

Name	AWS Region	IAM Access Analyzer	Creation date
cloudtrial-awslogs-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	March 18, 2021, 14:54:43 (UTC-04:00)
vagrantv4-isengard-do-not-delete-033742928620	US West (Oregon) us-west-2	View analyzer for us-west-2	April 1, 2021, 07:00:01 (UTC-04:00)
do-not-delete-gatedgarden-audit-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 22, 2021, 11:12:16 (UTC-04:00)
sagemaker-us-east-1-033742928620	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 4, 2024, 15:53:27 (UTC-04:00)
sim-website	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 4, 2024, 15:53:27 (UTC-04:00)

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SIMULATION SCENARIO **SIMULATION INSTRUCTIONS** **KEYBOARD SHORTCUTS**

Manage AWS Resources - AWS

AWS Management Console

Everything you need to access and manage the AWS Cloud — in one web interface

Log back in

Free AWS Training
Advance your career with AWS Cloud Practitioner Essentials—a free, six-hour, foundational course

AWS Certification
Propel your career forward with AWS Certification.

AWS Training
Free digital courses to help you develop your skills

7 Reasons to get AWS Certified
Discover the top 7 reasons to get AWS Certified

This completes Task 8: Testing the access of user-3. Choose Continue.

you with an AWS answer questions you Mac

Continue >

Practical 3: Getting Started with Amazon S3

Jul 15, 2025

- A. Create a bucket in Amazon S3.
- B. Configure a bucket to host a static website.
- C. Upload content to a bucket and Set access Permission.
- D. Securely share a bucket object by using a presigned URL
- E. Secure a bucket by using a bucket policy.
- F. Update the website.
- G. Exploring file versions

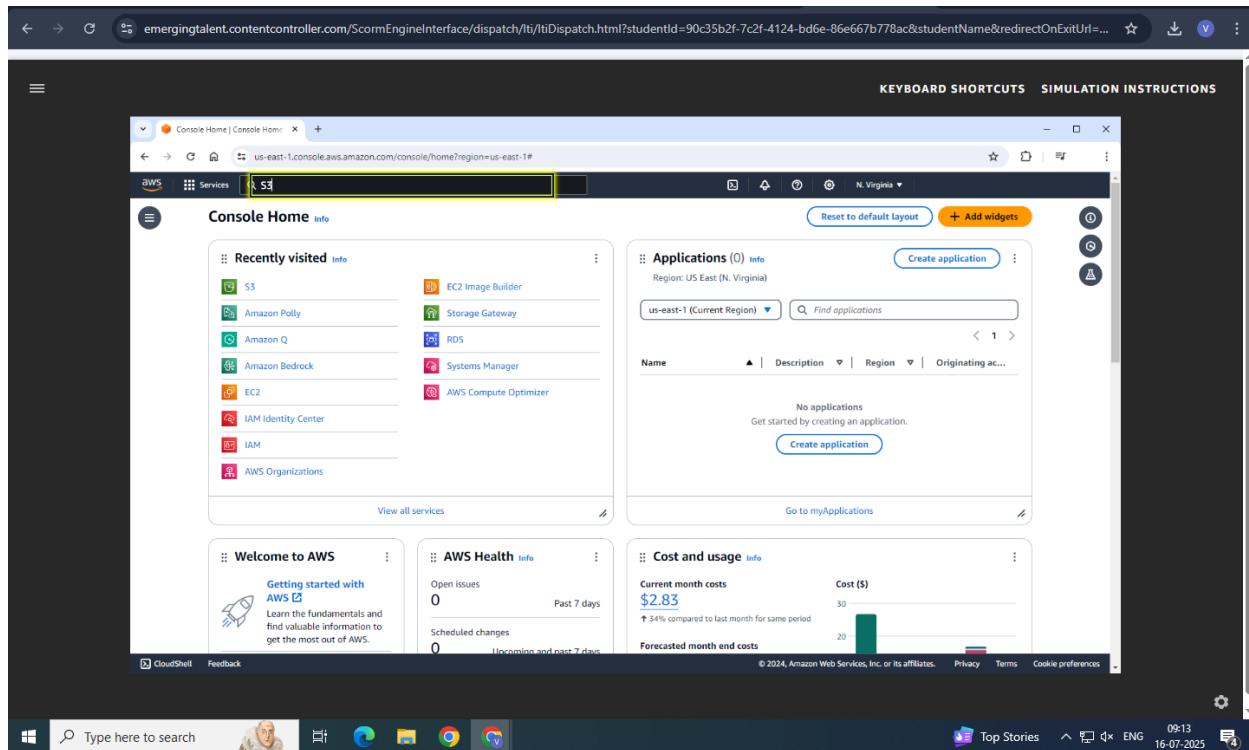
The screenshot shows a web browser window with the AWS Educate homepage. The search bar at the top contains the query "Getting Started with storage". The main content area displays a single result card for a course titled "Getting Started with Storage". The course is categorized under "Cloud Computing" and is described as "Foundational | 2 hour(s)". To the left of the search bar is a "Filters" sidebar with options for Course Features, Skills, Level, Duration, and Language. On the right side of the page, there is a sidebar titled "Explore" with various promotional links and sections like "Learn more from AWS" and "We want to hear from you! Tell us about your AWS Educate experience so we can improve". The bottom of the screen shows the Windows taskbar with several pinned icons and the system tray.

The screenshot shows a web browser window with multiple tabs open. The active tab is 'awseducate.instructure.com/courses/908/modules'. The page displays the 'EDSTORv1EN-US > Modules' section. On the left, there's a sidebar with links for 'Home', 'Modules' (which is selected), and 'Lucid (Whiteboard)'. Below the sidebar is a navigation bar with icons for 'History', 'Help', and a search bar. The main content area shows two sections: 'Getting Started with Storage' and 'Final Assessment'. The 'Getting Started with Storage' section contains three items: 'Pre-Course Survey', 'Getting Started with Storage' (with a 'View' link), and 'Getting Started with Amazon S3 Simulation'. The 'Final Assessment' section contains three items: 'Final Assessment' (with a '100 pts' link and a note 'Score at least 70.0'), 'End of Course Feedback Survey - Labs (New)', and 'End of Course Feedback Survey_Labs (Deprecated - Do not use)'. At the bottom of the page, the URL 'https://awseducate.instructure.com/course/908/modules/items/18929' is visible, along with the Windows taskbar showing various pinned apps like File Explorer, Edge, and Google Chrome.

Task 1: Creating a bucket in Amazon S3

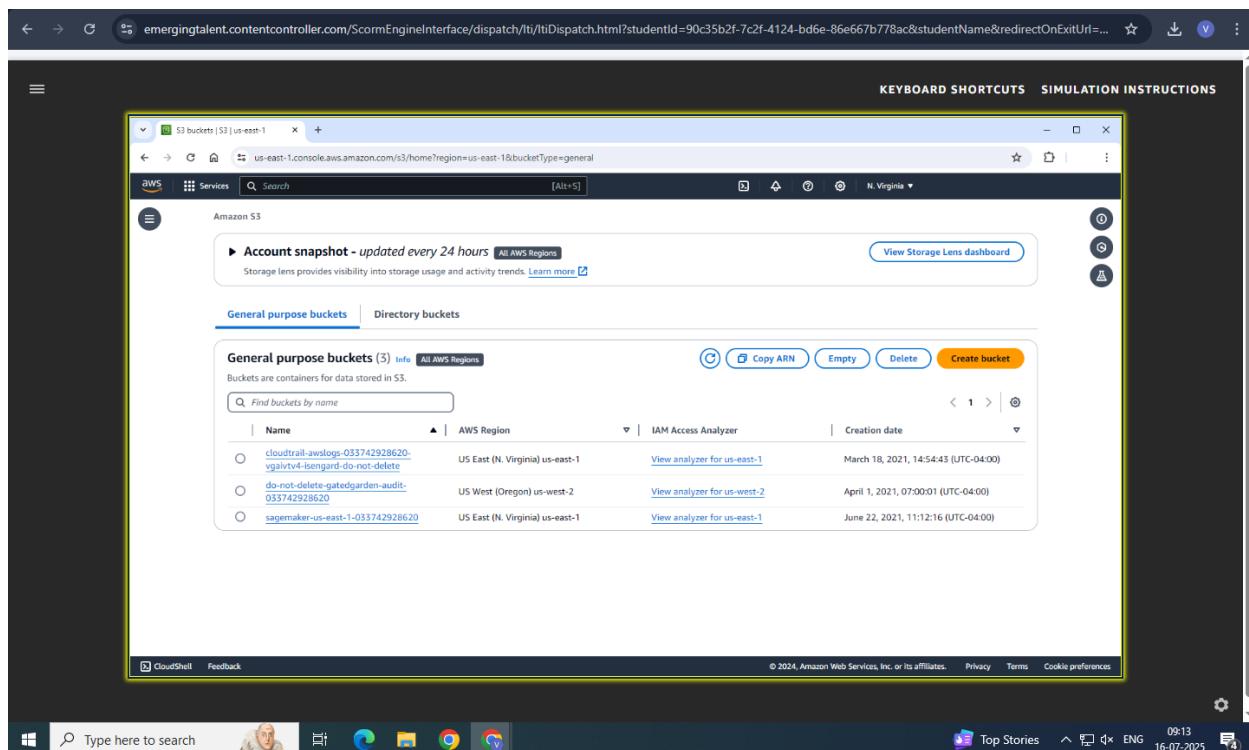
1. In the **AWS Management Console**, choose the search bar and enter S3.

Note: To record your entry, press **Enter** on your keyboard or choose any place outside the entry field.

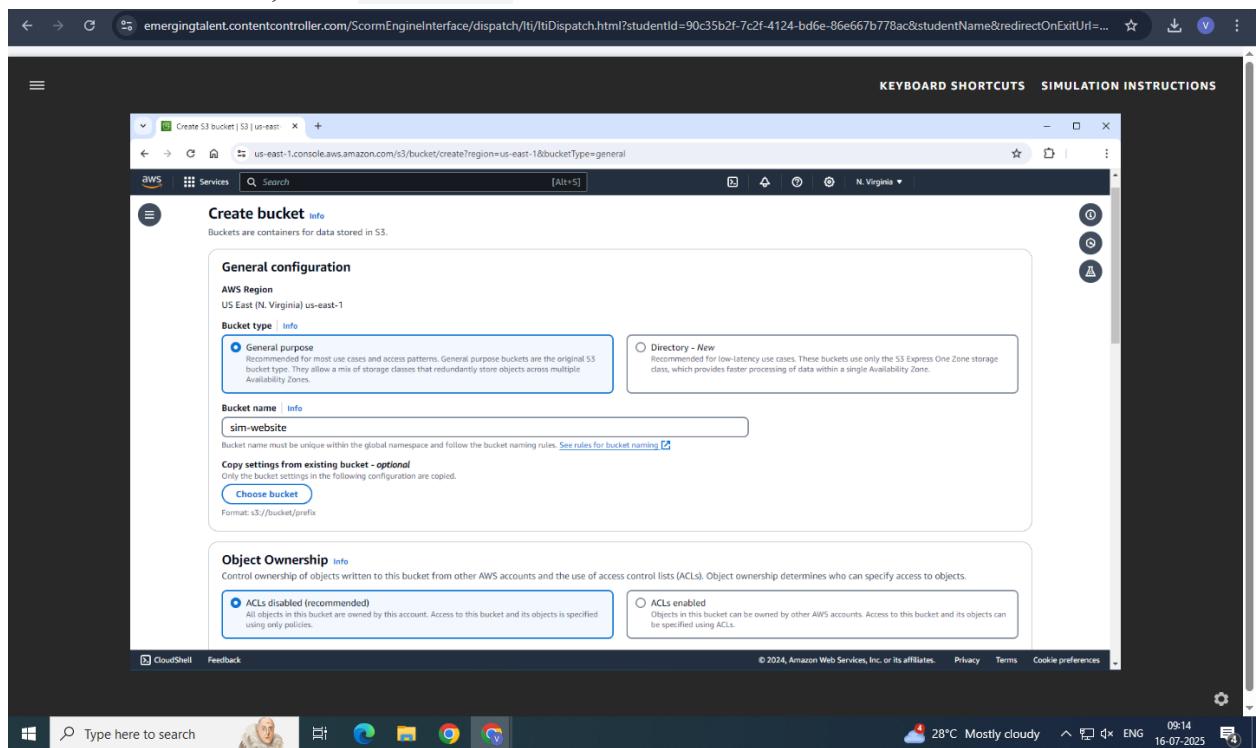


2. Then choose S3 from the search results.

3. Choose Create bucket.

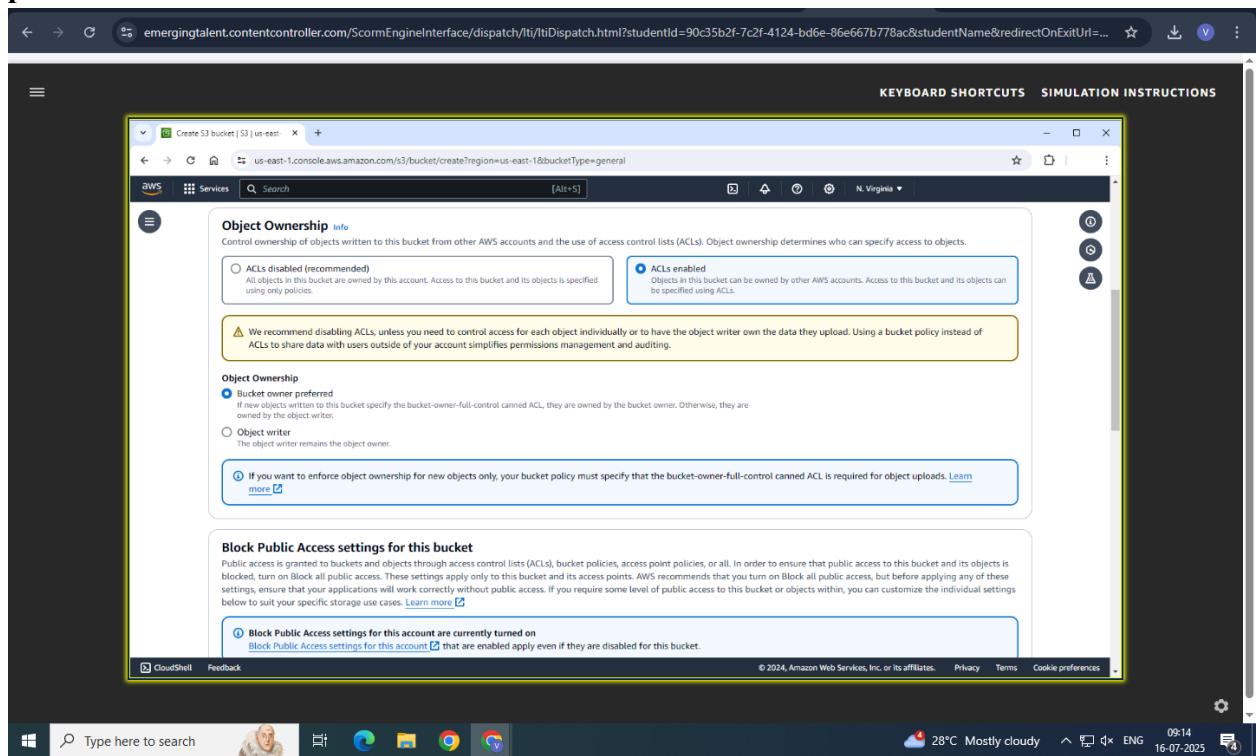


4. For Bucket name, enter sim-website



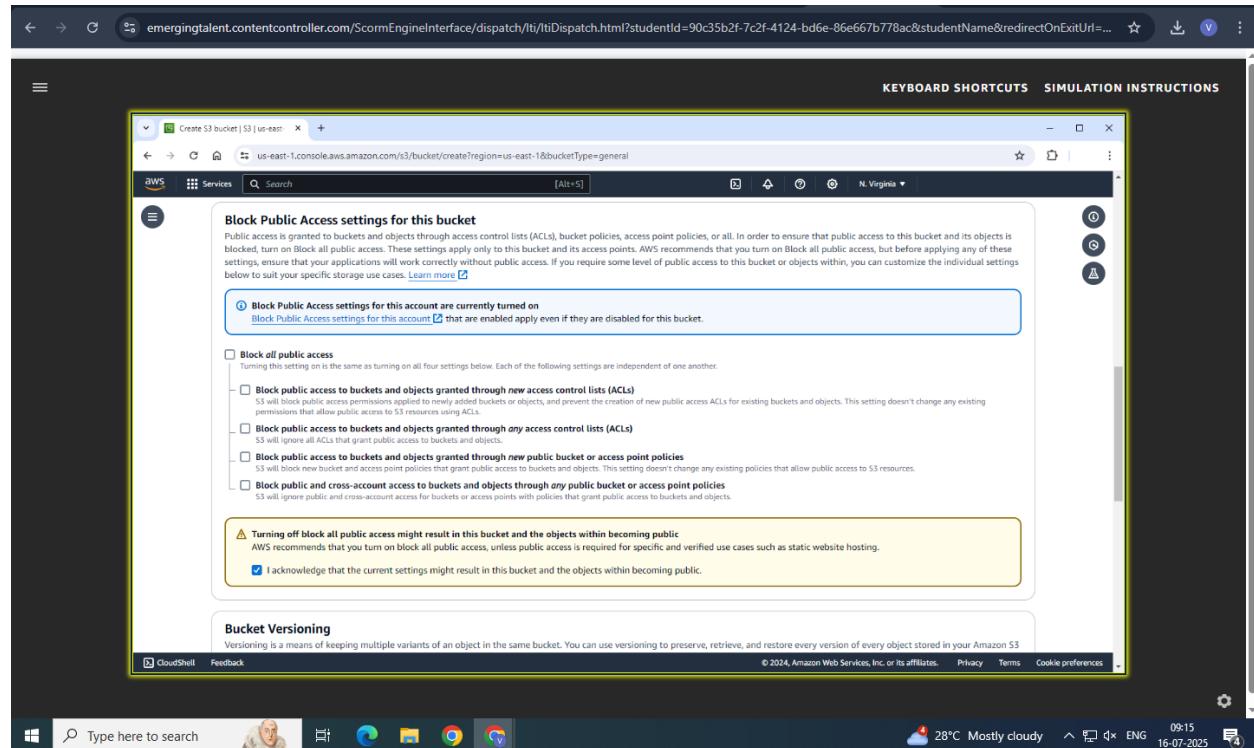
5. Choose the scroll bar to scroll down to Object Ownership.

6. For Object Ownership, choose ACLs enabled. Keep the default Bucket owner preferred selected.



7. Choose the scroll bar to scroll down to **Block Public Access settings for this bucket**. Public access to buckets is blocked by default. Because the files in your static website must be accessible through the internet, you must permit public access.

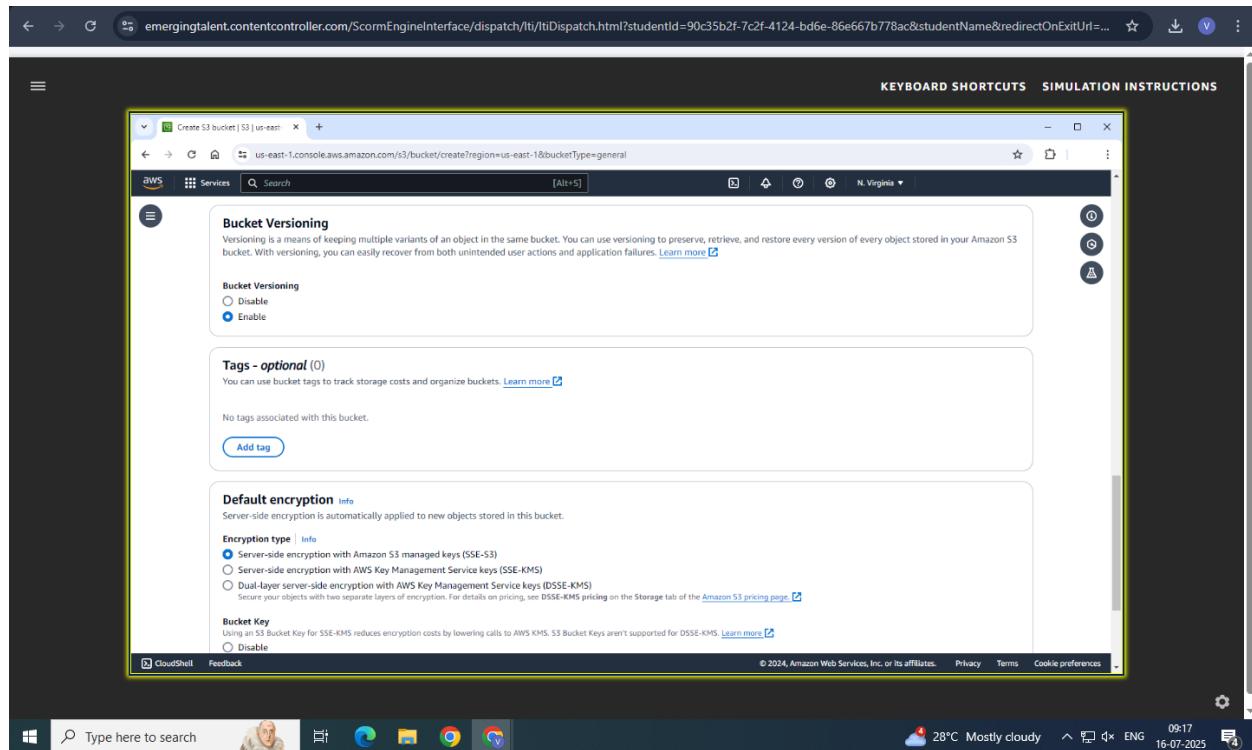
8. For **Block Public Access settings for this bucket**, clear the checkbox for **Block all public access**. Then, select the box that states **I acknowledge that the current settings might result in this bucket and the objects within becoming public**.



9. Choose the scroll bar to scroll down to **Bucket Versioning**.

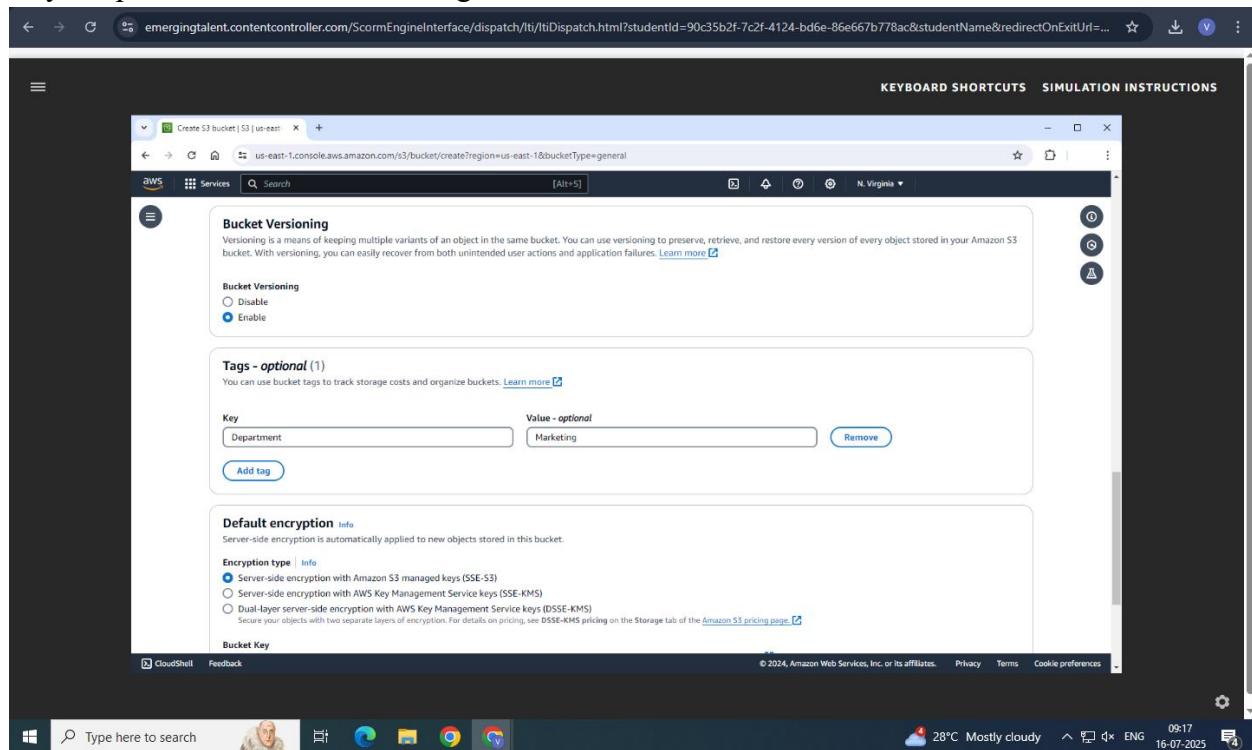
10. For **Bucket Versioning**, choose **Enable**.

Note: As soon as you turn on (enable) bucket versioning, you can't turn it off.



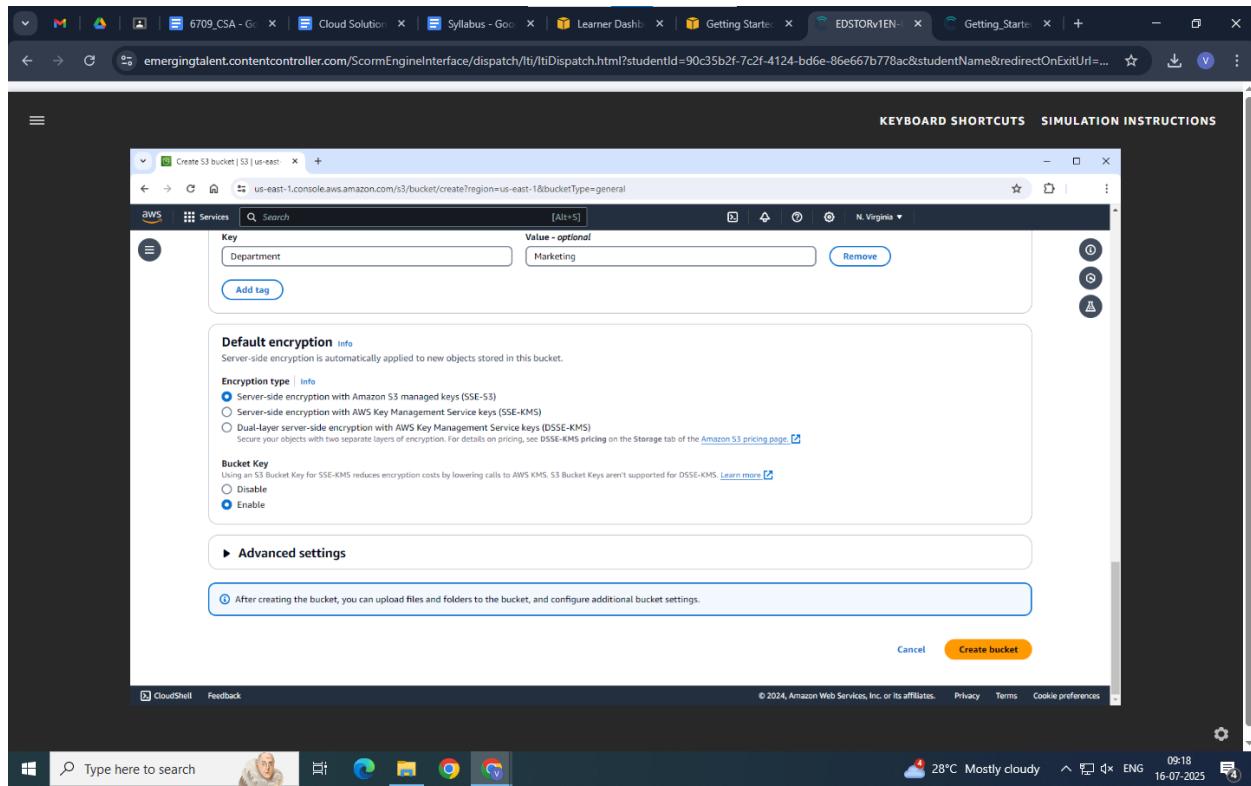
11. For Tags, choose Add tag, and enter the following:

Key: Department, Value: Marketing

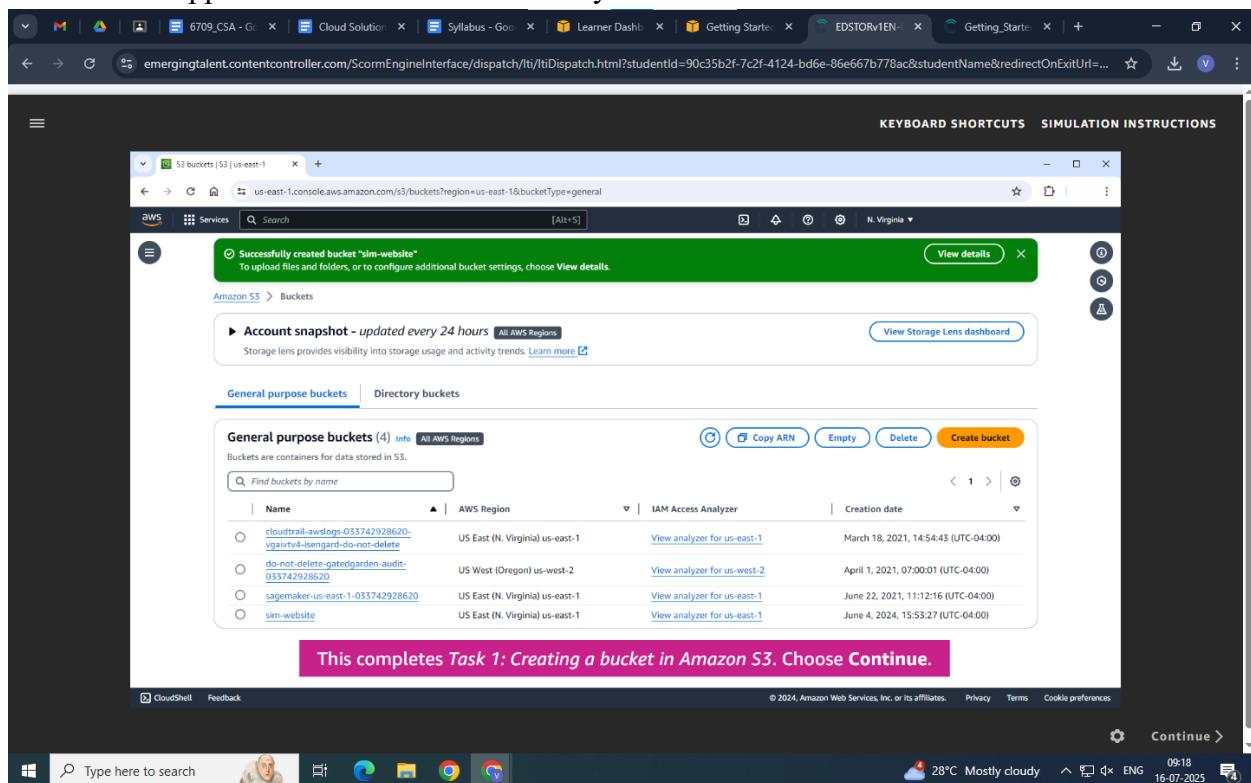


12. Choose the scroll bar to scroll down.

13. Choose Create bucket.



Your bucket appears in the list of buckets for your AWS account.



Task 2: Configuring a static website on Amazon S3

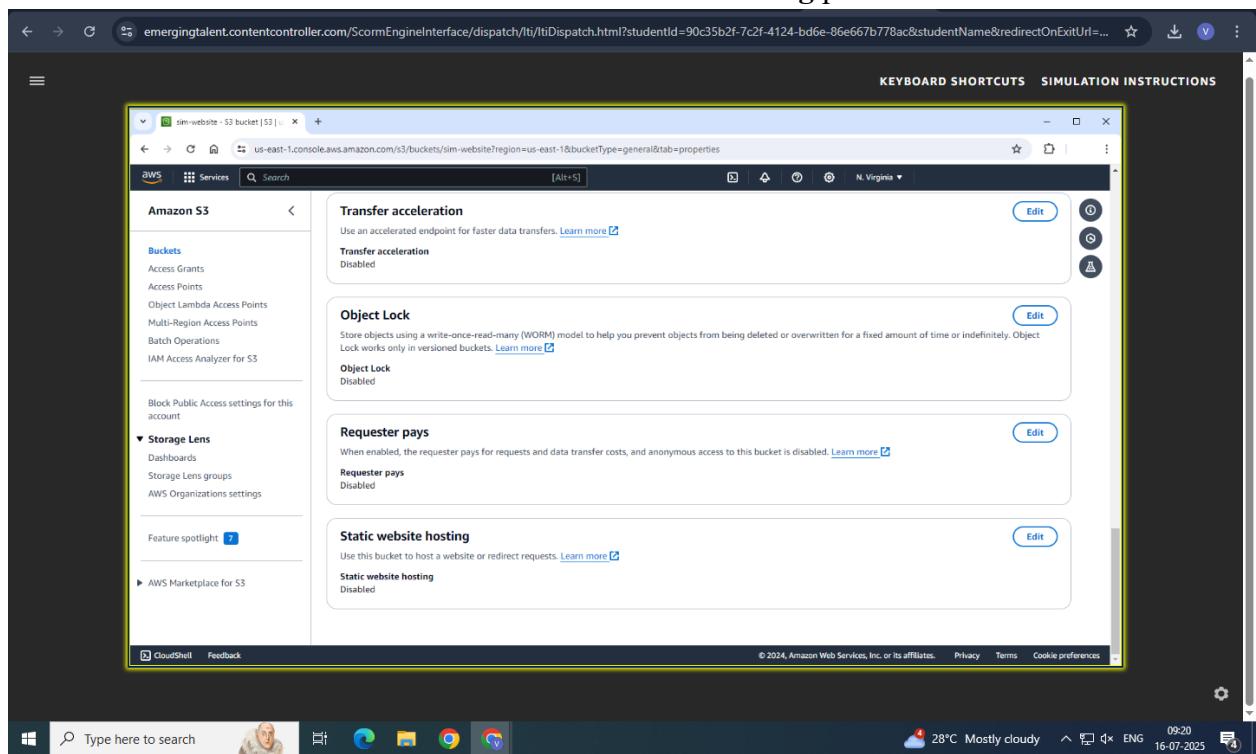
17. In the list of your buckets, choose the name of the bucket that you just created, sim website.

The screenshot shows the AWS S3 console with the 'sim-website' bucket selected. The left sidebar has 'Amazon S3' selected under 'Buckets'. The main area shows the 'Objects' tab with a message: 'No objects. You don't have any objects in this bucket.' A large orange 'Upload' button is visible. The top right corner shows 'KEYBOARD SHORTCUTS' and 'SIMULATION INSTRUCTIONS'.

18. Choose the Properties tab.

The screenshot shows the AWS S3 console with the 'Properties' tab selected for the 'sim-website' bucket. The 'Bucket overview' section is highlighted with a yellow box, showing the ARN (arn:aws:s3:::sim-website) and Creation date (June 4, 2024, 15:53:27 (UTC-04:00)). Other sections like 'Bucket Versioning' and 'Tags' are also visible. The top right corner shows 'KEYBOARD SHORTCUTS' and 'SIMULATION INSTRUCTIONS'.

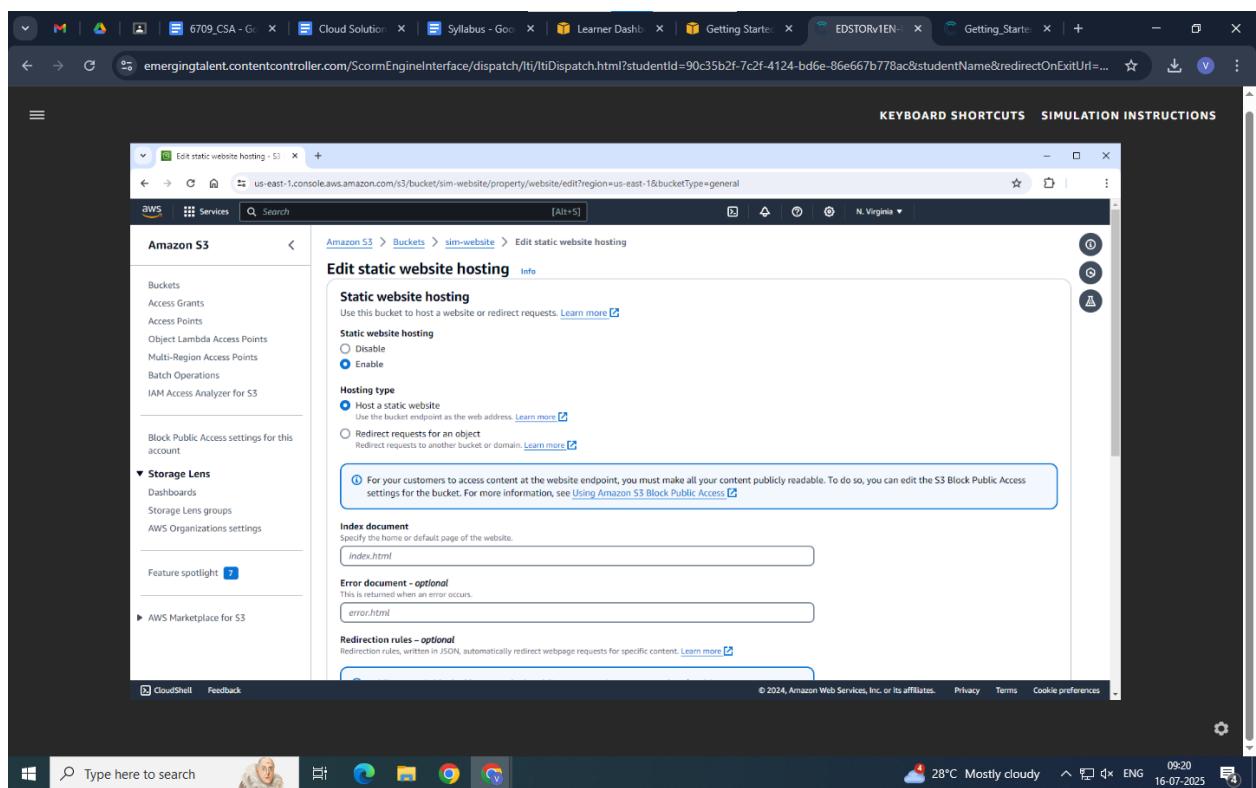
19. Choose the scroll bar to scroll to the **Static website hosting** panel.



The screenshot shows the AWS S3 console with a yellow box highlighting the 'Static website hosting' section. The left sidebar shows 'Amazon S3' with 'Buckets' selected. The main content area displays three sections: 'Transfer acceleration', 'Object Lock', and 'Static website hosting'. Under 'Static website hosting', it says 'Disabled'. At the bottom right of the main content area, there is an 'Edit' button.

20. Choose **Edit** to the **Static website hosting** panel.

21. Choose **Enable**.

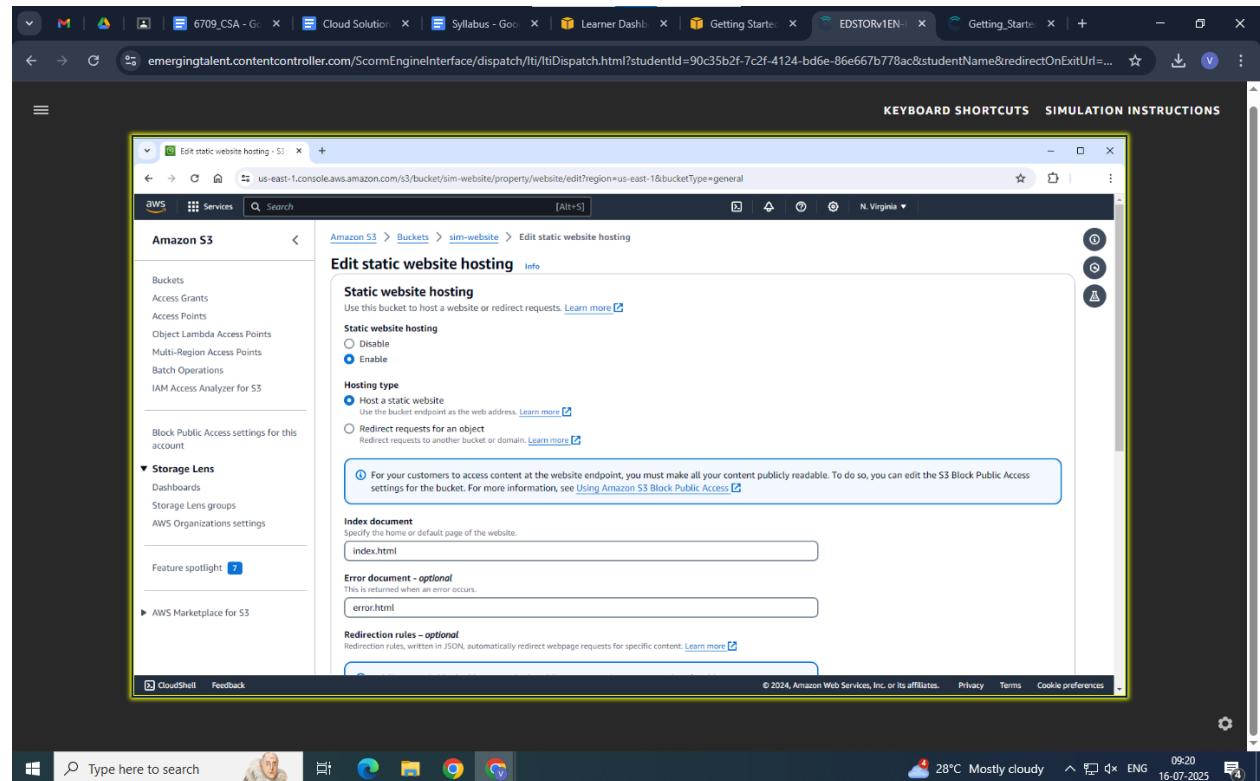


The screenshot shows the 'Edit static website hosting' configuration page. A yellow box highlights the 'Static website hosting' section. Under 'Hosting type', the 'Host a static website' option is selected. Below it, there is a note about making content publicly readable. The 'Index document' field contains 'index.html'. The 'Error document - optional' field contains 'error.html'. The 'Redirection rules - optional' section is collapsed. At the bottom right of the main content area, there is an 'Edit' button.

22. For **Hosting type**, keep the default setting **Host a static website**.

23. Configure the following settings:

- o **Index document:** Enter index.html
- o **Error document:** Enter error.html



Note: You must enter and even though they are already
Index.html
error.html

displayed. The display that you see is only an example of what the field is expecting.

24. Choose the scroll bar to scroll down.

25. Choose **Save changes**.

The screenshot shows the AWS S3 console interface. The left sidebar contains navigation links for Buckets, Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3, Storage Lens (Dashboards, Storage Lens groups, AWS Organizations settings), Feature spotlight, and AWS Marketplace for S3. The main content area is titled "Edit static website hosting" and shows a JSON editor with the following code:

```
{"IndexDocument": "index.html", "ErrorDocument": "error.html", "RedirectAllRequestsTo": "http://www.example.com/"}
```

Below the JSON editor are buttons for "Cancel" and "Save changes". A status bar at the bottom indicates "© 2024, Amazon Web Services, Inc. or its affiliates." and includes links for Privacy, Terms, and Cookie preferences.

The taskbar at the bottom of the screen shows various open browser tabs and system icons, including the date and time as 16-07-2025 09:21.

26. Choose the scroll bar to scroll to the **Static website hosting** panel.

27.In the Static website hosting panel under Bucket website endpoint, choose the link.

The screenshot shows the AWS S3 console with the 'sim-website - S3 bucket | S3' tab selected. In the main pane, under 'Static website hosting', the 'Enabled' status is shown with a green 'Edit' button. Below this, the 'Bucket website endpoint' section displays the URL <http://sim-website.s3-website-us-east-1.amazonaws.com>. A success message at the top states: 'Successfully edited static website hosting.' Other settings like 'Object Lock' and 'Requester pays' are also visible.

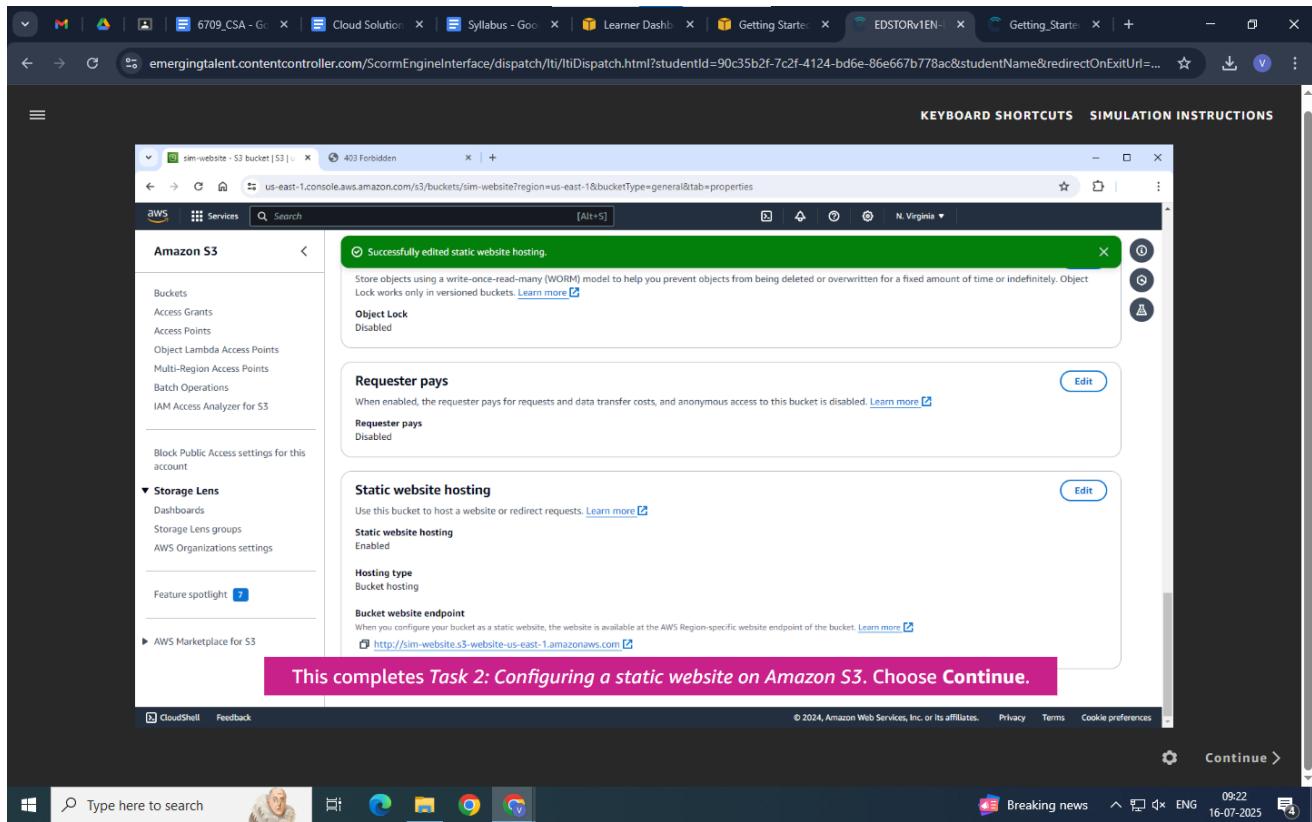
The screenshot shows a browser window with the URL <http://sim-website.s3-website-us-east-1.amazonaws.com>. The page displays a '403 Forbidden' error. The error message includes:

- Code: AccessDenied
- Message: Access Denied
- RequestId: 7FRGD77RN2142KQT
- HostId: XjYfTgkAqE54Z4ZQDzua2+mTbzZQR6vEOA6f5vQT3zxOhr0PIW6qDzjofHrmnBdT5gkrClWM=

An additional note below states: 'An Error Occurred While Attempting to Retrieve a Custom Error Document'.

28.Choose the AWS Management Console tab on your browser.

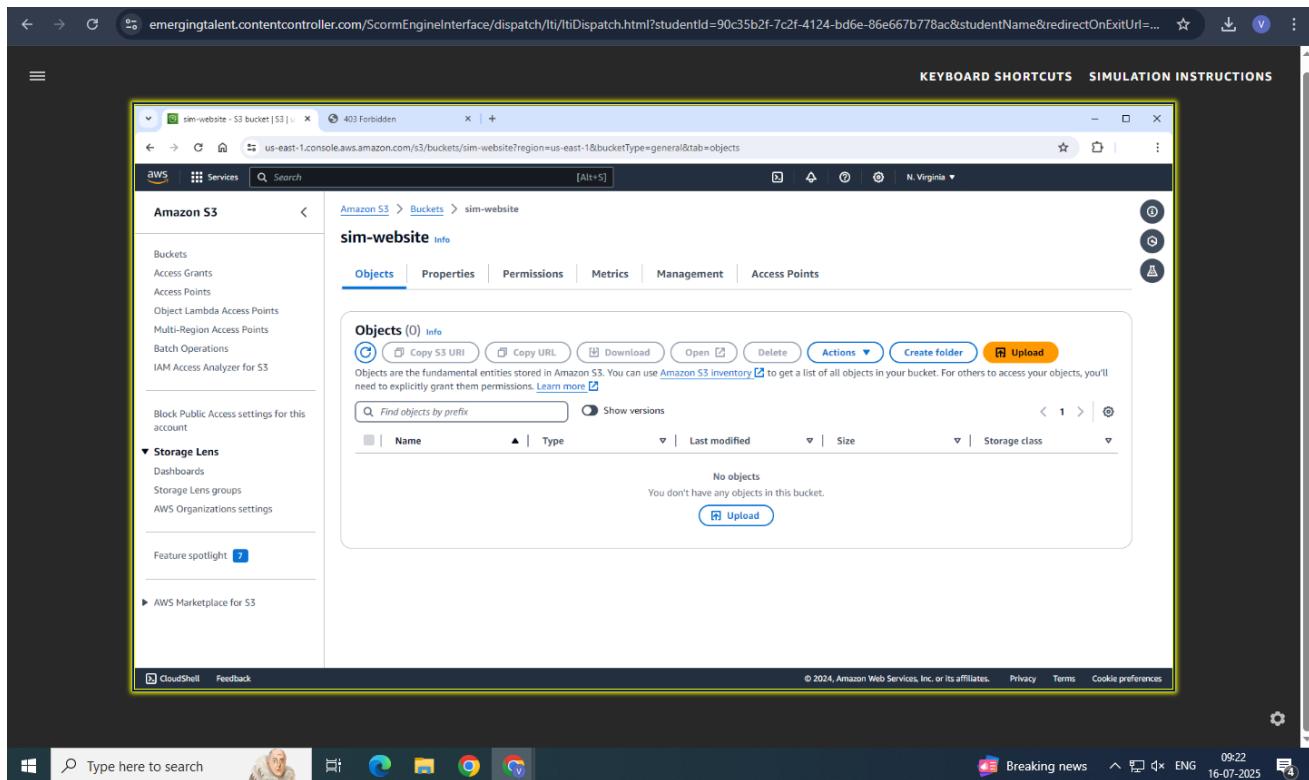
You have configured your bucket to host a static website.



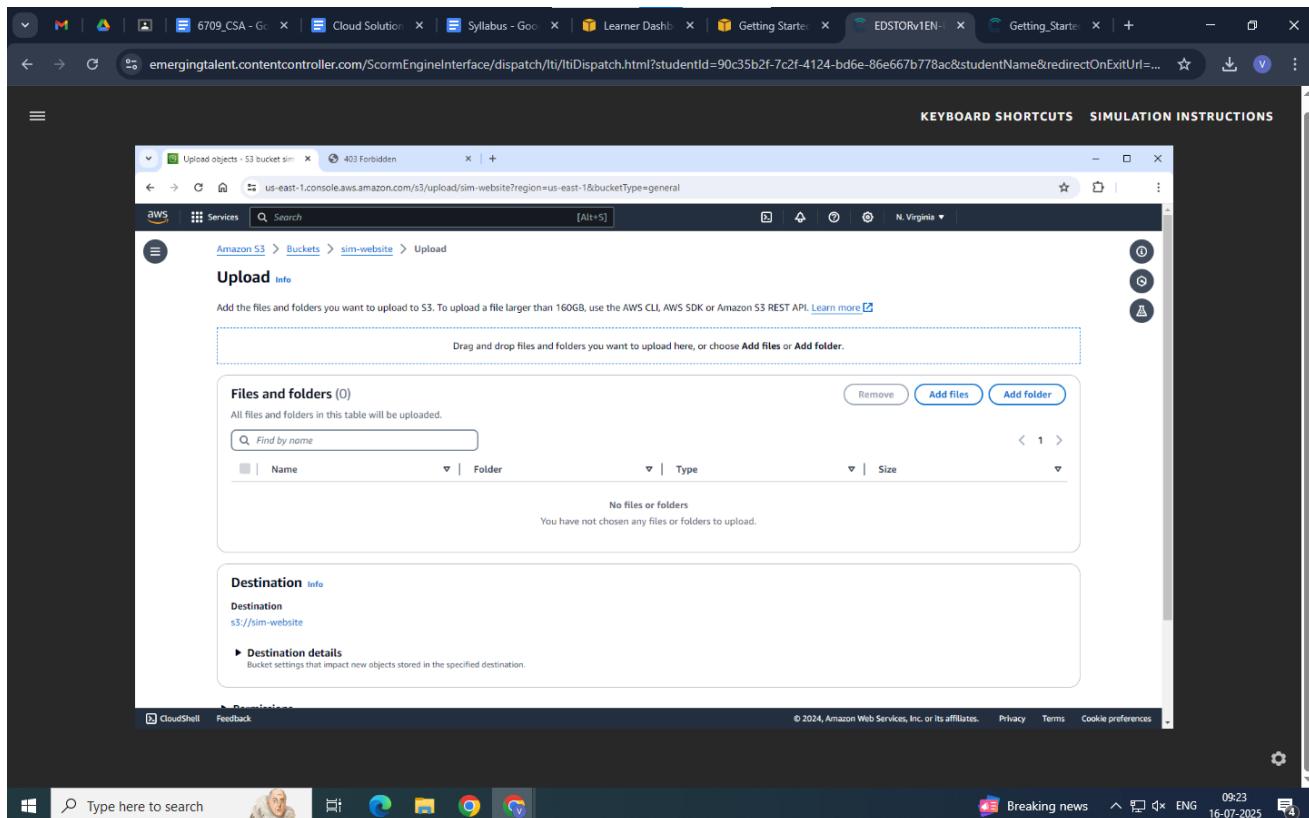
Task 3: Uploading content to your bucket

22. Choose the scroll bar to scroll to the top of the page, and choose the **Objects** tab.

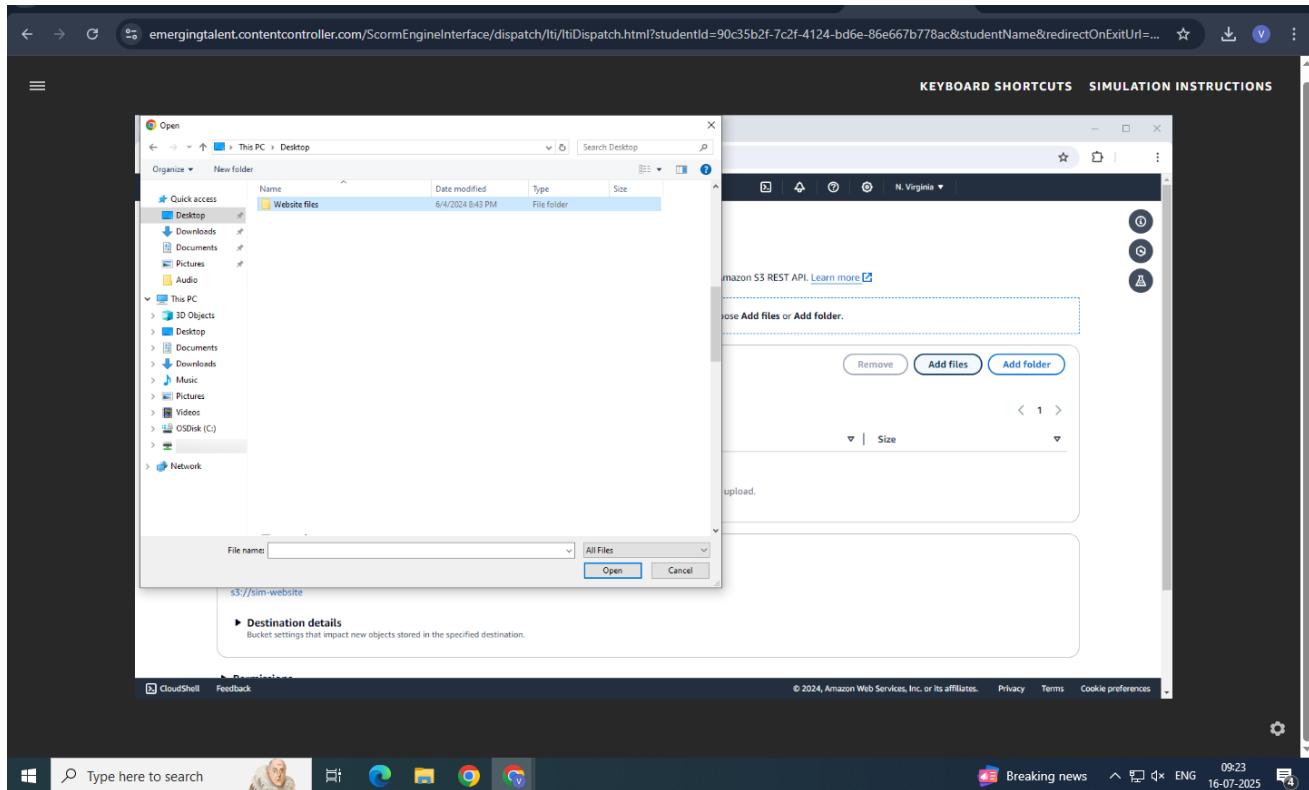
23. Choose **Upload**.



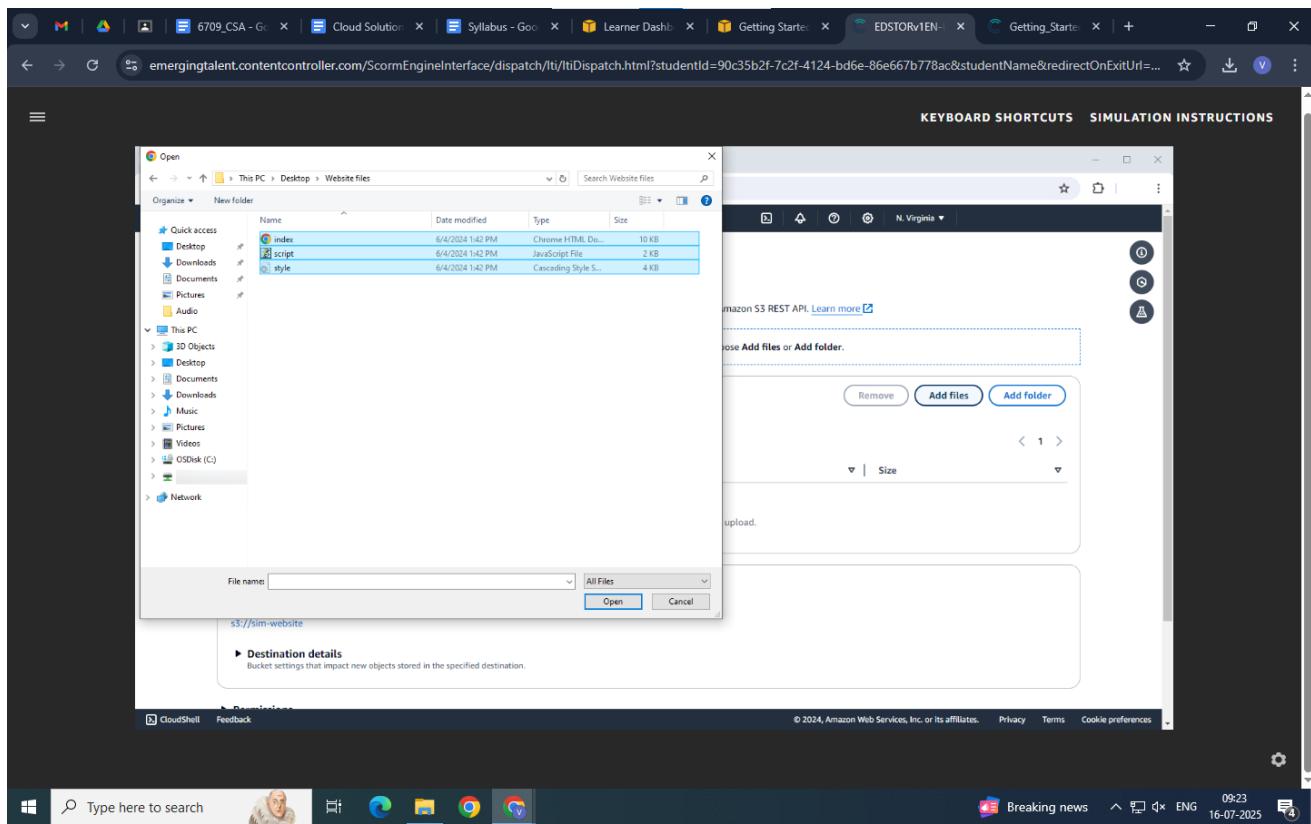
24. Choose Add files.



25. Choose the Website files folder, and choose Open to open the folder.



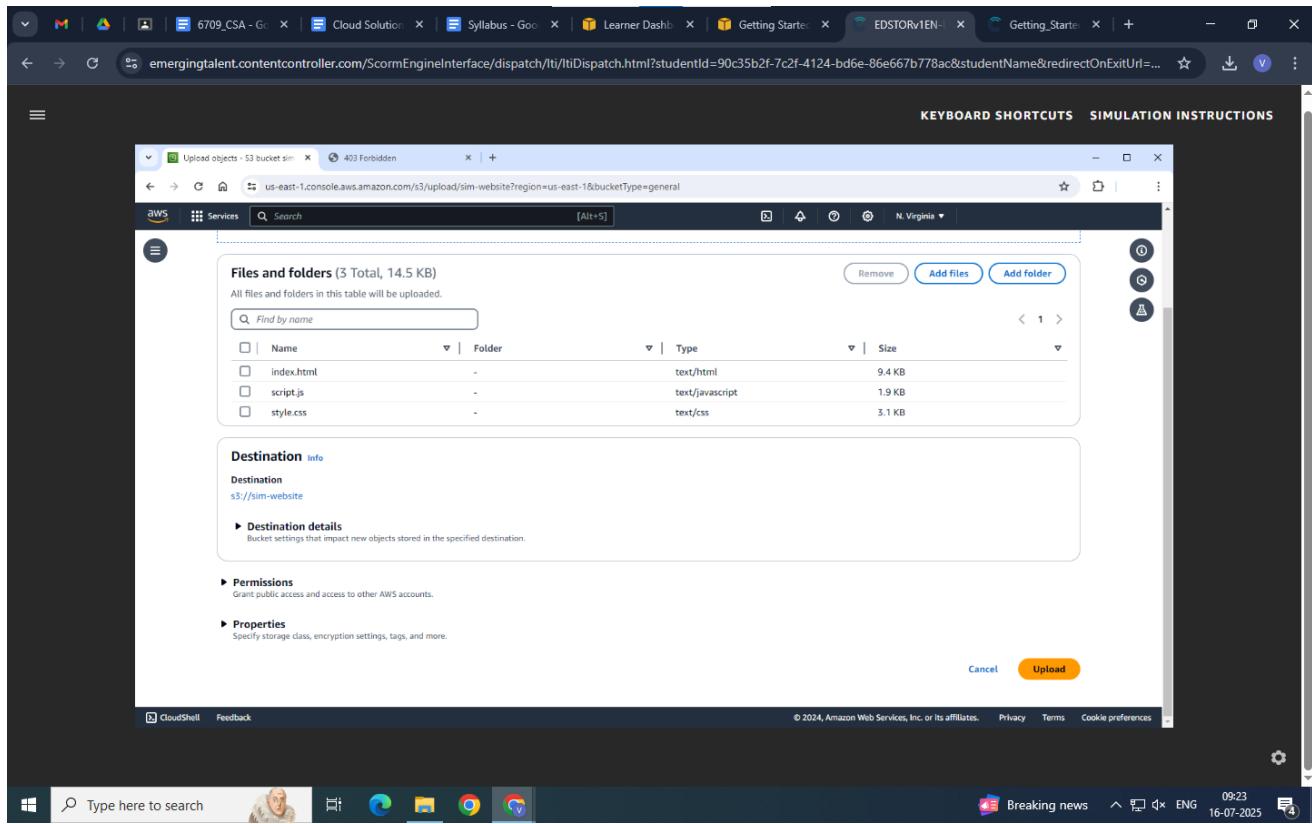
26. Use your mouse to choose each of the following files: **index.html**, **script.js**, and **style.css** (order does not matter). Then choose **Open**.



27. Choose the scroll bar to scroll down.

28. Choose **Upload**.

Your files are uploaded to the bucket.



27. Choose Close.

You have successfully uploaded your website file to your sim-website bucket.

Upload: status

The information below will no longer be available after you navigate away from this page.

Summary	Succeeded	Failed
Destination s3://sim-website	3 files, 14.5 KB (100.00%)	0 files, 0 B (0%)

Files and folders (3 Total, 14.5 KB)

Name	Folder	Type	Size	Status	Error
index.html	-	text/html	9.4 KB	Succeeded	-
script.js	-	text/javascript	1.9 KB	Succeeded	-
style.css	-	text/css	3.1 KB	Succeeded	-

Amazon S3 > Buckets > sim-website

Objects (3) Info

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

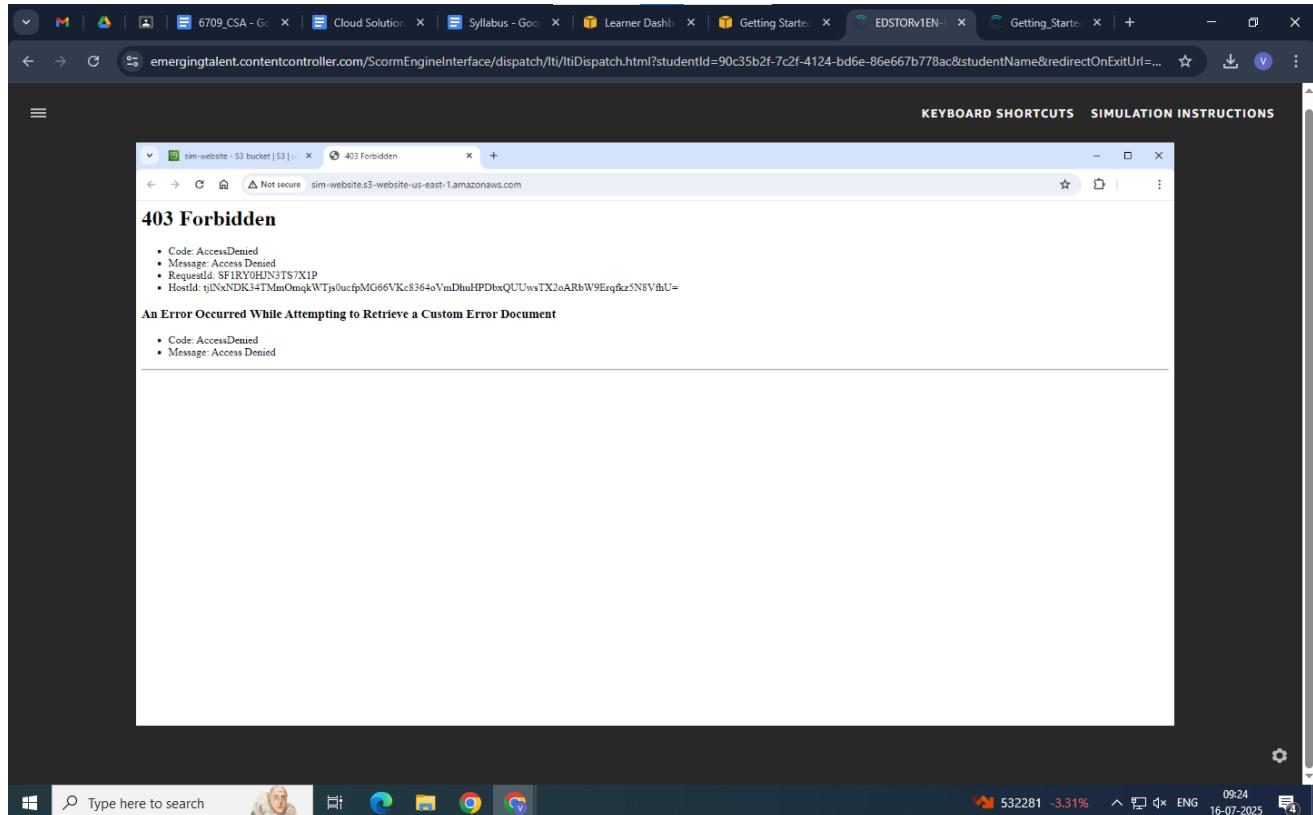
This completes Task 3: Uploading content to your bucket. Choose Continue.

Task 4: Turning on public access to the objects

28.Return to the browser tab that showed the 403 Forbidden message.

29.Choose the **Refresh** button for the webpage.

You should still see a 403 Forbidden message. This response is expected. This message indicates that your static website is being hosted by Amazon S3 but that the content is private.



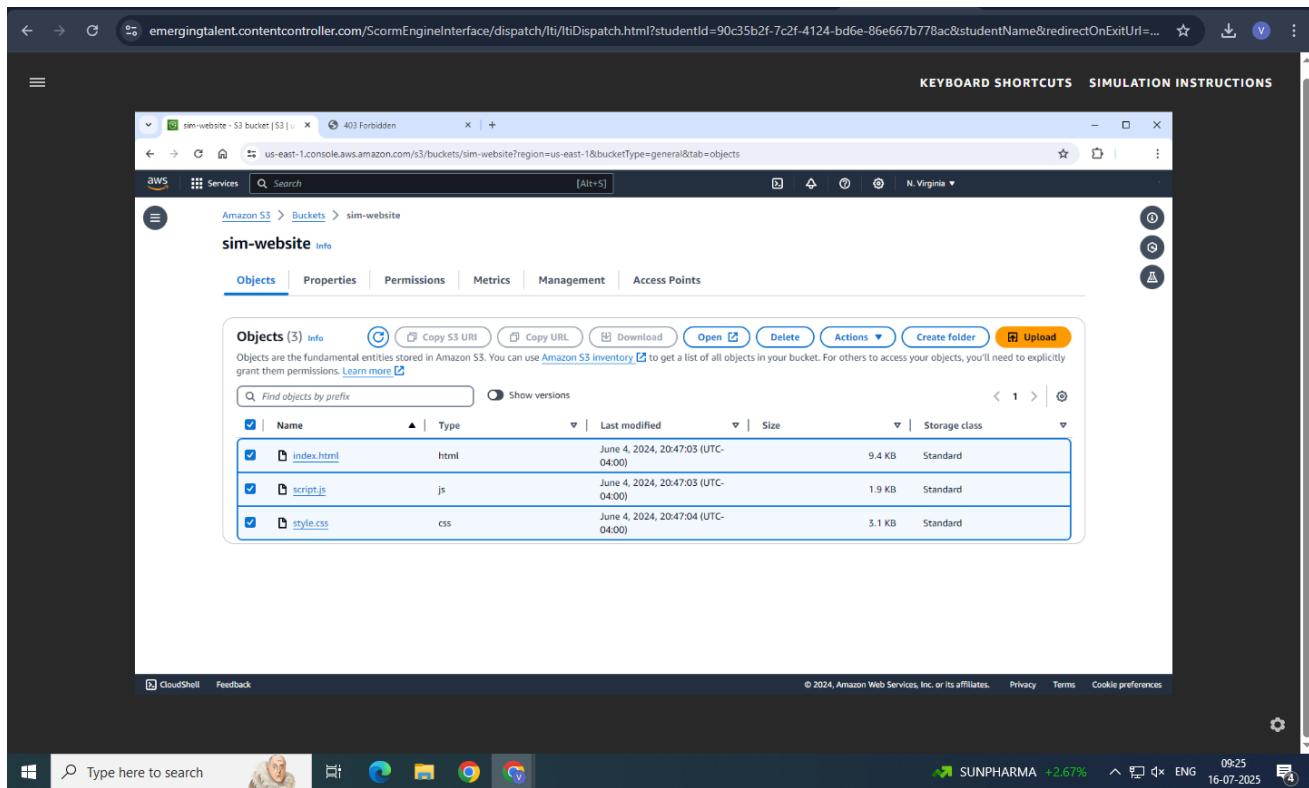
You can make Amazon S3 objects public in two different ways:

- To make either a whole bucket public or a specific directory in a bucket public, use a bucket policy.
 - To make individual objects in a bucket public, use an access control list (ACL).
- It is normally safer to make individual objects public because doing so avoids accidentally making other objects public. However, if you know that the entire bucket contains no sensitive information, you can use a bucket policy.

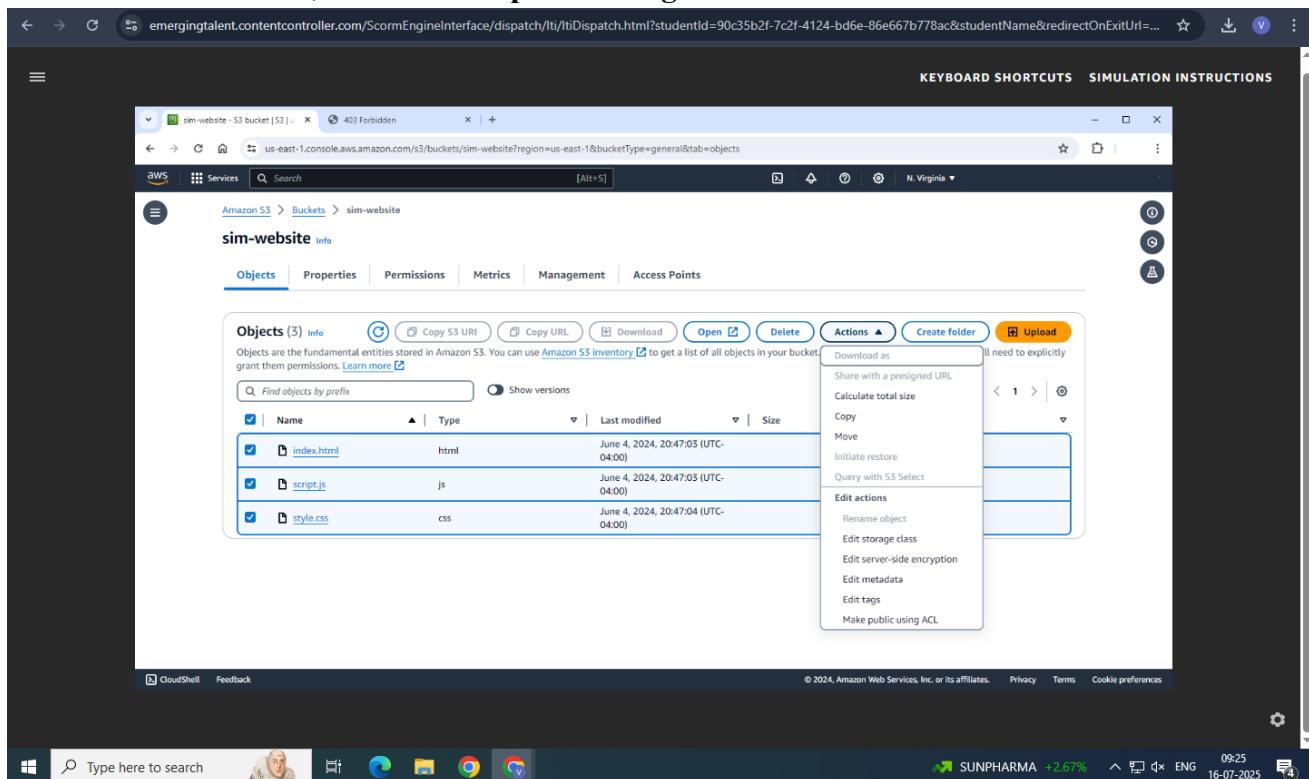
You now configure the individual objects to be publicly accessible.

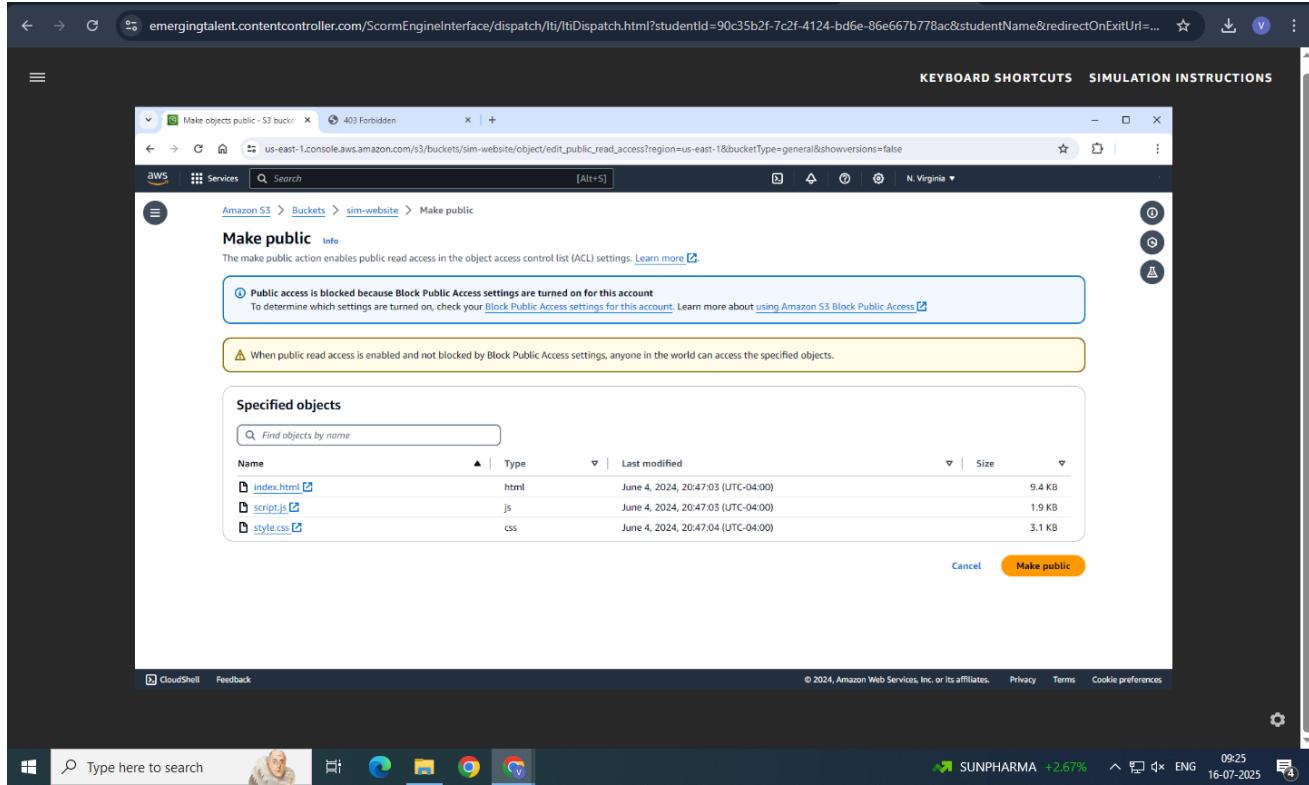
30.Keep the website tab open, and return to the web browser tab with the **Amazon S3 console**.

31.Choose the **Name** checkbox to select all three objects.

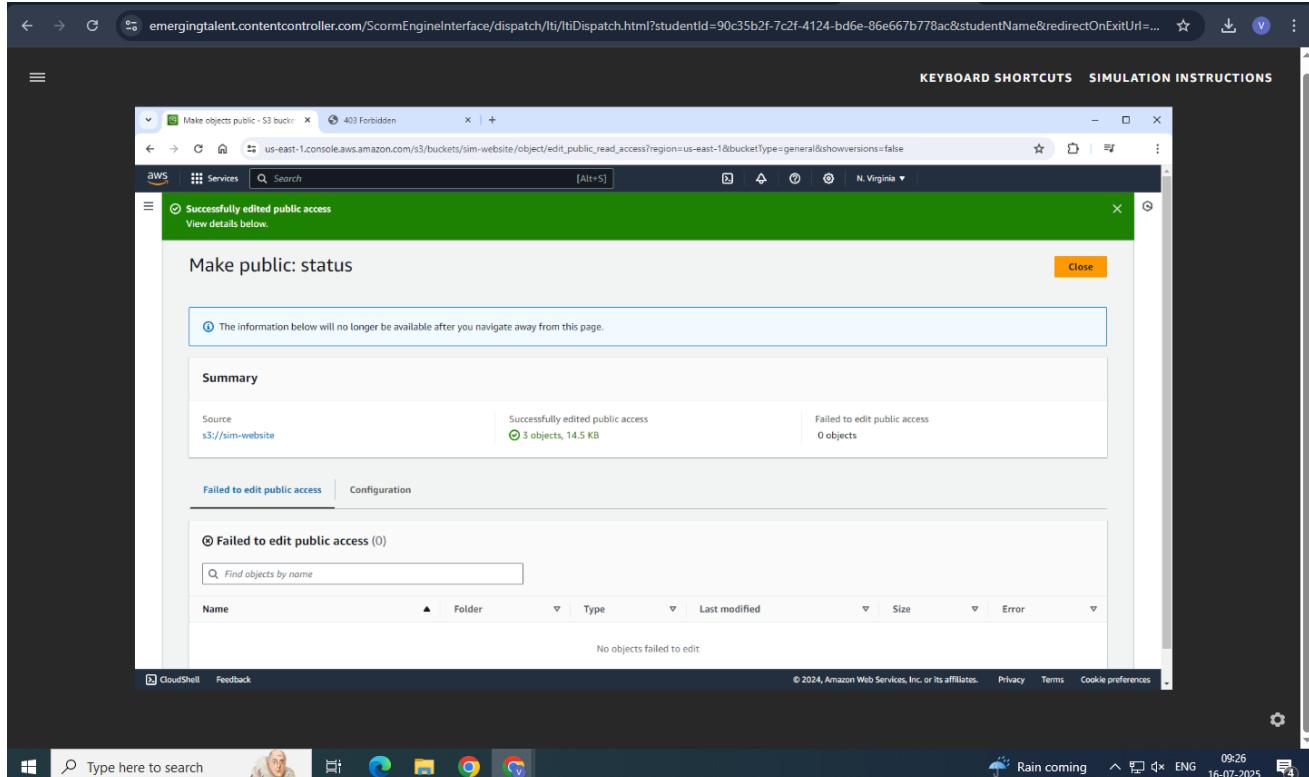


32.In the Actions menu, choose Make public using ACL.





33. Choose Make public.

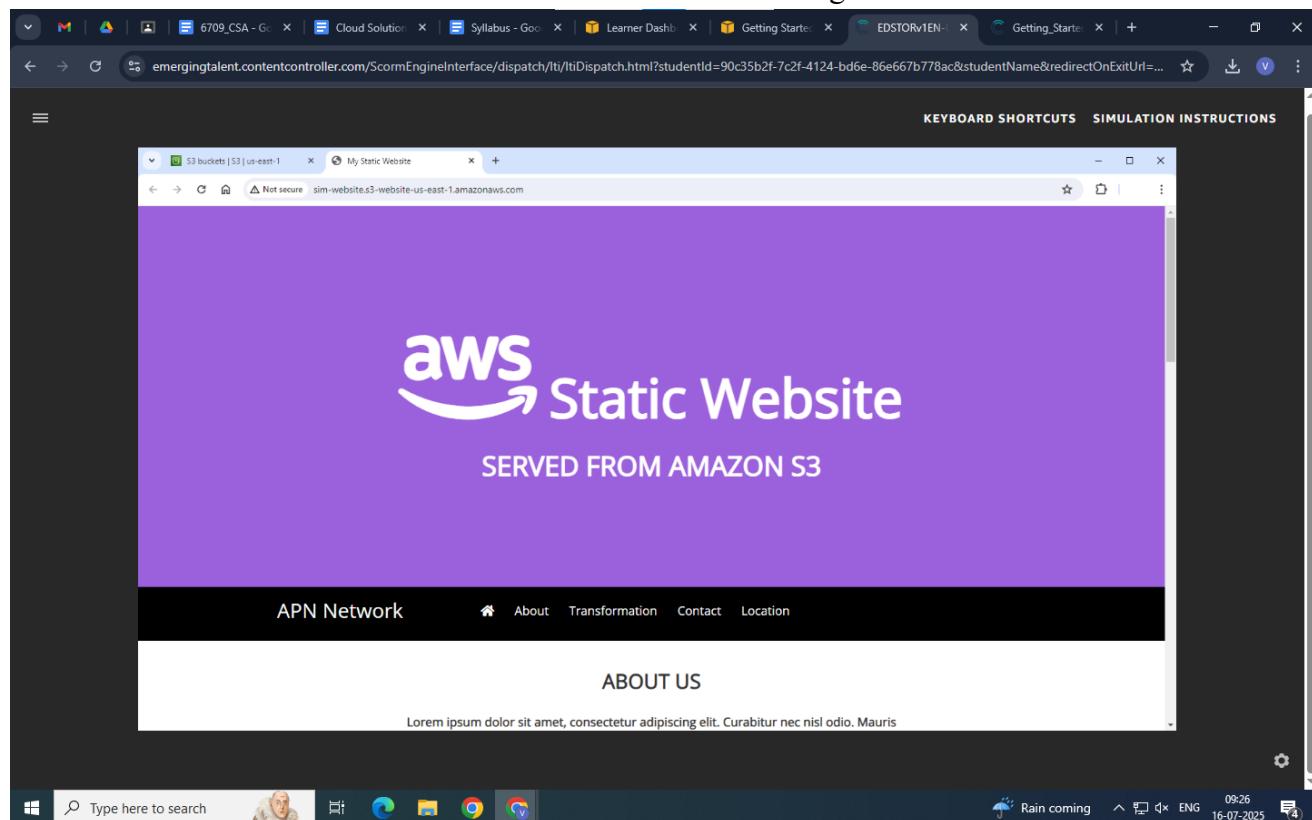


34. Choose Close.

35.Return to the web browser tab that has the 403 Forbidden message.

36.Refresh the webpage.

You should now see the static website that Amazon S3 is hosting.



37.On your browser, choose the x on the My Static Website tab.

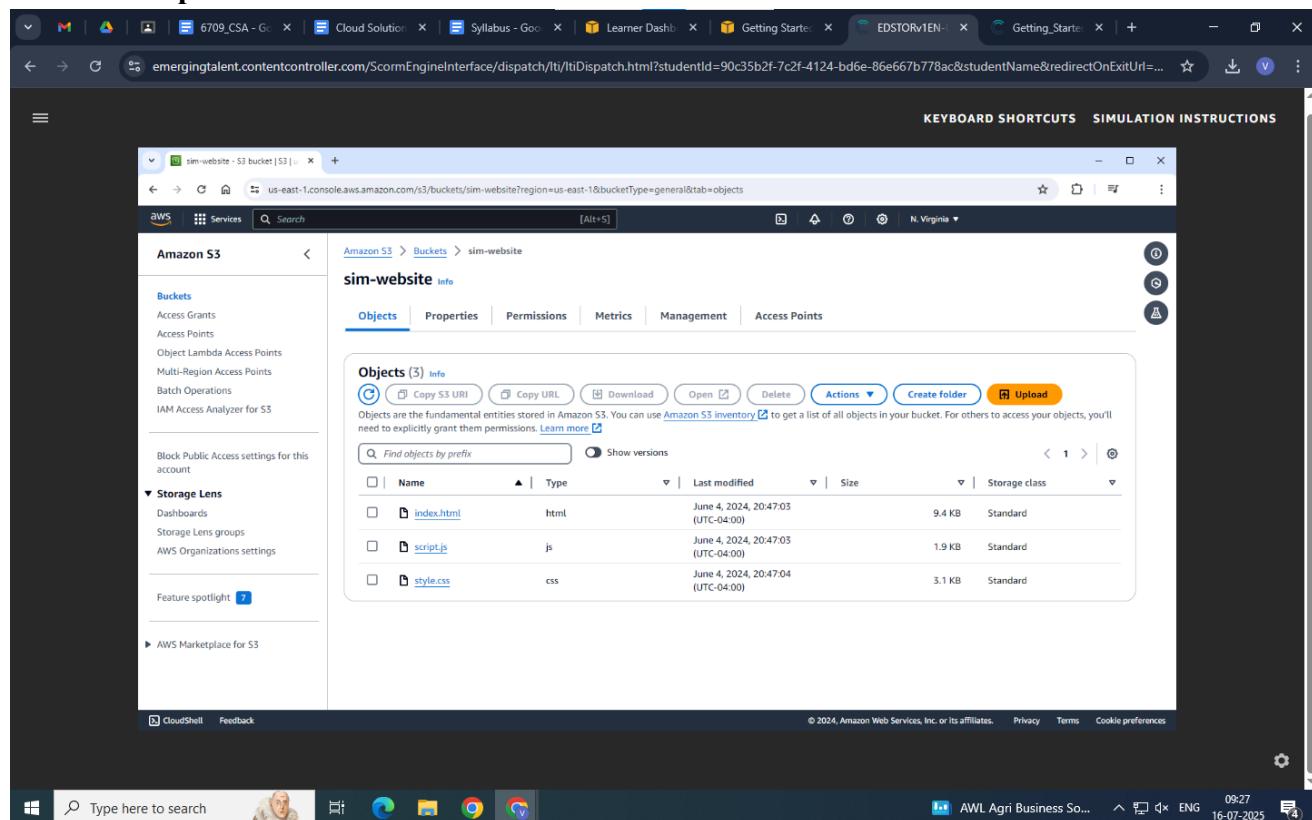
Name	Type	Last modified	Size	Storage class
index.html	HTML	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
script.js	JS	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	CSS	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

Task 5: Securely sharing an object by using a presigned URL

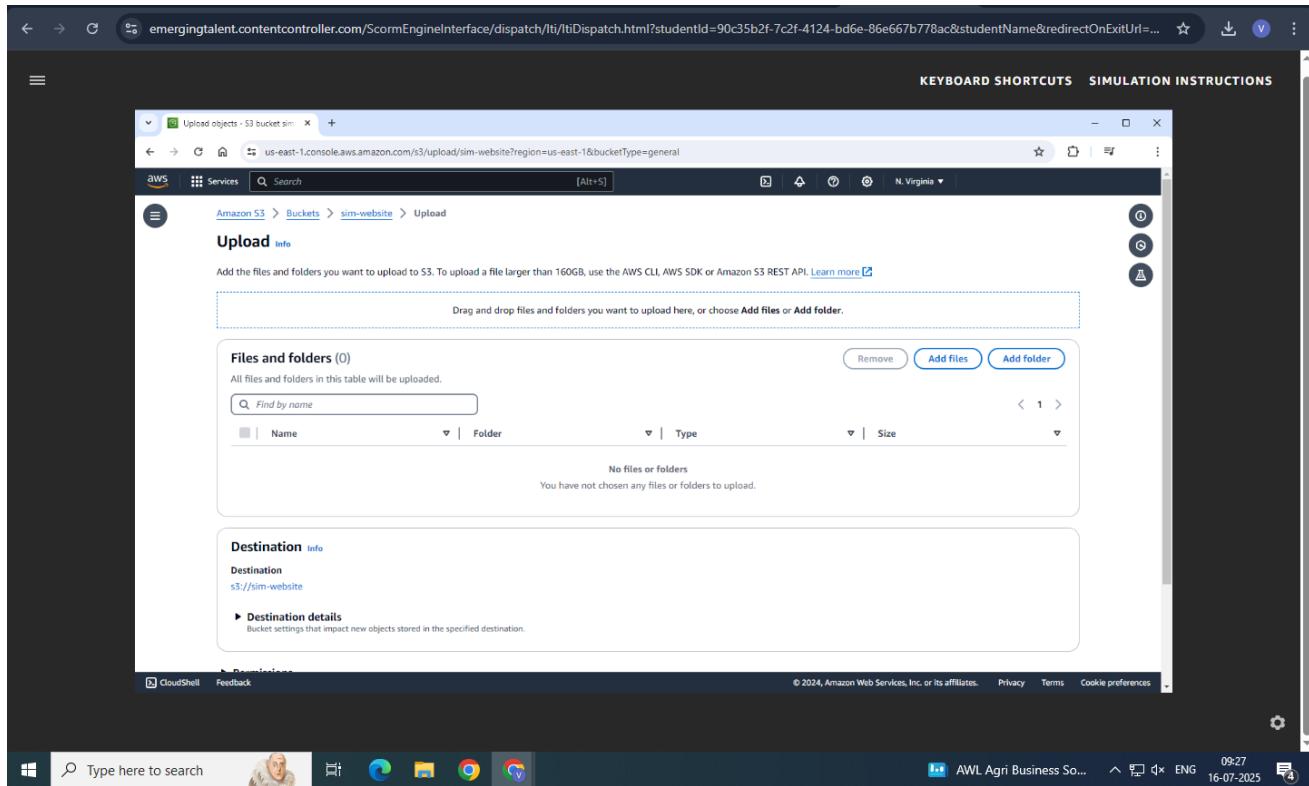
When you must temporarily and securely share an object with a person or group of people, you can create a presigned URL. When you create the URL, you must configure how long the URL will be

valid. Then, you can share this URL with the users who should have access to the object. If the presigned URL is valid, anyone who has it can get to the object. Avoid keeping the URL active longer than necessary, and only share the URL with people you trust.

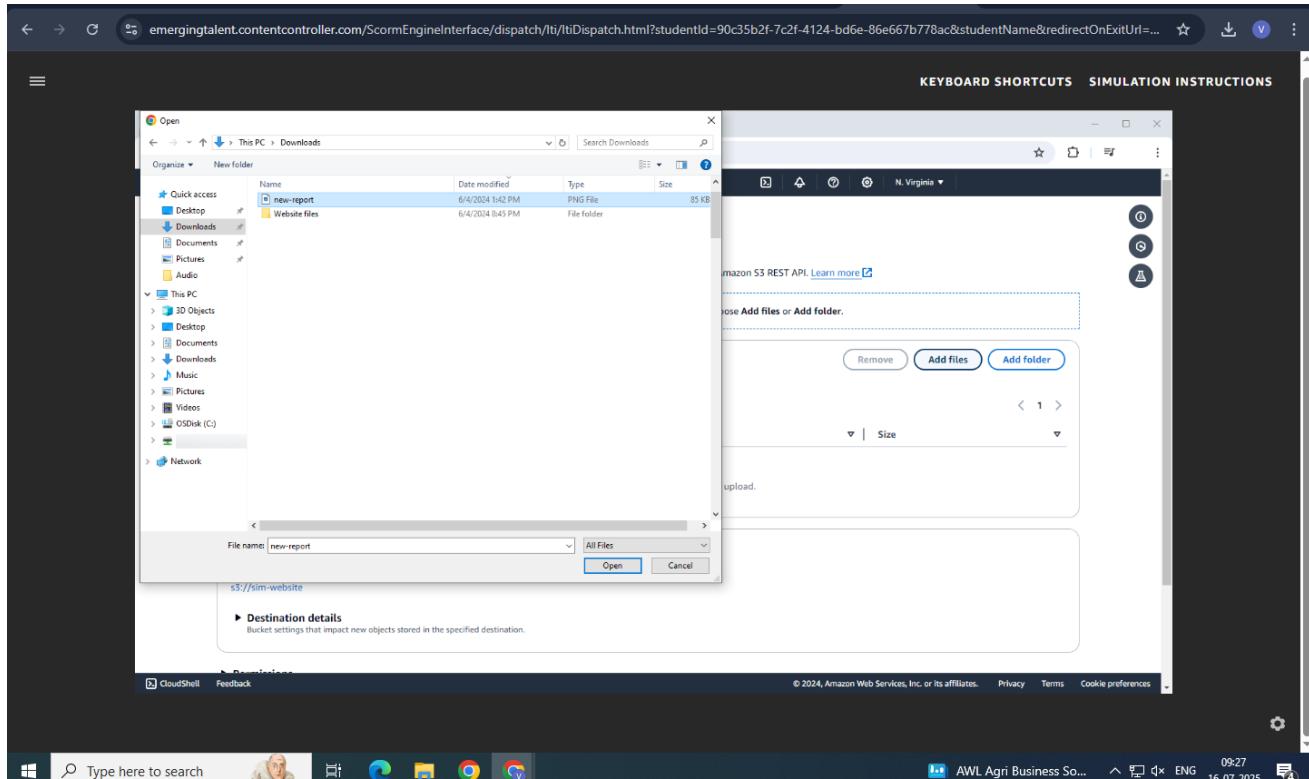
38. Choose Upload.



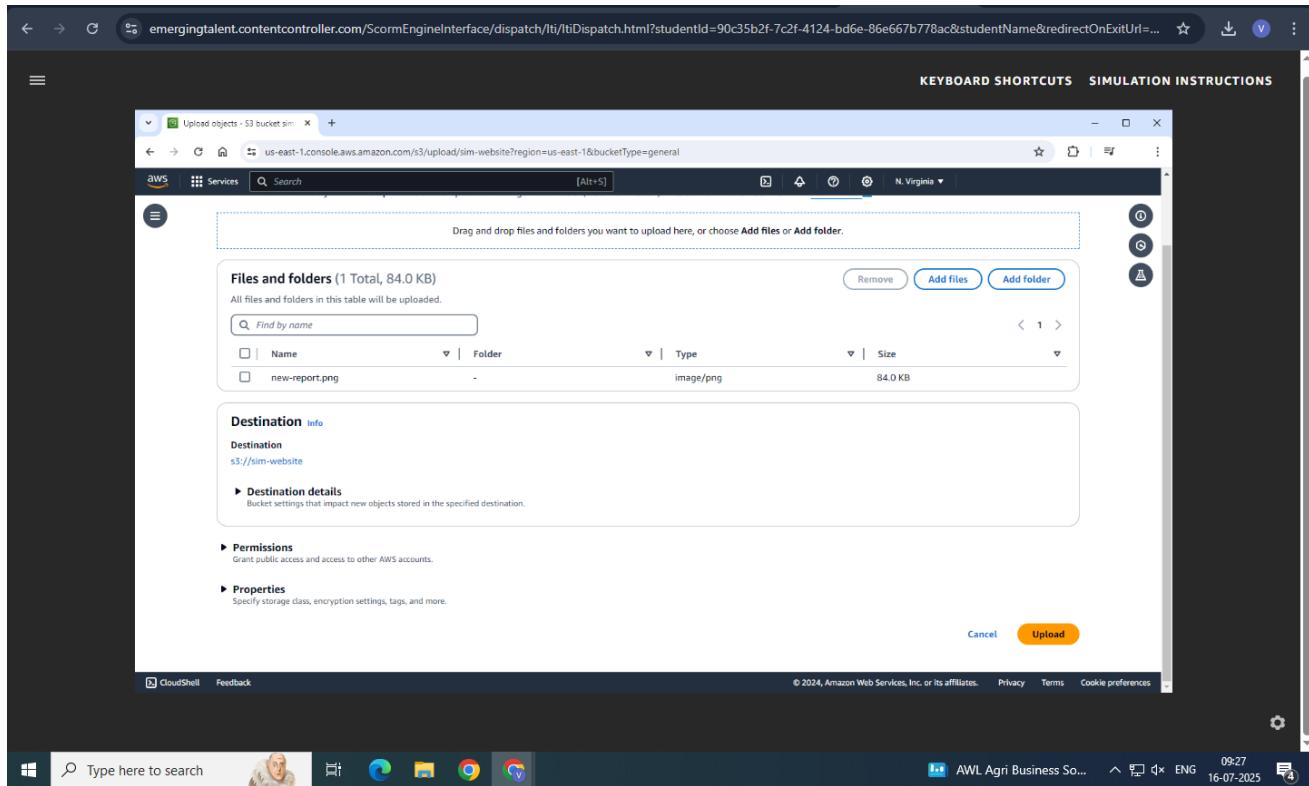
39. Choose Add files.



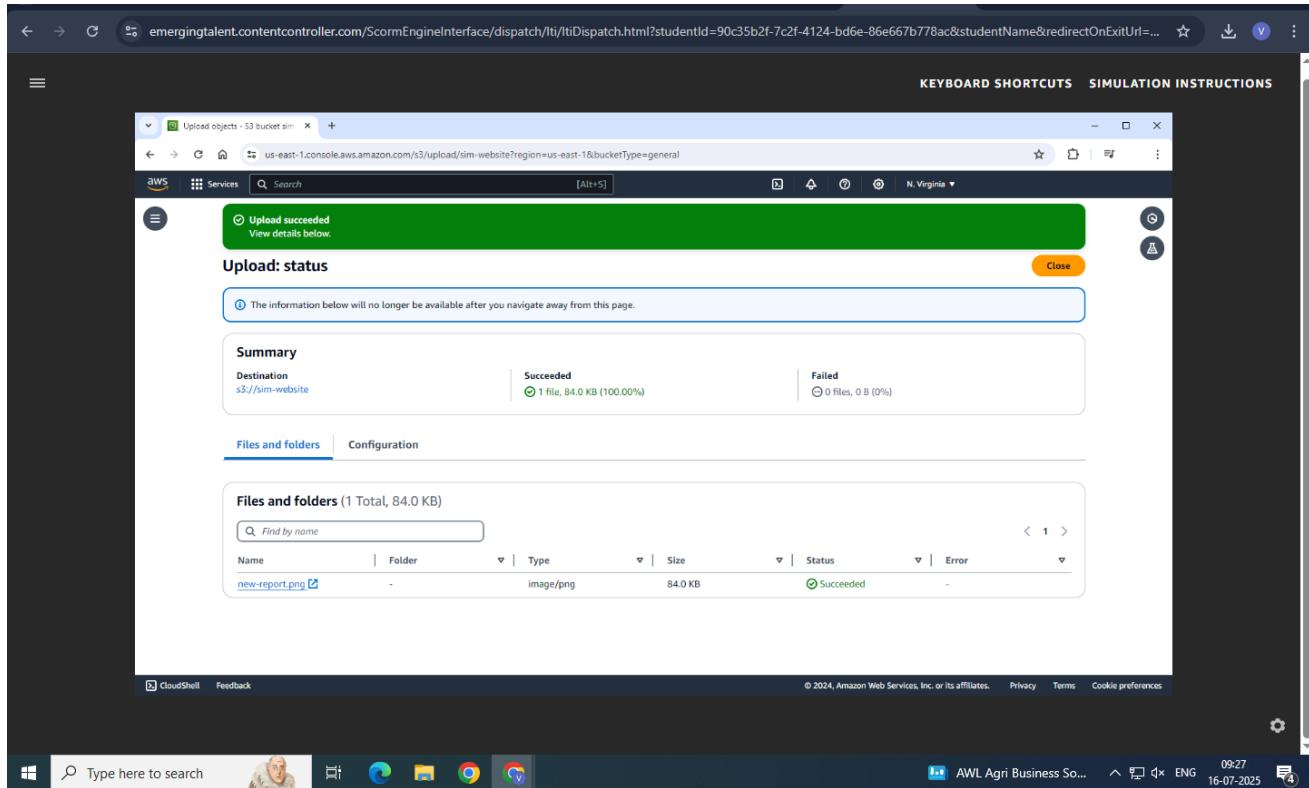
40. Choose the file **new-report** file and choose **Open**.



41. Choose the scroll bar to scroll down.

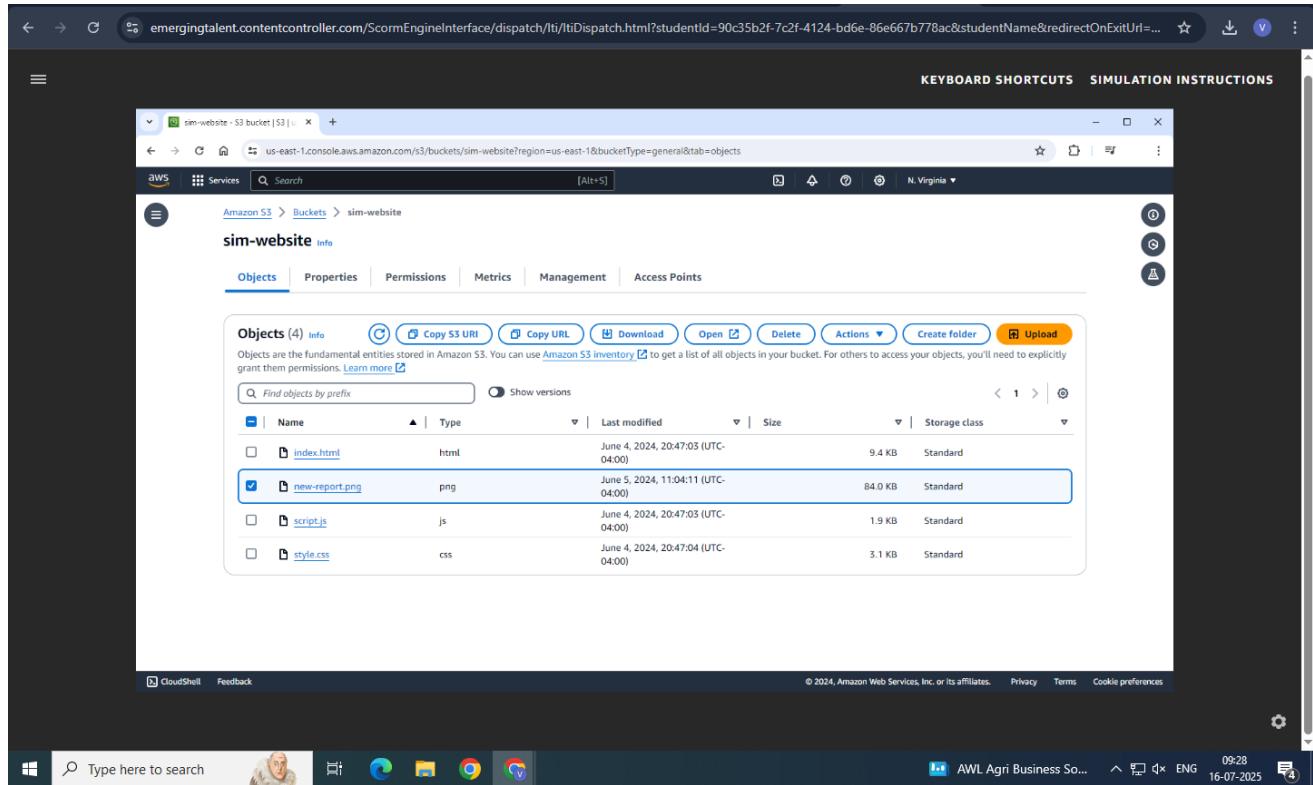


42. Choose Upload.



43. Choose Close.

Like when you first uploaded the website files, the **new-report.png** file is private by default. This time, instead of making the object public, you create a presigned URL to access the file.

44. In the Objects tab, choose new-report.png.

The screenshot shows the AWS S3 console with the 'Objects' tab selected. The 'new-report.png' file is highlighted with a blue border. The table below lists the objects:

Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

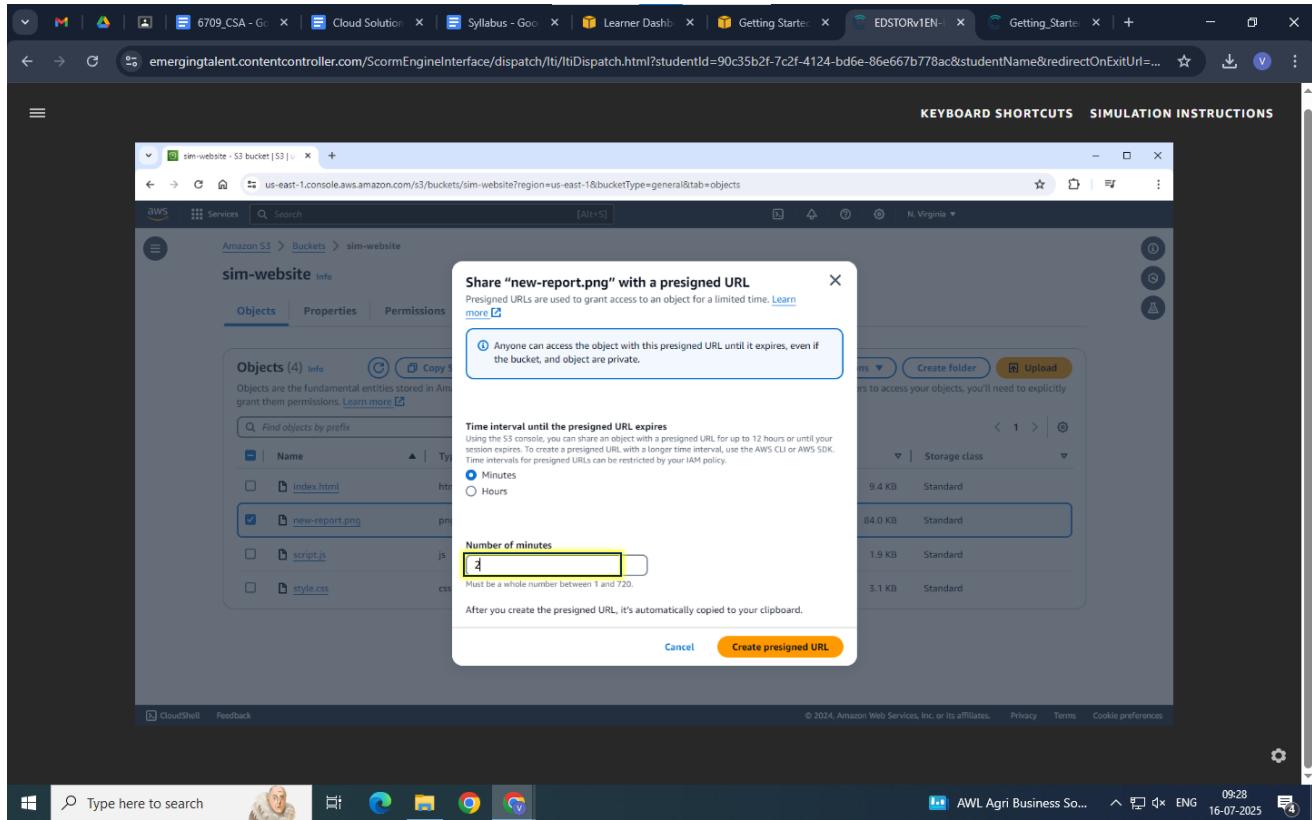
45. From the Actions menu, select Share with a presigned URL.

The screenshot shows the AWS S3 console with a bucket named 'sim-website'. Inside the bucket, there are four objects: 'index.html', 'new-report.png', 'script.js', and 'style.css'. The object 'new-report.png' is selected, and a context menu is open over it. The menu includes options like 'Download as', 'Share with a presigned URL', 'Calculate total size', 'Copy', 'Move', 'Initiate restore', 'Query with S3 Select', 'Edit actions', 'Rename object', 'Edit storage class', 'Edit server-side encryption', 'Edit metadata', 'Edit tags', and 'Make public using ACL'. The 'Actions' button at the top of the menu has a dropdown arrow.

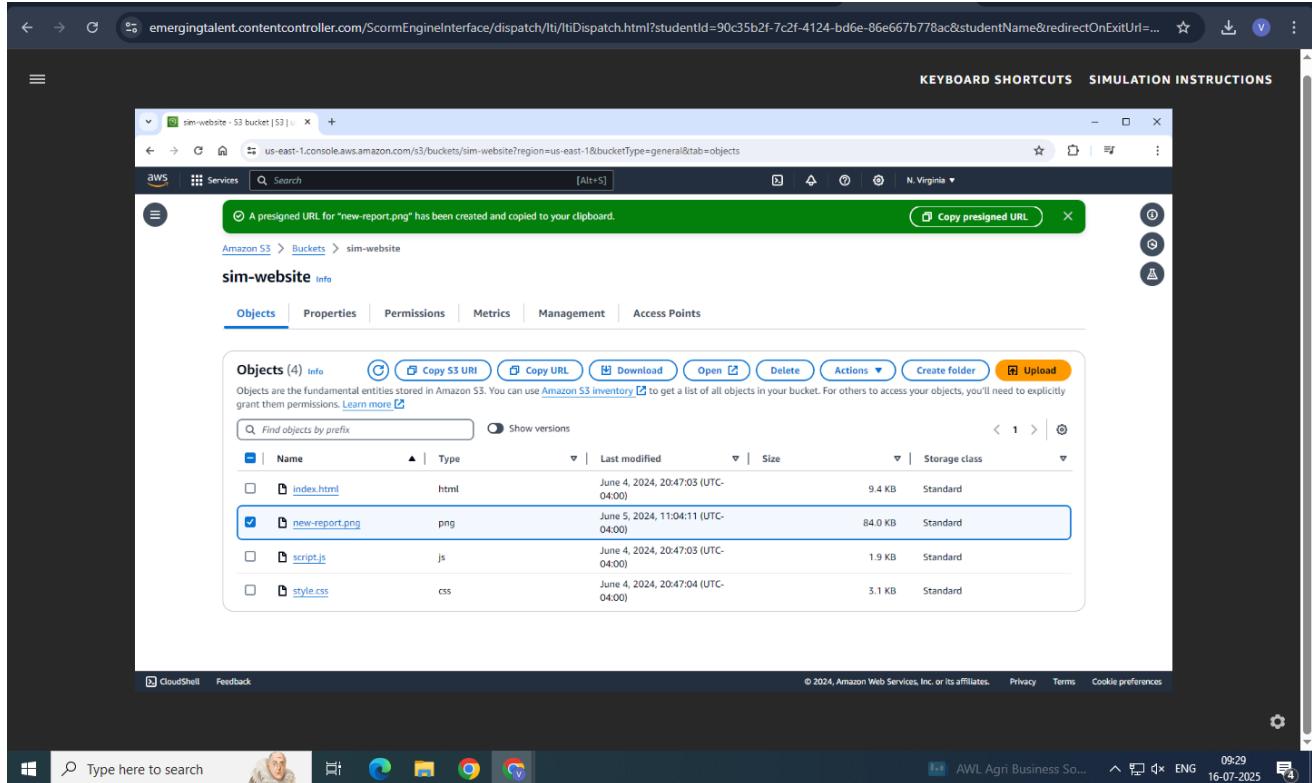
46.In the pop-up window, keep the default Minutes selected for the Time interval until the presigned URL expires.

47.For Number of minutes, enter .

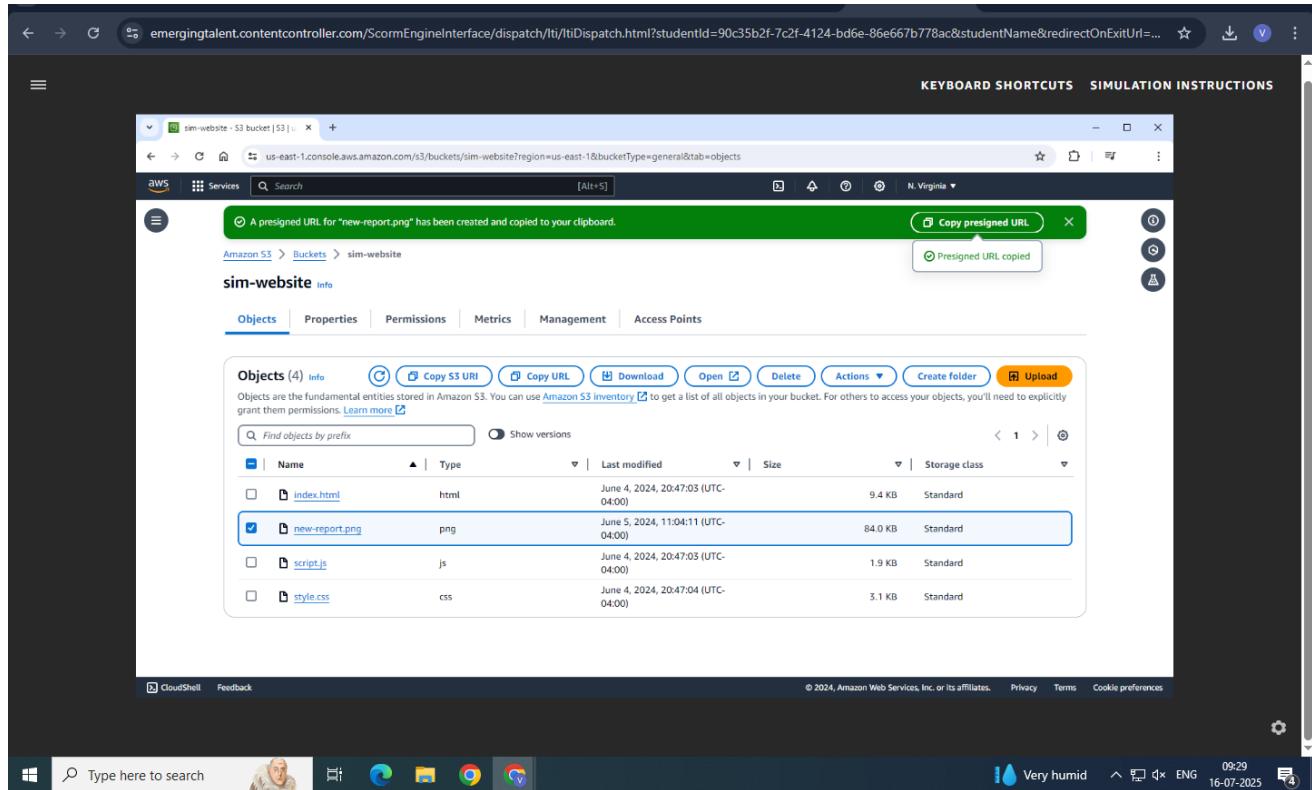
2



48. Choose Create presigned URL.



49.From the banner at the top of the page, choose **Copy presigned URL**.



The screenshot shows the AWS S3 console interface. A green banner at the top states: "A presigned URL for \"new-report.png\" has been created and copied to your clipboard." Below the banner, there is a "Presigned URL copied" message with a copy icon. The main area displays a list of objects in the "sim-website" bucket:

Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
<input checked="" type="checkbox"/> new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

50.Open a new browser tab.

51.Paste the URL that you copied into the address bar. Use these specific steps to paste and launch the URL:

- o Choose the browser URL search bar.
- o Press **Ctrl + v** on your keyboard.
 - **Note:** Mac users should also press **Ctrl + v** on their keyboard. This command is not the pasting command for Mac keyboards, but this simulation requires you to use your keyboard as a Windows keyboard.
- o Press **Enter** to load the page.

A report is displayed in the web browser.

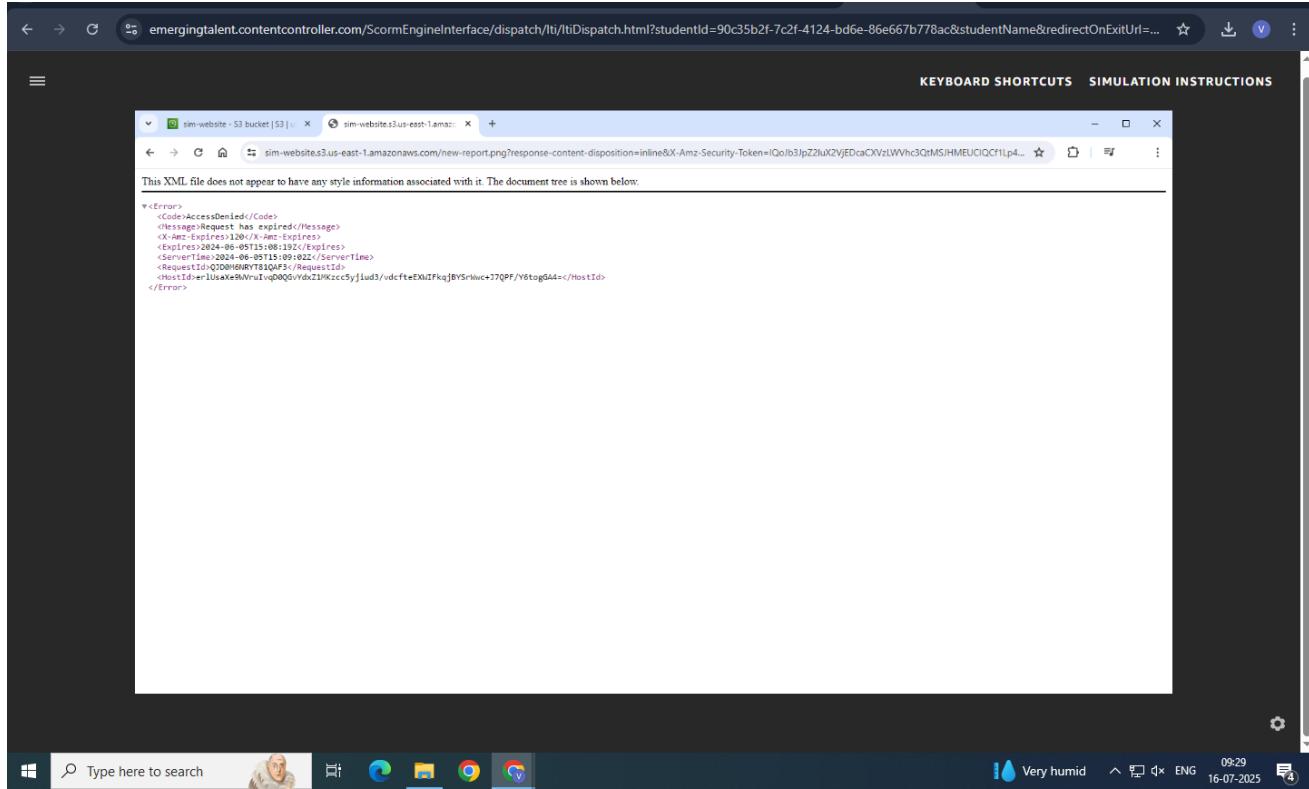
The screenshot shows an Excel spreadsheet with the following data:

Service	Operation	UsageType	Resource	StartTime	EndTime	UsageValue
AmazonS3	HeadBucket	USW2-C3DataTransfer-Out-Bytes	lab-test-bucket-77	10/31/2020 00:00	12/31/2020 11:59	15309
AmazonS3	PutObject	USW2-C3DataTransfer-In-Bytes	admin-test-77	10/31/2020 00:00	12/31/2020 11:59	19032
AmazonS3	HeadBucket	USW2-C3DataTransfer-Tier2	admin-test-77	10/31/2020 00:00	12/31/2020 11:59	128
AmazonS3	PutObjectForReplication	USW1-Request-SLA-Tier1	mybucket-98755	10/31/2020 00:00	12/31/2020 11:59	56888
AmazonS3	GetObjectForReplication	USW1-USV2-AWS-In-Bytes	mybucket-98756	10/31/2020 00:00	12/31/2020 11:59	254587
AmazonS3	GetObjectForReplication	USW2-C3DataTransfer-Out-Bytes	mybucket-98757	10/31/2020 00:00	12/31/2020 11:59	235
AmazonS3	HeadBucket	USW2-C3DataTransfer-In-Bytes	mybucket-98768	10/31/2020 00:00	12/31/2020 11:59	35889
AmazonS3	PutObject	USW2-Requests-Tier2	mybucket-98769	10/31/2020 00:00	12/31/2020 11:59	2348
AmazonS3	PutObjectForReplication	USW1-Request-SLA-Tier1	mybucket-98770	10/31/2020 00:00	12/31/2020 11:59	15309
AmazonS3	GetObjectForReplication	USW1-USV2-AWS-In-Bytes	mybucket-98771	10/31/2020 00:00	12/31/2020 11:59	19032
AmazonS3	GetObjectForReplication	USW2-C3DataTransfer-Out-Bytes	lab-example-bucket	10/31/2020 00:00	12/31/2020 11:59	128
AmazonS3	HeadBucket	USW2-C3DataTransfer-In-Bytes	lab-example-bucket	10/31/2020 00:00	12/31/2020 11:59	56888
AmazonS3	PutObject	USW2-Requests-Tier2	lab-example-bucket	10/31/2020 00:00	12/31/2020 11:59	254587
AmazonS3	PutObjectForReplication	USW1-Request-SLA-Tier1	lab-example-bucket	10/31/2020 00:00	12/31/2020 11:59	235
AmazonS3	GetObjectForReplication	USW1-USV2-AWS-In-Bytes	lab-example-bucket	10/31/2020 00:00	12/31/2020 11:59	25589

If you wait 2 minutes and use the link again, you will find that the URL has expired and no longer works. Note: for the sake of the simulation, you do not need to wait 2 minutes.

52. Choose the Refresh icon on the browser.

Now that the presigned URL is expired, you get an Access denied page.



53. Choose x to close the Access denied tab.

A presigned URL for "new-report.png" has been created and copied to your clipboard.

Copy presigned URL

Presigned URL copied

Amazon S3 > Buckets > sim-website

sim-website Info

Objects [4] Info Copy S3 URI Copy URL Download Open Actions Create folder Upload

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

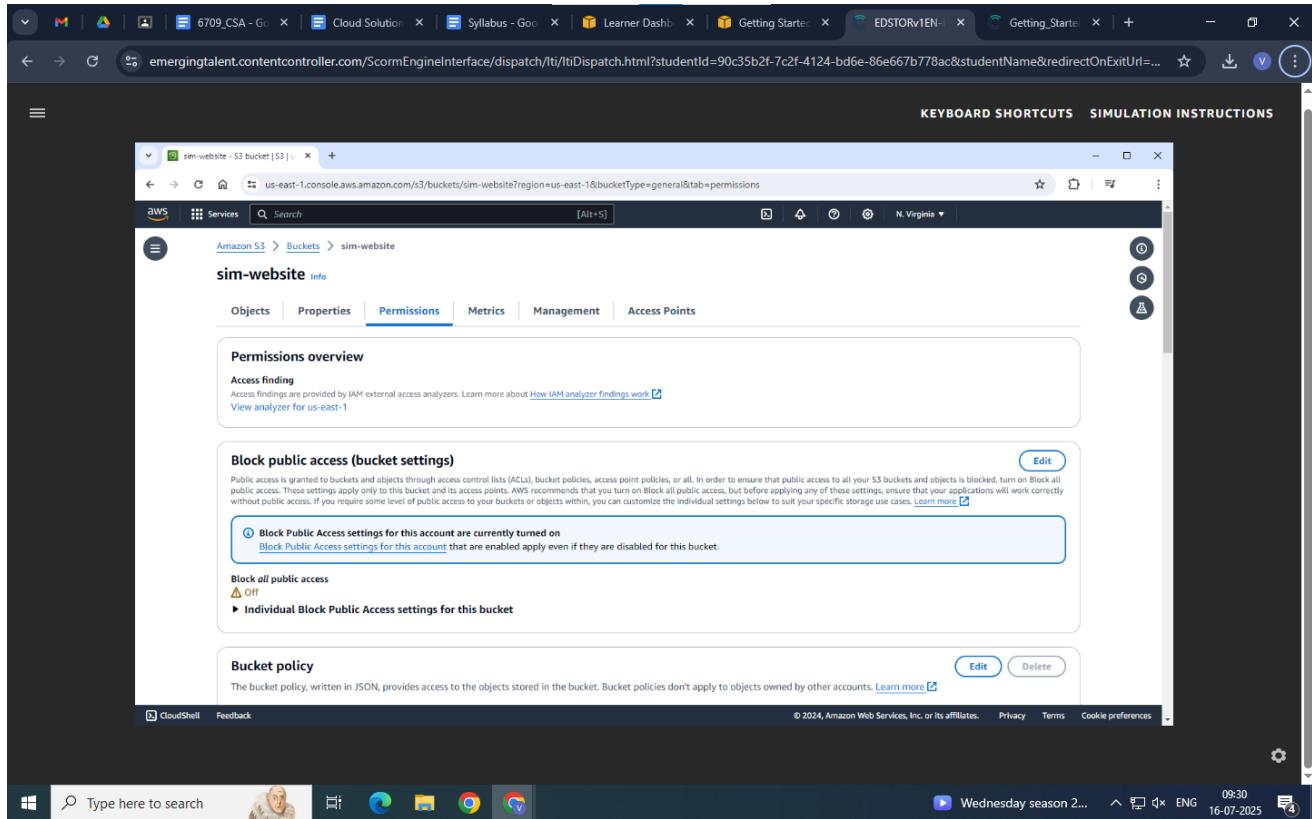
Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 UTC-04:00	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

This completes Task 5: Securely sharing an object by using a presigned URL. Choose Continue.

CloudShell Feedback © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookies preferences Continue >

Task 6: Using a bucket policy to secure your bucket

50. Choose the Permissions tab.



51. Choose the scroll bar to scroll down to the Bucket policy panel.

52. In the Bucket policy panel, choose Edit.

53. Copy the following policy text and paste it in the Policy text editor field. To do so, follow these specific steps:

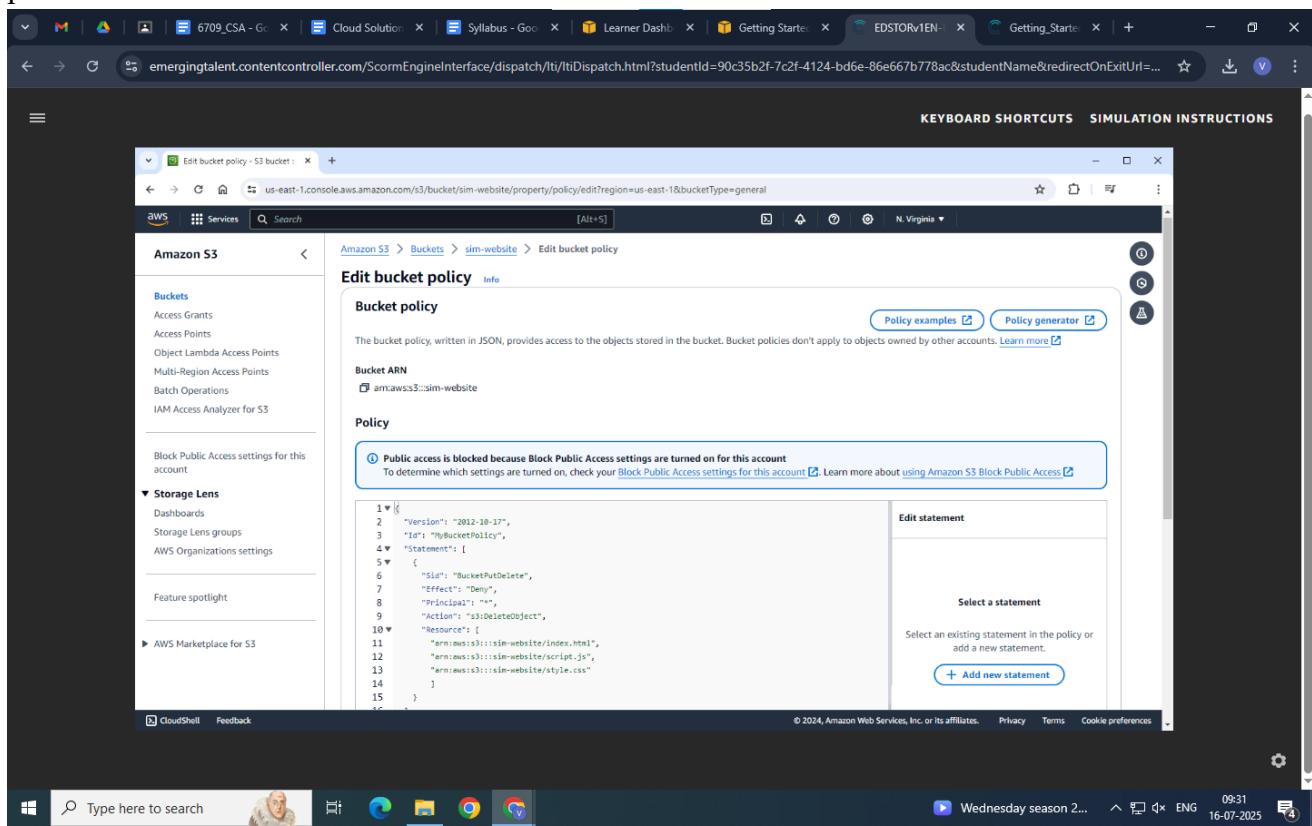
o Open the context (right-click) menu for the Policy text editor field. o Choose Paste.

```
{
"Version": "2012-10-17",
"Id": "MyBucketPolicy",
"Statement": [
{
"Sid": "BucketPutDelete",
"Effect": "Deny",
"Principal": "*",
>Action": "s3:DeleteObject",
"Resource": [
"arn:aws:s3:::sim-website/index.html",
"arn:aws:s3:::sim-website/script.js",
]
```

```
"arn:aws:s3:::sim-website/style.css"
]
}
]
}
```

This policy prevents everyone from deleting the three files that make your website work.

Note: If you use this code in your own AWS account, you must use the name of your bucket in place of this simulation's **sim-website** bucket.



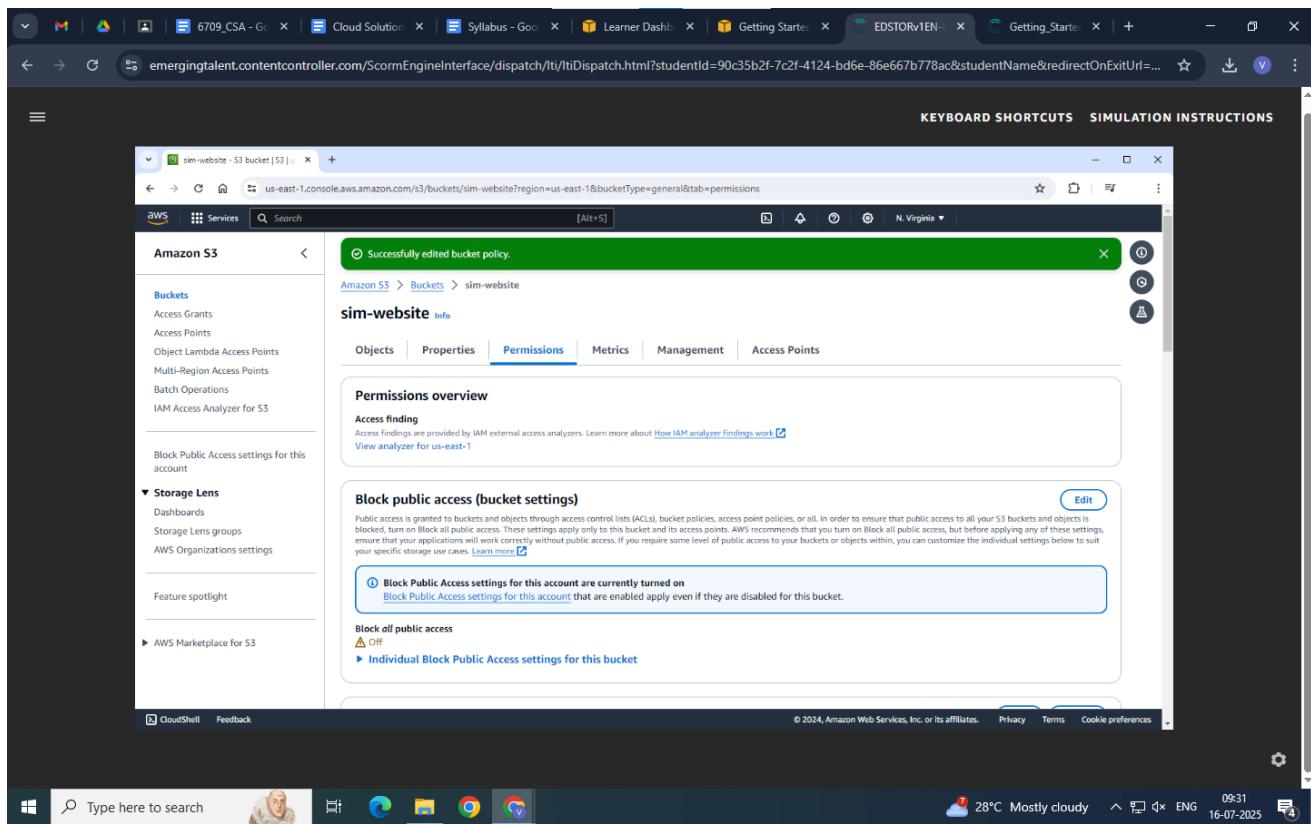
The screenshot shows the AWS S3 console with the 'Edit bucket policy' page for a bucket named 'sim-website'. The left sidebar shows navigation options like Buckets, Storage Lens, and AWS Marketplace. The main area displays a JSON policy document:

```
1 [ {
  2   "Version": "2012-10-17",
  3   "Statement": [
  4     {
  5       "Effect": "Deny",
  6       "Action": "s3:DeleteObject",
  7       "Resource": [
  8         "arn:aws:s3:::sim-website/index.html",
  9         "arn:aws:s3:::sim-website/script.js",
  10        "arn:aws:s3:::sim-website/style.css"
  11      ]
  12    }
  13  ]
  14 }
```

The policy denies the 'DeleteObject' action on specific files within the 'sim-website' bucket. A note at the top indicates that public access is blocked because Block Public Access settings are turned on.

53. Choose the scroll bar to scroll down.

54. Choose **Save changes**.



55.Return to the **Objects** tab.

56.Select **index.html**.

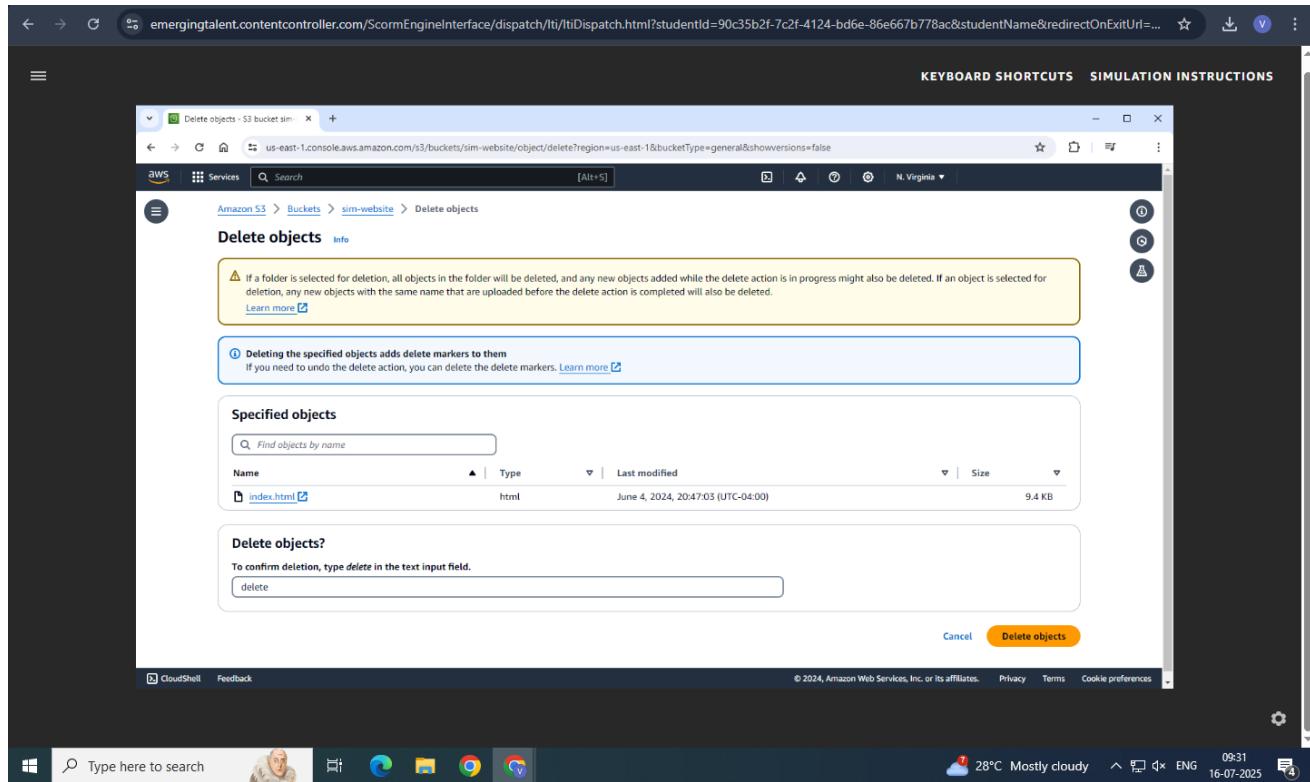
The screenshot shows the AWS S3 console interface. On the left, a sidebar lists 'Buckets' (Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3) and 'Storage Lens' (Dashboards, Storage Lens groups, AWS Organizations settings). The main area displays the 'sim-website' bucket under 'Amazon S3 > Buckets > sim-website'. The 'Objects' tab is selected, showing four objects: 'index.html' (selected), 'new-report.png', 'script.js', and 'style.css'. A modal dialog box is overlaid on the page, containing the word 'delete'.

Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

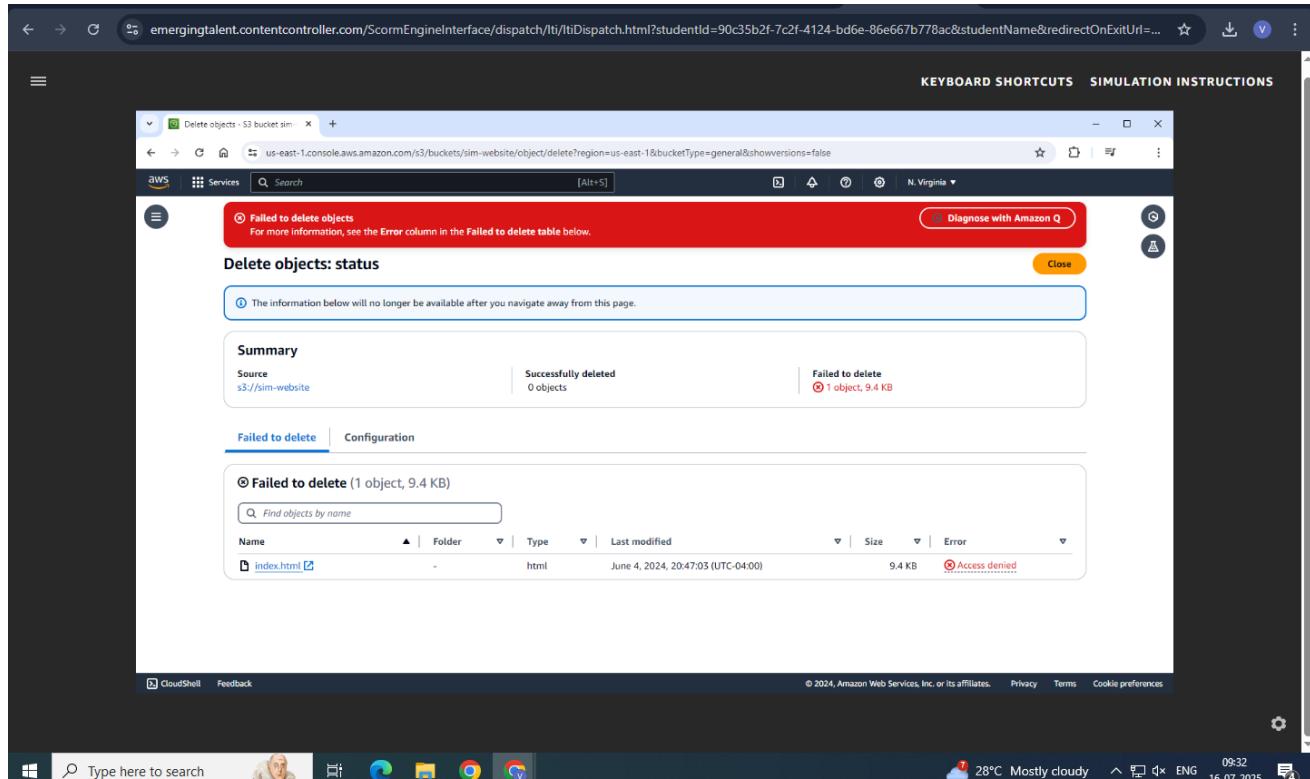
57. Choose **Delete**.

58. In the **Delete objects** panel, enter to confirm that you want to remove this file.

delete



59. Choose Delete objects.



60. Notice that the **index.html** file is listed in the Failed to delete pane.

This entry confirms that your policy is working and preventing the website's files from being deleted.

61. Choose **Close** to return to the **Objects** tab.

Your bucket policy is now protecting your website files from being deleted.

The screenshot shows the AWS S3 console with the 'Objects' tab selected. The table displays the following data:

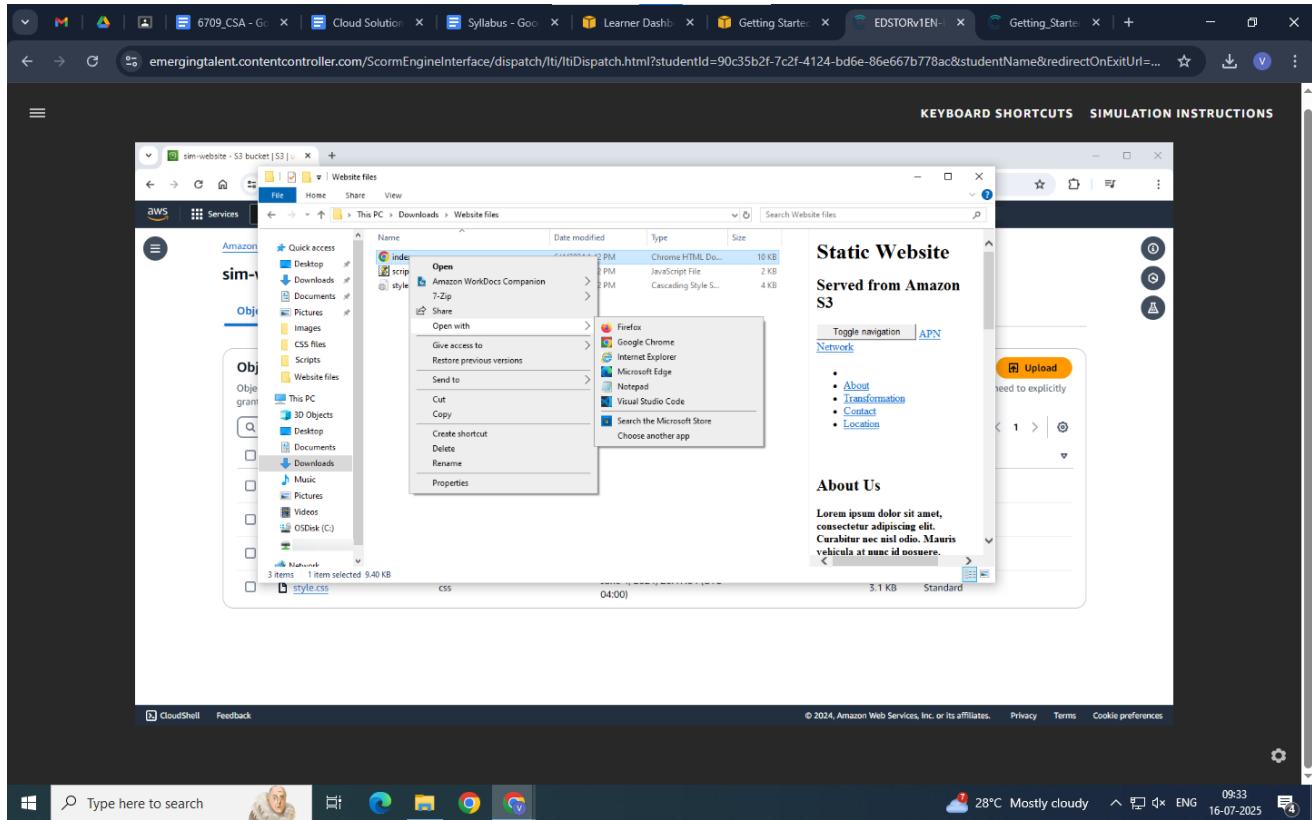
Name	Type	Last modified	Size	Storage class
index.html	html	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

This completes Task 6: Using a bucket policy to secure your bucket. Choose Continue.

Task 7: Updating the website

62. On your computer, load the **index.html** file into a text editor (in this simulation, you use Notepad). Follow these specific steps:

1. Open the context (right-click) menu for the **index.html** file.
2. Choose **Open with**.
3. Choose **Notepad**.



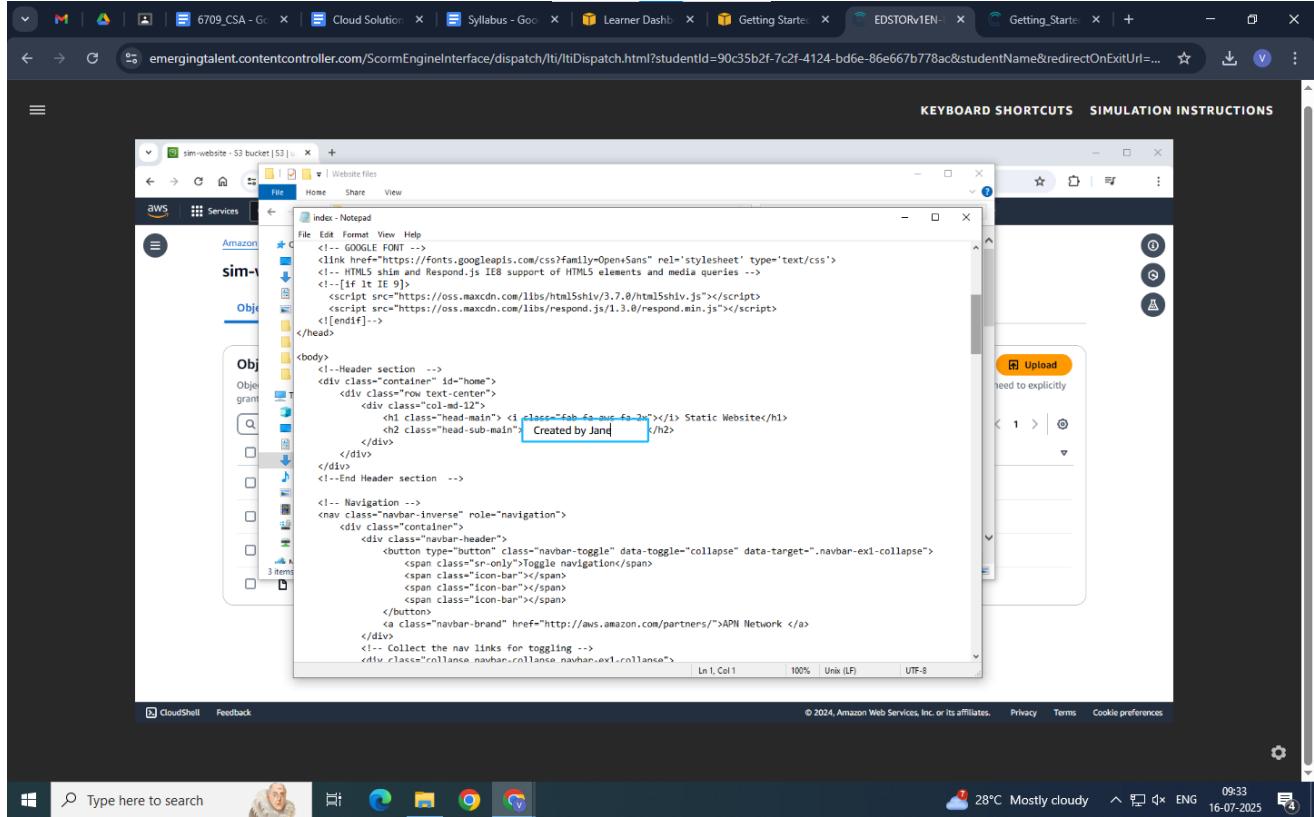
63. Find the text **Served from Amazon S3**, and replace it with . Follow

Created by
Jane

these specific steps:

1. Choose the text **Served from Amazon S3**.
2. Enter .

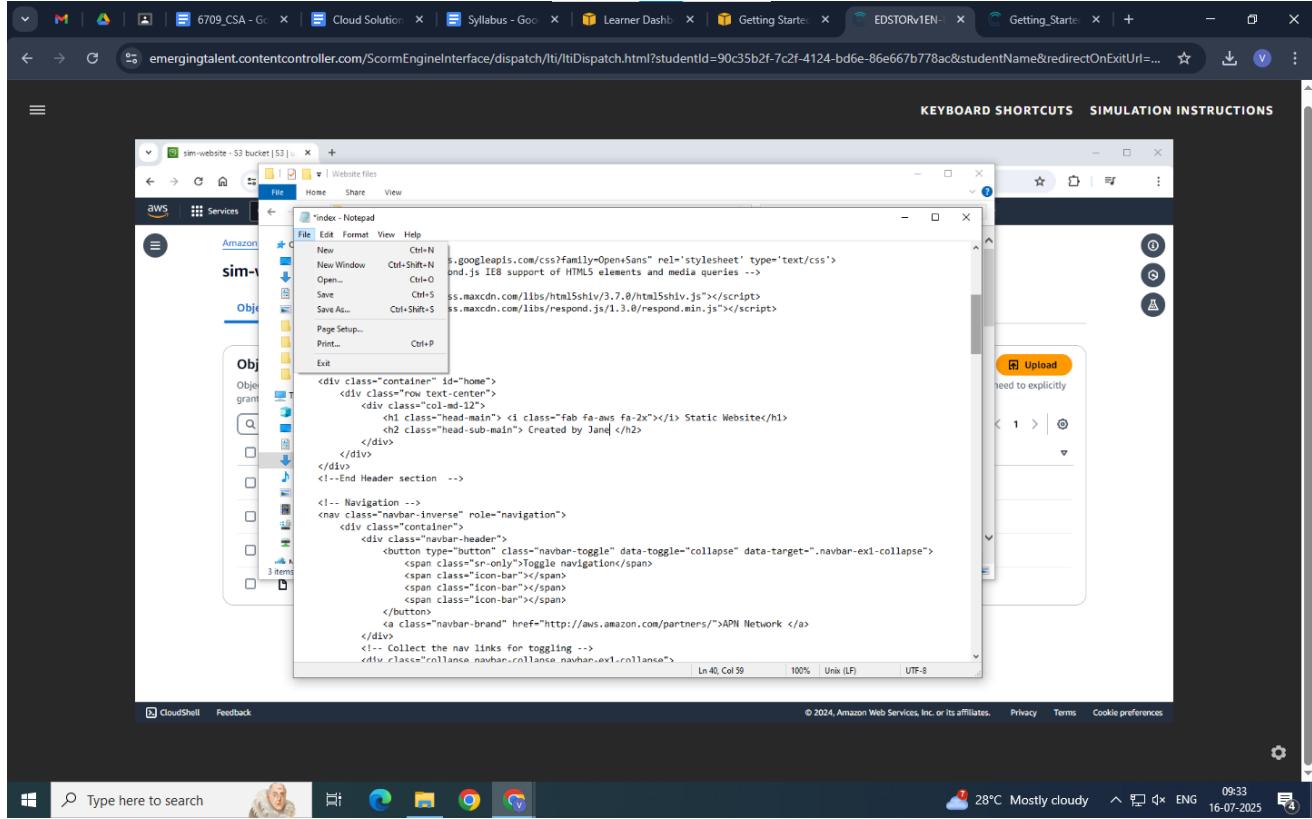
Created by
Jane



Note: To record your entry, press **Enter** on your keyboard or choose any place outside the entry field.

64. Save the file. Follow these specific steps:

1. Choose **File** from the Notepad menu.
2. Choose **Save**.



65.Return to the **Amazon S3 console** by selecting the **Amazon S3 console** window in the background.

Now you review the current website version.

66.Choose the **index.html** file name (choose the link, not the checkbox).

67.Choose the **Object URL** link.

Served from Amazon S3 should still be visible on your website page because you have not yet uploaded the new version and made it public. Next, you will upload the index.html file that you edited and make it public.

68.Choose the **Back** arrow on your browser to return to the **Amazon S3 console**.

69.Choose the **sim-website** link from the navigation at the top of the page. 70.Upload the **index.html** file that you just edited. Follow these specific steps:

1. Choose **Upload**.

2. Choose **Add files**.

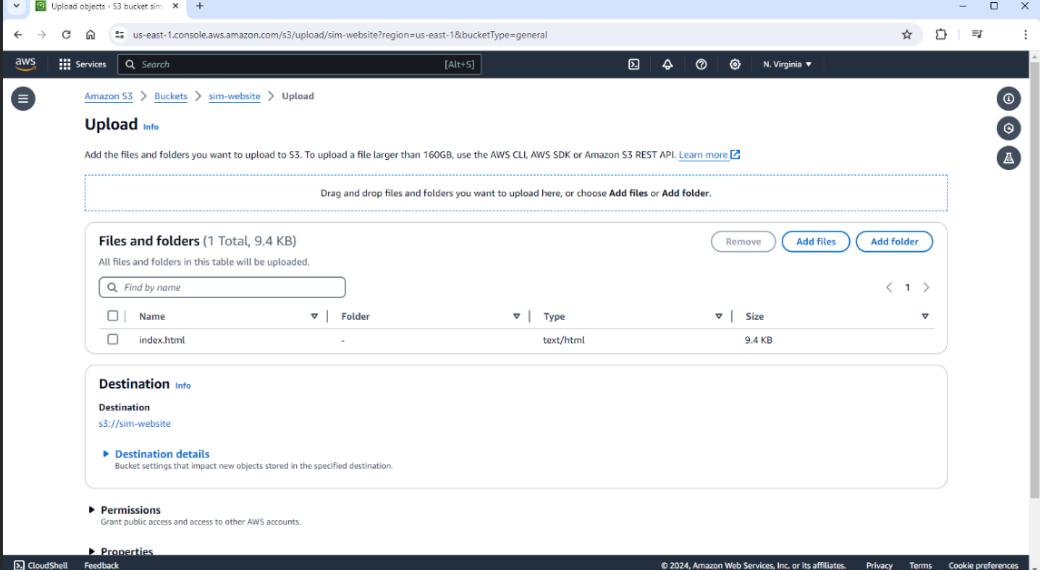
3. Choose the **Website files** folder, and choose **Open**.

4. Choose the **index** file and choose **Open**.

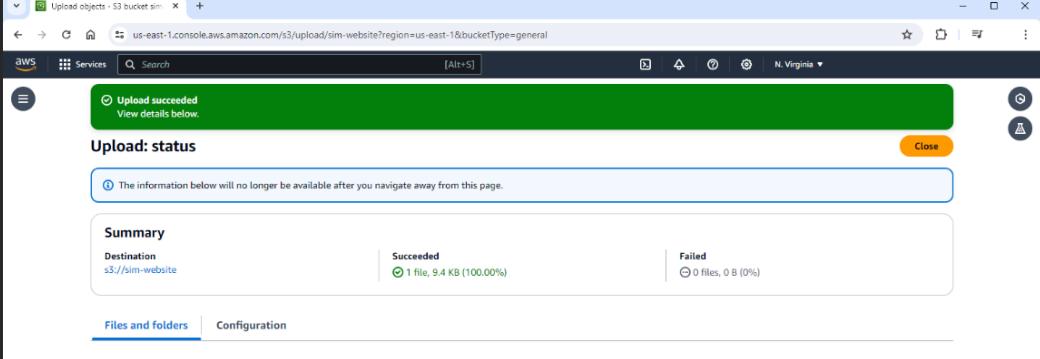
5. Choose the scroll bar to scroll down.

6. Choose **Upload**.

7. Choose Close.



The screenshot shows the AWS S3 console interface for uploading objects to a bucket named 'sim-website'. In the 'Upload' section, a file named 'index.html' is selected and ready to be uploaded. The destination is set to 's3://sim-website'. The 'Permissions' section indicates that public access is granted. The 'Properties' section shows the file's type as 'text/html' and size as '9.4 KB'. A green success message at the top states 'Upload succeeded'.



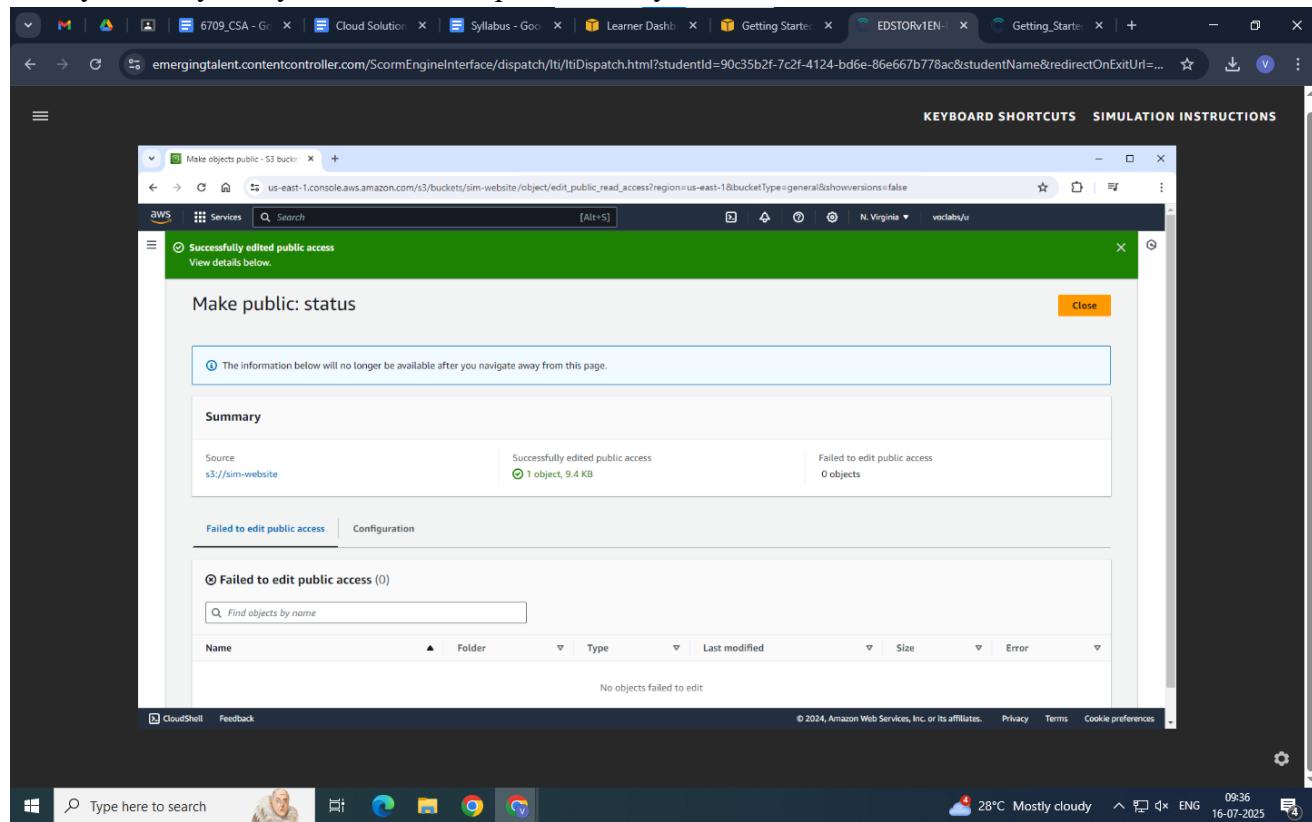
The screenshot shows the 'Upload: status' page after the upload has completed successfully. It displays a summary table with one succeeded file ('index.html') and zero failed files. The 'Files and folders' table below lists the uploaded file with its details: name 'index.html', folder '-', type 'text/html', size '9.4 KB', status 'Succeeded', and error '-'.

71. Select the **index.html** checkbox, and in the **Actions** menu, choose the **Make public using**

ACL option again.

72. Choose **Make public**, and choose **Close**.

Now you verify that your website is updated with your edits.

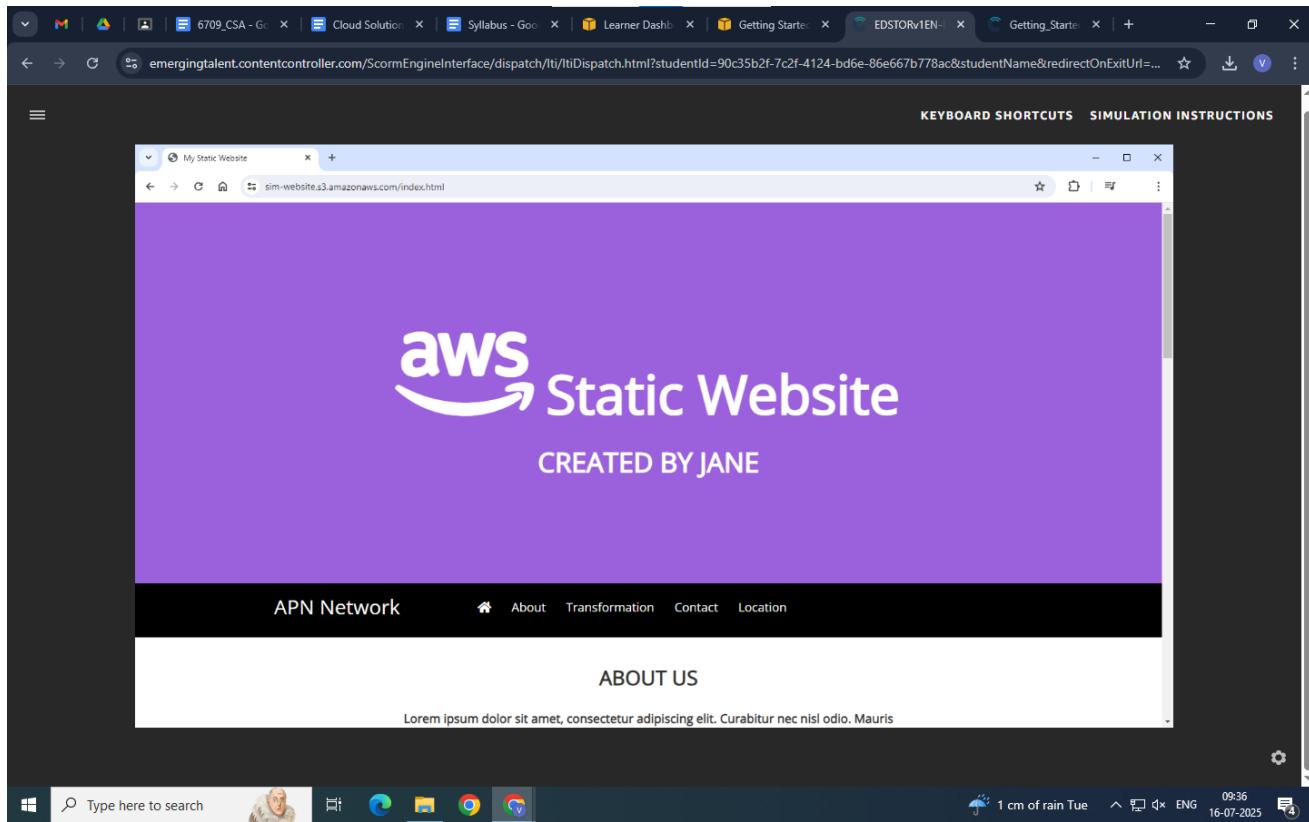


73. Choose the **index.html** file name (choose the link, not the checkbox).

74. Choose the **Object URL** link.

Created by Jane should now be on the page in place of Served from Amazon S3.

Your static website is now accessible on the internet. Because it is hosted on Amazon S3, the website has high availability and can serve high volumes of traffic without using any servers.



75. Choose the Back arrow on your browser to return to the Amazon S3 console.

76. Choose the **sim-website** link from the navigation at the top of the page.

Name	Type	Last modified	Size	Storage class
index.html	html	June 5, 2024, 12:27:06 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

Task 8: Exploring file versions

77. Choose **Show versions** to see which files have multiple versions.

The screenshot shows the AWS S3 console interface. The URL in the browser is <https://us-east-1.console.aws.amazon.com/s3/buckets/sim-website?region=us-east-1&bucketType=general&tab=objects&showversions=true>. The page displays the 'sim-website' bucket under the 'Objects' tab. There are five objects listed:

Name	Type	Version ID	Last modified	Size	Storage class
index.html	html	SymJ44zBwNraE6N.zu5ID77d18vO3MP	June 5, 2024, 12:27:06 (UTC-04:00)	9.4 KB	Standard
index.html	html	i9Resqhvsv2620Ysgf17tRbkfQFQ8t0W	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	E_M8zqdYWWG9X4gviGvdEl7EpOnqZERd	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	CjJUKC6FMWDL1psQ1ANOhQoMn	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard

The 'Show versions' button is highlighted with a yellow box. The browser taskbar at the bottom shows various open tabs and system status.

78. Choose the scroll bar to scroll down.

79. Review the list of objects in the bucket.

The screenshot shows the AWS S3 console interface. At the top, there are tabs for 'KEYBOARD SHORTCUTS' and 'SIMULATION INSTRUCTIONS'. Below the tabs, the main content area displays a list of objects in a table. The table has columns for Name, Type, Version ID, Last modified, Size, and Storage class. There are five rows of data:

Name	Type	Version ID	Last modified	Size	Storage class
index.html	html	SymJ442BwNraE6NzU5ID7d18vO3MIP	June 5, 2024, 12:27:06 (UTC-04:00)	9.4 KB	Standard
index.html	html	i9Resqhvay2620Yfg17tRtkfQfQ8t0W	June 4, 2024, 20:47:03 (UTC-04:00)	9.4 KB	Standard
new-report.png	png	E_MBzqdYWOG9x4GvGvdI7EpOnqZERd	June 5, 2024, 11:04:11 (UTC-04:00)	84.0 KB	Standard
script.js	js	CjjiJXKGFMWDL1PtQ1ANOhQqMn_LiO.	June 4, 2024, 20:47:03 (UTC-04:00)	1.9 KB	Standard
style.css	css	KSo5Hct3wgo7NbLQD_Xr3QjfuUr	June 4, 2024, 20:47:04 (UTC-04:00)	3.1 KB	Standard

A pink banner at the bottom of the table area says 'This completes Task 8: Exploring file versions. Choose Continue.'

At the bottom of the screen, there is a Windows taskbar with icons for File Explorer, Edge, and Google Chrome. The system tray shows the date as 16-07-2025, the time as 09:37, and a weather icon indicating '1 cm of rain Tue'.

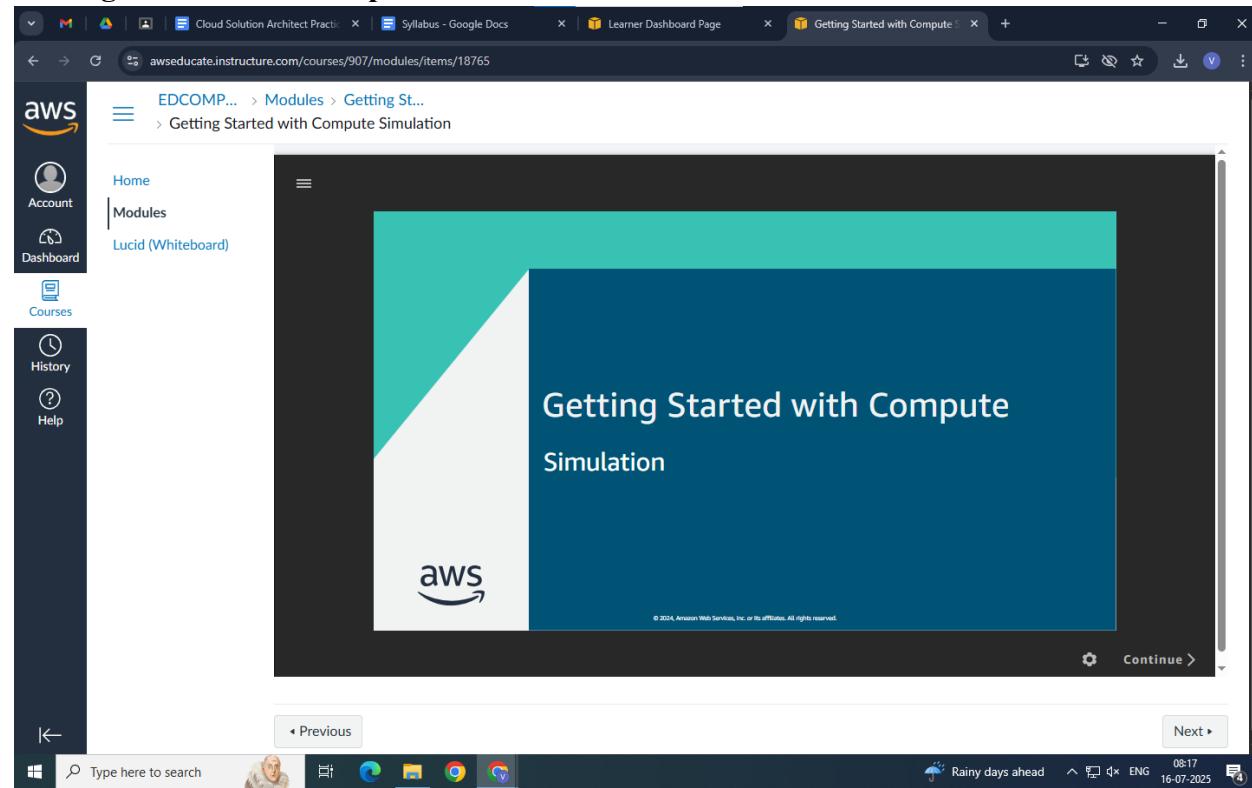
- o Notice that each file has a **Version ID**. Amazon S3 automatically generates these IDs when versioning is turned on.
- o You should also find two versions of the **index.html** file because you uploaded a new version of the file. The current version is the file that you uploaded when you updated your website.

Practical 4: Getting Started with Amazon EC2

Jul 16, 2025

- A. Launch an EC2 instance with termination protection turned on.
- B. Monitor your EC2 instance.
- C. Modify the security group that your web server is using to allow HTTP access.
- D. Connect to your EC2 instance using AWS Systems Manager Fleet Manager.
- E. Manage the state of an EC2 instance.
- F. Change your EC2 instance type.
- G. Test termination protection.
- H. Explore Amazon EC2 limits.

Getting Started with Compute

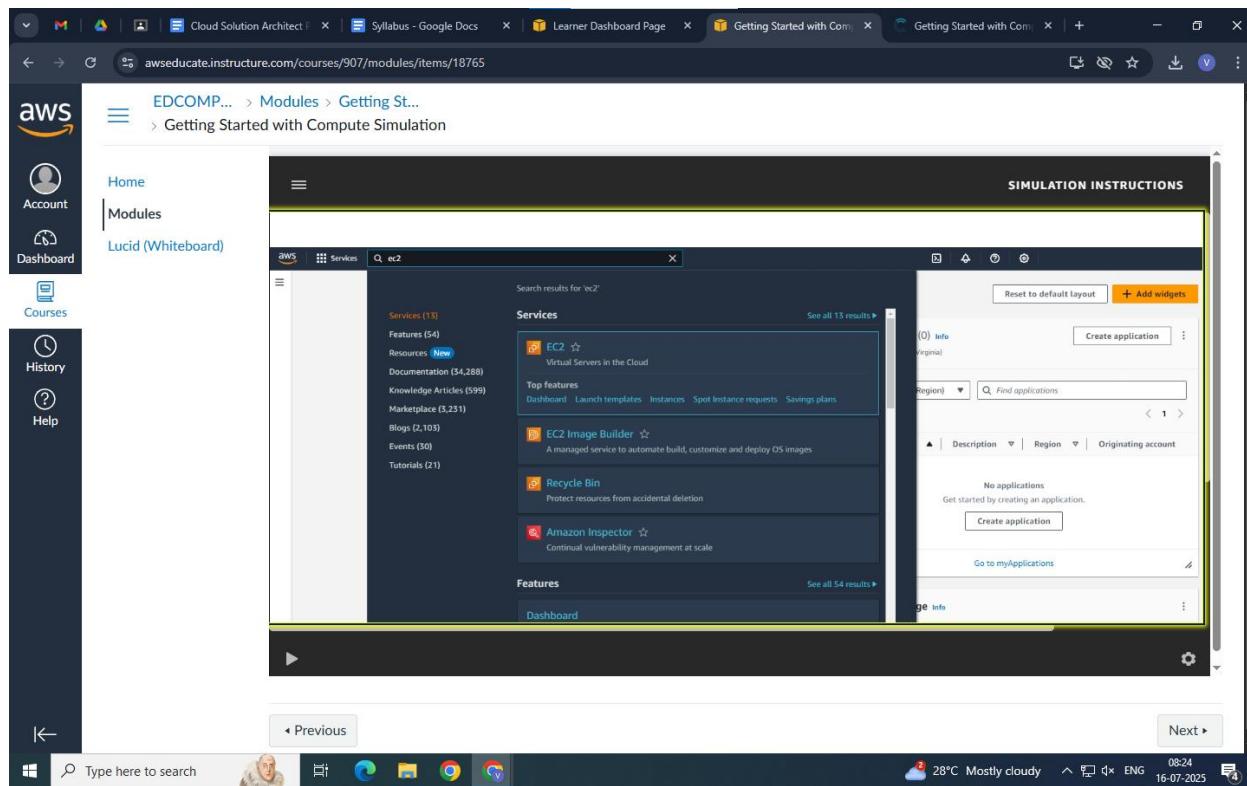


Task 1: Launching your EC2 instance

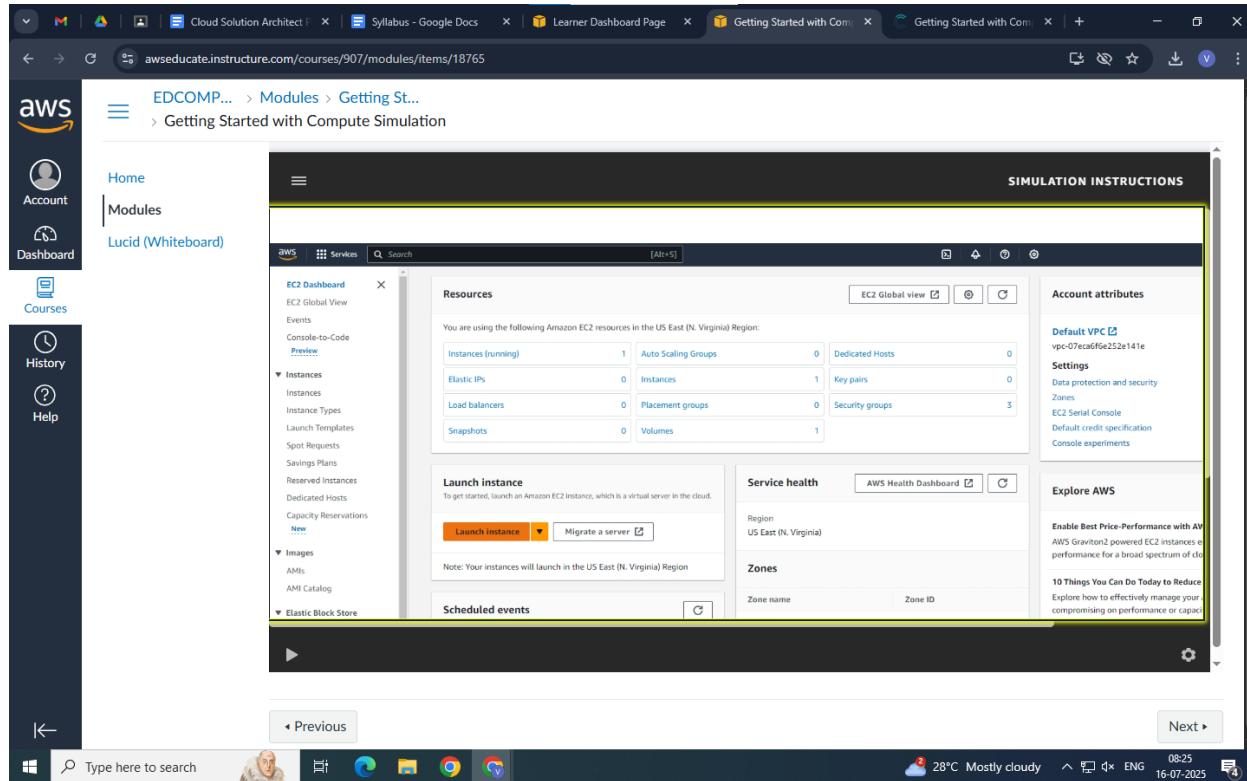
1. In the AWS Management Console in the **Search**, enter **EC2** and choose **Enter**.

The screenshot shows the AWS Management Console interface. On the left, there is a sidebar with navigation links: Home, Modules, Lucid (Whiteboard), Courses, History, and Help. The main content area has a search bar at the top with the text 'awseduce.it.instructure.com/courses/907/modules/items/18765'. Below the search bar, the URL 'awseduce.it.instructure.com/courses/907/modules/items/18765' is displayed. The main content area shows a search result for 'EC2'. The search term 'EC2' is highlighted in a yellow box. The results include sections for 'Welcome to AWS', 'AWS Health', 'Applications', and 'Cost and usage'. A 'SIMULATION INSTRUCTIONS' bar is visible at the top right. At the bottom, there are navigation buttons for 'Previous' and 'Next', and a status bar showing weather (28°C, Mostly cloudy), battery level (ENG), and date/time (08:24, 16-07-2025).

2. From the search results, choose **EC2**.



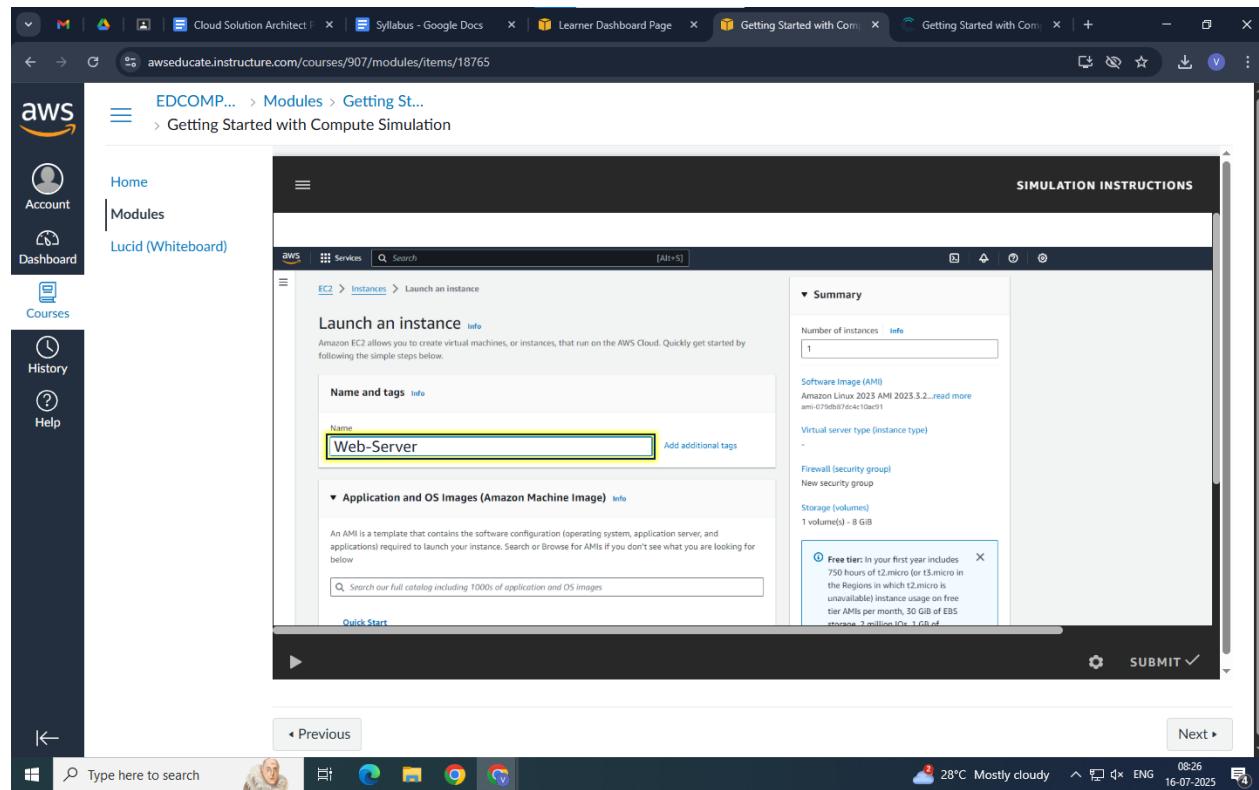
3. In the Launch instance section, choose Launch instance.



STEP 1: NAME YOUR EC2 INSTANCE

4. In the **Name and tags** pane, in the **Name** text box, enter then choose **Enter**.
5. Choose the **Add additional tags** link.
6. From the **Resource types** dropdown list, **Instances** is selected by default. Leave Instances selected and select **Volumes**.

Web-
Server



The screenshot shows the AWS CloudFormation console with the 'Launch an instance' step selected. In the 'Name and tags' section, the 'Name' field contains 'Web-Server'. A callout box highlights the 'Free tier' information: '750 hours of t2.micro (or t3.micro) in the Regions in which t2.micro is unavailable'.

STEP 2: CHOOSE AN AMI

7. Locate the **Application and OS Images (Amazon Machine Image)** section. It's below

Windows Server 2019
Base

the **Name and tags** section. In the search box, enter and choose Enter.

8. Next to **Microsoft Windows Server 2019 Base**, choose **Select**.

The screenshot shows a browser window displaying the AWS Cloud Solution Architect course module. The user is in the 'Getting Started with Compute Simulation' section. On the left, there's a sidebar with navigation links: Account, Dashboard, Courses, History, and Help. The main content area shows a simulation interface with a summary of the selected instance. The instance details include:

- Number of instances: 1
- Software Image (AMI): Amazon Linux 2023.3.2... (ami-079db87dc1c10ac91)
- Virtual server type (instance type): t2.micro
- Firewall (security group): New security group
- Storage (volume): 1 volume(s) - 8 GiB

A callout box highlights a free tier offer: "Free tier: In your first year includes 750 hours of t2.micro in the Regions in which t2.micro is unavailable" (with a link to read more).

SIMULATION INSTRUCTIONS

Summary

Number of instances: 1

Software Image (AMI): Amazon Linux 2023.3.2... (ami-079db87dc1c10ac91)

Virtual server type (instance type): t2.micro

Firewall (security group): New security group

Storage (volume): 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro in the Regions in which t2.micro is unavailable

Next ▶

Selected AMI: ami-079db87dc1c10ac91 (Quickstart AMIs)

Refine results

Windows Server 2019 Base (1 filtered, 1 unfiltered)

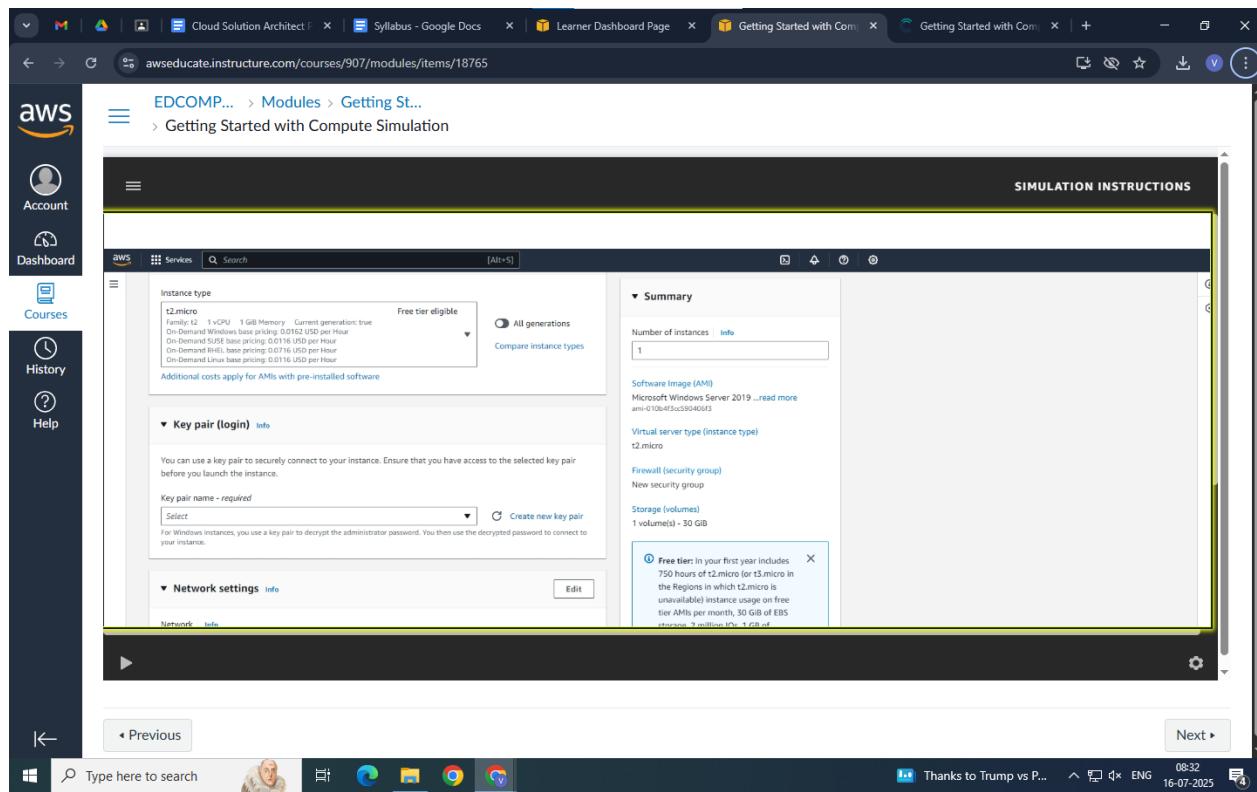
Results

Platform	Description	Region	ENI enabled	Architecture
Windows	Microsoft Windows Server 2019 Base ami-010ba4f3c59040ef3 (64-bit (x86)) Platform: windows Root device type: ebs Virtualization: hvm ENI enabled: Yes 64-bit (x86)	US East (N. Virginia)	Yes	64-bit (x86)

Following results for "Windows Server 2019 Base" were found in other categories

- 9321 results in AWS Marketplace AMIs
- AWS Marketplace AMIs are AMIs that are published by AWS & trusted third-parties
- 4+ results in Community AMIs
- Community AMIs are AMIs that are shared by the general AWS community

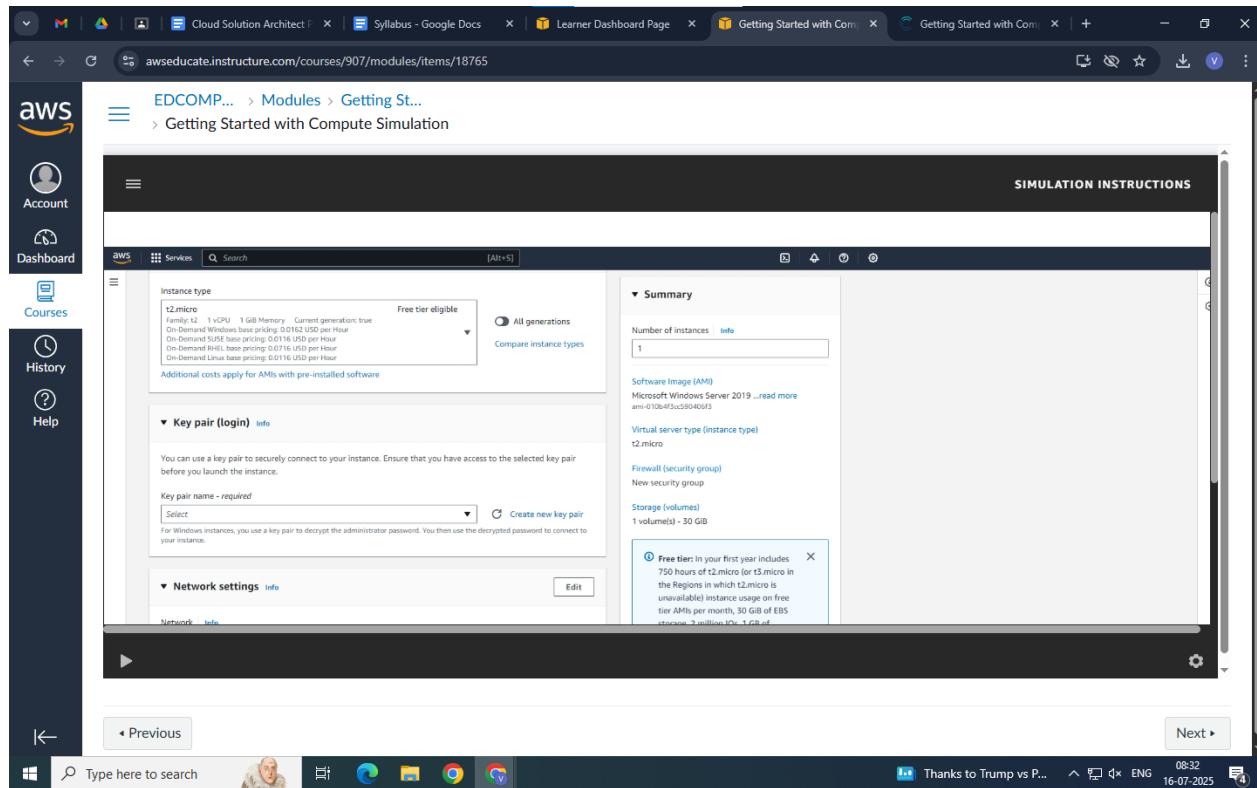
Next ▶



STEP 3: CHOOSE AN INSTANCE TYPE

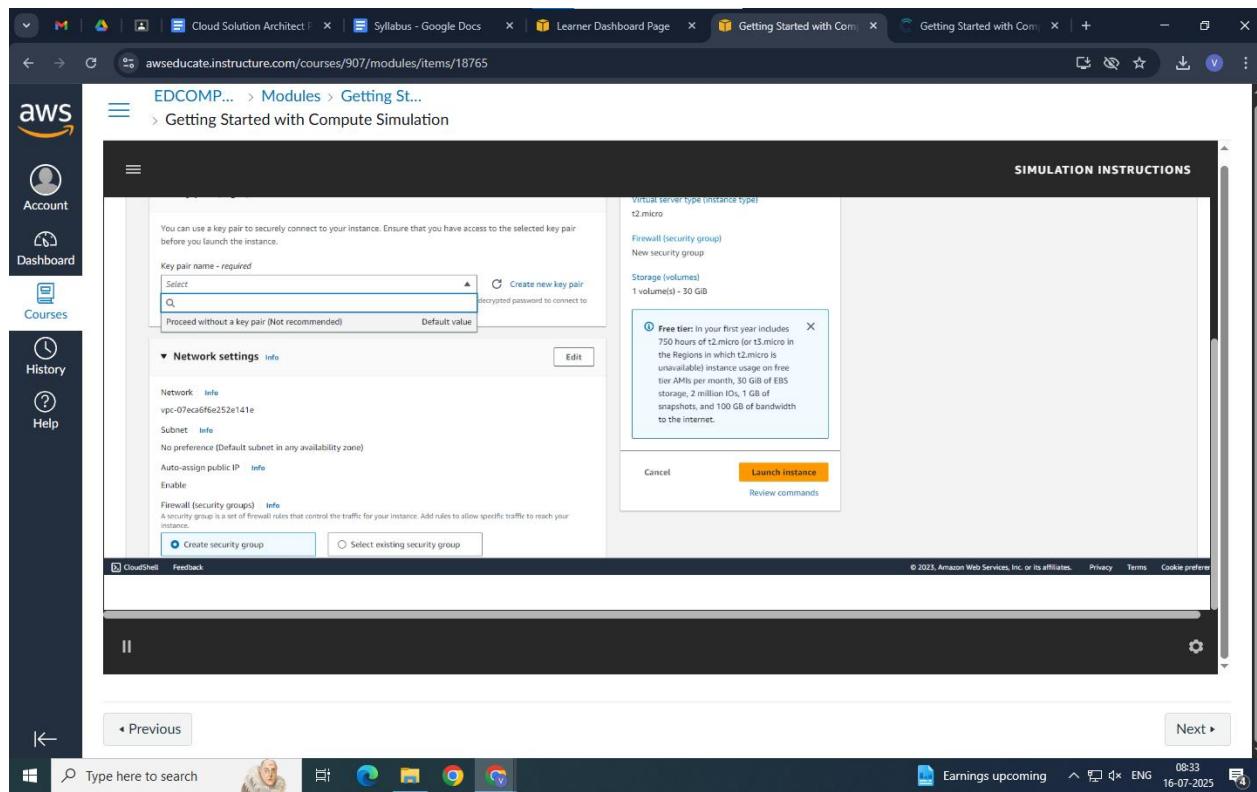
9. In the **Instance type** section, keep the default instance type, **t2.micro**.

Note: When creating your own instance type, always check which instance type is the right one for your purpose.



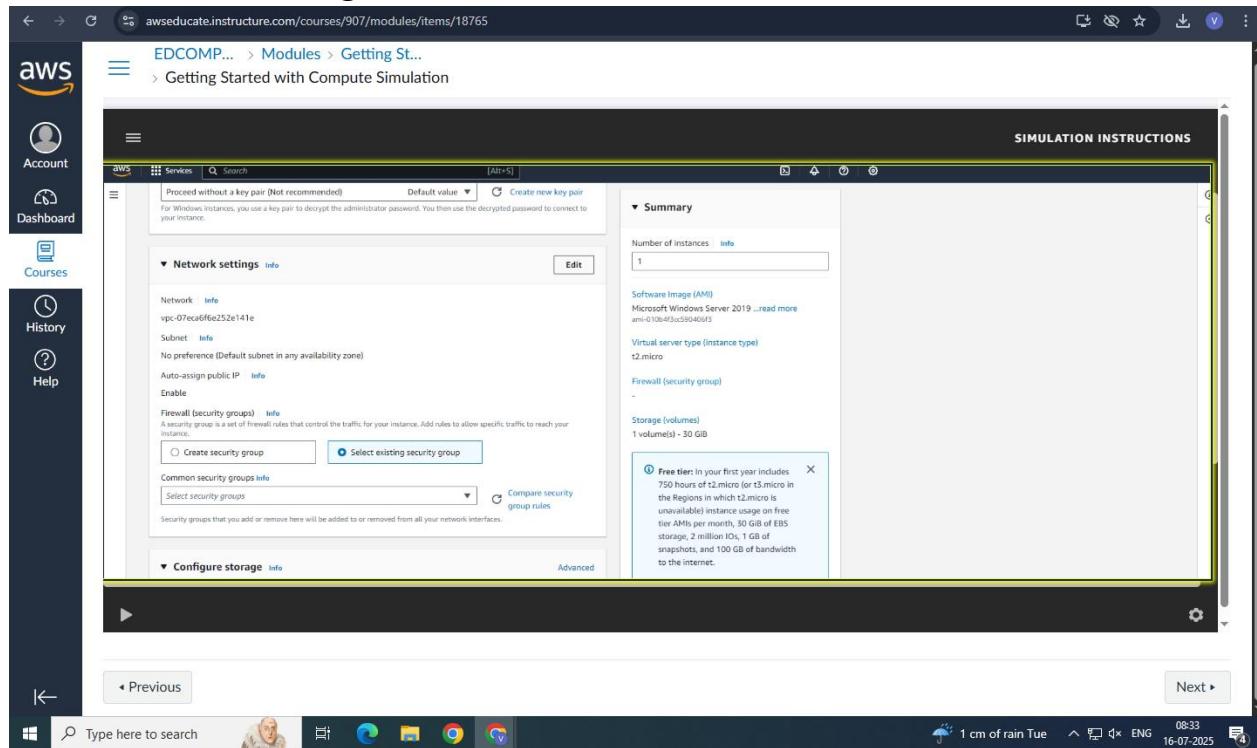
STEP 4: CONFIGURE A KEY PAIR

10. In the **Key pair (login)** section, from the **Key pair name - required** dropdown list, choose **Proceed without a key pair (not recommended)**.



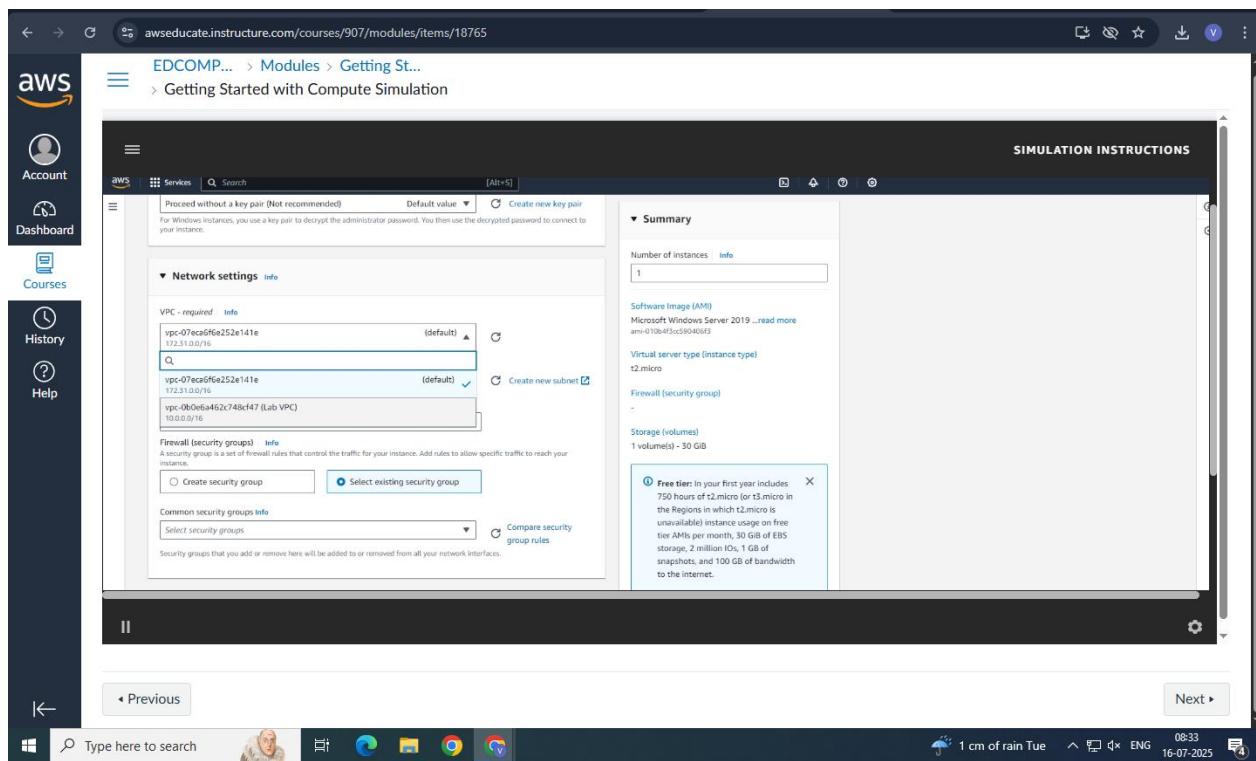
STEP 5: CONFIGURE THE NETWORK SETTINGS

11. In the Network settings section, choose Edit.

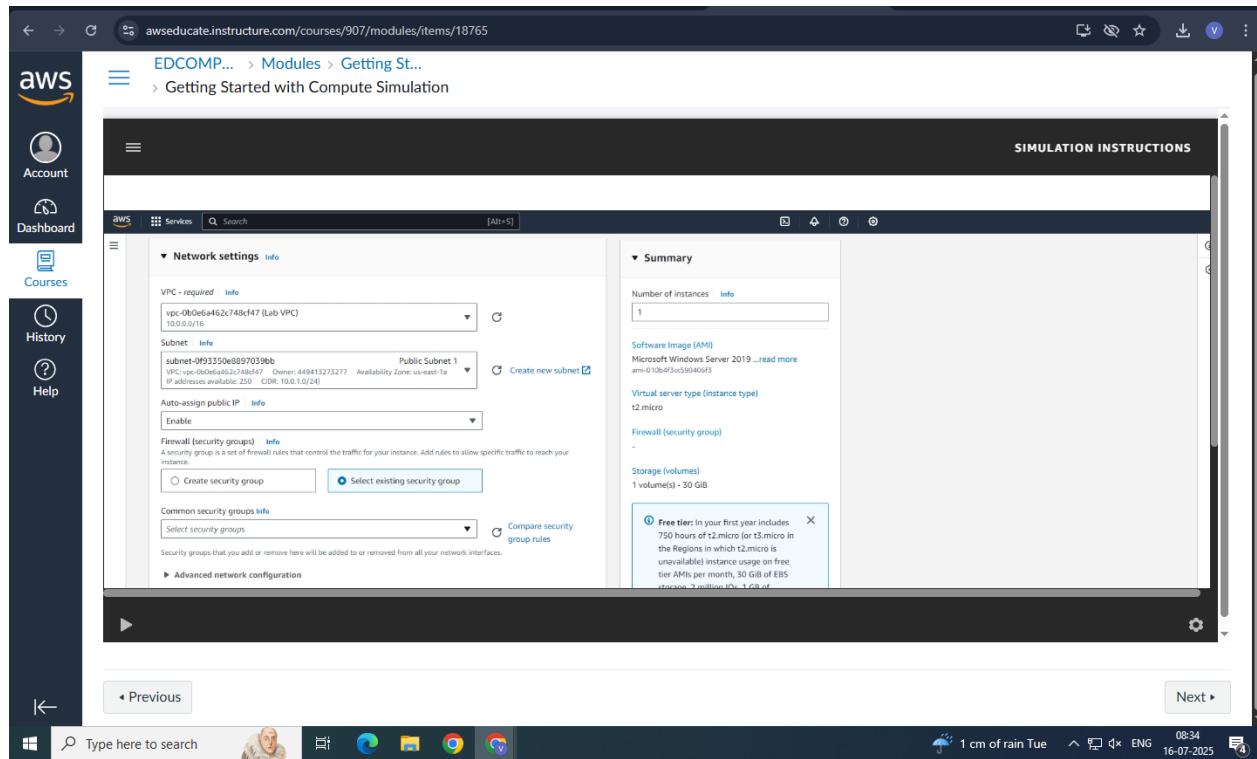


12. From the **VPC - required** dropdown list, choose **Lab VPC**.

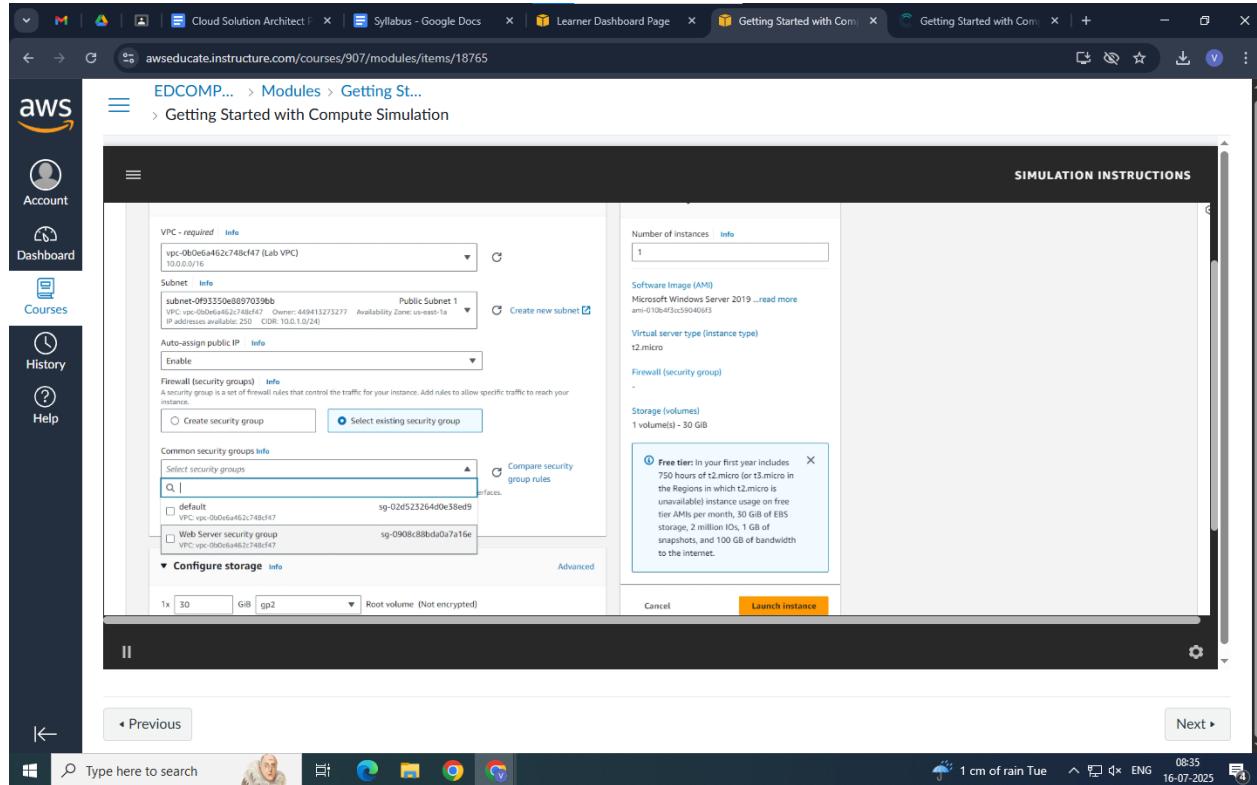
The Lab VPC was created using an AWS CloudFormation template during the setup process of your simulation. This VPC includes two public subnets in two different Availability Zones.

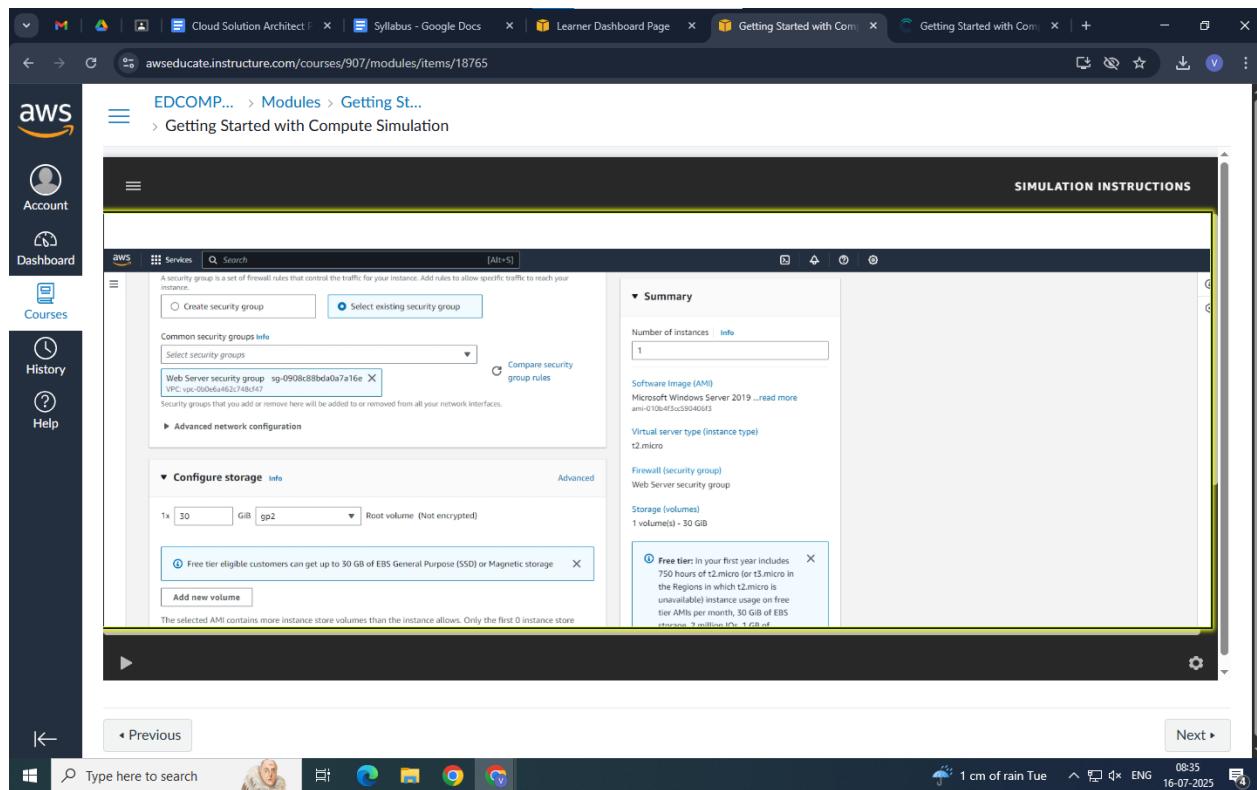


13. For **Firewall (security groups)**, choose **Select existing security group**.

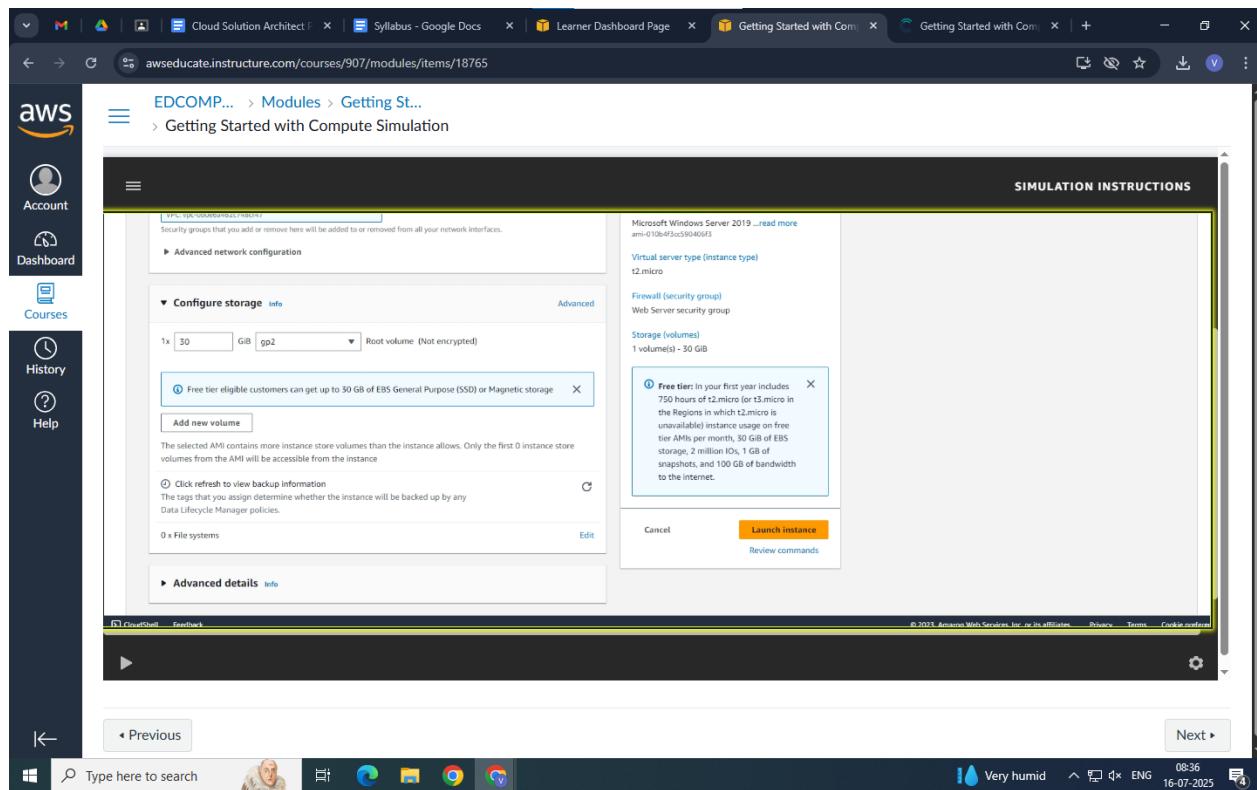


14. From Common security groups, choose Web Server security group.





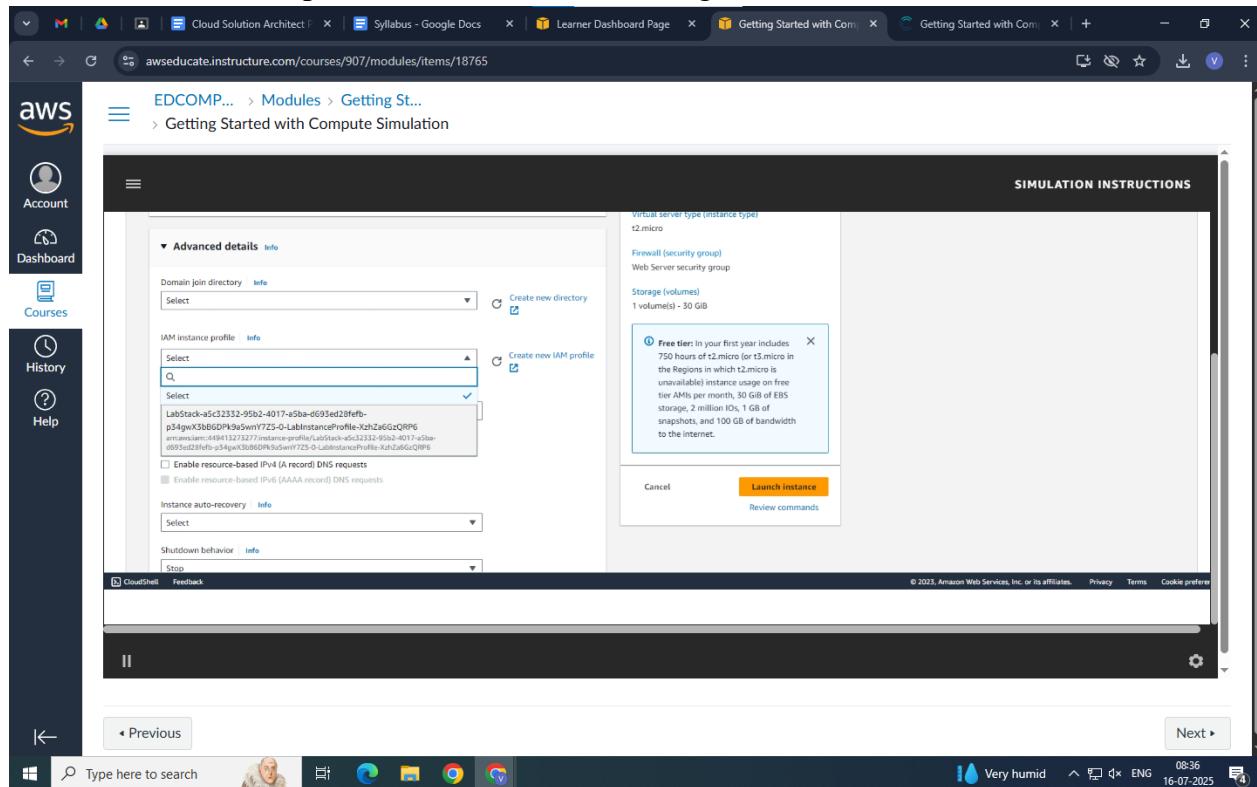
STEP 6: ADD STORAGE



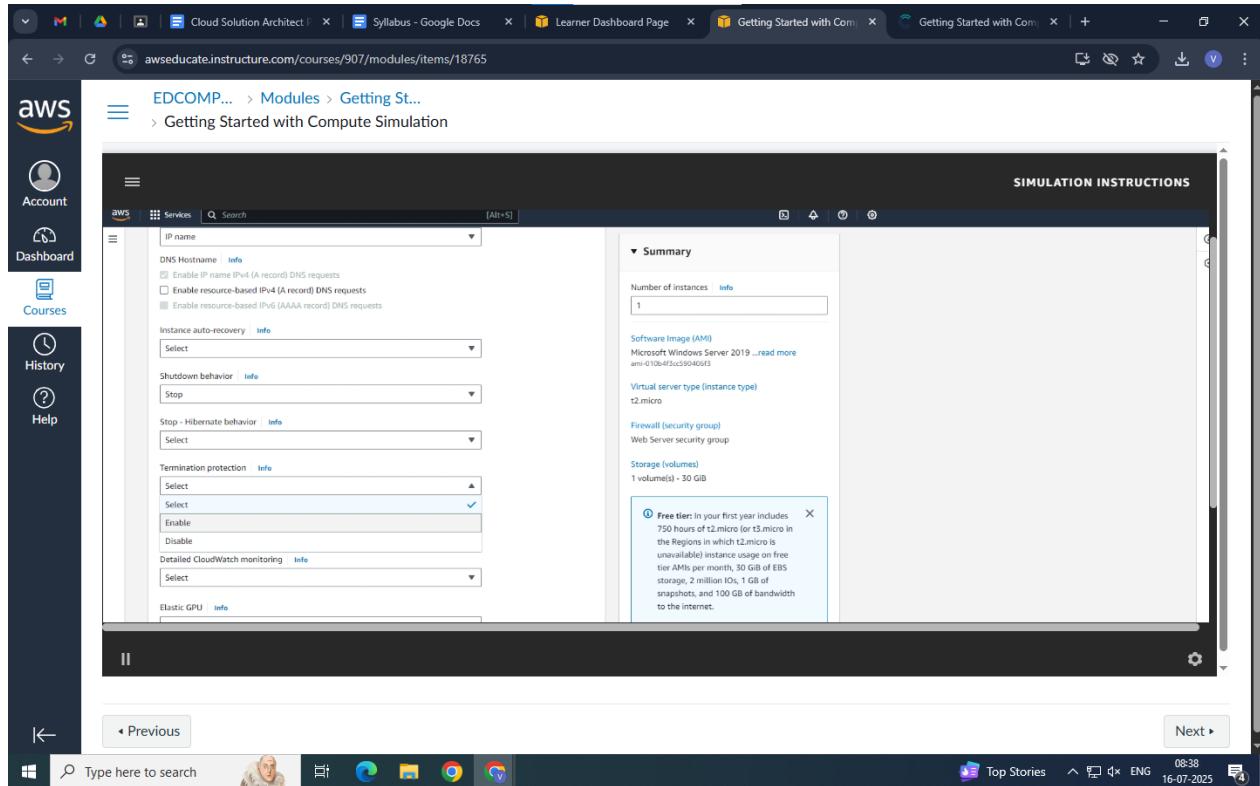
STEP 7: CONFIGURE ADVANCED DETAILS

15. Expand the **Advanced details** section.

16. For **IAM instance profile**, choose the role that begins with **LabStack** in the name.



17. From the **Termination protection** dropdown list, choose **Enable**.



18. Copy the following commands, and choose the **User data** text box. Then, choose **Paste**.

<powershell>

Installing web server

```
Install-WindowsFeature -name Web-Server -IncludeManagementTools
```

Getting website code

```
wget https://us-east-1-tcprod.s3.amazonaws.com/courses/CUR-TF-100-
```

```
EDCOMP/v1.0.4.prod-ef70397c/01-Lab-ec2/scripts/code.zip -outfile
```

```
"C:\Users\Administrator\Downloads\code.zip"
```

Unzipping website code

```
Add-Type -AssemblyName System.IO.Compression.FileSystem
```

function Unzip

{

```
param([string]$zipfile, [string]$outpath)
```

```
[System.IO.Compression.ZipFile]::ExtractToDirectory($zipfile, $outpath) }
```

```
Unzip "C:\Users\Administrator\Downloads\code.zip" "C:\inetpub\"
```

Setting Administrator password

```
$Secure_String_Pwd = ConvertTo-SecureString "P@ssW0rD!" -AsPlainText -Force
```

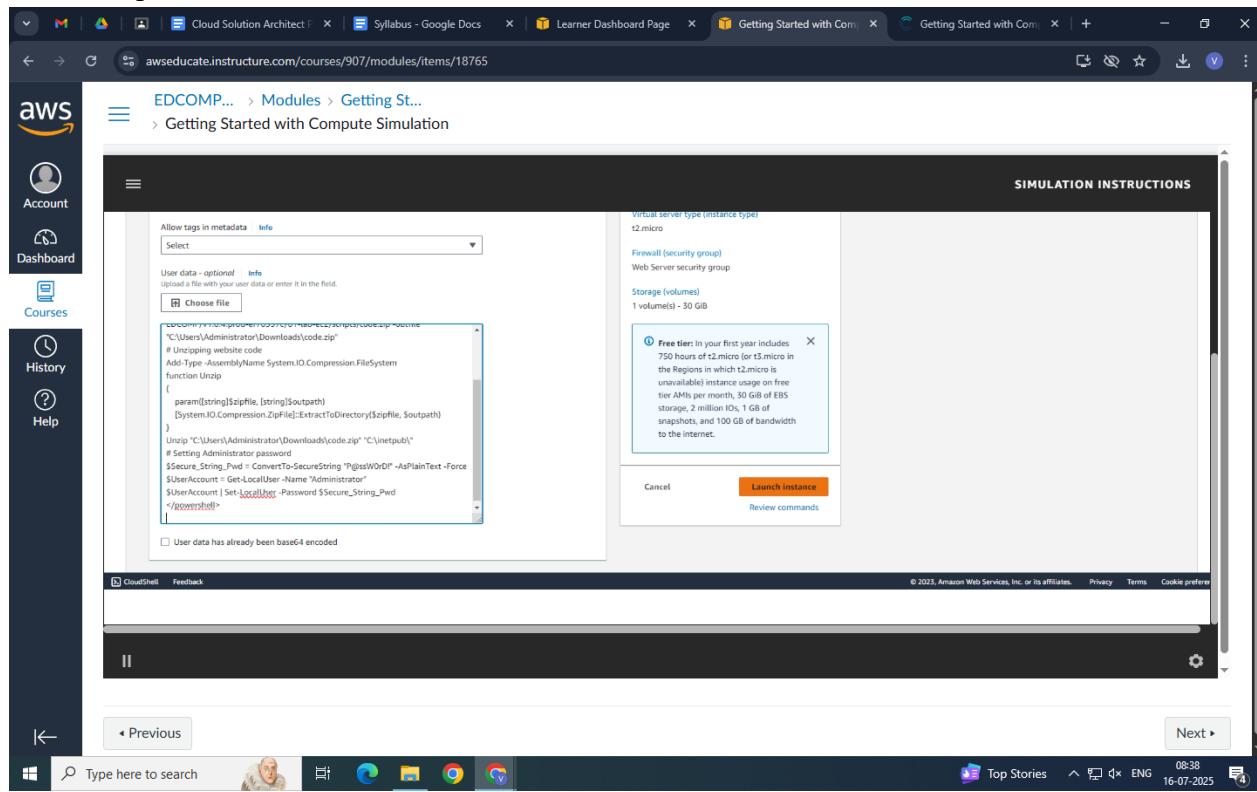
```
$UserAccount = Get-LocalUser -Name "Administrator"
```

```
$UserAccount | Set-LocalUser -Password $Secure_String_Pwd
```

</powershell>

The script does the following:

- Installs a Microsoft Internet Information Services (IIS) web server
- Creates a simple web site
- Sets the password for the Administrator user



STEP 8: LAUNCH AN EC2 INSTANCE

19. In the **Summary** section, choose **Launch instance**.

A message indicates that you have successfully initiated the launch of your instance.

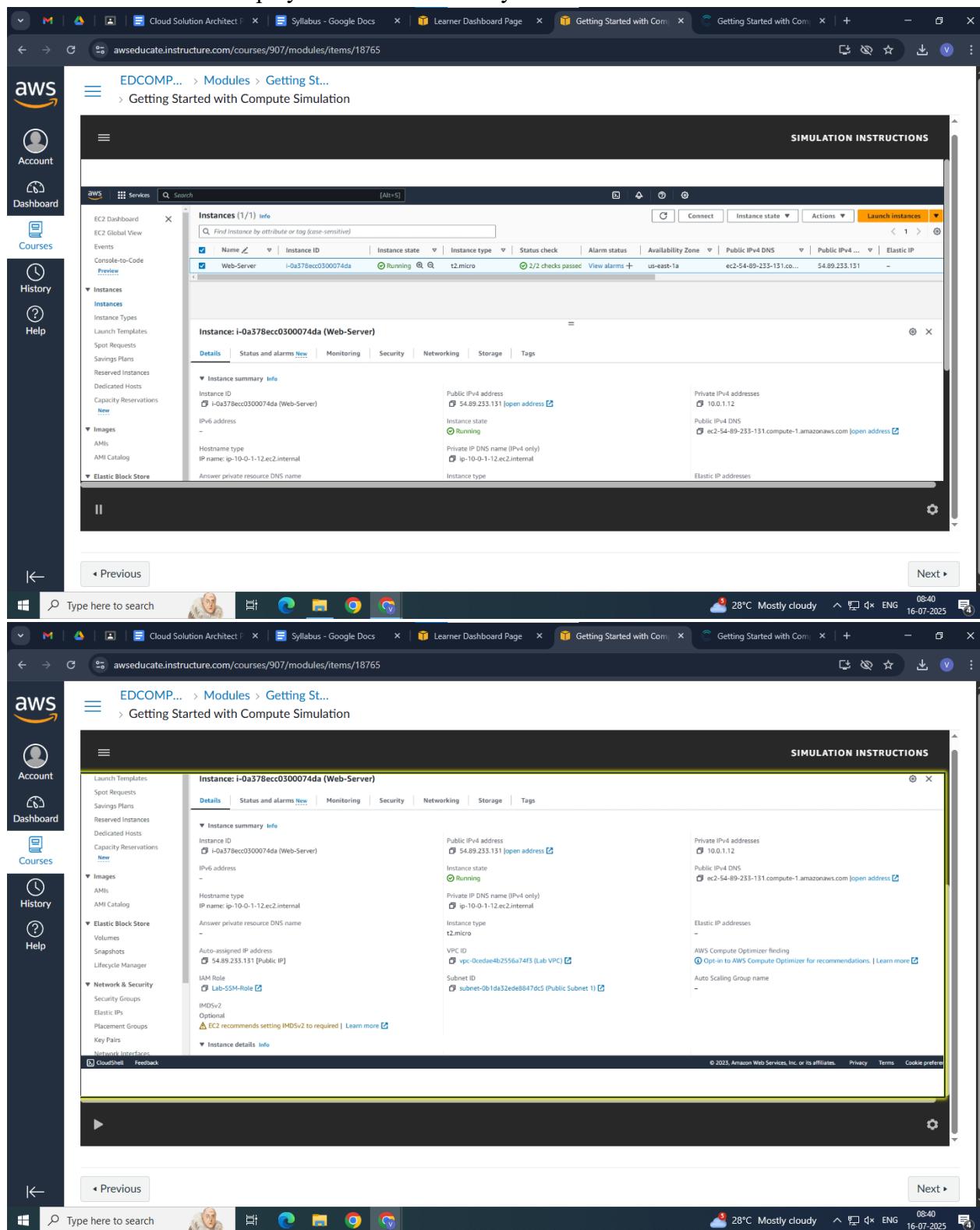
The screenshot shows a browser window with the URL awseducate.instructure.com/courses/907/modules/items/18765. The page title is "EDCOMP... > Modules > Getting St... > Getting Started with Compute Simulation". A green success message box at the top says "Successfully initiated launch of instance i-0a578ecc0300074da". Below it, a "Next Steps" section contains several options: "Create billing and free tier usage alerts", "Connect to your instance", "Connect an RDS database", and "Create EBS snapshot policy". At the bottom right of the main content area is a "View all instances" button.

20. Choose View all instances.

This screenshot is identical to the one above, but the "View all instances" button at the bottom right of the main content area is highlighted with a yellow box.

21. Next to your Web-Server, select the check box. This will show the Details tab. Review

the **Details** tab which displays information about your instance.



The screenshot shows two instances of the AWS Cloud Solution Architect course interface. Both instances are displaying the 'Getting Started with Compute Simulation' module. In the top navigation bar, the path 'EDCOMP... > Modules > Getting St...' is visible, followed by 'Getting Started with Compute Simulation'. The main content area shows a table of EC2 instances with one row selected. The selected instance is a 'Web-Server' with the ID i-0a378ecc0300074da, currently running in the t2.micro instance type. It has a public IP address of 54.89.233.131 and a private IP address of 10.0.1.12. Below this table, a detailed view of the selected instance is shown under the 'Details' tab. The 'Instance summary' section provides basic information like Instance ID, Public IP, Private IP, Instance state (Running), and Instance type (t2.micro). The 'Networking' section shows the VPC ID (vpc-0cedae4b2556a74f3) and Subnet ID (subnet-0b1da32ede8847dc). A note indicates that EC2 recommends setting IMDSv2 to required. The 'Security' tab is highlighted in yellow, indicating it is the active tab for review.

22. Choose the **Security** tab and review the information that's available to you.

The screenshot shows the AWS Educate simulation interface for the 'Getting Started with Compute Simulation' module. The left sidebar includes links for Account, Dashboard, Courses, History, and Help. The main content area displays the 'Instances' section, specifically the details for instance i-0a378ecc0300074da. The 'Networking' tab is selected, showing the security group sg-0752c055047233cb0 (Web Server security group). Below it, the 'Inbound rules' and 'Outbound rules' sections are visible, both currently empty. The status bar at the bottom right indicates the date as 16-07-2025.

23. Choose the **Networking** tab and review the information that's available to you. Next, choose **Continue**.

The screenshot shows the AWS Educate simulation interface for the 'Getting Started with Compute Simulation' module. The left sidebar includes links for Account, Dashboard, Courses, History, and Help. The main content area displays the 'Instances' section, specifically the details for instance i-0a378ecc0300074da. The 'Networking' tab is selected, showing networking details such as the public IP (54.89.233.131), private IP (10.0.1.12), and VPC ID (vpc-0cedae4b2556a74f5). Below this, the 'Network Interfaces' section shows one interface (eni-0e1a9e1e685077184) with its associated details. The status bar at the bottom right indicates the date as 16-07-2025.

Your instance should display the following:

- **Instance State:** Running
- **Status Checks:** 2/2 checks passed

The screenshot shows the AWS EC2 Instances page. A single instance, 'Web-Server' (i-0a378ecc0300074da), is listed as 'Running' in the 'Instance state' column. The 'Status check' column shows '2/2 checks passed'. The 'Networking' tab is selected, displaying details like Public IPv4 address (54.89.233.131), Private IPv4 address (10.0.1.12), and VPC ID (vpc-0cedae4b2556a74f3). The EC2 dashboard sidebar is visible on the left.

Task 2: Monitor your instance

24. Choose the **Status and alarms** tab. Review the information that's available to you.

Notice that both the **System reachability** and **Instance reachability** checks have passed.

The screenshot shows the AWS Management Console with the Instances page open for an EC2 instance named 'i-0a378ecc0300074da (Web-Server)'. The 'Monitoring' tab is selected. In the 'Status checks' section, there is one entry: 'System reachability check passed'. Below this, the 'Metrics' and 'Alarms' sections are present. The Metrics section has a search bar and a table with columns for Name, State, Description, Metric name, and State reason. The Alarms section states 'Instance has no associated alarms'. The top navigation bar shows the path 'EDCOMP... > Modules > Getting St... > Getting Started with Compute Simulation'.

25. Choose the Monitoring tab.

The screenshot shows the AWS Management Console with the Instances page open for the same EC2 instance. The 'Monitoring' tab is selected. The page displays several performance metrics in a grid format, each with a line chart and some numerical values. The metrics include CPU utilization (%), Network in (bytes), Network out (bytes), Network packets in (count), Network packets out (count), Disk reads (bytes), Disk write operations (operations), Disk read operations (operations), Disk writes (bytes), CPU credit usage (count), and CPU credit balance (count). The top navigation bar shows the path 'EDCOMP... > Modules > Getting St... > Getting Started with Compute Simulation'.

26. At the top of the page, choose the Actions dropdown list. Choose Monitor and

troubleshoot Get system log.

The screenshot shows a browser window with the URL awseducate.instructure.com/courses/907/modules/items/18765. The page title is "EDCOMP... > Modules > Getting St... > Getting Started with Compute Simulation". On the left, there's a sidebar with navigation links like Account, Dashboard, Courses, History, Help, and a search bar. The main content area shows the EC2 Instances page with one instance listed: "Web-Server" (i-0a378ecc0300074da) is running on t2.micro. A context menu is open over this instance, with "Actions" expanded. Under "Actions", "Monitor and troubleshoot" is selected, and "Get system log" is highlighted.

27. In the System log, review the messages in the output.

The screenshot shows the same browser window as the previous one, but the main content area now displays the "Get system log" page for the selected EC2 instance. The title is "EC2 > Instances > i-0a378ecc0300074da > Get system log". The page header says "Get system log info" and provides instructions: "When you experience issues with your EC2 instance, reviewing system logs can help you pinpoint the cause." Below this is a "System log" section with a scrollable text area containing system log messages. At the bottom of this section are three buttons: "Copy log", "Download", and "Copy log".

28. To return to the Amazon EC2 dashboard, choose **Cancel**.

The top screenshot shows a 'SIMULATION INSTRUCTIONS' panel with a scrollable log of EC2 instance launch events. The bottom screenshot shows the 'Instances' section of the EC2 Dashboard with a single 'Web-Server' instance selected.

SIMULATION INSTRUCTIONS Log:

```

2023/12/27 15:17:54Z: Language: en-US
2023/12/27 15:17:54Z: TimeZone: Coordinated Universal Time
2023/12/27 15:17:54Z: Offset: UTC 00:00:00
2023/12/27 15:17:54Z: AMI-ID: ami-0104f4c5c59046f1
2023/12/27 15:17:54Z: Instance-ID: i-0a378ec0300074da
2023/12/27 15:17:54Z: Instance Type: t2.micro
2023/12/27 15:17:59Z: Driver: AWS PV Driver Package v8.4.3
2023/12/27 15:17:59Z: Launch: EC2 Launch v1.2.2004491
2023/12/27 15:17:59Z: SSM: Amazon SSM Agent v3.0.1765.0
2023/12/27 15:17:59Z: X509CERTIFICATE-SUBJECTNAME: EC2AMAZ-TVABSKI
2023/12/27 15:17:59Z: X509CERTIFICATE-THUMPREPRINT: B2C732b0f3C68e4788CE8358f5EABE23D8B4DC
2023/12/27 15:17:59Z: HibernationEnabled: False
2023/12/27 15:18:02Z: ImageUsageAllowed: True
2023/12/27 15:18:02Z: EC2LaunchTelemetry: AgentIsReachable=true
2023/12/27 15:18:02Z: EC2LaunchTelemetry: AgentIsReachable=false
2023/12/27 15:18:02Z: EC2LaunchTelemetry: IsAgentDataScheduledForRoot=false
2023/12/27 15:18:02Z: EC2LaunchTelemetry: AgentCommandErrorCode=0
2023/12/27 15:18:02Z: EC2LaunchTelemetry: AdminPasswordTypeCode=0

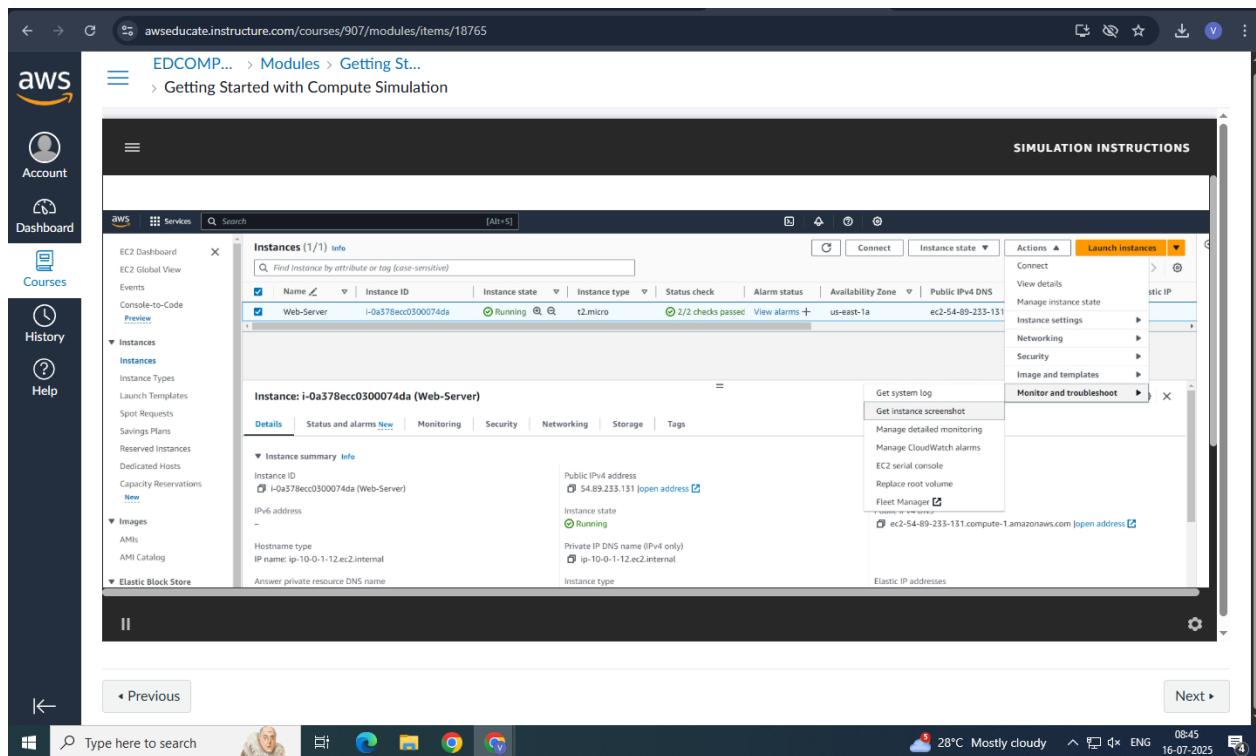
```

EC2 Instances Table:

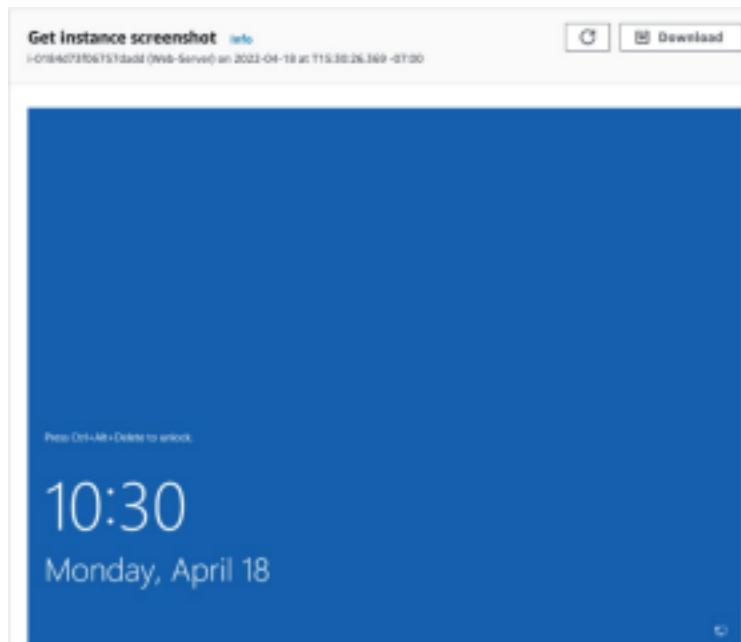
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 IP	Elastic IP
Web-Server	i-0a378ec0300074da	Running	t2.micro	2/2 checks passed	View alarms	us-east-1a	ec2-54-89-233-131.co...	54.89.233.131	-

29. With your **Web-Server** selected, choose the **Actions** dropdown list, and choose **Monitor**

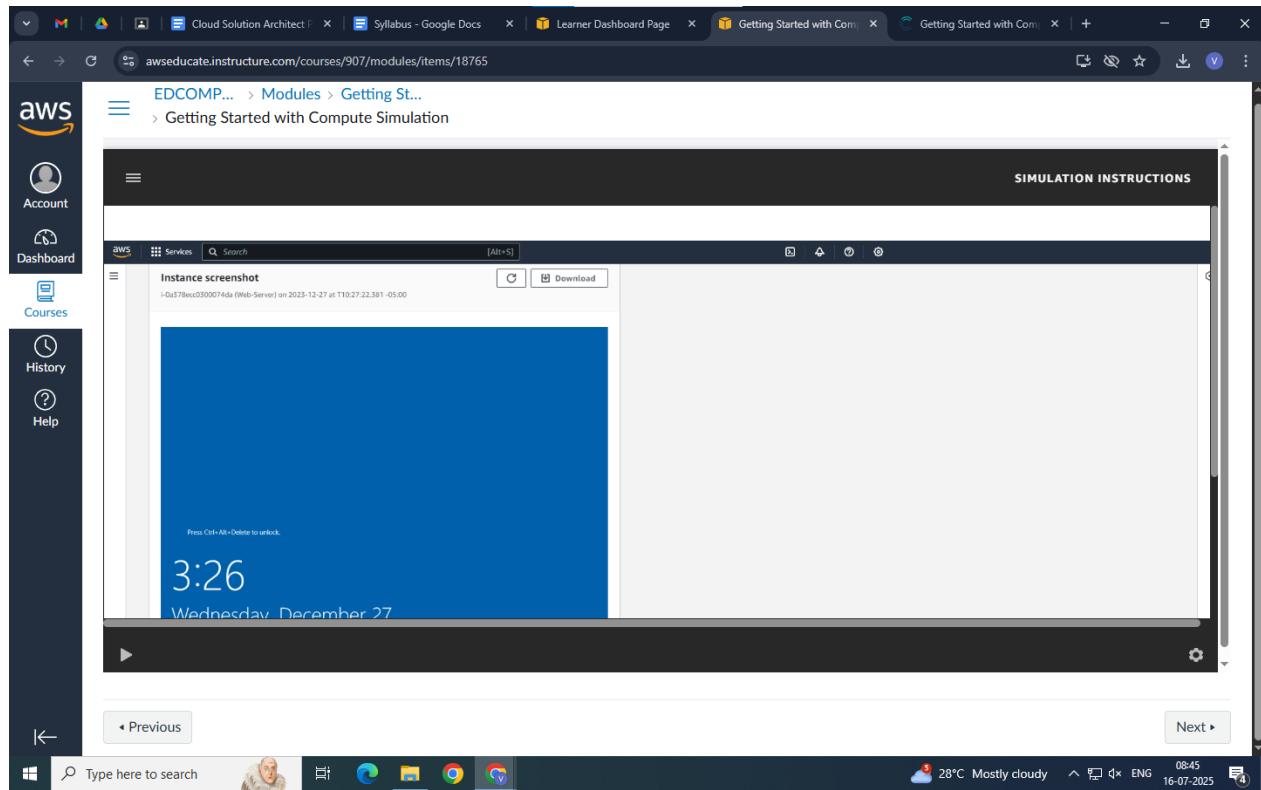
and troubleshoot ►Get instance screenshot.



This option shows you what your EC2 instance console would look like if a screen were attached to it. Because this is a Windows instance, the screenshot shows a locked log-in screen.



If you are unable to reach your instance through SSH or RDP, you can capture a screenshot of your instance and view it as an image. This option provides visibility about the status of the instance for quicker troubleshooting.



30. At the bottom of the page, choose **Cancel**.

Task 3: Updating your security group and accessing the web server

31. In the left navigation pane, choose **Security Groups**.

The screenshot shows the AWS Management Console with the AWS logo in the top left. The main navigation bar includes 'Account', 'Dashboard', 'Courses', 'History', and 'Help'. The left sidebar has sections for Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security (Security Groups, Elastic IPs, Placement Groups), and SIMULATION INSTRUCTIONS. The 'Security Groups' section is expanded, showing three entries:

Name	Security group ID	Security group name	VPC ID	Description	Owner
-	sg_0e79a7889e0095c53	default	vgc_0cedae4b2556a74f1	default VPC security group	929932431040
-	sg_0732c055047233cb0	Web Server security group	vgc_0cedae4b2556a74f1	Security group for the web server	929932431040
-	sg_d416a76dcdf7c5620	default	vgc_0b9aaaccf07bf8093f	default VPC security group	929932431040

At the bottom of the table, the text "sg-0732c055047233cb0 - Web Server security group" is highlighted.

32. Next to **Web Server security group**, select the check box.

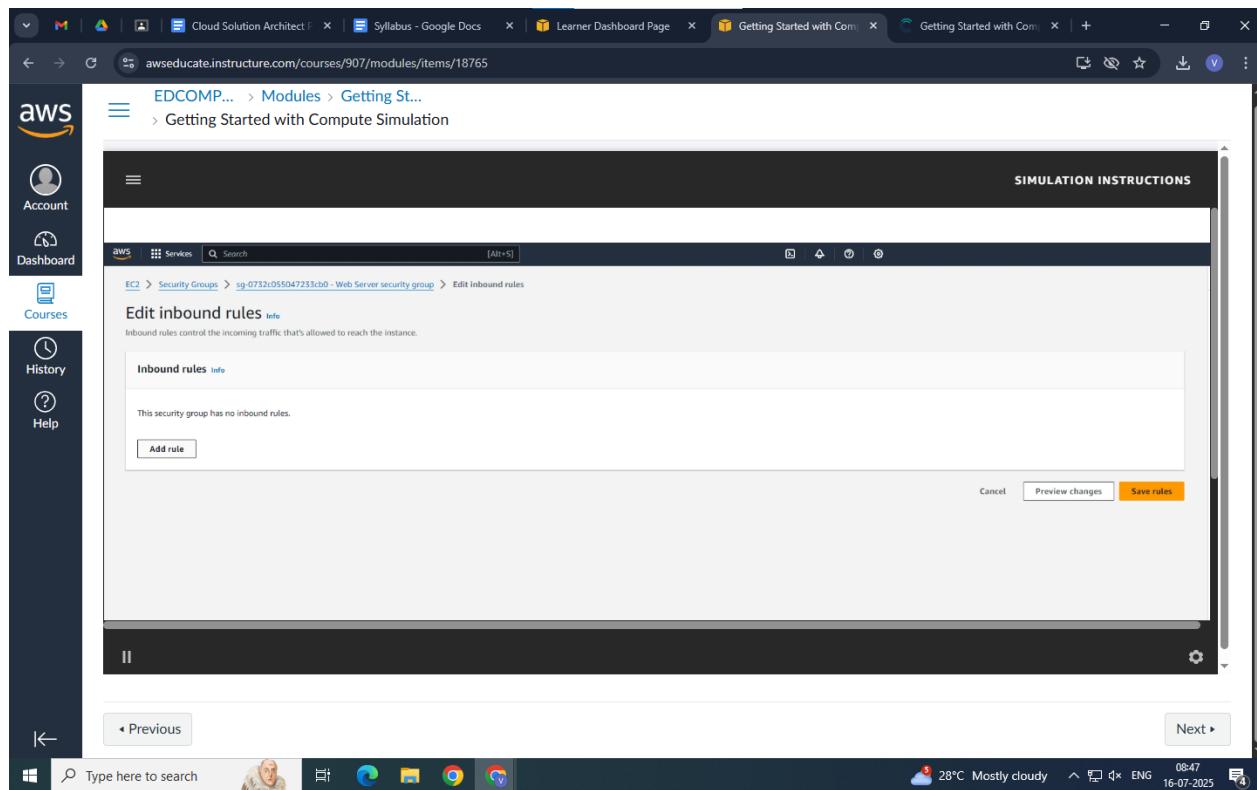
This screenshot is identical to the one above, but the 'Web Server security group' row now has a checked checkbox next to it. The rest of the interface and data are the same.

33. Choose the **Inbound rules** tab.

The security group currently has no rules.

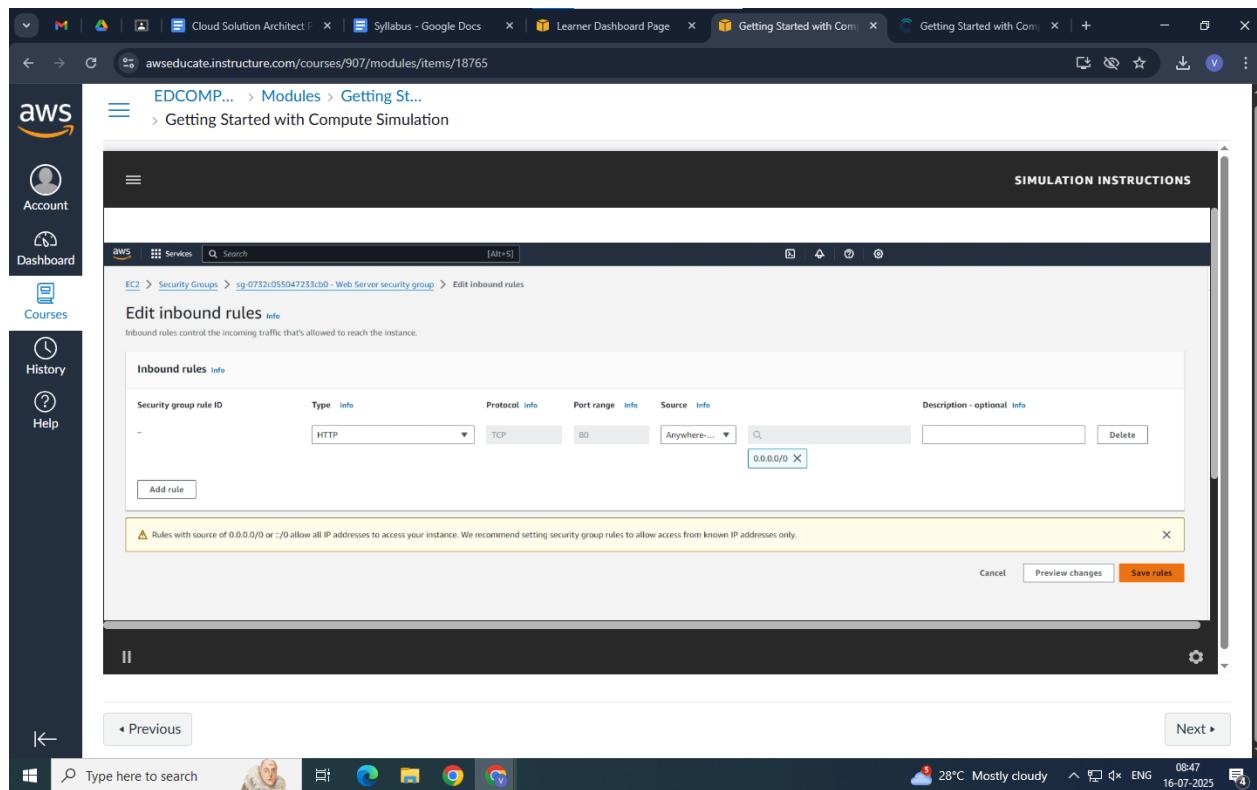
34. Choose **Edit inbound rules**, and then choose **Add rule**, and configure the following options:

- **Type:** Choose **HTTP**.
- **Source:** Choose **Anywhere-IPv4**.



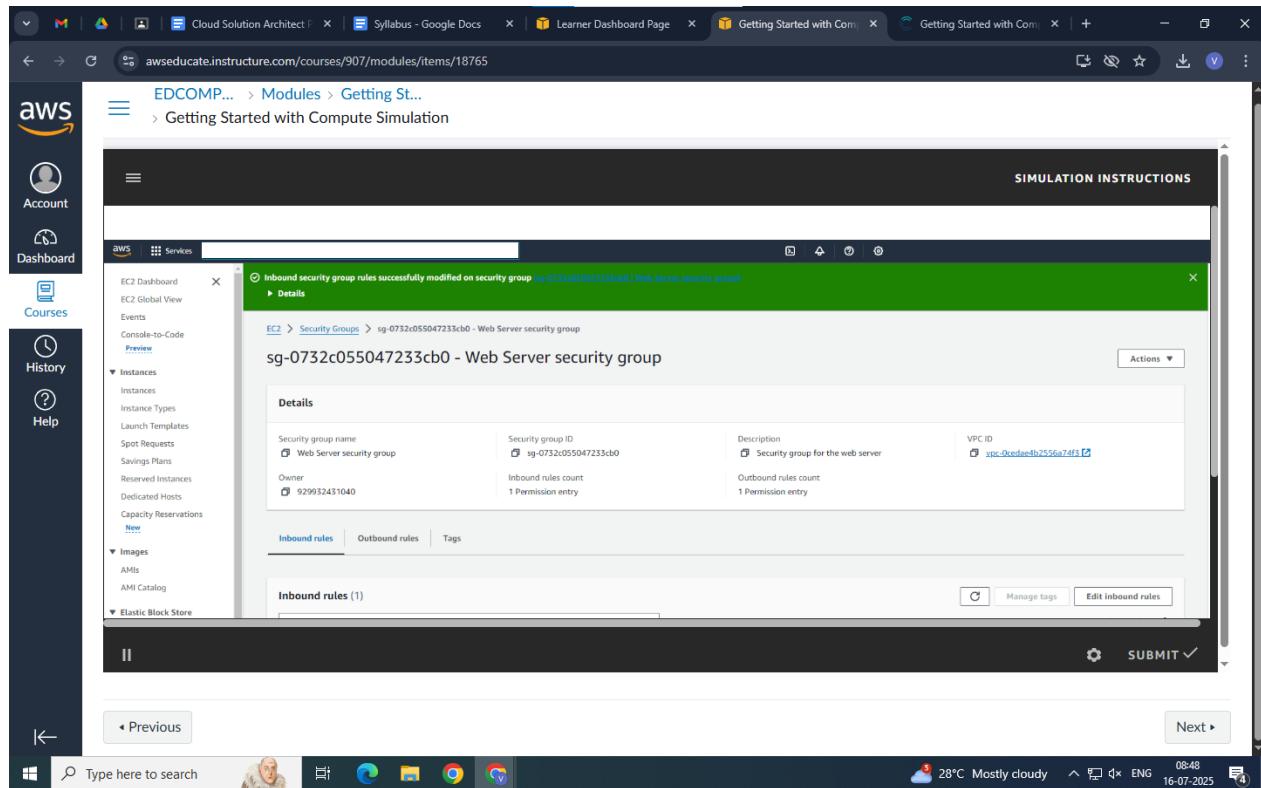
Note: Notice the “*Rules with source of 0.0.0.0/0 allow all IP addresses to access your inbound port 80. We recommend setting security group rules to allow access from known IP addresses only.*” While this is true and common best practice, this simulation allows access from any IP address anywhere to simplify both the security group configuration and testing of the website running on your EC2 instance.

In this simulation, you can only add a new ingress rule. You cannot change a rule after it’s created. Double check the configuration before choosing **Save rules**.



35. Choose **Save rules**.

In a live environment, you would be able to copy the public IPv4 address and paste it into a browser to ensure that the SG and user data script deployed.



Task 4: Connecting to your instance using AWS Systems Manager Fleet Manager

36. Search for **Systems Manager** and choose **Enter**.

The screenshot shows the AWS Systems Manager interface. On the left, the navigation pane includes options like Account, Dashboard, Courses, History, Help, and a search bar. The main content area is titled "System Manager" and shows the "Security Groups" section. A specific security group, "sg-0732c055047233cb0 - Web Server security group", is selected. The "Details" tab is active, displaying information such as the security group name, ID, owner, and VPC ID. The "Inbound rules" tab shows one rule: "Inbound rules (1)". Below the details, there are buttons for "Manage tags", "Edit inbound rules", and "SUBMIT". The status bar at the bottom indicates it's 28°C, mostly cloudy, and the date is 16-07-2025.

37. Choose Systems Manager.

The screenshot shows the AWS Systems Manager search results page. The search term "systems Manager" has been entered into the search bar. The results list "Services (11)" and "Features (32)". Under "Services", "Systems Manager" is highlighted, showing its description as a central place to view and manage AWS resources. Other services listed include AWS Marketplace Subscriptions, EFS, and Incident Manager. The right side of the screen shows the same "Security Groups" configuration window as the previous screenshot, indicating a transition between different AWS services.

38. In the left navigation pane, choose Fleet Manager.

The screenshot shows a browser window for the AWS Educate module 'EDCOMP...' under 'Modules > Getting St...'. The main content area is titled 'SIMULATION INSTRUCTIONS' and features the heading 'Gain Operational Insight and Take Action on AWS Resources.'. Below this, there's a 'Get Started with Systems Manager' button and a brief description: 'View operational data for groups of resources, so you can quickly identify and act on any issues that might impact applications that use those resources.' The page then details 'How it works' with three sections: 'Group your resources' (Icon: three boxes), 'View insights' (Icon: document with charts), and 'Take action' (Icon: laptop with circular icons). A 'More resources' sidebar on the right lists 'Documentation', 'API reference', and 'FAQs'. On the left, a sidebar menu includes sections for Operations Management (Explorer, OpsCenter, CloudWatch Dashboard, Incident Manager), Application Management (Application Manager, AppConfig, Parameter Store), Change Management (Change Manager, Automation, Change Calendar, Maintenance Windows), and Node Management (Fleet Manager, Compliance, Inventory, Hybrid Activations, Session Manager, Run Command). The bottom of the screen shows a Windows taskbar with the Start button, search bar, and various pinned icons.

39. Under **Managed nodes**, select your **Web-Server** EC2 instance.

The screenshot shows a browser window for the AWS Systems Manager 'Fleet Manager' under 'Systems Manager > Fleet Manager > Managed nodes'. The title bar says 'Fleet Manager info'. The main content area displays a table titled 'Managed Nodes (1)'. The table has columns for Node ID, Node state, Name, Platform type, Operating sys..., Resource type, Source ID, Ping status, Agent version, Image ID, and EC2 instance. One row is shown, corresponding to an EC2 instance named 'Web-Server' with Node ID 'i-0a37becc0300...', which is marked as 'Running'. There are buttons for 'Settings' and 'Account management' at the top right of the table. Below the table, there are buttons for 'Report' and 'Node actions'. The bottom of the screen shows a Windows taskbar with the Start button, search bar, and various pinned icons.

40. From the Node actions dropdown list, choose **Connect**, then **Connect with Remote Desktop**.

The screenshot shows the AWS Fleet Manager interface. On the left is a sidebar with links for Account, Dashboard, Courses, History, and Help. The main area displays a single managed node: **i-0a378ecc0300074da**. The node details are as follows:

- Name:** Web-Server
- Platform type:** Windows
- Operating system:** Microsoft Wind..
- Resource type:** EC2 Instance
- Ping status:** Online
- Agent version:** 3.2.1705.0
- Image ID:** ami-010b4f3cc...

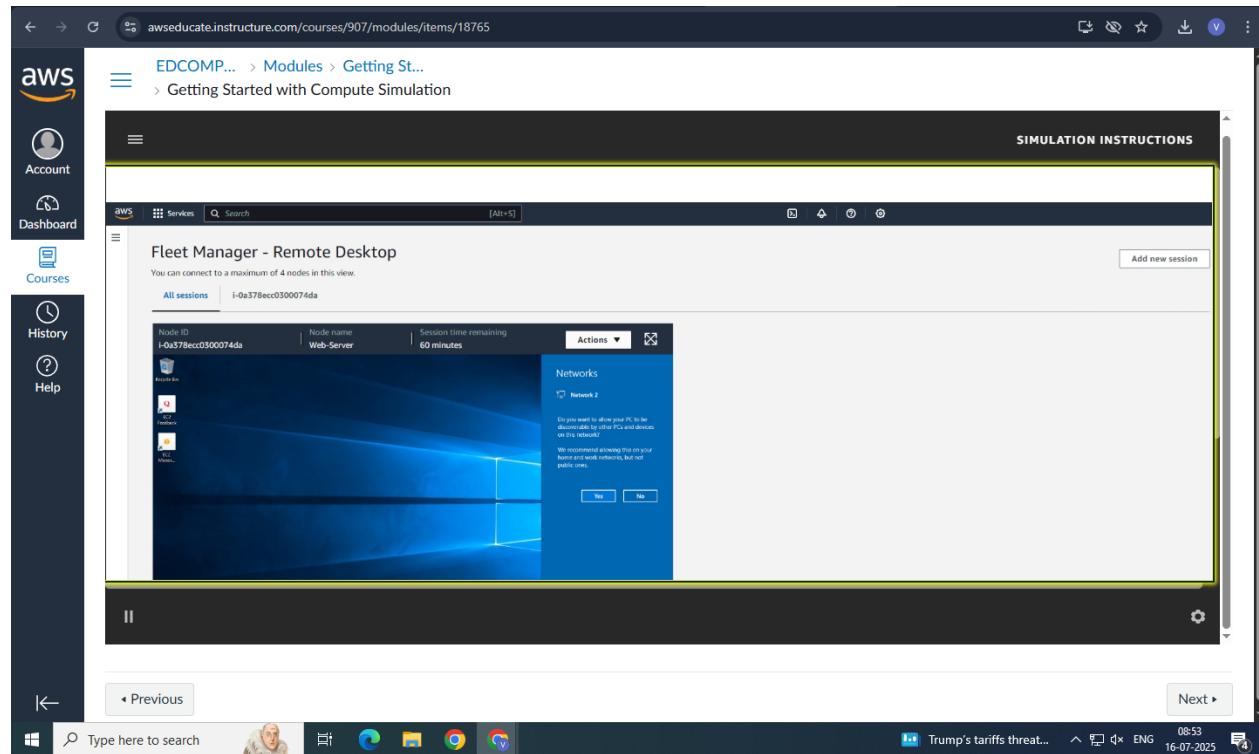
Below the node details, there are buttons for **Start terminal session**, **Connect**, **Tools**, **Node settings**, and **EC2 instance**. A message at the top indicates that you may have unmanaged Amazon EC2 instances and provides a link to learn more about Default Host Management Configuration.

41. Enter the Username: Administrator

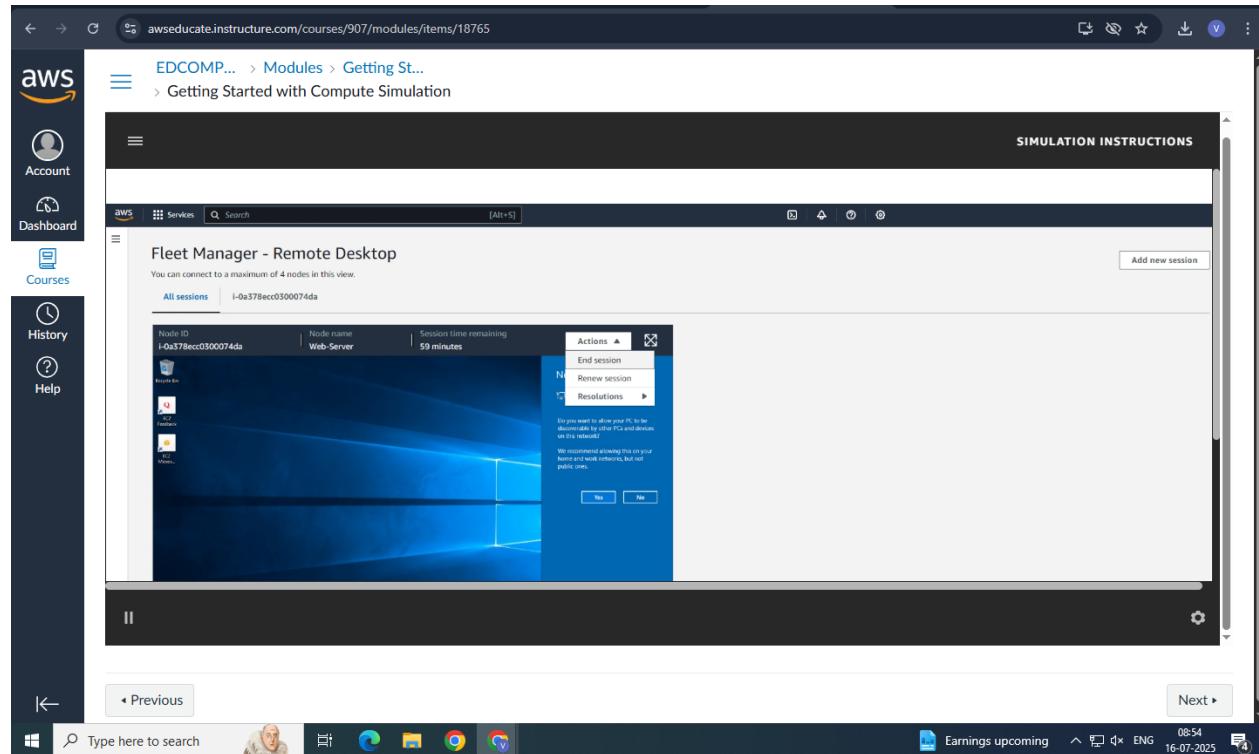
42. Enter the Password: P@ssW0rD!

The screenshot shows the connection configuration for the node **i-0a378ecc0300074da**. The **Authentication type** is set to **User credentials**. The **Username** field contains **Administrator** and the **Password** field contains **P@ssW0rD**. There is also a **Show password** checkbox. At the bottom right of the configuration window is a **Connect** button.

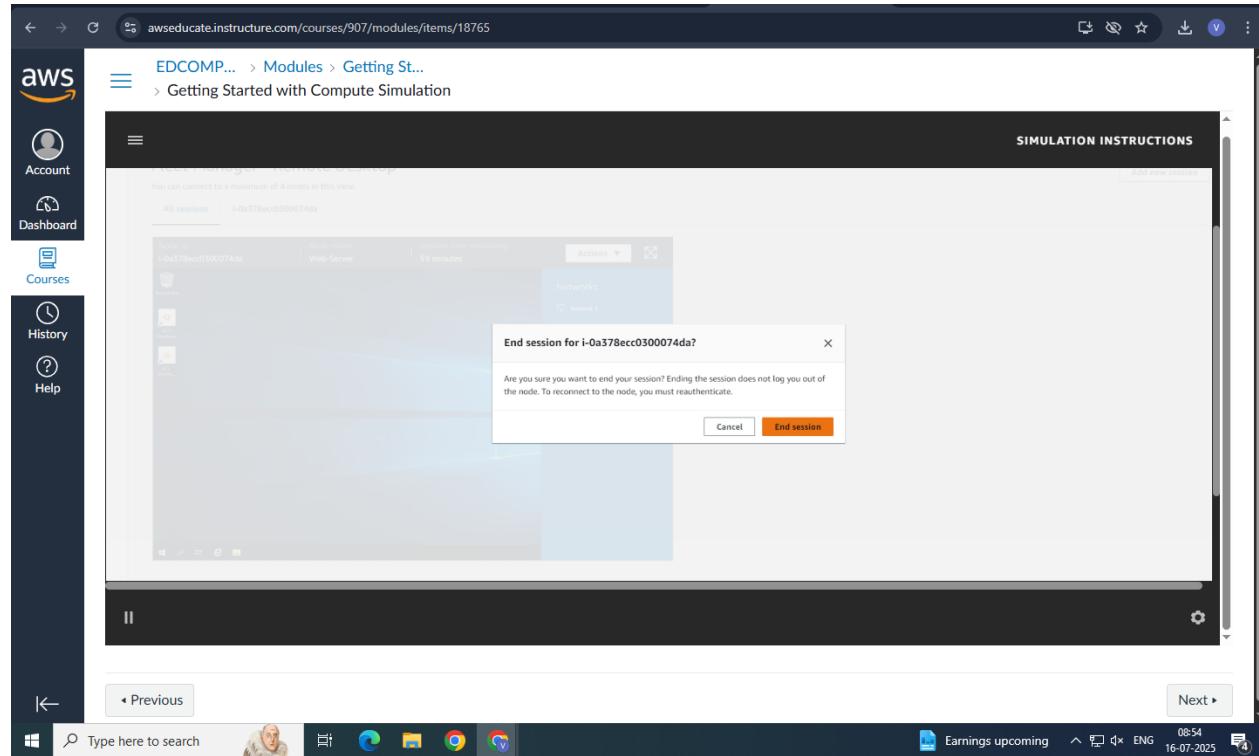
43. Choose Connect.



44. To disconnect from your Web-Server instance, choose Action and then choose End session.

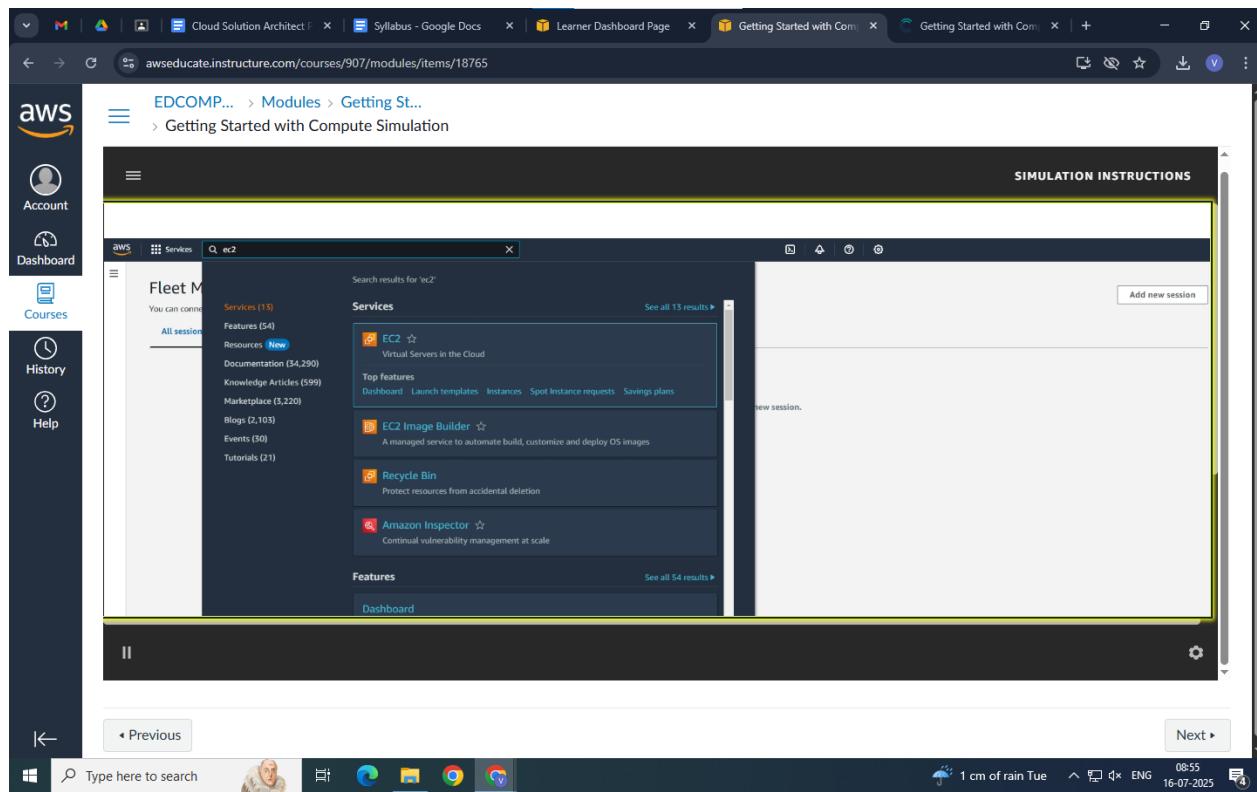


45. In the pop-up window, choose **End session** again.

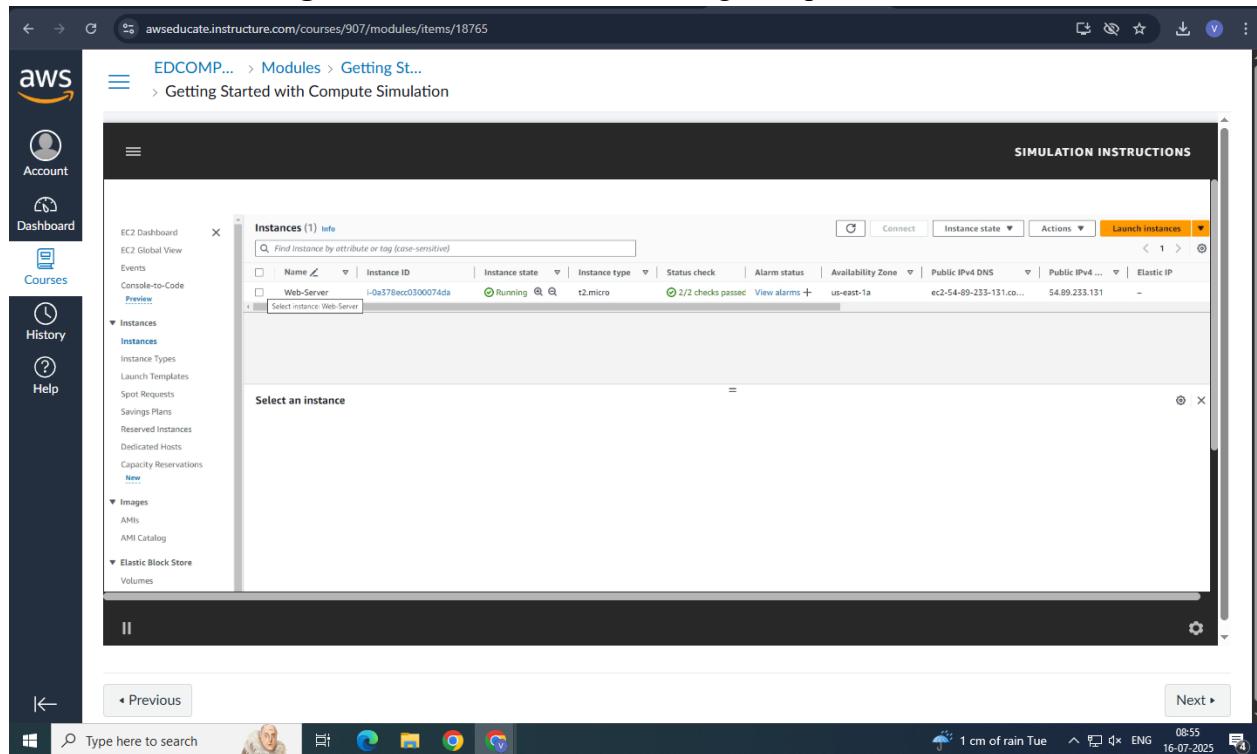


Task 5: Resizing your instance

46. In the AWS Management Console, search for **EC2** and choose **Enter**. Then, choose **EC2**.

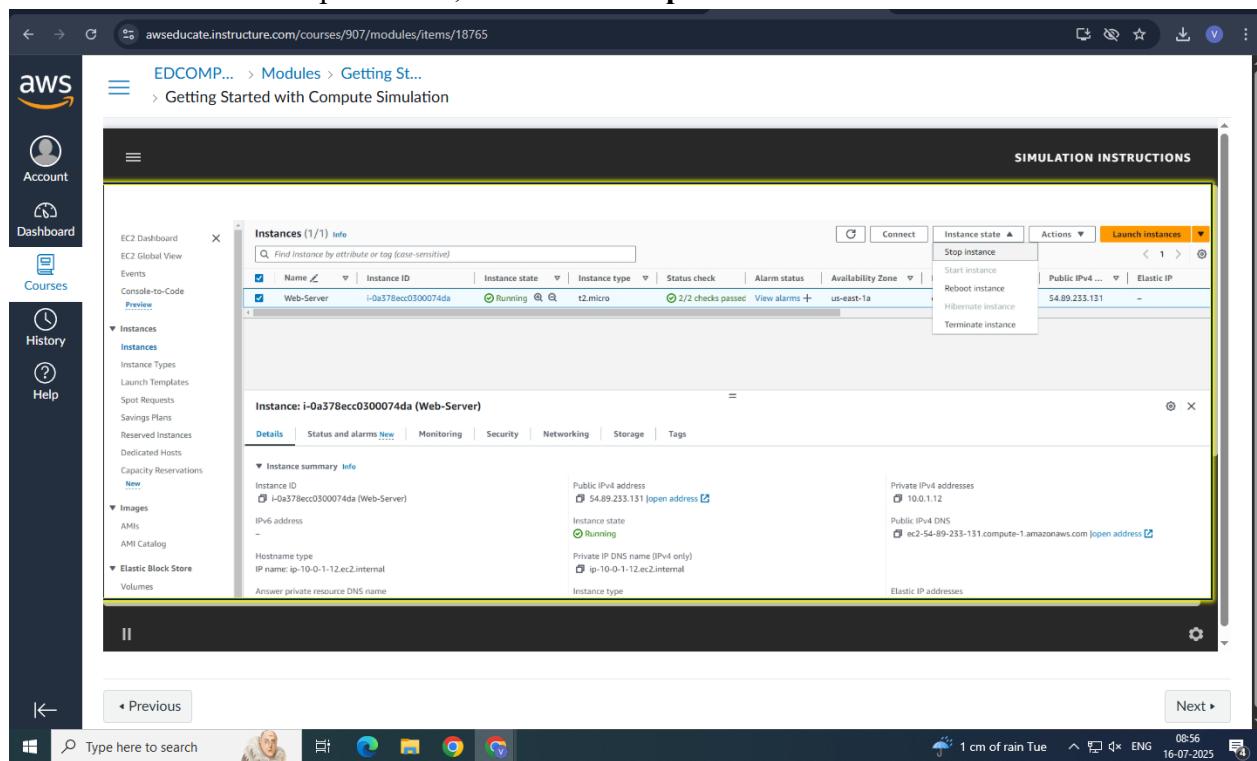


47. On the EC2 Management Console, in the left navigation pane, choose Instances.

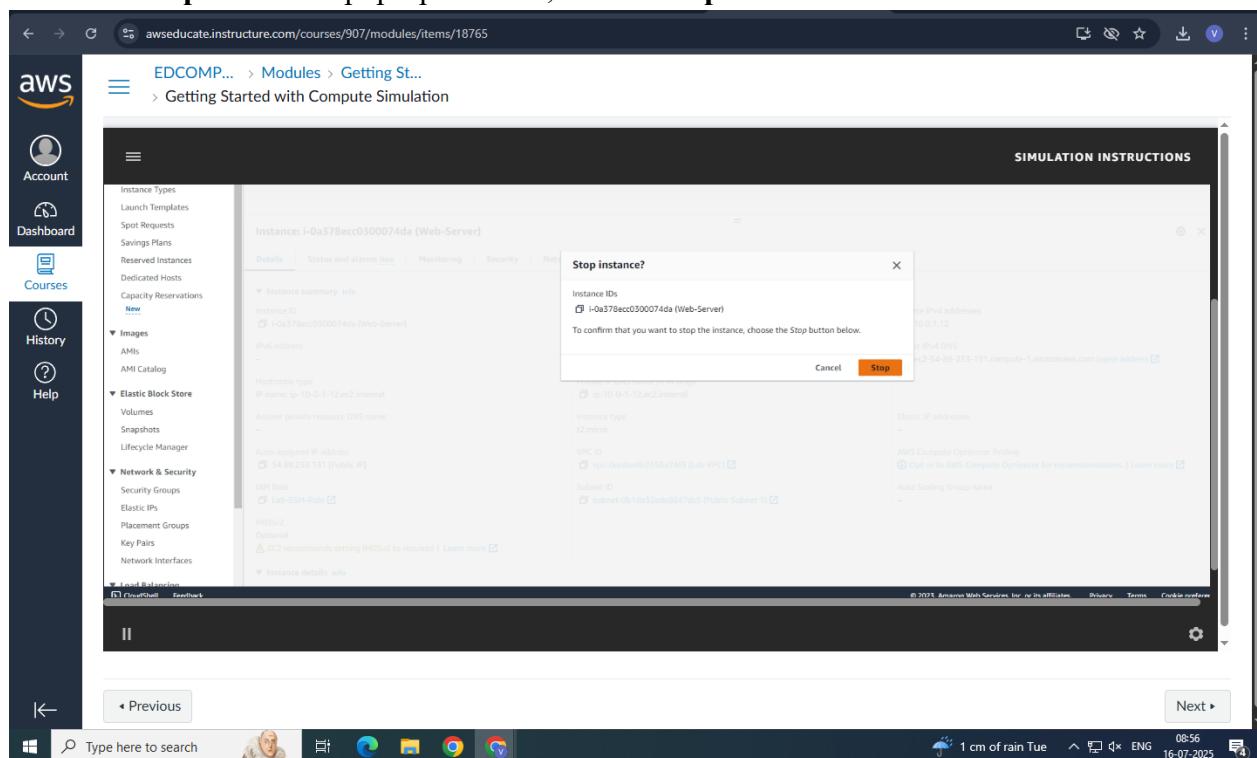


48. Select the check box next to your Web-Server instance. At the top of the page, choose

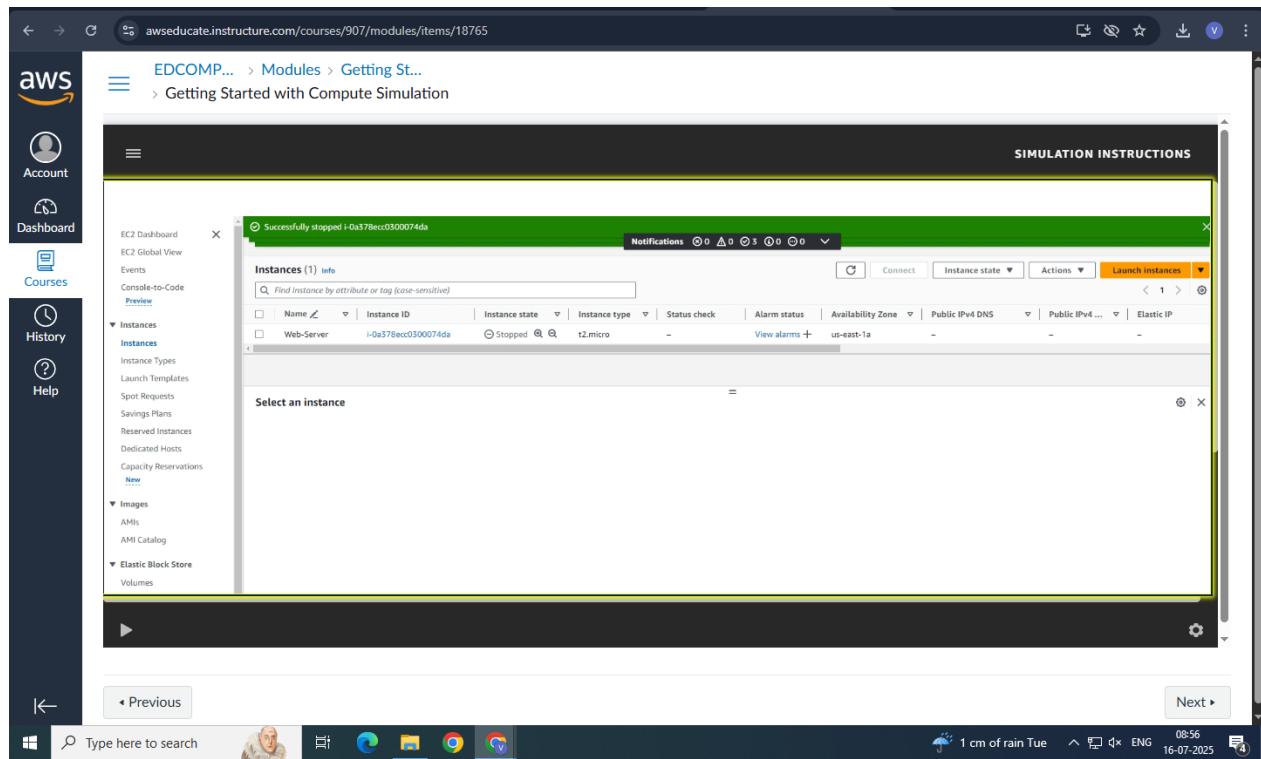
the **Instance state** dropdown list, and choose **Stop instance**.



49. In the **Stop instance?** pop-up window, choose **Stop**.



50. Wait for the **Instance state** to display **Stopped**.



CHANGE THE INSTANCE TYPE

51. Select the check box next to your **Web-Server**. From the **Actions** dropdown list, select **Instance settings** → **Change instance type**, and then configure the following option:

- **Instance type:** Select **t2.nano**.

The screenshot shows two consecutive screenshots of the AWS Cloud Solution Architect course interface. Both screenshots are identical, displaying the 'EDCOMP...' > 'Modules' > 'Getting St...' > 'Getting Started with Compute Simulation' section.

Screenshot 1 (Top): The main view shows the EC2 Instances page. A green notification bar at the top says 'Successfully stopped i-0a378ecc0300074da'. Below it, the 'Instances (1/1) info' table shows one instance named 'Web-Server' with ID 'i-0a378ecc0300074da', which is currently 'Stopped'. The 'Actions' dropdown menu is open, showing options like 'Launch instances', 'View details', and 'Change instance type'. The 'Details' tab is selected in the instance summary.

Screenshot 2 (Bottom): This screenshot shows the 'Change instance type' dialog box. It displays the current instance ID 'i-0a378ecc0300074da (Web-Server)', the 'Current instance type' as 't2.micro', and a dropdown menu for selecting a new instance type. The dropdown shows 't2.nano' as the selected option. A note below the dropdown states 'EBS-optimized EBS-optimized is not supported for this instance type'. At the bottom of the dialog are 'Cancel' and 'Apply' buttons.

52. Choose **Apply**.

The screenshot shows the AWS EC2 Instances page. A modal window titled "Instance type changed successfully" is open, indicating that the instance type has been changed to t2.nano. The main table lists one instance:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 IP	Elastic IP
Web-Server	i-0a378ec0300074da	Stopped	t2.nano	-	-	us-east-1a	-	-	-

The left sidebar shows the navigation menu for the EC2 service, including "Instances", "Instance Types", "Launch Templates", and "Capacity Reservations". The "Instances" section is currently selected.

Note: You are restricted from using other instance types in this simulation.

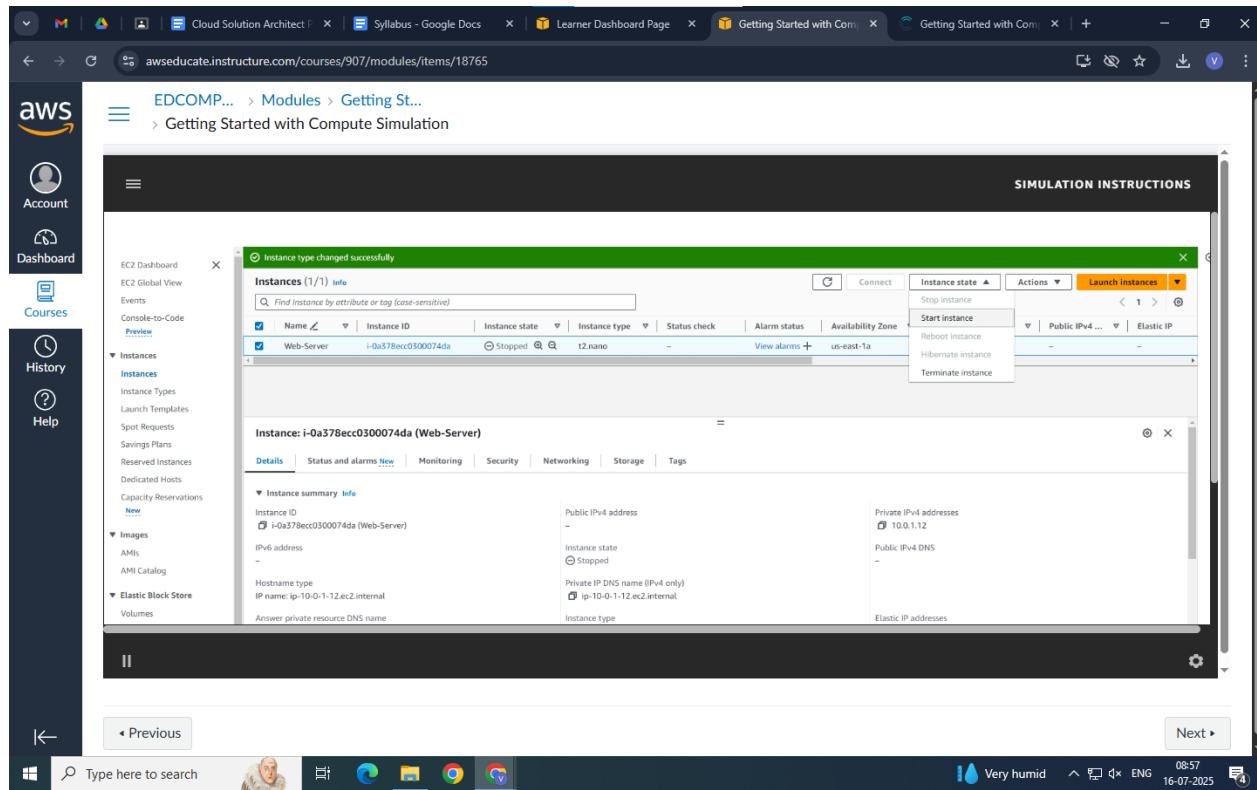
START THE RESIZED INSTANCE

When the instance is started again, it is a t2.nano instance. You now start the instance again, which has less memory but more disk space.

53. Next to your **Web-Server**, select the check box.

54. From the **Instance state** dropdown list, choose **Start instance**.

After the instance is restarted, the **Instance state** displays **Running**. Choose **Continue**.



Task 6: Testing termination protection

55. Select the check box next to your **Web-Server** instance. From the **Instance state** dropdown list, choose **Terminate instance**.

Notice that Termination protection is enabled. This is a safeguard to prevent the accidental termination of an instance.

The screenshot shows the AWS CloudFormation console. A modal window titled "Successfully started i-0a378ecc0300074da" is displayed, indicating that an instance has been successfully launched. The main interface shows the "Instances (1/1) info" section with one instance listed: "Web-Server" (i-0a378ecc0300074da), which is "Running" on the "t2.nano" instance type in the "us-east-1a" availability zone. The instance has a public IPv4 address of 54.236.4.137 and a private IPv4 address of 10.0.1.12. The "SIMULATION INSTRUCTIONS" bar at the top right includes options like "Launch instances" and "Terminate instance". The left sidebar shows navigation links for EC2 Dashboard, EC2 Global View, Events, Console-to-Code, Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, and Elastic Block Store.

56. Choose **Terminate** to see what will happen if you try to terminate the instance. If you really want to terminate the instance, you need to turn off termination protection.

The screenshot shows the AWS CloudFormation console with a "Terminate instance?" dialog box open. The dialog contains a warning message: "On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated. Storage on any local drives will be lost." It asks, "Are you sure you want to terminate these instances?" Below this, it lists the instance ID (i-0a378ecc0300074da) and its termination protection status ("Enabled"). A "Terminate" button is prominently displayed. The background shows the same "Instances (1/1) info" screen as the previous screenshot, with the "SIMULATION INSTRUCTIONS" bar visible at the top right.

SIMULATION INSTRUCTIONS

Actions ▾

- Instance settings

57. From the Actions dropdown list, choose **Instance settings**, and then choose **Change termination protection**.

SIMULATION INSTRUCTIONS

Actions ▾

Instance settings

- Enable

58. The check box for **Enable** will be selected. Clear the checkbox to disable & Choose Save.

The screenshot shows the AWS CloudFormation console with a modal dialog titled "Change termination protection". The dialog contains a single checkbox labeled "Enable". Below the checkbox, there is explanatory text: "To prevent your instance from being accidentally terminated, you can enable termination protection for the instance." At the bottom right of the dialog is a "Save" button.

60. Now, try to terminate the instance again. From the **Instance state** dropdown list, choose **Terminate instance**.

The screenshot shows the AWS CloudFormation console with a modal dialog titled "Terminate instance?". The dialog contains a warning message: "On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated. Storage on any local drives will be lost." Below the message, it asks "Are you sure you want to terminate these instances?", with a checkbox for "Termination protection". The checkbox is checked and labeled "Disabled". At the bottom right of the dialog is a "Terminate" button.

61. The instance state will now successfully be terminated. Choose **Terminate**.

The screenshot shows a browser window with multiple tabs open, including "Cloud Solution Architect F", "Syllabus - Google Docs", "Learner Dashboard Page", "Getting Started with Compute Simulation", and "Getting Started with Compute Simulation". The main content area displays the "EDCOMP... > Modules > Getting St..." section of the course. A yellow callout box highlights a message: "The instance has now successfully terminated." Below this, the EC2 Dashboard shows a table with one row for an instance named "Web-Server" (i-0a378ecc0300074da). The instance status is listed as "Shutting-down" with an "t2.nano" instance type. The table includes columns for Instance type, Status check, Alarm status, Availability Zone, Public IPv4 DNS, Public IPv4 ... (partially visible), and Elastic IP.

Practical 5: Restoring an EBS Snapshot

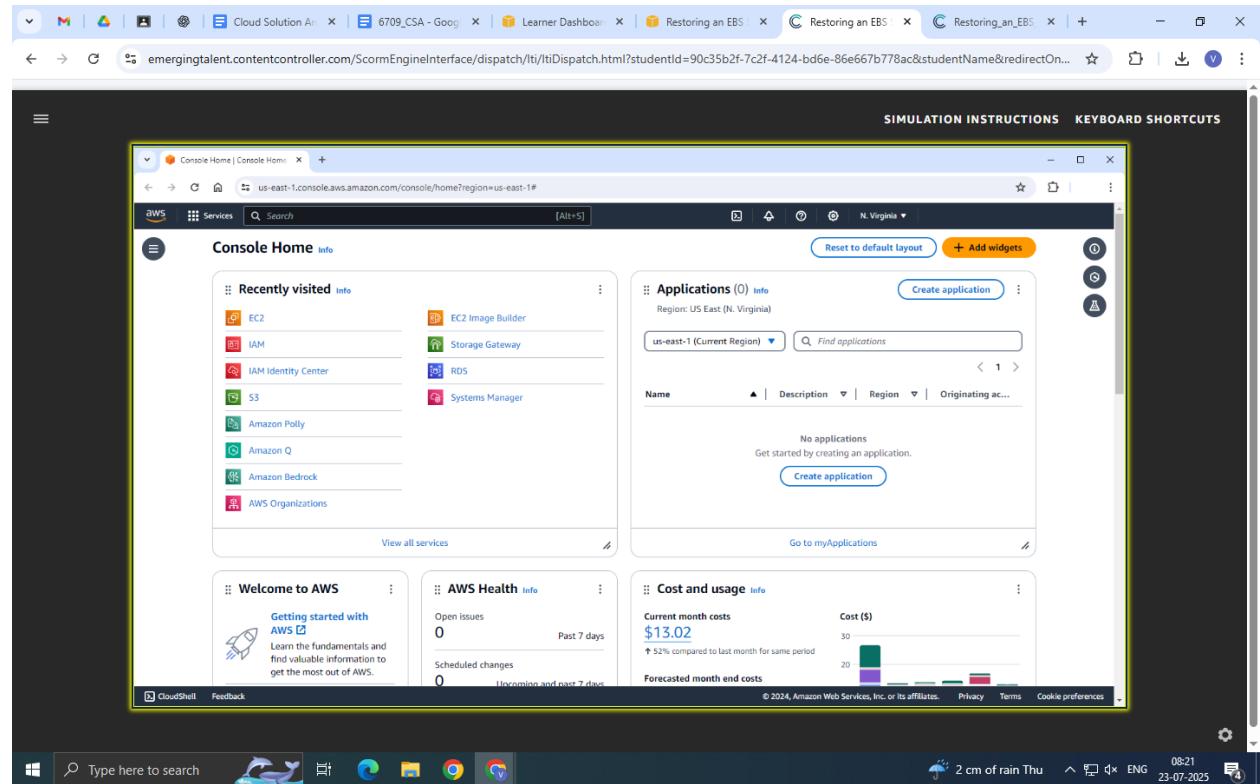
Jul 23, 2025

- A. Prepare a snapshot.
- B. Create a new volume using a snapshot.
- C. Attach a volume to an Amazon EC2 instance.
- D. Configure an operating system (OS) to use an Amazon EBS volume.

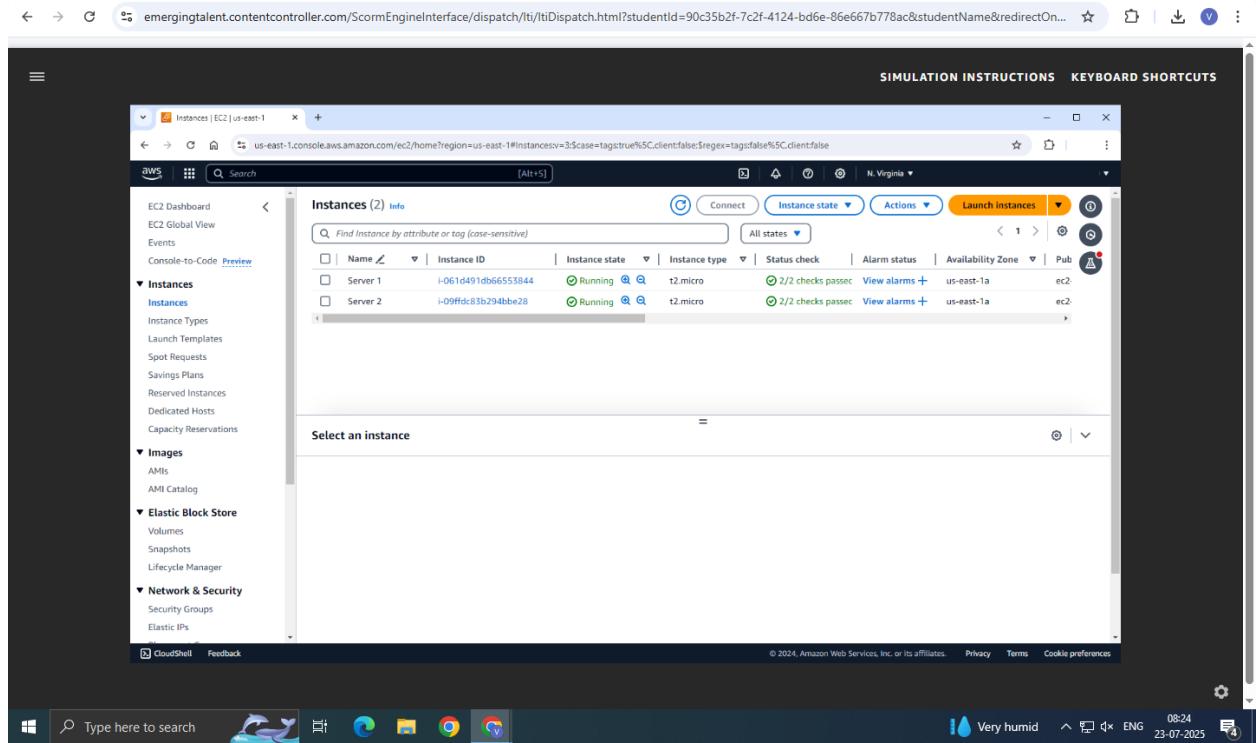
The screenshot shows a web browser window with multiple tabs open. The main content is the AWS Educate homepage, which features a dark header with the AWS Educate logo and navigation links for Courses & labs, Jobs, Emerging Talent Community, and a user profile for Shivam Vishwakarma. Below the header, a large banner reads "Your cloud journey starts here" with the subtext "No matter your goal, we've gathered the most useful content to build your cloud skills." On the left, there's a sidebar with "Filters" and a search bar containing the query "Working with Amazon EBS Snapshots". The main area displays "Results (1)" for a course titled "Working with Amazon EBS Snapshots", which is listed under the "Cloud Computing" category and is marked as "Intermediate | 0.75 hour(s)". To the right, there's a "Explore" sidebar with various promotional links and information about AI certification and GenAI training. The bottom of the page includes a Windows taskbar with icons for search, file explorer, and browser, along with system status indicators like weather, battery, and date/time.

Task 1: Connect to the EC2 instance named Server 1

1. In the **AWS Management Console**, choose **EC2** from the **Recently visited** pane.

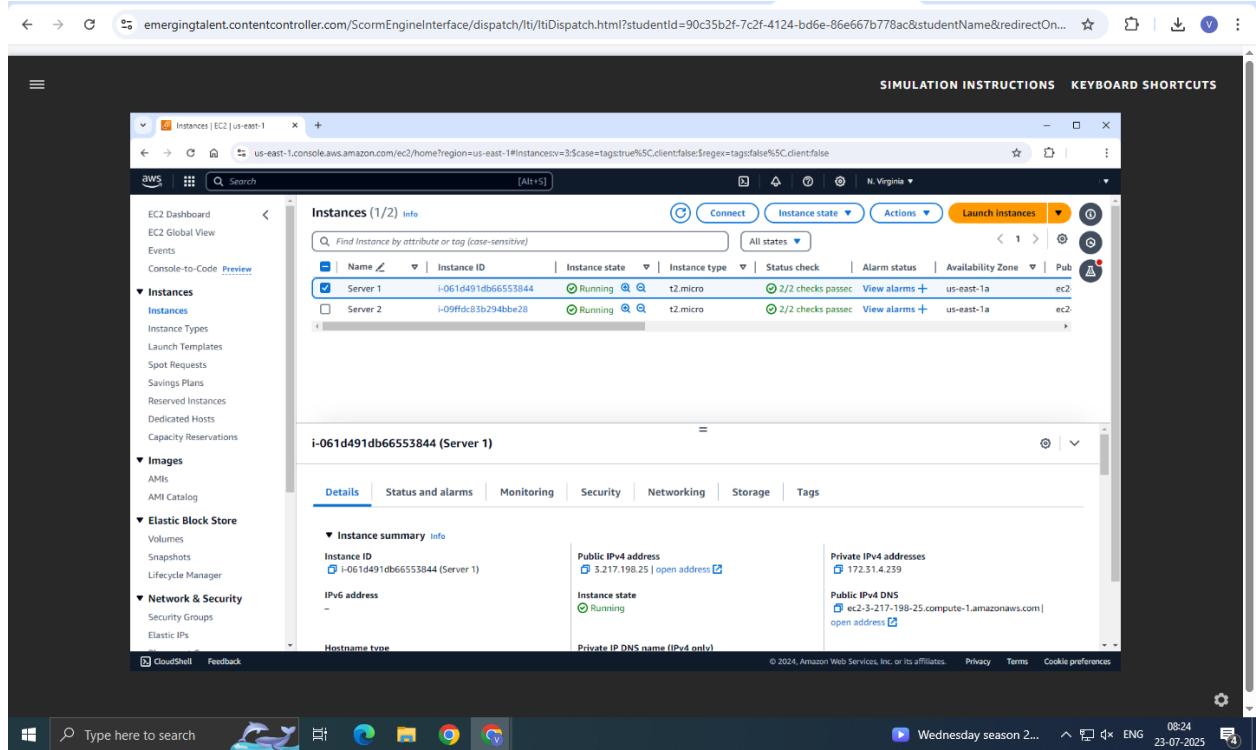


2. On the **EC2 Dashboard** page, choose **Instances** from either the left navigation pane or the **Resources** pane.

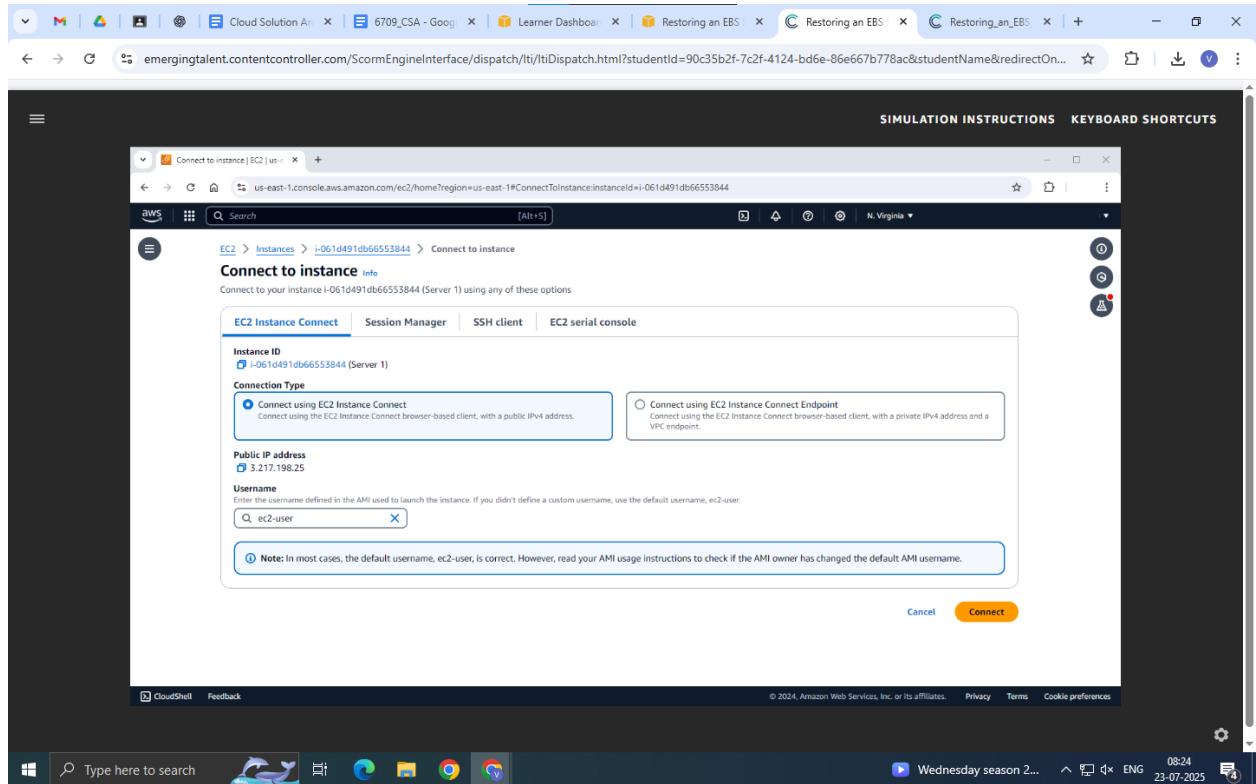


3. Select the check box for the instance named **Server 1**.

4. Choose **Connect**.

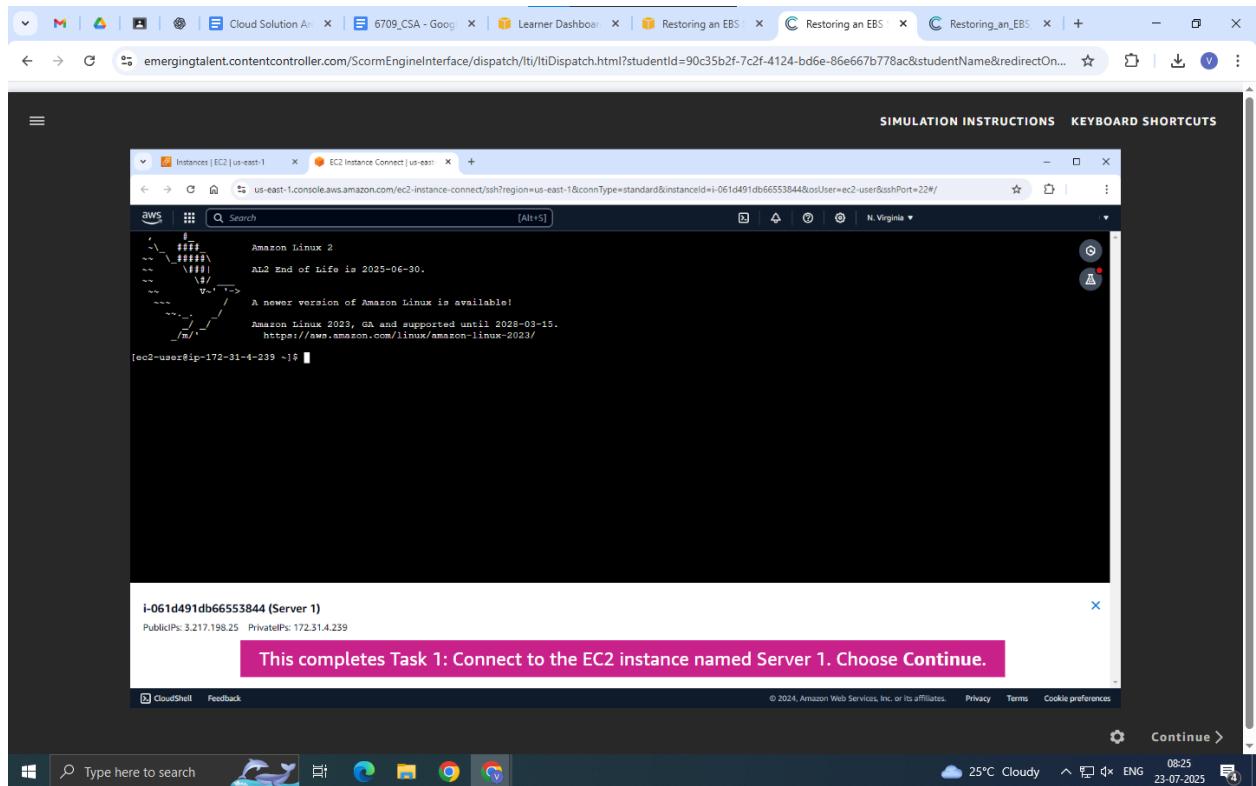


5. On the **EC2 Instance Connect** tab, choose **Connect**.



The connection to your instance opens in a new tab. Now, the following two tabs are open:

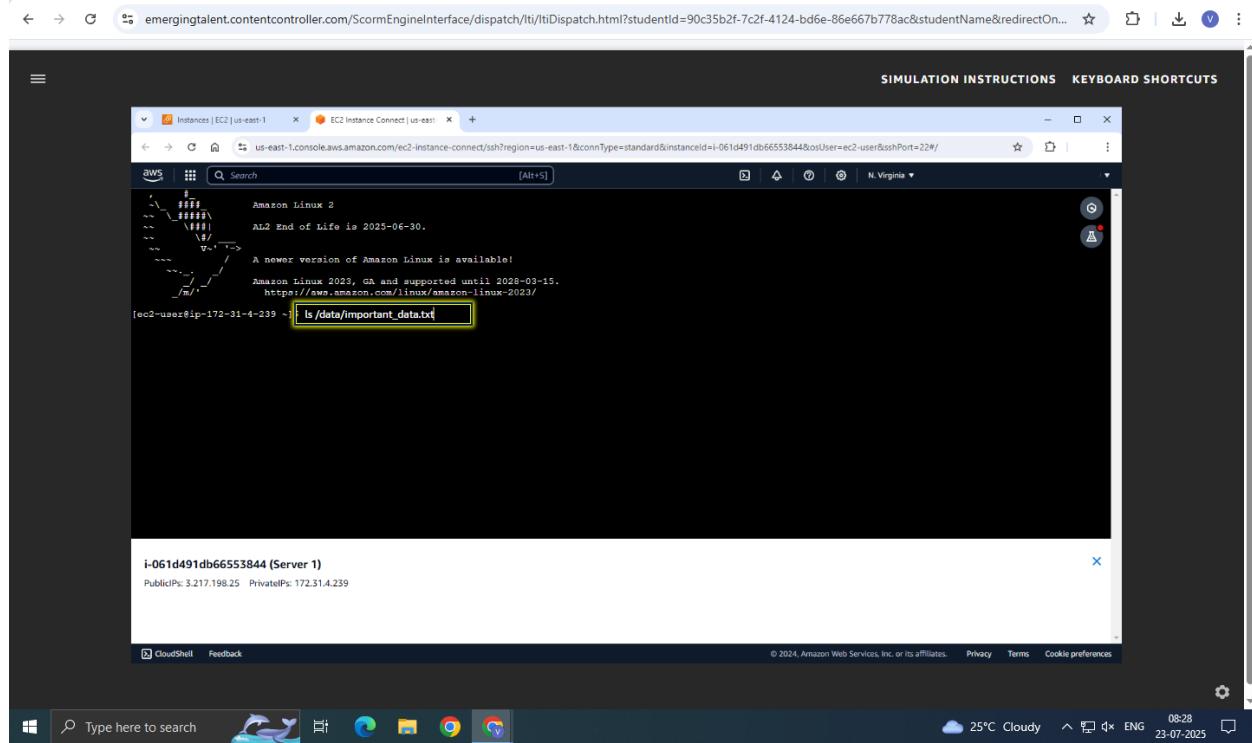
- EC2 Instance Connect (where you are logged in to your instance)
- AWS Management Console (where you can navigate the console)



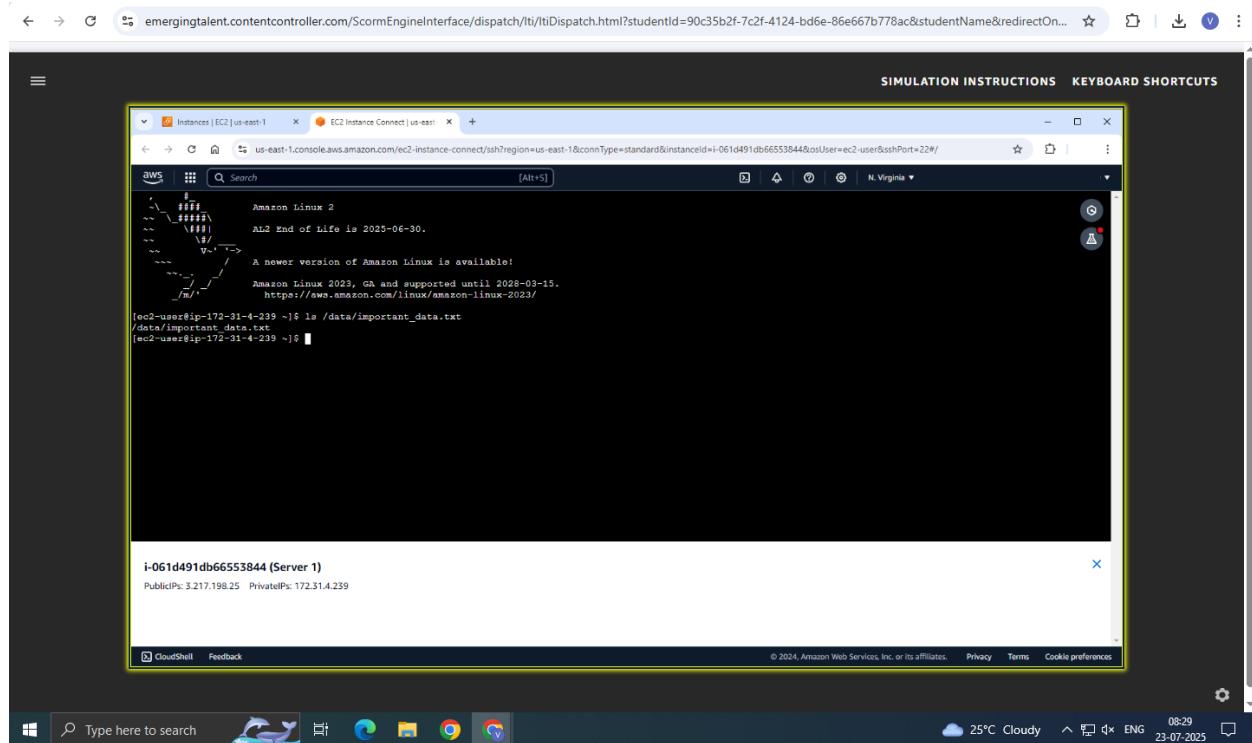
Task 2: Explore Server 1

6. From the **EC2 Instance Connect** tab, to list the contents of the data directory, run the following command. To do this, follow these specific steps:

```
ls /data/important_data.txt
```



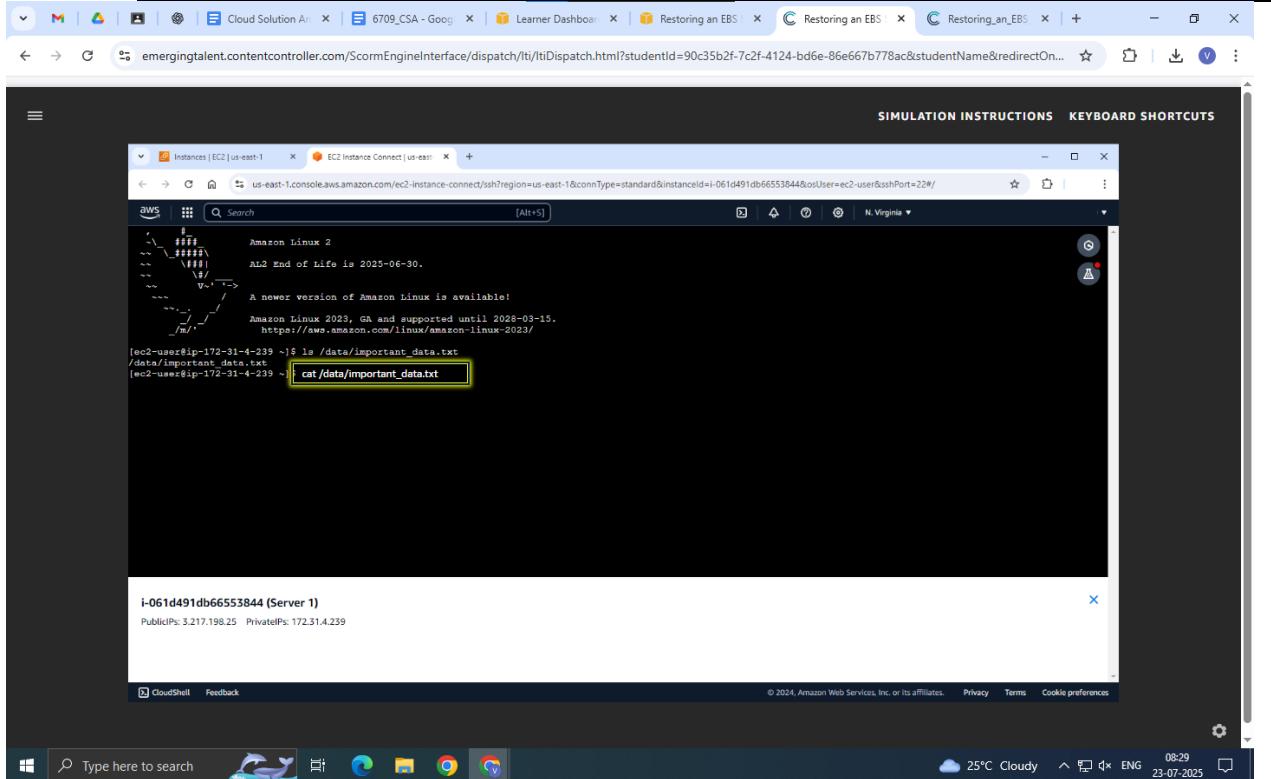
On the **EC2 Instance Connect** screen, choose the cursor marker.
In the open field, paste (or type) the code. To run the command, press **Enter**



7. To display the contents of the **important_data.txt** file, run the following command. To do

this, follow these specific steps:

```
cat /data/important_data.txt
```



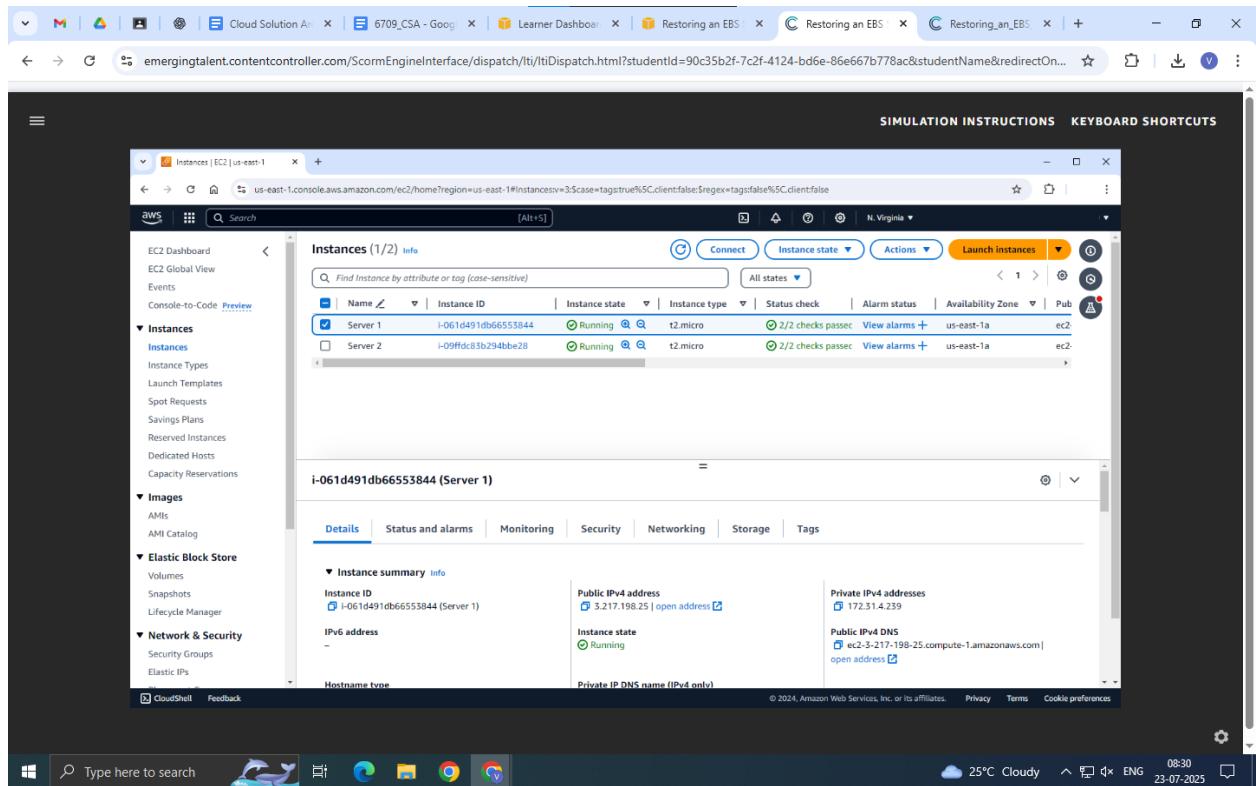
The **important_data.txt** file only exists on **Server 1**. It's backed up when you create an EBS snapshot in the following task. After the data is backed up, your data is safe. You can restore it to a different server if anything goes wrong with Server 1.

8. Close the **EC2 Instance Connect** browser tab.

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with navigation links like EC2 Dashboard, EC2 Global View, Events, Console-to-Code (selected), Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security, Security Groups, and Elastic IPs. The main pane displays 'Instances (1/2) info' for two servers: 'Server 1' (i-061d491db66553844) and 'Server 2' (i-09fdc83b294bbe28). Both are listed as 'Running'. Below the table, a detailed view for 'Server 1' is shown with tabs for Details, Status and alarms, Monitoring, Security, Networking, Storage, and Tags. Under the Details tab, the 'Instance summary' section shows the Instance ID (i-061d491db66553844), Public IPv4 address (3.217.198.25), Private IPv4 addresses (172.31.4.239), and Public IPv4 DNS. A pink banner at the bottom of the page reads 'This completes Task 2: Explore Server 1. Choose Continue.'

Task 3: Prepare a snapshot of the Server 1 user volume

- With the **Server 1** instance still selected, in the bottom pane, choose the **Storage** tab.

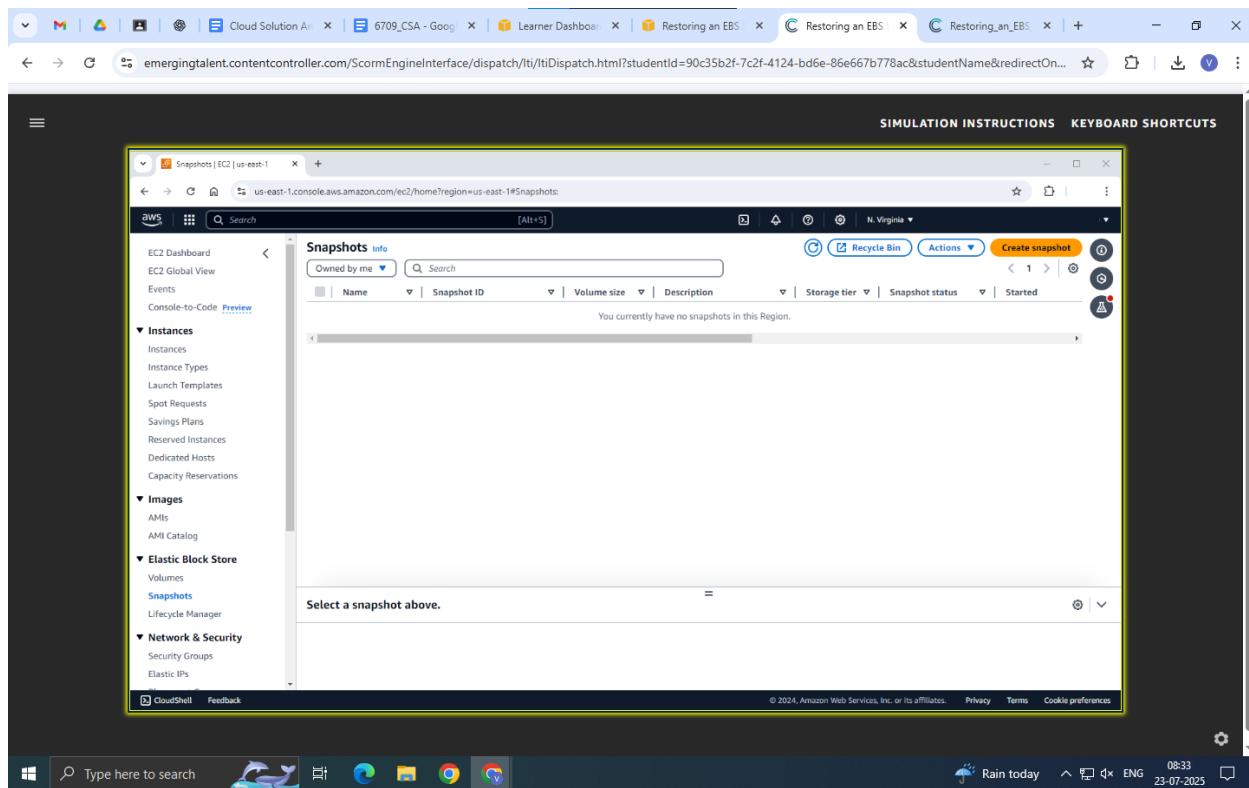


10. To see more details about the storage pane, choose the scroll bar for the bottom pane. Under **Block devices**, notice and record the **Volume ID** for the device named **/dev/xvdf**. It ends with 72847. This is the volume with the important data that you need to back up.

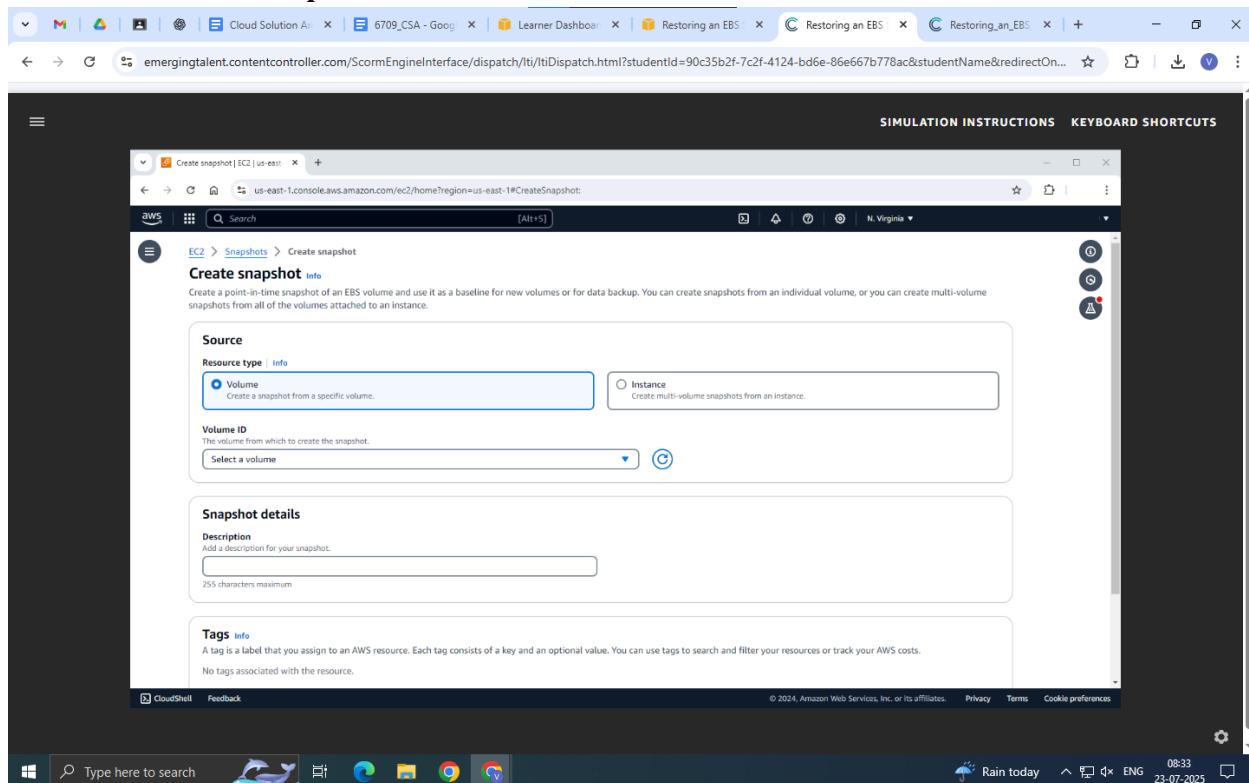
The screenshot shows the AWS EC2 Instances page. On the left, the navigation pane includes sections for EC2 Dashboard, EC2 Global View, Events, Console-to-Code (Preview), Instances (selected), Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images (AMIs, AMI Catalog), Elastic Block Store (Volumes, Snapshots, Lifecycle Manager), Network & Security (Security Groups, Elastic IPs), CloudShell, and Feedback. The main content area displays 'Instances (1/2) Info' for two instances: Server 1 (i-061d491db66553844, Running, t2.micro, 8 GiB, Attached, 2024/08/03 21:47 GMT-4) and Server 2 (i-09fdc83b294bbe28, Running, t2.micro, 8 GiB, Attached, 2024/08/03 21:47 GMT-4). A detailed view for Server 1 is open, showing 'Block devices' (vol-0e26afc7a02f7fd39, /dev/xvda, 8 GiB, Attached, 2024/08/03 21:47 GMT-4) and 'Volume monitoring (1)'.

11. In the left navigation pane, under Elastic Block Store, choose Snapshots.

The screenshot shows the same AWS EC2 Instances page as the previous one, but with a red arrow pointing to the 'Snapshots' link under the 'Elastic Block Store' section in the left navigation pane. The rest of the interface and content are identical to the first screenshot.

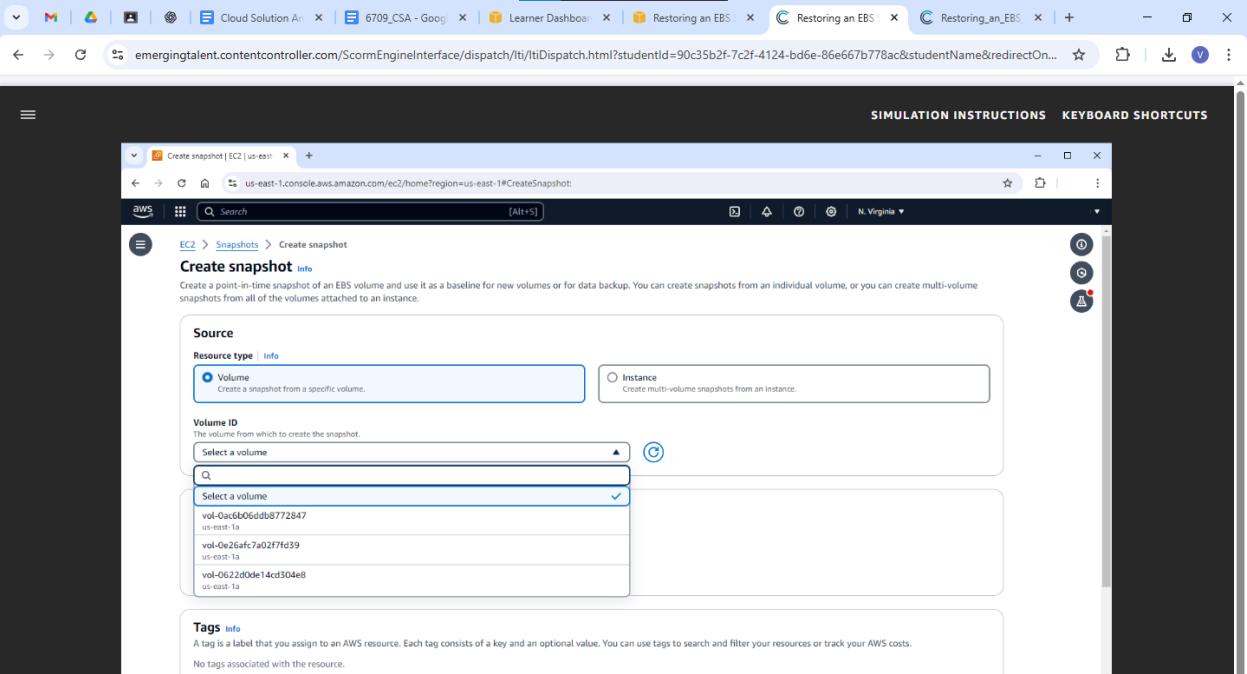


12. Choose Create snapshot.



13. In the **Source** pane, for the **Resource type**, keep **Volume** selected. Choose the **Volume ID**

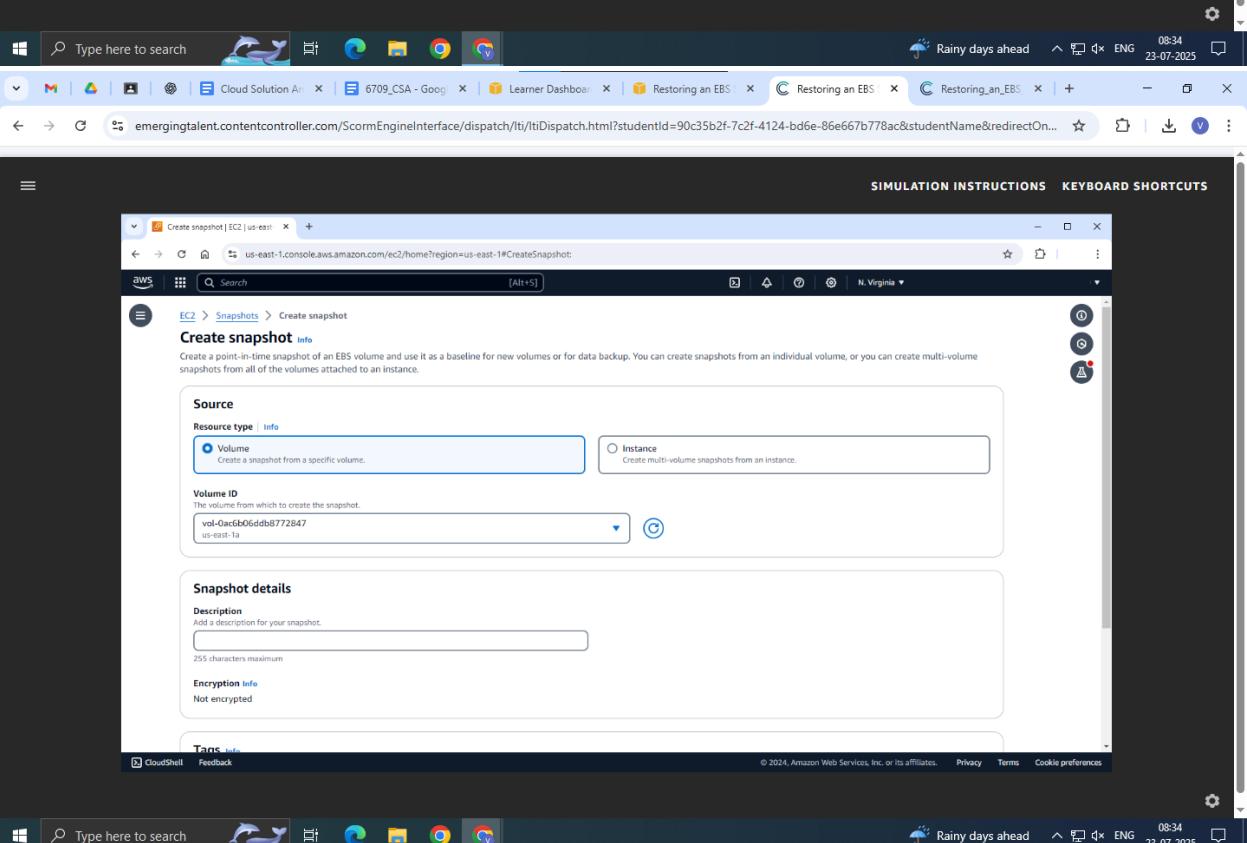
menu, then choose the Volume ID that you recorded earlier. It ends with **72847**.



The screenshot shows the 'Create snapshot' page in the AWS EC2 console. Under the 'Source' section, the 'Resource type' is set to 'Volume'. A dropdown menu titled 'Select a volume' lists several volume IDs:

- vol-0ac8b06db8772847 (selected)
- us-east-1a
- vol-0e26afc7a02f7fd39 (disabled)
- us-east-1a
- vol-0e22d0de14cd504e8 (disabled)
- us-east-1a

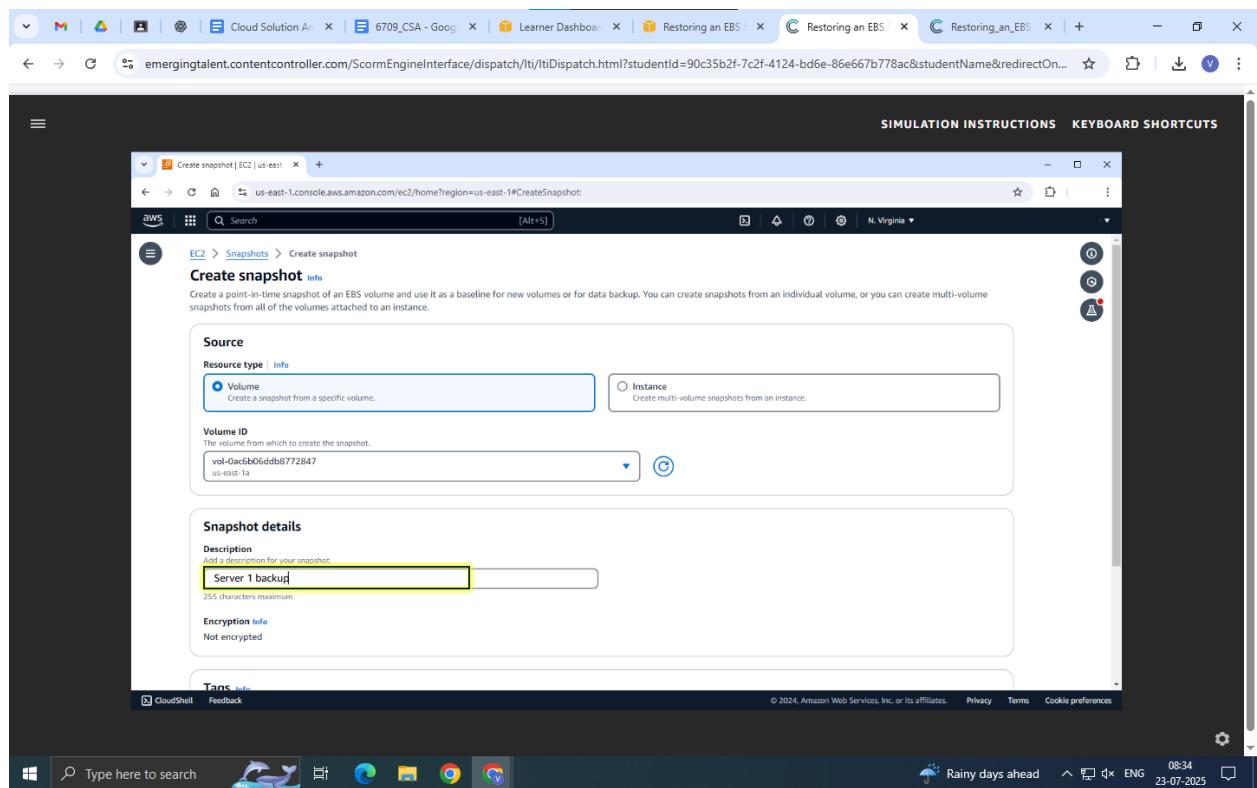
Tags info section: No tags associated with the resource.



The screenshot shows the 'Create snapshot' page in the AWS EC2 console. Under the 'Source' section, the 'Resource type' is set to 'Volume'. The 'Volume ID' dropdown menu is open, showing the selected volume ID: vol-0ac8b06db8772847. In the 'Snapshot details' pane, the 'Description' field contains the text 'Server 1 backup'.

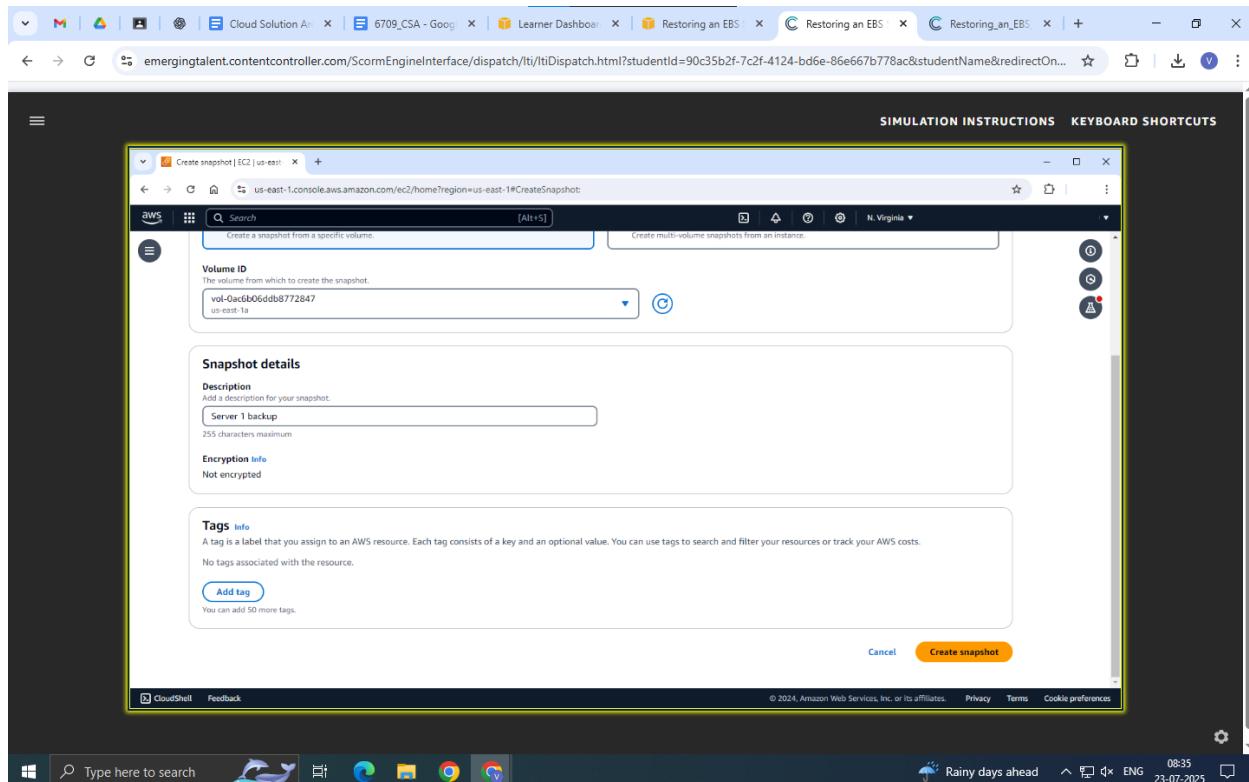
14. In the **Snapshot details** pane, enter **Server 1 backup** in the **Description** field. To record your entry after typing or pasting in the field, press **Enter** on your keyboard or choose any space

outside the field.

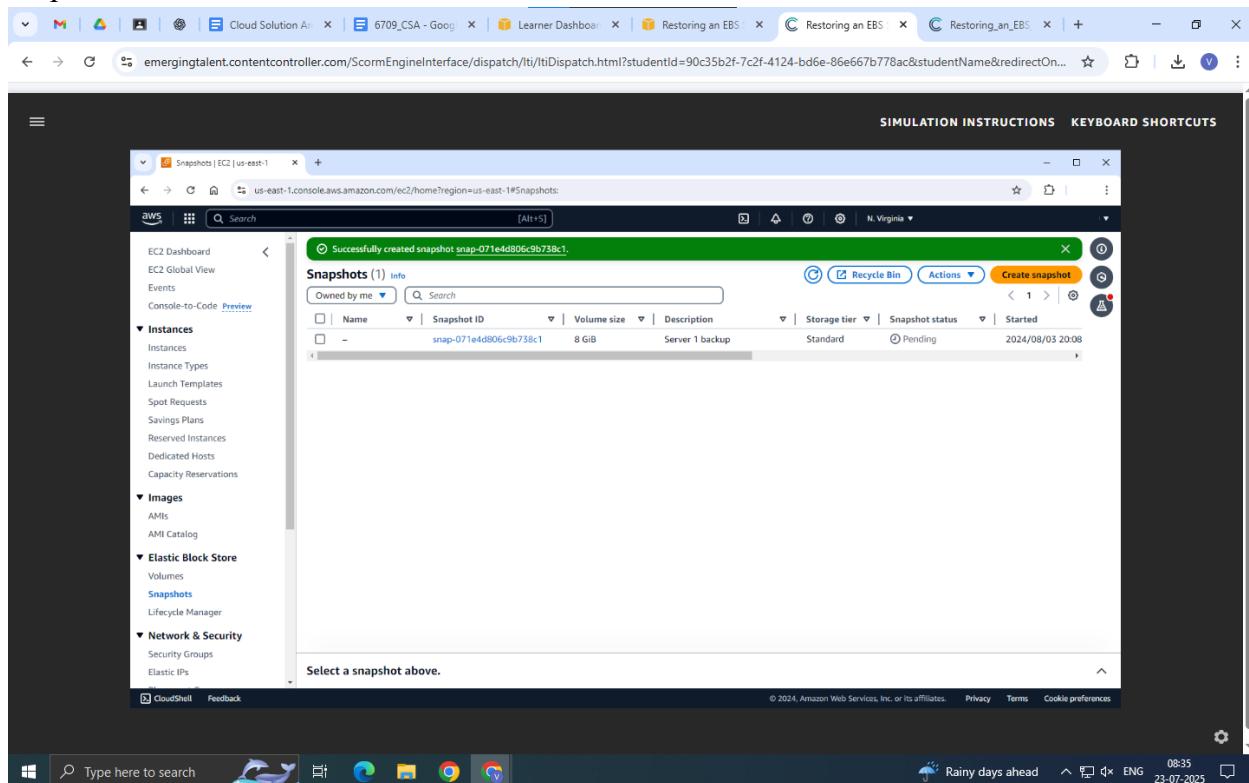


15. To scroll down, choose the scroll bar.

16. Choose **Create snapshot**.



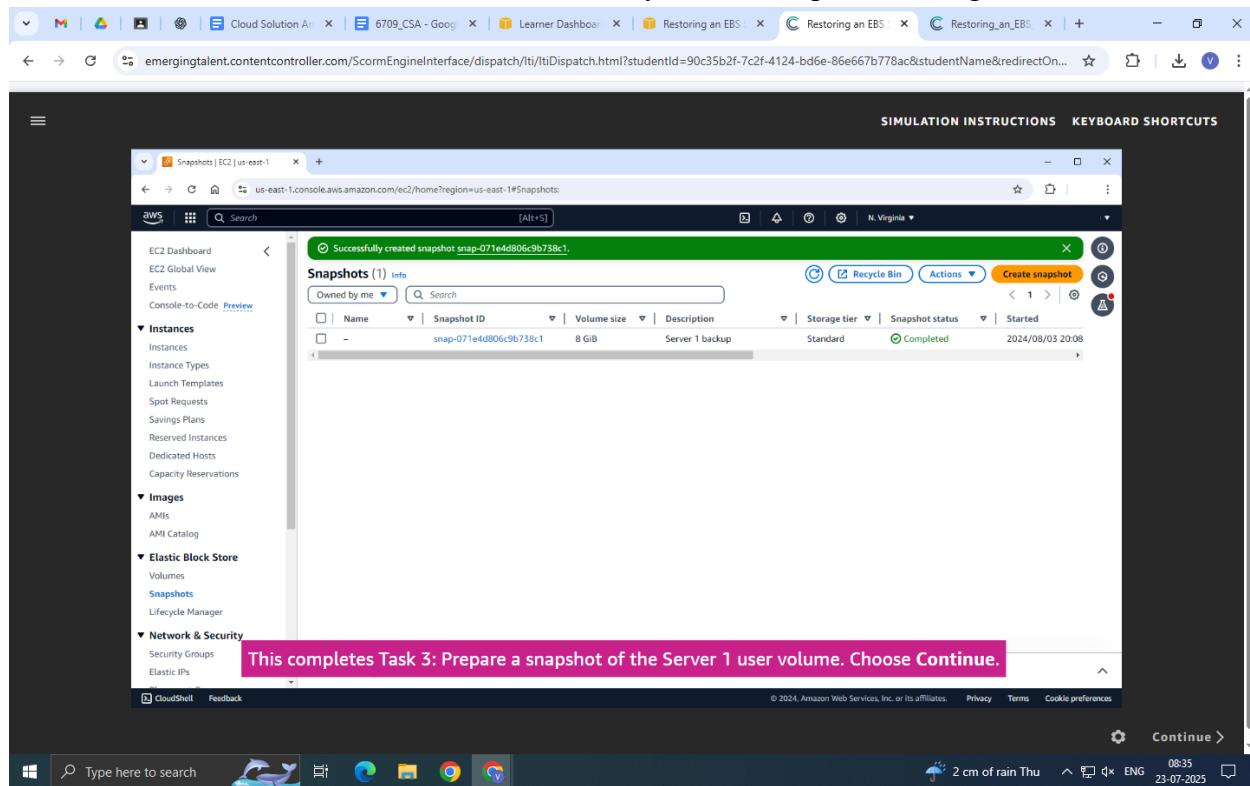
You return to the **Snapshots** page. A successfully created snapshot appears to confirm the snapshot was created.



In a live environment, it can take a couple of minutes for the snapshot creation to complete.

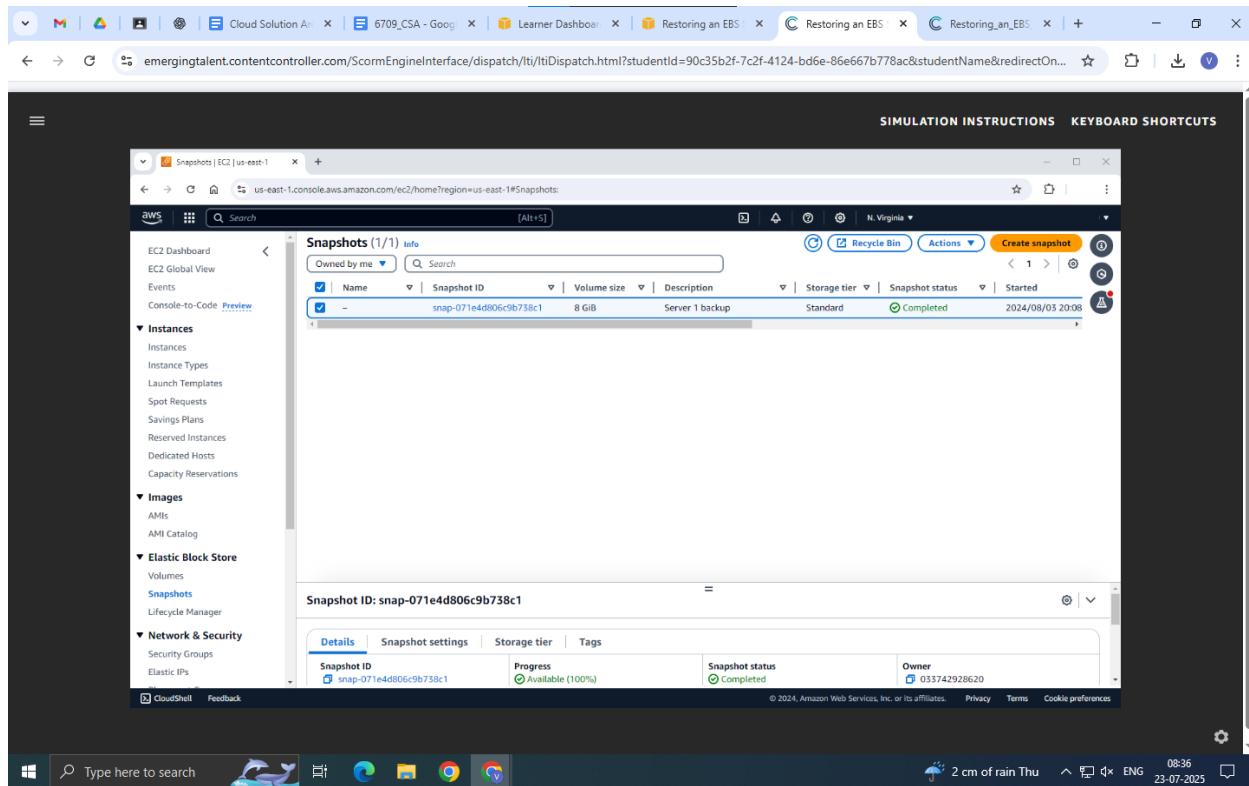
Before you can continue, the status in the **Progress** column must be Available.

17. Choose the **refresh** icon under the successfully created snapshot message.

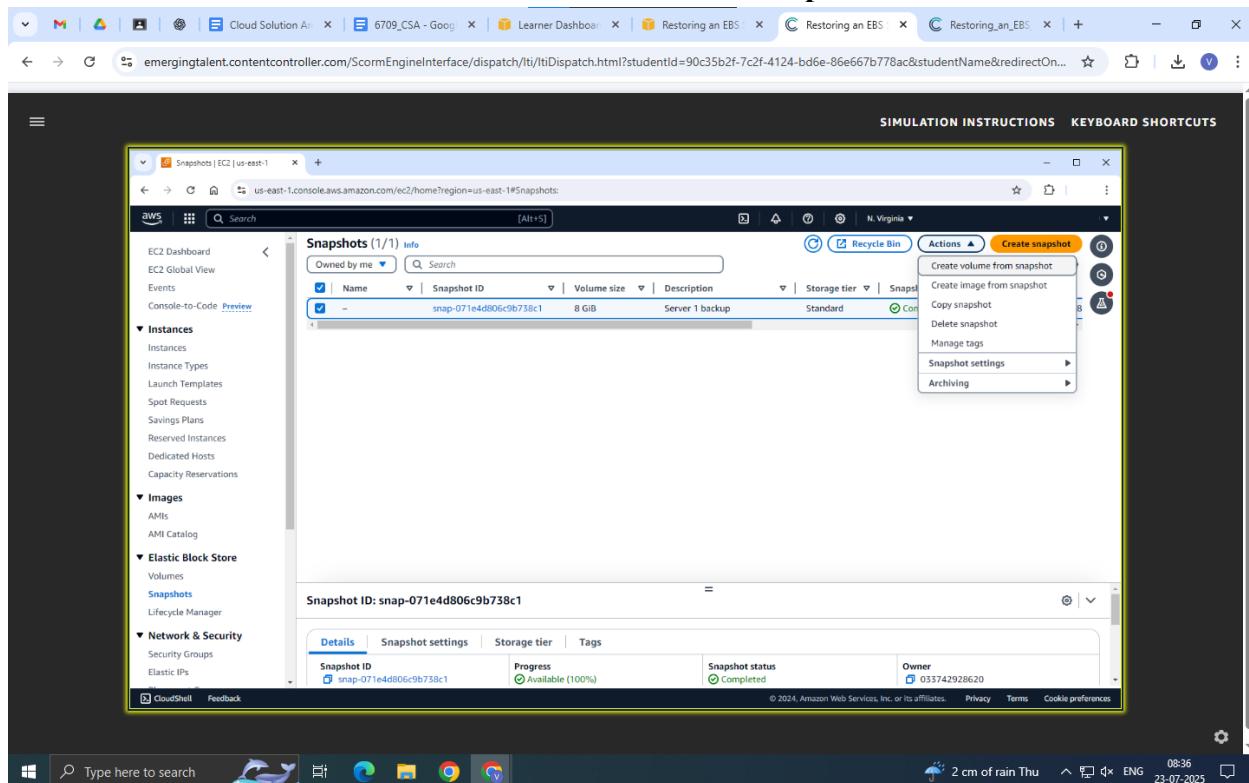


Task 4: Use a snapshot to create a new volume

18. Under Snapshots, select the check box for the snapshot.



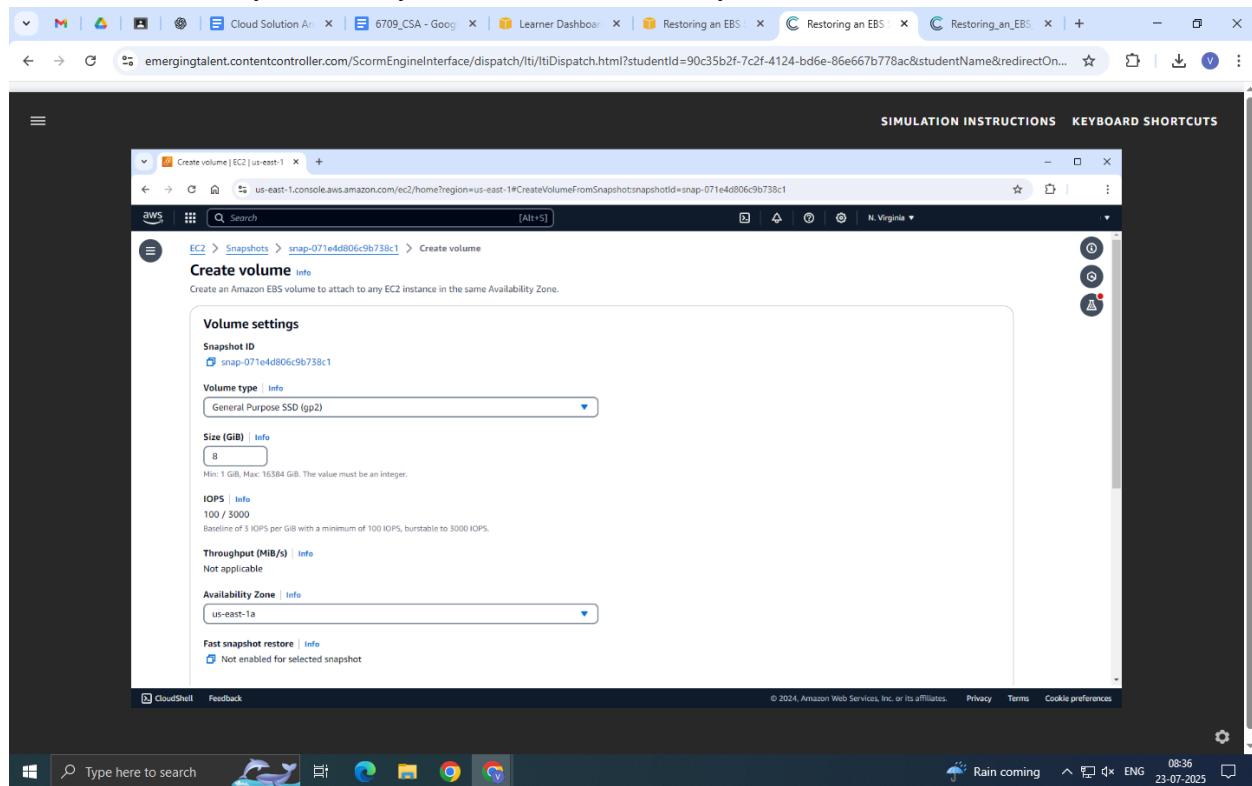
19. From the Actions menu, choose Create volume from snapshot.



20. On the Create volume page, choose the Volume type menu, then choose General Purpose

SSD (gp2).

Notice that the Availability Zone is already set to Availability Zone us-east-1a. This means that the volume can only be used by instances in Availability Zone a.

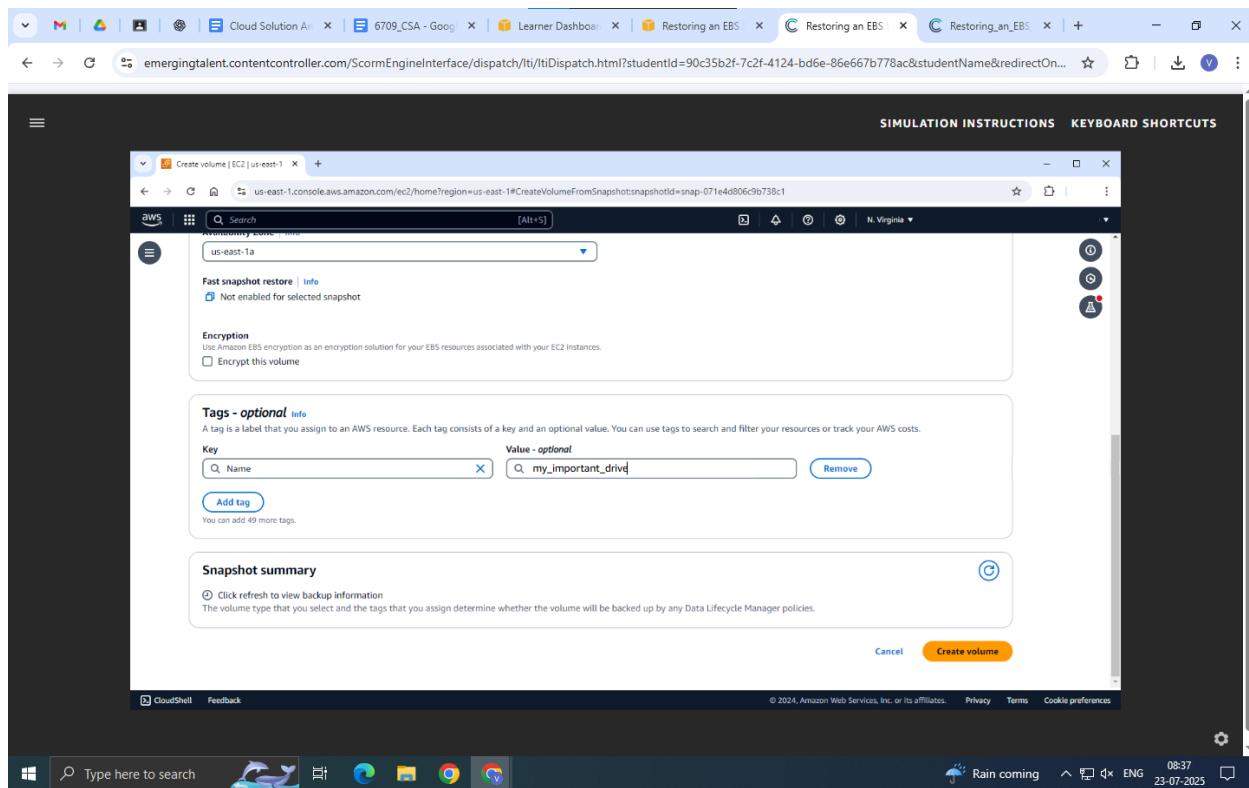


21. To scroll down, choose the scroll bar.

22. Choose **Add tag**.

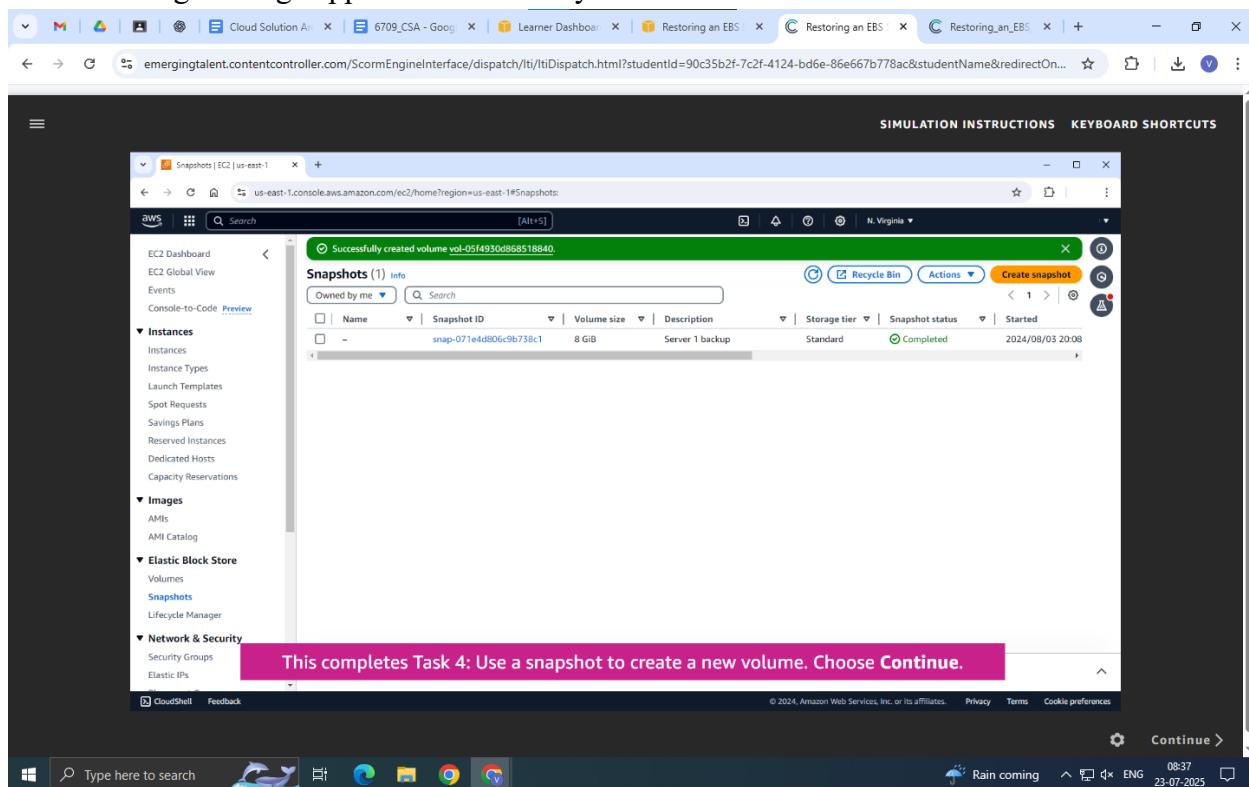
23. In the **Key** field, enter **Name**. Then, to record your entry, press **Enter** on your keyboard or choose any space outside the field.

24. In the **Value** field, enter **my_important_drive**. To record your entry, press **Enter** on your keyboard or choose any space outside the field.



25. Choose Create volume.

The following message appears: Successfully created volume.



Task 5: Attach the volume to a different EC2 instance

26. From the left navigation pane, under **Elastic Block Store**, choose **Volumes**.

The screenshot shows the AWS Management Console with the Volumes page open. The left sidebar navigation includes sections like EC2 Dashboard, Instances, Images, and Elastic Block Store. Under EBS, 'Volumes' is selected. The main content area displays a table of volumes with the following data:

Name	Volume ID	Type	Size	Snapshot ID	Availability Zone	Volume state	Alarm status
my_important...	vol-070f4239615af7101	gp2	8 GiB	snap-003bbb9...	us-east-1a	Available	No alarms
-	vol-0ac6b06dd8772847	gp2	8 GiB	-	us-east-1a	In-use	No alarms
-	vol-0e26afc7a02f7fd39	gp2	8 GiB	snap-0017f13...	us-east-1a	In-use	No alarms
-	vol-0622d0de14cd504e8	gp2	8 GiB	snap-0017f13...	us-east-1a	In-use	No alarms

Below the table, a 'Snapshot summary' section shows '1 / 4' recently backed up volumes. The browser address bar shows a URL related to restoring an EBS volume.

27. Select the checkbox for the volume named **my_important_drive**.

The screenshot shows the AWS Cloud9 IDE interface. On the left, there's a sidebar with navigation links like EC2 Dashboard, Instances, Images, and Elastic Block Store. The main area displays a table of volumes. One volume, 'my_important...', is selected. A context menu is open over this volume, with 'Actions' selected. Under 'Actions', the 'Create volume' option is highlighted in orange.

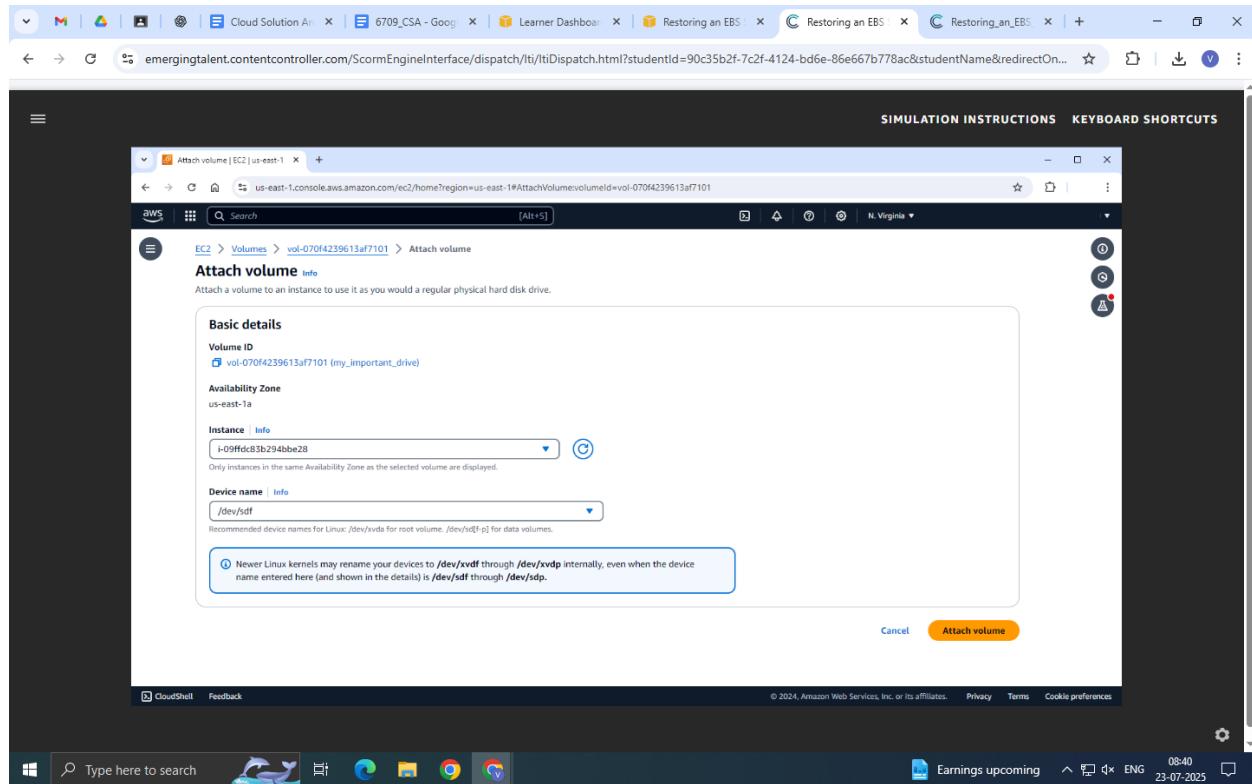
28. From the Actions menu, choose Attach volume.

This screenshot is similar to the previous one, showing the AWS Cloud9 IDE with the EC2 Volumes list. The context menu over the 'my_important...' volume now has 'Actions' selected, and the 'Attach volume' option is highlighted in orange.

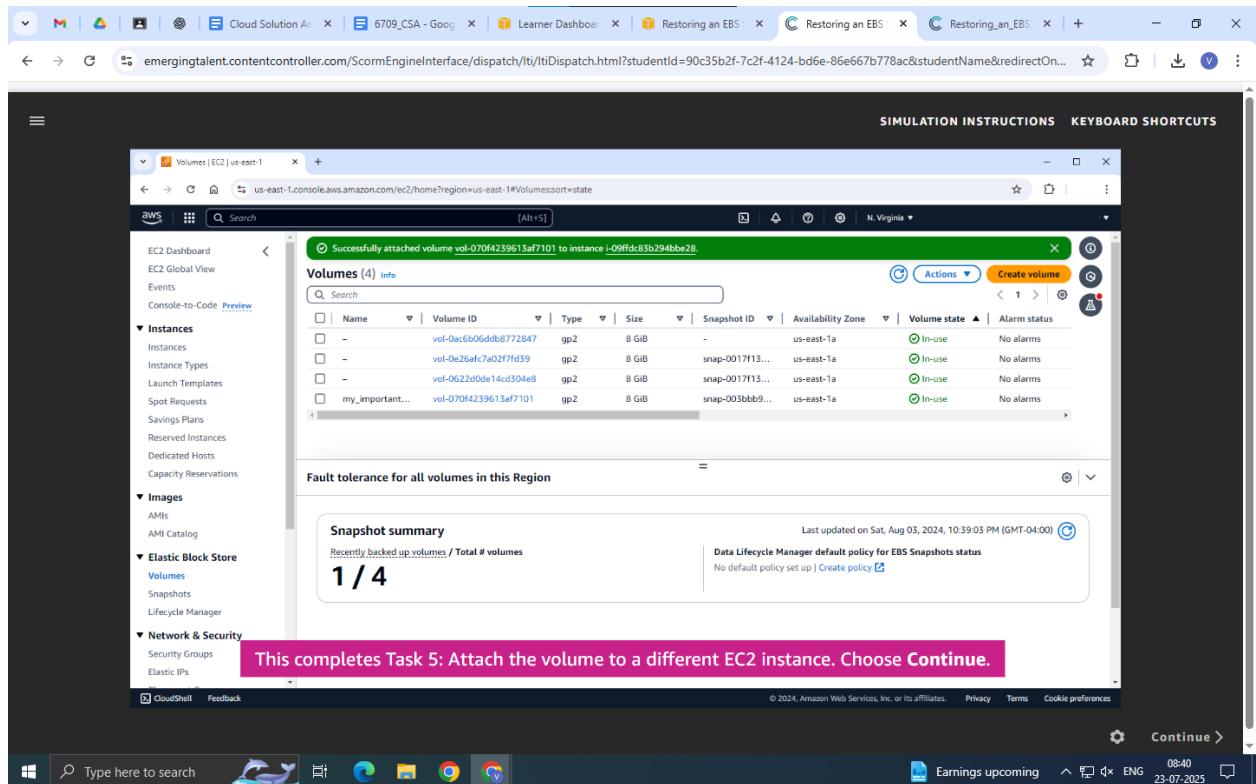
29. On the Attach volume page, choose the Instance menu, then choose Server 2 (the bottom

option).

30. Choose the **Device name** menu, then choose **/dev/sdf**.



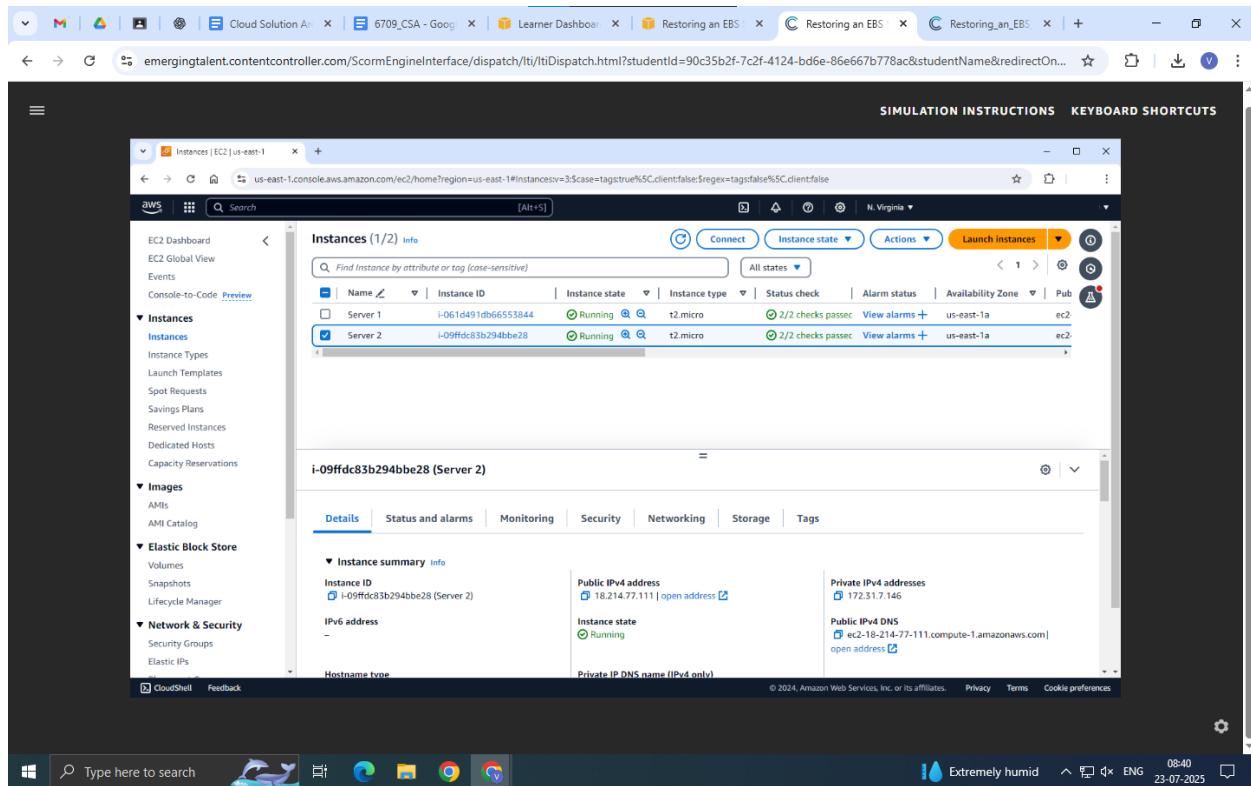
31. Choose **Attach volume**.



Task 6: Configure Server 2 to use the restored volume

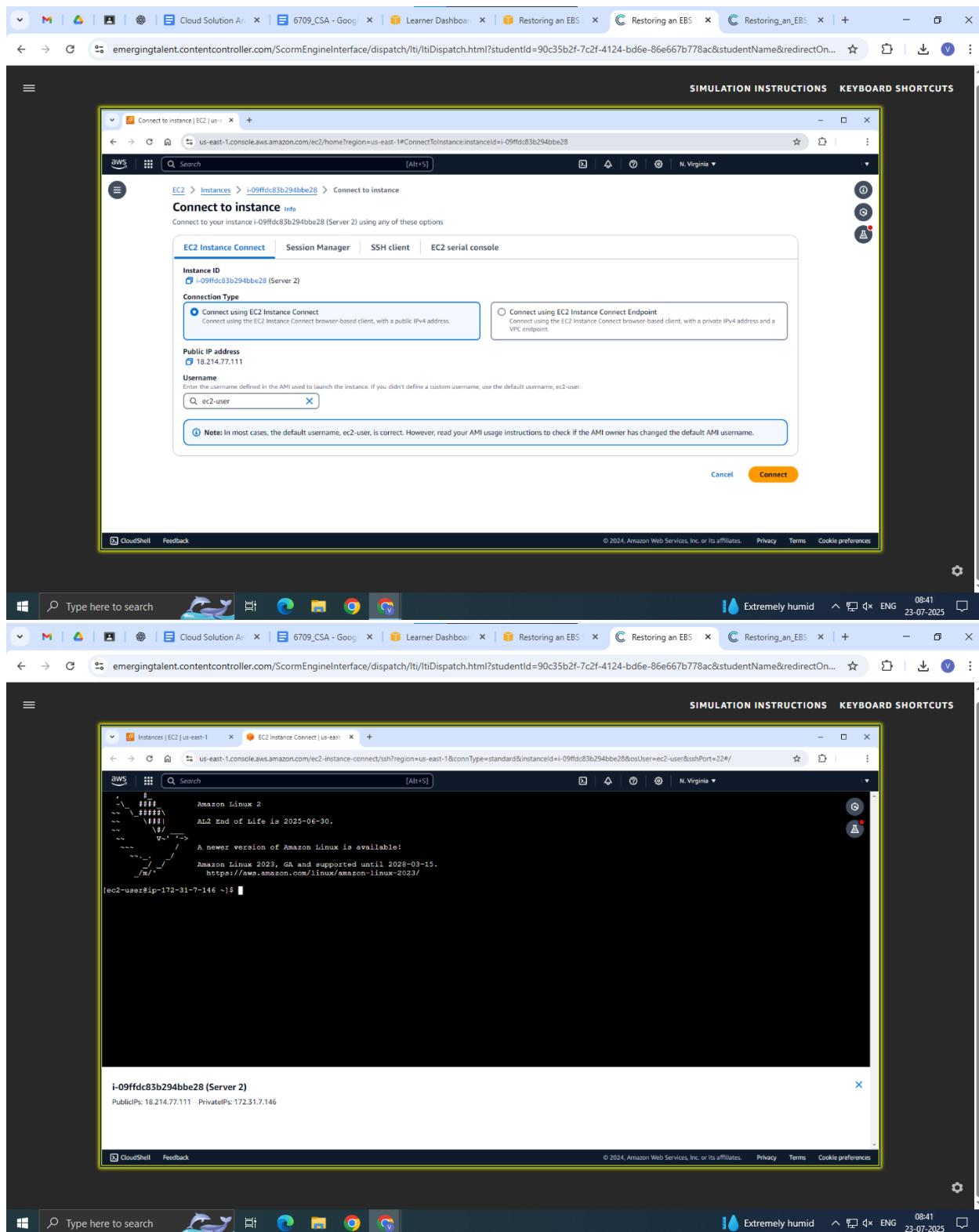
In this task, you create a new directory and mount the `/dev/xvdf` device under the new directory. Then, you check the **important_data.txt** file to make sure that it was successfully restored.

32. In the left navigation pane, choose **Instances**.
33. Select the check box for the instance named **Server 2**.



34. Choose **Connect**.

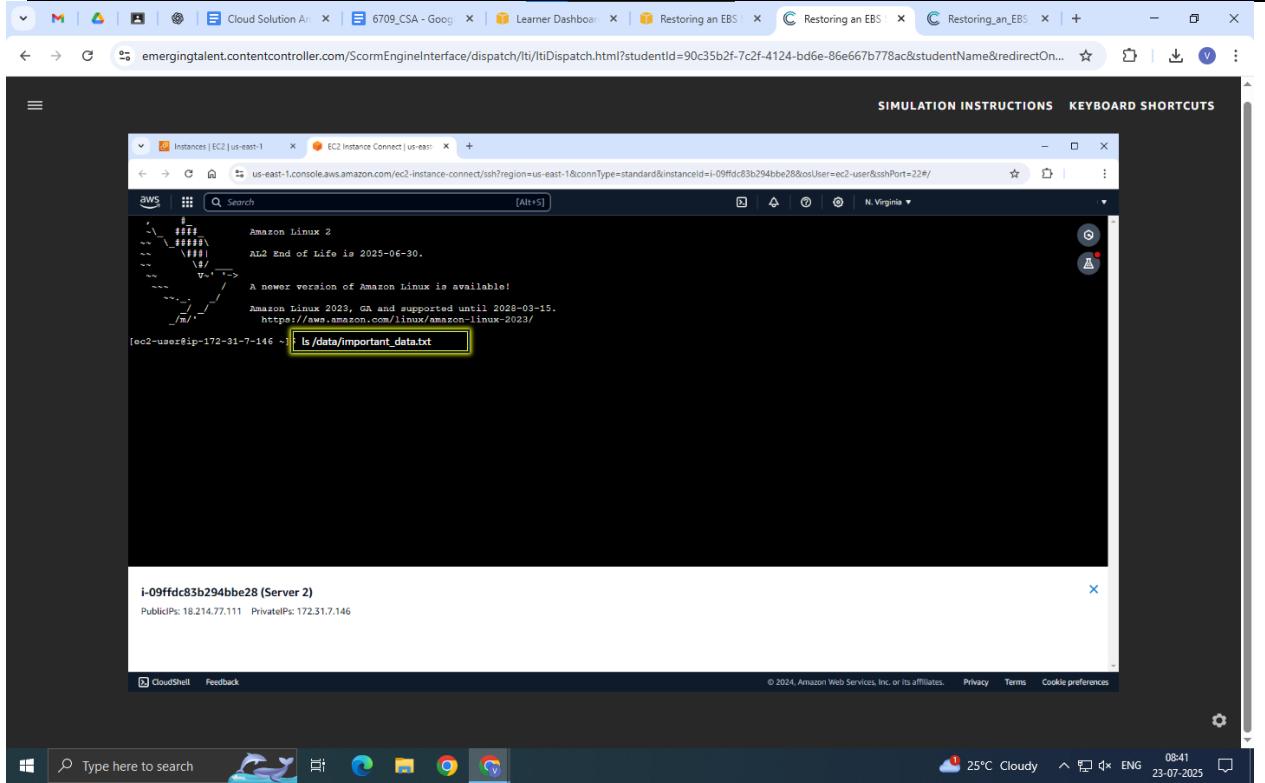
35. On the **EC2 Instance Connect** tab, choose **Connect**.



36. To verify that the **important_data.txt** file doesn't already exist on **Server 2**, run the following command. To do this follow these specific steps:

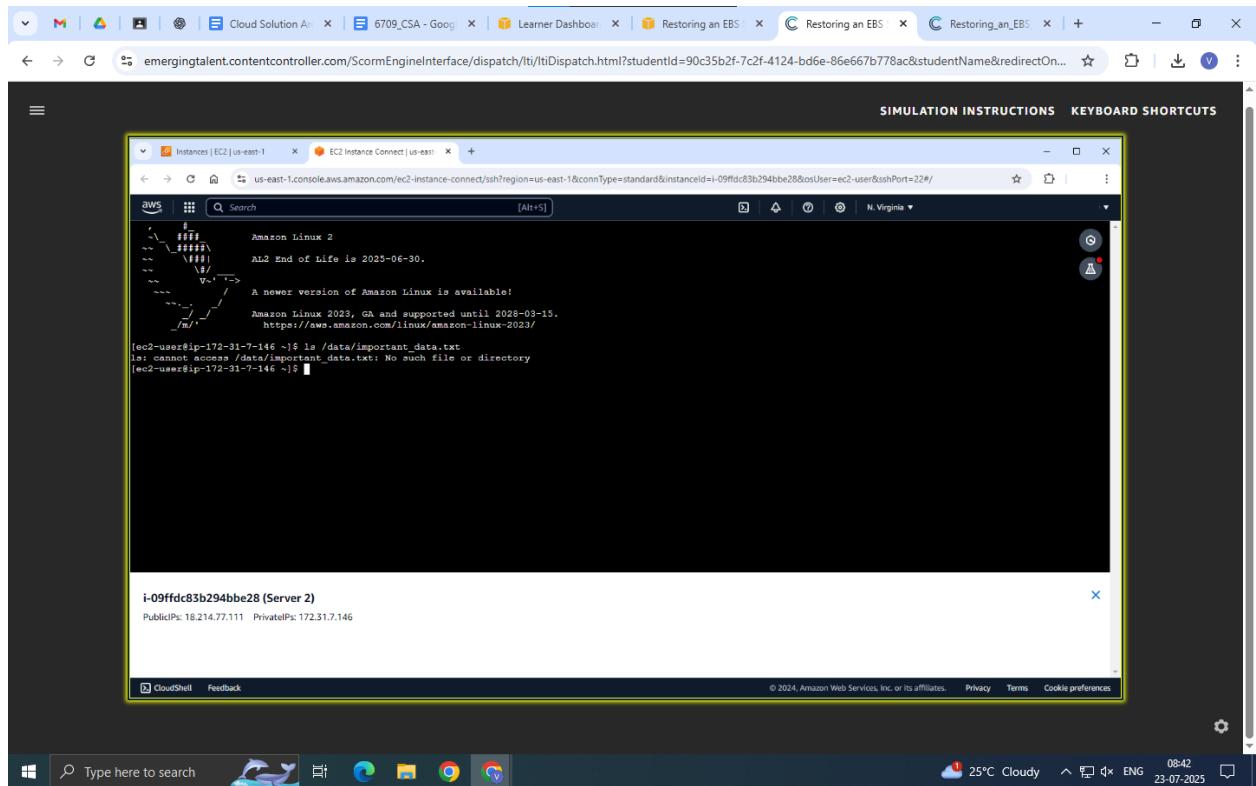
- o Copy the following code (unless you prefer to type it later):

```
ls /data/important_data.txt
```



- o On the **EC2 Instance Connect screen**, choose the cursor marker. o In the open field, paste (or type) the code.
o To run the command, press **Enter** on your keyboard.
The output shows the following:

```
ls: cannot access /data/important_data.txt: No such file or directory
```

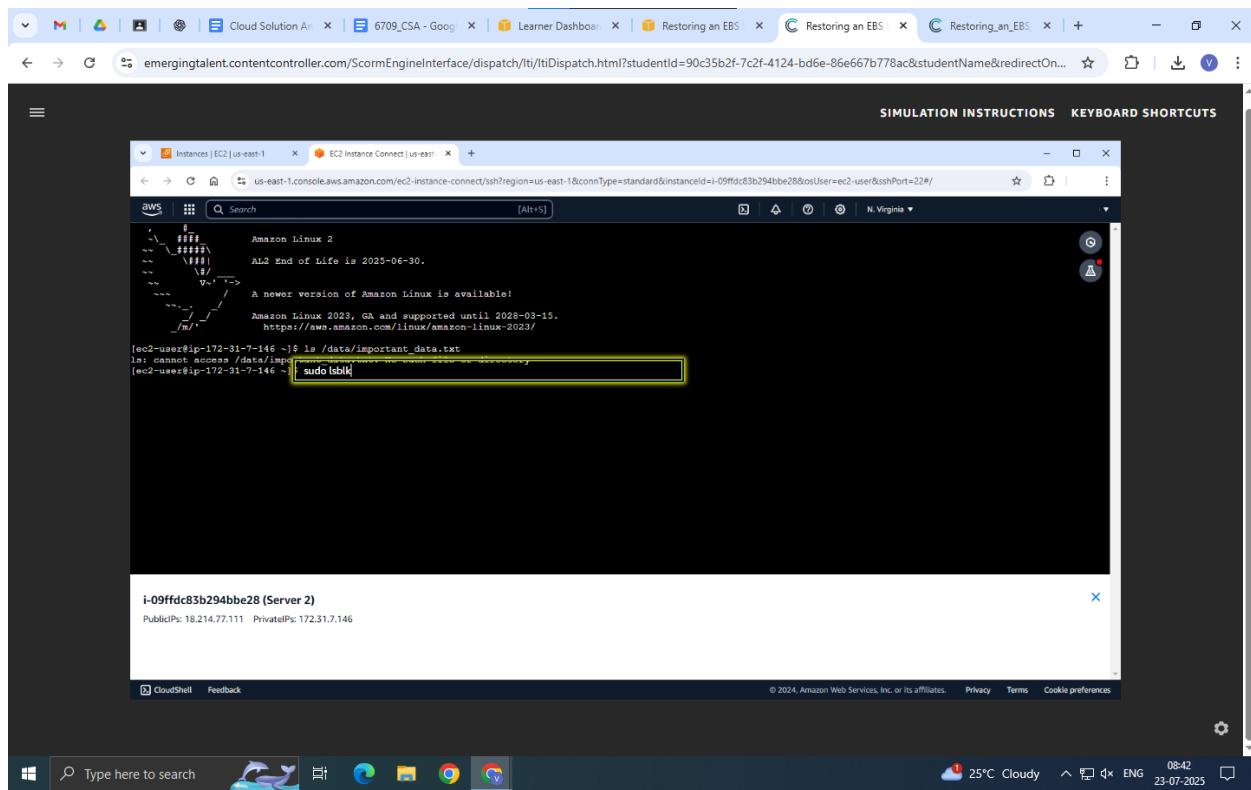


Currently, there is no directory on this server named **/data** or a file named **important_data.txt**. You must configure the **Server 2** OS so it can read the information from the **/dev/svdf** device.

37. To list the available block devices, run the following command. To do this follow these specific steps:

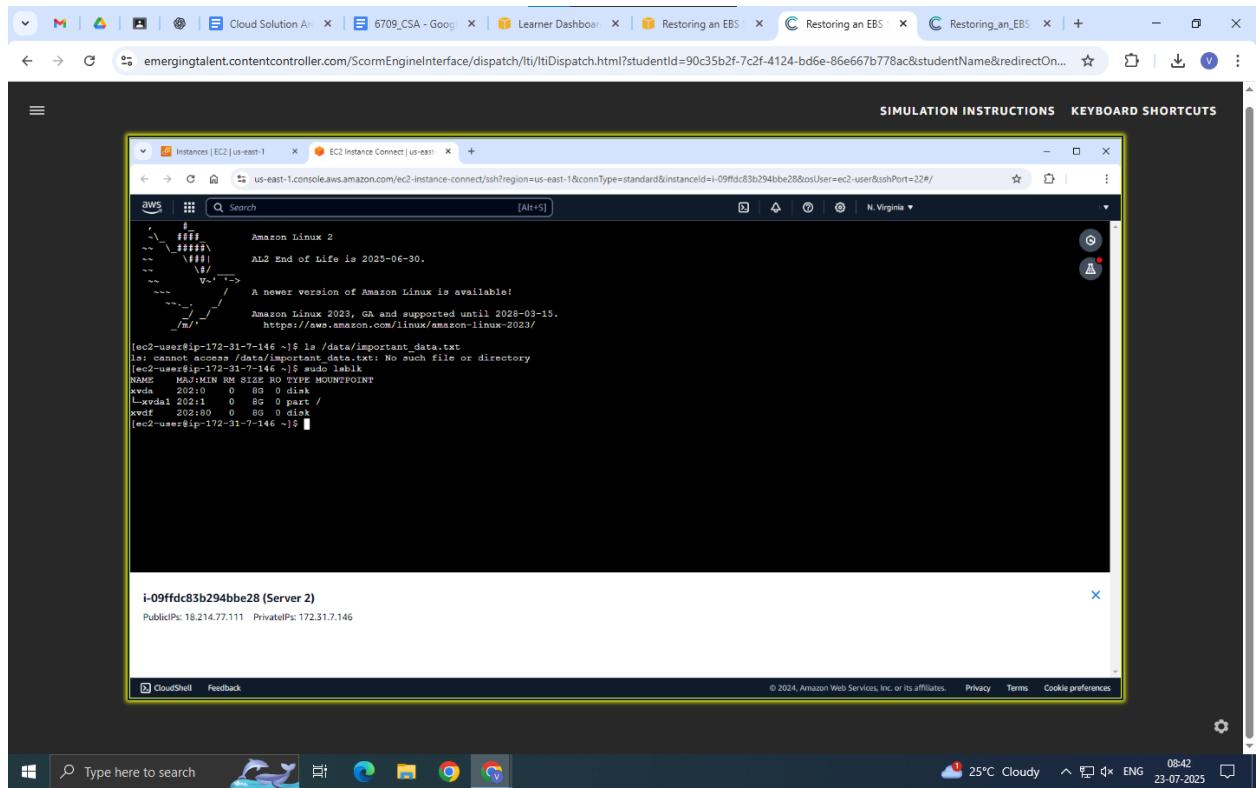
- o Copy the following code (unless you prefer to type it later).

```
sudo lsblk
```



- o On the **EC2 Instance Connect** screen, choose the cursor marker. o In the open field, paste (or type) the code.
 - o To run the command, press **Enter** on your keyboard.
- The output matches the following example:

```
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda 202:0 0 8G 0 disk
└─xvda1 202:1 0 8G 0 part /
xvdf 202:80 0 8G 0 disk
```

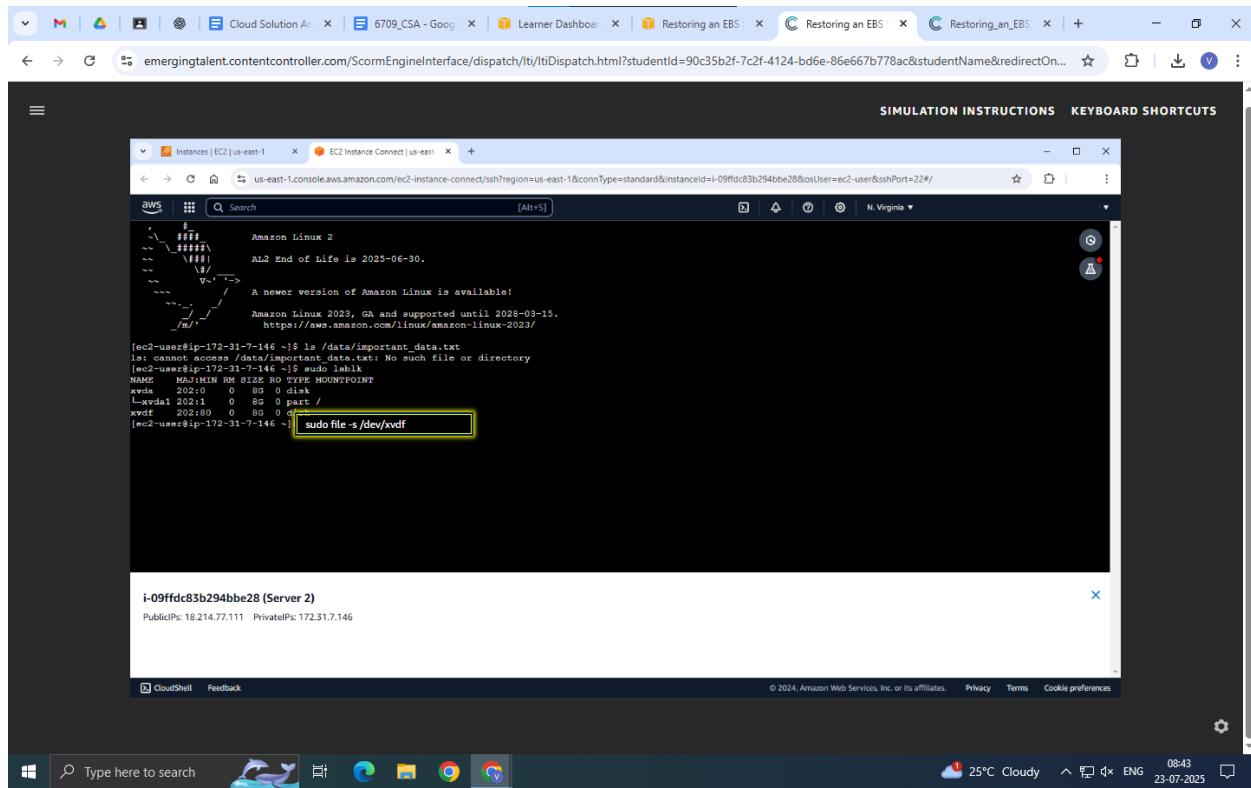


Notice the volume named **/dev/xvdf**. This is how the OS identifies the volume that you attached. Newer operating systems rename the volumes. For example, **/dev/sdf** was renamed **/dev/xvdf**.

38. To make sure that the restored EBS volume has a file system, run the following command. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later).

```
sudo file -s /dev/xvdf
```

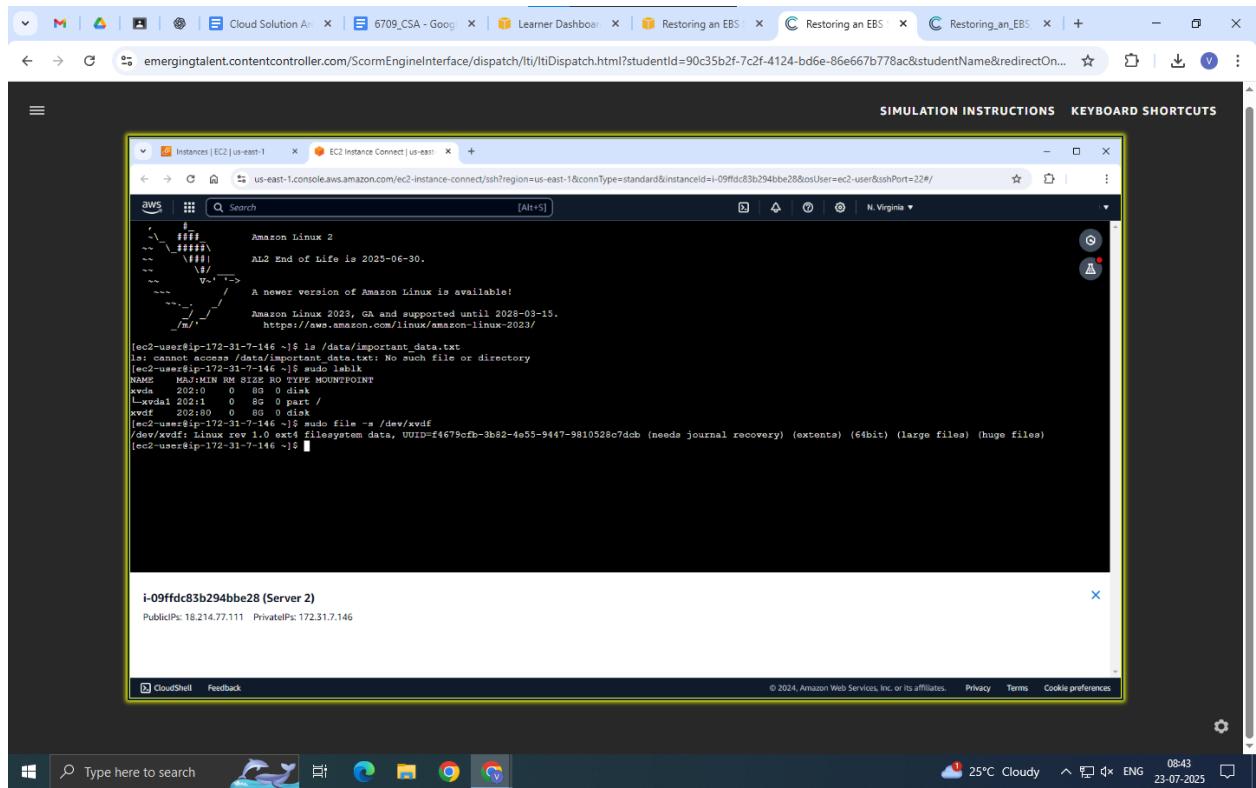


o On the **EC2 Instance Connect** screen, choose the cursor marker. o In the open field, paste (or type) the code.

o To run the command, press **Enter** on your keyboard.

The output is similar to the following example:

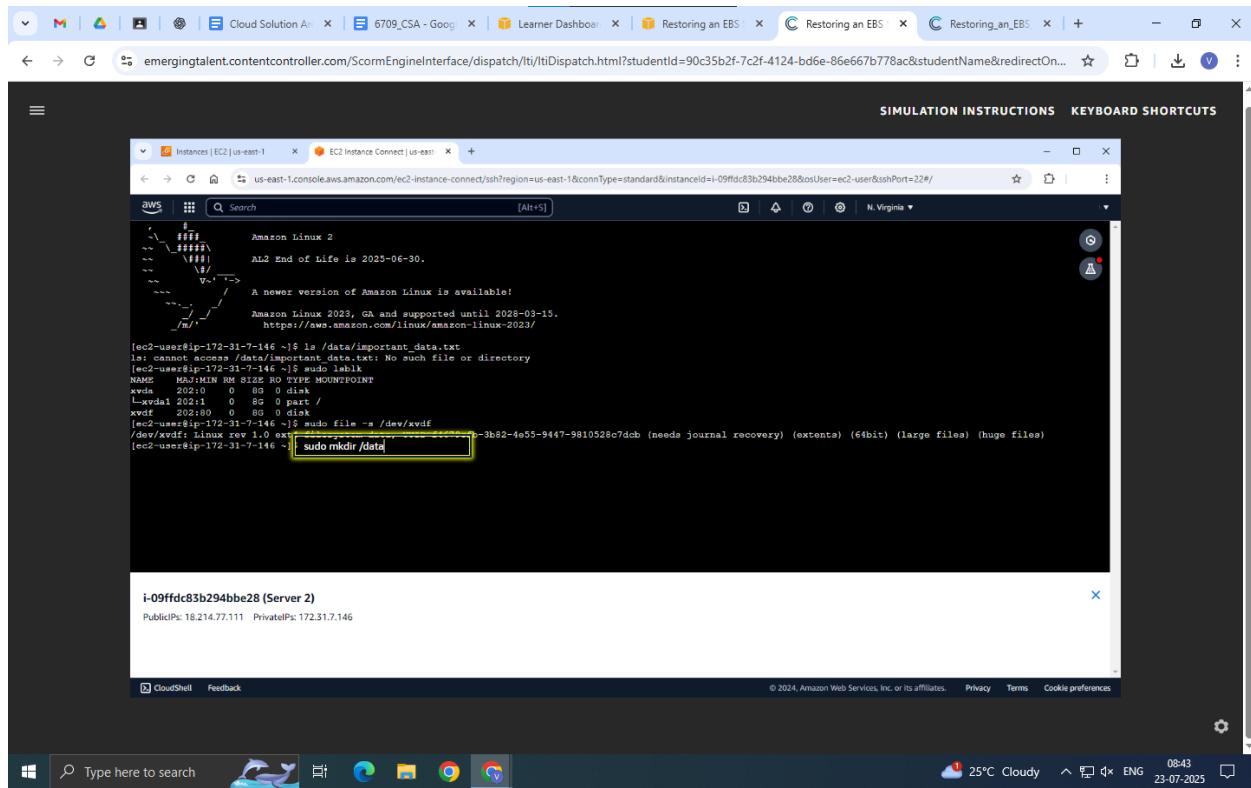
```
/dev/xvdf: Linux rev 1.0 ext4 filesystem data, UUID=dcef1cb6-6d55-477b-8179-fe8d7bbad258  
(needs journal recovery) (extents) (64bit) (large files) (huge files)
```



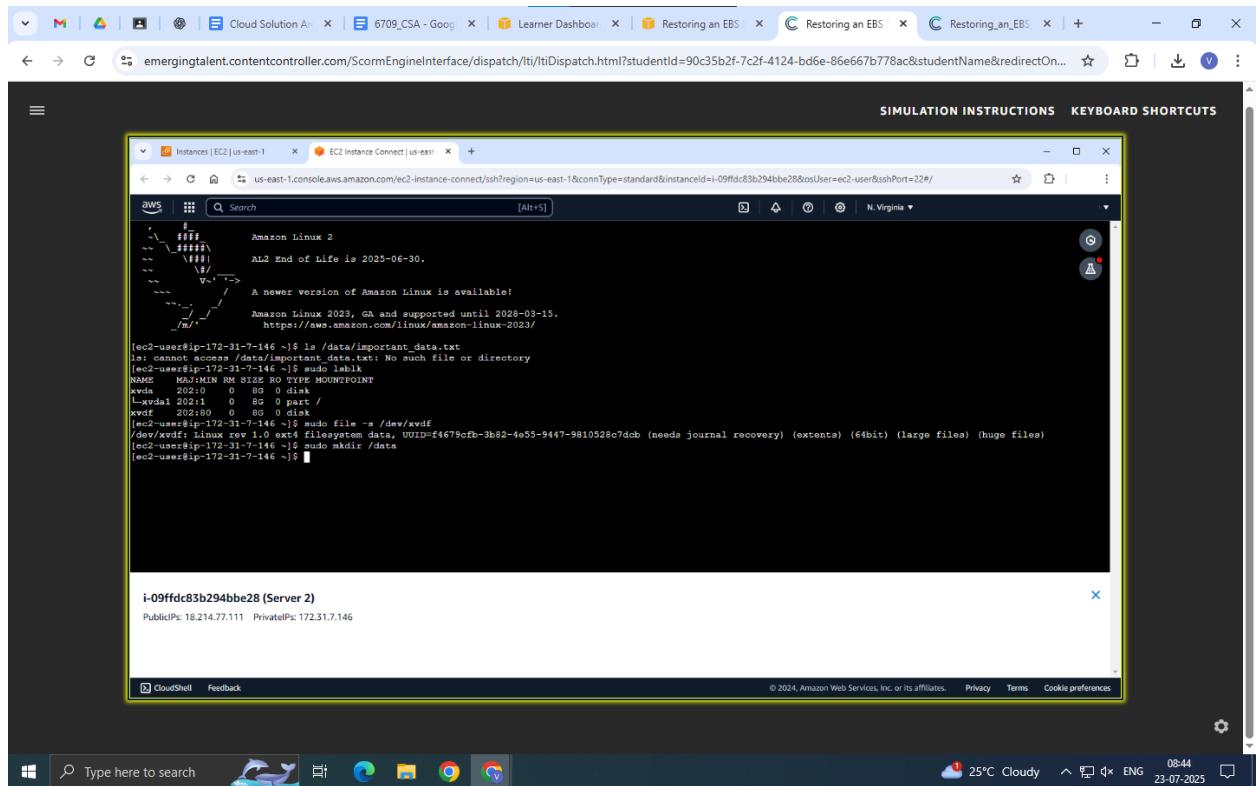
Note: Because this volume was created from a snapshot, it is already formatted and contains a file system. In the future, if you need to mount a new device that isn't formatted, you need to format it to create a file system. On Linux operating systems, you can use the **mkfs** command to format a drive.

39. To create a new directory, run the following command. To do this follow these specific steps:
- o Copy the following code (unless you prefer to type it later):

```
sudo mkdir /data
```



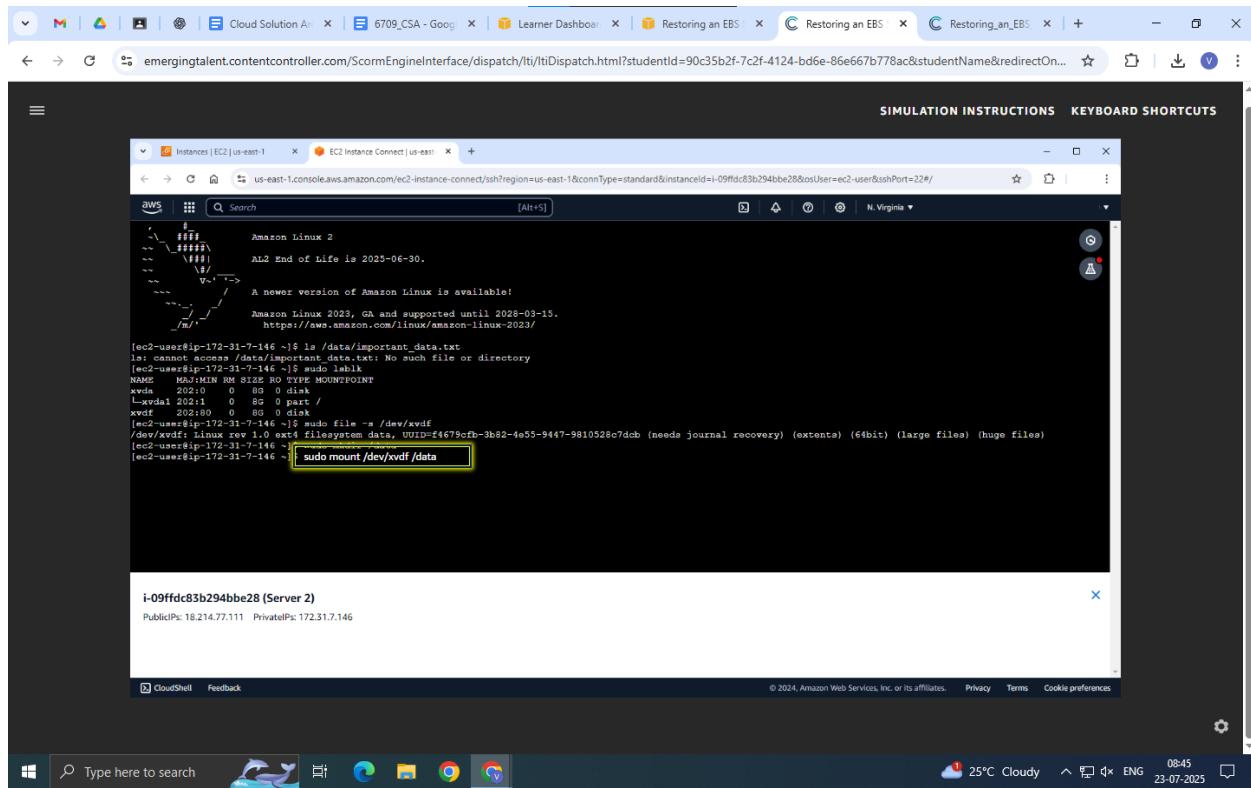
- o On the EC2 Instance Connect screen, choose the cursor marker. o In the open field, paste (or type) the code.
o To run the command, press **Enter** on your keyboard.



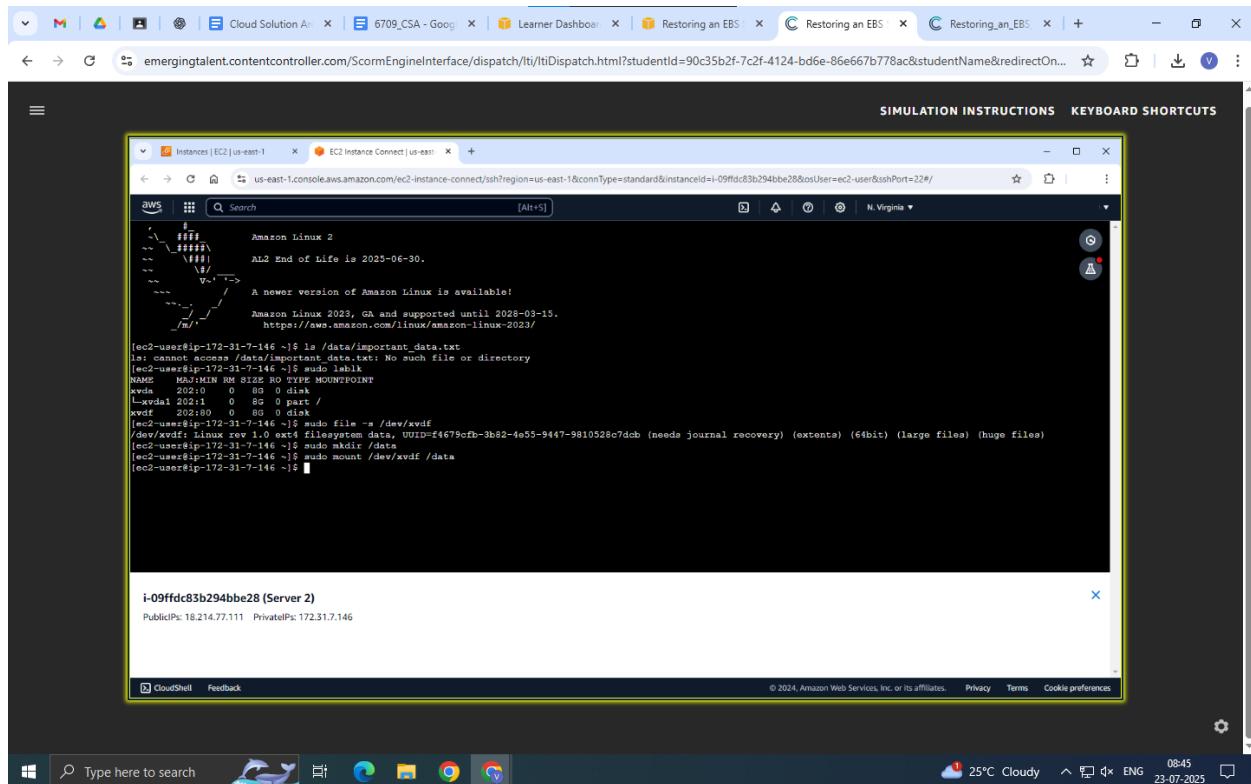
40. To mount the restored EBS volume to the newly created directory, run the following command. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
sudo mount /dev/xvdf /data
```



- o On the **EC2 Instance Connect** screen, choose the cursor marker. o In the open field, paste (or type) the code.
o To run the command, press **Enter** on your keyboard.



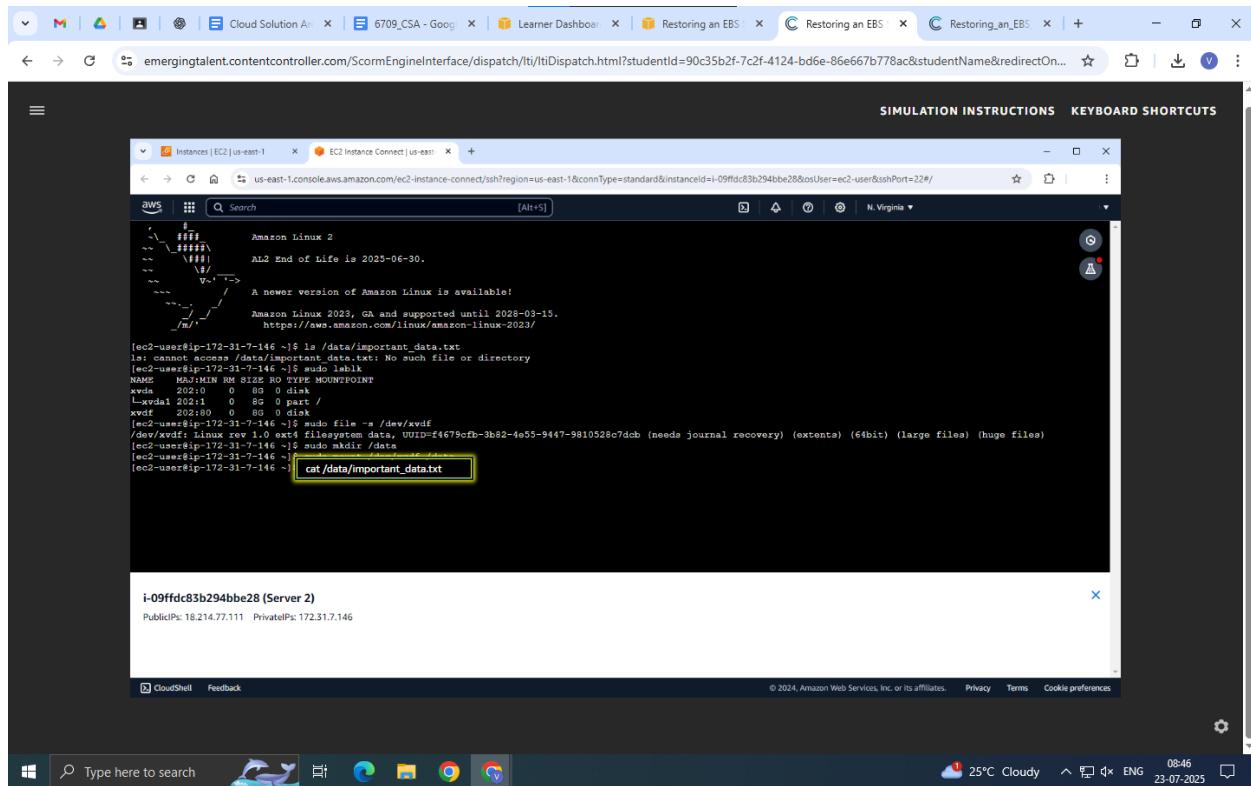
In this simulation, you backed up and restored a user volume. However, sometimes you need to restore a root volume to a different server.

When you need to restore a root volume, you can create an image from the snapshot and then create a whole new EC2 instance using the new image. Or you can mount the root volume to an existing instance.

41. To make sure that the important_data.txt file is now accessible on Server 2, use the following command. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
cat /data/important_data.txt
```

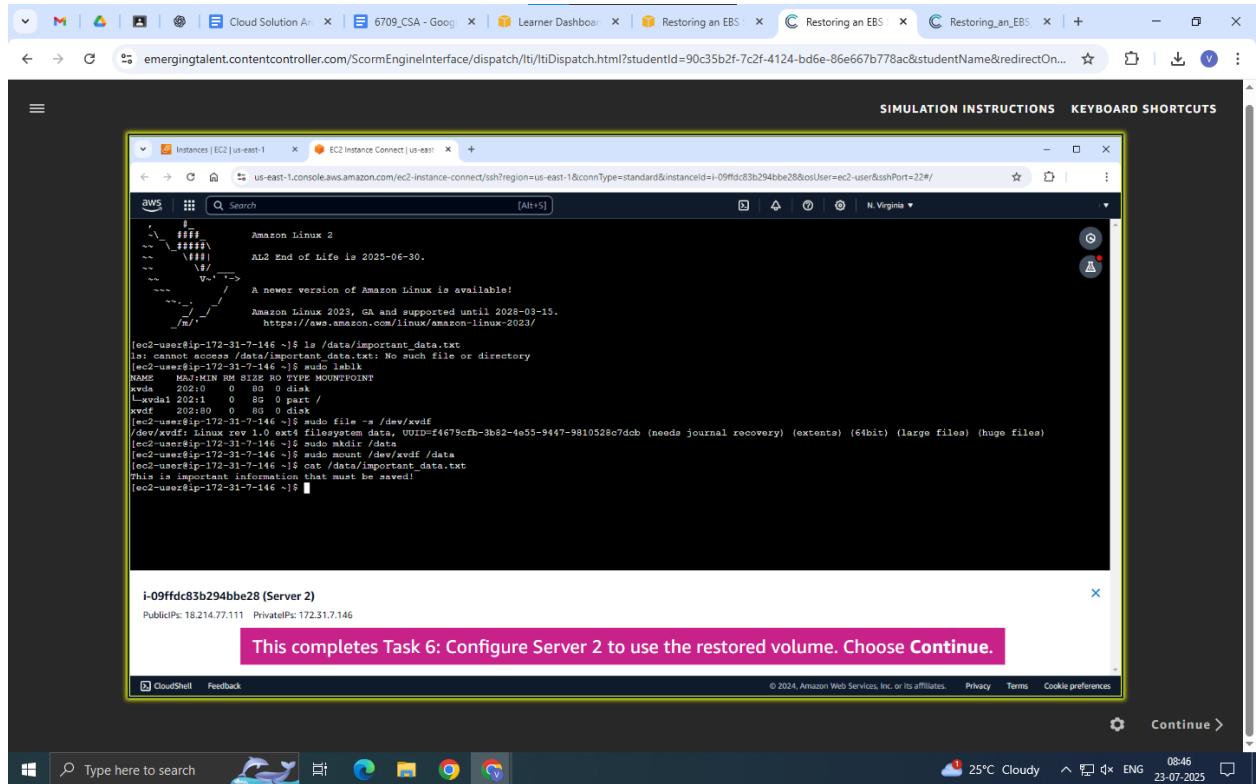


o On the **EC2 Instance Connect** screen, choose the cursor marker. o In the open field, paste (or type) the code.

o To run the command, press **Enter** on your keyboard.

The output shows the following:

This is important information that must be saved!

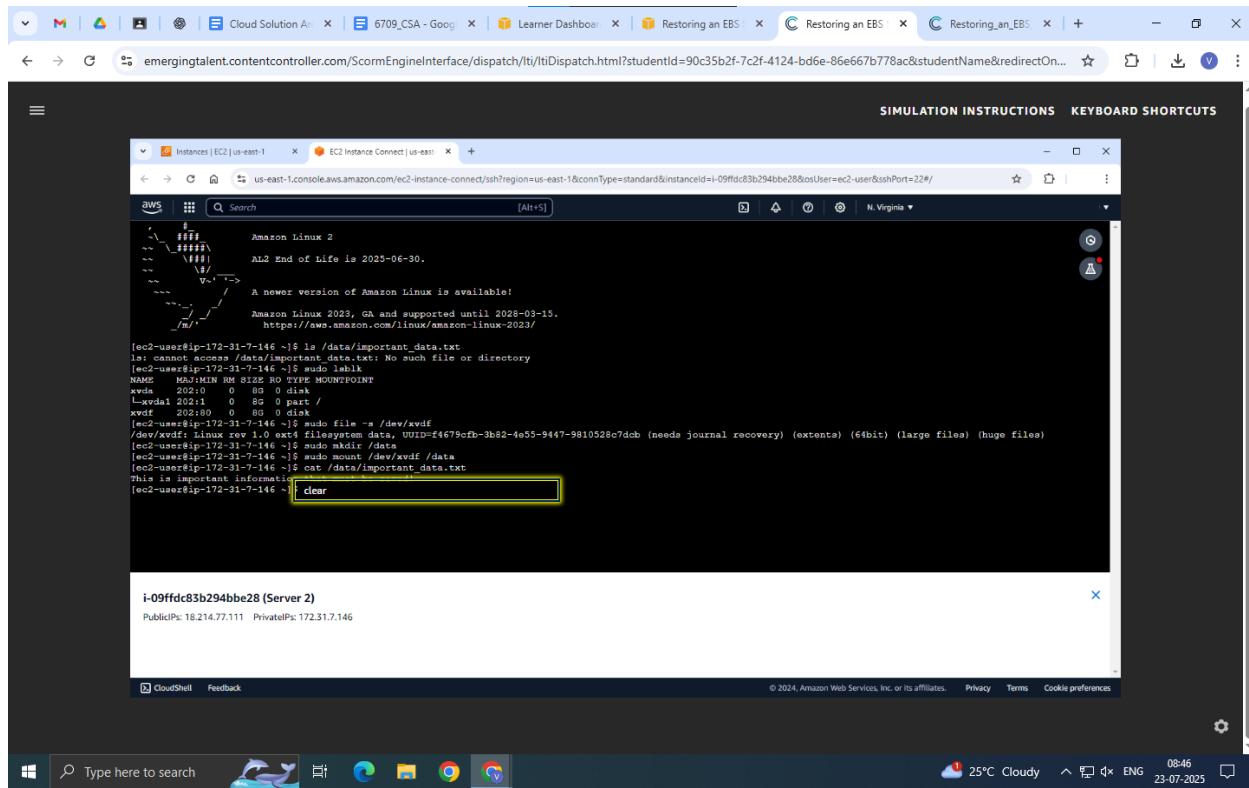


Task 7: Configure the OS to automatically mount the volume at startup

42. First, clear your screen. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
clear
```

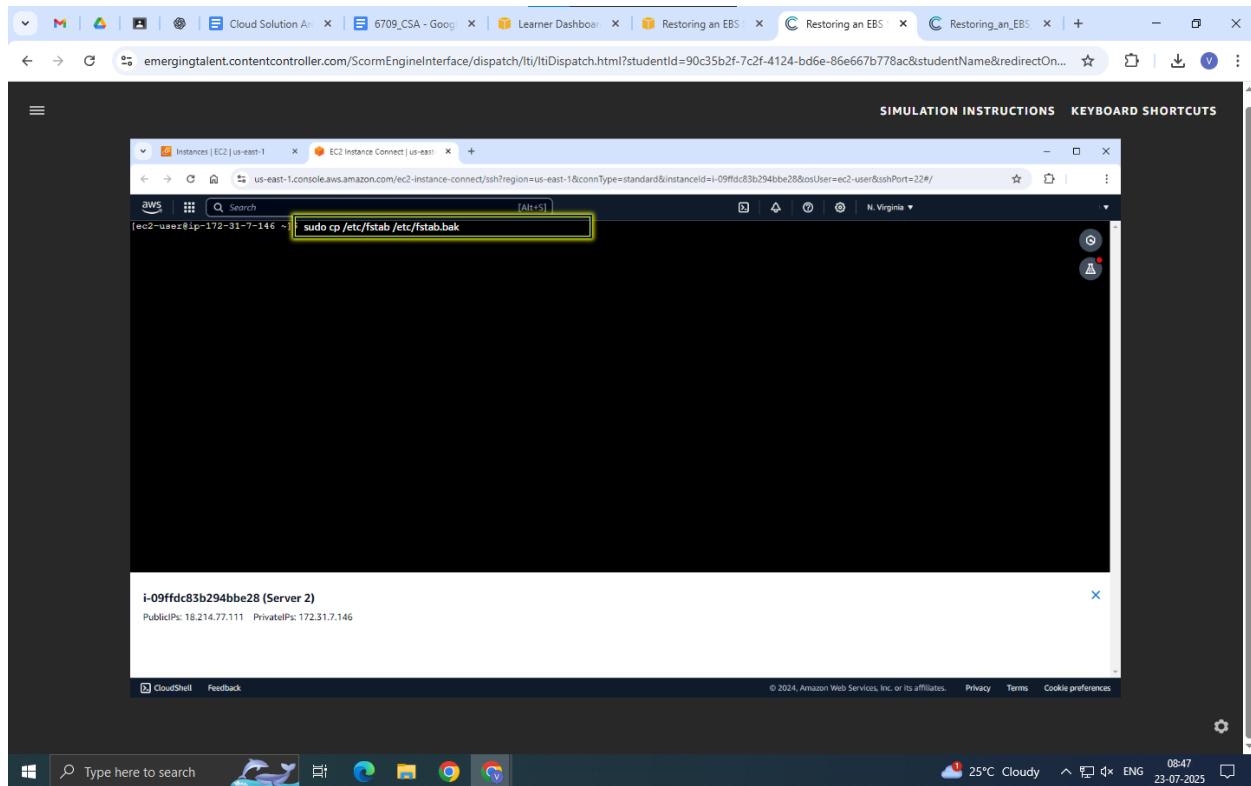


- o On the **EC2 Instance Connect** screen, choose the cursor marker. o In the open field, paste (or type) the code.
o To run the command, press **Enter** on your keyboard.

43. Next, to create a backup of the **fstab** file, run the following command. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
sudo cp /etc/fstab /etc/fstab.bak
```

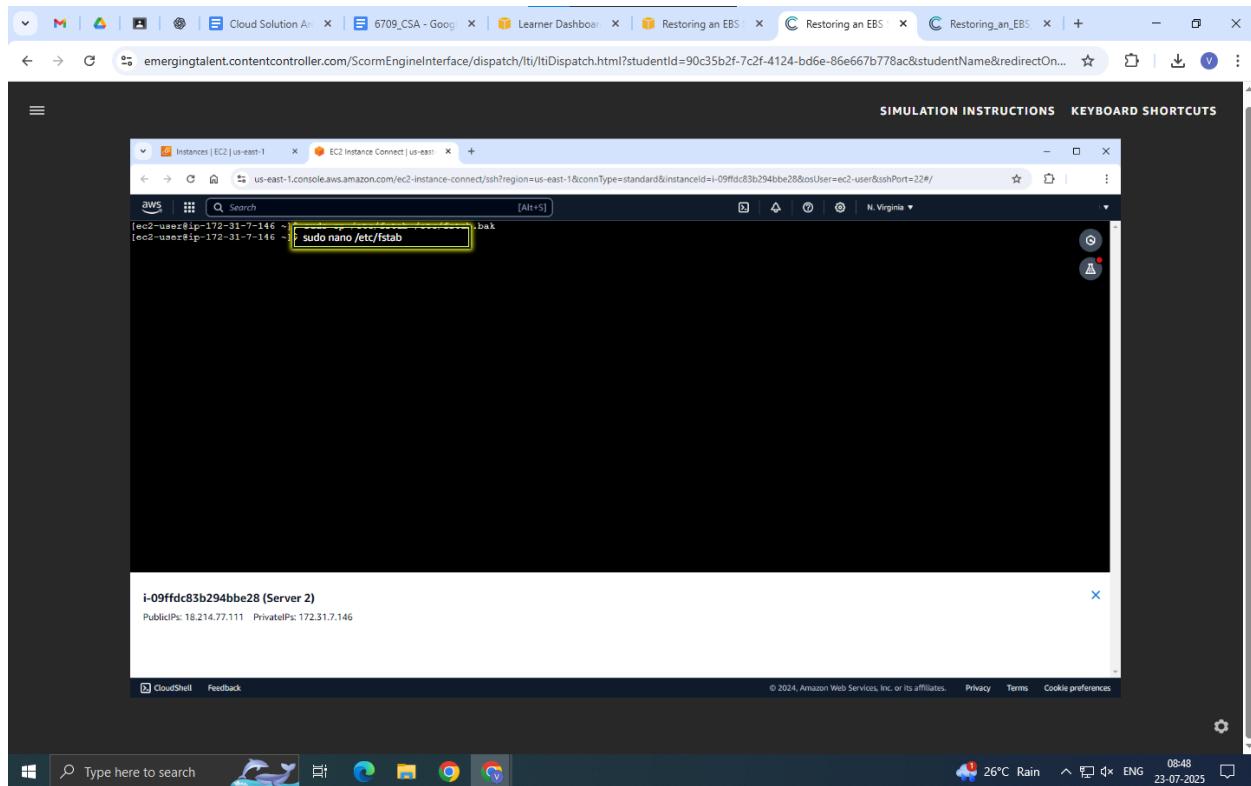


It's very important to back up the **fstab** file before you make changes to it. Most servers use multiple storage volumes. This file tells the server which volumes to mount when it starts and maps the volumes to directories (mountpoints) on the server. If the **fstab** file contains errors, when the server restarts, you might not be able to access the storage and files that your server and applications need to operate. You must be able to restore a previous version of this file, in case you make a mistake while updating it.

44. To open the **fstab** file in the nano text editor, run the following command. To do this follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
sudo nano /etc/fstab
```

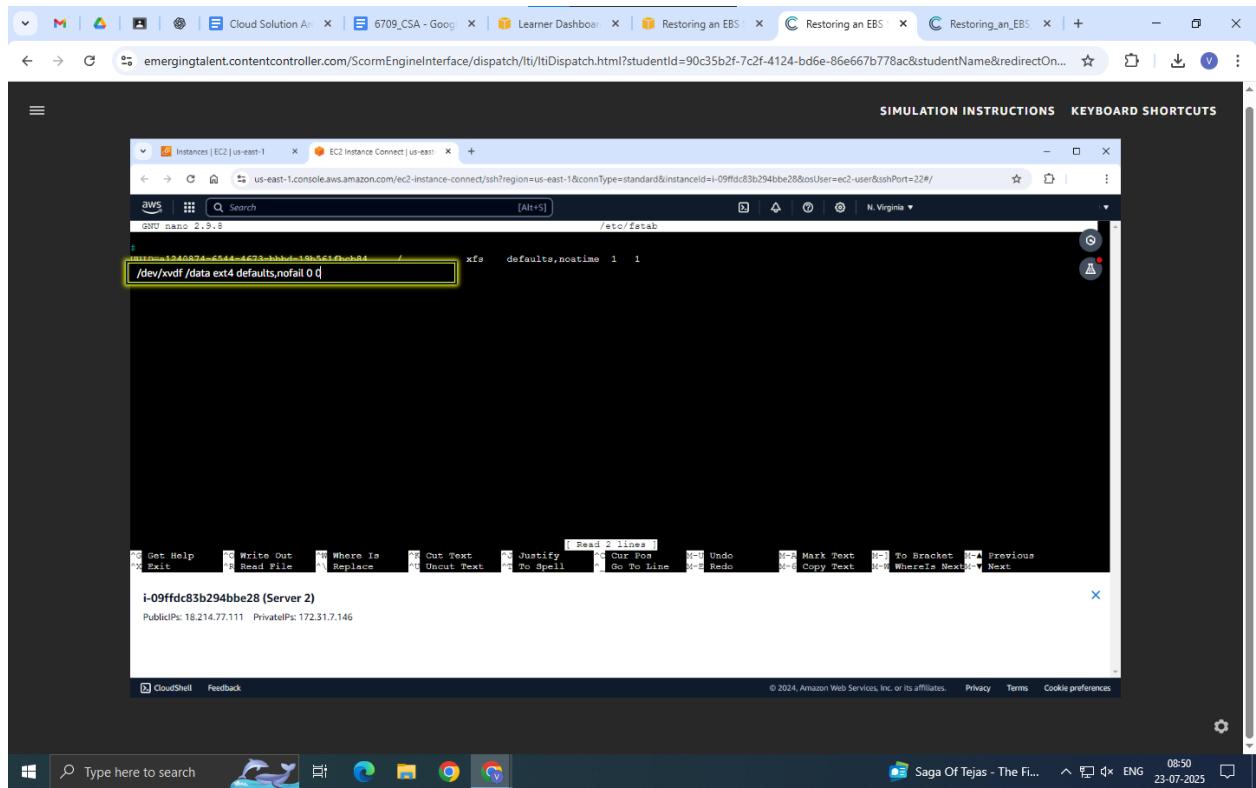


45. To navigate to the end of the existing file, press the **down arrow** on your keyboard twice.

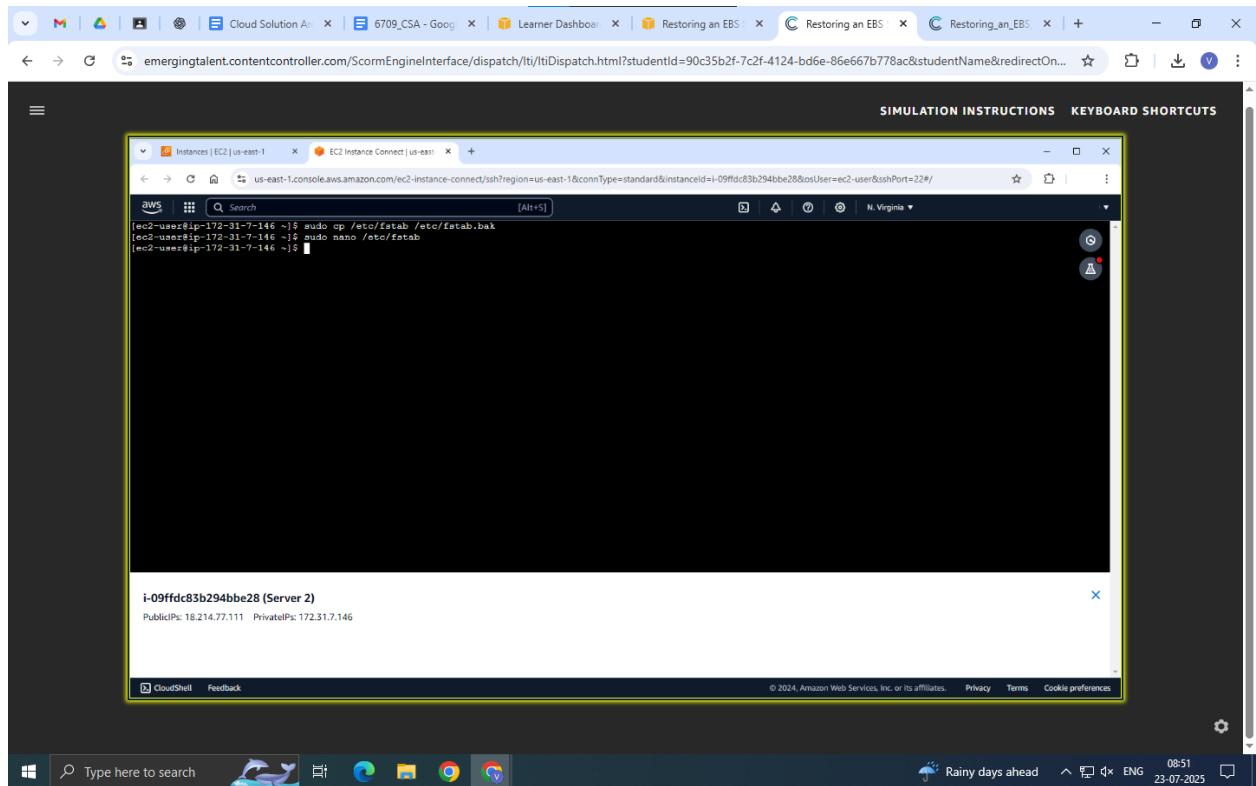
46. Add the following line at the end of the file. To do this, follow these specific steps:

- o Copy the following code (unless you prefer to type it later):

```
/dev/xvdf /data ext4 defaults,nofail 0 0
```



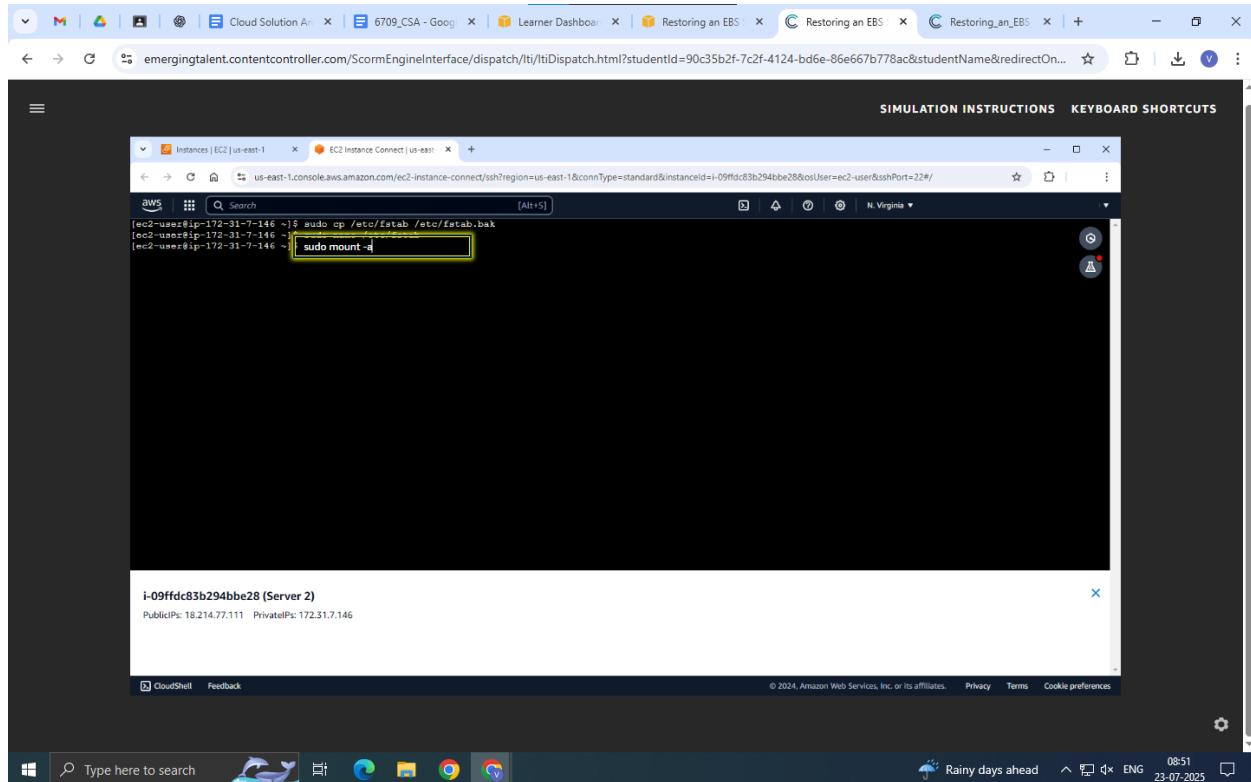
47. To save the changes and exit the nano editor, use the following keyboard patterns. **Note:** Both Windows and Mac users will press the same keys for this simulation.
- o On your keyboard, press **Ctrl + x**.
 - o On your keyboard, press **Shift + y**.
 - o On your keyboard, press **Enter**.



48. Verify that the **fstab** file is error-free by running the following command. To do this, follow these specific steps:

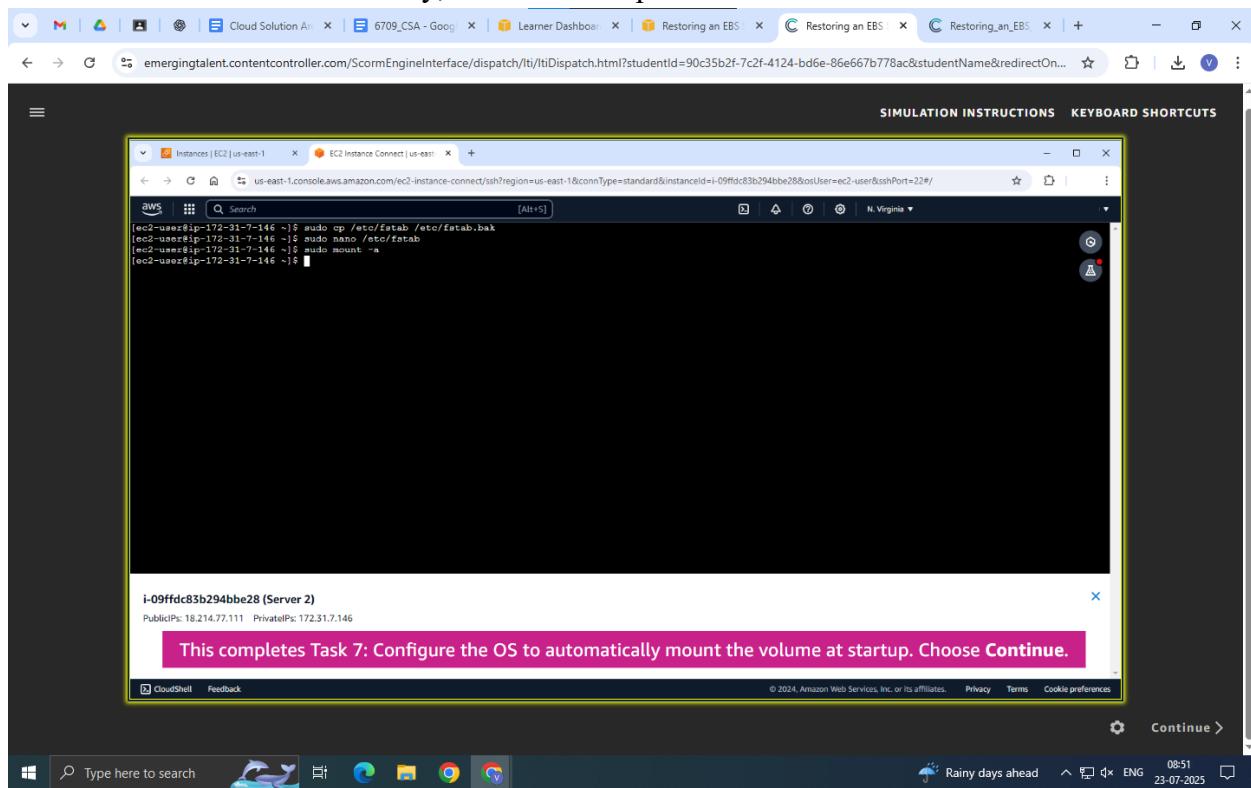
- o Copy the following code (unless you prefer to type it later):

```
sudo mount -a
```



A screenshot of an AWS CloudShell terminal window. The terminal shows a command-line session on an EC2 instance. The user has run the command `sudo cp /etc/fstab /etc/fstab.bak` and then `sudo nano /etc/fstab`. Now, they are running `sudo mount -a`. The terminal interface includes tabs for 'Instances | EC2 | us-east-1' and 'EC2 Instance Connect | us-east-1'. At the bottom, it displays the instance ID 'i-09ffdc83b294bbe28 (Server 2)' and its public and private IP addresses.

If the command runs successfully, there is no output.



A screenshot of an AWS CloudShell terminal window, identical to the one above but with a yellow border around the terminal area. The terminal shows the command `sudo mount -a` has been successfully executed. A message box at the bottom of the terminal window states: "This completes Task 7: Configure the OS to automatically mount the volume at startup. Choose Continue." The terminal interface includes tabs for 'Instances | EC2 | us-east-1' and 'EC2 Instance Connect | us-east-1'. At the bottom, it displays the instance ID 'i-09ffdc83b294bbe28 (Server 2)' and its public and private IP addresses.

Practical 6: Getting Started with Amazon Amazon RDS

Jul 30, 2025

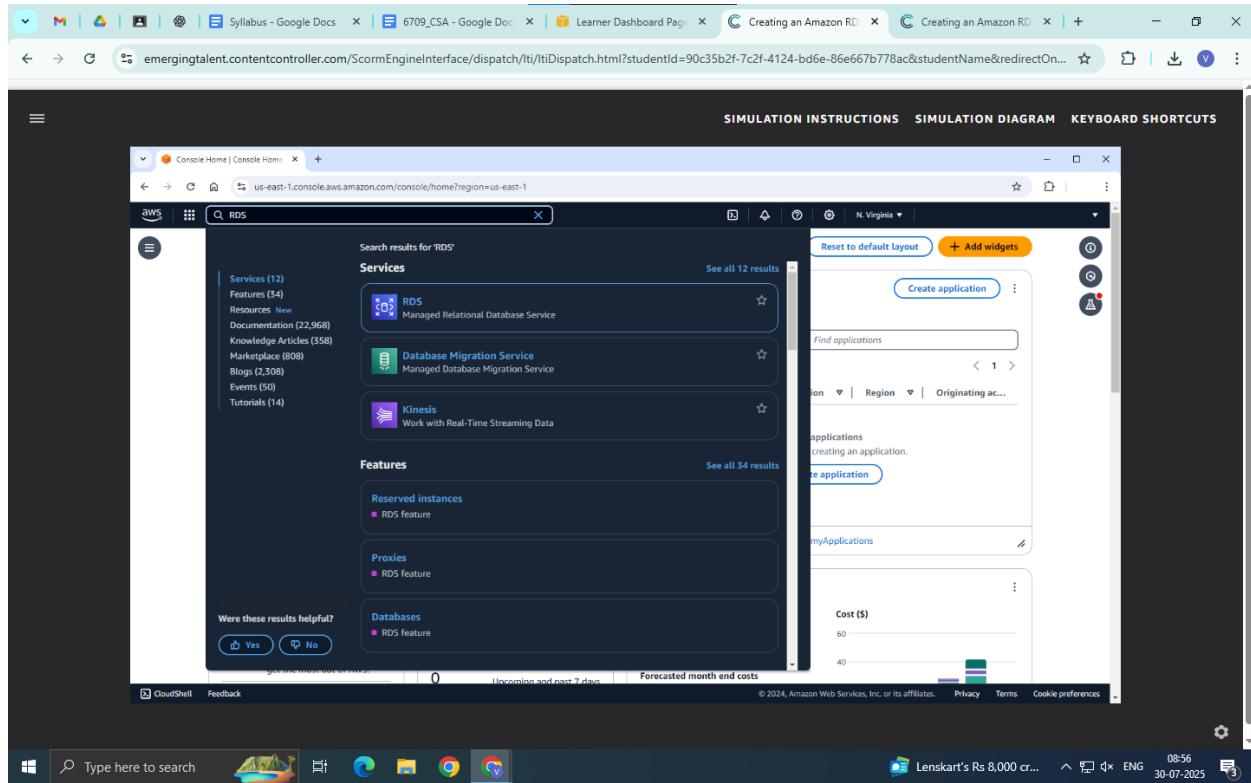
- A. Launch a MySQL database using Amazon RDS.
- B. Configure a web application to connect to the Amazon Relational Database Service (Amazon RDS) for MySQL database instance
- C. Perform operations (stop, start, and reboot) on the database instance.
- D. Perform basic database monitoring.

The screenshot shows a browser window with the AWS Educate homepage. The search bar at the top contains the query "Getting Started with Databases". Below the search bar, the main content area displays a single result titled "Getting Started with Databases". This result card includes a thumbnail icon of a cloud with a double-headed arrow, the title "Getting Started with Databases", a subtitle "Foundational | 2 hour(s)", and a category tag "Cloud Computing". To the left of the result card, there is a "Filters" sidebar with options like Course Features, Skills, Level, Duration, and Language. On the right side of the page, there is a sidebar titled "Explore" containing various promotional links and calls to action, such as "Fast-track your future. Learn to be an AWS Cloud developer in as little as one year with AWS Cloud Institute.", "Interested in building your AI skills to work towards the new AWS Certified AI Practitioner certification?", and "Interested in learning about GenAI or cloud basics from an instructor? AWS offers free, live Instructor-led training". The bottom of the screen shows the Windows taskbar with the Start button, a search bar, and icons for various applications like File Explorer, Edge, and Google Chrome.

Task 1: Create an Amazon RDS database

1. At the top of the **AWS Management Console**, enter **RDS** in the search bar. **Note:** To record your entry, press Enter on your keyboard or choose any place outside the entry field.

2. In the search results, choose **RDS**.

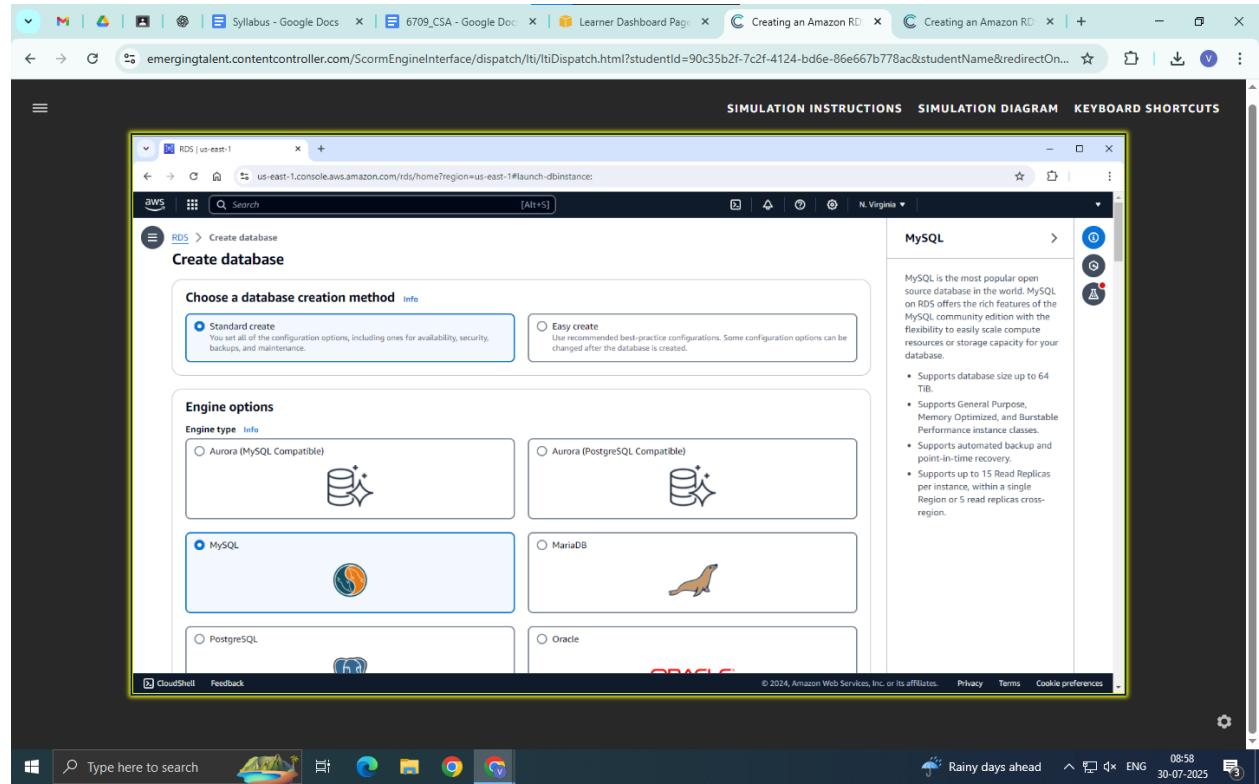


3. Choose **Create Database**.

For this simulation, for **Choose a database creation method**, keep the default, **Standard create**, to display the full set of features available.

Engine options

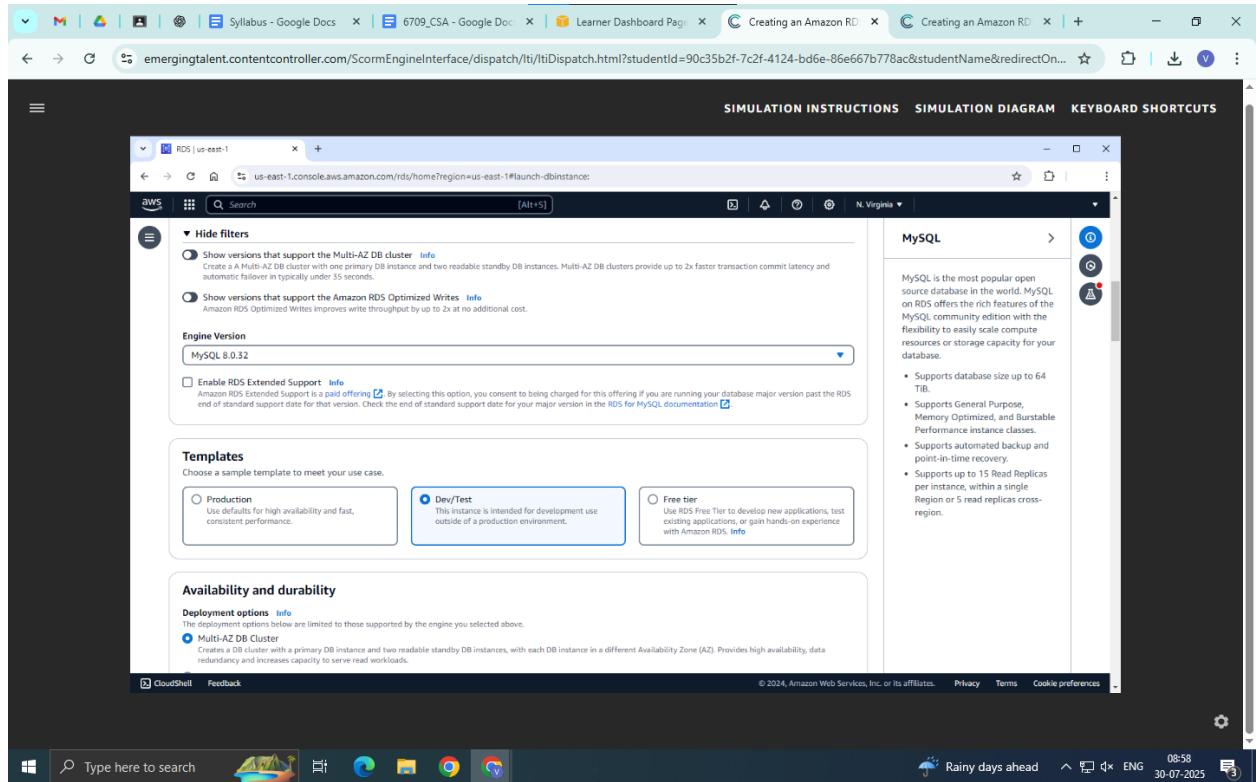
4. Under **Engine options**, for **Engine type**, choose **MySQL**.



5. To scroll down, choose the scroll bar.

6. Choose the **Engine Version** menu, and then select **MySQL 8.0.32**.

7. In the **Templates** section, choose **Dev/Test**.



8. To scroll down, choose the scroll bar.

9. In the **Availability and durability** section, choose **Single DB instance**.

10. To scroll down, choose the scroll bar.

The screenshot shows the AWS RDS MySQL creation wizard. In the 'Templates' section, three options are listed:

- Production**: Use defaults for high availability and fast, consistent performance.
- Dev/Test**: This instance is intended for development use outside of a production environment.
- Free tier**: Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. Info

In the 'Availability and durability' section, deployment options are shown:

- Multi-AZ DB Cluster**: Creates a DB cluster with a primary DB instance and two read-only standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy, and read-throughput capacity to serve read workloads.
- Multi-AZ DB instance**: Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.
- Single DB instance**: Creates a single DB instance with no standby DB instances.

The 'Settings' section includes a 'DB instance identifier' field where 'db-instance-identifier' is typed. A note states: 'The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.'

A sidebar on the right provides information about MySQL, including its popularity and features:

- MySQL is the most popular open source database in the world.
- On RDS, MySQL offers the rich features of the MySQL community edition with the flexibility to easily scale compute resources or storage capacity for your database.
- Supports database size up to 64 TiB.
- Supports General Purpose, Memory Optimized, and Burstable Performance instance classes.
- Supports automated backup and point-in-time recovery.
- Supports up to 15 Read Replicas per instance, within a single Region or 5 read replicas cross-region.

Settings

11. In the **Settings** section, for **DB instance identifier**, enter **inventory-db**.

The screenshot shows the 'Settings' section of the AWS RDS MySQL creation wizard. The 'DB instance identifier' field contains 'inventory-db'. A note below it says: 'The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.'

The 'Credentials Settings' section includes:

- Master username**: 'admin' (info)
- Credentials management**: 'Managed in AWS Secrets Manager - most secure' (info)
- Select the encryption key**: 'aws/secretsmanager (default)' (info)

A sidebar on the right provides information about MySQL, including its popularity and features:

- MySQL is the most popular open source database in the world.
- On RDS, MySQL offers the rich features of the MySQL community edition with the flexibility to easily scale compute resources or storage capacity for your database.
- Supports database size up to 64 TiB.
- Supports General Purpose, Memory Optimized, and Burstable Performance instance classes.
- Supports automated backup and point-in-time recovery.
- Supports up to 15 Read Replicas per instance, within a single Region or 5 read replicas cross-region.

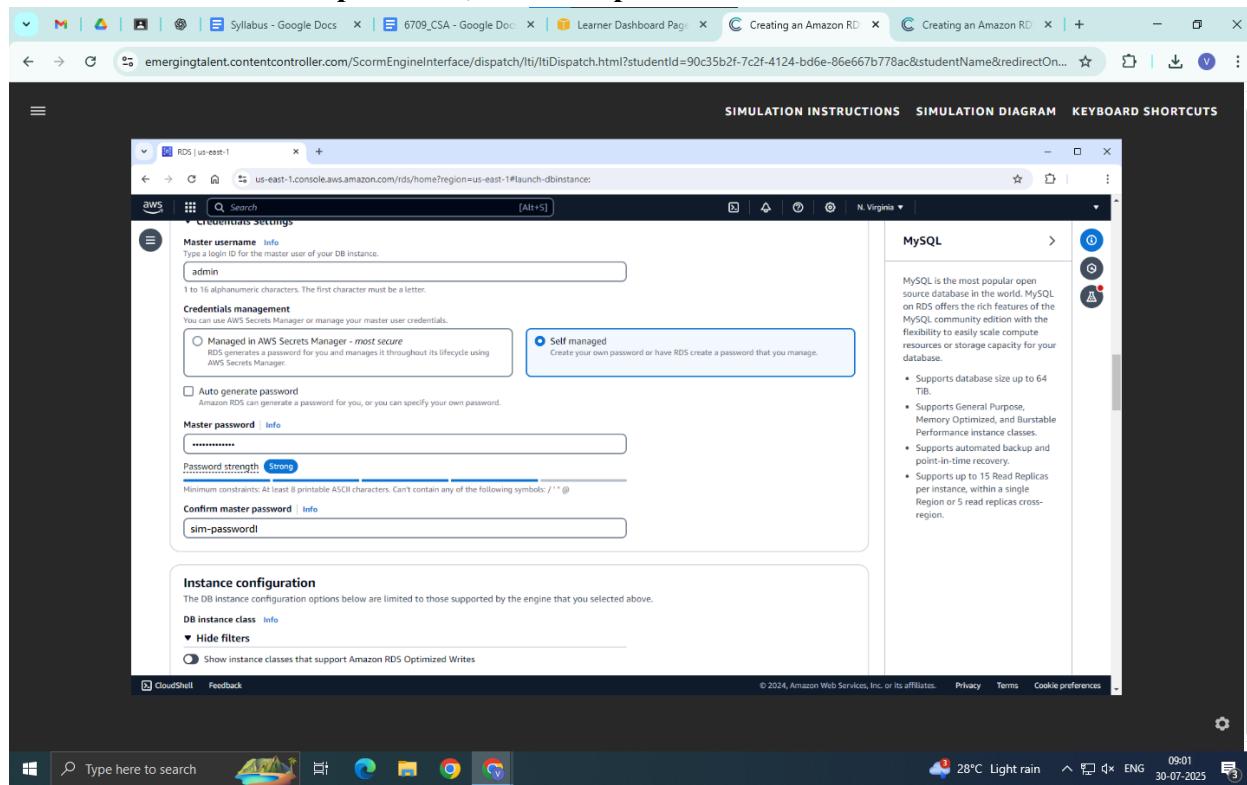
12. Under **Credentials Settings**, for **Master username**, keep the default value, **admin**.

13. Under **Credentials management**, choose **Self managed**.

14. To scroll down to the password fields, choose the scroll bar.

15. For **Master password**, enter **sim-password!** in lowercase letters.

16. For **Confirm master password**, enter **sim-password!** in lowercase letters.

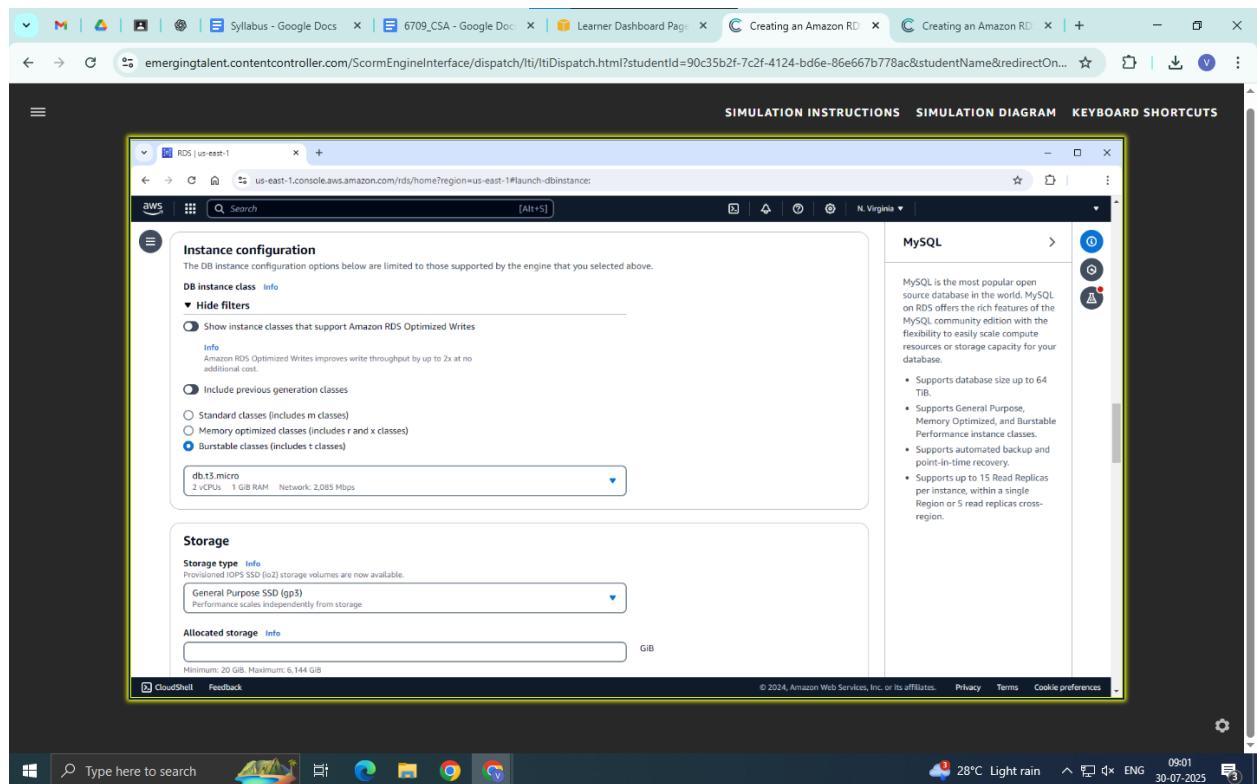


17. To scroll down, choose the scroll bar.

Instance configuration

18. In the **Instance configuration** section, choose **Burstable classes (includes t classes)**.

19. The instance type automatically changes to **db.t3.micro**. Keep this value.



20. To scroll down, choose the scroll bar.

Storage

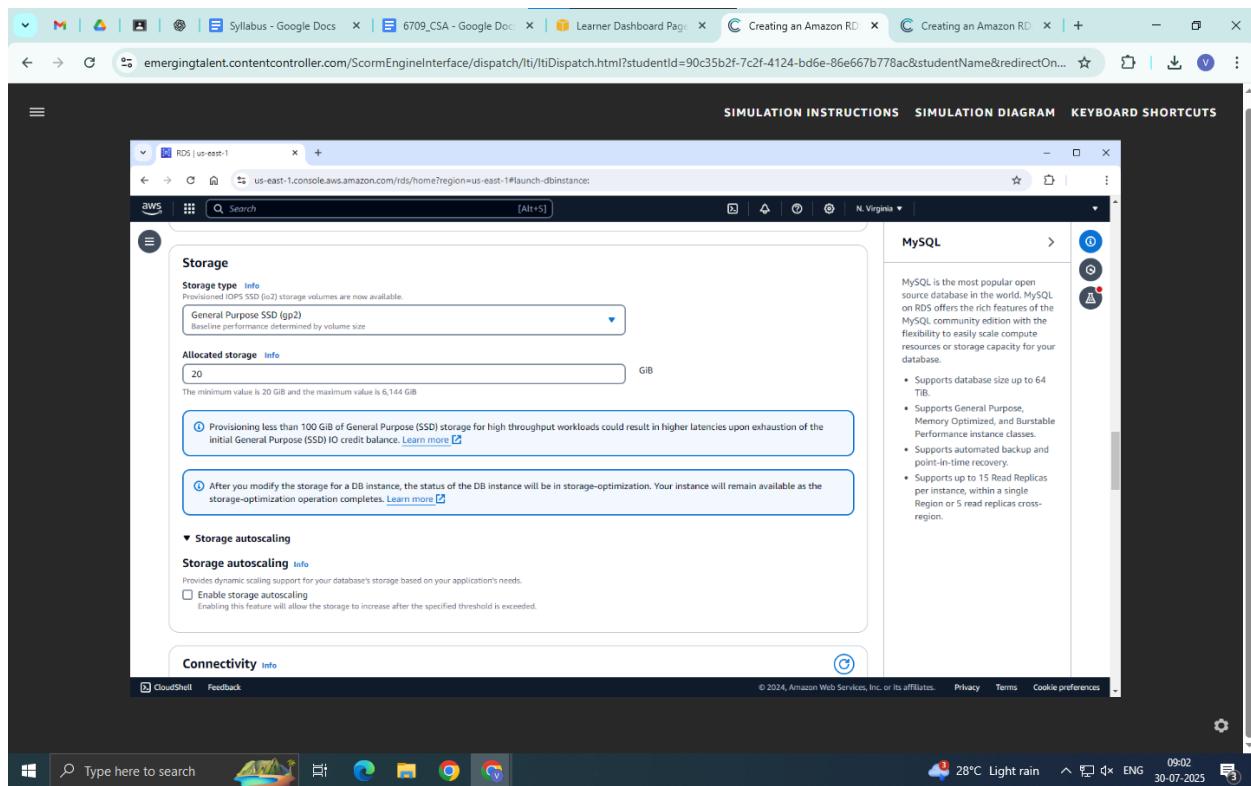
21. In the **Storage** section, choose the **Storage type** menu

22. Select **General Purpose SSD (gp2)**.

23. For **Allocated storage**, enter **20**.

24. Choose **Storage autoscaling** to expand the section.

25. Clear the **Enable storage autoscaling** checkbox.



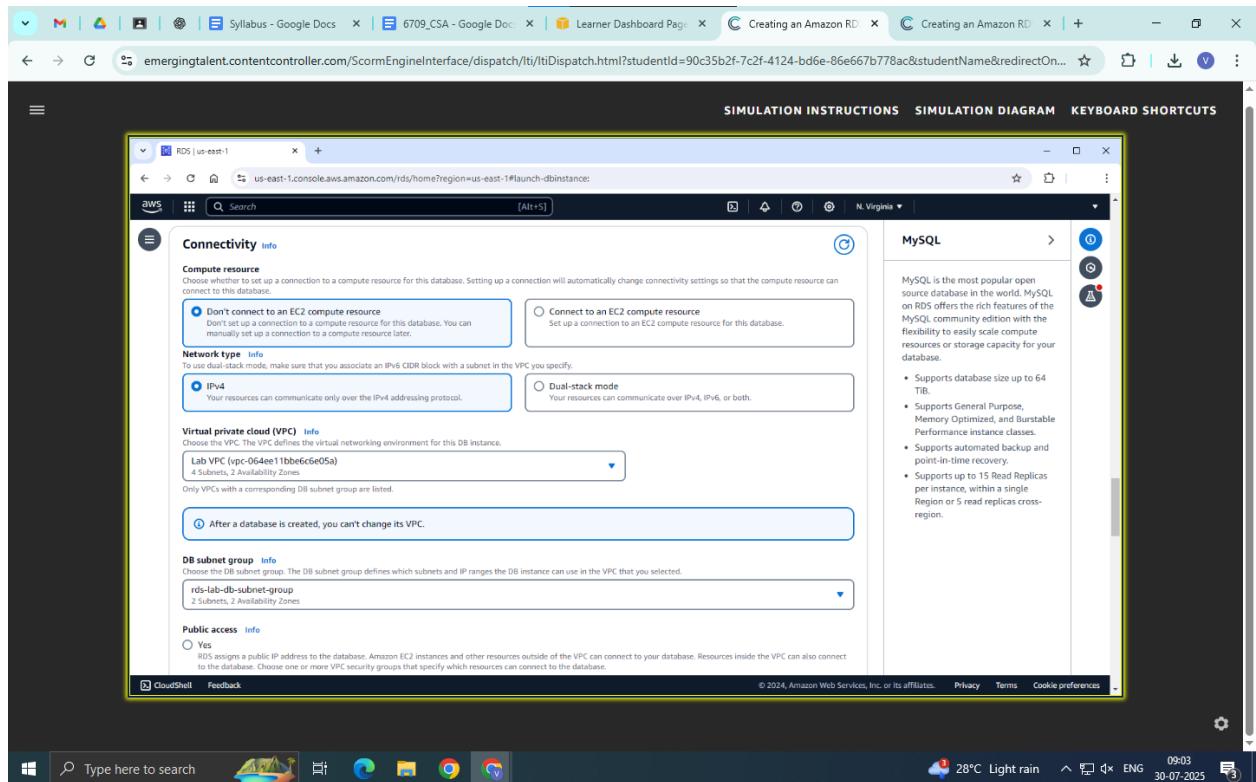
26. To scroll down, choose the scroll bar.

Connectivity

27. In the **Connectivity** section, for **Compute resource**, keep default value, **Don't connect to an EC2 compute resource**. You will establish this manually at a later stage. Also, for **Network type**, keep the default value, **IPv4**.

28. Choose the **Virtual private cloud (VPC)** menu, and then select the option that starts with **Lab VPC**.

29. For the **DB subnet group**, keep the default value, **rds-lab-db-subnet-group**. 30. To scroll down, choose the scroll bar.



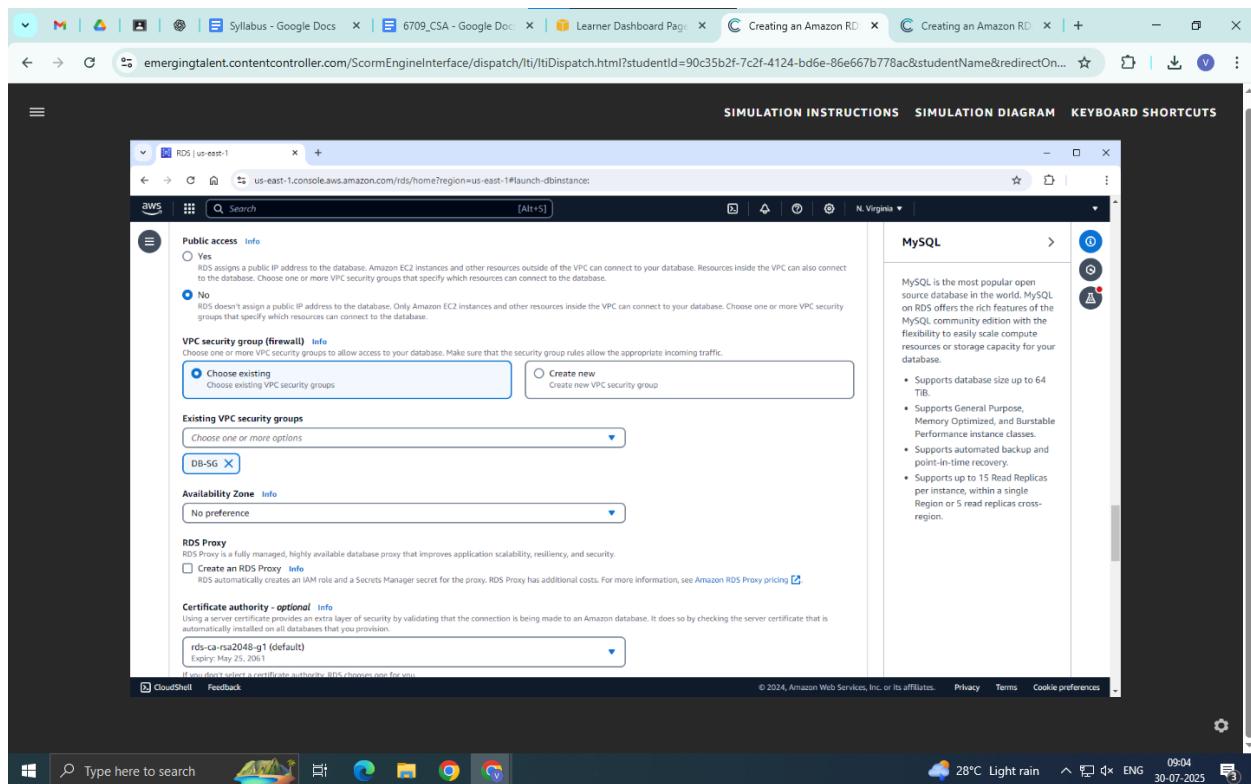
31. For **Public access**, keep the default value, **No**.

32. For **VPC security group (firewall)**, keep the default value, **Choose existing**.

33. For **Existing VPC security groups**, choose the **X** next to **default** to remove this security group.

34. Choose the **Existing VPC security groups** menu, and then select **DB-SG**. Choose any place outside the menu to close it.

35. For **Availability Zone**, keep the default value, **No preference**.



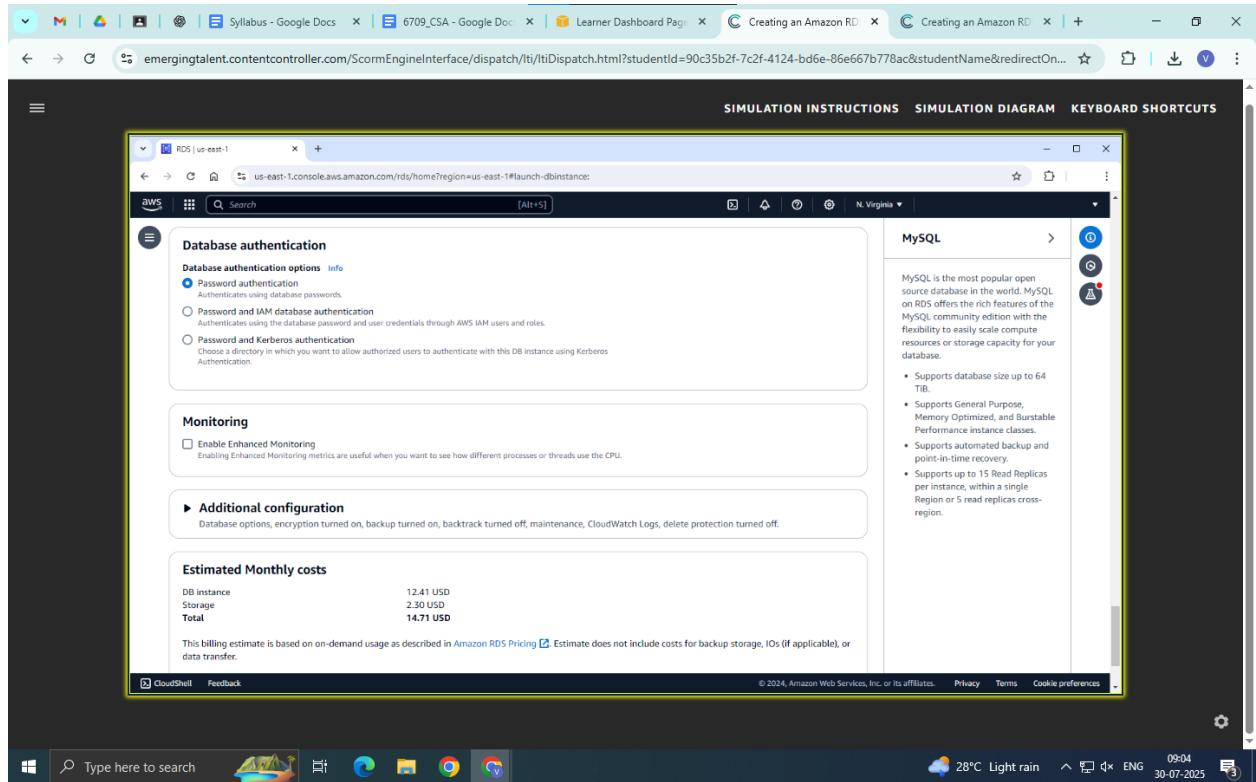
36. To scroll down, choose the scroll bar.

Database authentication

37. For **Database authentication**, keep default value, **Password authentication**.

Monitoring

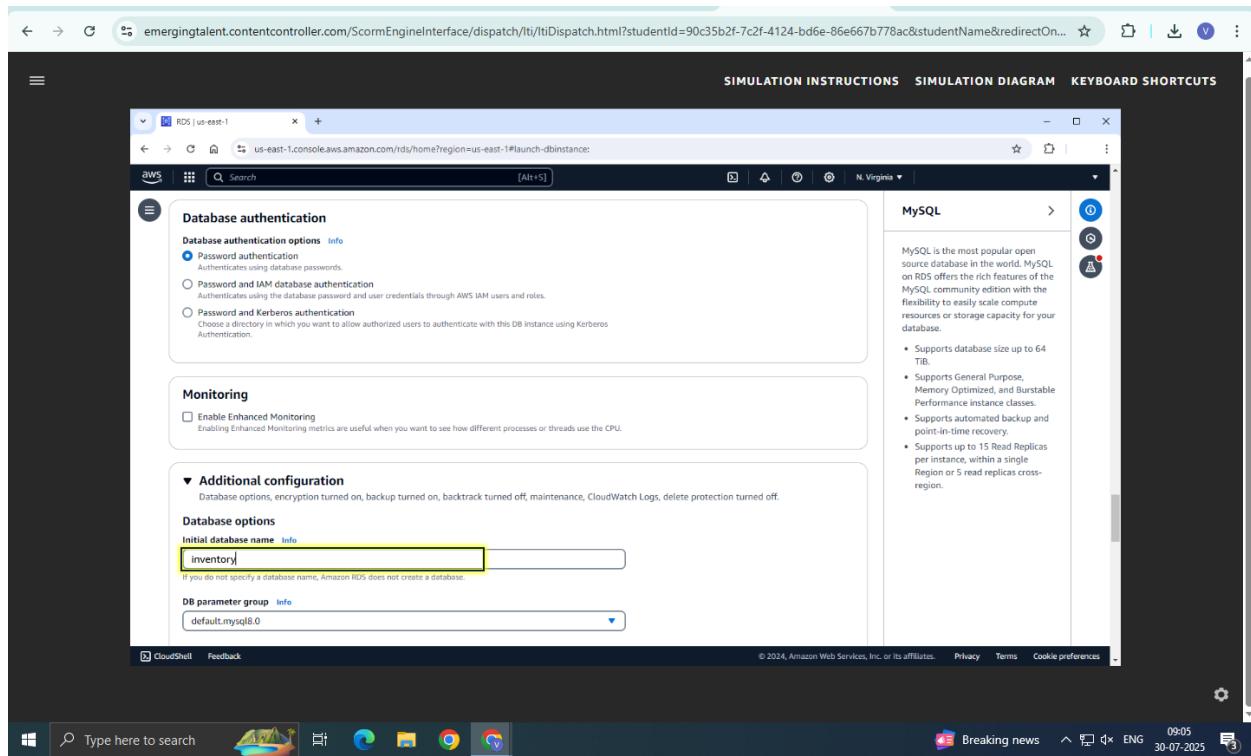
38. In the **Monitoring** section, clear the **Enable Enhanced Monitoring** checkbox.



Additional configuration

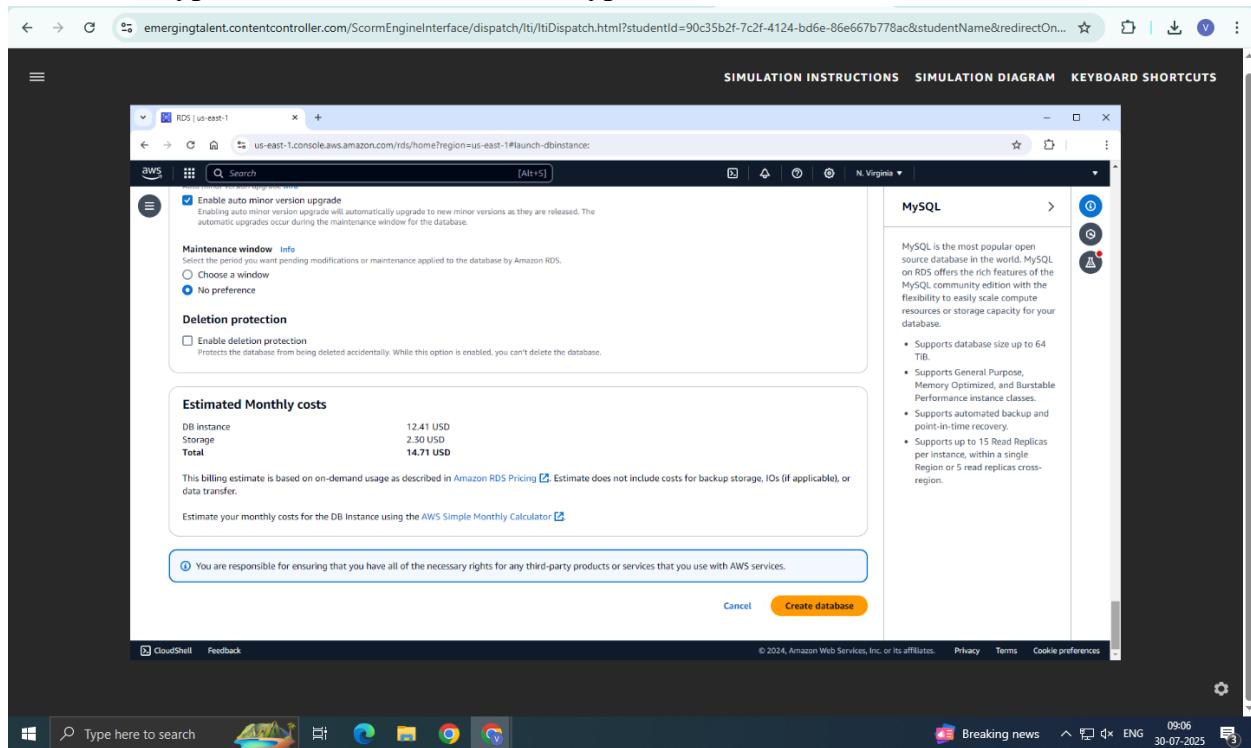
39. Choose **Additional configuration** to expand the section.

40. Under **Database options**, for **Initial database name**, enter **inventory**.



41. To scroll down, choose the scroll bar.

42. For **Encryption**, choose the **Enable encryption** checkbox to clear it.

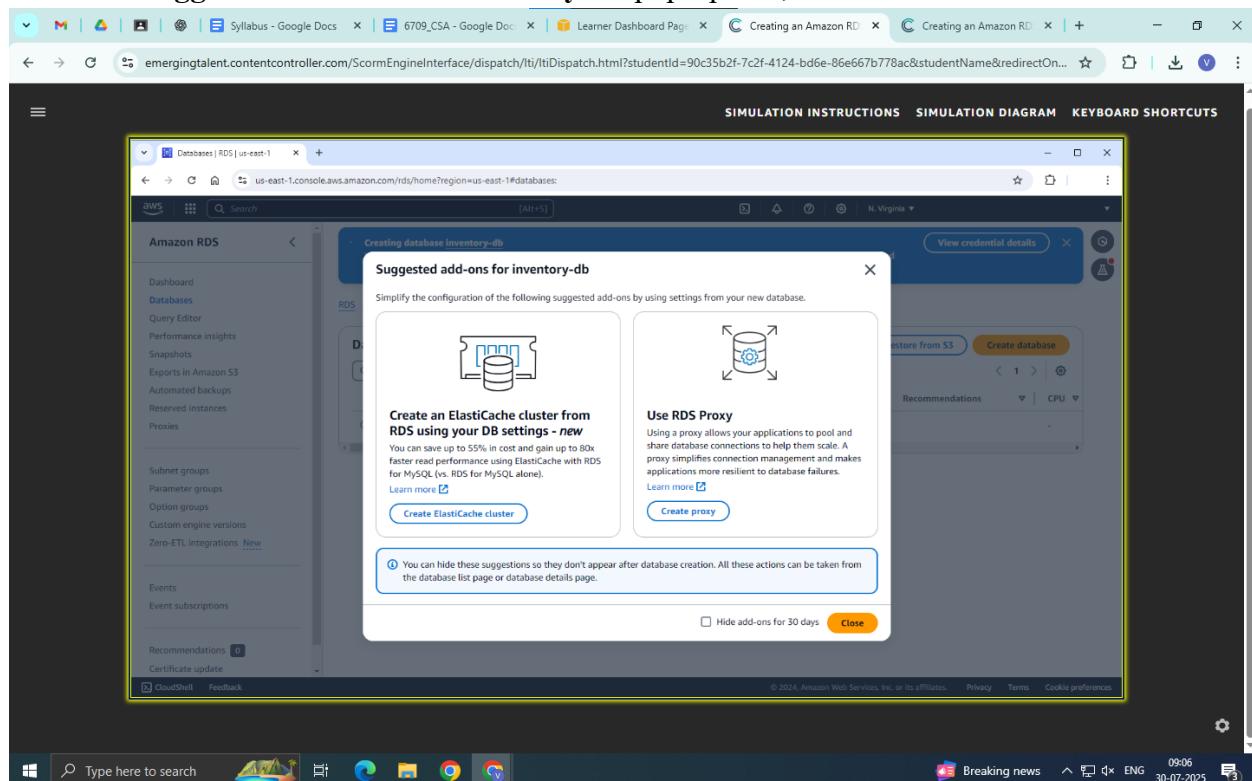


43. To scroll down, choose the scroll bar.

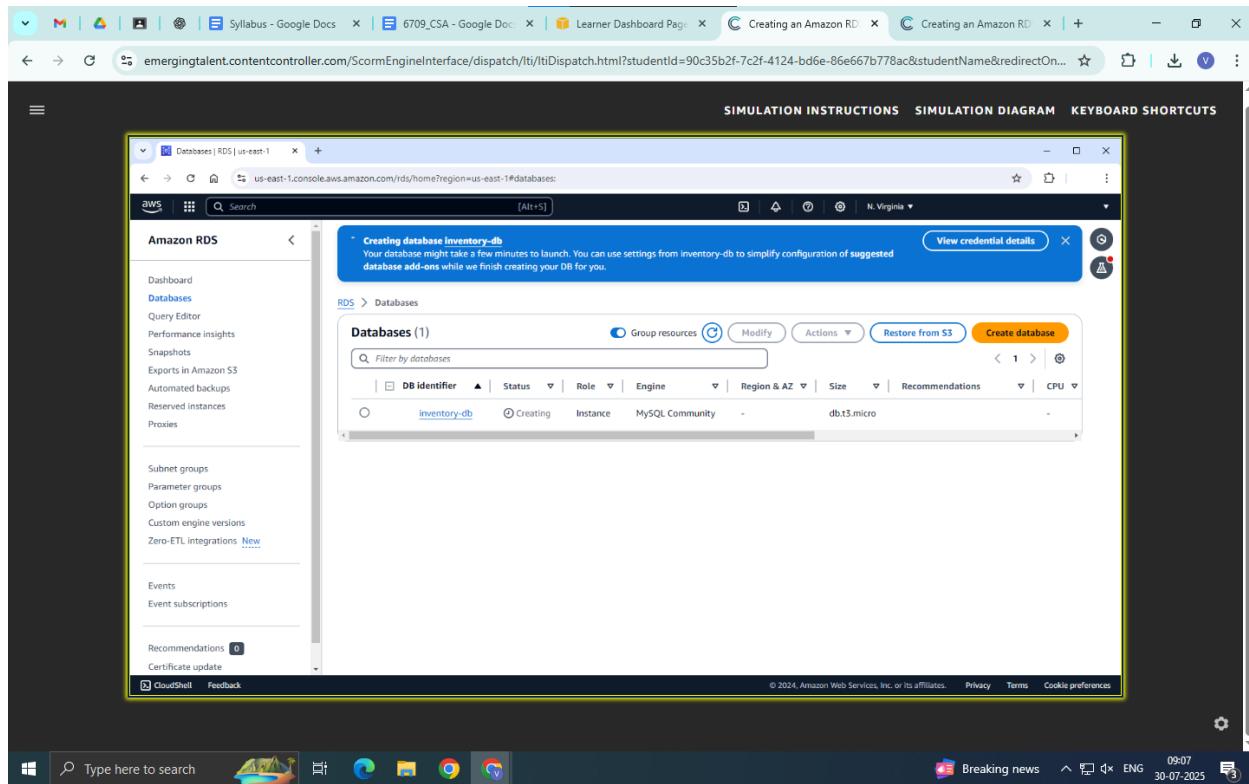
Create the database

44. At the bottom of the page, choose **Create database**.

45. In the **Suggested add-ons for inventory-db** pop-up box, choose **Close**.



The following message appears at the top of the page: “**Creating database inventory-db**”.



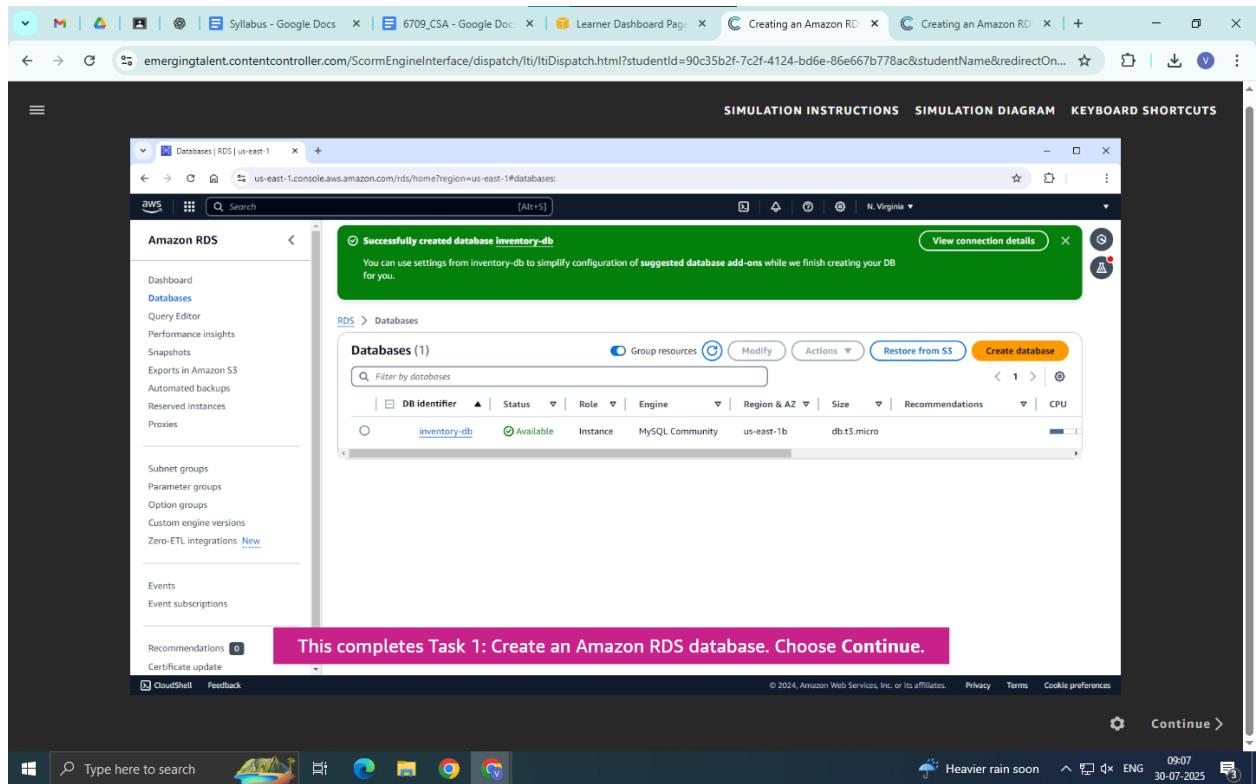
Before you continue to the next task, the database instance **Status** must be **Available**. This process can take several minutes in a live environment.

46. Choose the refresh icon.

Notice that the database has been created, but the **Status** is **Backing-up**.

47. Choose the refresh icon again.

Notice that the database **Status** is now **Available**, and you can continue to the next task to connect to it.



Task 2: Configure a web application communication with the database instance

Open the web application

48. Choose the recently visited services icon next to the search bar. It is the icon with nine white squares in three rows of three.

49. Choose EC2.

50. In the left navigation pane, choose Instances.

The screenshot shows the AWS EC2 Home page for the US East (N. Virginia) Region. The left sidebar includes sections for Instances, Images, Elastic Block Store, and Network & Security. The main content area displays the following resource counts:

Category	Count
Instances (running)	1
Elastic IPs	0
Load balancers	0
Snapshots	1
Auto Scaling Groups	0
Instances	1
Placement groups	0
Volumes	2
Dedicated Hosts	0
Key pairs	1
Security groups	30

Account attributes shown include:

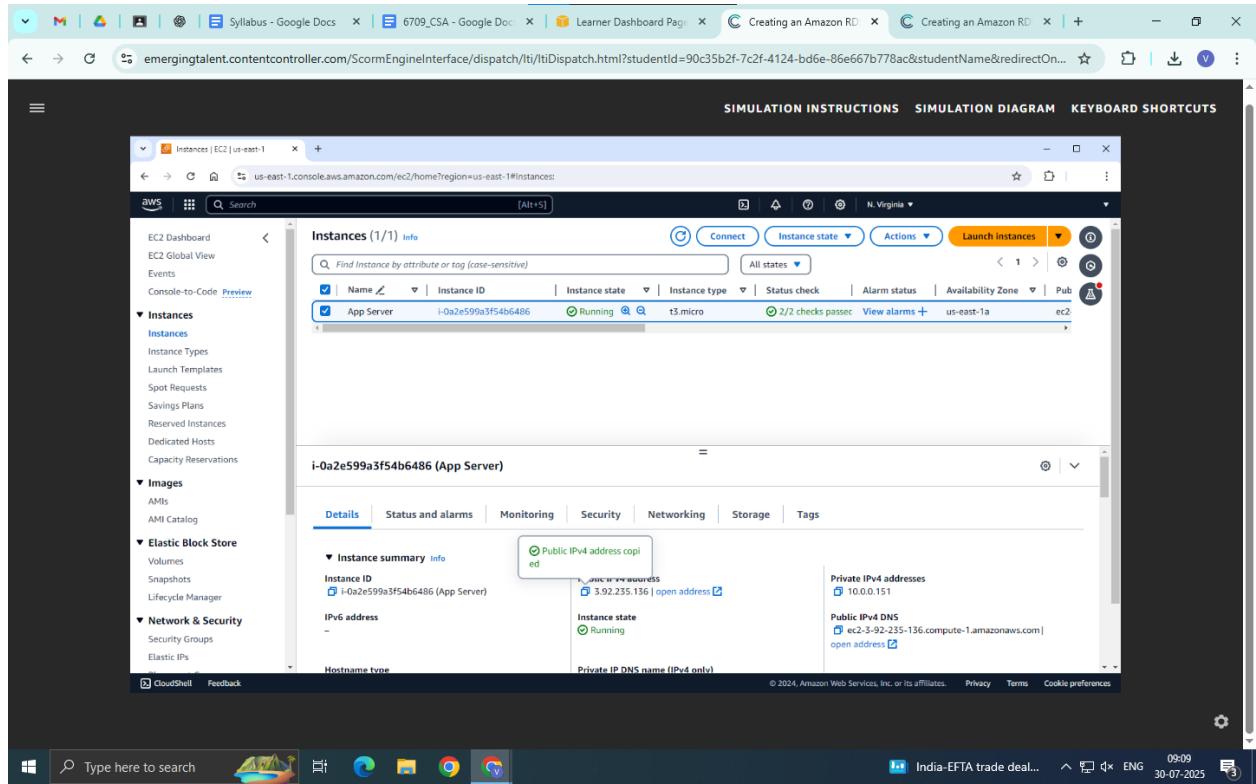
- Default VPC: vpc-3e368943
- Settings: Data protection and security, Zones, EC2 Serial Console, Default credit specification, EC2 console preferences

Other sections visible include Launch instance, Service health (AWS Health Dashboard), Instance alarms, and Explore AWS (10 Things You Can Do Today to Reduce AWS Costs, Get Up to 40% Better Price Performance, Amazon GuardDuty Malware Protection).

Notice that there is a running instance named **App Server**.

51. Select the **App Server** instance.

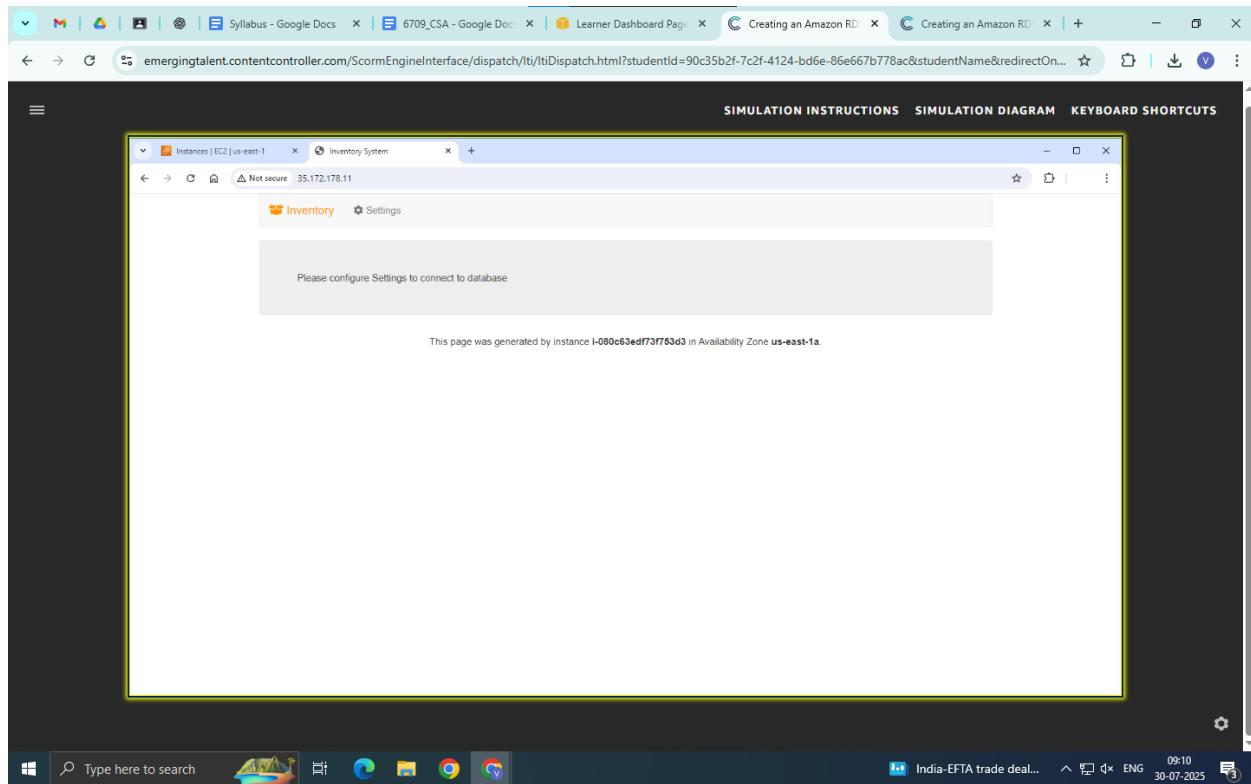
52. In the **Details** tab, choose the copy icon under **Public IPv4 address**.



53. To open a new tab, choose the plus sign (+) on your browser.

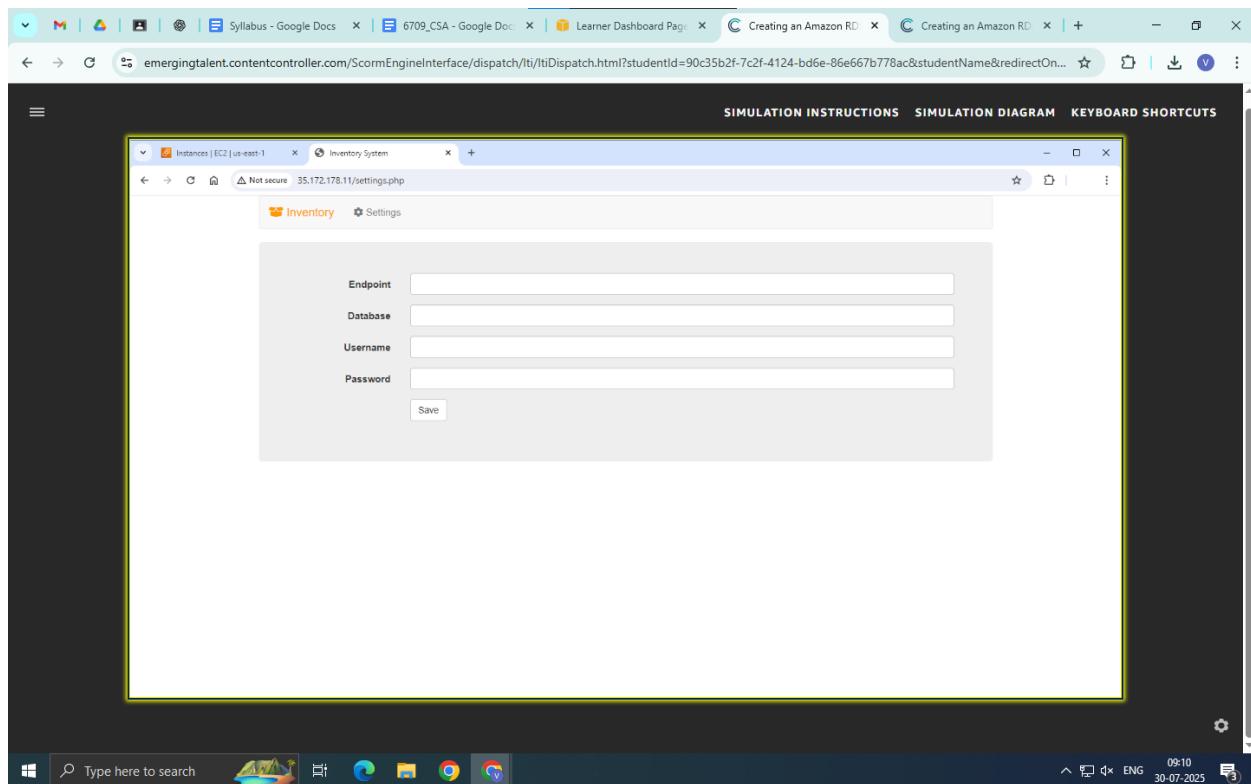
54. In the browser tab, choose the URL field, and then press **Ctrl+V** on your keyboard to paste the IP address into the address bar.

55. To load the page, press **Enter** on your keyboard.



The web application opens. It does not display much information because the application is not yet connected to the database.

56. Choose **Settings**.



Connect the web application to the database

57. Choose the **Instances** browser tab, but do not close the **Inventory System** tab. You will return to it soon.

58. Choose the recently visited services icon next to the search bar.

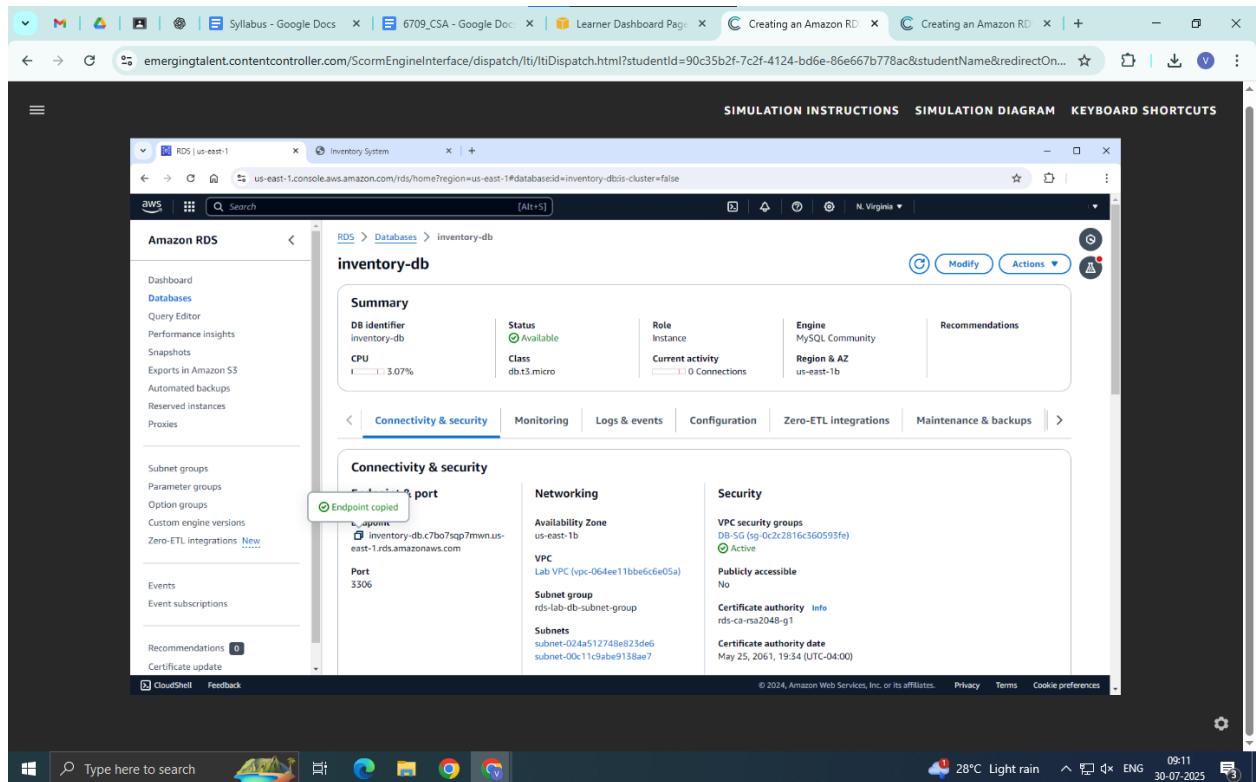
59. Choose **RDS**.

60. In the left navigation pane, choose **Databases**.

61. Under **DB identifier**, choose the link for **inventory-db**.

The screenshot shows the AWS RDS console with the 'inventory-db' database selected. The 'Summary' tab is active, displaying basic information like DB identifier, status, role, engine, and region. Below it, the 'Connectivity & security' tab is selected, showing the endpoint (inventory-db.c7bo7sqp7mwn.us-east-1.rds.amazonaws.com), port (3306), networking details (availability zone us-east-1b, VPC Lab VPC), and security settings (VPC security groups, public accessibility). The URL in the browser is <https://us-east-1.console.aws.amazon.com/rds/home?region=us-east-1#databaseid=inventory-db&is-cluster=false>.

62. In the **Connectivity & security** section, find the endpoint. It should be similar to this example:
inventory-db.c7bo7sqp7mwn.us-east-1.rds.amazonaws.com. Then, choose the copy icon under **Endpoint**.

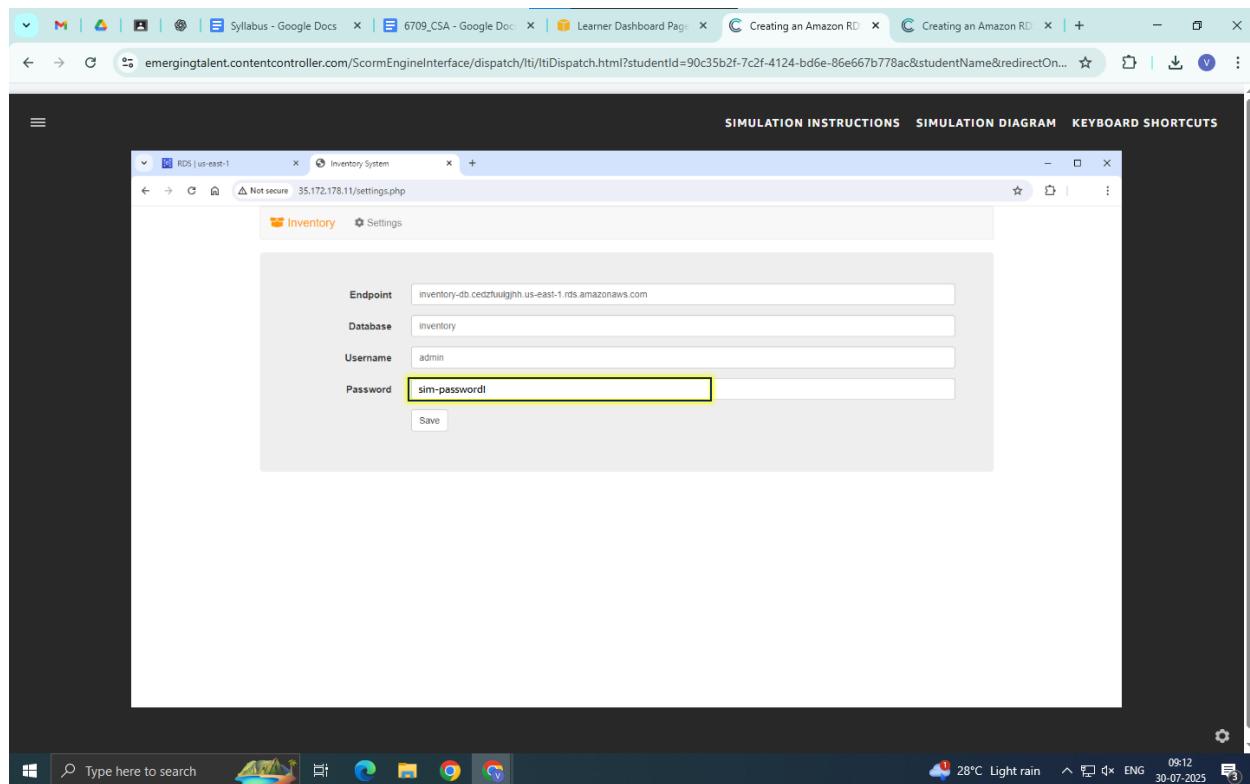


63. Choose the **Inventory System** browser tab.

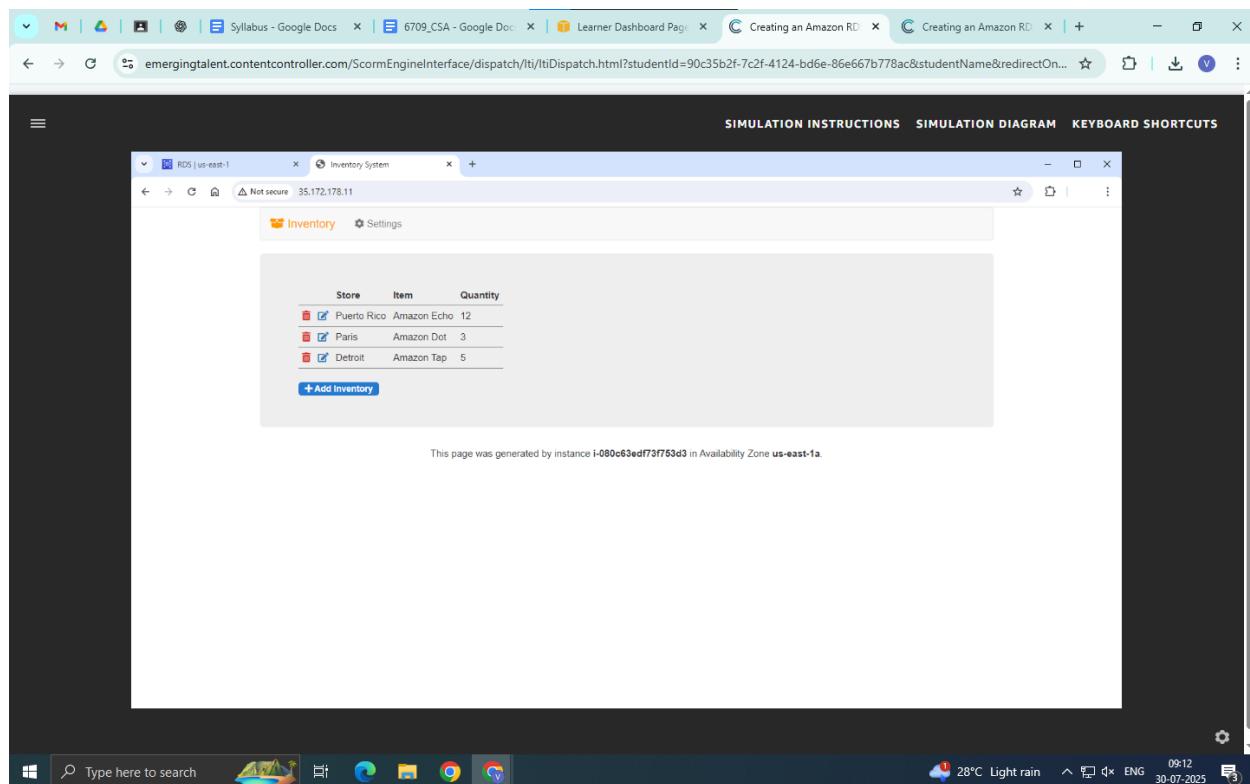
64. Choose the **Endpoint** field, and then press Ctrl+V on your keyboard to paste in the database endpoint you just copied.

66. For **Username**, enter **admin**.

67. For **Password**, enter **sim-password!** in lowercase letters.



68. Choose Save.



You can now use the web application to add, edit, and delete inventory information.

The inventory information is stored in the Amazon RDS for MySQL database you created earlier in the simulation. A failure in the application server will not lead to a loss of data, and multiple application servers can access the same data.

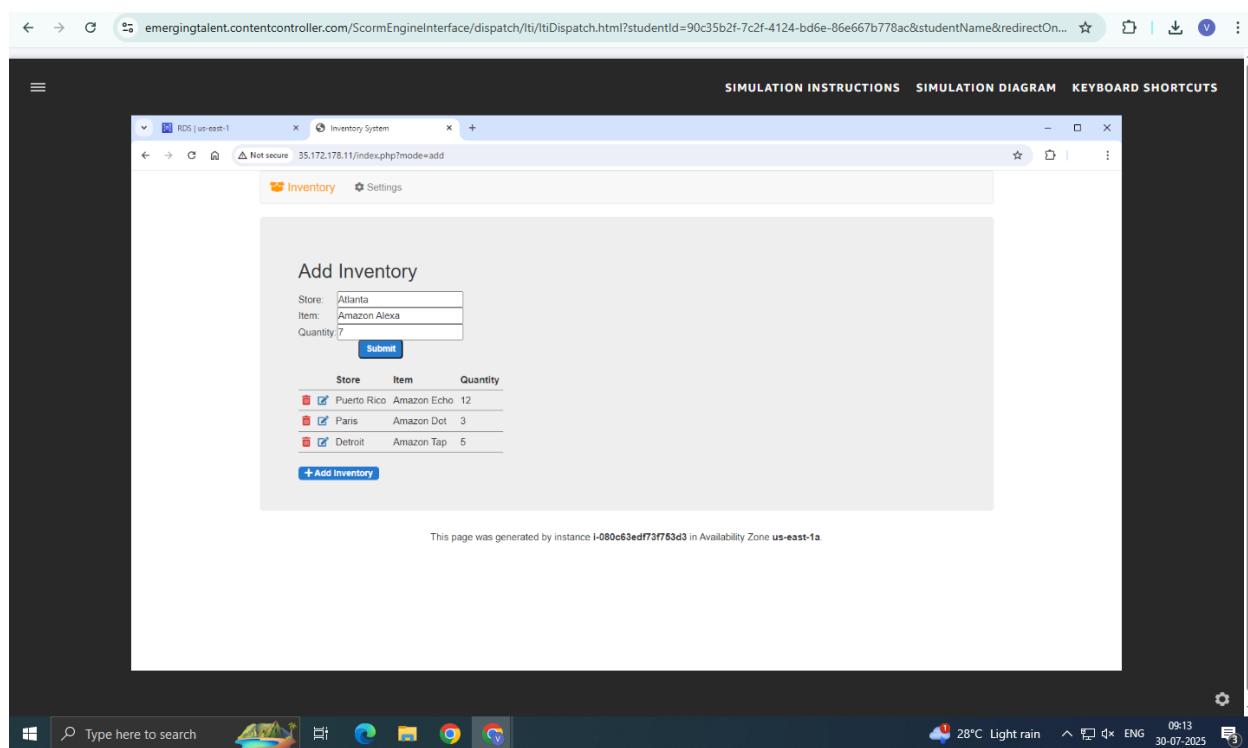
Modifying the database entries

69. To insert new records into the table, choose **+Add Inventory**.

70. For **Store**, enter **Atlanta**.

71. For **Item**, enter **Amazon Alexa**.

72. For **Quantity**, enter **7**.



73. Choose **Submit**.

SIMULATION INSTRUCTIONS SIMULATION DIAGRAM KEYBOARD SHORTCUTS

Store	Item	Quantity
Puerto Rico	Amazon Echo	12
Paris	Amazon Dot	3
Detroit	Amazon Tap	5
Atlanta	Amazon Alexa	7

+ Add Inventory

This page was generated by instance i-080c63edf73f753d3 in Availability Zone us-east-1a.

74. Choose the edit icon next to **Puerto Rico** in the top row of the table.

75. For **Quantity**, clear **12**, and then enter **5**.

SIMULATION INSTRUCTIONS SIMULATION DIAGRAM KEYBOARD SHORTCUTS

Inventory System

Edit Inventory

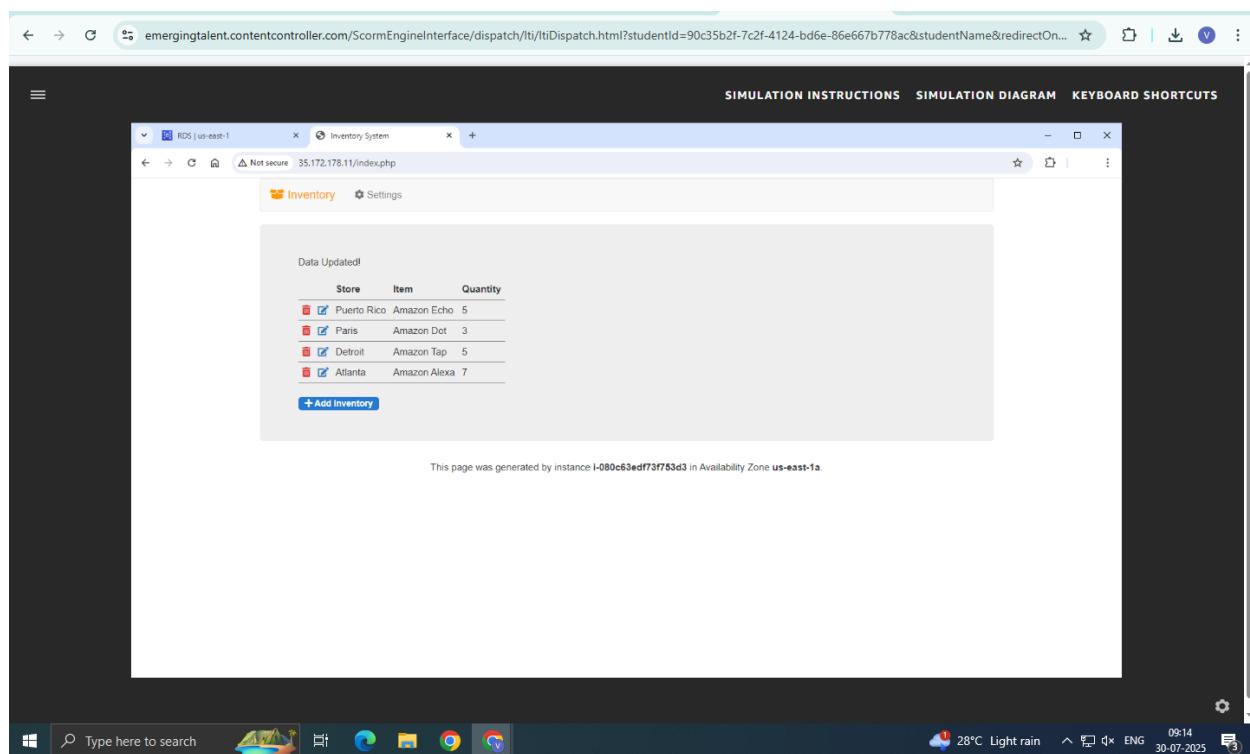
Store:	Puerto Rico
Item:	Amazon Echo
Quantity:	5

Submit

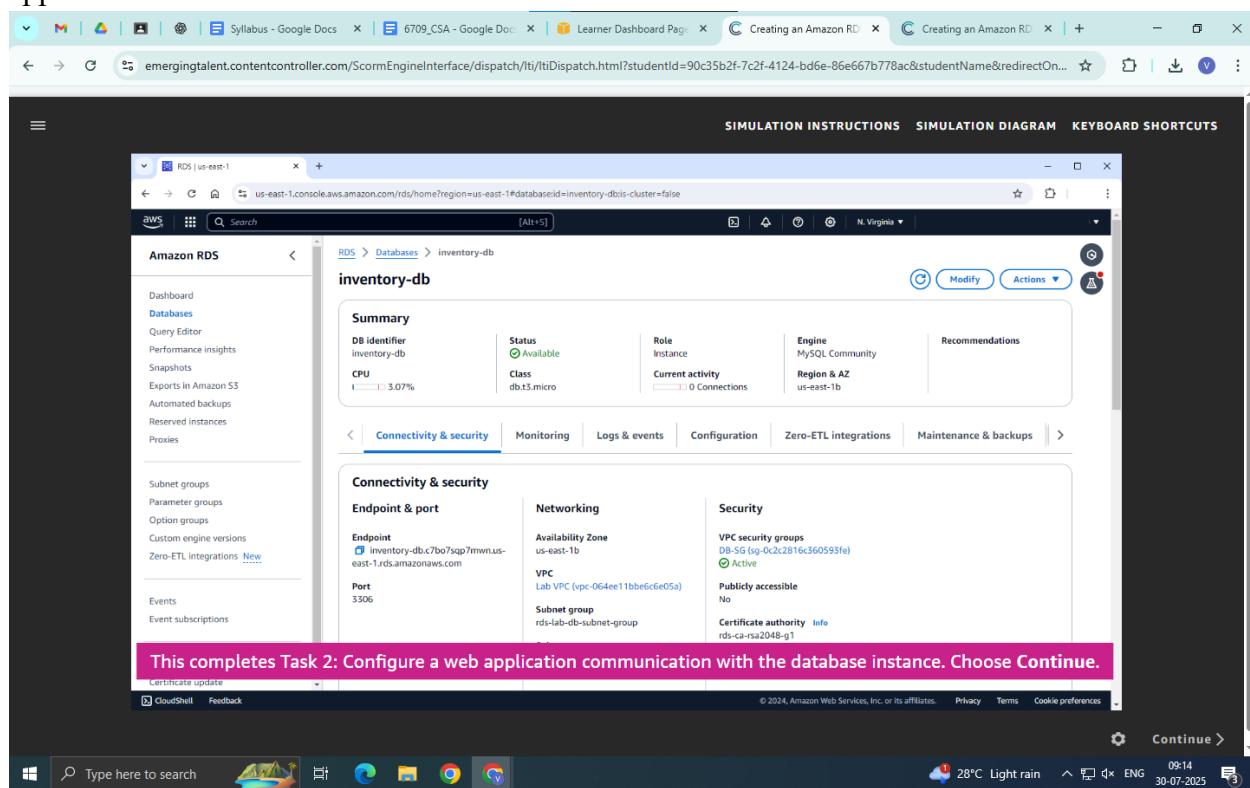
Store	Item	Quantity
Puerto Rico	Amazon Echo	12
Paris	Amazon Dot	3
Detroit	Amazon Tap	5
Atlanta	Amazon Alexa	7

+ Add Inventory

This page was generated by instance i-080c63edf73f753d3 in Availability Zone us-east-1a.

76. Choose Submit.

77. Choose the X on the **Inventory System** browser tab to close it. You successfully launched the application and connected it to the database.

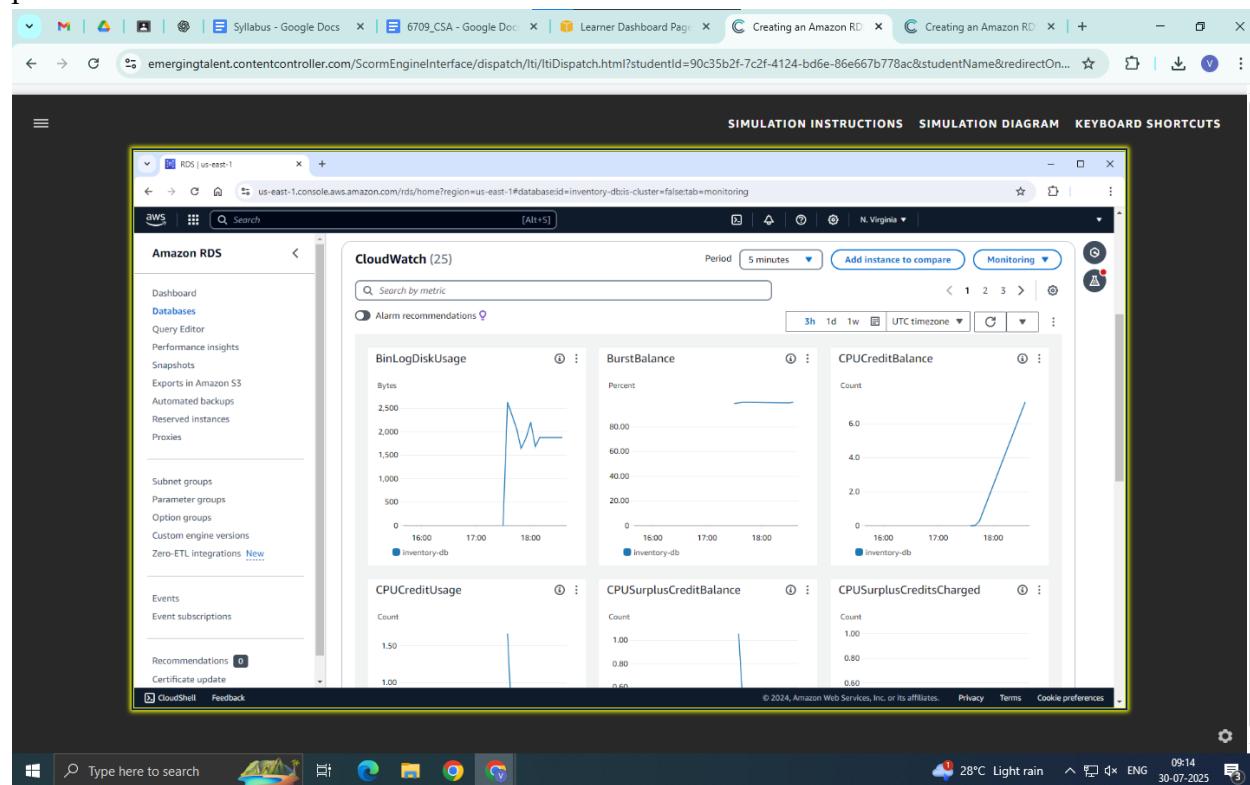


Task 3: Monitor the database instance

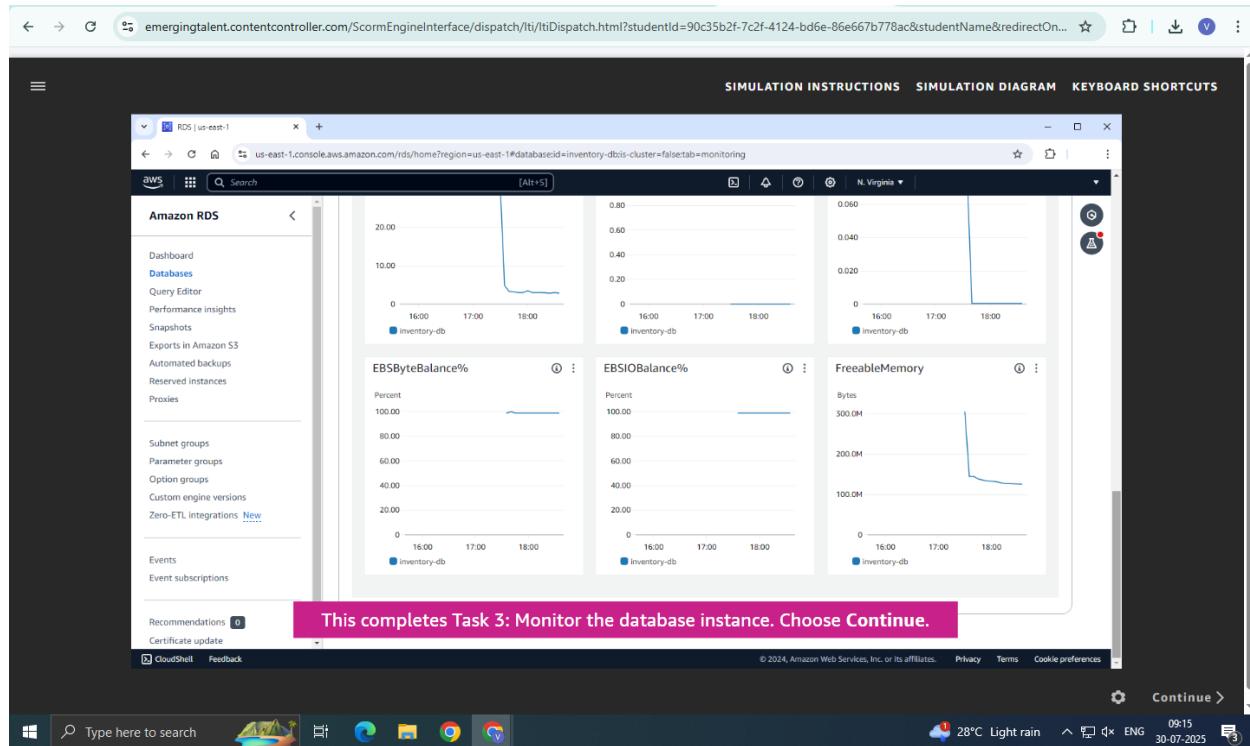
78. On the **inventory-db** page, choose the **Monitoring** tab.

79. To scroll down, choose the scroll bar.

80. Observe the Amazon CloudWatch metrics indicating the respective database instance parameters.



81. Continue to scroll down until you have reviewed all available metrics.



Task 4: Perform operations on the database

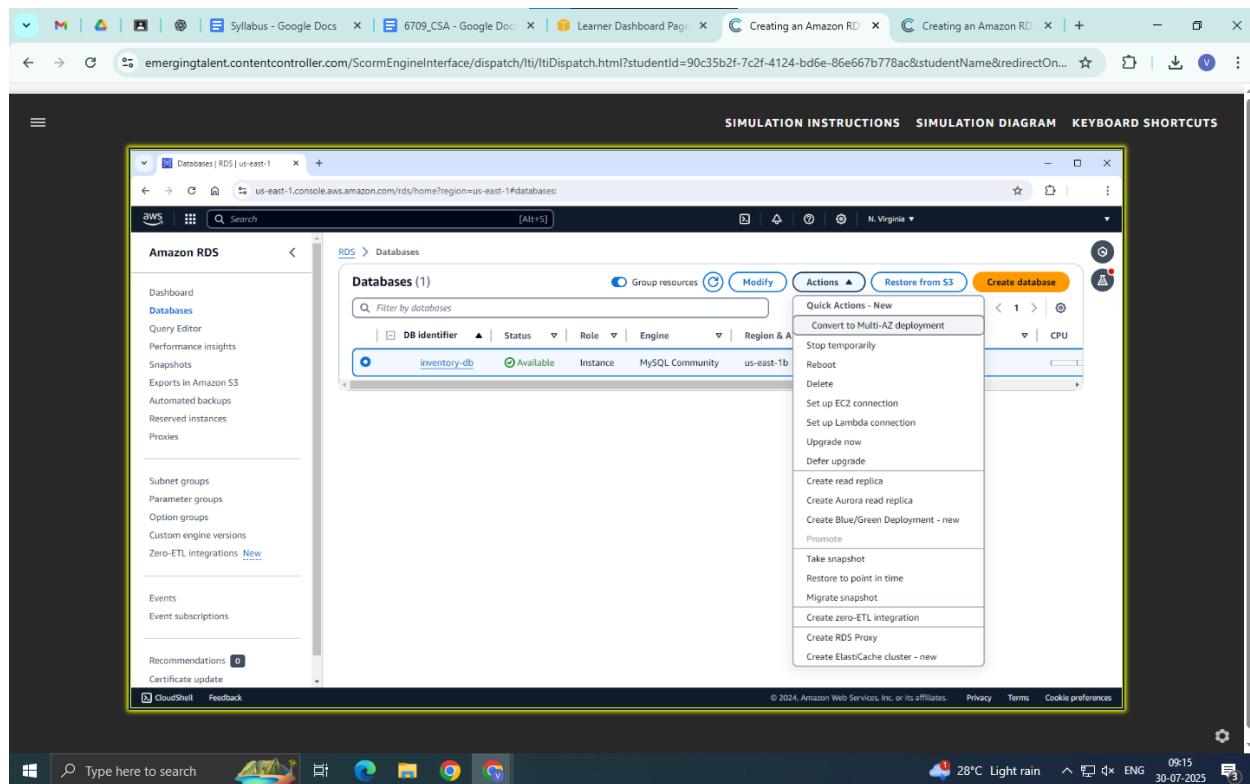
82. In the left navigation pane, choose **Databases**.

83. Choose the **inventory-db** database.

84. Choose the **Actions** menu.

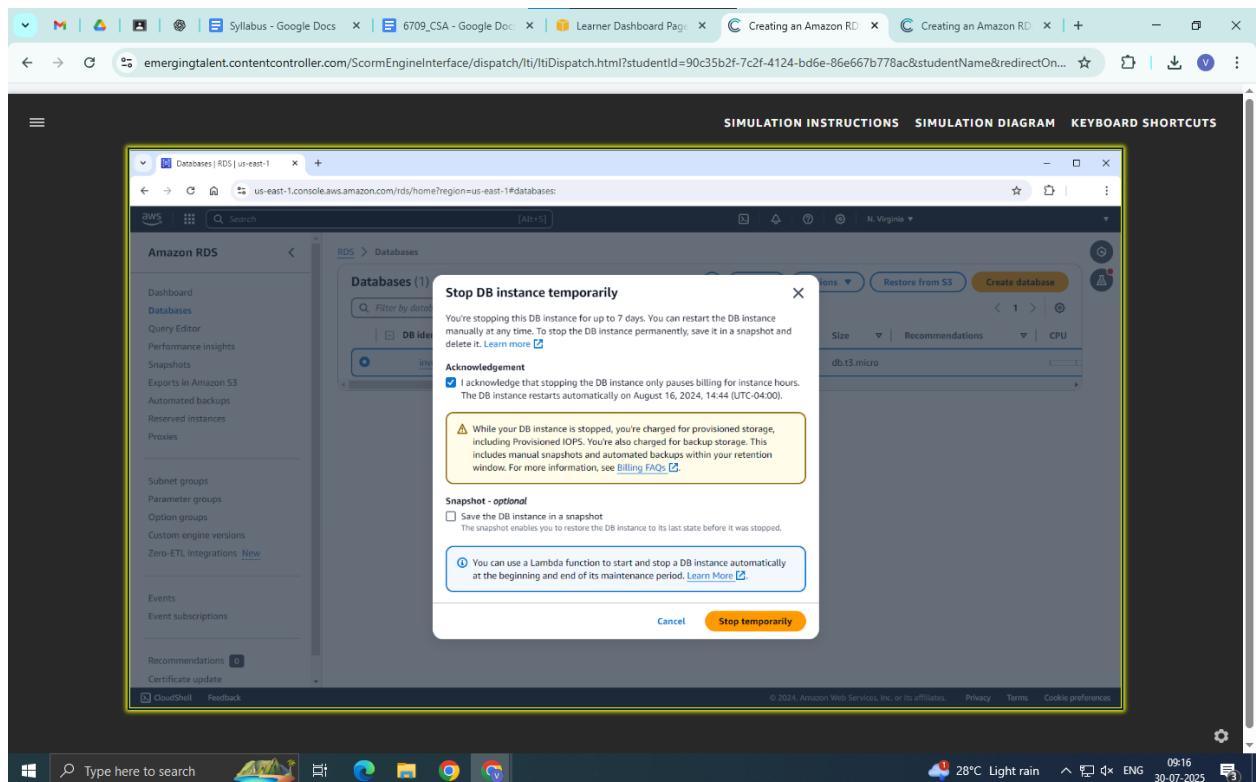
The **Actions** menu displays various operations, such as **Stop temporarily**, **Reboot**, and so on.

85. To stop the instance temporarily, choose **Stop temporarily**. The database will automatically restart after 7 days.

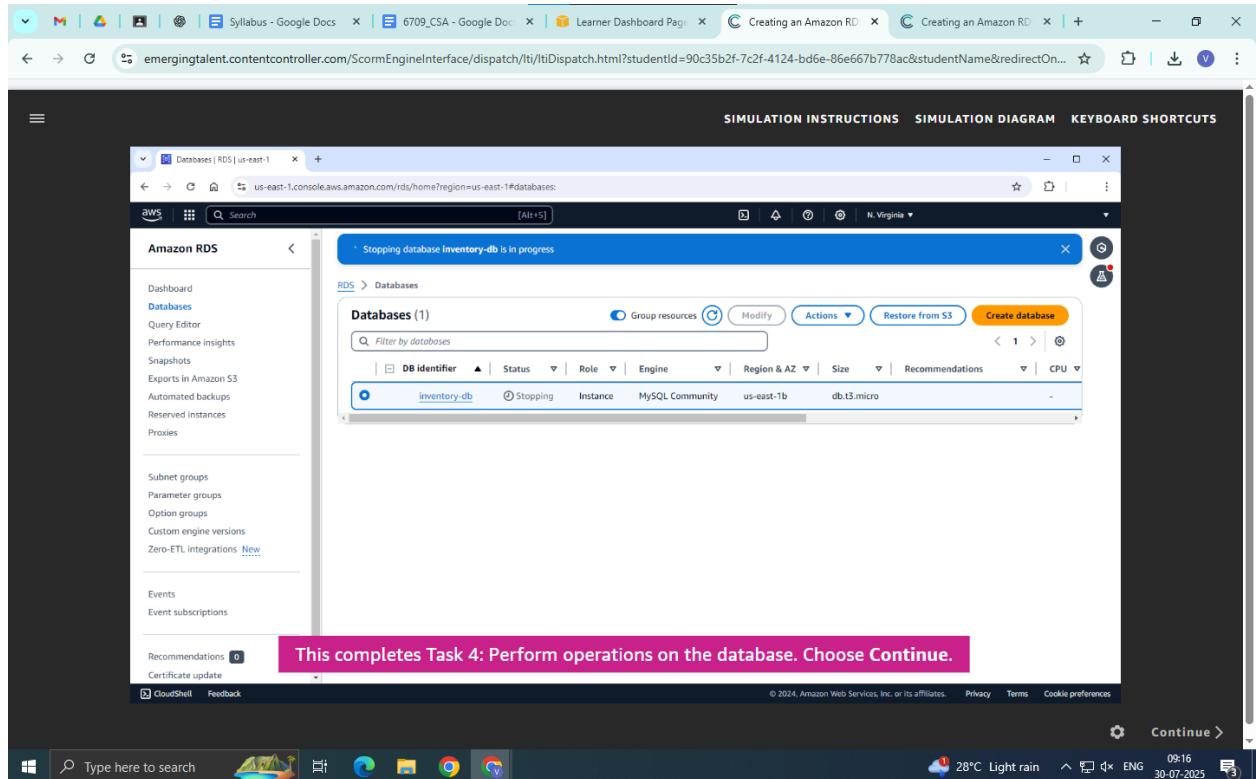


86. In the **Stop DB instance temporarily** pop-up box, select the checkbox under **Acknowledgement**.

87. Choose **Stop temporarily**.



Note: Stopping the instance also stops the billing charges associated with running the instance. Databases will continue to occupy storage space and incur billing charges.



Practical 7: Creating a Virtual Private Cloud

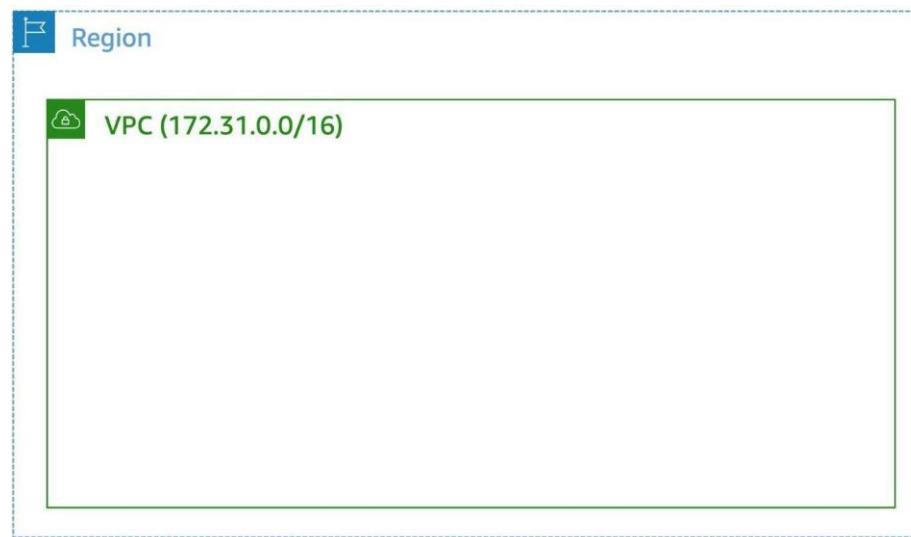
Jul 29, 2025

-
- A. Explore the Example VPC configuration
 - B. Explore a subnet, internet gateway, route table, security group
 - C. Explore a Identify an EC2 instance's VPC and subnet and create a VPC
 - D. Create a custom VPC
 - E. Explore the configuration settings for launching an EC2 instance into your custom VPC

Task 1: Explore the Example VPC configuration

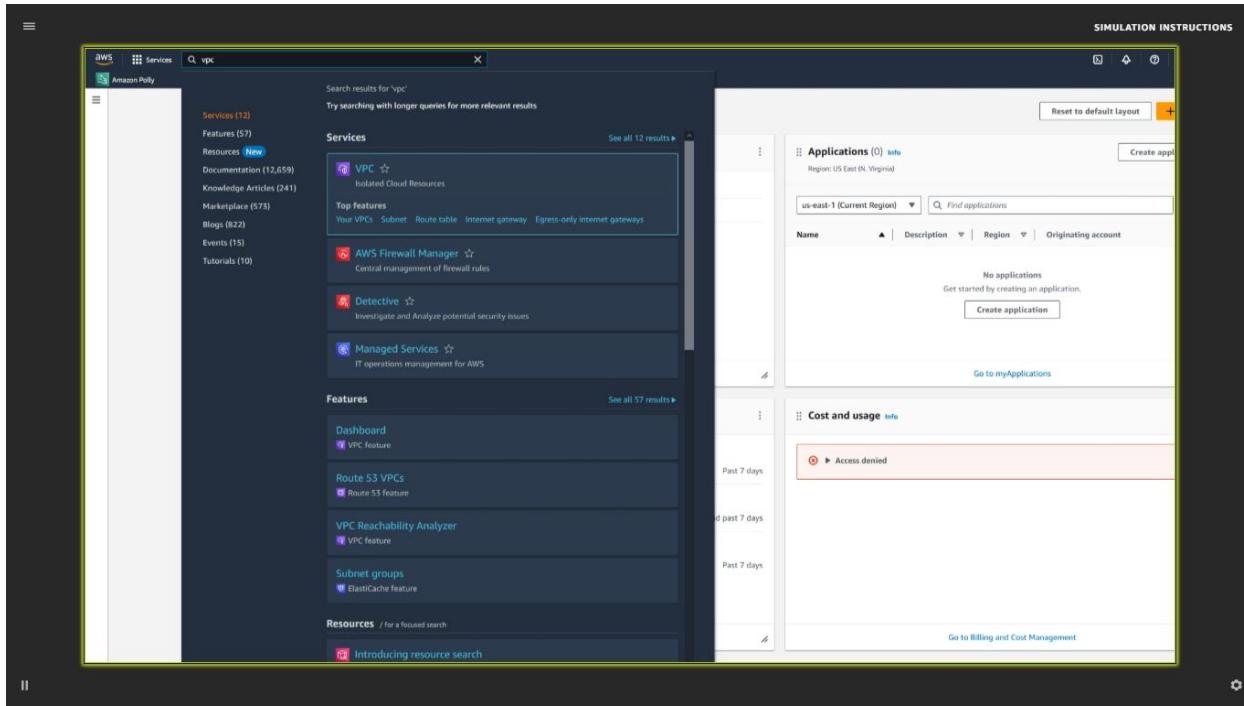
In this simulation, you begin by exploring the Example VPC. The Example VPC is modeled after the default VPC that is automatically included with each Region within an Amazon Web Services (AWS) account.

A VPC is a virtual network that is dedicated to your AWS account. It is logically isolated from other virtual networks in the AWS Cloud. You can launch AWS resources, such as EC2 instances, into the VPC.



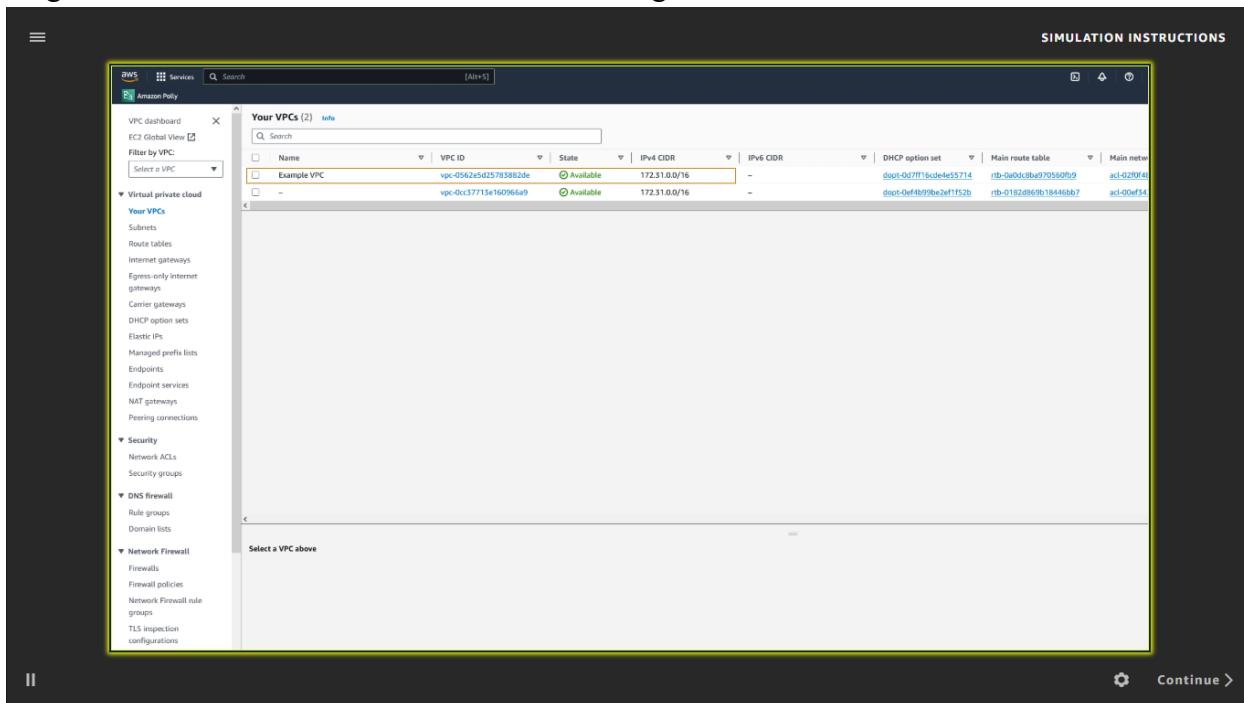
In the preceding diagram, a VPC is deployed into an AWS Region.

1. On the AWS Management Console on the **Services** menu, enter **VPC**, and press Enter on your keyboard.



2. From the search results, choose **VPC**.
3. In the left navigation pane, choose **Your VPCs**.

You should see two VPCs: the default VPC and the **Example VPC**. Notice that the **Example VPC** is configured with the Classless Inter-Domain Routing (CIDR) range of **172.31.0.0/16**. This CIDR range includes all addresses from 172.31.0.0 through 172.31.255.255, a total of 65,536 addresses.



4. Make a note of the **VPC ID** for the **Example VPC** (the VPC ID ending in **882de**). You

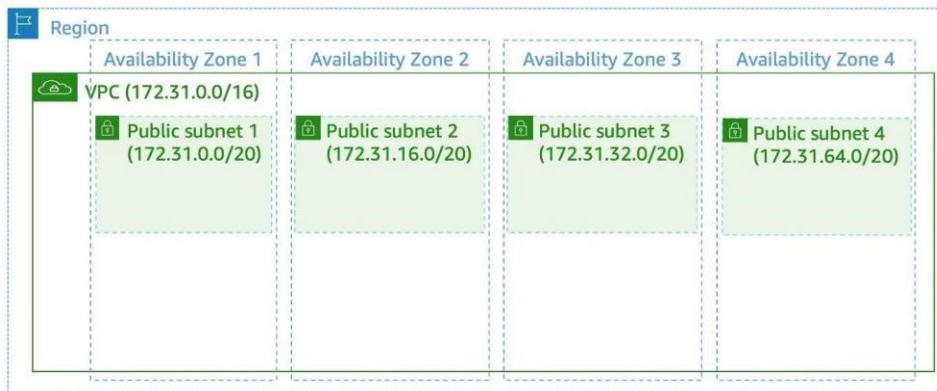
use this VPC ID later in the simulation.

5. Choose **Continue**.

Task 2: Explore a subnet

In this task, you explore a public subnet.

A subnet is a subrange of IP addresses in the VPC. AWS resources can be launched into a specified subnet. Use a *public subnet* for resources that must be accessible from the internet, and use a *private subnet* for resources that must remain inaccessible from the internet.



The preceding diagram includes the Example VPC and four subnets that reside inside it.

6. In the left navigation pane, choose **Subnets**.

Notice that all of the subnets that begin with the name **PublicSubnet** are associated with the same VPC, the **Example VPC**. Also notice that each subnet has an IPv4 CIDR range. Each subnet CIDR range is a distinct subset of the addresses available in the VPC. When designing your subnets, you must ensure that the CIDR ranges do not overlap within the same VPC with address ranges used in other subnets.

7. From the list of subnets, select the check box for **PublicSubnet1**.

The screenshot shows the AWS VPC Subnets page. On the left, there's a navigation pane with various options like Subnets, Route tables, Internet gateways, Security, DNS firewall, and Network Firewall. The main area shows a list of subnets under the 'Your VPCs' section. One subnet is selected: 'subnet-0dd00c732d402307c / PublicSubnet1'. The details for this subnet are displayed in a large box. Key settings shown include:

- Subnet ID:** subnet-0dd00c732d402307c
- Available IPv4 addresses:** 4090
- IPv4 CIDR:** 172.31.0.0/20
- VPC:** vpc-0562e5d257838b2de | Example VPC
- Auto-assign public IPv4 address:** Yes (highlighted)
- State:** Available
- Availability Zone:** us-east-1a
- Route table:** rtb-05432c7ac94d56d25 | Public Route Table
- Auto-assign IPv6 address:** No
- IPv6 CIDR:** -
- Resource name:** DNS A record
- Owner:** i114002646027

Below the details, there's a 'Flow logs' tab with a table showing no flow logs found. At the bottom right, there's a 'Continue >' button.

This subnet uses the IPv4 CIDR range 172.31.0.0/20.

The VPC has a CIDR block of 172.31.0.0/16, which includes all 172.31.x.x IP addresses. This subnet has a CIDR block of 172.31.0.0/20, which includes addresses 172.31.0.0–172.31.15.255. These CIDR ranges might look similar, but the subnet is smaller than the VPC because of the /20 in the CIDR range. This subnet uses the first 4,096 addresses available in the VPC. The console shows that only 4,091 addresses are available to use because AWS always reserves five addresses in each subnet for IP networking purposes.

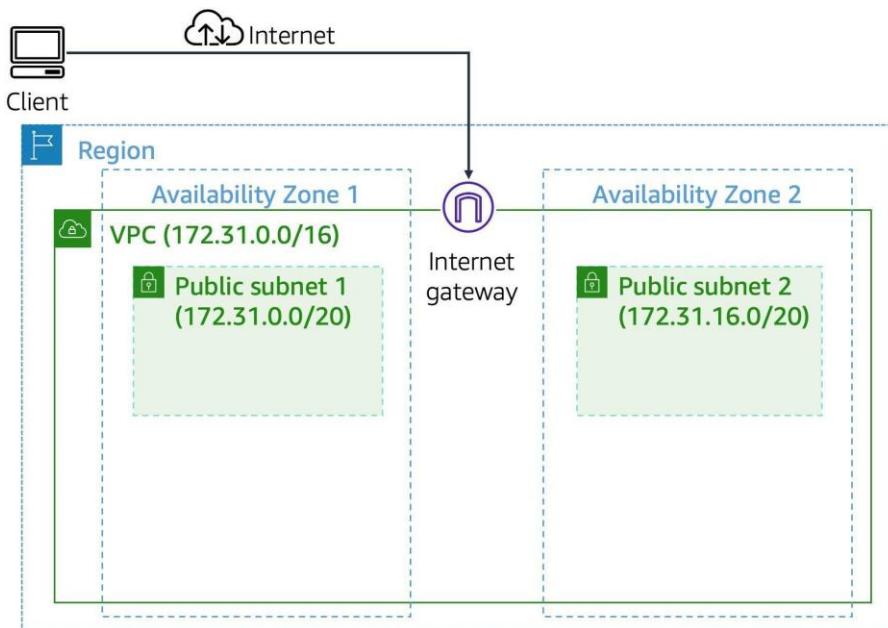
Notice that the value for **Auto-assign public IPv4 address** is **Yes**, which means that it is turned on. This means that the subnet automatically assigns a public IP address for all instances that are launched into it.

8. Choose **Continue**.

Task 3: Explore an internet gateway

In this task, you explore the VPC's internet gateway.

An *internet gateway* allows communication between the resources in a VPC and the internet. It is a horizontally scaled, redundant, and highly available VPC component. It imposes no availability risks or bandwidth constraints on network traffic.



In the preceding diagram, an internet gateway provides access to the internet to two subnets that reside in the VPC.

An internet gateway serves the following two purposes:

- To provide a target in route tables that connects to the internet
- To perform network address translation (NAT) for instances that were assigned public IPv4 addresses

9. In the left navigation pane, choose **Internet gateways**.

The screenshot shows the AWS VPC Internet Gateways page. The left navigation pane includes options like VPC dashboard, EC2 Global View, Filter by VPC, Virtual private cloud, Internet gateways, Security, DNS firewall, and Network Firewall. The main content area displays a table titled "Internet gateways (2) info". The table has columns for Name, Internet gateway ID, State, VPC ID, and Owner. The first row, "Example Internet Gateway", is selected and highlighted with a yellow border. Its details are shown in the modal below:

Name	Internet gateway ID	State	VPC ID	Owner
Example Internet Gateway	igw-057c95d76b1aa23ce	Attached	vpc-0cc37713e160966a9	114002646027

Below the table, a message says "Select an internet gateway above". At the bottom right of the page is a "Continue" button.

Review the row containing the internet gateway named **Example Internet Gateway**. Notice that the **State** of the internet gateway is *Attached*. Also, notice that the **VPC ID** column shows that the internet gateway is attached the **VPC ID** for the **Example VPC**.

10. Choose Continue.

Task 4: Explore a route table

In this task, you explore the route table used by the Example VPC.

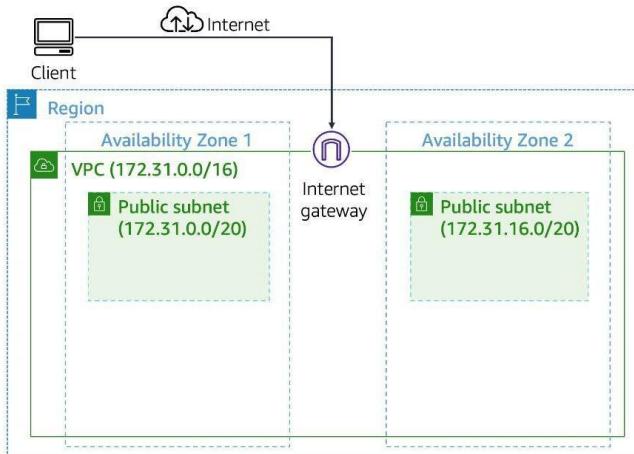
You verified that an internet gateway exists and that it is attached to the Example VPC. Before the subnets can access the internet gateway, the route table associated with the subnets must be configured to use the internet gateway.

A *route table* contains a set of rules, called routes, that are used to determine where network traffic is directed. Each subnet in a VPC must be associated with a route table because the table controls the routing for the subnet. A subnet can be associated with only one route table at a time, but you can associate multiple subnets with the same route table.

To use an internet gateway, a subnet's route table must contain a route that directs internet-bound traffic to the internet gateway. If a subnet is associated with a route table that has a route to an internet gateway, it is known as a public subnet.

In the preceding diagram, the route table directs traffic locally inside the VPC and sends public traffic to the internet gateway.

11. In the left navigation pane, choose **Route tables**.



Public route table	
Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	Internet gateway

The screenshot shows the AWS VPC Route Tables page. The left sidebar navigation includes 'Route tables', 'Internet gateways', 'Egress-only internet gateways', 'Carrier gateways', 'DHCP option sets', 'Elastic IPs', 'Managed prefix lists', 'Endpoints', 'Endpoint services', 'NAT gateways', 'Peering connections', 'Security', 'DNS firewall', and 'Network Firewall'. The 'Route tables' section is expanded, showing a list of route tables. One row is selected, labeled 'Public Route Table'. The main content area displays the details of the selected route table, including its name, route table ID, explicit subnet associations, edge associations, and owner information.

Name	Route table ID	Explicit subnet associations	Edge associations	Main	VPC	Owner ID
Public Route Table	rtb-05452c7a94d36d25	4 subnets	-	No	vpc-0562e5d25783882de Exa...	114002646027
-	rtb-0a0d8ba970560fb9	-	-	Yes	vpc-0562e5d25783882de Exa...	114002646027
-	rtb-0182db869618446bb7	-	-	Yes	vpc-0c37713e160966a9	114002646027

12. Locate the row containing the route table named **Public Route Table** and select it.

This route table is associated with the Example VPC.

The screenshot shows the AWS VPC Route Tables page. The left sidebar is collapsed. The main content area displays the details of the 'rtb-03432c7ac94d36d25 / Public Route Table'. The 'Details' tab is selected. Key information shown includes:

- Route table ID:** rtb-03432c7ac94d36d25
- Main:** No
- VPC:** vpc-0562e5d25783882de | Example VPC
- Owner ID:** 114002646027
- Explicit subnet associations:** 4 subnets

The 'Routes' tab is selected, showing two routes:

Destination	Target	Status	Propagation
0.0.0.0/0	igw-0e5d1f6485fe94763	Active	No
172.31.0.0/16	local	Active	No

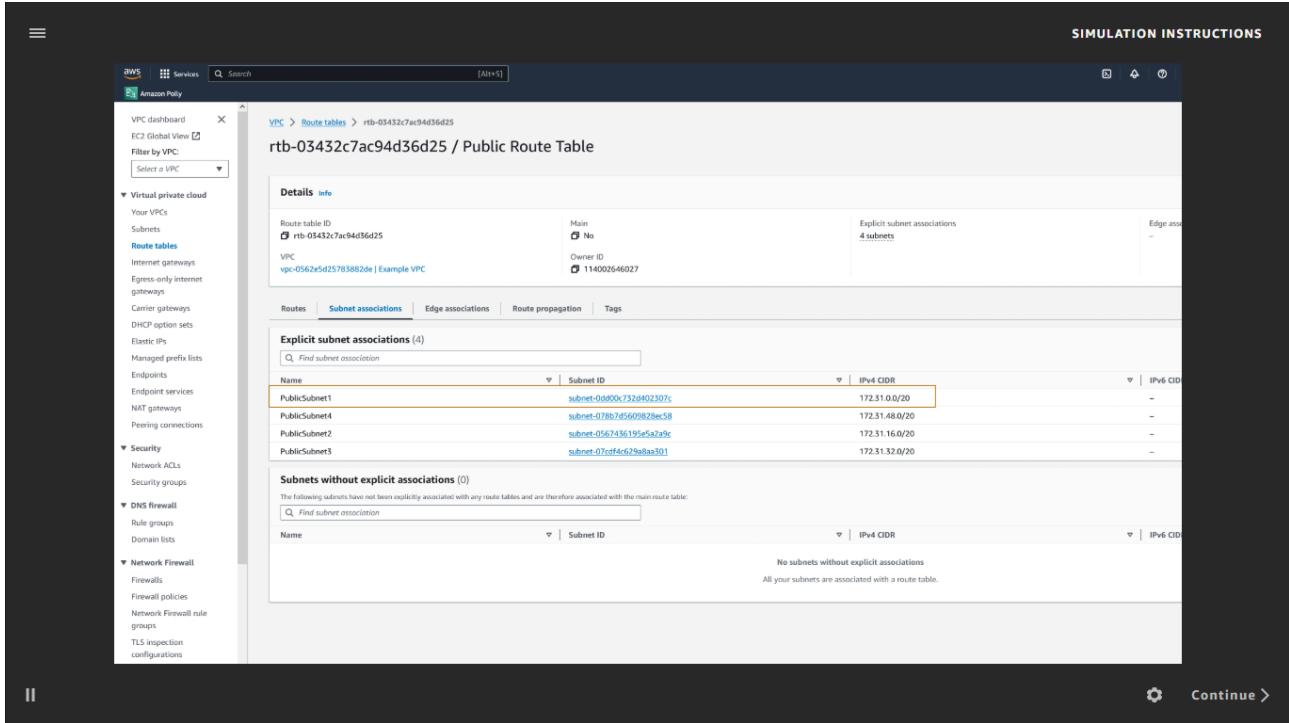
The **Routes** tab is selected by default. Take a minute to review the routes. There are two routes: a local route and a public route.

Route tables follow the longest prefix match when overlapping routes exist. Overlapping routes occur when two routes in a route table match on a specific destination IP. In this case, the 172.31.0.0/16 route overlaps with 0.0.0.0/0 route for all destination IPs within the 172.31.0.0/16 IP range.

Because the 172.31.0.0/16 prefix (16) is higher in value compared to the 0.0.0.0/0 prefix (0), the 172.31.0.0/16 route will be used first before the 0.0.0.0/0 route for all conflicting destination IPs. As a result, all traffic that is destined for 172.31.0.0/16 (which is the range of the Example VPC) is routed locally. This route allows all subnets in a VPC to communicate with each other. All other traffic (0.0.0.0/0) is routed to the internet gateway.

13. Choose the Subnet associations tab.

In the **Explicit subnet associations** section, notice that the subnet with the **IPv4 CIDR** block of **172.31.0.0/20** is included in the list. This is the same subnet you reviewed earlier.



14. Choose Continue.

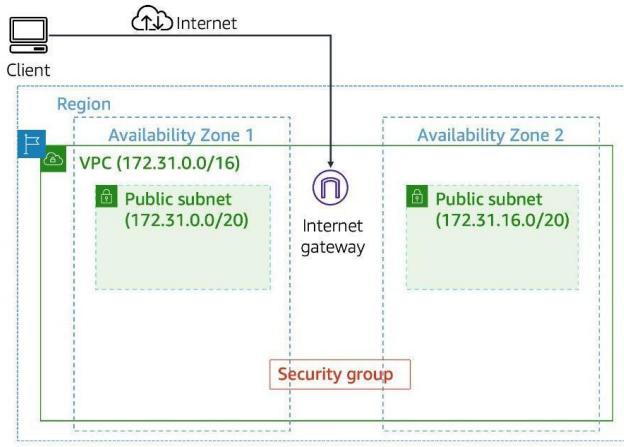
All of the subnets in this list are public subnets because they have a route table entry that sends traffic to the internet through the internet gateway.

Task 5: Explore a security group

In this task, you explore and update the security group used by the Example VPC subnets.

A *security group* acts as a virtual firewall for instances to control inbound and outbound traffic.

Security groups operate at the level of the elastic network interface for the instance. Security groups do not operate at the subnet level. Thus, each instance can have its own firewall that controls traffic. If you do not specify a particular security group at launch time, the instance is automatically assigned to the default security group for the VPC.



Public route table	
Destination	Target
172.31.0.0/16	Local

Security Group Inbound Rule		
Source	Protocol	Port range
Security Group	All	All

Security Group Outbound Rule		
Destination	Protocol	Port range
0.0.0.0/0	All	All

In the preceding diagram, the security group rules allow access to all ports for traffic that comes from the security group. The rules allow outbound access to the internet, both internal and external (0.0.0.0/0).

In this task, you review the default security group that is associated with the Example VPC. Then, you update a custom security group so that users can access resources by using HTTP.

15. In the left navigation pane, choose **Security groups**.

The screenshot shows the AWS CloudFormation console with the 'SIMULATION INSTRUCTIONS' tab selected. The main table lists two security groups: 'sg-0c0870a411823eff9 - default' and 'Web-Server-SG'. The 'default' group is selected. The lower half of the page shows the details for the 'sg-0c0870a411823eff9 - default' security group, including its details, inbound rules, and outbound rules tabs. The 'Outbound rules' tab is currently selected, showing one rule allowing all protocols and port ranges to any IP address.

16. Locate the row containing the **default VPC security group** for the Example VPC (VPC ID ending in **882de**) and select it.

17. In the lower half of the page, choose the **Outbound rules** tab.

You see one rule. This rule allows **All** protocols and **All** port ranges to send traffic to any IP address (0.0.0.0/0).

The screenshot shows the AWS VPC Security Groups console. At the top, there is a table listing security groups. Below the table, a specific security group is selected, showing its details. The 'Outbound rules' tab is active, displaying a table of outbound rules. One rule is present: 'sg-057eba118b622e2bf' (IPv4, All traffic, All, 0.0.0.0/0). A yellow box highlights this rule.

18. Choose the Inbound rules tab.

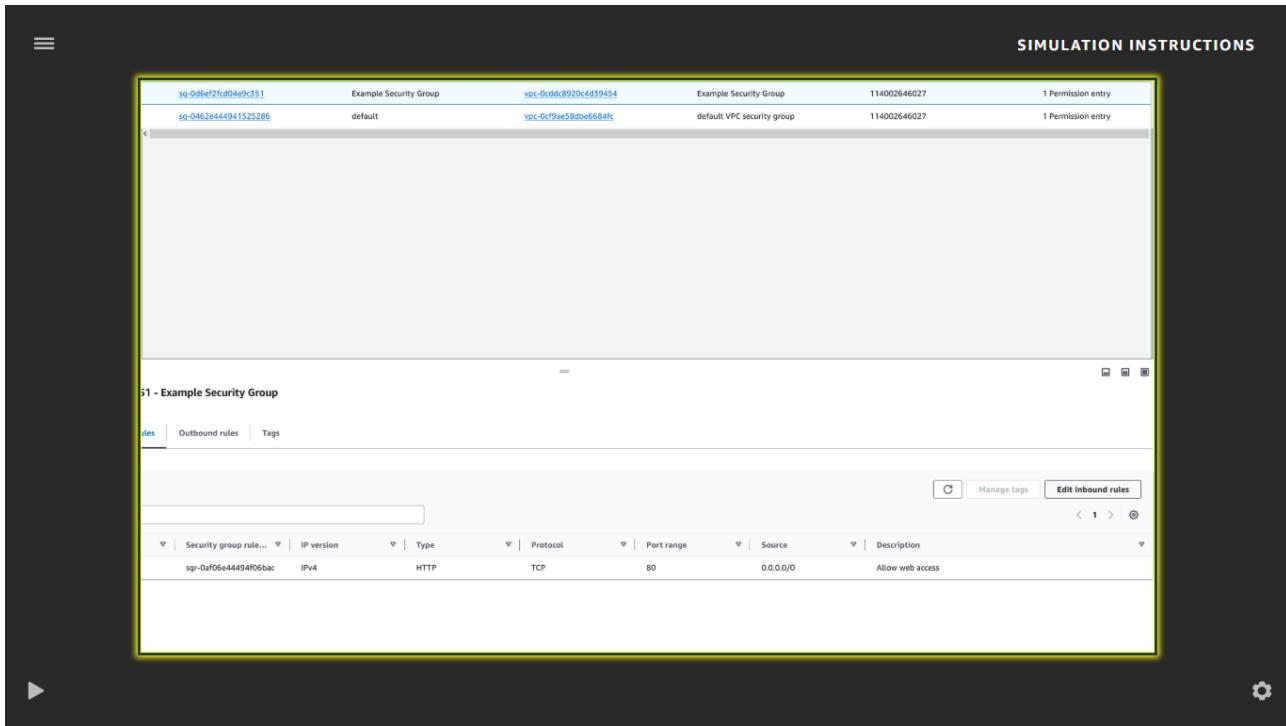
You find one rule for incoming traffic. This rule allows incoming traffic to **All** protocols and **All** port ranges from resources that use the default security group.

The screenshot shows the AWS VPC Security Groups console. At the top, there is a table listing security groups. Below the table, a specific security group is selected, showing its details. The 'Inbound rules' tab is active, displaying a table of inbound rules. One rule is present: 'sg-057eba118b622e2bf' (All traffic, All, All, sg-0c0870a411823eff9). A yellow box highlights this rule.

In a later step, you will test an EC2 instance that was deployed into the Example VPC when the simulation started. For incoming traffic from sources outside your VPC to access this website, you must add a new security group rule. Because you should not make changes to the default security

group, you create a new one. Then, you add a rule to your new security group to permit HTTP (port 80) traffic that comes from anywhere on the internet (0.0.0.0/0).

19. Clear the **default** security group.
20. Locate the row containing the **Web-Server-SG** security group for the Example VPC and select it.
21. In the lower half of the page, choose the **Inbound rules** tab.



22. Choose **Edit inbound rules**.
23. Choose **Add rule**.
24. Configure the following settings:
 - For **Type**, choose **HTTP**.
 - From the **Source** dropdown list, choose **Anywhere-IPv4**.
 - For **Description**, enter **Allow web access**, and then press Enter.
25. Choose **Save rules**.

SIMULATION INSTRUCTIONS

The screenshot shows the AWS Security Groups console. A new inbound rule is being added. The 'Protocol' is set to TCP, 'Port range' is 80, and 'Source' is Anywhere-IPv4. The 'Description' field contains the value 'Allow web access', which is highlighted with a yellow box. At the bottom right, there are 'Cancel', 'Preview changes', and 'Save rules' buttons.

SIMULATION INSTRUCTIONS

The screenshot shows the AWS VPC Security Groups console. A success message at the top states 'Inbound security group rules successfully modified on security group sg-0863024549d0d93f5 - Example Security Group'. Below this, the 'Details' tab is selected, showing a table of security group rules:

Name	Security group ID	Security group name	VPC ID	Description	Owner
sg-0c0870aa11825eff	default	vpc-05462efed25763882de	default VPC security group	114002646027	
Web-Server-SG	sg-0863024549d0d93f5	Example Security Group	vpc-05462efed25763882de	Example Security Group	114002646027
sg-09577222e2fe9b4a	default	vpc-0c37713e160966a9	default VPC security group	114002646027	

At the bottom right, there are 'Cancel', 'Actions', and 'Export' buttons.

SIMULATION INSTRUCTIONS

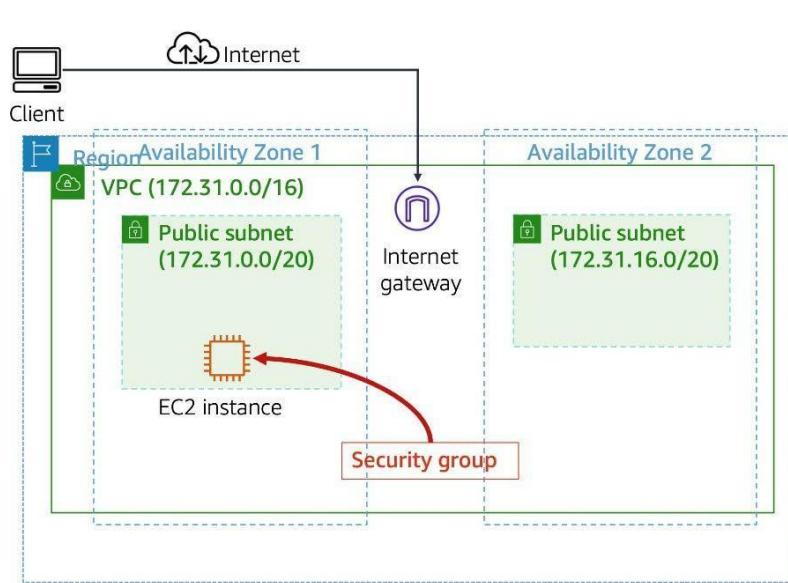
The screenshot shows the AWS VPC Security Groups console. A success message at the top states 'Inbound security group rules successfully modified on security group sg-0863024549d0d93f5 - Example Security Group'. Below this, the 'Inbound rules' tab is selected, showing a table of security group rules:

Details	Inbound rules	Outbound rules	Tags
sg-0863024549d0d93f5 - Example Security Group			

At the bottom right, there are 'Cancel', 'Actions', and 'Export' buttons.

Task 6: Identify an EC2 instance's VPC and subnet and create a VPC

In this task, you find the VPC and subnet for an EC2 instance. You also test your Web-Server-SG security group configuration by confirming that you can access the EC2 instance from the internet.



Public route table	
Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	Internet gateway

Security Group Inbound Rule		
Source	Protocol	Port range
0.0.0.0/0	TCP	80

Security Group Outbound Rule		
Destination	Protocol	Port range
0.0.0.0/0	All	All

In the preceding diagram, an EC2 instance is deployed into a public subnet in the default VPC. A security group is associated with the EC2 instance.

26. In the search box, enter **EC2**, and press Enter on your keyboard.

SIMULATION INSTRUCTIONS

Search results for ec2

Try searching with longer queries for more relevant results

Services

- EC2
- EC2 Image Builder
- Recycle Bin
- Amazon Inspector

Features

- EC2 feature
- AMIs
- Elastic IPs
- Capacity reservations

Resources

VPC ID	Description	Owner
v-0562e5d257838820e	default VPC security group	114002646027
v-0562e5d257838820e	Example Security Group	114002646027
v-0c37713e160966e9	default VPC security group	114002646027

27. On the **Services** menu, choose **EC2**.
28. For **Resources**, choose **Instances (running)**.
29. Select **Web-Server**.

The screenshot shows the AWS EC2 Instances page. The left sidebar has sections like EC2 Dashboard, EC2 Global View, Events, and various EC2 management options. The main area shows a table with one instance listed:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
Web-Server	i-0f5939574962eeea	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-107-20-115-151.co...	107.20.115.151	-

Below the table, there's a detailed view for the instance 'i-0f5939574962eeea (Web-Server)'. It shows the private IP (172.31.12.216), instance type (t2.micro), VPC ID (vpc-0562e5d25783882de), and Subnet ID (subnet-0ed00c732d402307c). A callout box highlights the VPC ID and Subnet ID fields.

30. In the bottom half of the screen, locate the value for **VPC ID** and the **Subnet ID**.

This EC2 instance was deployed into the Example VPC that you explored.

31. Review the following information, and then choose **Continue** in the player window.
This EC2 instance was deployed into Public Subnet 1, which is part of the Example VPC. When you launch an EC2 instance, both the VPC and the subnet are defined for the instance.
These configurations can't be changed. In a later task, you explore the steps for creating a new EC2 instance.

In a live environment, you could test that the website that runs on the EC2 instance is live. You would copy and paste the public IPv4 address into a web browser.

Being able to use the default VPC when you are first learning about and working with AWS cloud is very convenient. However, in the real world, you often need to create custom VPCs to meet a customer's requirements. For example, a customer might have already used the CIDR range of the default VPC in their on-premises network configuration. A customer might also want to vary how many addresses are included in each subnet. Because it is not possible to change the CIDR ranges assigned to the VPC or its subnets, you need to create a new VPC for your customer.

In this scenario, you create a new VPC. Your customer provided the following network requirements for the VPC's CIDR ranges:

Top-level VPC:

- VPC IPv4 CIDR block: 10.0.0.0/16

Availability Zones:

- They need to deploy their resources to two Availability Zones.

Two public subnets:

- Public Subnet 1: 10.0.0.0/24
 - Public Subnet 2: 10.0.1.0/24
- Two private subnets:

- Private Subnet 1: 10.0.2.0/24
- Private Subnet 2: 10.0.3.0/24

The Example VPC that you explored earlier did not have any private subnets. Remember that the difference between a public subnet and a private subnet is if they can be reached directly from the internet. The route table associated with a public subnet includes a route to an internet gateway, and the route table for a private subnet does not.

Task 7: Create a custom VPC

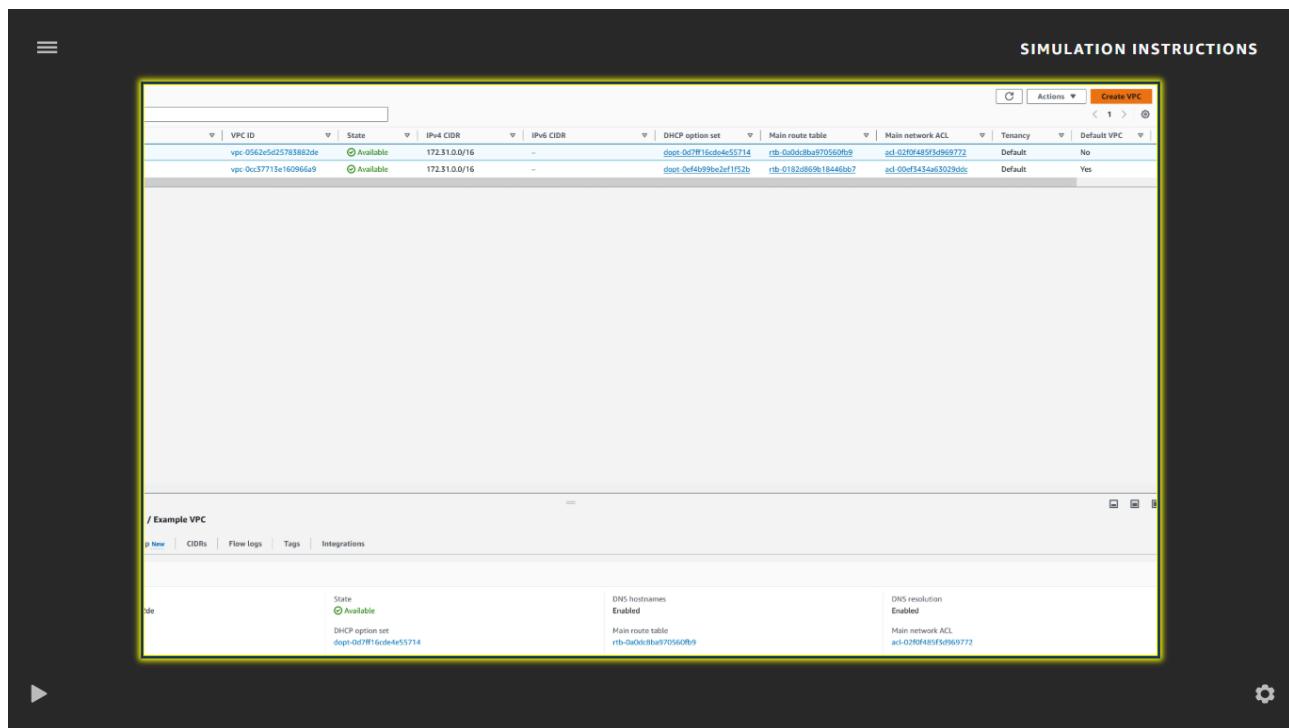
You can configure the VPC by defining its IP address range and creating subnets. You can also configure route tables, network gateways, and security settings.

The VPC console provides a wizard that can automatically create several VPC architectures. You use this wizard to create a new VPC.

If the configuration of a setting is not mentioned in these steps, leave the default value.

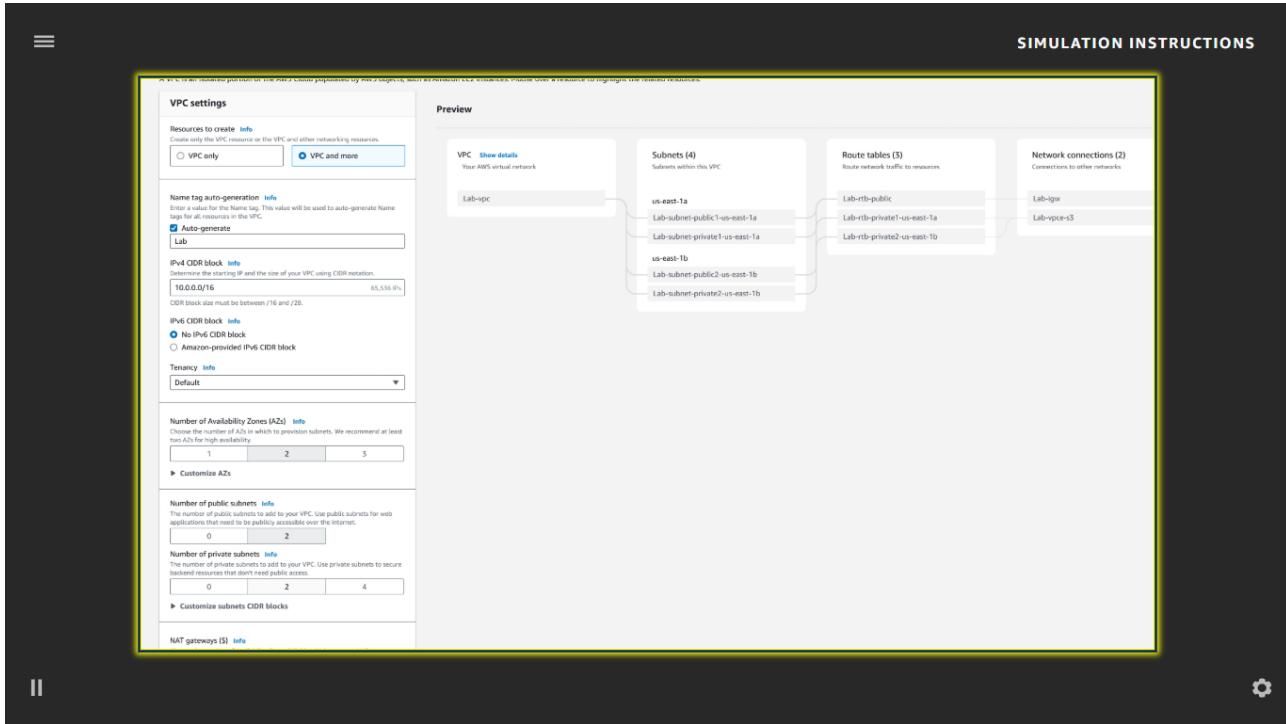
32. On the AWS Management Console on the **Services** menu, enter **VPC**, and press Enter on your keyboard.
33. From the search results, choose **VPC**.

34. In the left navigation pane, choose **Your VPCs**.
35. Choose **Create VPC**.



36. On the **Create VPC** page, configure the following settings:
 - o For **Resources to create**, choose **VPC and more**.
 - o For **Name tag auto-generation**, enter **Lab**, and then press Enter on your keyboard.
 - o Ensure that **IPv4 CIDR block** is **10.0.0.0/16**.
 - o For **Availability Zones (AZs)**, choose **2**.

- o For Number of public subnets, choose 2.
- o For Number of private subnets, choose 2.
- o Expand Customize subnets CIDR blocks.
- o Update the subnet CIDR block values with the following ranges. Press Enter after each input:



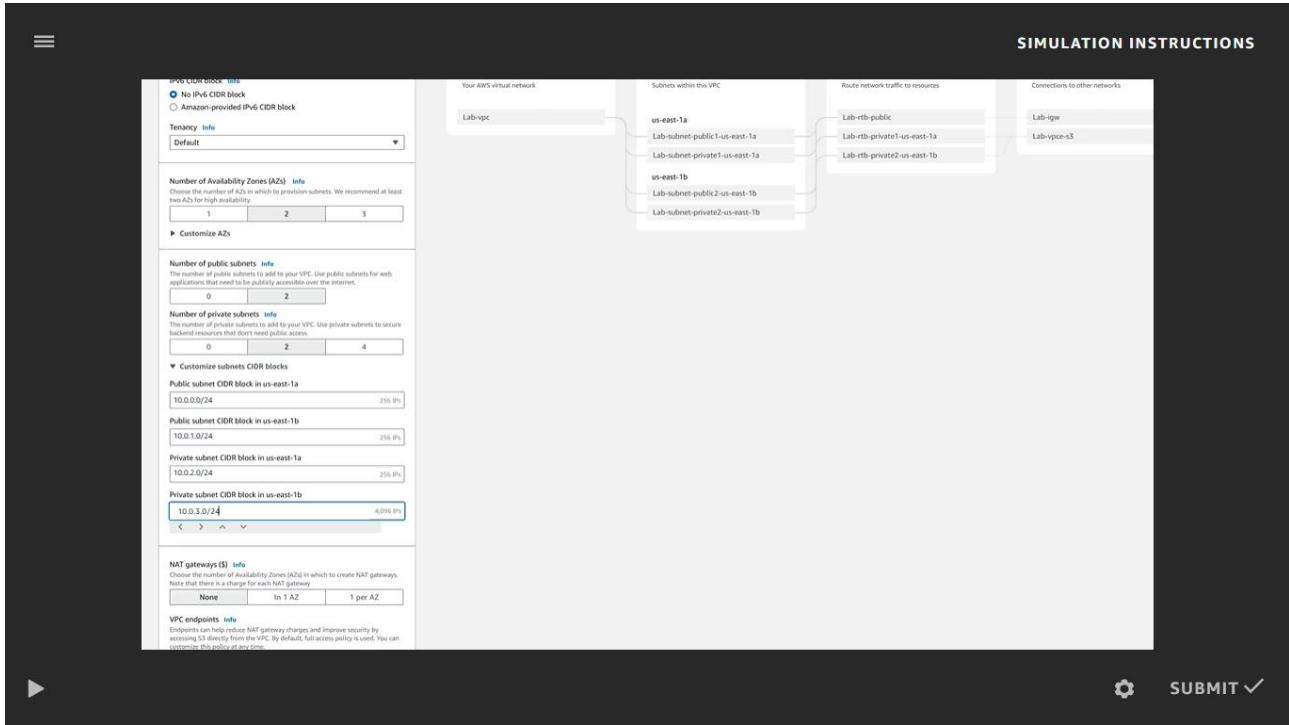
Two public subnets:

- **Public Subnet 1a:** 10.0.0.0/24
- **Public Subnet 2b:** 10.0.1.0/24

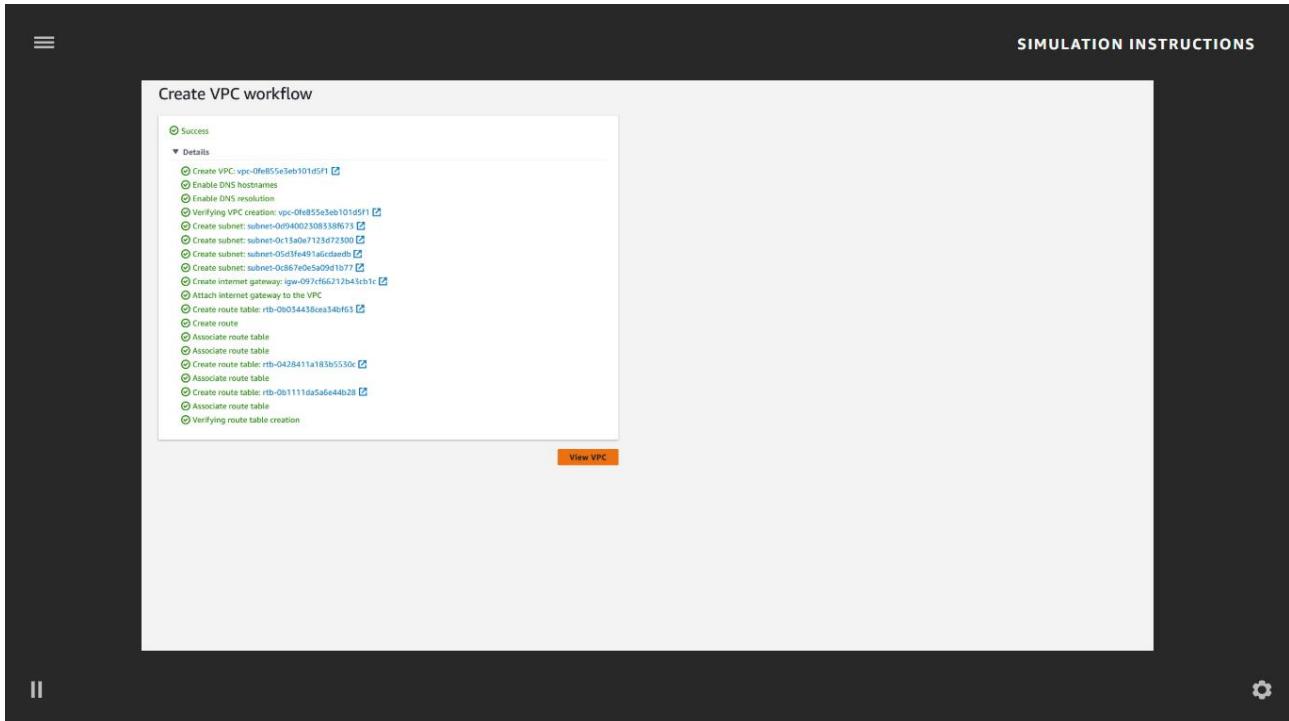
Two private subnets:

- **Private Subnet 1a:** 10.0.2.0/24
- **Private Subnet 2b:** 10.0.3.0/24

Take a moment to review the **Preview** diagram provided in the wizard.



37. Choose Continue.
38. Choose Create VPC.



The wizard immediately starts creating your VPC. After it finishes, you have a VPC that has all of the components that you explored earlier: subnets, route tables, an internet gateway, and a default security group. The VPC wizard also automatically configures the routes in the route tables for both the public subnets and the private subnets.

Like the default security group you explored earlier, the default security group created by the wizard

blocks incoming traffic from the internet. To reach a web server in the new VPC, you need to add a rule to this default security group.

39. Choose View VPC.

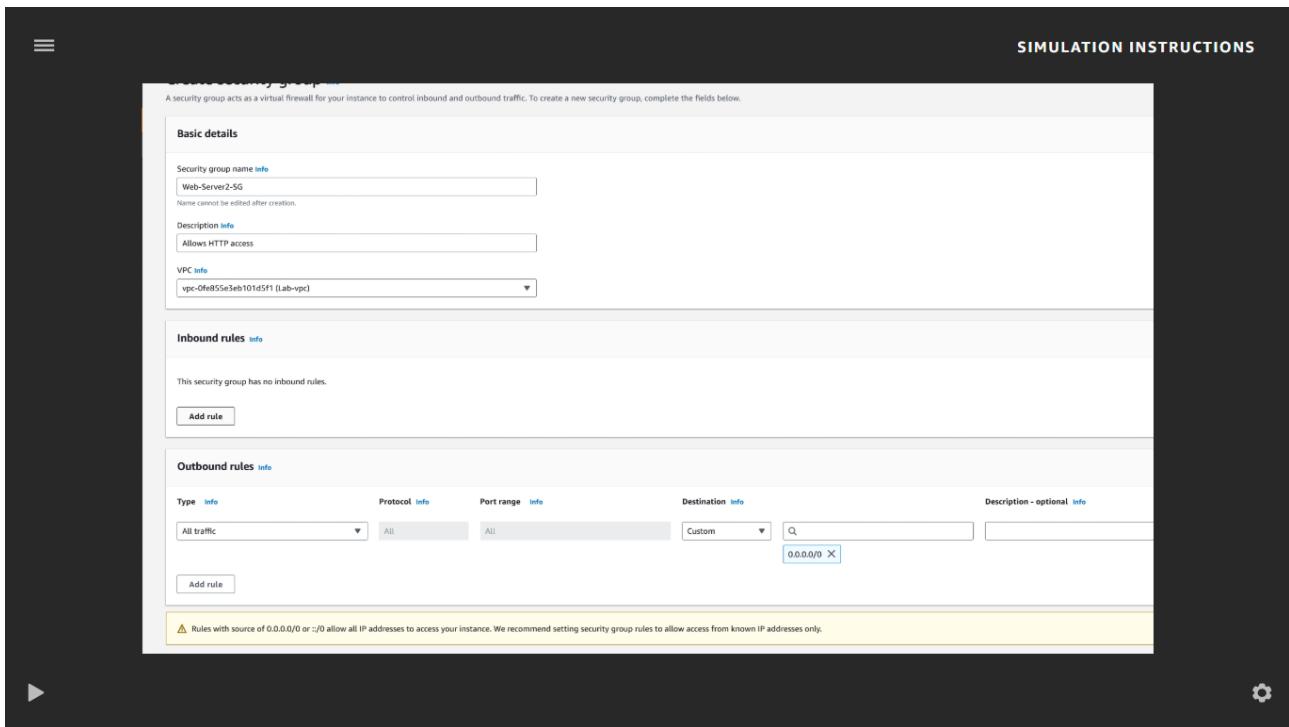
The screenshot shows the AWS CloudFormation console with the 'Details' tab selected for a VPC named 'Lab-vpc'. The VPC ID is 'vpc-0fe855e3eb101d5f1'. The status is 'Available'. The resource map shows the following components:

- Subnets (4):** Lab-east-1a, Lab-subnet-public1-us-east-1a, Lab-subnet-private1-us-east-1a, Lab-east-1b, Lab-subnet-public2-us-east-1b, Lab-subnet-private2-us-east-1b.
- Route tables (4):** Lab-rtb-private01-us-east-1a, Lab-rtb-public, rtb-0facc0160f00e553, Lab-rtb-private2-us-east-1b.
- Network connections (1):** Lab-lgw.

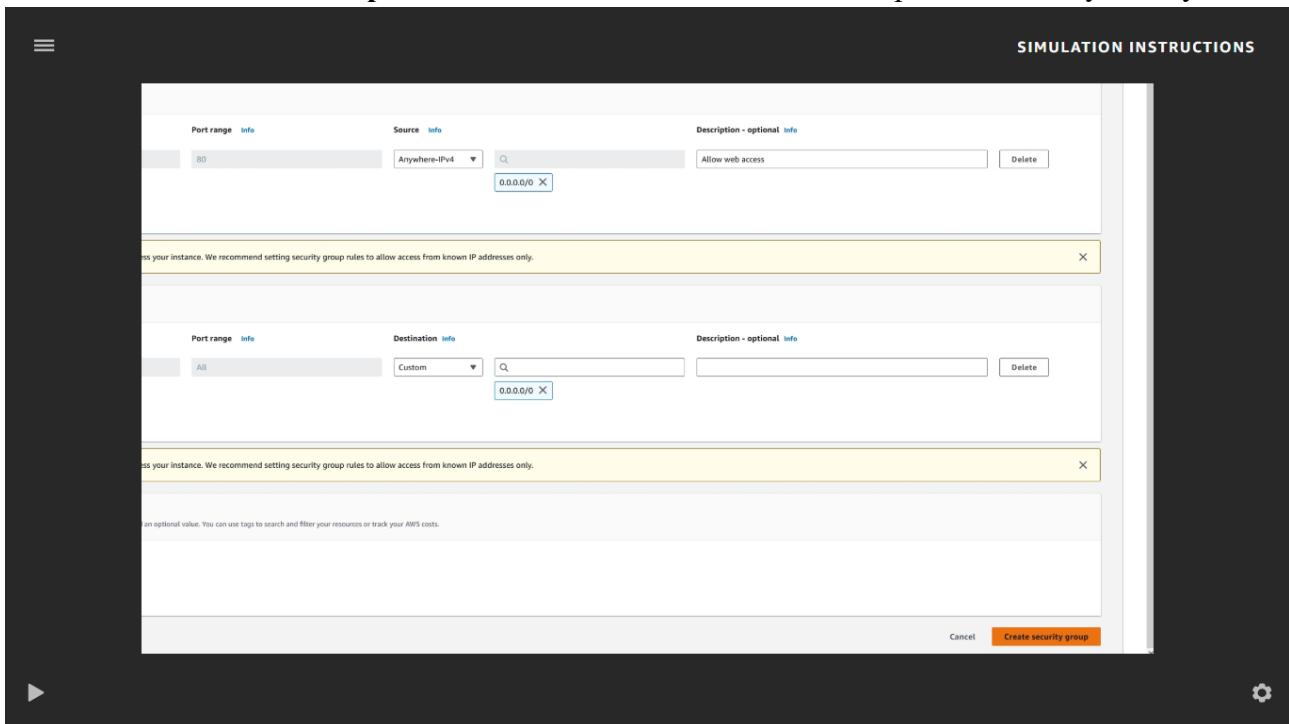
A callout box highlights the 'Resource map' section, which displays the VPC structure with subnets, route tables, and network connections.

Recall that a VPC's default security group does not allow traffic from outside the VPC. Because you should not change the default security group, you add a new security group to your custom VPC.

40. In the left navigation pane, choose **Security groups**.
41. Choose **Create security group**.
42. For **Security group name**, enter **Web-Server2-SG**, and then press Enter on your keyboard.
43. For **Description**, enter **Allows HTTP access**, and then press Enter on your keyboard.
44. For **VPC**, choose **Lab-vpc**.



45. In the **Inbound rules** section, choose **Add rule**, and then configure the following settings:
- o For **Type**, choose **HTTP**.
 - o From the **Source** dropdown list, choose **Anywhere-IPv4**.
 - o For **Description**, enter **Allow web access**, and then press Enter on your keyboard.

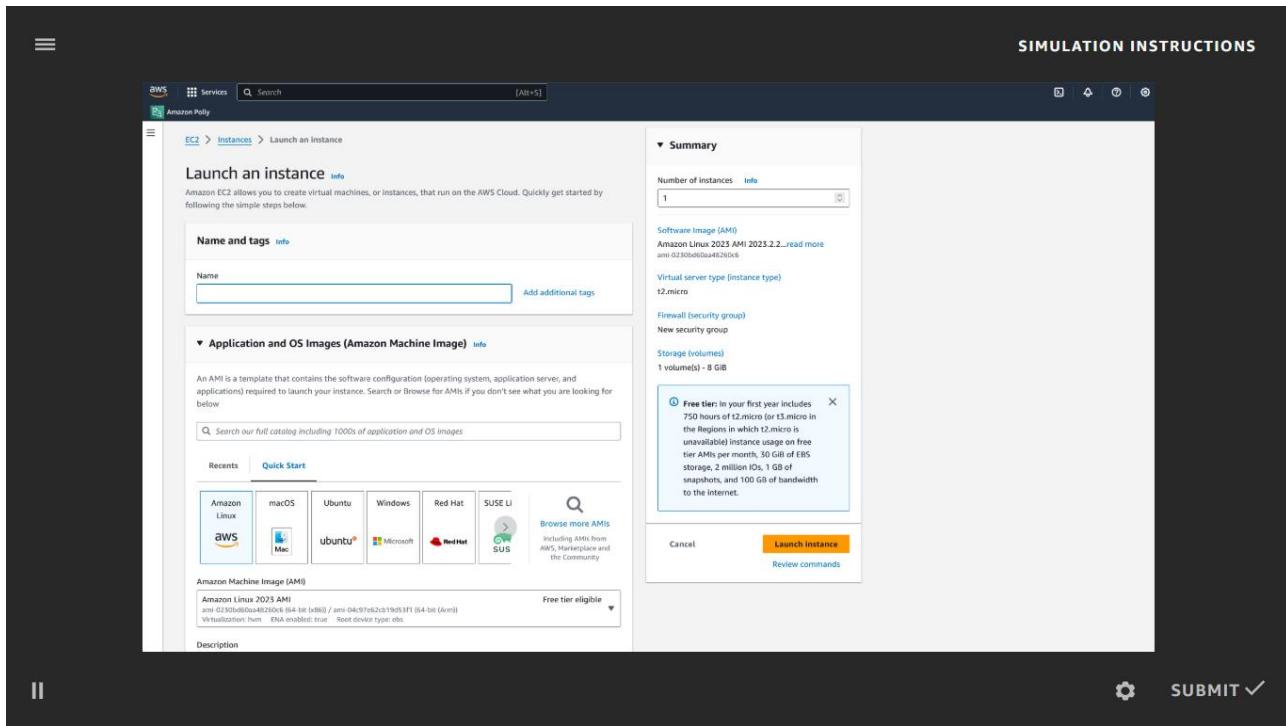


46. Choose **Create security group**.

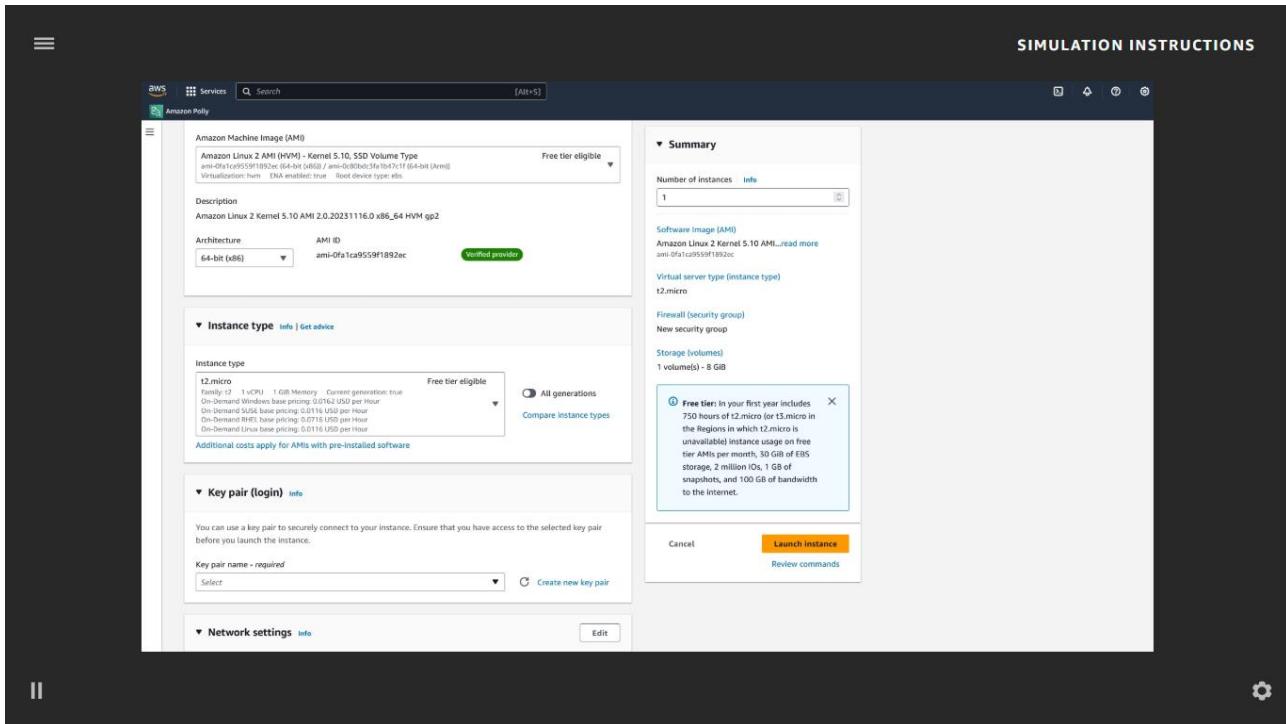
Task 8: Explore the configuration settings for launching an EC2 instance into your custom VPC

In this task, you explore the **Launch an instance** page and enter the settings required to launch a new EC2 instance into your custom VPC.

47. In the **Launch instance** section, choose the **Launch instance** button.

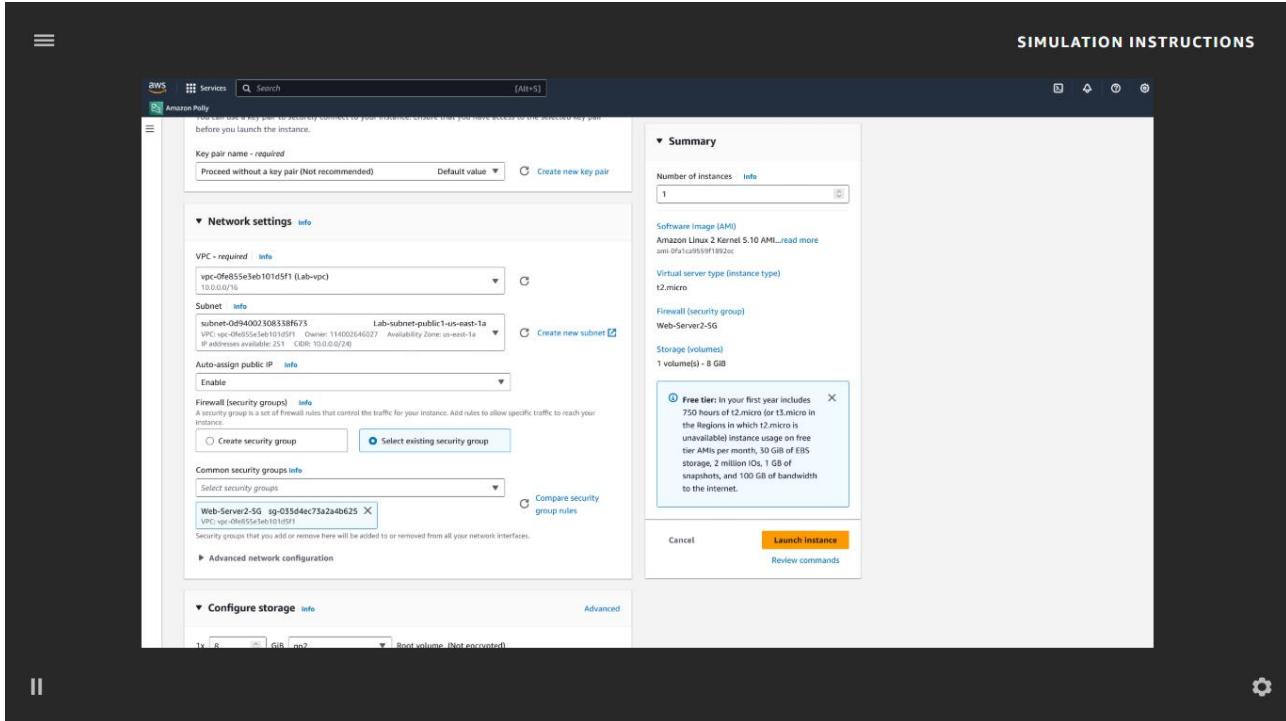


48. On the **Launch an instance** page, configure the following options:
- o In the **Name and tags** pane, for **Name**, enter **Web-Server2**, and then press Enter on your keyboard.
 - o In the **Application and OS Images (Amazon Machine Image)** section, **Amazon Linux** is the default. From the **Amazon Machine Image (AMI)** list, choose **Amazon Linux 2 AMI**.



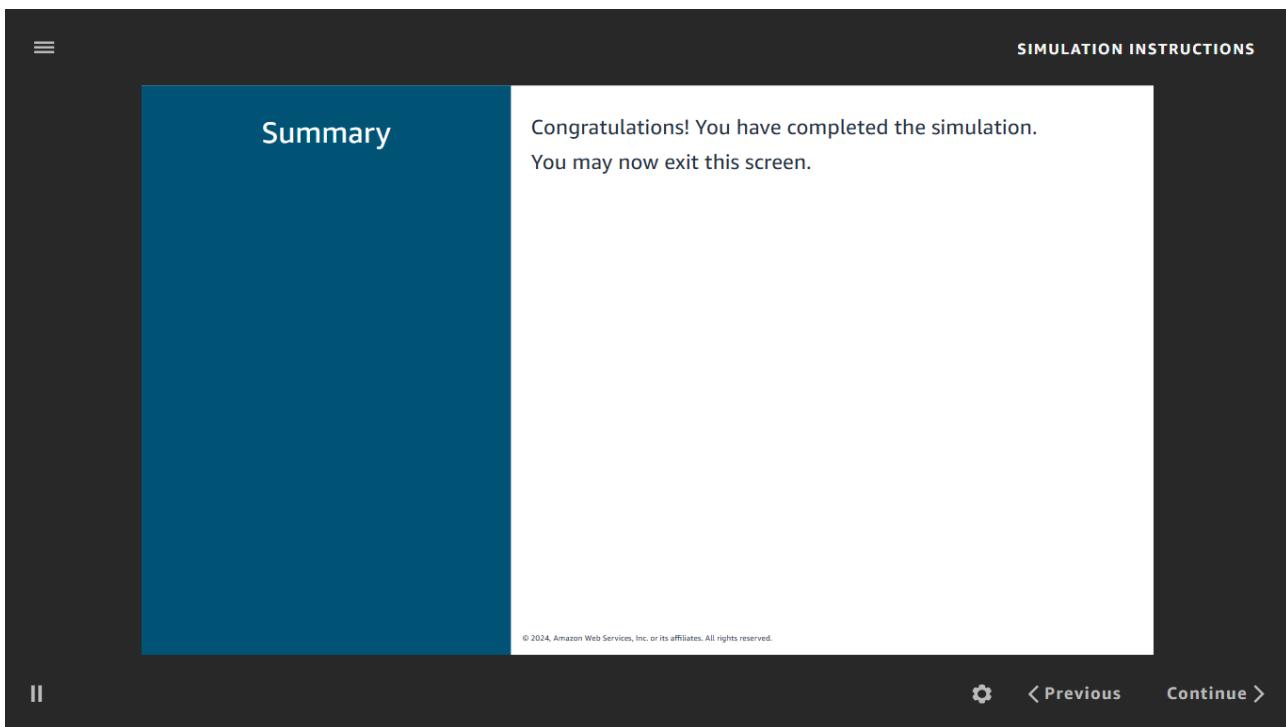
Note: Do not choose **Amazon Linux 2023 AMI**.

- o The default instance type is **t2.micro**. Keep the default setting.
- o In the **Key pair (login)** section, from the **Key pair name - required** dropdown list, choose **Proceed without a key pair (Not recommended)**.
- o In the **Network settings** section, choose **Edit**, and configure the following settings:
 - o For **VPC - required**, choose **Lab-vpc**.
 - o For **Subnet**, choose the subnet with **public1** in the name.
 - o For **Auto-assign public IP**, choose **Enable**.
 - o For **Firewall (security groups)**, choose **Select an existing security group**.
 - o From the **Common security groups** dropdown list, choose the **WebServer2-SG** security group.



49. Choose Launch instance.

Well done! Now you know how to create a custom VPC and how to deploy a new EC2 instance into it.



Practical 8: Getting Started with AWS Lambda

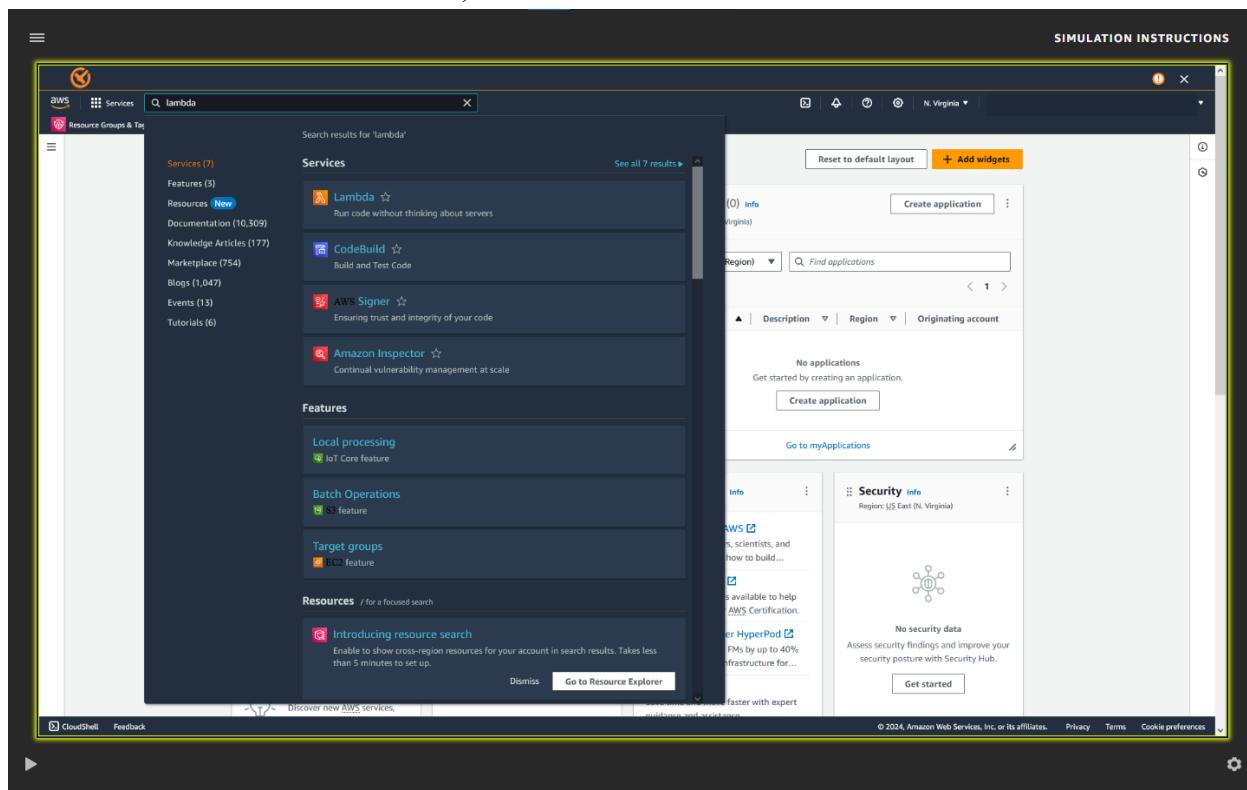
Aug 6, 2025

- A. Create a Lambda function.
- B. Configure an Amazon S3 trigger on a Lambda function.
- C. Observe logs and metrics for a Lambda function to determine performance.
- D. Size and configure a Lambda function for optimal performance.

The screenshot shows a web browser window with the AWS Educate homepage. The URL in the address bar is `awseducate.com/student/s/content?keyword=lambda`. The page features a dark header with the AWS Educate logo and navigation links for Courses & labs, Jobs, Emerging Talent Community, and a user profile for Shivam Vishwakarma. The main content area has a teal banner with the text "Your cloud journey starts here" and "No matter your goal, we've gathered the most useful content to build your cloud skills.". Below this is a search bar with the term "lambda". On the left, there's a sidebar with "Filters" (Course Features, Skills, Level, Duration, Language) and a "Results (1)" section showing a card for "Getting Started with Serverless" (Foundational | 2 hour(s), Cloud Computing). To the right, there's an "Explore" sidebar with sections for "Learn more from AWS", "We want to hear from you! Tell us about your AWS Educate experience so we can improve", "Share your feedback now", "Fast-track your future. Learn to be an AWS Cloud developer in as little as one year with AWS Cloud Institute.", "Apply Today! Available only to US based learners, 18 years or older.", "Interested in building your AI skills to work towards the new AWS Certified AI Practitioner certification?", "Visit this AWS T&C blog to learn more!", and "Interested in learning about GenAI or cloud basics from an instructor? AWS offers free, live Instructor-led training". The bottom of the screen shows a Windows taskbar with icons for File Explorer, Edge, File Manager, Google Chrome, and File History, along with system status indicators like weather (28°C Mostly cloudy), date (06-08-2025), and time (08:07).

Task 1: Creating a Lambda function

1. On the **AWS Management Console**, in the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
2. From the search results, choose **Lambda**.



3. Choose **Create function**.

The screenshot shows the AWS Lambda Functions page. On the left, there's a sidebar with options like Dashboard, Applications, Functions, Additional resources, and Related AWS resources. The main area shows a table titled 'Functions (1)'. The table has columns for Function name, Description, Package type, Runtime, and Last modified. One row is visible for a function named 's3Mover' which is described as a 'Lambda function to move files from one bucket to the other'. It is packaged as a Zip file and runs on Python 3.9, with the last modification being 5 minutes ago.

4. For the **Function name**, enter **resize_image**, and then press Enter on your keyboard.
5. From the **Runtime** dropdown list, choose **Python 3.9**.

The screenshot shows the 'Create function' wizard. In the first step, 'Basic information', the 'Function name' field contains 'resize_image'. The 'Runtime' dropdown is set to 'Python 3.9'. Other options like 'Author from scratch', 'Use a blueprint', and 'Container image' are also shown. Below these, sections for 'Architecture', 'Permissions', and 'Advanced settings' are partially visible. At the bottom right, there are 'Cancel' and 'Create function' buttons.

6. Expand the **Change default execution role** section.

7. Choose **Use an existing role**.
8. From the **Existing role** dropdown list, choose **ResizeImageLambdaRole**.

SIMULATION INSTRUCTIONS

Basic information

Function name
Enter a name that describes the purpose of your function.

Runtime [Info](#)
Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.
 [Change](#)

Architecture [Info](#)
Choose the instruction set architecture you want for your function code.
 x86_64
 arm64

Permissions [Info](#)
By default, Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. You can customize this default role later when adding triggers.

▼ Change default execution role

Execution role
Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).

Create a new role with basic Lambda permissions
 Use an existing role
 Create a new role from AWS policy templates

Existing role
Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.

[View the ResizeImageLambdaRole role](#) on the [IAM](#) console. [Change](#)

► Advanced settings

[Cancel](#) [Create function](#)

9. Choose **Create function**.

SIMULATION INSTRUCTIONS

Successfully created the function **resize_image**. You can now change its code and configuration. To invoke your function with a test event, choose "Test".

[Lambda](#) > [Functions](#) > [resize_image](#)

[Throttle](#) [Copy ARN](#) [Actions](#)

[Export to Application Composer](#) [Download](#)

Function overview [Info](#)

resize_image

Description
-

Last modified
23 seconds ago

Function ARN
[arn:aws:lambda:us-east-1:666517437573:function:resize_image](#)

Function URL [Info](#)
-

[Code](#) [Test](#) [Monitor](#) [Configuration](#) [Aliases](#) [Versions](#)

Code source [Info](#)

[File](#) [Edit](#) [Find](#) [View](#) [Go](#) [Tools](#) [Window](#) [Test](#) [Deploy](#)

Environment Variants [Create New](#)

Environment [Edit](#)

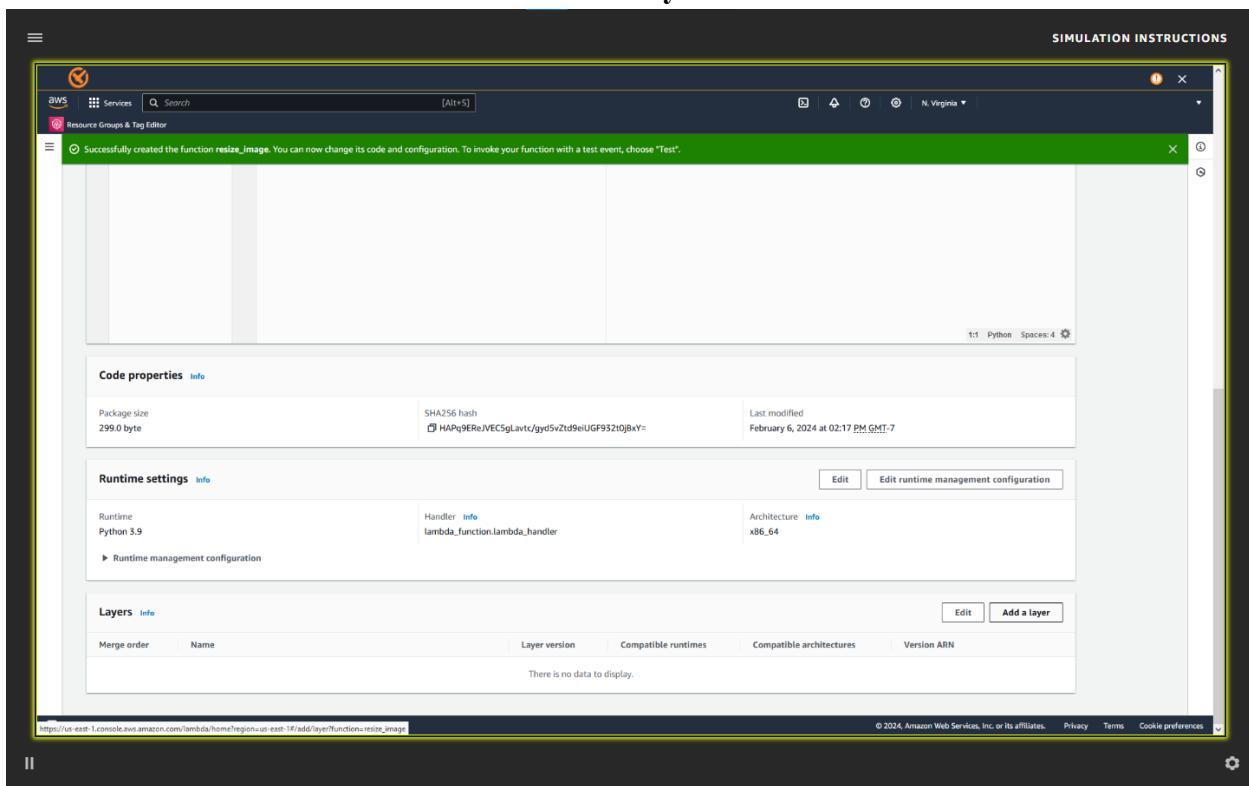
lambda function [Environment Variables](#)

```
import json
def lambda_handler(event, context):
    # TODO implement
    return {
        'statusCode': 200,
        'body': json.dumps('Hello from Lambda!')
    }
```

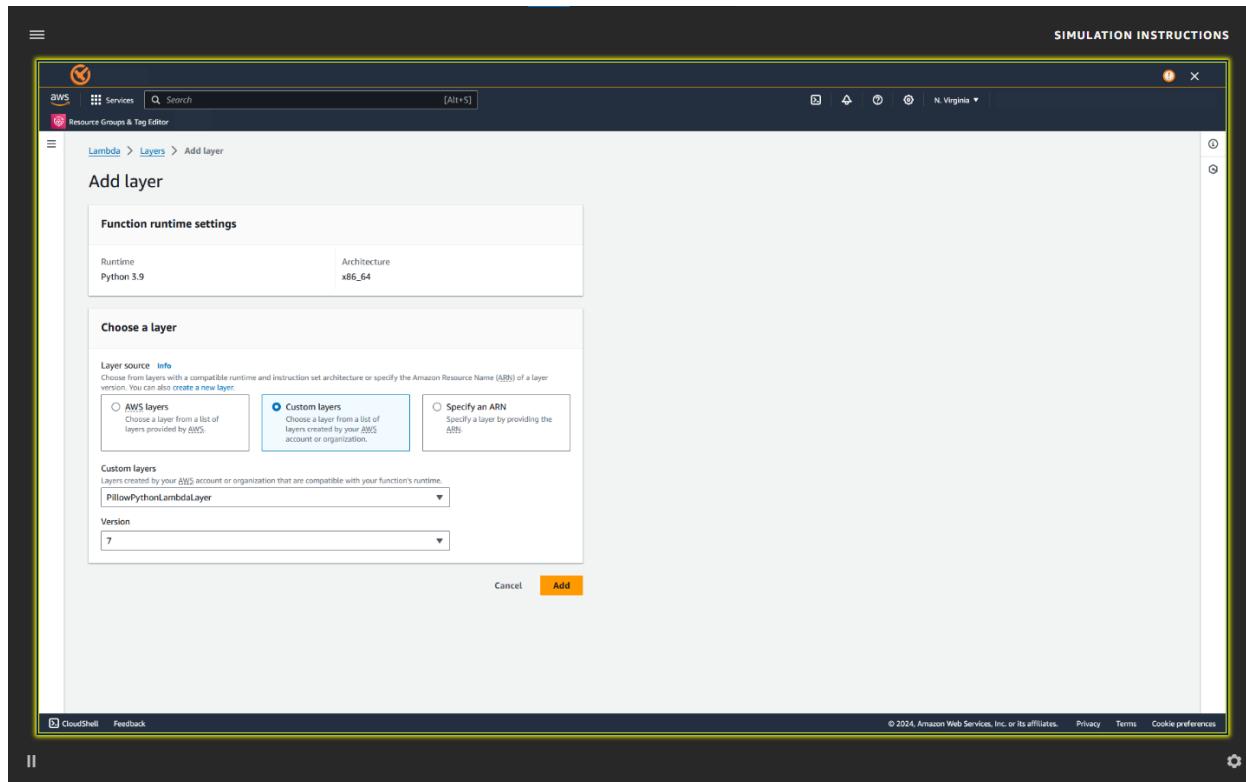
[Upload from](#)

[CloudShell](#) [Feedback](#)

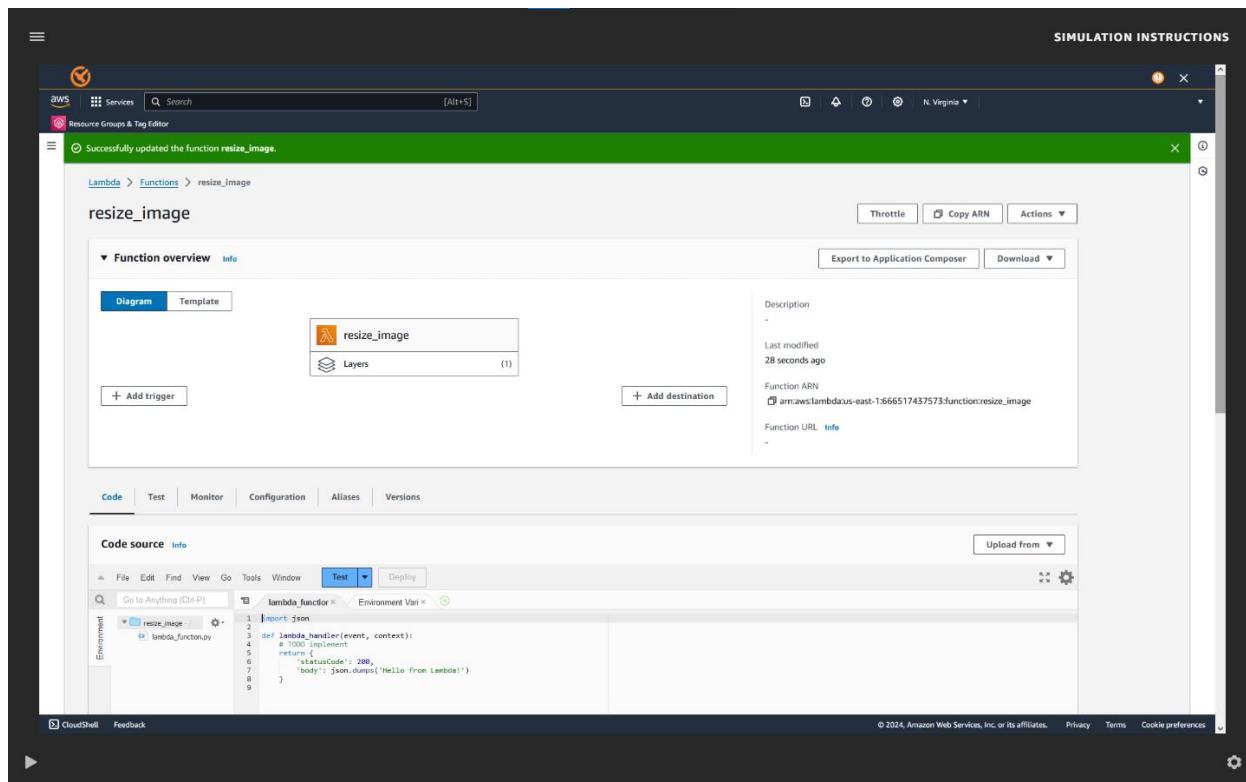
10. Select the scroll bar to scroll to the **Layers** section.



11. Choose **Add a layer**.
12. Choose **Custom layers**.
13. From the **Custom layers** dropdown list, choose **PillowPythonLambdaLayer**.
14. From the **Version** dropdown list, choose the available option.



15. Choose Add.



16. Select the scroll bar to scroll to the **Code source** section.

17. Press Shift+S on your keyboard to switch to a virtual version of these simulation

instructions.

18. Press Shift+C to select the following code in the simulation instructions.

```
import
boto3 import
os import sys
import uuid
from urllib.parse import unquote_plus
from PIL import Image
import PIL.Image

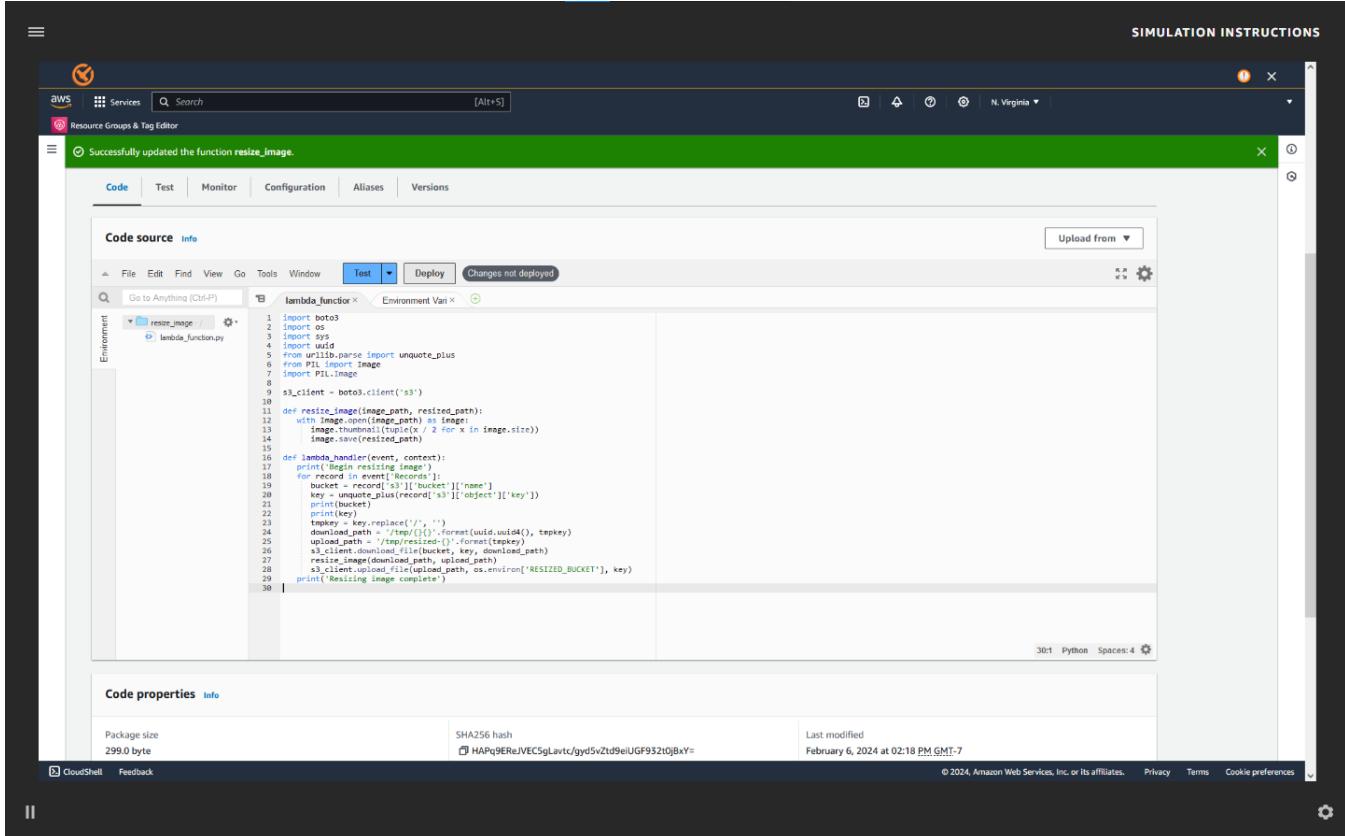
s3_client = boto3.client('s3')

def resize_image(image_path, resized_path):
    with Image.open(image_path) as image:
        image.thumbnail(tuple(x / 2 for x in image.size))
        image.save(resized_path)

def lambda_handler(event, context):
    print('Begin resizing image')
    for record in event['Records']:
        bucket = record['s3']['bucket']['name']
        key = unquote_plus(record['s3']['object']['key'])
        print(bucket)
        print(key)
        tmpkey = key.replace('/', '-')
        download_path = '/tmp/{}{}'.format(uuid.uuid4(), tmpkey)
        upload_path = '/tmp/resized-{}'.format(tmpkey)
        s3_client.download_file(bucket, key, download_path)
        resize_image(download_path, upload_path)
        s3_client.upload_file(upload_path, os.environ['RESIZED_BUCKET'], key)
    print('Resizing image complete')
```

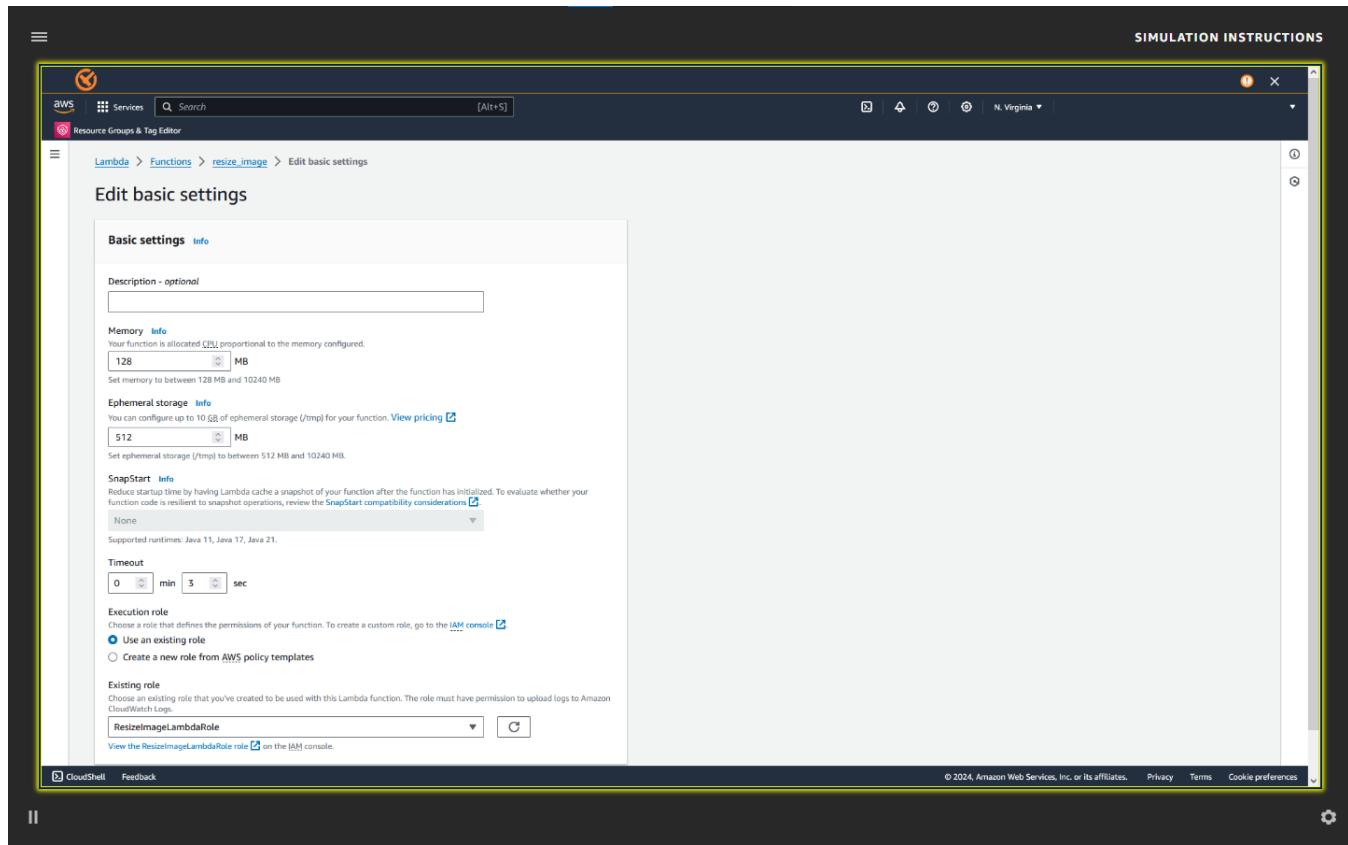
19. Choose (right-click) the selected text to open the context menu, and copy the code.
20. Press Shift+S on your keyboard to switch back to the AWS Management Console.
21. Press Shift+C on your keyboard to copy the text in the **Code source** section.

22. Choose (right-click) the selected text to open the context menu to paste and replace the default source code in the `lambda_function.py` file.

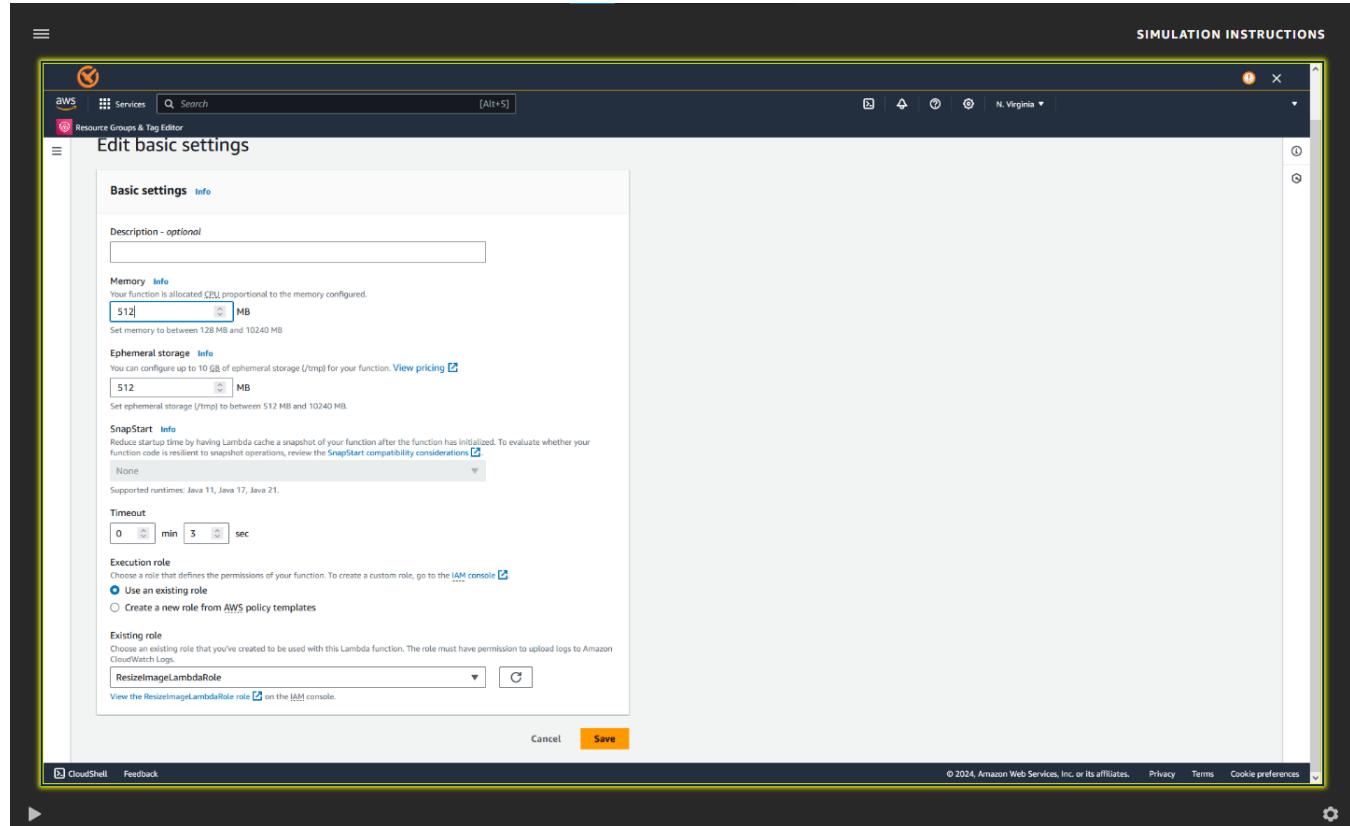


```
1 import boto3
2 import os
3 import sys
4 import uuid
5 import json
6 from PIL import Image
7 import io
8
9 s3_client = boto3.client('s3')
10
11 def resize_image(image_path, resized_path):
12     with Image.open(image_path) as image:
13         image.thumbnail(tuple(x / 2 for x in image.size))
14         image.save(resized_path)
15
16 def lambda_handler(event, context):
17     print('Begin resizing image')
18     for record in event['Records']:
19         bucket = record['S3']['bucket']['name']
20         key = unquote_plus(record['S3']['object']['key'])
21         print(bucket)
22         print(key)
23         image = key.replace('/', '_')
24         download_path = '/tmp/{}{}'.format(uuid.uuid4(), tmpkey)
25         upload_path = '/tmp/{}{}_resized'.format(tmpkey)
26         s3.download_file(bucket, key, download_path)
27         resize_image(download_path, upload_path)
28         s3_client.upload_file(upload_path, os.environ['RESIZED_BUCKET'], key)
29         print('Resizing image complete')
30
```

23. To deploy your Lambda function, choose **Deploy**.
24. Choose the **Configuration** tab.
25. Choose **Edit**.



26. For Memory, enter **512 MB**, and then press Enter on your keyboard.



27. Choose **Save**.

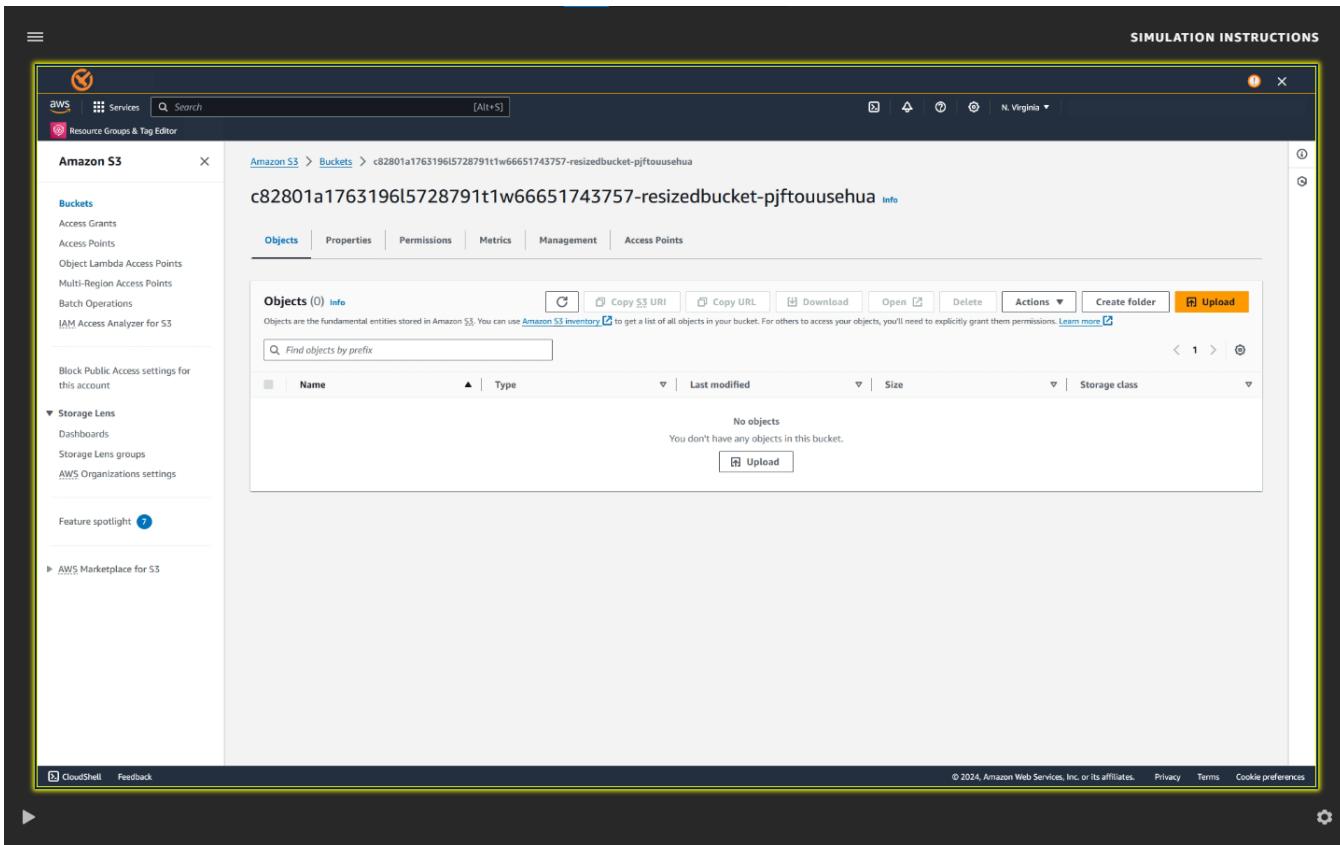
The screenshot shows the AWS Lambda console with the function 'resize_image' selected. The 'Function overview' tab is active, displaying a diagram with a single layer labeled 'resize_image'. Below the diagram are buttons for '+ Add trigger' and '+ Add destination'. On the right side, there are fields for 'Description', 'Last modified', 'Function ARN', and 'Function URL'. The 'Configuration' tab is selected, showing the 'General configuration' section with settings for Memory (512 MB), Ephemeral storage (512 MB), Timeout (0 min 3 sec), and SnapStart (None). The sidebar on the left includes links for Code, Test, Monitor, Configuration, Aliases, and Versions.

28. In the **Search** box, enter **S3**, and then press Enter on your keyboard.

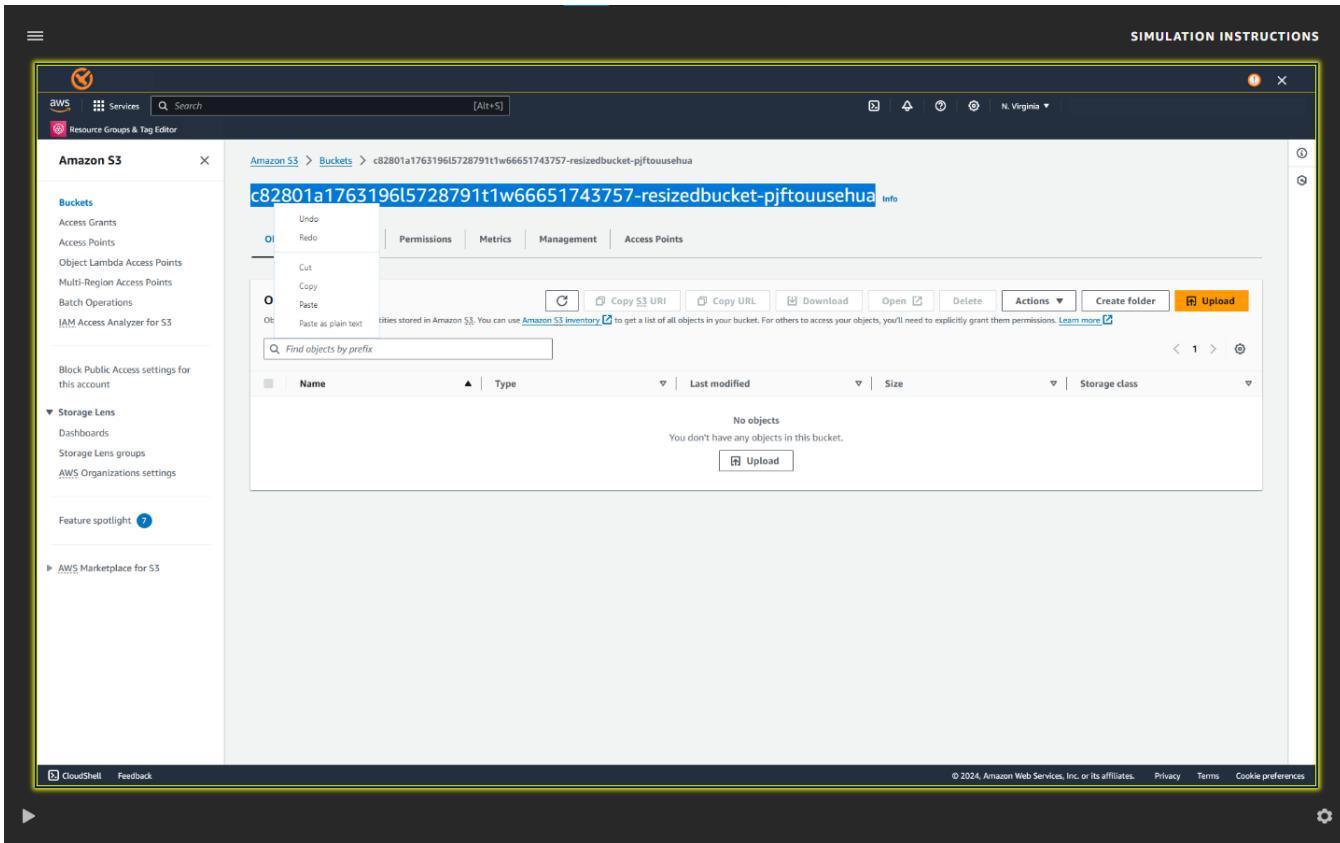
29. From the search results, choose **S3**.

The screenshot shows the AWS S3 console with the 'Amazon S3' page selected. The left sidebar includes links for Buckets, Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3, Block Public Access settings for this account, Storage Lens, Dashboards, Storage Lens groups, AWS Organizations settings, Feature spotlight, and AWS Marketplace for S3. The main area displays an 'Account snapshot' with total storage (Pending), object count (Pending), and average object size (Pending). Below this, the 'General purpose buckets' section lists three buckets: 'c82801a17631965728791t1w6665174574-lambdalayerbucket-koffqzfxfo0', 'c82801a17631965728791t1w6665174575-originalbucket-dvz7ruilic', and 'c82801a17631965728791t1w66651743757-resizedbucket-pjftouusehuu'. Each bucket entry includes its name, AWS Region (US East (N. Virginia) us-east-1), access status ('Bucket and objects not public'), and creation date (February 6, 2024, 14:12:41 (UTC-07:00)).

30. From the list of buckets, open the bucket with **resizedbucket** as part of the title.

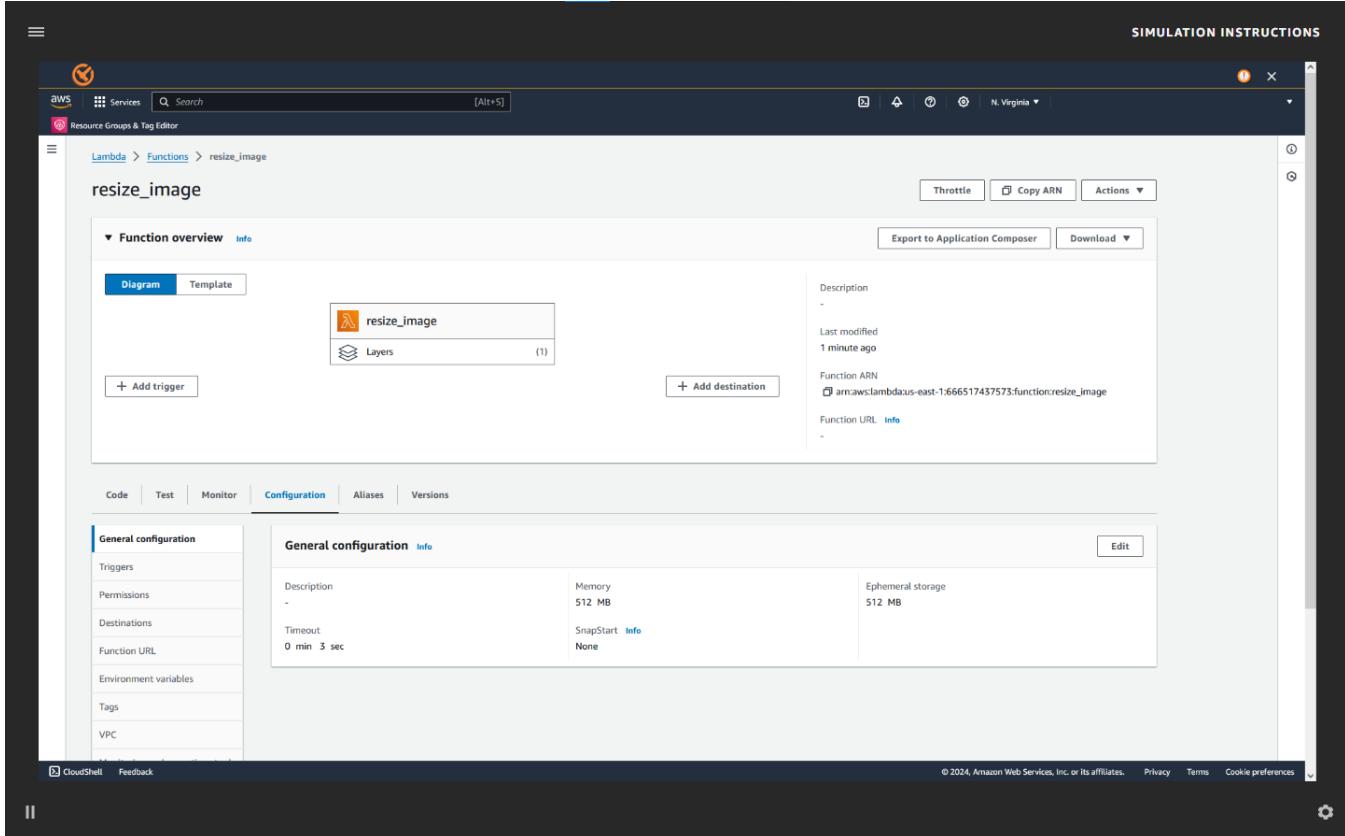


31. Press Shift+C on your keyboard to select the name of the bucket, and then open (right-click) the context menu to copy its name.

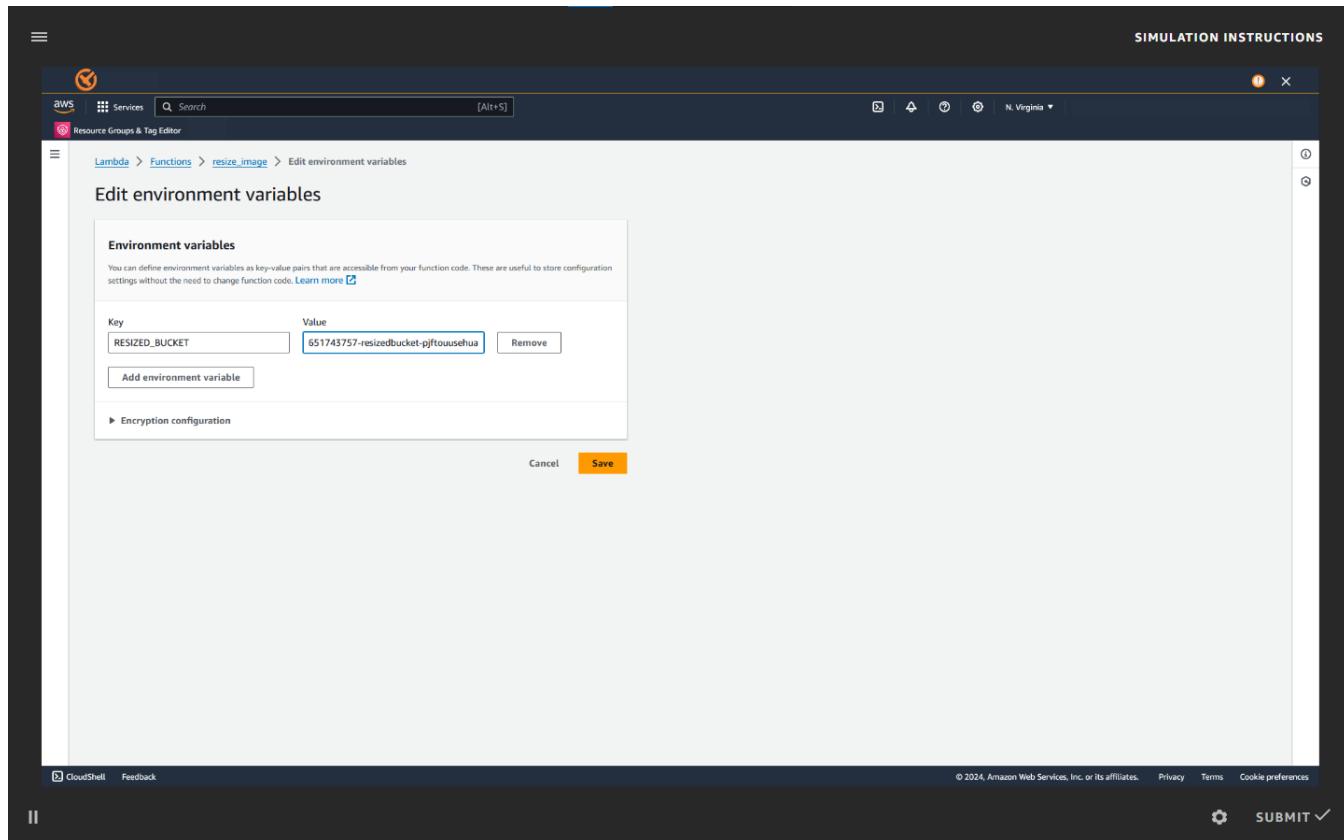


You will use it as the value later.

32. In the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
33. From the search results, choose **Lambda**.
34. Choose the **resize_image** function.

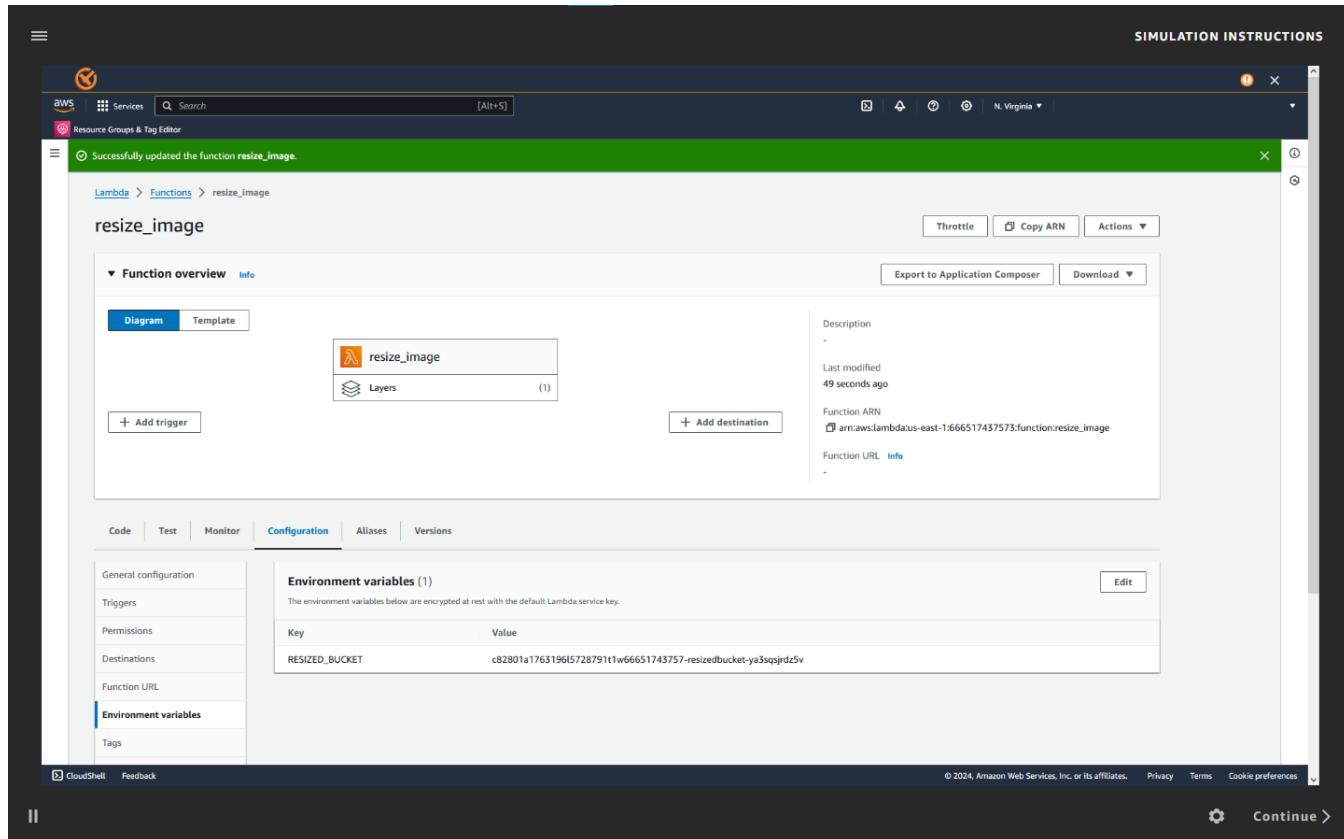


35. On the **Configuration** tab, choose **Environment variables**.
36. In **Environment variables** section, choose **Edit**.
37. Choose **Add environment variable**.
38. For **Key**, enter **RESIZED_BUCKET**, and press Enter on your keyboard.
39. For **Value**, open (right-click) the context menu, and paste in the value you retrieved.



40. Choose Save.

You have created a Lambda function.

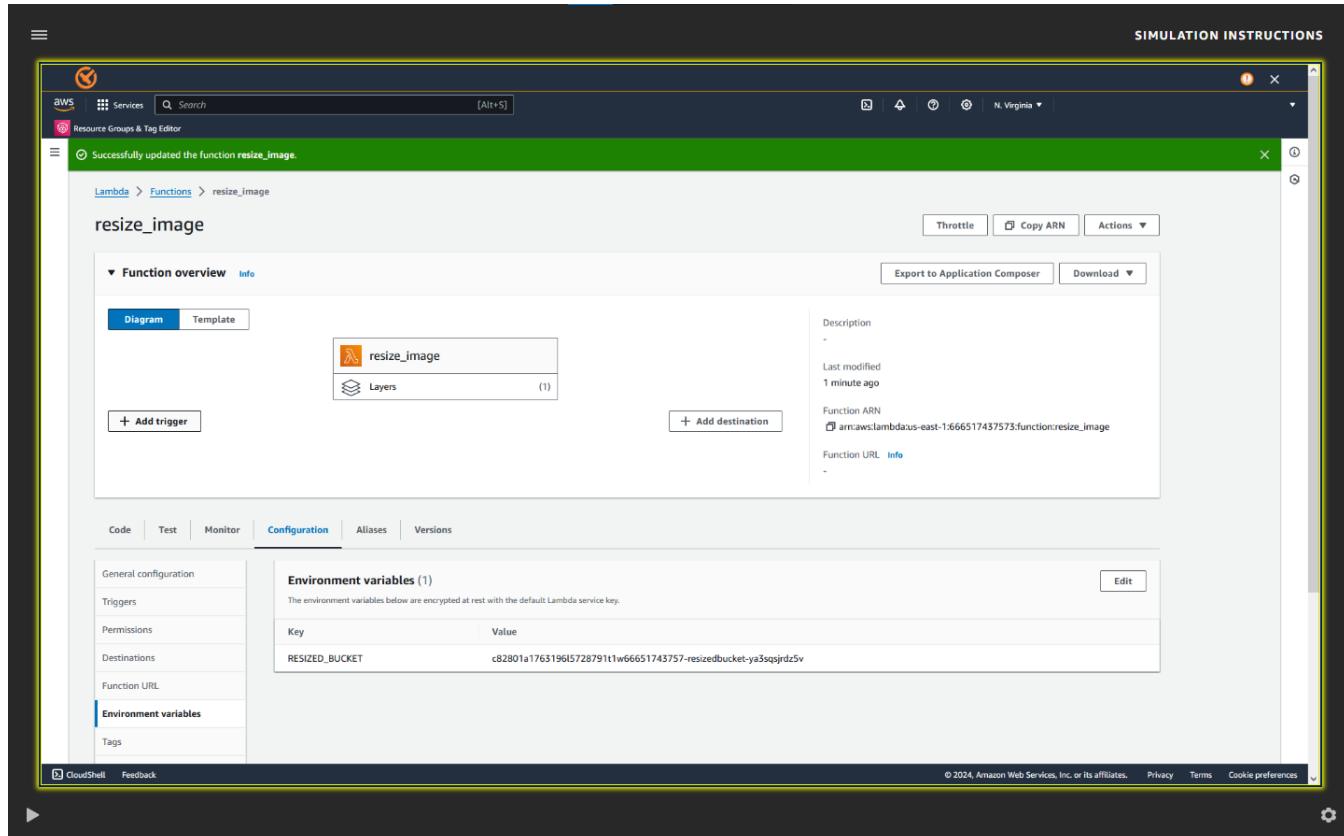


41. Choose **Continue** to move on to task 2.

Task 2: Configuring an Amazon S3 trigger to invoke a Lambda function

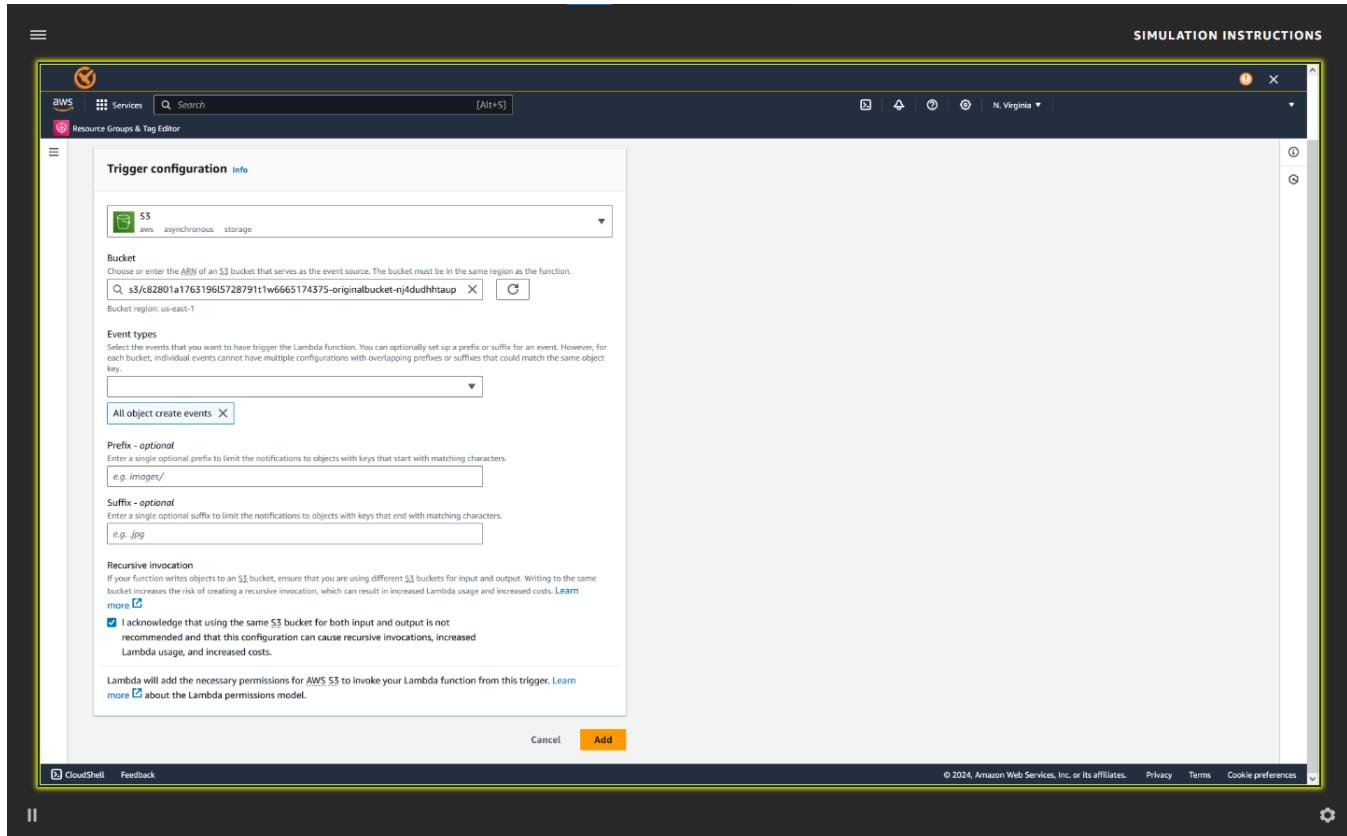
In this task, you configure an Amazon S3 trigger on an existing S3 bucket and your Lambda function. The Lambda function resizes images and places them in another bucket.

42. In the **Function overview** section of the Lambda console, choose **Add trigger**.

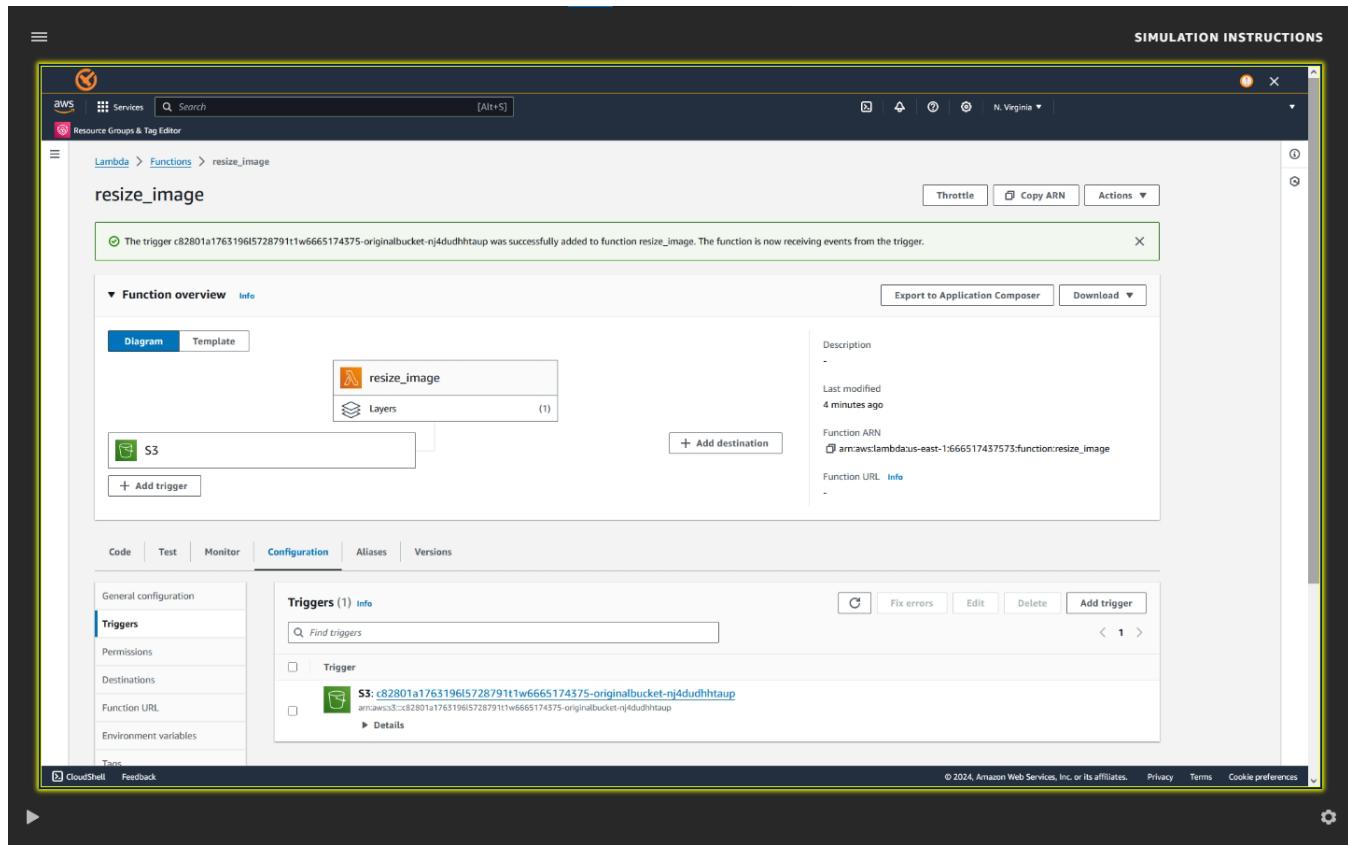


43. In the **Trigger configuration** section, choose **S3** from the dropdown list.

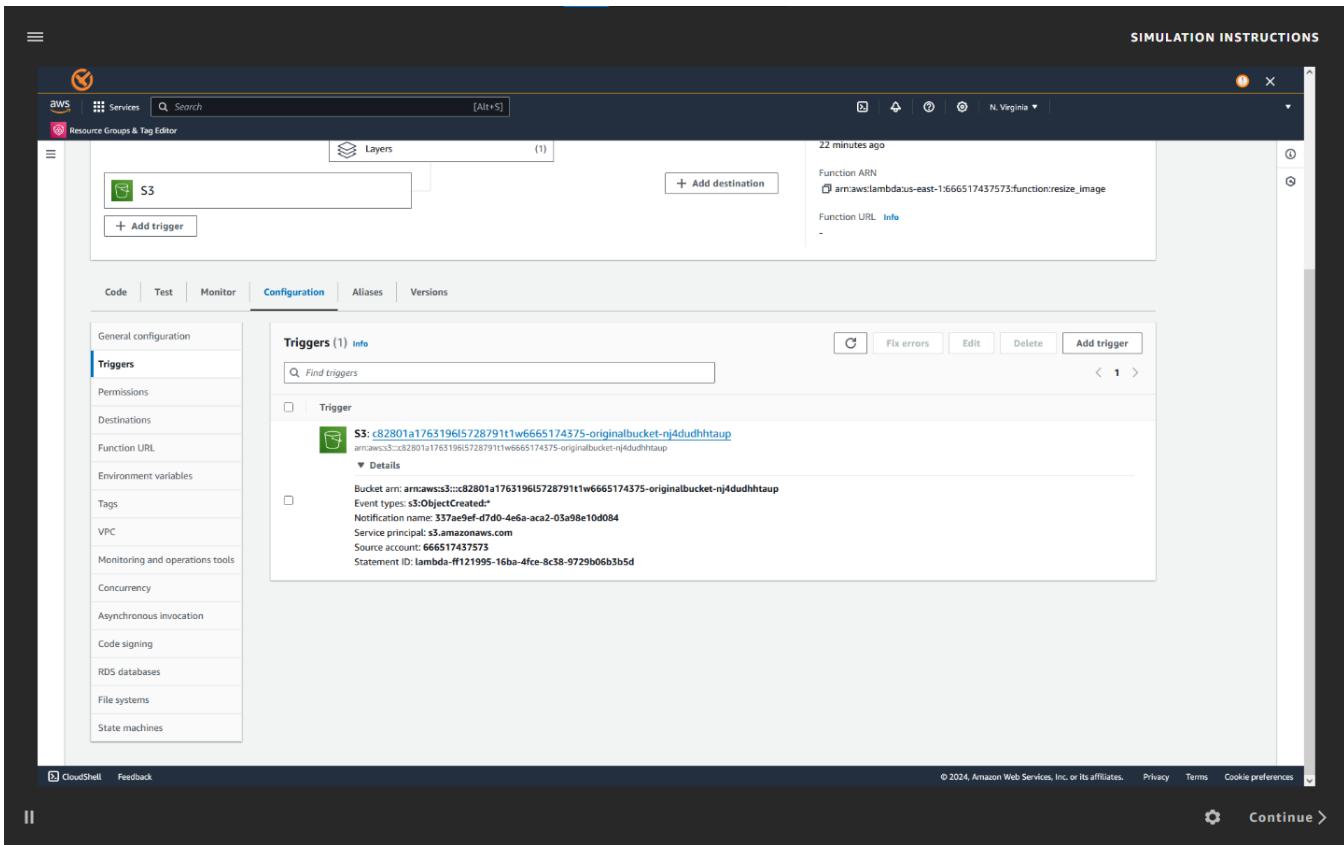
44. For **Bucket**, choose the bucket with **original** in the name.
45. For **Event types**, choose **All object create events** if it is not already selected.
46. For **Recursive invocation**, select the check box to acknowledge the statement



47. Choose **Add**.



48. Select the scroll bar to scroll to the bottom of the page.
49. In the **Triggers** section, for the S3 trigger that was just created, expand **Details**.
50. Verify that the **Bucket arn** has **originalbucket** in the name and that **Event types** contains **s3-ObjectCreated**.



You have configured your Lambda function to be initiated when a new object is uploaded to the S3 bucket.

51. Choose **Continue** to move on to task 3.

Task 3: Uploading an image to the Amazon S3 bucket

In this task, you upload an image file to your bucket.

52. Choose (right-click) the link to open the context menu, choose **Save Link As...**, and then choose **Save** to download the file to your computer:

- large-image.jpg

SIMULATION INSTRUCTIONS

Task 3: Uploading an image to the Amazon S3 bucket

In this task, you upload an image file to your bucket.

33. Open the context (right-click) menu for the following link, and download the file to your computer:
• [large-image.jpg](#)

34. In the AWS Management Console, on the Services menu, enter S3. From the search results, choose S3.

35. Choose the link for the bucket that has **original** in the name.

36. Choose Upload.

37. Choose Add files.

38. Choose the file that you downloaded.

39. Choose Upload.
Your file is uploaded to the bucket.

40. Choose Close.

If you are working on Task 4, you can now return to [step 5](#).

When your Lambda function runs correctly, the image file that you uploaded is reduced in size and placed in the S3 bucket that you specified when you set the environment variable for **RESIZED_BUCKET**.

41. Return to the **Buckets** section in the S3 Console.

42. Choose the link for the bucket that has **resized** in the name.

Notice the file size. It's significantly reduced from the original size of 4.9 MB.

When you uploaded the image file, S3 initiated the **resize_image** Lambda function. Review the logs to see how your function performed.

SIMULATION INSTRUCTIONS

Enter name of file to save to...
File name: **large-image.jpg**
Save as type: JPEG Image (*.jpeg)

When your Lambda function runs correctly, the image file that you uploaded is reduced in size and placed in the S3 bucket that you specified when you set the environment variable for **RESIZED_BUCKET**.

41. Return to the **Buckets** section in the S3 Console.

42. Choose the link for the bucket that has **resized** in the name.

Notice the file size. It's significantly reduced from the original size of 4.9 MB.

When you uploaded the image file, S3 initiated the **resize_image** Lambda function. Review the logs to see how your function performed.

53. Press Shift+S on your keyboard to return to the AWS Management Console.
54. On the AWS Management Console, in the **Search** box, enter **S3**, and then press Enter on your keyboard.

55. From the search results, choose S3.

The screenshot shows the AWS CloudFront console. On the left, there's a sidebar with navigation links like 'Buckets', 'Access Grants', 'Access Points', etc. The main area displays the 'Distribution' configuration for a distribution named 'CloudFront'. It includes sections for 'General' (with a preview of the distribution), 'Behaviors', 'Origin Groups', 'Cache Behaviors', and 'Logs'. A 'Create new distribution' button is at the bottom right.

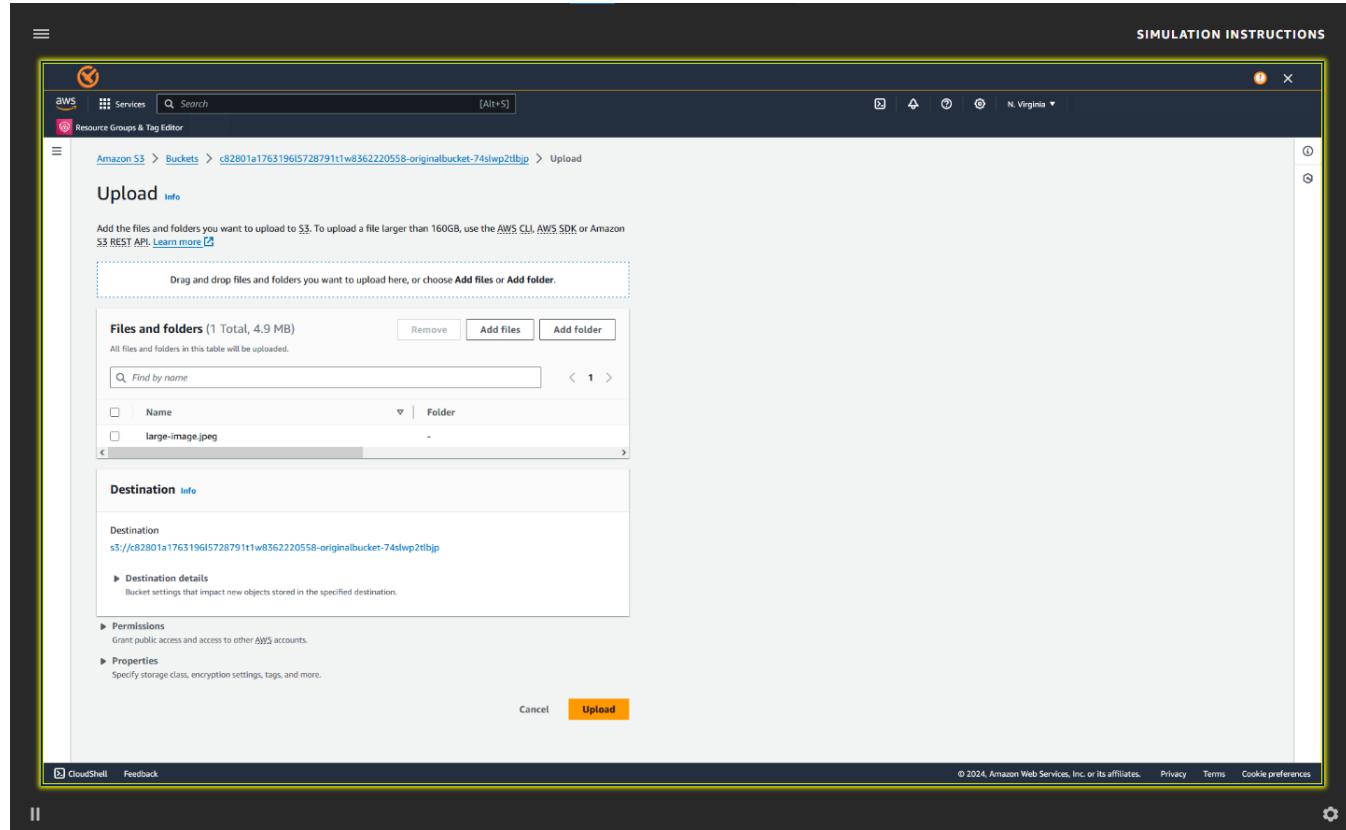
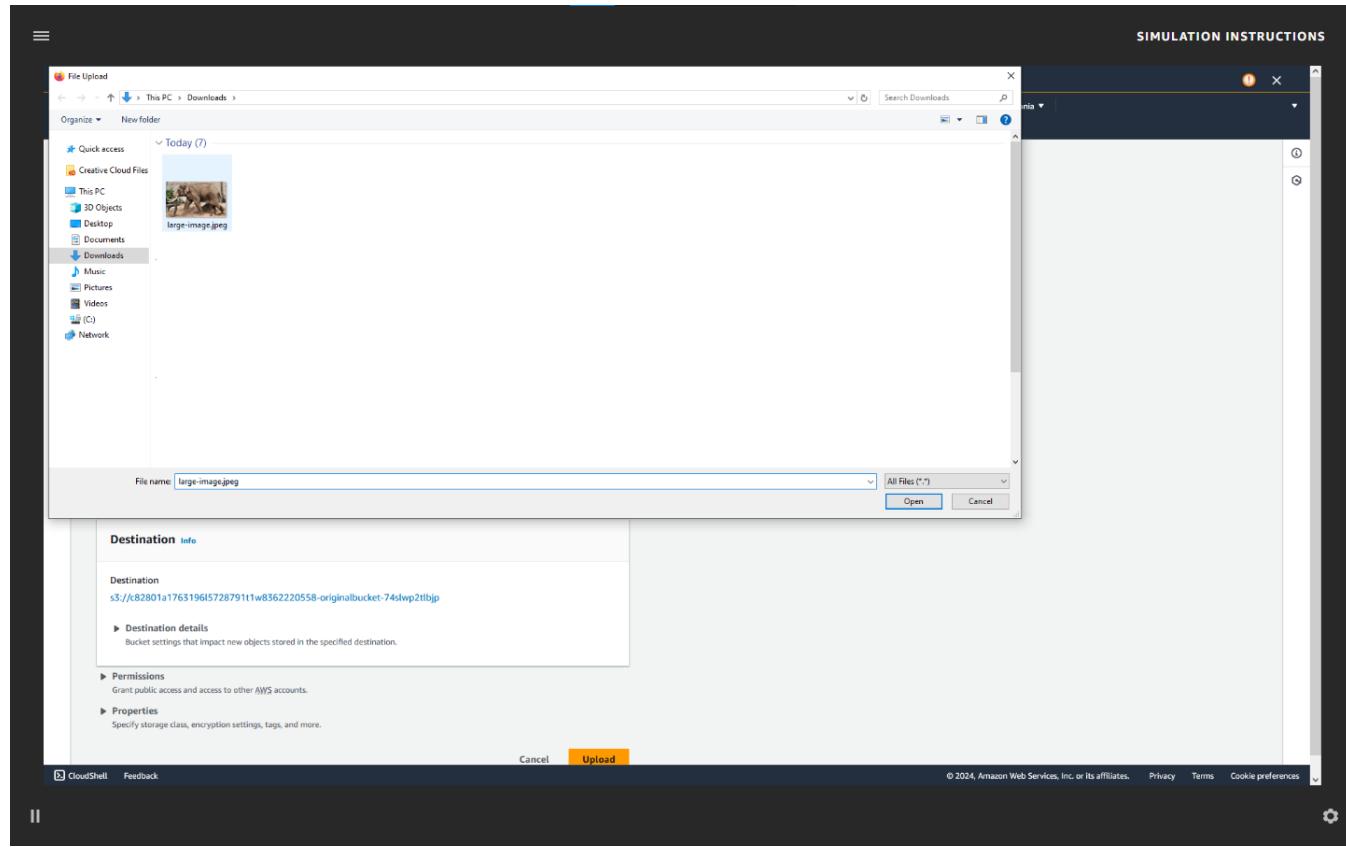
56. Choose the link for the bucket that has **original** in the name

The screenshot shows the AWS S3 console. The left sidebar lists 'Buckets', 'Access Grants', 'Access Points', etc. The main area shows a single bucket named 'c82801a1763196l5728791t1w8362220558-originalbucket-74slwp2tlbjp'. Below the bucket name, there are tabs for 'Objects', 'Properties', 'Permissions', 'Metrics', 'Management', and 'Access Points'. The 'Objects' tab is selected, showing a table with one row: 'No objects'. There are buttons for 'Upload' and 'Actions' (Copy, Copy S3 URI, Copy URL, Download, Open, Delete). The footer includes links for 'CloudShell', 'Feedback', and copyright information.

57. Choose **Upload**.

58. Choose Add files.

59. Choose the file that you downloaded, and choose **Open**.

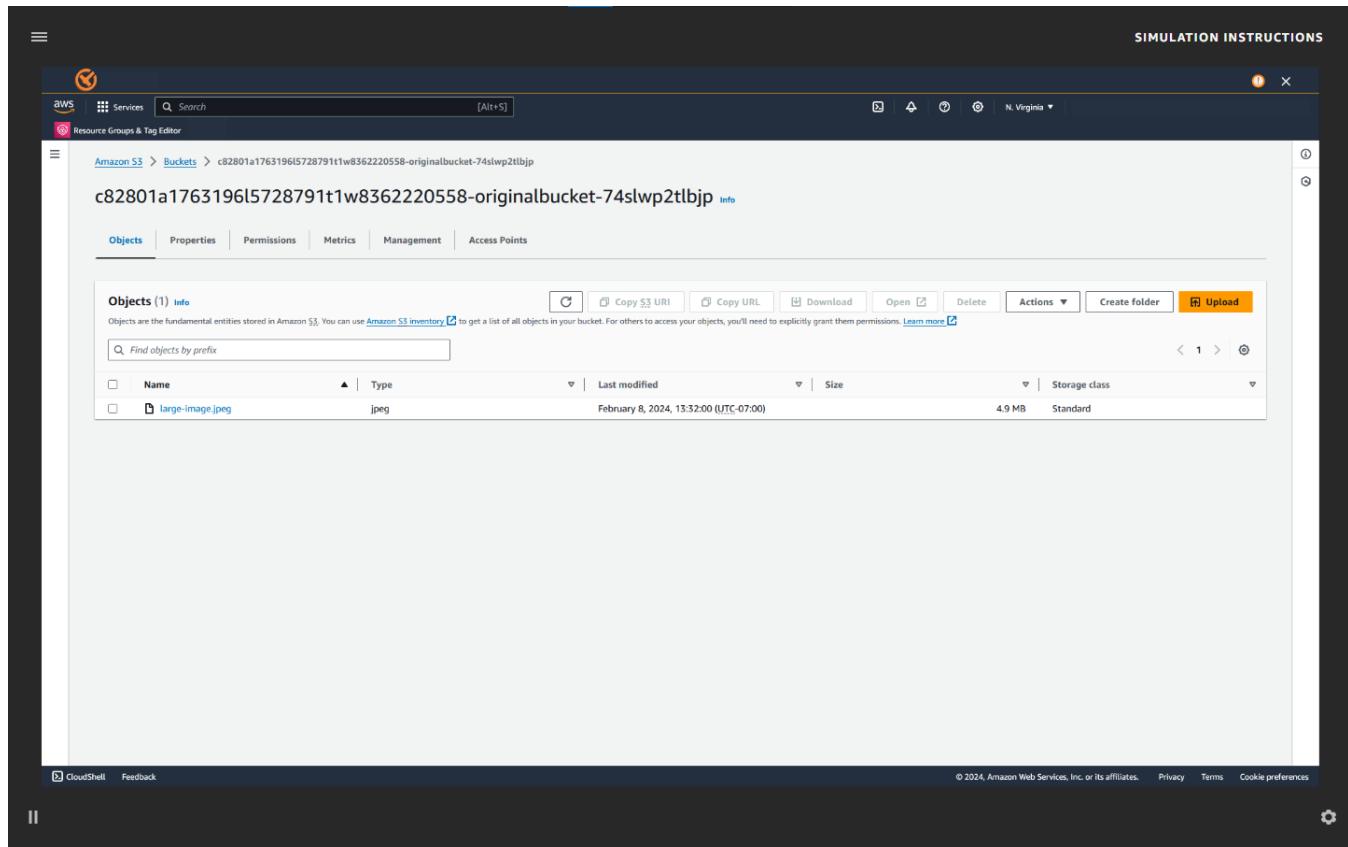


60. Choose Upload.

The screenshot shows the AWS S3 console interface. At the top, there's a green banner indicating "Upload succeeded". Below it, a summary table shows the destination bucket and the upload status. Under "Files and folders", a table lists a single file named "large-image..." which is an image/jpeg file, 4.9 MB in size, and has a status of "Succeeded". A "Close" button is visible in the top right corner of the main content area.

Your file is uploaded to the bucket. Notice the file size. The size of the file is around 4.9 MB.

61. Choose Close.



When your Lambda function runs correctly, the image file that you uploaded is reduced in size and placed in the S3 bucket that you specified when you set the environment variable for RESIZED_BUCKET.

62. To return to the **Buckets** section on the Amazon S3 console, choose **Buckets**.
63. Choose the link for the bucket that has **resized** in the name.

Notice the file size. It's significantly reduced from the original size of 4.9 MB.

When you uploaded the image file, Amazon S3 initiated the resize_image Lambda function. Review the logs to see how your function performed.

The screenshot shows the AWS S3 console interface. On the left, the navigation pane is visible with sections like 'Buckets', 'Access Grants', 'Access Points', etc. The main content area shows a single object named 'large-image.jpeg' in a bucket path: 'Amazon S3 > Buckets > c82801a1763196l5728791t1w83622205580-resizedbucket-orqxu9t4rde2'. The object details are as follows:

Name	Type	Last modified	Size	Storage class
large-image.jpeg	jpeg	February 8, 2024, 13:32:05 (UTC-07:00)	573.7 KB	Standard

At the bottom right of the main content area, there is a note: 'Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)'.

64. In the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
65. From the search results, choose **Lambda**.

66. Choose the link for the **resize_image** function.

67. Choose the **Monitor** tab.
68. Select the scroll bar to scroll to **CloudWatch Logs**.

#	:Timestamp	:RequestId	:LogStream	:DurationInMS	:BilledDurationInMS	:MemorySetInMB	:MemoryUsedInMB
1	2024-02-08T22:41:19.721Z	f40b4d4b-991e-40e0-8d90-dc6f7f351f6e	2024/02/08/[SLATEST]5ccc9e70572848678c167fcadic00290	1882,42	1883,0	512,0	166,0

#	:Timestamp	:RequestId	:LogStream	:BilledDurationInMS	:MemorySetInMB	:BilledDurationInGBSeconds
1	2024-02-08T22:41:19.721Z	f40b4d4b-991e-40e0-8d90-dc6f7f351f6e	2024/02/08/[SLATEST]5ccc9e70572848678c167fcadic00290	1883,0	512	0,9415

69. In the **Recent invocations** table, choose the most recent row (row 1) to expand the details.

#	:Timestamp	:RequestId	:LogStream	:DurationInMS	:BilledDurationInMS	:MemorySetInMB	:MemoryUsedInMB
1	2024-02-08T22:41:19.721Z	f40b4d4b-991e-40e0-8d90-dc6f7f351f6e	2024/02/08/[SLATEST]5ccc9e70572848678c167fcadic00290	1882,42	1883,0	512,0	166,0
			@AllledDuration	1883,0			
			@Duration	1882,42			
			@IngestionTime	1797432088747			
			@InitDuration	474,94			
			@Log	836222055887 aws/lambda/resilience_image			
			@LogStream	2024/02/08/[SLATEST]5ccc9e70572848678c167fcadic00290			
			@MemoryUsed	1,6658			
			@MemorySize	5,1258			

#	:Timestamp	:RequestId	:LogStream	:BilledDurationInMS	:MemorySetInMB	:BilledDurationInGBSeconds
1	2024-02-08T22:41:19.721Z	f40b4d4b-991e-40e0-8d90-dc6f7f351f6e	2024/02/08/[SLATEST]5ccc9e70572848678c167fcadic00290	1883,0	512	0,9415

Notice the metrics that are recorded for each function invocation. In the actual AWS Management Console, you might have to wait for up to 1 minute for the data to be updated.

The **DurationInMS** column tells you how long your function ran for this invocation.

The first time that your Lambda function is invoked, the Lambda execution environment has to download your code and start a new execution environment. This process is called a cold start. The **@initDuration** metric in the **Recent invocations** details signifies the cold start time.

Note the **MemorySetInMB** column. The amount of memory that's available to your Lambda function can be adjusted to affect the performance of your Lambda function.

The amount of memory also determines the amount of virtual CPU available to a function. Adding more memory proportionally increases the amount of CPU, which increases the overall computational power available. If a function is CPU-, network-, or memory-bound, then changing the memory setting can dramatically improve its performance.

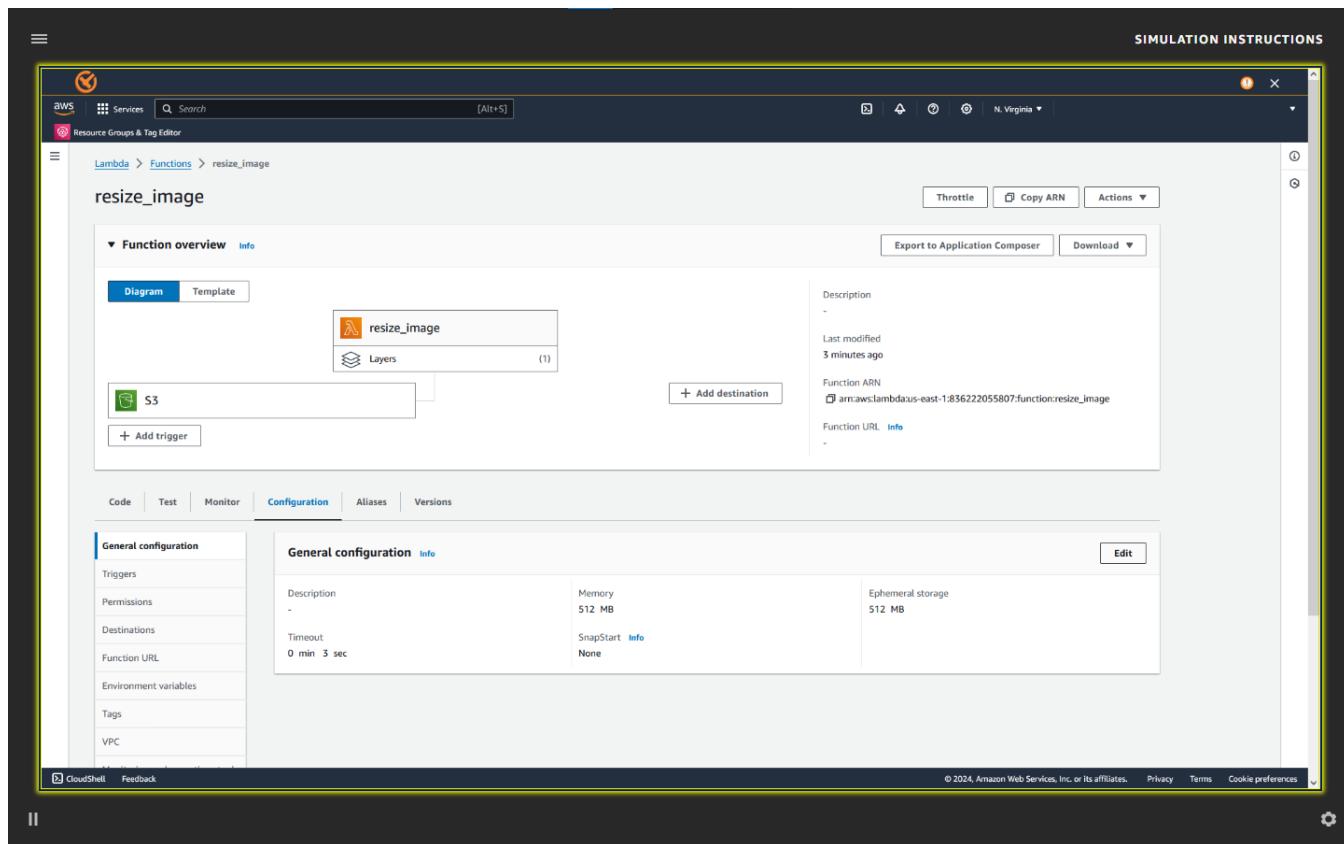
Notice how long it took your function to run. It could be faster. Adjust your Lambda function so that it runs faster.

70. Choose **Continue** to move on to task

Task 4: Optimizing Lambda function memory for performance

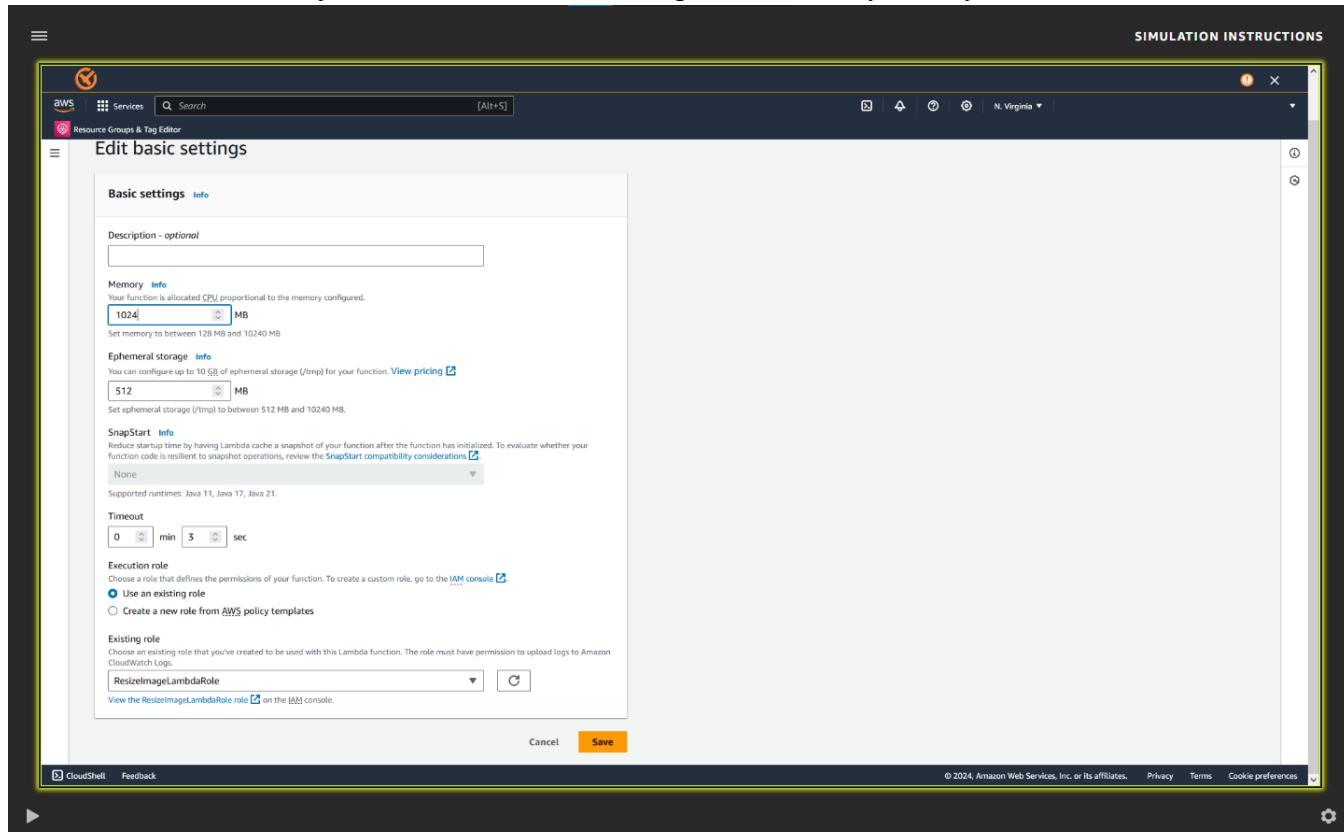
In this task, you first adjust the memory to 1024 MB.

71. Choose the **Configuration** tab.
72. Choose **General configuration**.



73. Choose Edit.

74. For Memory, enter 1024 MB, and then press Enter on your keyboard.



75. Choose Save.

The screenshot shows the AWS Lambda console with the function `resize_image`. The function is triggered by an S3 event. The configuration tab displays the following settings:

Setting	Value
Description	-
Memory	1024 MB
Timeout	0 min 3 sec
SnapStart	None
Ephemeral storage	512 MB

76. In the **Search** box, enter **S3**, and then press Enter on your keyboard.

77. From the search results, choose **S3**.

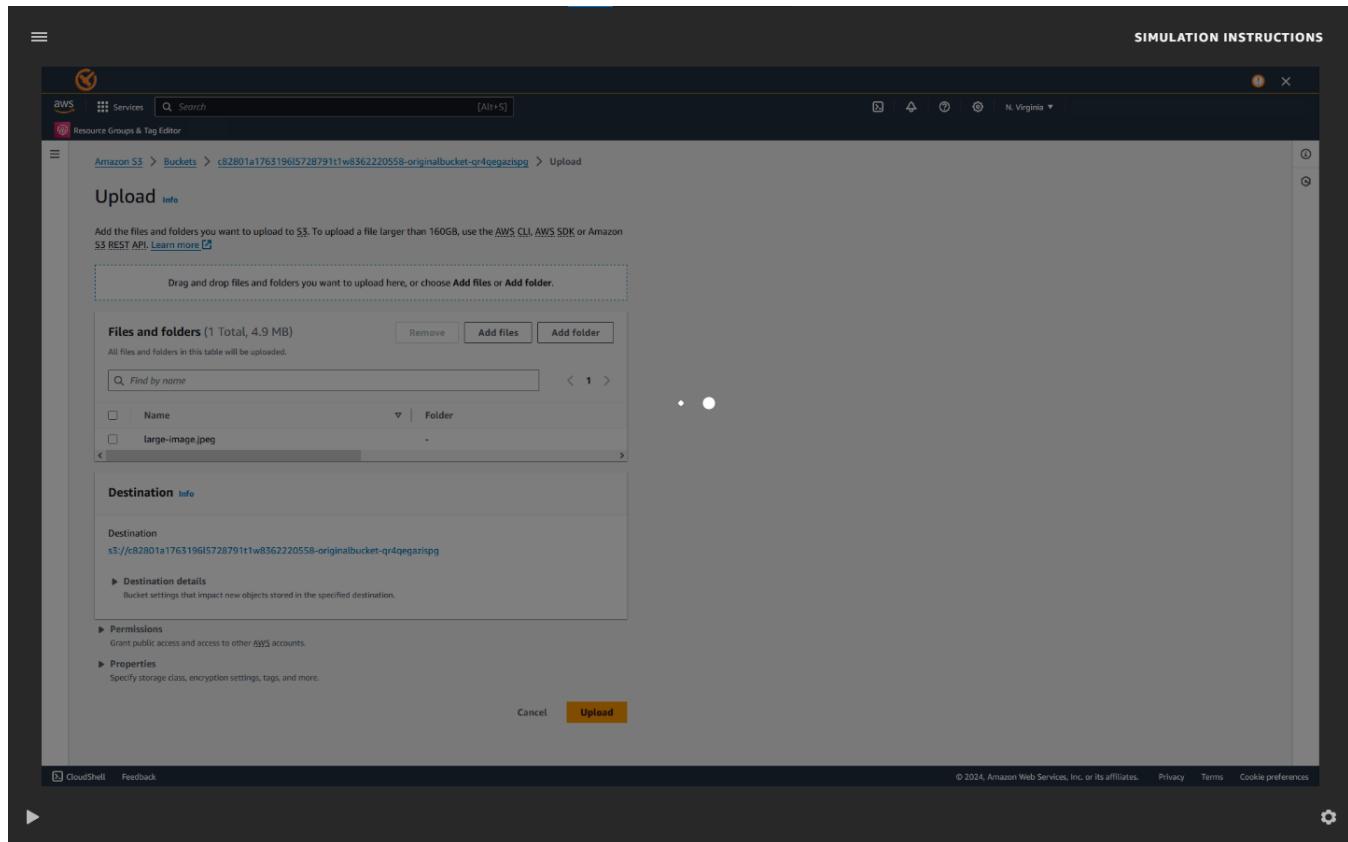
Name	AWS Region	Access	Creation date
c82801a176319605728791t1wb8362220-lambdalayerbucket-Onlytuughjh1	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:27 (UTC-07:00)
c82801a176319605728791t1wb8362220558-originalbucket-qr4qeqazispq	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:28 (UTC-07:00)
c82801a176319605728791t1wb8362220580-resizedbucket-bqgwlujgttl	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:28 (UTC-07:00)

78. Choose the link for the bucket that has **original** in the name.

The screenshot shows the AWS S3 console interface. On the left, there's a sidebar with various navigation options like Buckets, Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3, Block Public Access settings, Storage Lens, Dashboards, Storage Lens groups, AWS Organizations settings, Feature spotlight, and AWS Marketplace for S3. The main area shows a bucket named 'c82801a1763196l5728791t1w8362220558-originalbucket-qr4qegazispg'. Under the 'Objects' tab, there's a table with one item: 'large-image.jpeg' (Type: jpeg, Last modified: February 8, 2024, 15:41:16 (UTC-07:00), Size: 4.9 MB, Storage class: Standard). At the top right, there are buttons for Actions (Create folder, Upload), Copy S3 URI, Copy URL, Download, Open, Delete, and Create folder.

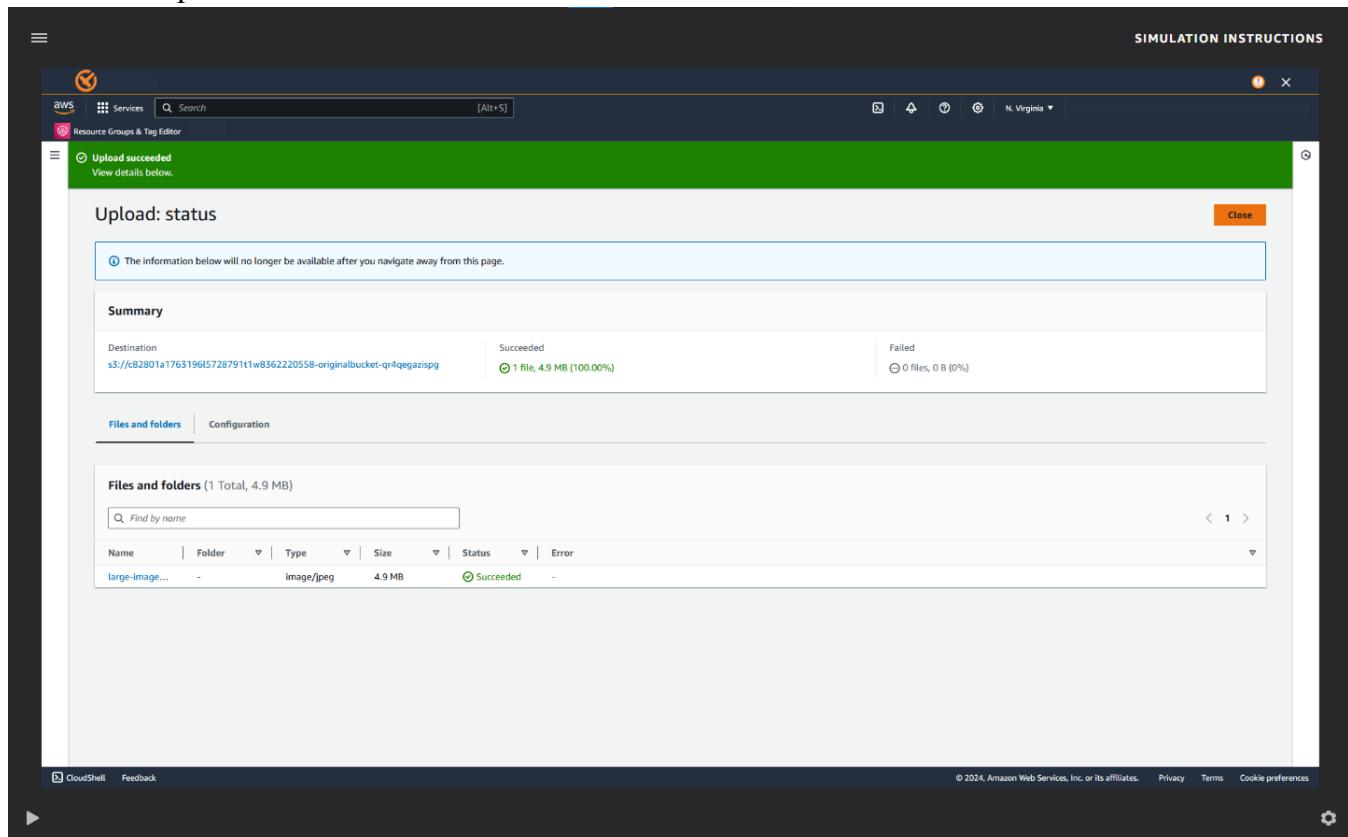
79. Choose **Upload**.
80. Choose **Add files**.
81. Choose the file that you downloaded, and chose **Open**.

The screenshot shows a 'File Upload' dialog box over a Windows File Explorer window. The File Explorer shows a folder structure with 'Downloads' selected. Inside 'Downloads', there is a file named 'large-image.jpeg'. Below the file list, there are tabs for 'Destination' and 'Info'. The 'Destination' tab shows the path 's3://c82801a1763196l5728791t1w8362220558-originalbucket-74slwp2lbj0'. There are also sections for 'Permissions' and 'Properties'. At the bottom of the dialog box, there are 'Cancel' and 'Upload' buttons, with 'Upload' being highlighted in yellow.



82. Choose Upload.

Your file is uploaded to the bucket.



83. Choose **Close**.
84. In the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
85. From the search results, choose **Lambda**.

The screenshot shows the AWS Lambda Functions page. The left sidebar has 'AWS Lambda' selected under 'Functions'. The main area shows a table of functions:

Function name	Description	Package type	Runtime	Last modified
s3Mover	Lambda function to move files from one bucket to the other	Zip	Python 3.9	14 minutes ago
resize_image	-	Zip	Python 3.9	1 minute ago

At the top right, there is a 'Create function' button. The top bar includes the AWS logo, services menu, search bar, and simulation instructions.

86. Choose the link for the **resize_image** function.
87. Choose the **Monitor** tab.

SIMULATION INSTRUCTIONS

resize_image

Function overview

Description

Last modified 1 minute ago

Function ARN arn:aws:lambda:us-east-1:836222055807:function:resize_image

Function URL [Info](#)

Monitor

View CloudWatch logs View X-Ray traces View Lambda Insights View CodeGuru profiles

Filter metrics by Function

1h 3h 12h 1d 3d 1w Custom UTC timezone C ;

CloudWatch metrics

Lambda sends runtime metrics for your functions to Amazon CloudWatch. The metrics shown are an aggregate view of all function runtime activity. To view metrics for the unqualified or \$LATEST resource, choose Filter by. To view metrics for a specific function version or alias, choose Aliases or Versions, select the alias or version, and then choose Monitor.

Invocations	Error count and success rate (%)
1	1 0.8

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88. Select the scroll bar to scroll to CloudWatch Logs.

SIMULATION INSTRUCTIONS

Iterator age

No unit

1

No data available.
Try adjusting the dashboard time range.

0.5

0 20:00 21:00 22:00

0 20:00 21:00 22:00

0.5

0 20:00 21:00 22:00

0 20:00 21:00 22:00

CloudWatch Logs

Lambda logs all requests handled by your function and automatically stores logs generated by your code through Amazon CloudWatch Logs. To validate your code, instrument it with custom logging statements. The following tables list the most recent and most expensive function invocations across all function activity. To view logs for a specific function version or alias, visit the Monitor section at that level.

Recent invocations

#	Timestamp	RequestId	LogStream	DurationInMS	BilledDurationInMS	MemorySetInMB	MemoryUsedInMB
1	2024-02-08T22:44:23.837Z	08ca0102-82d9-4b37-8026-da48f31f14e8	2024/02/08/[\$LATEST]88678980c198473ba14f6684586fa214	1086.44	1087.0	1024.0	166.0
2	2024-02-08T22:41:19.721Z	f4804d40-991e-4be0-809b-dc6f7f351f6e	2024/02/08/[\$LATEST]5ccc9e70572848678c167fcad1c88290	1082.42	1083.0	512.0	166.0

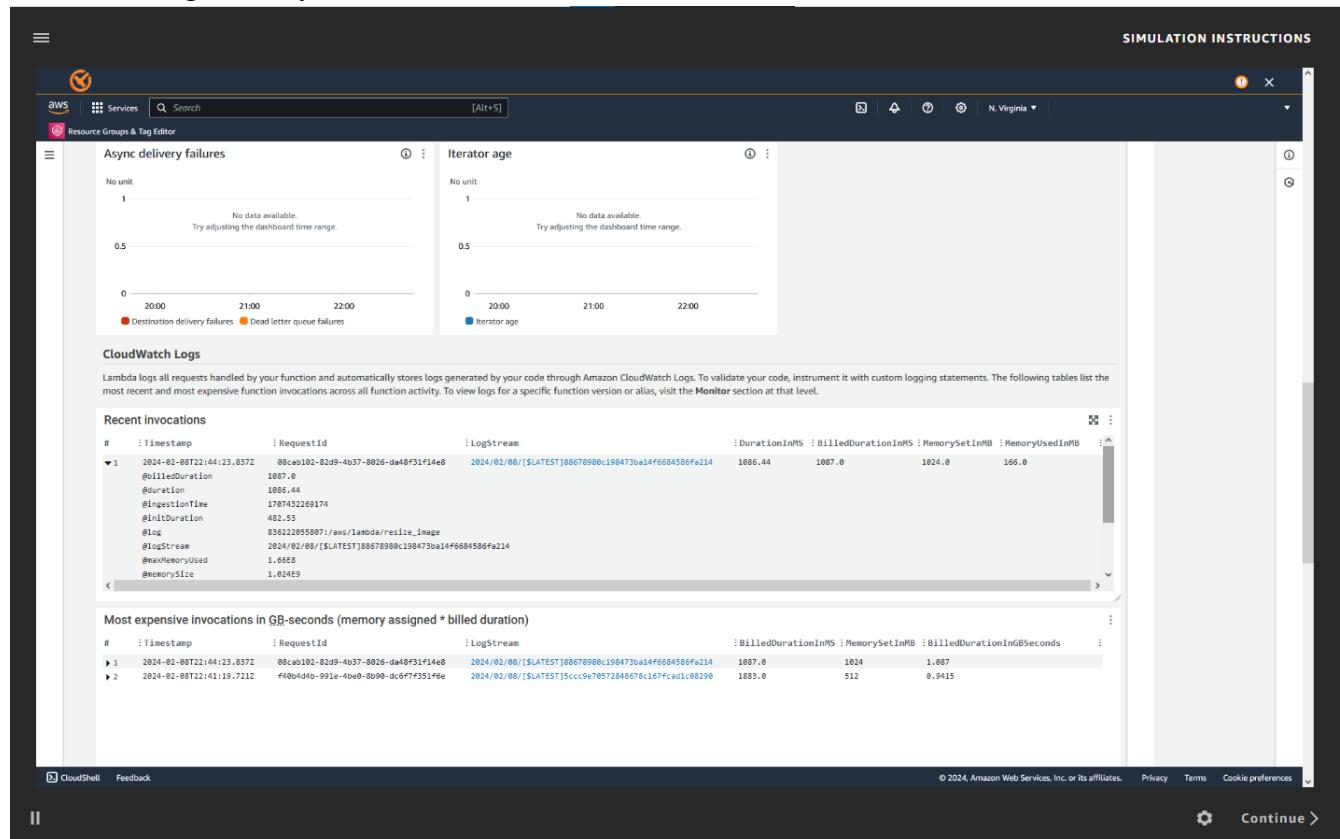
Most expensive invocations in GB-seconds (memory assigned * billed duration)

#	Timestamp	RequestId	LogStream	BilledDurationInMS	MemorySetInMB	BilledDurationInGBSeconds
1	2024-02-08T22:44:23.837Z	08ca0102-82d9-4b37-8026-da48f31f14e8	2024/02/08/[\$LATEST]88678980c198473ba14f6684586fa214	1087.0	1024	1.087
2	2024-02-08T22:41:19.721Z	f4804d40-991e-4be0-809b-dc6f7f351f6e	2024/02/08/[\$LATEST]5ccc9e70572848678c167fcad1c88290	1083.0	512	0.9415

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89. In the Recent invocations table, choose the most recent row (row 1) to expand the details.

Note how long it took your function to run.



90. Choose **Continue** to try the next memory adjustment.

Next, you adjust the memory to 2048 MB.

91. Choose the **Configuration** tab.

The screenshot shows the AWS Lambda console. In the left sidebar, under 'Functions', 'resize_image' is selected. The main area displays the function overview with a diagram showing an S3 trigger pointing to the 'resize_image' function. On the right, there's a 'Description' panel with details like 'Last modified 3 minutes ago', 'Function ARN', and 'Function URL'. Below the diagram, the 'Configuration' tab is active, showing the 'General configuration' section. This section includes fields for 'Description', 'Memory' (set to 1024 MB), 'Timeout' (set to 0 min 3 sec), and 'Ephemeral storage' (set to 512 MB). An 'Edit' button is located in the top right of this configuration panel.

92. Choose Edit.

93. For Memory, enter **2048** MB, and then press Enter on your keyboard.

The screenshot shows the 'Edit basic settings' page for the 'resize_image' function. The 'Memory' field is highlighted with a yellow box and contains the value '2048'. Other settings shown include 'Ephemeral storage' (512 MB), 'SnapStart' (None), 'Timeout' (0 min 3 sec), and 'Execution role' (Use an existing role, 'ResizelImageLambdaRole'). At the bottom right, there is a large 'SUBMIT' button.

94. Choose Save.

resize_image

Function overview Info

Configuration Aliases Versions

General configuration Info

Description	Memory	Ephemeral storage
-	2048 MB	512 MB
Timeout	Snapshot	
0 min 3 sec	Info	None

Destinations

- S3
- + Add destination
- + Add trigger

Code Test Monitor Configuration Aliases Versions

95. In the **Search** box, enter **S3**, and then press Enter on your keyboard.

96. From the search results, choose **S3**.

Amazon S3

Amazon S3

Account snapshot

General purpose buckets (3) **Create bucket**

Name	AWS Region	Access	Creation date
c82801a17631965728791t1w8362220558-lambdaLayerBucket-0mytuujjh1	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:27 (UTC-07:00)
c82801a17631965728791t1w8362220558-originalBucket-qrlqegazispq	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:28 (UTC-07:00)
c82801a17631965728791t1w8362220558-resizedBucket-bgxelwugjtl	US East (N. Virginia) us-east-1	Bucket and objects not public	February 8, 2024, 15:30:28 (UTC-07:00)

Buckets **Storage Lens** **Feature spotlight** **AWS Marketplace for S3**

97. Choose the link for the bucket that has **original** in the name.

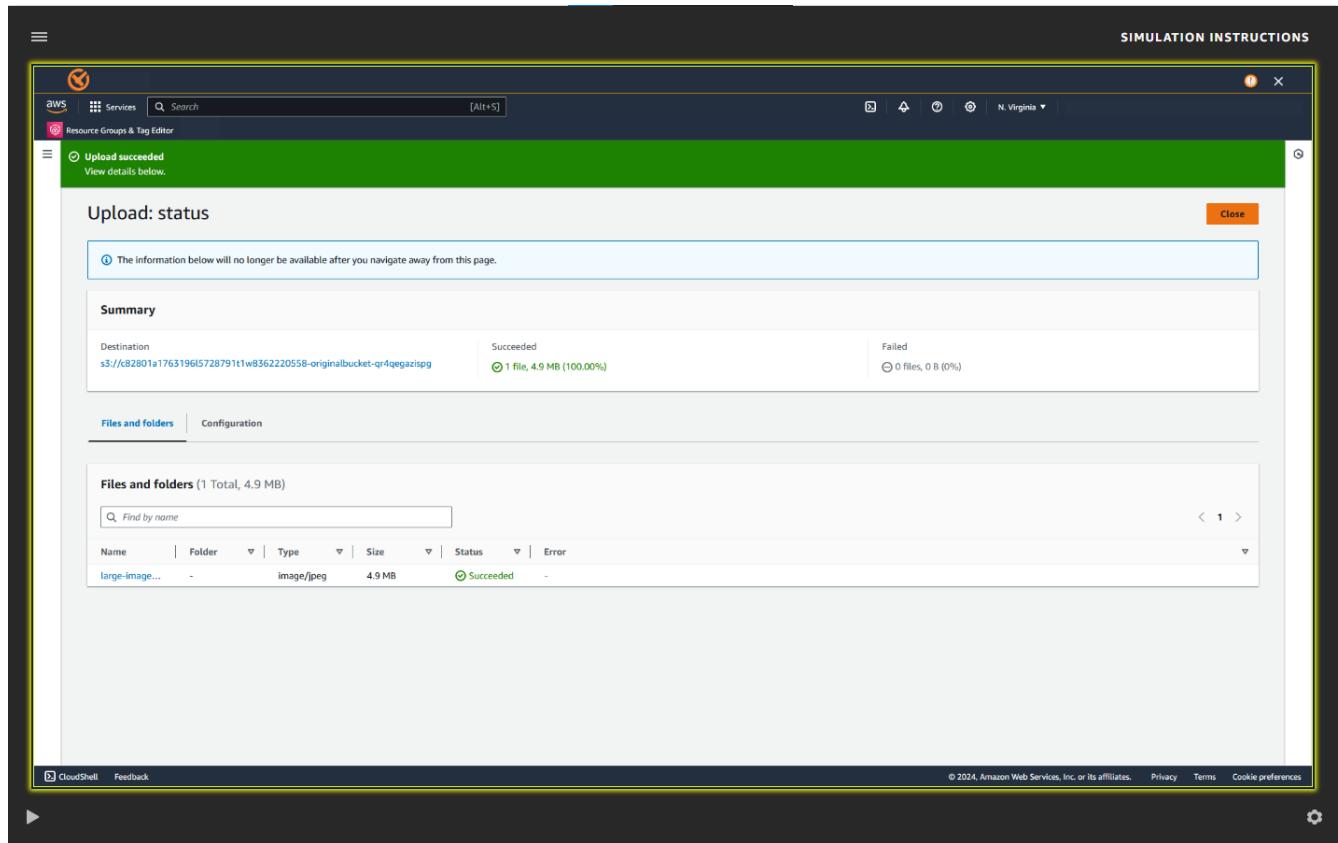
The screenshot shows the AWS S3 console interface. The left sidebar is titled 'Amazon S3' and includes sections for Buckets, Access Grants, Access Points, Object Lambda Access Points, Multi-Region Access Points, Batch Operations, IAM Access Analyzer for S3, Block Public Access settings for this account, Storage Lens, Dashboards, Storage Lens groups, AWS Organizations settings, Feature spotlight, and AWS Marketplace for S3. The main content area shows a bucket named 'c82801a1763196l5728791t1w8362220558-originalbucket-qr4qegazispg'. The 'Objects' tab is selected, displaying a single object named 'large-image.jpeg' with a type of 'jpeg'. The object was last modified on February 8, 2024, at 15:44:21 (UTC-07:00), has a size of 4.9 MB, and is stored in the 'Standard' storage class. The top right corner of the window says 'SIMULATION INSTRUCTIONS'.

98. Choose **Upload**.

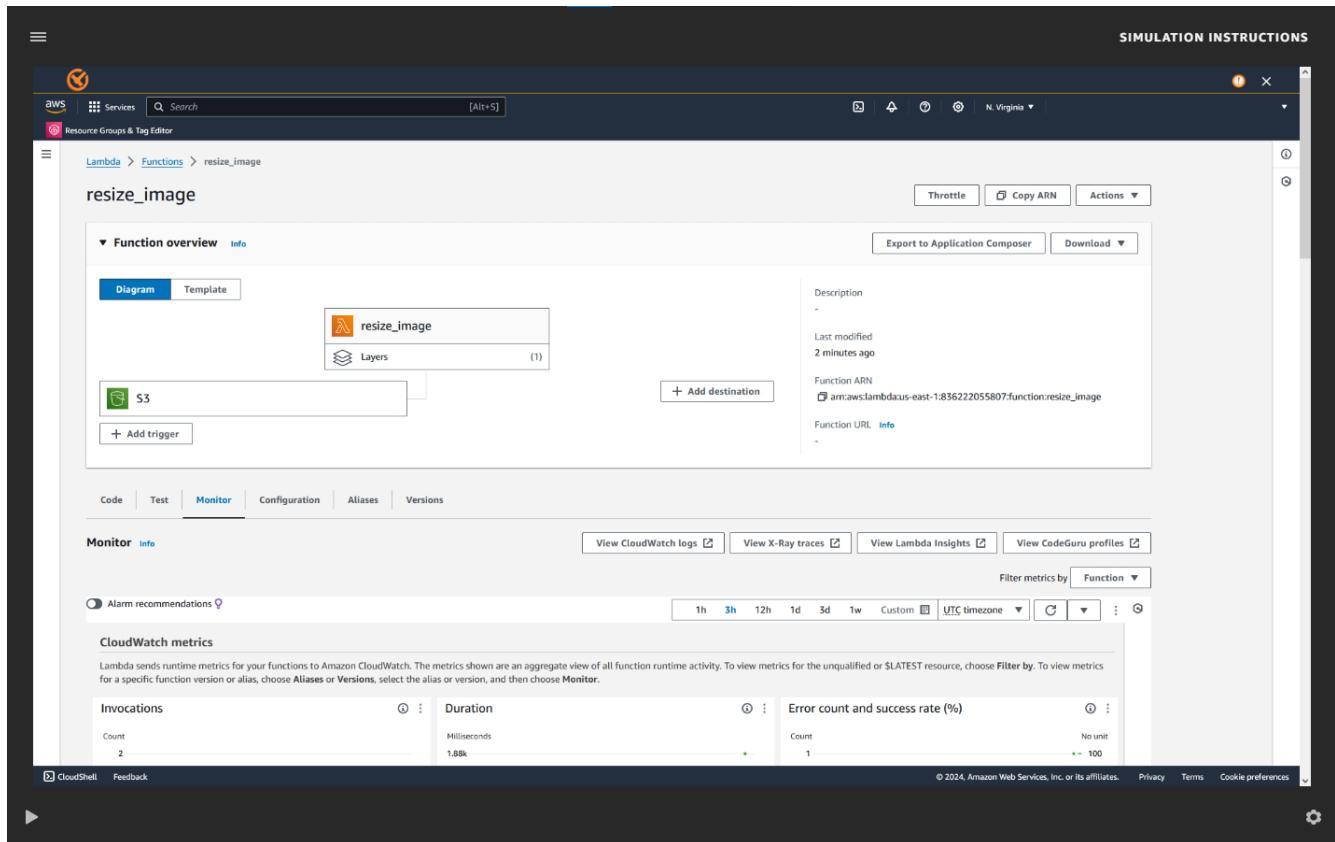
99. Choose **Add files**.

The screenshot shows a 'File Upload' dialog box. On the left, there is a file browser window showing a file named 'large-image.jpeg' in the 'Downloads' folder. The file browser has a sidebar with 'Organize' options like 'New folder', 'Quick access', 'Creative Cloud Files', 'This PC', '3D Objects', 'Desktop', 'Documents', 'Downloads', 'Music', 'Pictures', 'Videos', '(C:) Network'. Below the file browser, there is a 'File name' field containing 'large-image.jpeg' and an 'Open' button. To the right of the file browser, there is a 'Destination' section with a dropdown menu showing the URL 's3://c82801a1763196l5728791t1w8362220558-originalbucket-74slwp2tbjp'. The 'Destination' section also includes 'Destination details' (Bucket settings that impact new objects stored in the specified destination) and 'Permissions' (Grant public access and access to other AWS accounts). At the bottom right of the dialog box is a large yellow 'Upload' button. The top right corner of the window says 'SIMULATION INSTRUCTIONS'.

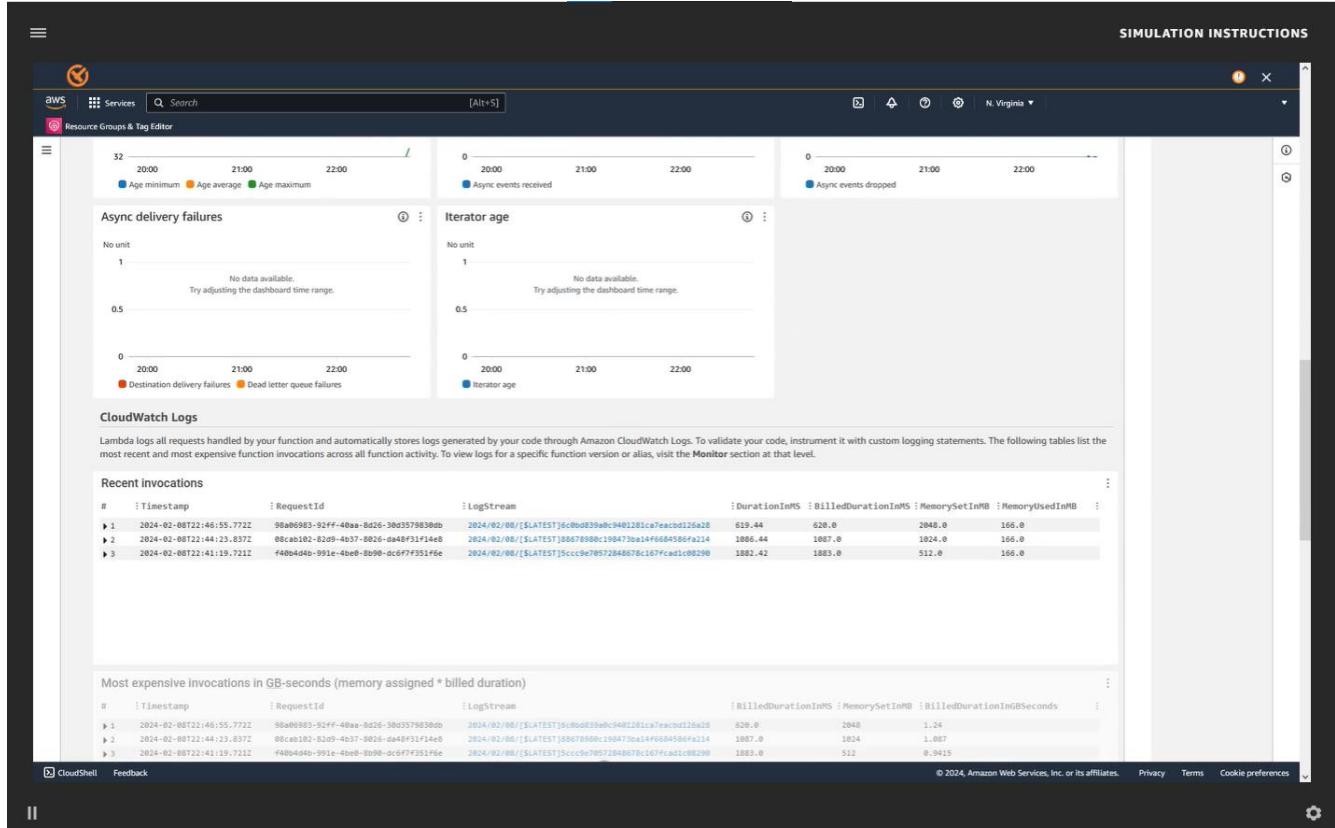
100. Choose the file that you downloaded, and choose **Open**.
101. Choose **Upload**.



102. Choose **Close**.
103. In the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
104. From the search results, choose **Lambda**.
105. Choose the link for the **resize_image** function.
106. Choose the **Monitor** tab.

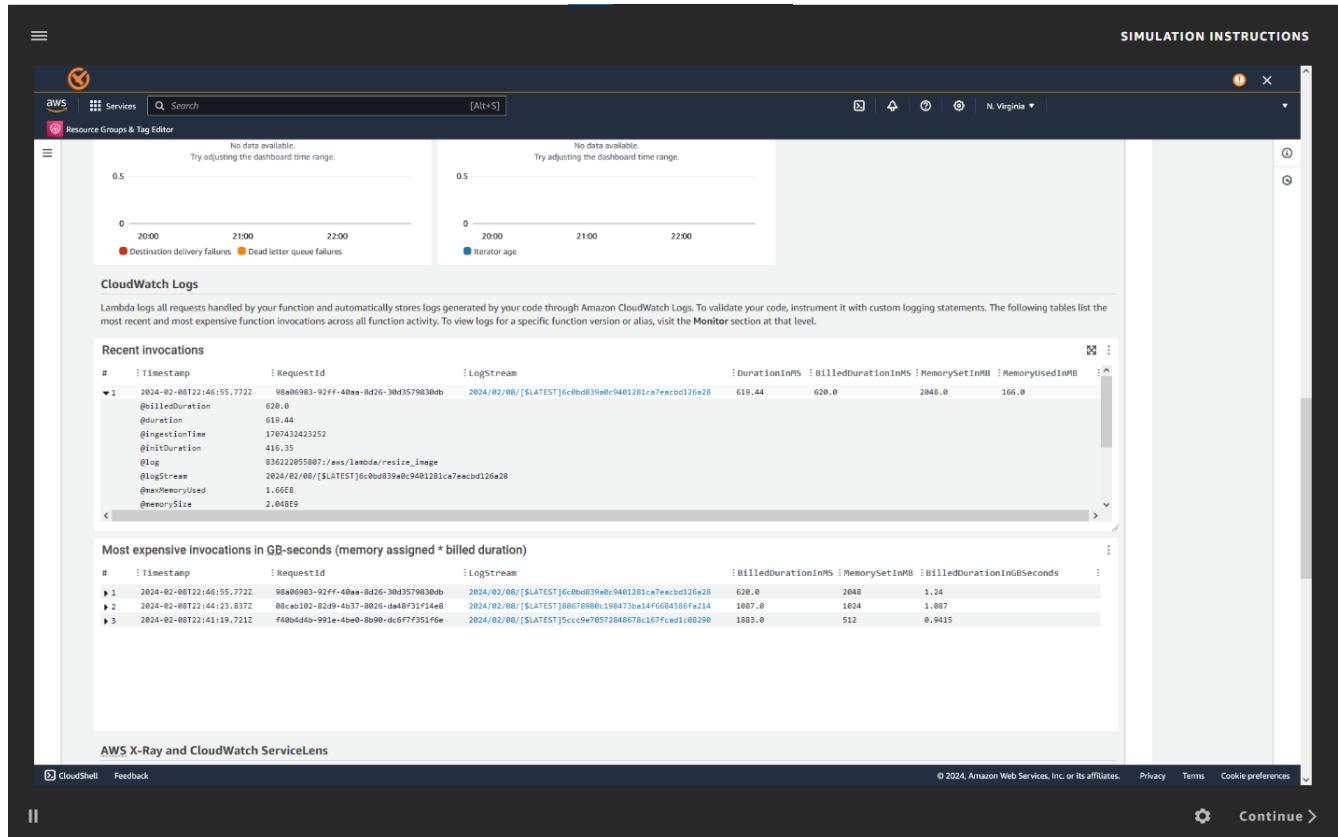


107. Select the scroll bar to scroll to CloudWatch Logs.



108. In the Recent invocations table, choose the most recent row (row 1) to expand the details.

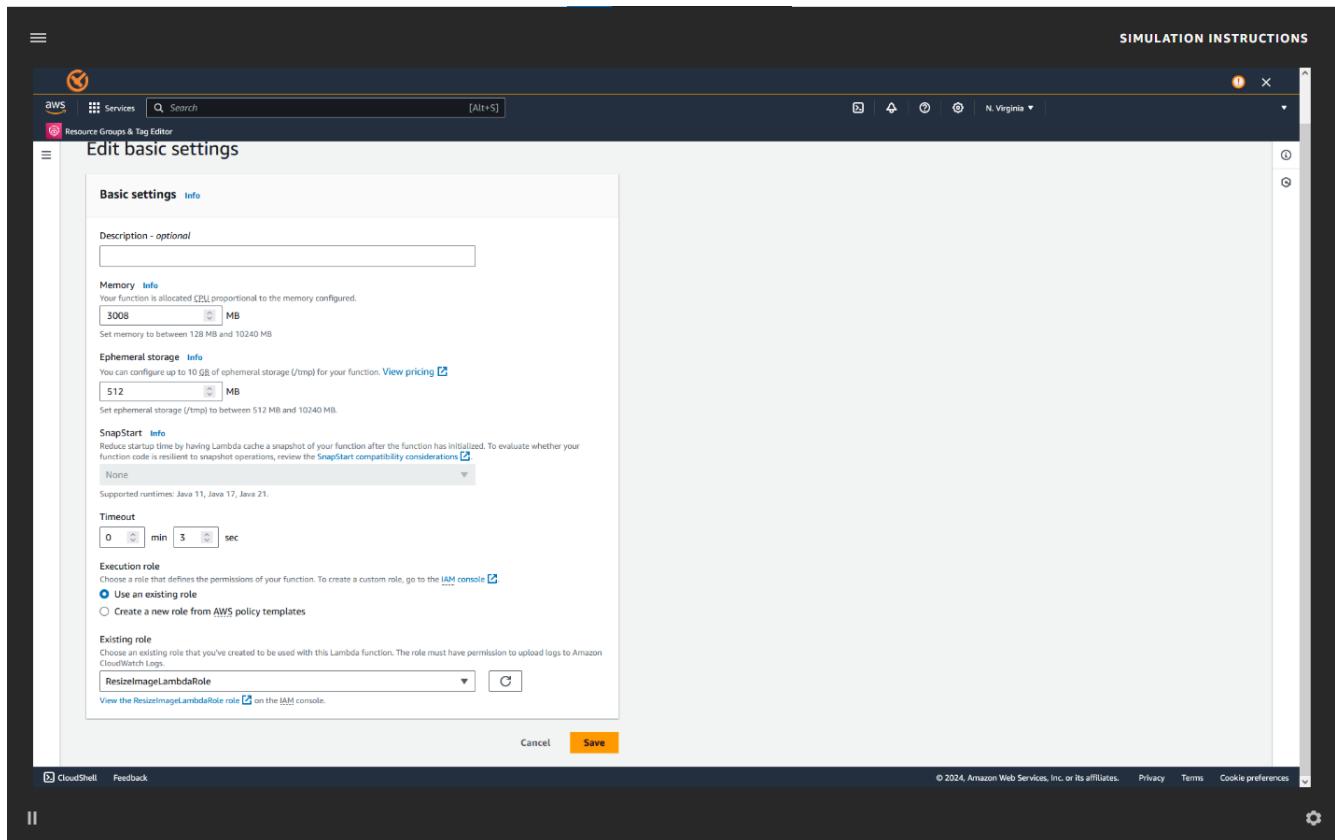
Note how long it took your function to run.



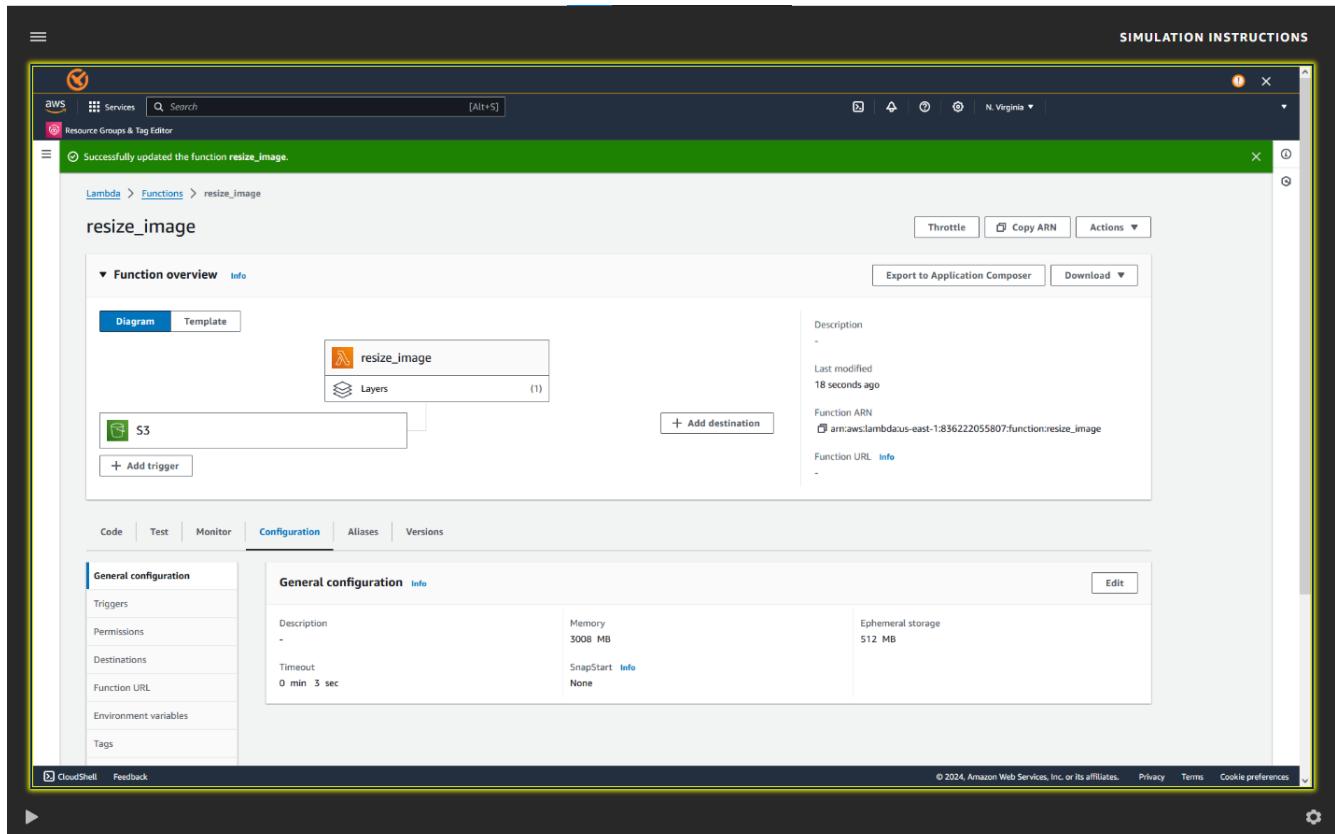
109. Choose **Continue** to try the next memory adjustment.

Next, you adjust the memory to 3008 MB.

110. Choose the **Configuration** tab.
111. Choose **Edit**.
112. For **Memory**, enter **3008** MB, and then press Enter on your keyboard.



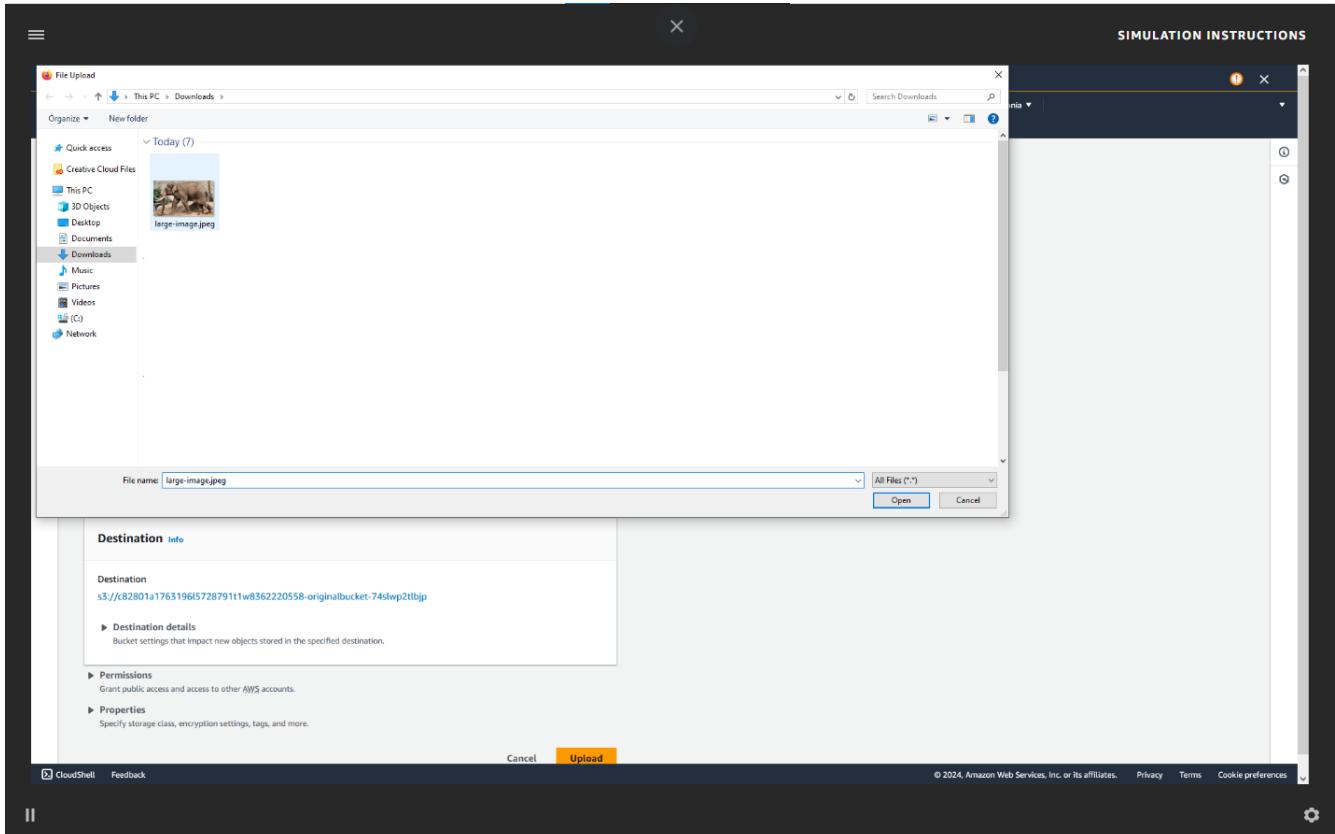
113. Choose Save.



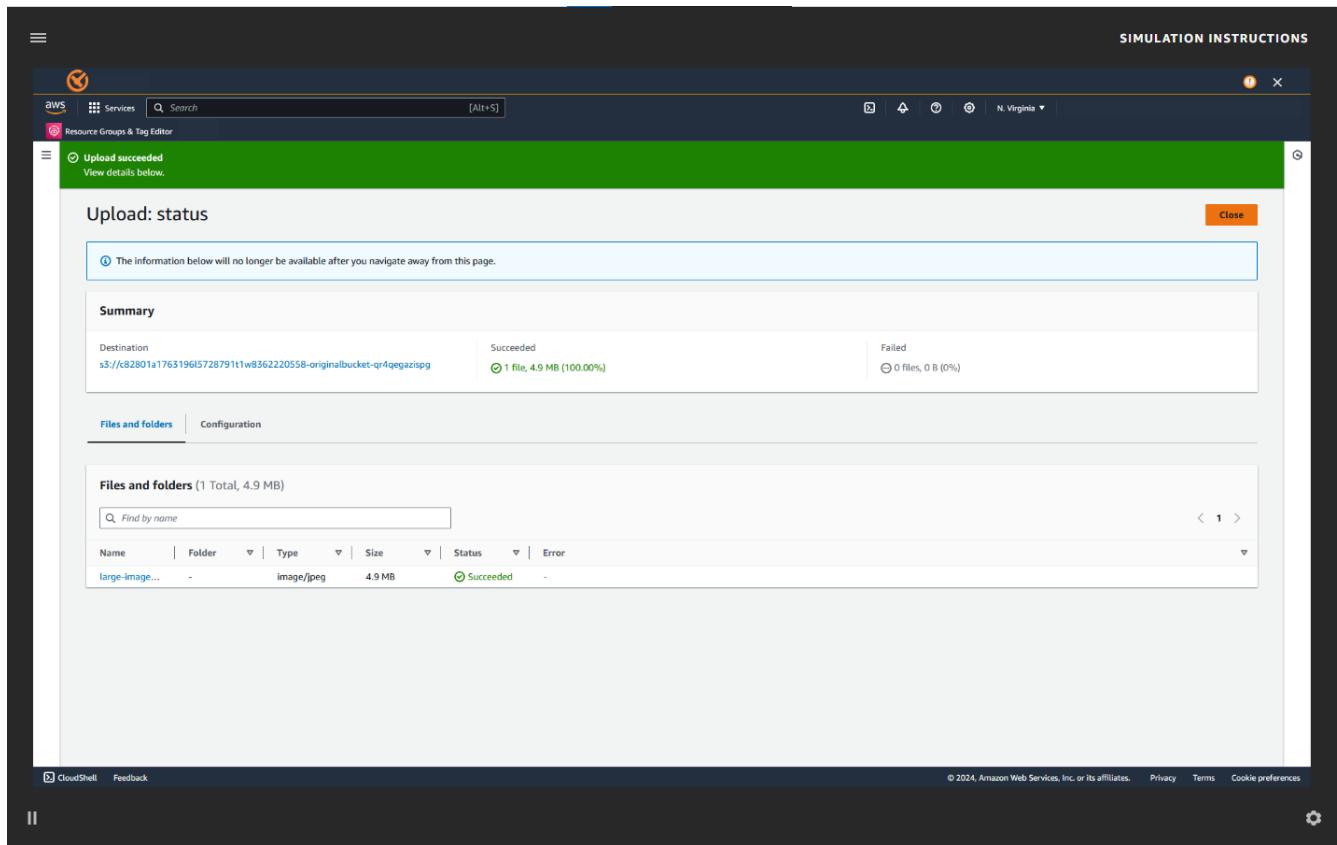
114. In the Search box, enter S3, and then press Enter on your keyboard.

115. From the search results, choose S3.

116. Choose the link for the bucket that has **original** in the name.
117. Choose **Upload**.
118. Choose **Add files**.
119. Choose the file that you downloaded, and choose **Open**.



120. Choose **Upload**.



121. Choose **Close**.
122. In the **Search** box, enter **Lambda**, and then press Enter on your keyboard.
123. From the search results, choose **Lambda**.
124. Choose the link for the **resize_image** function.
125. Choose the **Monitor** tab.
126. Select the scroll bar to scroll to **CloudWatch Logs**.

The screenshot shows the AWS Lambda CloudWatch Metrics and CloudWatch Logs interface. At the top, there are two time-based dashboards: 'Recent delivery failures' (0-22:00) and 'Dead letter queue failures' (0-22:00). Below these are sections for 'CloudWatch Logs' and 'AWS X-Ray and CloudWatch ServiceLens'. The 'Recent invocations' table lists six entries, with the first row expanded to show detailed metrics. The 'Most expensive invocations in GB-seconds' table lists four entries. The bottom section contains a 'Service Map' and navigation links.

#	Timestamp	RequestId	LogStream	DurationInMS	BilledDurationInMS	MemorySetInMB	MemoryUsedInMB
1	2024-02-08T22:49:51.166Z	23177340-0e85-459b-953a-33a1b0b5a5e	2024/02/08/[LATEST]2dba73fe940b424b9b1fd31356be688	562.88	536.55	3008.0	166.0
2	2024-02-08T22:49:55.772Z	98a09083-92ff-4ba9-8d26-30d3579830db	2024/02/08/[LATEST]1ccb0d19eb9401281c7e7ecbd12628	619.44	620.0	2048.0	166.0
3	2024-02-08T22:44:23.837Z	0fcab102-82d9-4b37-8026-ds48f31f14e8	2024/02/08/[LATEST]1b8678980c198473b314f6604586fe214	1086.44	1087.0	1024.0	166.0
4	2024-02-08T22:41:19.721Z	f40b4d40-991e-4be0-8b90-dc6f7f351f6e	2024/02/08/[LATEST]5ccc9e70572048678c167fcad1c80290	1882.42	1883.0	512.0	166.0

#	Timestamp	RequestId	LogStream	BilledDurationInMS	MemorySetInMB	BilledDurationInGBSeconds
1	2024-02-08T22:49:51.166Z	23177340-0e85-459b-953a-33a1b0b5a5e	2024/02/08/[LATEST]2dba73fe940b424b9b1fd31356be688	536.55	3008	2.097375
2	2024-02-08T22:49:55.772Z	98a09083-92ff-4ba9-8d26-30d3579830db	2024/02/08/[LATEST]1ccb0d19eb9401281c7e7ecbd12628	620.0	2048	1.24
3	2024-02-08T22:44:23.837Z	0fcab102-82d9-4b37-8026-ds48f31f14e8	2024/02/08/[LATEST]1b8678980c198473b314f6604586fe214	1087.0	1024	1.087
4	2024-02-08T22:41:19.721Z	f40b4d40-991e-4be0-8b90-dc6f7f351f6e	2024/02/08/[LATEST]5ccc9e70572048678c167fcad1c80290	1883.0	512	0.9415

127. In the Recent invocations table, choose the most recent row (row 1) to expand the details.

The screenshot shows the AWS Lambda CloudWatch Metrics and CloudWatch Logs interface. The 'Recent invocations' table has the first row expanded, showing detailed metrics for the invocation at 2024-02-08T22:49:51.166Z. The expanded row includes fields like @BilledDuration, @Duration, @IngestionTime, @InvocationTime, @Initialization, @Log, @LogStream, @MaxMemoryUsed, and @MemorySize. The 'Most expensive invocations in GB-seconds' table and other sections are visible below.

#	Timestamp	RequestId	LogStream	DurationInMS	BilledDurationInMS	MemorySetInMB	MemoryUsedInMB
1	2024-02-08T22:49:51.166Z	23177340-0e85-459b-953a-33a1b0b5a5e	2024/02/08/[LATEST]2dba73fe940b424b9b1fd31356be688	562.88	536.55	3008.0	166.0

Notice how long it took your function to run. Your function now runs in approximately 500 milliseconds with 3008 MB of memory and an image that is 5 MB.

Practical 9: Case study: Sports Data Analytics

Aug 13, 2025

Work with Big Data Using Athena

- A. Get familiar with the soccer data set
- B. Run queries on player attributes
- C. Investigate the data on your own

Creating a Data Dashboard Using QuickSight

- A. Identify a dashboard in QuickSight
- B. Create a new visualization.
- C. Update and customize visualizations.

The screenshot shows a web browser window with multiple tabs open. The active tab is titled 'Learner Dashboard Page'. The URL in the address bar is 'awseducate.com/student/s/content?keyword=Sports%20Data%20Analytics'. The page content is from the 'aws educate' website. It features a dark header with the AWS logo and navigation links for 'Courses & labs', 'Jobs', 'Emerging Talent Community', and a user profile for 'Shivam Vishwakarma'. Below the header, a banner reads 'No matter your goal, we've gathered the most useful content to build your cloud skills.' On the left, there's a 'Filters' sidebar with options like 'Course Features', 'Skills', 'Level', 'Duration', and 'Language'. A search bar at the top right contains the query 'Sports Data Analytics'. The main area displays a single result card for 'Sports Data Analytics', which is categorized under 'Analytics' and described as 'Foundational | 1.5 hour(s)'. To the right of the results, there's a sidebar titled 'Explore' with sections for feedback, fast-tracking, AI skills, and GenAI learning. The bottom of the page includes standard footer links like 'FAQ', 'Contact us', and 'Cookie preferences', along with system status indicators for weather, language, and time.

The screenshot shows the AWS Educate Learner Dashboard. The left sidebar has links for Home, Modules, and Lucid (Whiteboard). The main area displays course modules:

- Module 1: Introduction to Data Analytics in Sports**
 - Module 1: Introduction to Data Analytics in Sports (Viewed)
 - Work with Big Data Using Athena Simulation
- Module 2: Visualization of Sports Big Data**
 - Module 2: Visualization of Sports Big Data (View)
 - Creating Data Dashboard Using QuickSight Simulation
- Student Survey & Unit Quiz**

Prerequisites: Module 1: Introduction to Data Analytics in Sports, Module 2: Visualization of Sports Big Data

Complete All Items

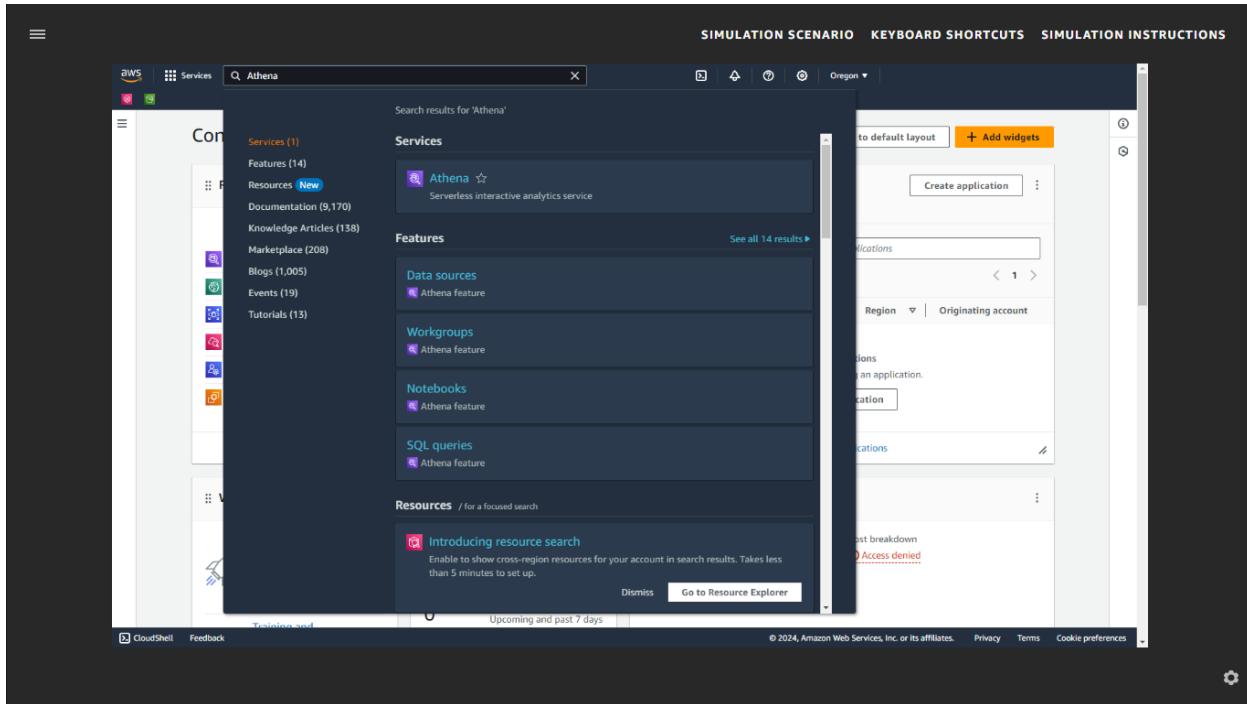
The task bar at the bottom shows various application icons and the date 27-08-2025.

A. Work with Big Data Using Athena

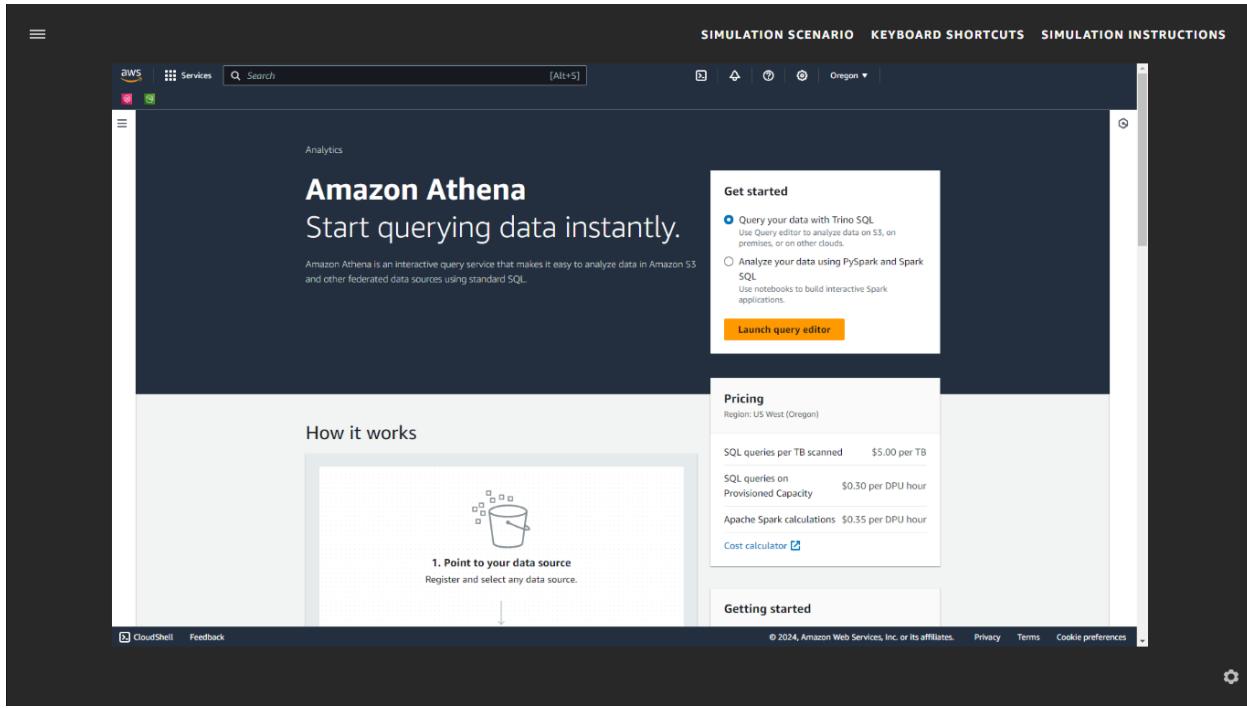
Task 1: Open Amazon Athena

To begin, you will need to access Amazon Athena and then load the sport-analytics dataset that you will be querying.

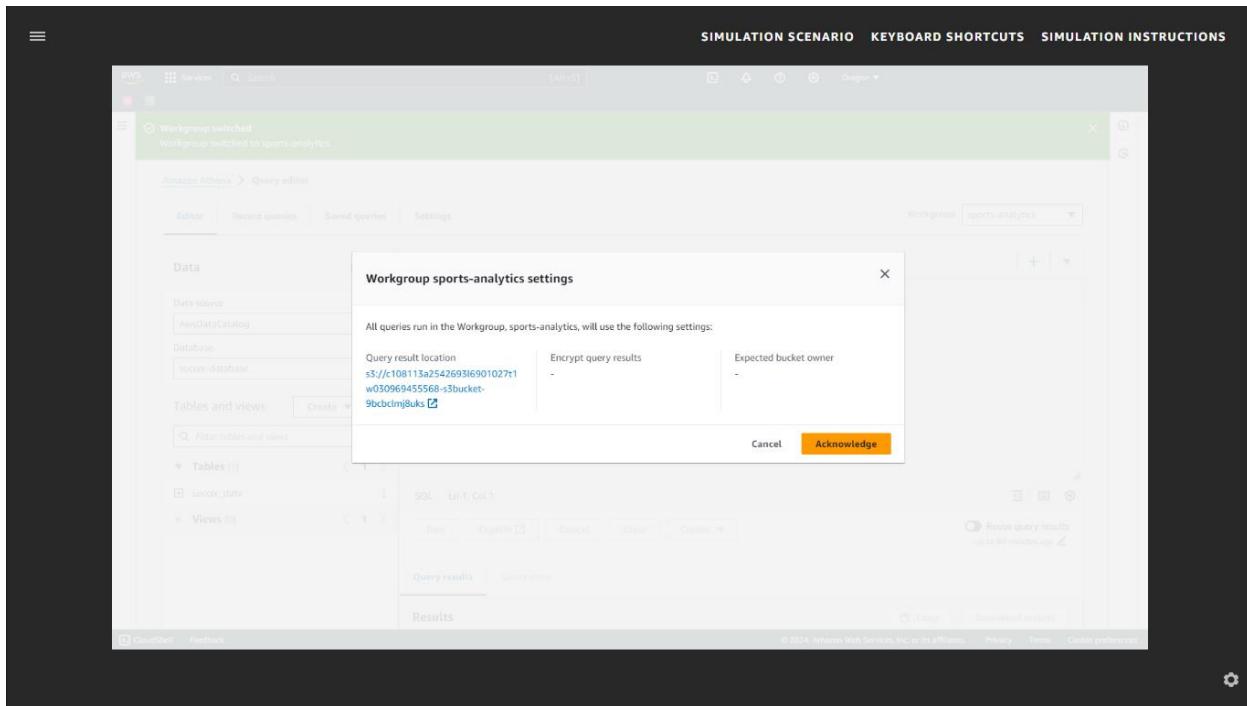
1. Choose the search box on the AWS Management Console. Enter **Athena**, and then choose **Athena** from the results list.



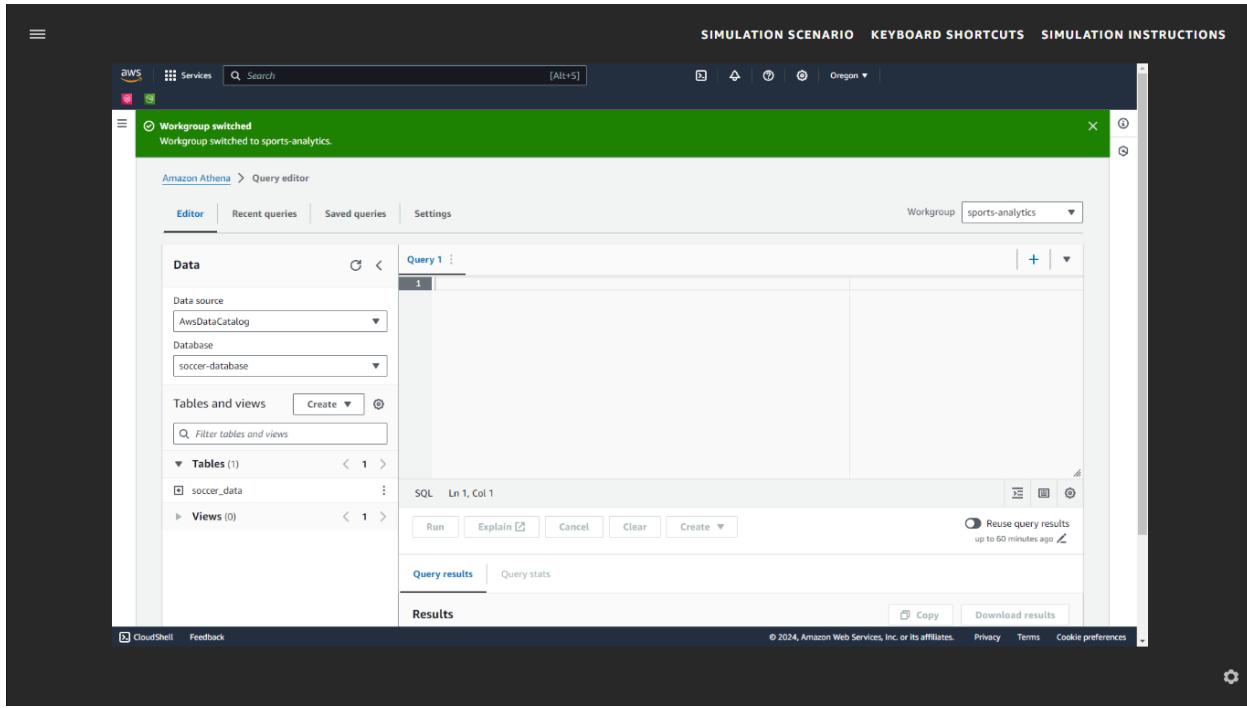
2. Choose **Launch query editor**.



3. On the top right of the screen, expand the **Workgroup** dropdown list and choose sports-analytics.



4. In the pop-up window that appears, choose **Acknowledge**.



5. Close the **Workgroup switched** banner by choosing the X icon.

In the **Data** pane, the **Database** dropdown list shows that **soccer-database** is selected.

6. In the **Tables and views** section, expand the **soccer_data** table to view its details.

The screenshot shows the Amazon Athena Query Editor interface. At the top, there are tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. The 'Editor' tab is selected. Below it, the 'Data' section shows a 'Data source' set to 'AwsDataCatalog' and a 'Database' set to 'soccer-database'. Under 'Tables and views', a table named 'soccer_data' is listed. Expanding this table reveals columns: id (bigint), name (string), age (bigint), rating (bigint), potential (bigint), team (string), height_inches (double), and weight_lbs (bigint). To the right of the table list is a SQL editor window titled 'Query 1' with the text 'SELECT * FROM soccer_data'. Below the editor are buttons for 'Run', 'Explain', 'Cancel', 'Clear', and 'Create'. A message at the bottom of the editor area says 'This completes Task 1: Open Amazon Athena. Choose Continue.' The bottom right corner of the editor has a 'Continue' button.

Task 2: Get familiar with the soccer dataset

Now that the dataset has been loaded, it's time to query the data to see how it can be used to make informed choices. To accomplish this, you will begin by using saved queries.

7. Choose **Saved queries**. This is a list of pre-created queries for you to start with.
8. From the list of options, choose the link in the **ID** column for the option with the name **1 - All soccer player data**.

SIMULATION SCENARIO KEYBOARD SHORTCUTS SIMULATION INSTRUCTIONS

Amazon Athena > Query editor

Editor Recent queries Saved queries Settings Workgroup sports-analytics

Saved queries (6)

ID	Name	Query	Description
19bb49dc-f987-4208-aefb-306eb6d57836	3 - Basic attributes of 10 players	SELECT name, age, team, gender, height_in... Basic attributes of 10 players	
72569558-8a16-45c5-8fe3-35b1e102b6bd	5 - Top 15 dribblers	SELECT name, dribbling FROM soccer_data ... Players ordered by dribbling ability, top 15	
f56a8668-a55c-4974-a65b-bf292e3a3f8e	1 - All soccer player data	SELECT * FROM soccer_data All soccer player data	
6679a790-5e4a-418f-8874-b0e11758fa37	2 - Count number of rows	SELECT count(*) FROM soccer_data Count number of rows	
a6204516-0b32-411d-9a90-9b9a9ccfc922	6 - Top 3 attackers	SELECT name, attacking, age, team, gender,... Top 3 attackers with detailed attributes	
62518be8-d3d6-4a02-a596-0d0a23b53fa2	4 - Goal scoring ability	SELECT name, finishing FROM soccer_data ... Players ordered by goal scoring ability	

https://us-west-2.console.aws.amazon.com/athena/home?region=us-west-2#/query-editor/s... © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

9. In the pop-up window that appears, choose **Acknowledge**.

10. Choose **Run**.

SIMULATION SCENARIO KEYBOARD SHORTCUTS SIMULATION INSTRUCTIONS

Amazon Athena > Query editor

Editor Recent queries Saved queries Settings Workgroup sports-analytics

Data

Data source AwsDataCatalog Database soccer-database

Tables and views Create

Tables (1)

- soccer_data

id	bigint
name	string
age	bigint
rating	bigint
potential	bigint
team	string
height_inches	double
weight_lbs	bigint

SQL Ln 1, Col 1

Run Explain Cancel Clear Create Reuse query results up to 60 minutes ago

Query results Query stats

Results Copy Download results

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The screenshot shows the AWS Management Console with the Athena service selected. In the top navigation bar, there are tabs for 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. The main area is titled 'Amazon Athena > Query editor'. A sub-tab 'Editor' is selected, along with 'Recent queries', 'Saved queries', and 'Settings'. A 'Workgroup' dropdown is set to 'sports-analytics'. On the left, a sidebar titled 'Data' shows a 'Tables' section with one entry: 'soccer_data' (1 row). The table schema includes columns: id (bigint), name (string), age (bigint), rating (bigint), potential (bigint), team (string), height_inches (double), and weight_lbs (bigint). The main panel contains a query editor with the following SQL code:

```

1 SELECT * FROM soccer_data
2

```

Below the editor are buttons for 'Run again', 'Explain', 'Cancel', 'Clear', and 'Create'. A status bar indicates the query is 'Completed' with a duration of 61 ms, run time of 1.349 sec, and data scanned of 3.27 MB. The results section shows a table with 61,412 rows. Buttons for 'Copy' and 'Download results' are available. At the bottom, there are links for 'CloudShell', 'Feedback', and copyright information.

11. Choose the scroll bar to scroll down to see the results. You should see the full set of unfiltered soccer data.
12. Choose the horizontal scroll bar to scroll to the right to see the rest of the data.
13. Choose the scroll bar to scroll up.

This screenshot shows the same interface as the previous one, but the results table is now fully visible, displaying 61,412 rows of soccer player data. The table has 13 columns: #, id, name, age, rating, potential, team, height_inches, and weight_lbs. Each row contains numerical values corresponding to the columns. The table is paginated, with a header showing page 1 of 1. The rest of the interface remains the same, including the sidebar, query editor, and status bar.

The screenshot shows the AWS Athena results page. At the top, it says "Completed" with a timestamp of "Time in queue: 61 ms" and "Run time: 1.349 sec". Below this, there's a table titled "Results (61,412)". The table has columns: penalties, composure, defendin g, standing_tackl e, sliding_tackl e, goalkeepin g, hits, and gender. The data consists of 61,412 rows of soccer player statistics.

14. Choose **Saved queries** again.
15. Choose the link in the **ID** column for the option with the name **2 - Count number of rows**.
16. Choose **Run** to run this new query.

The screenshot shows the AWS Athena Query editor. On the left, there's a sidebar with "Recent queries", "Saved queries", and "Settings". The "Saved queries" tab is selected, showing a list of queries. One query is highlighted: "2 - Count number of rows". The main area shows the query code: "1 SELECT count(*) FROM soccer_data". Below the code, there's a "Run again" button and a "Results" section. The results table shows one row with the value "61412".

17. Choose the scroll bar to scroll down to see the result again, which is a single number this time.

The results show that you have 6,1412 rows in your database, and because each row is one player, you have 6,1412 players.

The screenshot shows the AWS Lambda SQL interface. In the top navigation bar, 'AwsDataCatalog' is selected under 'Database' and 'soccer-database' is selected under 'Tables and views'. The 'Tables' section shows the 'soccer_data' table with 1 row. The table has columns: id, name, age, rating, potential, team, height_inches, weight_lbs, foot, growth, joined, and value_mill_E_#. The 'Results' section shows a single row with the value 61412. The status bar at the bottom indicates the query was completed in 84 ms.

18. Choose the scroll bar to scroll up.
19. Choose **Saved queries** again.
20. Choose the link in the **ID** column for the option with the name **3 - Basic attributes of 10 players**.

When this query opens, notice that it uses a SELECT statement to choose a variety of attributes. The LIMIT 10 statement chooses only 10 players. Because you aren't specifying any particular order, this query pulls up any 10 players.

21. Choose **Run** to run this new query

The screenshot shows the AWS Management Console with the Athena service selected. In the top navigation bar, there are tabs for 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. The main area is titled 'Amazon Athena > Query editor'. On the left, there's a sidebar with 'Data' settings (Data source: AwsDataCatalog, Database: soccer-database) and a 'Tables and views' section listing the 'soccer_data' table with columns: id, name, age, rating, potential, team, height_inches, and weight_lbs. The main panel contains a query editor with three numbered steps: 1 - All soccer player ..., 2 - Count number of..., and 3 - Basic attributes o... (highlighted). Step 3 contains the SQL query: `SELECT name, age, team, gender, height_inches, foot, weight_lbs FROM soccer_data LIMIT 10`. Below the query editor is a results pane showing a green status bar with 'Completed' and performance metrics: Time in queue: 98 ms, Run time: 693 ms, Data scanned: 820.86 KB. The results table has 10 rows of player data.

22. Choose the scroll bar to scroll down to see the results, and confirm that the data matches the SELECT statement.

This screenshot is identical to the one above, showing the completed query execution and the resulting 10 rows of soccer player data. A pink banner at the bottom of the results table area reads: 'This completes Task 2: Get familiar with the soccer dataset. Choose Continue.' Below the banner, there are 'CloudShell' and 'Feedback' buttons at the bottom left, and 'Cookie preferences' at the bottom right.

Task 3: Run queries on player attributes

To better understand the data that you have available, scan through the following data field table. Use this as a reference if you customize the queries to whatever you want to look at

closer.

Each player attribute is rated with the highest number being the higher value of the skill. Most attributes are rated 0–99, but some have higher ranges.

Fields: Player Attributes	Description
name	Player's name
team	Player's team
age	Player's age
height_inches	Player's height in inches
weight_lbs	Player's weight in pounds
gender	Player's gender
foot	Player's preferred foot
attacking	Player's ability to spot open space and move into good positions that offer an attacking advantage
crossing	Player's accuracy and quality of a player's crosses. A cross is a medium-to-long-range pass (kicking, hitting, or throwing the ball to a teammate) from a wide area of the field toward the center of the field near the opponent's goal.
finishing	Player's ability to score a goal
heading_accuracy	Player's accuracy when passing, shooting, or clearing the ball with their head
short_passing	Player's accuracy for short passes
volleys	Player's ability to kick the ball before the ball touches the ground
skill	Player's impact on the ball when passing, receiving, shooting, and completing other movements on the pitch toward scoring a goal
dribbling	Player's ability to carry the ball past an opponent while being in control
curve	Player's ability to curve the ball when passing and shooting
freekick_accuracy	Player's accuracy for taking free kicks. A free kick is a kick that a player takes to restart play after there is an unfair act by a player.
long_passing	Player's accuracy for long passes. Passing is when a player kicks the ball to another teammate.

Fields: Player Attributes	Description
ball_control	Player's ability to control the ball
movement	Player's movement of their body with or without the ball to ensure balance and coordination
acceleration	The increment in a player's running speed on the field. It shows how fast a player can reach their maximum sprint speed.
sprint_speed	Player's running speed rate
agility	Player's ability to quickly and gracefully control the ball. It involves both the physical and mental skills of the player.
reactions	Player's speed at responding to situations happening around them
balance	Player's ability to remain upright and steady when running, carrying, and controlling the ball
power	Player's use of their body to win a match
shot_power	Strength of the player's shooting jumping
	Height of the player's jumps
stamina	Player's ability to sustain prolonged physical or mental effort in a match
strength	Player's overall strength
long_shots	Player's accuracy for the shots that they take from long distances
	Player's desire for success. It involves the mental approach to
mentality	handling pressure, responding positively to difficult situations, and being consistent.
aggression	Player's aggression level regarding pushing, pulling, and tackling
interceptions	Player's capability to catch an opposing team's passes
positioning	Player's ability to place themselves in the right position to catch the ball, score goals, or do a tactical move
vision	Player's mental awareness of teammate positioning
penalties	Player's accuracy for taking shots from penalty kicks
composure	Player's feeling of being calm and controlling frustration during the match
defending	Player's ability to defend against scoring by opponents
	<small>standing_tackle</small>
	Player's ability to take the ball from an opponent by sticking a leg out and still staying on their feet
sliding_tackle	Player's ability to take the ball from an opponent by sliding to an opponent's body
goalkeeping	Player's ability to guard against a goal by an opponent

That's a lot of data fields! Where should you start?

The top-scoring players is one reasonable way to rank the players first. Let's look at the players that have the top goal-scoring abilities by ordering them using the **finishing** attribute.

23. Choose the scroll bar to scroll up.
24. Choose **Saved queries** again.
25. Choose the link in the **ID** column for the option with the name **4 - Goal scoring ability**.

Notice the line of this query that orders the results in descending order of finishing, meaning that the players with the highest value of finishing are on the top.

26. Choose **Run** to run this new query.

The screenshot shows the Amazon Athena Query Editor interface. At the top, there are tabs for 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. Below the tabs, the title bar says 'Amazon Athena > Query editor' and shows the 'Editor' tab is selected. The main area has a 'Data' sidebar on the left with sections for 'Data source' (AwsDataCatalog), 'Database' (soccer_database), and 'Tables and views' (Tshlax). A 'SQL' editor window contains the following query:

```
1 | SELECT name, finishing FROM soccer_data ORDER BY finishing DESC
```

Below the SQL window, the 'Query results' tab is active, showing the status 'Completed' and the results count 'Results (61,412)'. The results table is partially visible. At the bottom of the interface, there are links for 'CloudShell', 'Feedback', and copyright information: '© 2024, Amazon Web Services, Inc. or its affiliates.'

27. Choose the scroll bar to scroll down to see the results.

You might notice that some of the players are tied for the top finishing score. Look at another metric for more perspective on these players.

The screenshot shows a AWS Lambda CloudWatch Logs interface. On the left, there is a sidebar with a tree view of log groups and a 'Views (0)' section. The main area is titled 'Results (61,412)' and contains a table with columns '#', 'name', and 'finishing'. The table lists 16 rows of soccer players and their finishing scores. At the bottom of the results table, there is a note: '16 rows selected. 16 rows displayed.'

#	name	finishing
1	R. Lewandowski	95
2	Cristiano Ronaldo	95
3	L. Messi	95
4	V. Miedema	95
5	Luis Fabiano	94
6	S. Agüero	94
7	Eto'o	94
8	Jenni Hermoso	94
9	H. Kane	94
10	C. Immobile	93
11	A. Alves	93
12	E. Le Sommer	93
13	Z. Ibrahimovic	93
14	Pauletta	93
15	A. Wambach	93
16	R. Van Nistelrooy	93

28. Choose the scroll bar to scroll up to the code window.
29. To add to this query's SELECT statement, choose it.
30. In the text entry box after the **finishing** attribute, enter the following metric: **defending**. After entering the metric, press Enter on your keyboard.

Reference the following code snippet to check your formatting.

```
SELECT name, finishing, defending FROM soccer_data ORDER BY finishing DESC
```

The screenshot shows the Amazon Athena Query Editor interface. At the top, there are tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. A 'Workgroup' dropdown is set to 'sports-analytics'. The main area displays a query in the editor pane:

```

1 SELECT name, finishing, defending
  FROM soccer_data
 ORDER BY finishing DESC
  
```

The 'Query results' pane shows the status as 'Completed' with a green checkmark. It provides performance metrics: Time in queue: 65 ms, Run time: 763 ms, Data scanned: 681.36 KB. Below this, the 'Results' section shows a count of 61,412 rows. Buttons for 'Copy' and 'Download results' are available.

31. Choose **Run** to run this query.

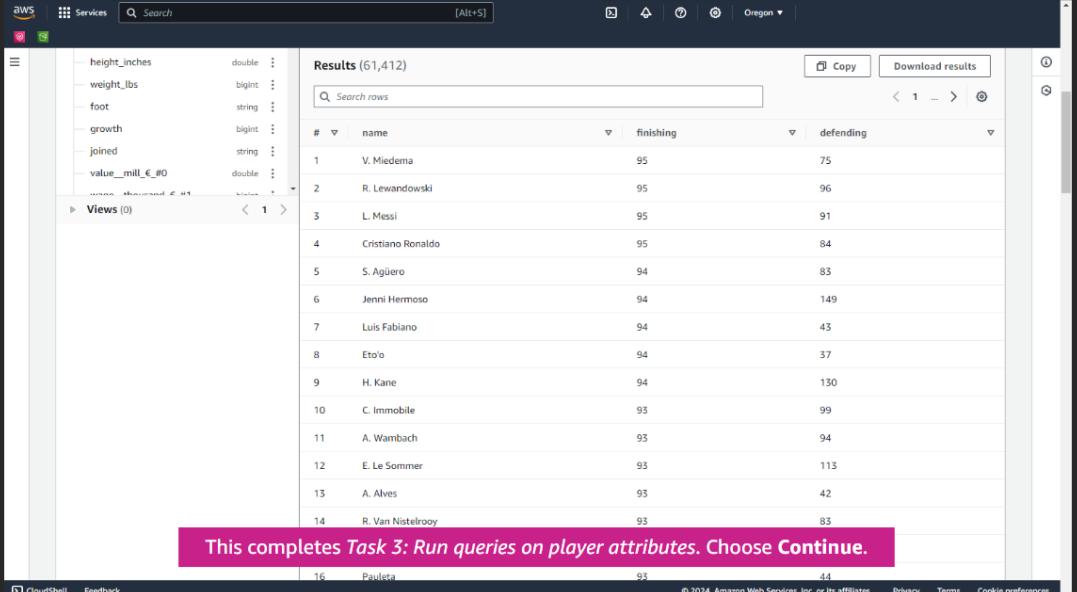
This screenshot is similar to the previous one but shows the 'Run' button being clicked. The status in the 'Query results' pane has changed to 'Running' with a yellow progress bar. The other details remain the same: Time in queue: 60 ms, Run time: 1.108 sec, Data scanned: 681.36 KB.

32. Scroll down to see the results.

Are the top scorers also the top defenders?

Consider what it would be like if it were your job to look at data like this and make decisions about the best players? Is it always a clear choice?

Great work on those queries. Now you will get to customize your own.



This completes Task 3: Run queries on player attributes. Choose Continue.

SIMULATION SCENARIO KEYBOARD SHORTCUTS SIMULATION INSTRUCTIONS

Results (61,412)

#	name	finishing	defending
1	V. Miedema	95	75
2	R. Lewandowski	95	96
3	L. Messi	95	91
4	Cristiano Ronaldo	95	84
5	S. Agüero	94	83
6	Jenni Hermoso	94	149
7	Luis Fabiano	94	43
8	Eto'o	94	37
9	H. Kane	94	130
10	C. Immobile	93	99
11	A. Wambach	93	94
12	E. Le Sommer	93	113
13	A. Alves	93	42
14	R. Van Nistelrooy	93	83
15	Pauleta	93	44
16	I. Ibrahimovic	93	93

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SIMULATION SCENARIO KEYBOARD SHORTCUTS SIMULATION INSTRUCTIONS

Results (61,412)

#	name	finishing
1	R. Lewandowski	95
2	Cristiano Ronaldo	95
3	L. Messi	95
4	V. Miedema	95
5	Luis Fabiano	94
6	S. Agüero	94
7	Eto'o	94
8	Jenni Hermoso	94
9	H. Kane	94
10	C. Immobile	93
11	A. Alves	93
12	E. Le Sommer	93
13	Z. Ibrahimovic	93
14	Pauleta	93
15	A. Wambach	93
16	R. Van Nistelrooy	93

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Task 4: Investigate the data on your own

Take the time to customize a few queries, and look closely at the results.

Using what you learned in the previous tasks, run the last two options, **5 - Top 15 dribblers** and **6 - Top 3 attackers**. View the results, and notice how the SQL queries work.

Saved query 5: 5 - Top 15 dribblers

Let's examine the players that have the top dribbling ability by ordering them using the corresponding attribute.

33. Choose the scroll bar to scroll up.
34. Choose **Saved queries** again.
35. Choose the link in the **ID** column for the option with the name **5 - Top 15 dribblers**.

Notice this query ends with ordering the results in descending order of dribbling, meaning that the players with the highest value of dribbling are on the top. It's also limited to just the top 15 results, so the rest are filtered out.

36. Choose **Run** to run this new query.

The screenshot shows the AWS Lambda console with the Lambda function configuration page open. The function name is 'HelloWorld'. The configuration section includes 'Handler' (index.handler), 'Runtime' (Node.js 18.x), 'Memory Size' (128 MB), and 'Timeout' (3 seconds). The 'Environment Variables' section contains the variable 'GREETING' with the value 'Hello World'. The 'Role' dropdown is set to 'Lambda execution role'. The 'Test' tab is selected, showing a successful test result with the message 'Hello World!'. The 'Logs' tab shows log entries for the function's execution. The bottom of the screen shows the AWS navigation bar and other open tabs.

37. Choose the scroll bar to scroll down to see the results, and confirm that the data matches the SELECT statement.

The screenshot shows the AWS Lambda CloudWatch Metrics Insights interface. At the top, there are tabs for 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. Below the tabs is a search bar with the placeholder 'Search' and a keybinding '[Alt+S]'. The main area displays a table titled 'Results (15)' with two columns: '# name' and 'dribbling'. The data rows are as follows:

#	name	dribbling
1	Neymar	96
2	L. Messi	96
3	Neymar Jr	95
4	C. Ronaldo	95
5	T. Heath	95
6	Z. Ibrahimovic	94
7	M. Rapinoe	94
8	E. Hazard	93
9	Y. Brahimi	93
10	Douglas Costa	92
11	A. Recoba	92
12	Iago	92
13	Adama Traoré	92
14	Bernardo Silva	92
15	C. Hansen	92

At the bottom of the interface, there are links for 'CloudShell', 'Feedback', and copyright information: '© 2024, Amazon Web Services, Inc. or its affiliates.' followed by 'Privacy', 'Terms', and 'Cookie preferences'.

38. Choose the scroll bar to scroll up to the code window.

You can change the LIMIT parameter to suit your needs. Edit it to just show the top 10 players instead of the top 15.

39. To edit this query's SELECT statement, choose it.
40. In the text entry box after the **DESC LIMIT** attribute, enter the following metric:
10. After entering the metric, press Enter on your keyboard.

The screenshot shows the Amazon Athena Query Editor interface. At the top, there are tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. A 'Workgroup' dropdown is set to 'sports-analytics'. The main area has a 'Data' sidebar with 'Data source' (AwsDataCatalog) and 'Database' (soccer-database). Below this are sections for 'Tables and views' (Tables: soccer_data, Views: 0), 'SQL' (Ln 1, Col 73), and 'Query results' (Completed, Results: 15). The SQL query is:

```
1 SELECT name, dribbling FROM soccer_data ORDER BY dribbling DESC LIMIT 10;
```

The 'Results' section shows 15 rows of data:

#	name	dribbling
1	Neymar	96
2	L. Messi	96
3	T. Heath	95
4	C. Ronaldo	95
5	Neymar Jr	95
6	Z. Ibrahimovic	94
7	M. Rapinoe	94
8	Y. Brahimi	93
9	E. Hazard	93
10	Iago	92

41. Choose **Run** to run this query.
42. Scroll down to see the results.

You see now that only the top 10 players are shown, instead of the original 15.

The screenshot shows the same Amazon Athena Query Editor interface after running the query. The 'Results' section now displays only 10 rows of data, as indicated by the 'Results (10)' label. The data is identical to the previous screenshot.

#	name	dribbling
1	Neymar	96
2	L. Messi	96
3	T. Heath	95
4	C. Ronaldo	95
5	Neymar Jr	95
6	Z. Ibrahimovic	94
7	M. Rapinoe	94
8	Y. Brahimi	93
9	E. Hazard	93
10	Iago	92

43. Choose the scroll bar to scroll up.

Saved query 6: 6 - Top 3 attackers

For the final saved query, let's examine the players that are rated as the top three attackers.

44. Choose Saved queries.

45. Choose the link in the ID column for the option with the name **6 - Top 3 Attackers**.

Notice the line of this query that orders the results in descending order of attacking, in addition to also showing the players' age, team, gender, and height in inches, limited to the top three players.

46. Choose Run to run this new query.

The screenshot shows the AWS Management Console with the Athena service selected. The main area is the 'Query editor'. A saved query named '6 - Top 3 attackers' is selected. The SQL code is:

```
1 SELECT name, attacking, age, team, gender, height_inches FROM soccer_data ORDER BY attacking DESC LIMIT 3
```

The 'Results' section shows the output of the query, which is currently empty. Below the results, it says 'Completed' with a timestamp of 'Time in queue: 71 ms' and 'Run time: 784 ms'.

47. Choose the scroll bar to scroll down to see the results.

Confirm that the data matches the SELECT statement.

The screenshot shows the AWS Athena Query Editor interface. The left sidebar displays the database 'soccer-database' and table 'soccer_data'. The main area shows a completed SQL query in the editor:

```
SELECT name, attacking, team, gender, height_inches
FROM soccer_data
ORDER BY attacking DESC
LIMIT 3;
```

The results pane shows the following data:

#	name	attacking	team	gender	height_inches
1	Cristiano Ronaldo	437	Juventus	M	6.17
2	C. Sinclair	432	Canada	W	5.75
3	R. Lewandowski	430	Bayern München	M	6.08

48. Choose the scroll bar to scroll up to the code window.

It's simple to modify these metrics to change what is being measured. Instead of the top three attackers, search for the top three goalkeepers.

49. To edit this query's SELECT statement, choose it.
 50. In the text entry box after the **name** attribute, enter the following metric:
Goalkeeping. After entering the metric, press Enter on your keyboard.

The screenshot shows the AWS Athena Query Editor interface. The left sidebar displays the database 'soccer-database' and table 'soccer_data'. The main area shows the modified SQL query in the editor:

```
SELECT name, Goalkeeping, team, gender, height_inches
FROM soccer_data
ORDER BY attacking DESC
LIMIT 3;
```

The results pane shows the following data:

#	name	Goalkeeping	team	gender	height_inches
1	Cristiano Ronaldo	437	Juventus	M	6.17
2	C. Sinclair	432	Canada	W	5.75
3	R. Lewandowski	430	Bayern München	M	6.08

You will also need to change the second instance of attacking to goalkeeping, or else the query won't work correctly.

51. Continue editing this query's SELECT statement by choosing it.
52. In the text entry box after the **ORDER BY** attribute, enter the following metric: **Goalkeeping**. After entering the metric, press Enter on your keyboard.

The screenshot shows the Amazon Athena Query Editor interface. The top navigation bar includes 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. The main area has tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. The 'Workgroup' dropdown is set to 'sports-analytics'. On the left, the 'Data' sidebar shows 'Data source: AwsDataCatalog' and 'Database: soccer-database'. Under 'Tables and views', there is a 'Tables (1)' section with 'soccer_data' selected. The central editor pane displays a query with two numbered steps: '1. SELECT name, goalkeeping, age, team, gender, height_inches FROM soccer_data ORDER BY goalkeeping DESC LIMIT 3' and '2. 6 - Top 3 attackers'. Below the editor is a SQL panel showing 'Ln 1, Col 114'. At the bottom, there are buttons for 'Run', 'Explain', 'Cancel', 'Clear', and 'Create'. The 'Query results' section at the bottom indicates the query is 'Completed' with a time of 62 ms, a run time of 596 ms, and 835.36 KB scanned. A 'Results (3)' table is shown, but its contents are not visible in the screenshot. The footer includes links for 'CloudShell', 'Feedback', and copyright information: '© 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences'.

53. Choose **Run** to run this query.
54. Scroll down to see the results.

Now, instead of the top three attackers, you should see the top three goalkeepers.

The screenshot shows the AWS Data Catalog interface. On the left, there's a sidebar with 'AwsDataCatalog' selected under 'Database' and 'soccer-database' selected under 'Tables and views'. A 'Create' button is available. Below it, a search bar and a 'Tables (1)' section with 'soccer_data' listed. To the right, a SQL editor window titled 'soccer_data' shows the query: 'SELECT name, goalkeeping, age, team, gender, height_inches FROM soccer_data ORDER BY goalkeeping DESC LIMIT 3'. Below the editor is a 'Run again' button and an 'Explain' button. The results section is titled 'Completed' with a green status icon. It shows a table with three rows of data:

#	name	goalkeeping	age	team	gender	height_inches
1	M. Neuer	440	34	Bayern München	M	6.33
2	Alisson	439	27	Liverpool	M	6.25
3	M. ter Stegen	439	28	Barcelona	M	6.17

At the bottom, there are 'Copy' and 'Download results' buttons. The footer includes links for CloudShell, Feedback, and various AWS terms like Privacy, Terms, and Cookie preferences.

55. Choose the scroll bar to scroll up.

The screenshot shows the Amazon Athena Query Editor. The top navigation bar includes 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. The main interface has tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. The 'Workgroup' dropdown is set to 'sports-analytics'. The left sidebar shows 'Data' with 'AwsDataCatalog' and 'soccer-database' selected. A 'Tables and views' section lists 'soccer_data'. The central area contains a query editor with three tabs: 'Query 1', '5 - Top 15 dribblers', and '6 - Top 3 attackers'. The '6 - Top 3 attackers' tab is active, displaying the query: 'SELECT name, goalkeeping, age, team, gender, height_inches FROM soccer_data ORDER BY goalkeeping DESC LIMIT 3'. Below the editor is a 'Run again' button and an 'Explain' button. The results section is titled 'Completed' with a green status icon. It shows a table with three rows of data:

#	name	goalkeeping	age	team	gender	height_inches
1	M. Neuer	440	34	Bayern München	M	6.33
2	Alisson	439	27	Liverpool	M	6.25
3	M. ter Stegen	439	28	Barcelona	M	6.17

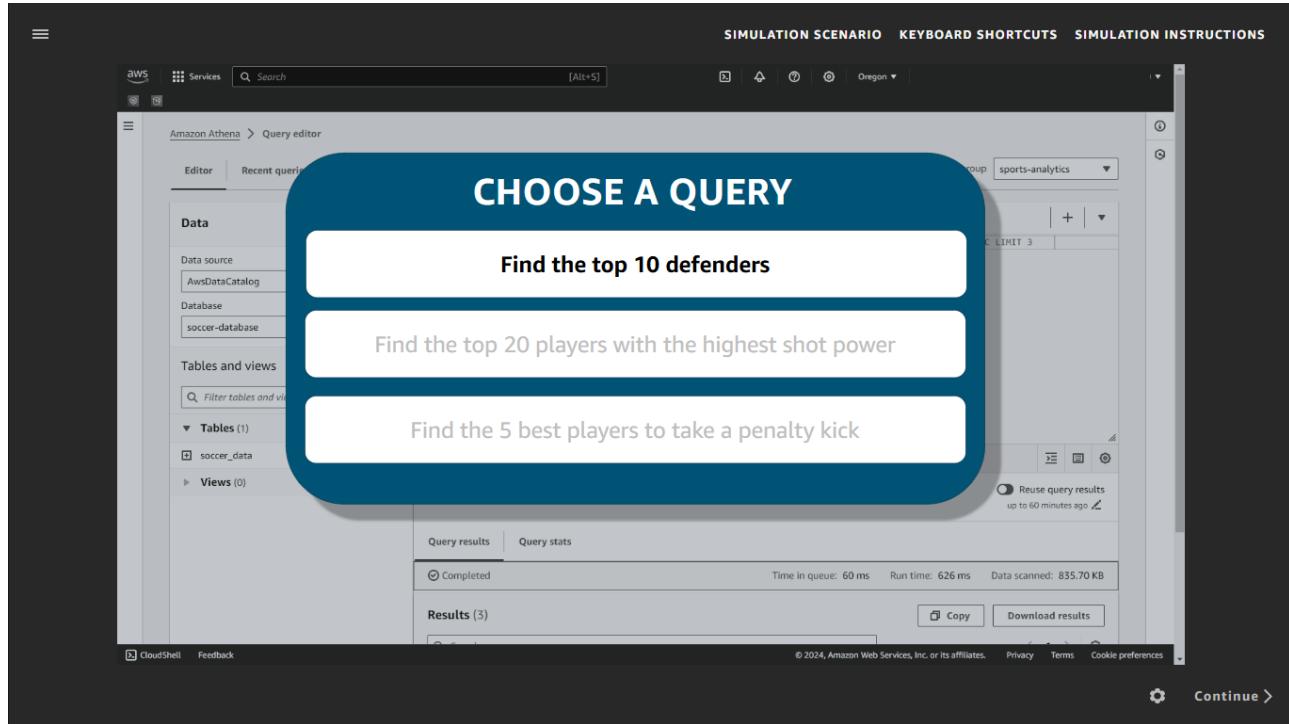
A pink banner at the bottom states: 'This completes Task 4: Investigate the data on your own. Choose Continue.' At the very bottom, there are 'CloudShell', 'Feedback', and 'Continue >' buttons.

Task 5: Create new queries

In this simulation, you've been using saved queries, but it's easy enough to create your own.

57. Choose + to create a new query.

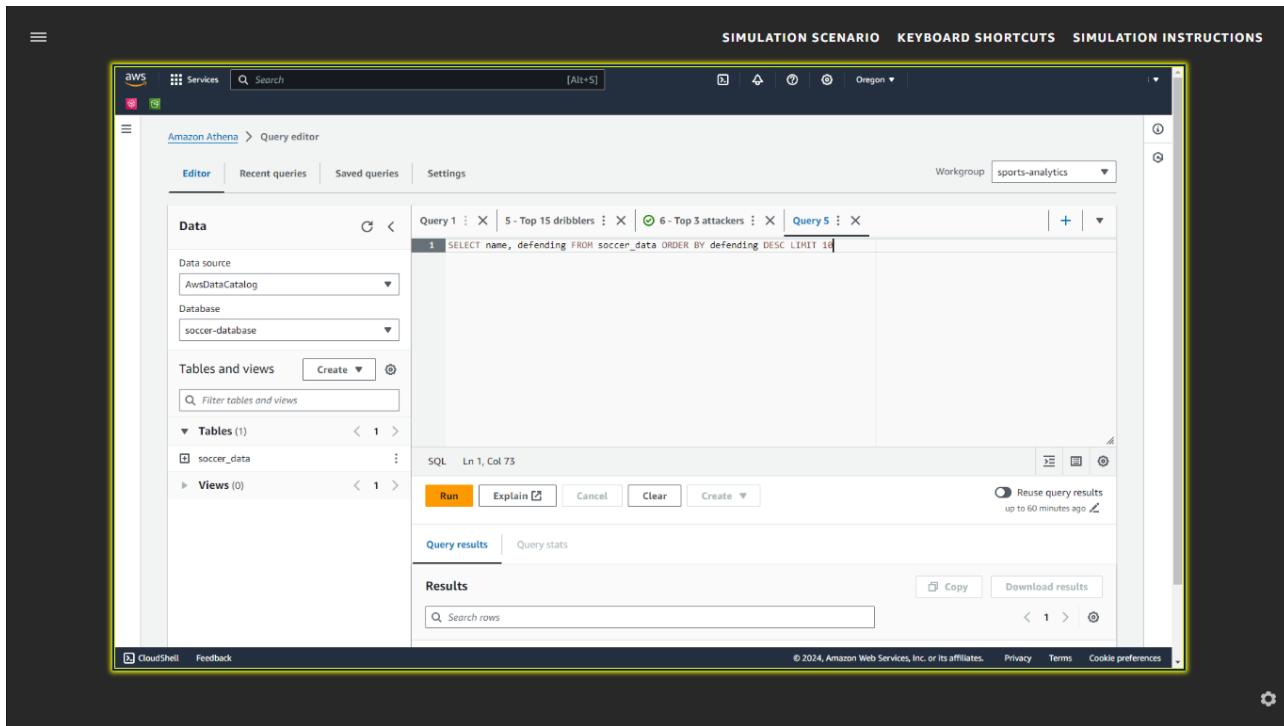
This opens a new query code window, where users can add and run their own query statements. For this simulation, choose from each of the three custom queries that have been provided for you.

**New query 1: Find the top 10 defenders**

This first simulated query will find the top 10 rated defenders. You will need to enter the complete SELECT statement, so be careful copying it from this document into the code window!

58. To add a SELECT statement, choose this query's code window.
59. In the text entry box, carefully enter the following SELECT statement:

```
SELECT name, defending FROM soccer_data ORDER BY defending DESC LIMIT 10
```

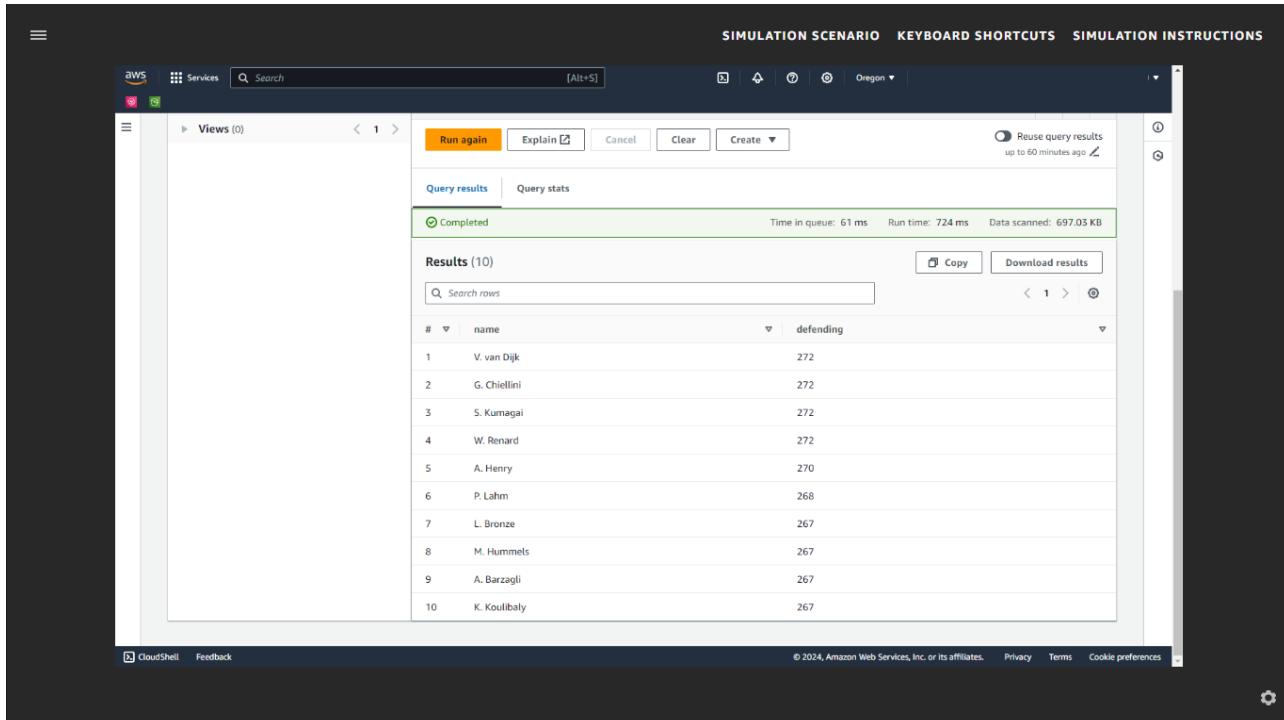


60. After entering the statement, press Enter on your keyboard. Choose **Run** to run this query.

61. Choose the scroll bar to scroll down to see the results.

You should see the name and defensive rating for the top 10 defensive players.

62. Choose the scroll bar to scroll up.



63. Choose **Continue** to return to the query selection screen.

The screenshot shows the Amazon Athena Query Editor interface. The query editor has tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. The 'Editor' tab is selected. The 'Data' section shows the data source as 'AwsDataCatalog' and the database as 'soccer-database'. The 'Tables and views' section shows a single table 'soccer_data'. The main query window contains the following SQL code:

```
Query 1 : 5 - Top 15 dribblers : X | 6 - Top 3 attackers : X | Query 5 : X
1 | SELECT name, defending FROM soccer_data ORDER BY defending DESC LIMIT 10;
```

Below the query window, there are buttons for 'Run again', 'Explain', 'Cancel', 'Clear', and 'Create'. A status bar at the bottom indicates the query was completed successfully with a time of 66 ms, a run time of 1.014 sec, and data scanned of 697.03 KB.

A pink banner at the bottom of the editor states: "This completes the query Find the top 10 defenders. Choose Continue."

New query 2: Find the top 20 players with the highest shot power

This next query will find the top 20 rated players with the highest shot power, and will also include their overall power rating and age. You will need to enter the complete SELECT statement accurately, so be careful copying it from this document into the code window!

A large blue callout bubble is overlaid on the Amazon Athena Query Editor interface, containing three query options:

- Find the top 10 defenders
- Find the top 20 players with the highest shot power**
- Find the 5 best players to take a penalty kick

The background of the callout bubble is white, and the text is black. The callout bubble is semi-transparent, allowing the underlying Query Editor interface to be seen.

64. To add a SELECT statement, choose this query's code window.
65. In the text entry box, carefully enter the following SELECT statement:

```
SELECT name, shot_power, power, age FROM soccer_data ORDER BY shot_power DESC LIMIT 20
```

After entering the statement, press Enter on your keyboard.

66. Choose **Run** to run this query.

The screenshot shows the Amazon Athena Query Editor interface. The top navigation bar includes 'SIMULATION SCENARIO', 'KEYBOARD SHORTCUTS', and 'SIMULATION INSTRUCTIONS'. Below the navigation is a toolbar with icons for search, refresh, and location, followed by 'Oregon' and a dropdown menu. The main workspace has tabs for 'Editor', 'Recent queries', 'Saved queries', and 'Settings'. The 'Workgroup' dropdown is set to 'sports-analytics'. On the left, the 'Data' panel shows 'Data source: AwsDataCatalog' and 'Database: soccer-database'. Under 'Tables and views', there is a table named 'soccer_data' and no views. The central area contains a query history with five entries: 'Query 1', '5 - Top 15 dribblers', '6 - Top 3 attackers', 'Query 5' (which is currently selected), and another unnamed entry. The 'Query 5' entry contains the SQL code: 'SELECT name, shot_power, power, age FROM soccer_data ORDER BY shot_power DESC LIMIT 20'. Below the history is a SQL editor with the same query. The editor includes buttons for 'Run again', 'Explain', 'Cancel', 'Clear', and 'Create'. A note says 'Reuse query results up to 60 minutes ago'. At the bottom, the 'Query results' tab is active, showing a status bar with 'Completed', 'Time in queue: 78 ms', 'Run time: 1.101 sec', and 'Data scanned: 750.78 KB'. There are 'Copy' and 'Download results' buttons. The footer includes links for 'CloudShell', 'Feedback', and copyright information: '© 2024, Amazon Web Services, Inc. or its affiliates.' and links for 'Privacy', 'Terms', and 'Cookie preferences'.

67. Choose the scroll bar to scroll down to see the results. Make sure to scroll all the way down to see all 20 results.

The LIMIT command is a great way to reduce the amount of data you need to examine, especially when you have more than a few fields.

The screenshot shows a table titled "Results (20)" with columns: #, name, shot_power, power, and age. The data is as follows:

#	name	shot_power	power	age
1	R. Olive	95	256	36
2	Ronny	94	308	30
3	M. Buga	94	238	28
4	E. Haaland	94	426	19
5	Cristiano Ronaldo	94	444	35
6	Hulk	94	424	33
7	M. Behringer	94	429	29
8	D. Munteanu	93	335	38
9	F. Guarín	93	417	32
10	M. Rashford	92	411	22
11	E. Le Sommer	92	409	31
12	M. Tarnat	92	312	38
13	Assunção	92	328	29
14	J. Krzynówek	92	325	33
15	T. Hitzlsperger	91	390	30
16	Piti	91	337	35

68. Choose the scroll bar to scroll up.

Excellent job! Let's try another one!

69. Choose **Continue** to return to the query selection screen.

New query 3: Find the 5 best players to take a penalty kick

This final query will find the five best players to take a penalty kick. Be careful entering the SELECT statement into the code window!

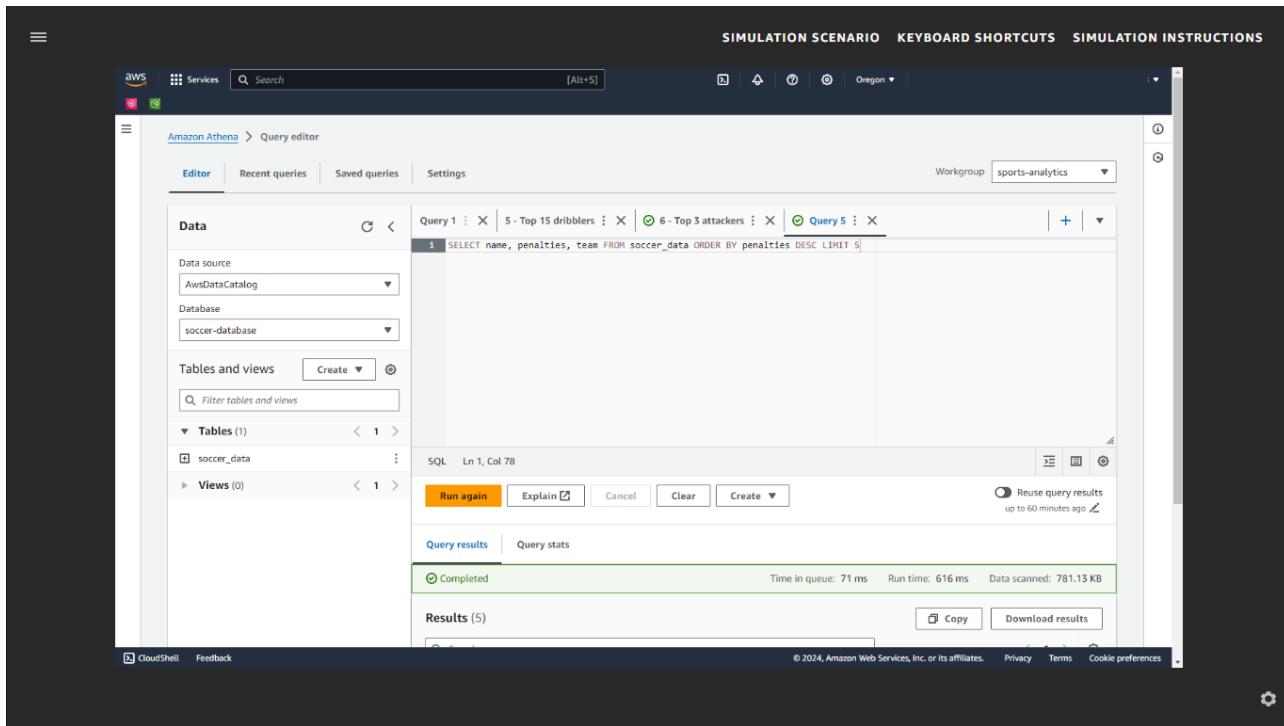
70. To add a SELECT statement, choose this query's code window.

71. In the text entry box, carefully enter the following SELECT statement:

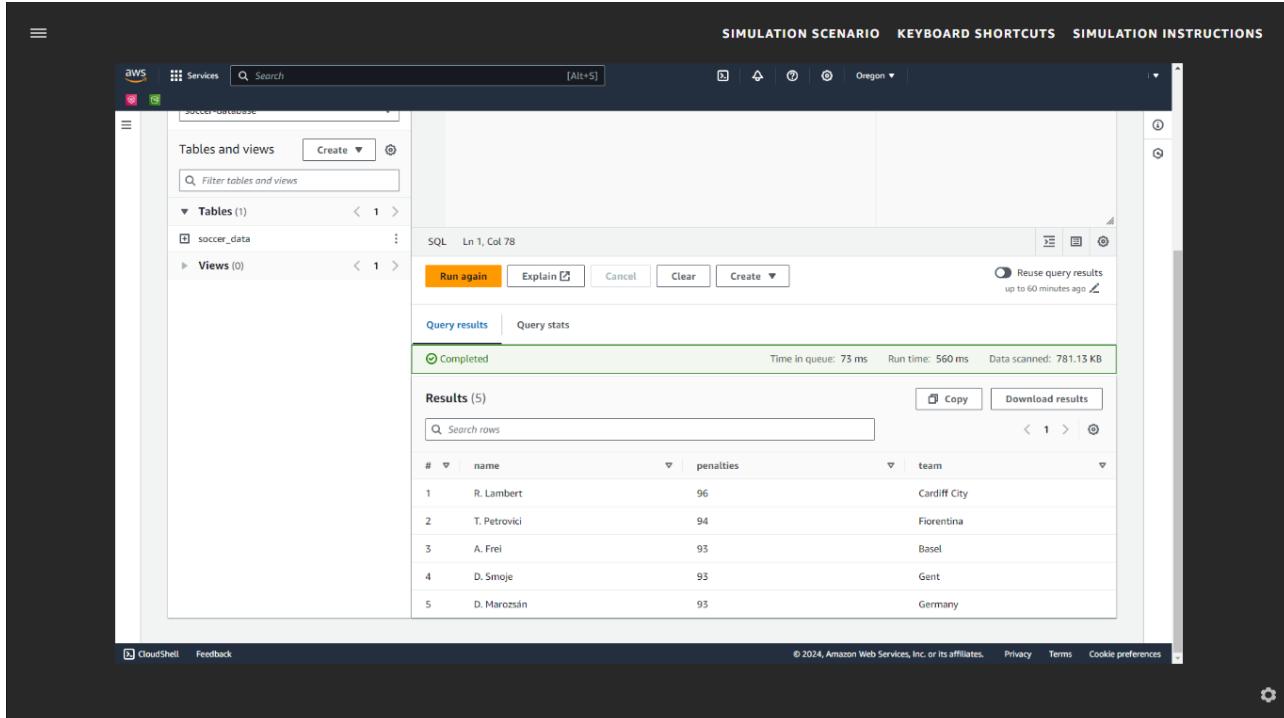
```
SELECT name, penalties, team FROM soccer_data ORDER BY penalties DESC  
LIMIT 5
```

After entering the statement, press Enter on your keyboard.

72. Choose **Run** to run this query.



73. Choose the scroll bar to scroll down to see the results.



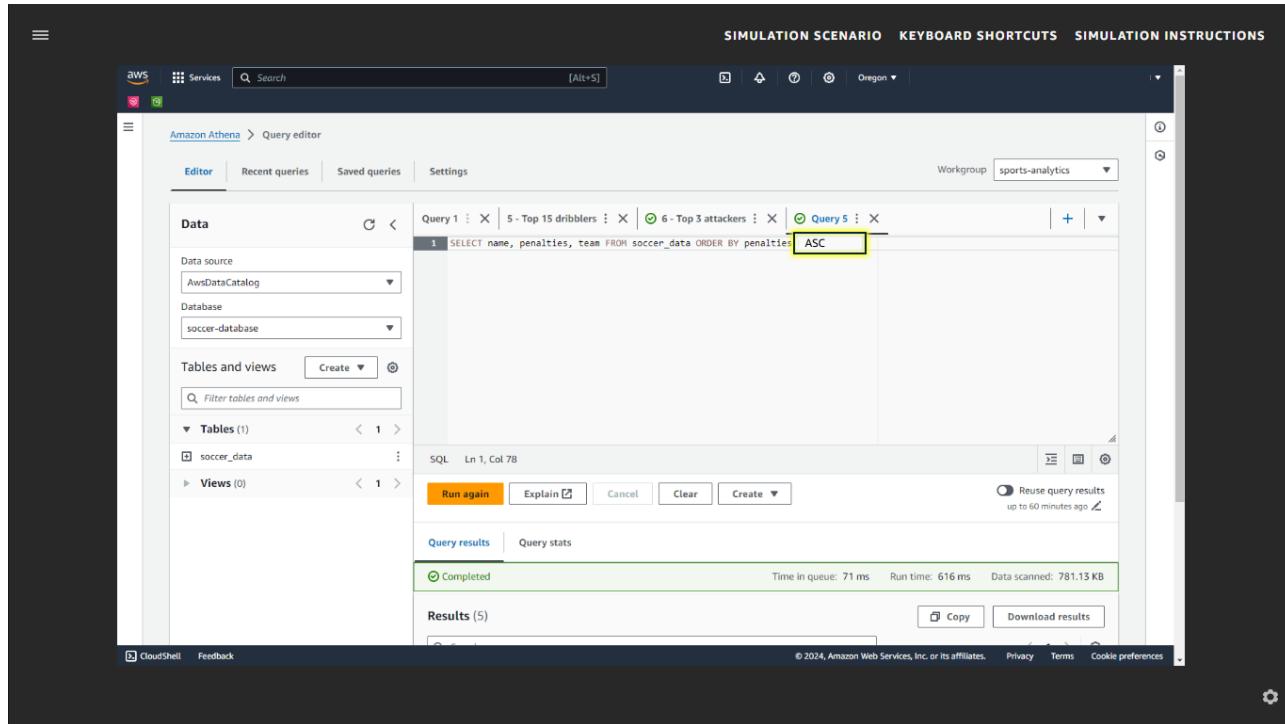
74. Choose the scroll bar to scroll up.

If you have noticed from the last few queries, the DESC statement allows users to see the top players in descending order. But what if you wanted to observe the opposite? What if you wanted to see what players to avoid by sorting in ascending order, from

the bottom of the metric? That can also be done using the ASC, or ascending, statement.

75. To edit the SELECT statement, choose this query's code window.

76. In the text entry box, enter the following metric: **ASC**. After entering the metric, press Enter on your keyboard.



The screenshot shows the AWS Management Console with the Athena service selected. The 'Query editor' tab is active. On the left, there's a sidebar for 'Data' with 'Data source' set to 'AwsDataCatalog' and 'Database' set to 'soccer-database'. Below that are sections for 'Tables and views' and 'Views'. The main area contains a list of queries: 'Query 1', '5 - Top 15 dribblers', '6 - Top 3 attackers', 'Query 5', and 'Query 6'. The 'Query 5' entry is highlighted with a yellow box around its SQL code. The SQL code is:

```
1 SELECT name, penalties, team FROM soccer_data ORDER BY penalties ASC
```

Below the code, the status bar shows 'SQL Ln 1, Col 78'. At the bottom of the editor, there are buttons for 'Run again', 'Explain', 'Cancel', 'Clear', and 'Create'. The 'Run results' section below shows a green status bar indicating the query is 'Completed' with a run time of 616 ms and data scanned of 781.13 KB. There are 'Copy' and 'Download results' buttons here as well.

77. Choose **Run** to run this query.

78. Choose the scroll bar to scroll down to see the results.

Now, instead of the top five players that are rated the best at taking penalty kicks, you can now view the five players who rate at the bottom of this metric. You probably wouldn't want to choose any of these players to take your penalty kicks!

The screenshot shows the AWS Athena Query Editor interface. The left sidebar displays the database structure for 'soccer-database' with one table 'soccer_data'. The main area shows the results of a SQL query:

```
SQL  Ln 1, Col 65
Run again Explain Cancel Clear Create
Reuse query results up to 60 minutes ago

Completed Time in queue: 75 ms Run time: 650 ms Data scanned: 781.13 KB

Results (5)
Search rows
# name penalties team
1 J. Collister 2 Tranmere Rovers
2 O. Chenoworth 3 Plymouth Argyle
3 K. Goeman 5 Racing Club de Lens
4 R. Flitney 5 Gillingham
5 S. Villanova 5 Cittadella
```

79. Choose the scroll bar to scroll up.
80. Choose **Continue** to return to the query selection screen.

The screenshot shows the AWS Athena Query Editor interface. The left sidebar displays the database structure for 'soccer-database'. The main area shows the results of a completed query:

```
Amazon Athena > Query editor
Editor Recent queries Saved queries Settings
Workgroup sports-analytics

Data
Data source AwsDataCatalog
Database soccer-database
Tables and views Create
Filter tables and views
Tables (1)
soccer_data
Views (0)

Query 1 : 5 - Top 15 dribblers : 6 - Top 3 attackers : Query 5 :
1 SELECT name, penalties, team FROM soccer_data ORDER BY penalties ASC LIMIT 5
2

Completed Time in queue: 75 ms Run time: 650 ms Data scanned: 781.13 KB
```

A pink banner at the bottom of the results pane says: "This completes the query Find the 5 best players to take a penalty kick. Choose Continue."

B. Creating a Data Dashboard Using QuickSight

Task 1: Get familiar with Amazon QuickSight

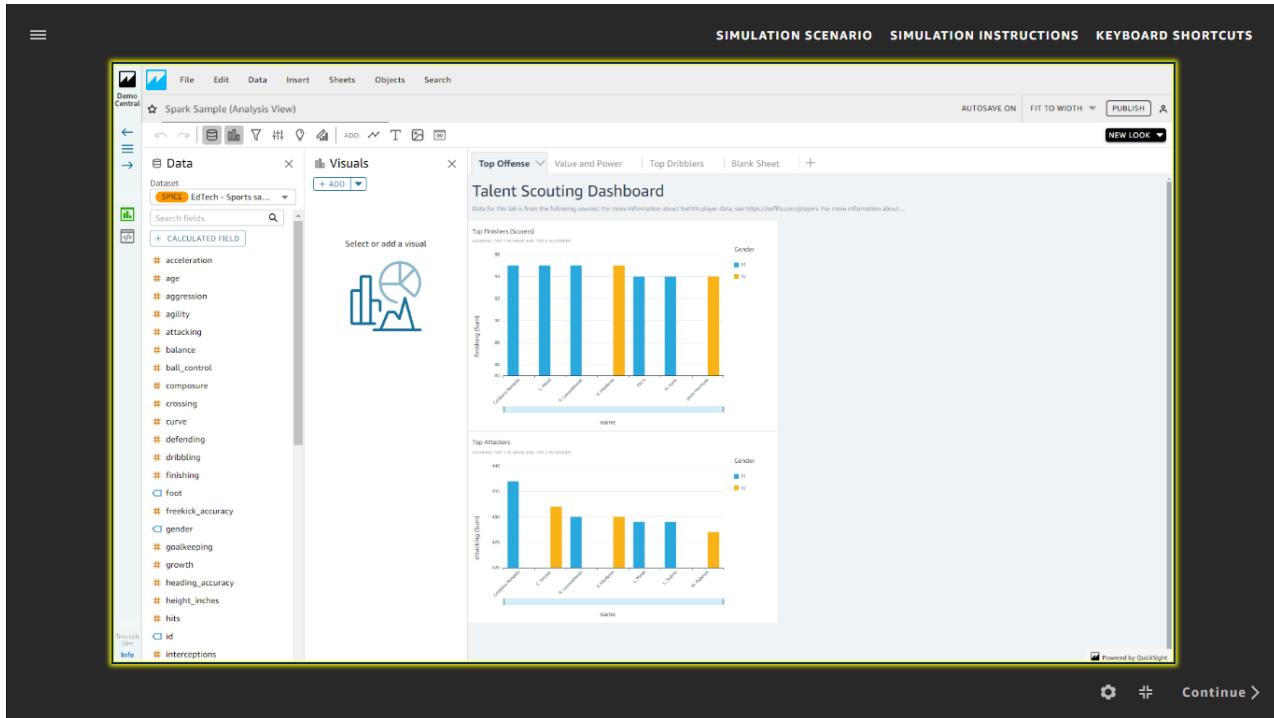
R.J.College

325

In this simulation, you will use a pre-created Amazon QuickSight dashboard.

In this task, you will explore QuickSight and make your first modification to a dashboard.

- To begin, in Amazon QuickSight you will see two graphs on the right, and a menu bar on the left.



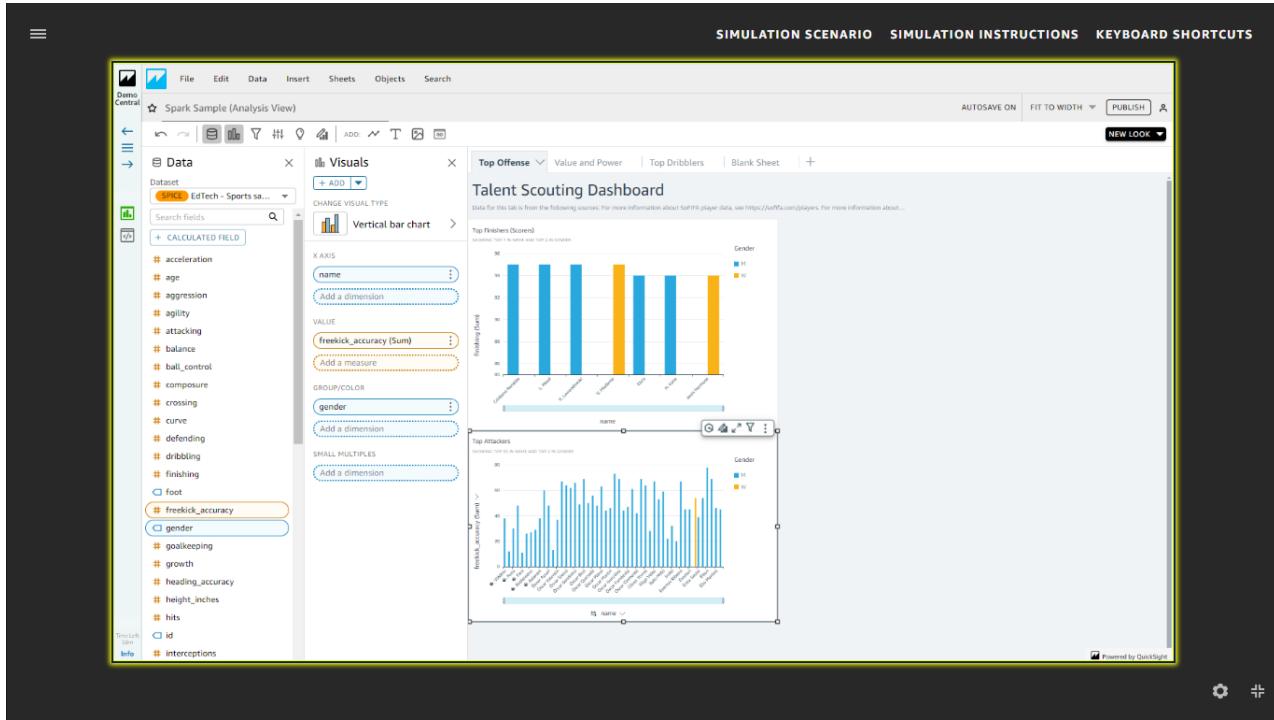
There are four sheets precreated for you. You can navigate between them near the top of your screen. For now, only the first tab is active.

- The first sheet displayed, labeled **Top Offense**, shows two visualizations with the Top Finishers (Scorers) and Top Attackers. Note that when you hover your cursor over the bars, it displays the exact score associated with that player.
- When you've finished examining the charts, choose **Continue**.

Now you will modify the **Top Attackers** visualization on this sheet to another metric that might be valuable when looking at our top offense players.

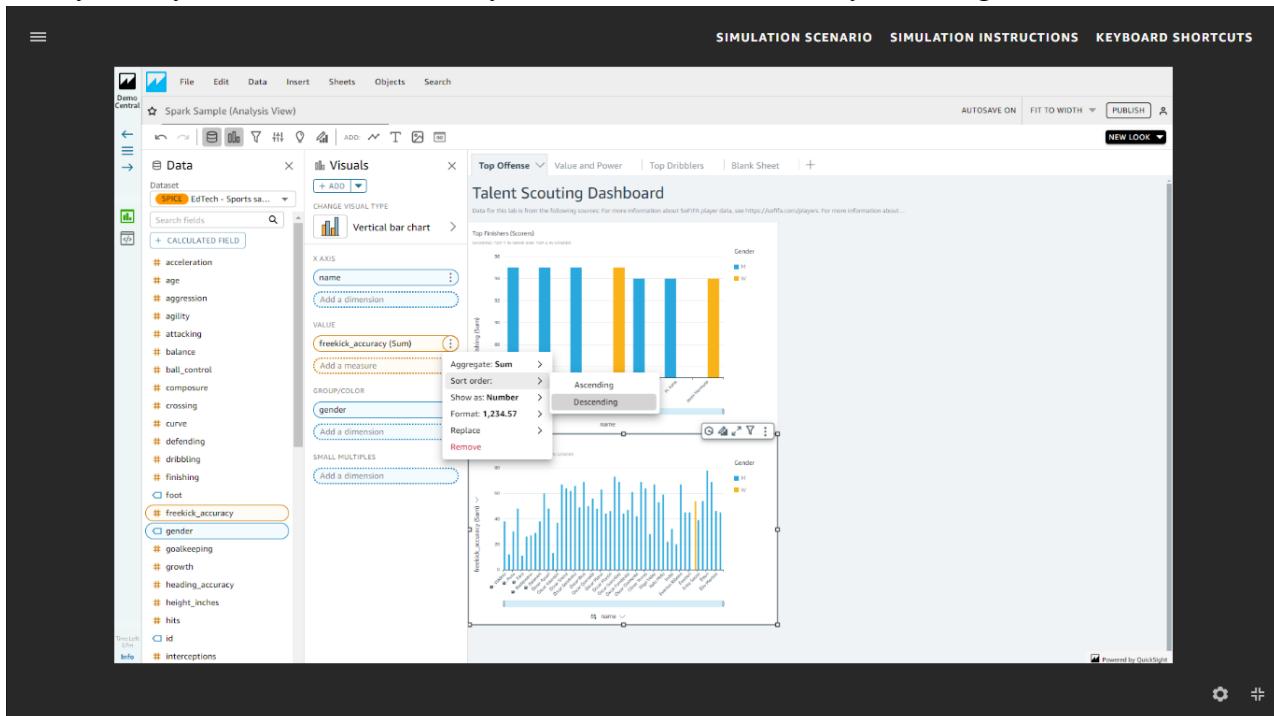
- Choose the data visualization graph labeled **Top Attackers**. It is the second one down on the page.
- In the **Data** pane, under **Dataset**, choose freeskick_accuracy.

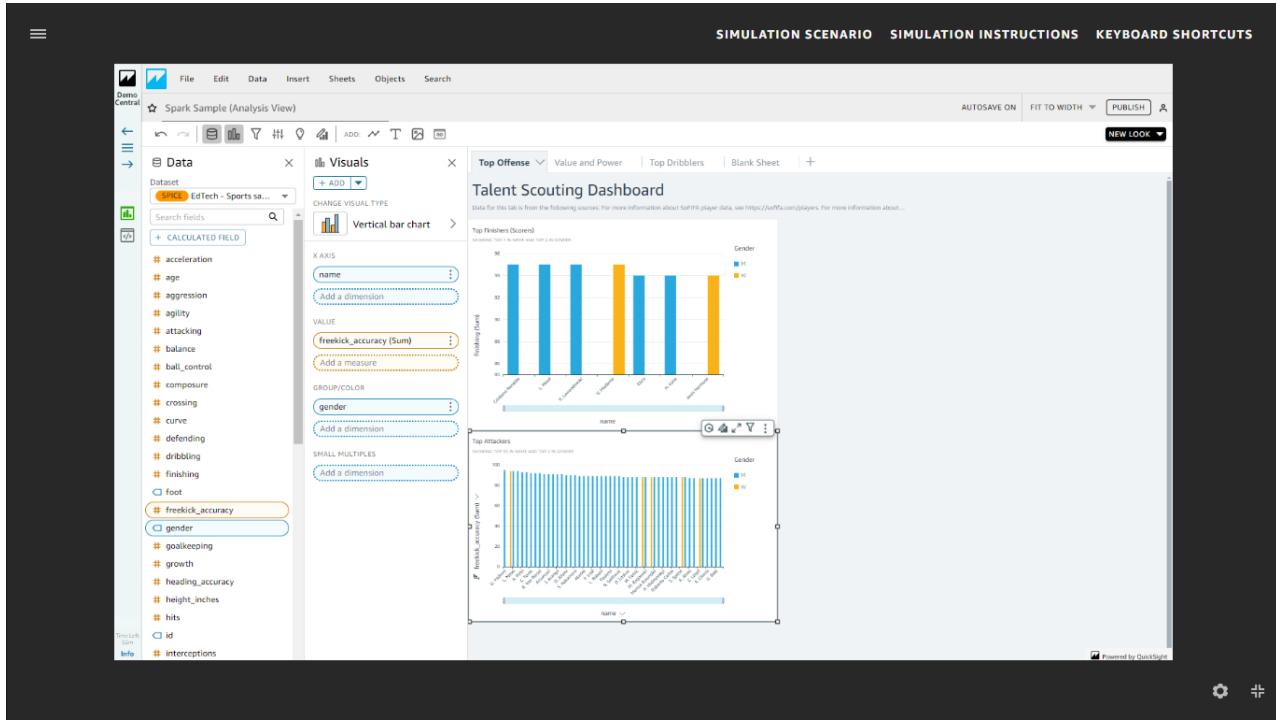
When you do this, notice that the visualization immediately updates. It now shows freekick accuracy instead of attacking. However, the names are in a random order, instead of in order of descending from highest to lowest.



6. To put the names in descending order, in the **Visuals** pane, choose the **three dots** next to **freckick_accuracy (Sum)**. This is the label for the y-axis.
7. Choose **Sort order > Descending**.

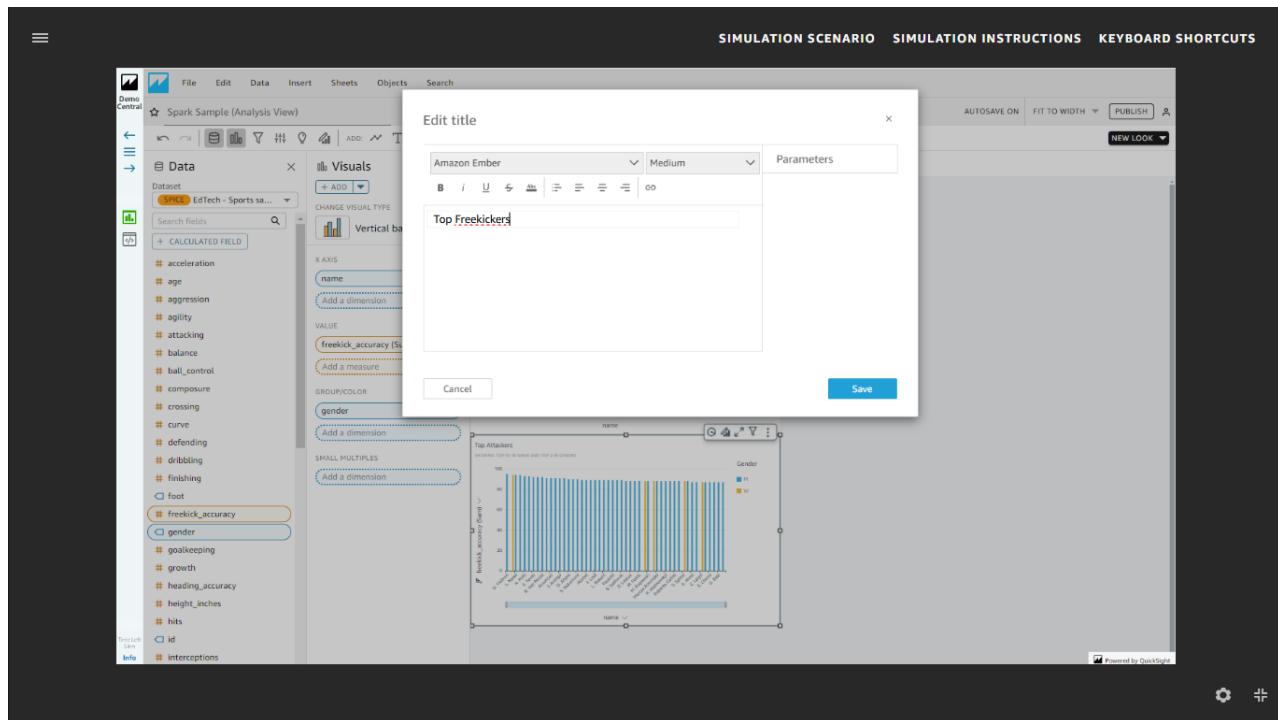
At any time, you can edit the titles of your visualization to reflect your changes.



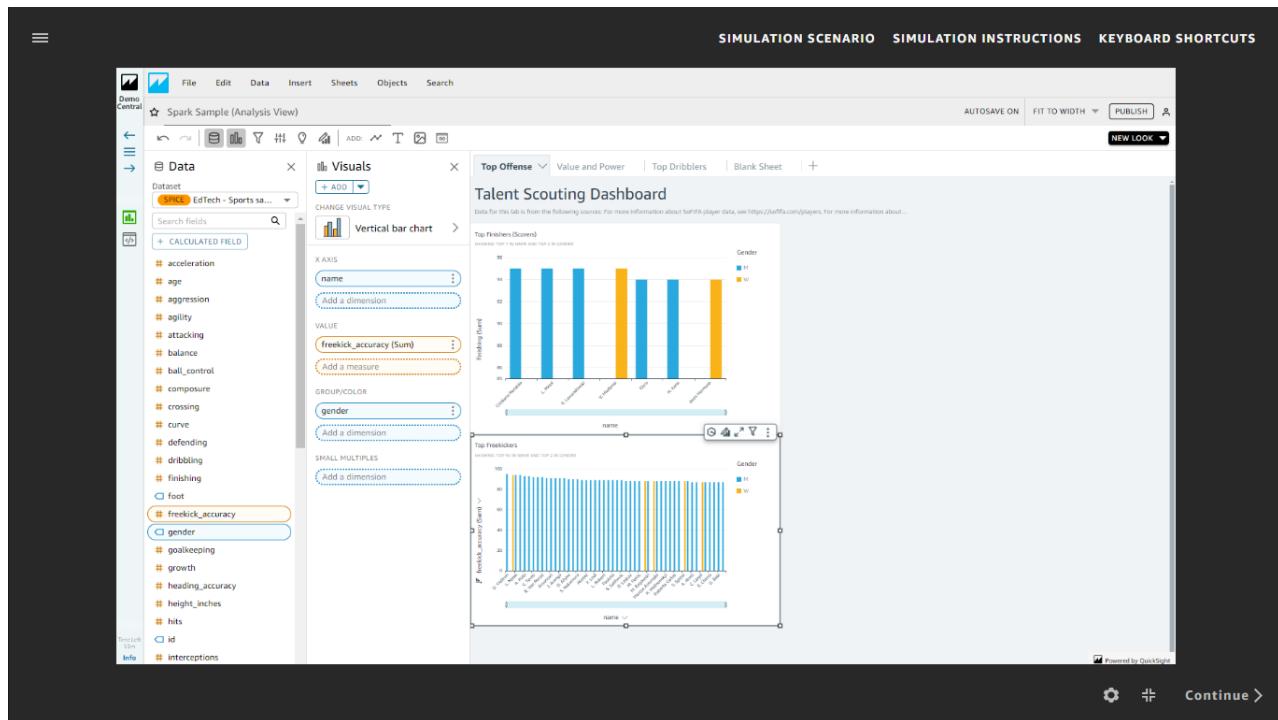


8. Choose the title (**Top Attackers**) of the data visualization, which pulls up a text editor window.
9. Choose the text entry box in the **Edit title** pop-up.

10. Make your changes to the text. Enter **Top Freekickers** in the text entry box. This will be the new title to reflect the new metric.

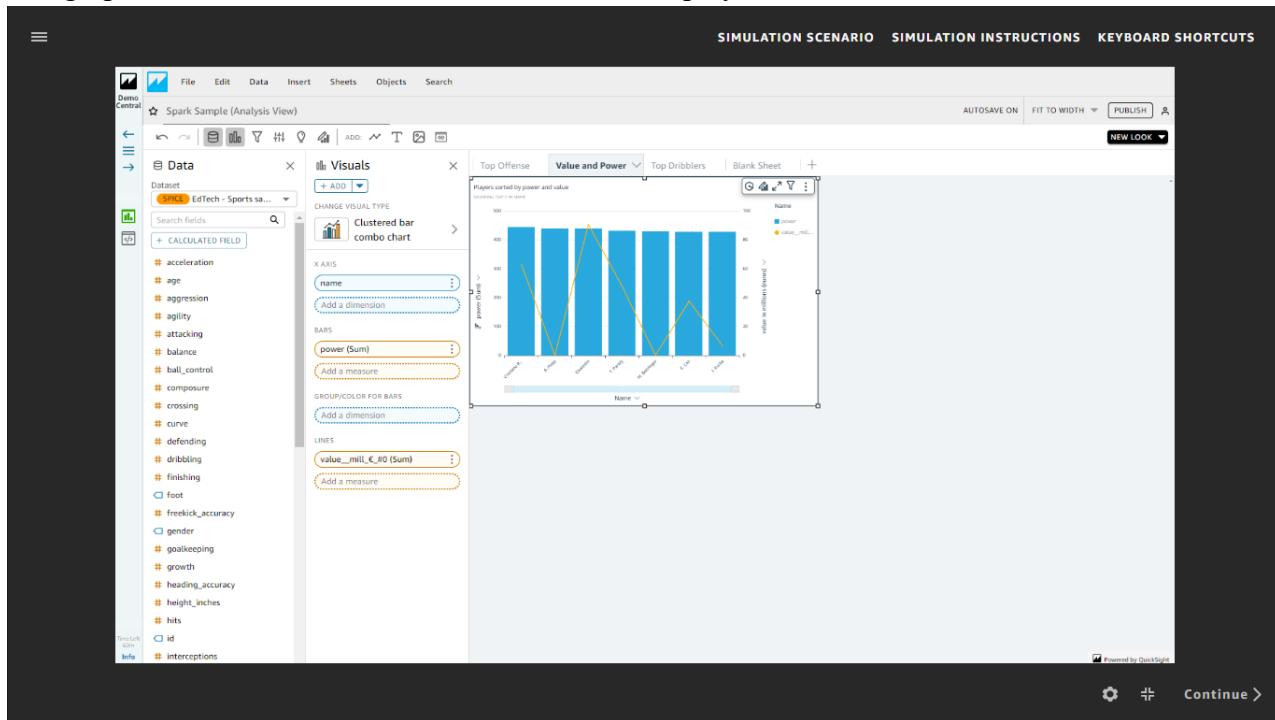


11. Choose Save.



12. Take a moment to open and look at the other precreated sheets by choose the tabs.

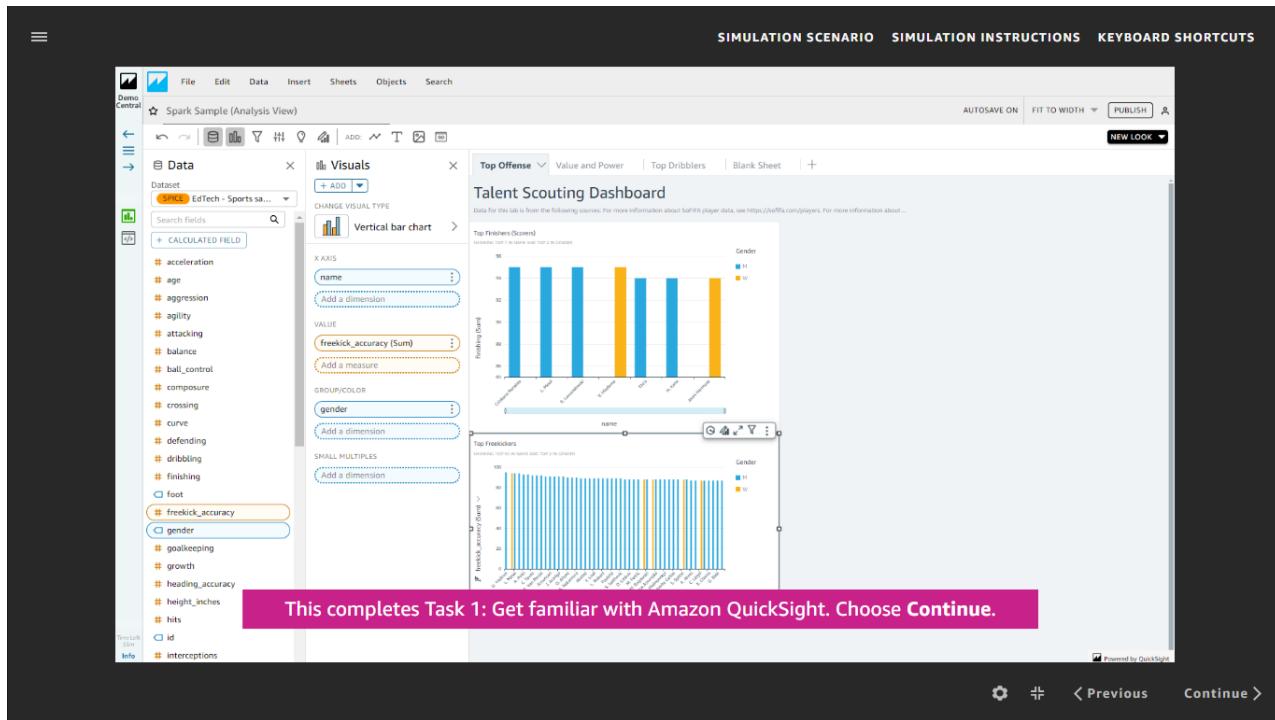
The second sheet, labeled **Value and Power**, sorts the players by the power metric and overlays a line graph that shows the value associated with each player.



The third sheet, labeled **Top Dribblers**, shows the top seven dribblers sorted by gender.

The fourth sheet, labeled **Blank Sheet**, is intentionally left blank so that you can create your own from scratch, which you will simulate in Task 2. You can create as many additional sheets as you want as well, by selecting the + symbol next to the sheet tabs.

13. After you have viewed each tab, choose **Continue** to complete this task.



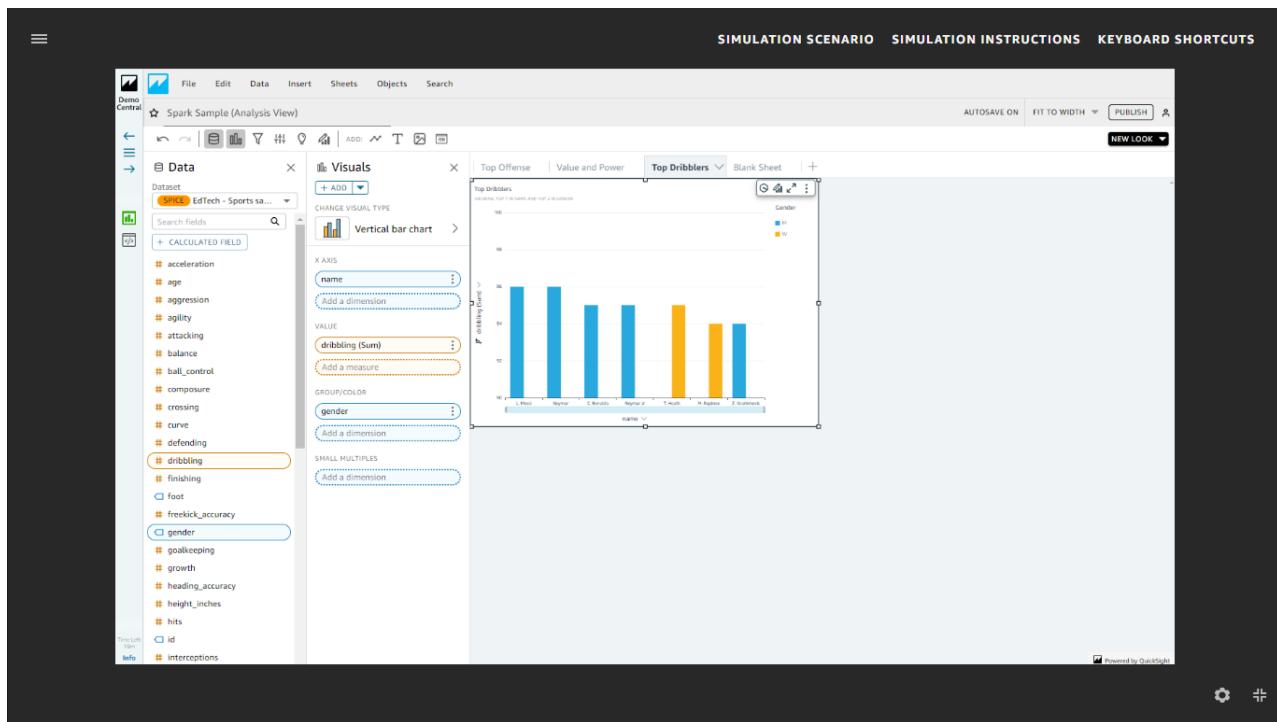
Task 2: Customize your dashboard

Now it's time for you to take on your talent scout role, and craft a dashboard that informs and supports your decision on which three soccer players to recruit.

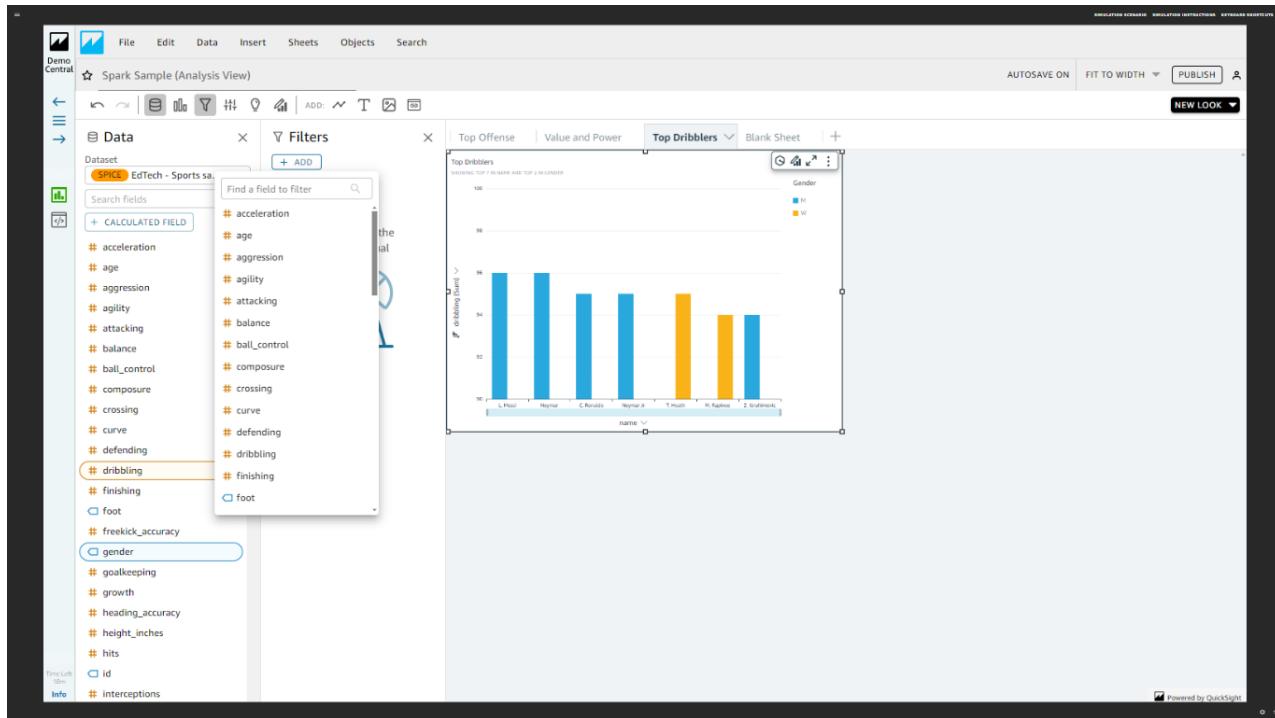
Choose each of these recommended customization jobs to add to your dashboard. For each job, choose the title. After you complete a job, you will return to the selection screen to choose a new job. When you complete this task by completing all four jobs, choose **Continue**.

Job 1: Add a filter to the Top Dribblers visualization to only look at left-footed players.

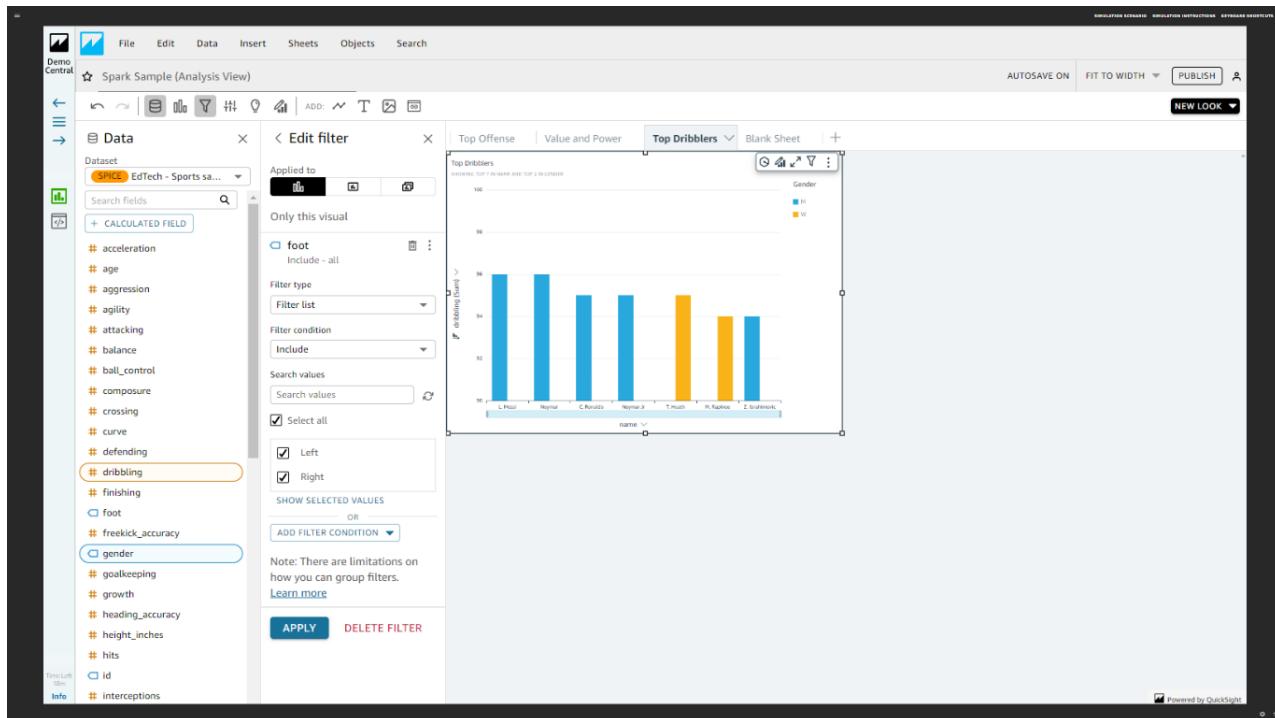
1. Choose the **Top Dribblers** tab.



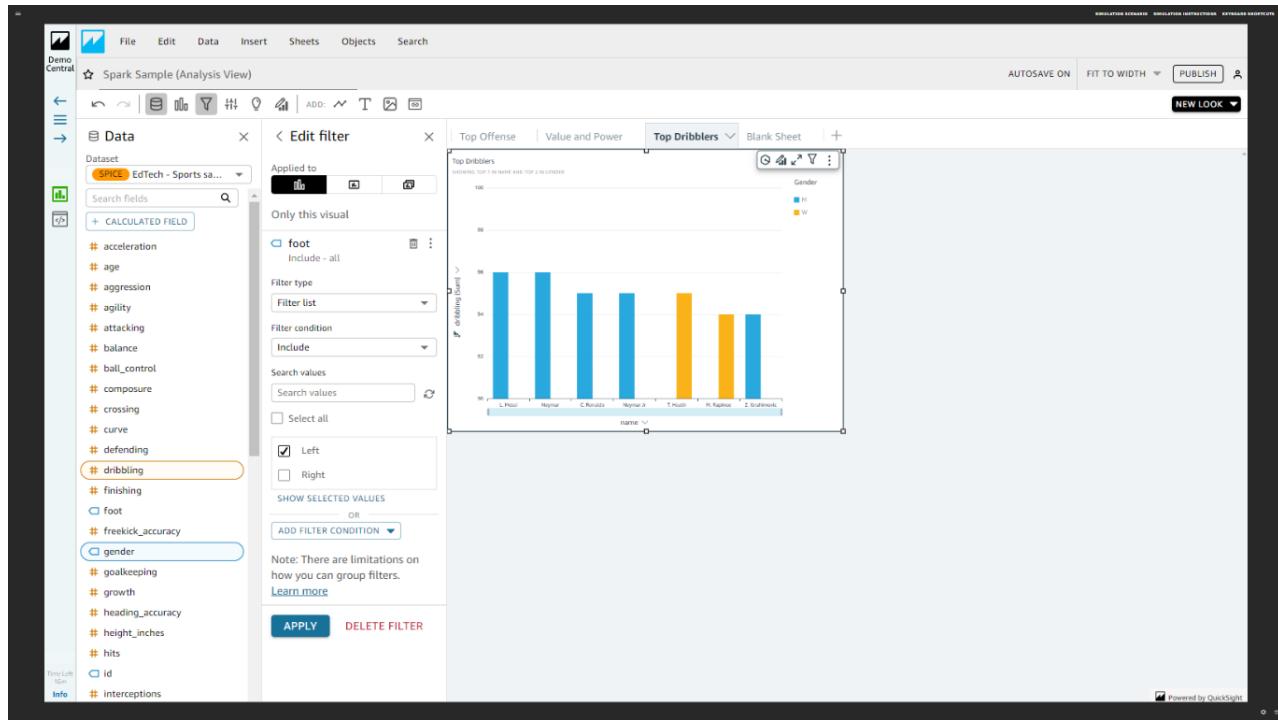
2. Choose the filter icon  to view the **Filters** pane.
3. Choose **+ADD**.



4. From the **Filters** dropdown, choose **foot**.
5. Choose the **three dots** next to **foot**.
6. Choose **Edit**.

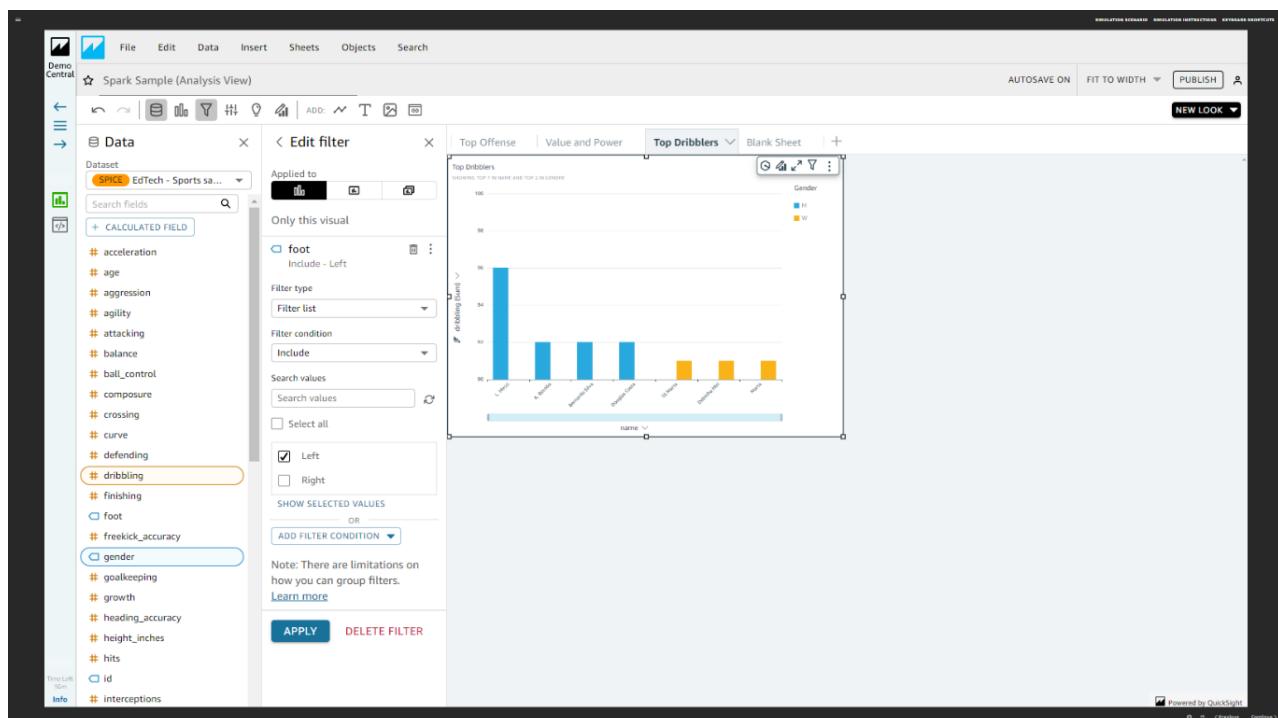


7. Navigate to the **Right** checkbox and clear it.

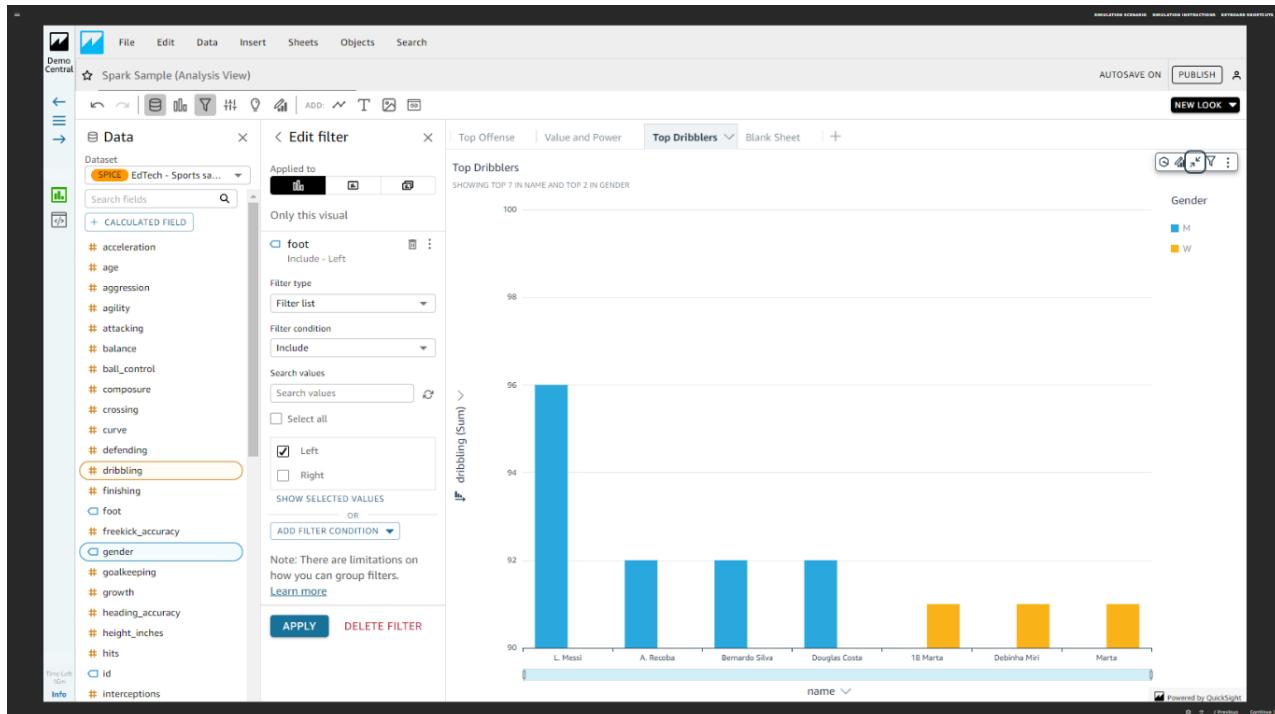


8. Choose **APPLY**.

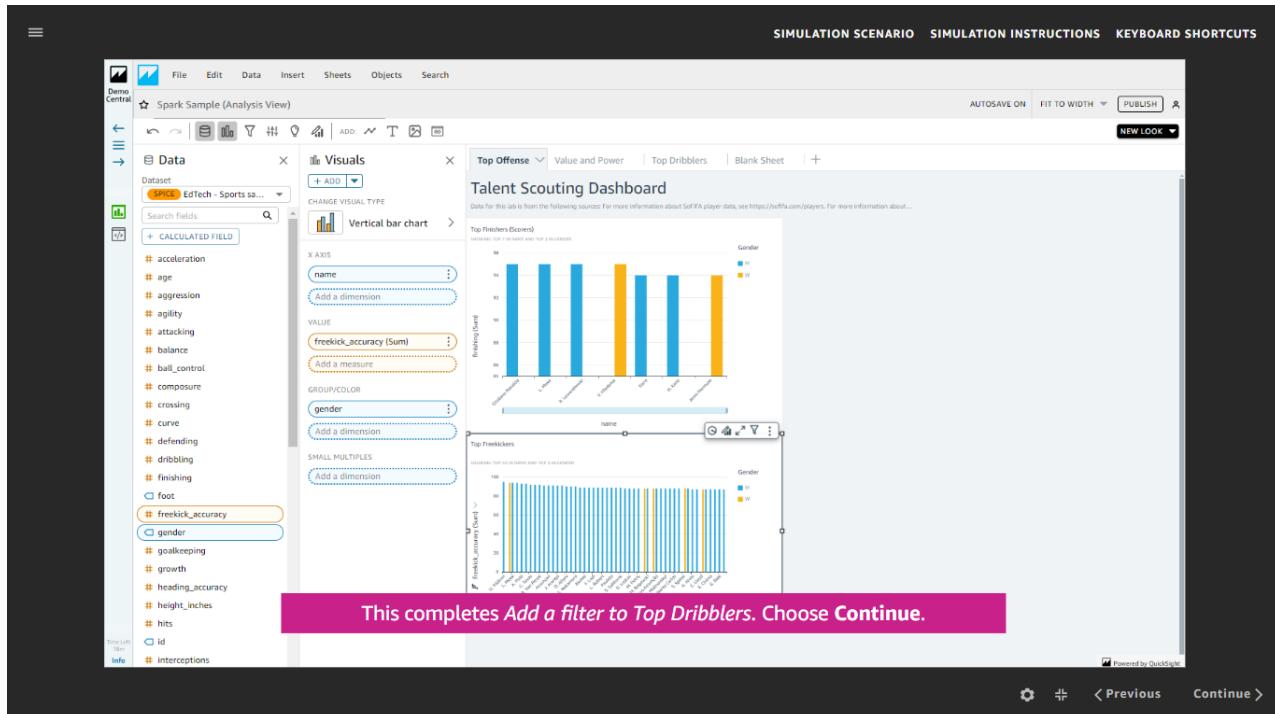
The visualization is updated to only show the top left-footed dribblers. This can help you make decisions when you have specific needs. To better view your results, you can resize the visualization.



9. Choose the maximize icon. This will resize the visualization to fit the screen.

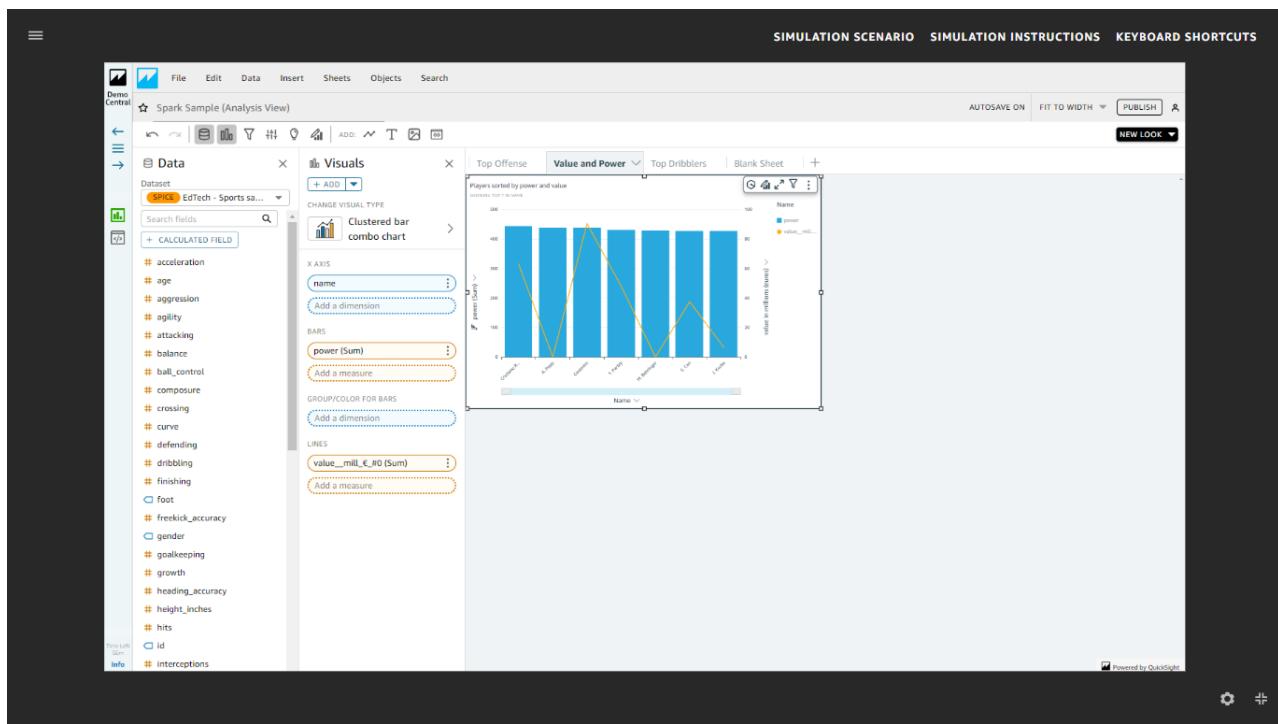


10. You have successfully applied a filter. Choose the **Top Offense** tab to return to the job selection screen.

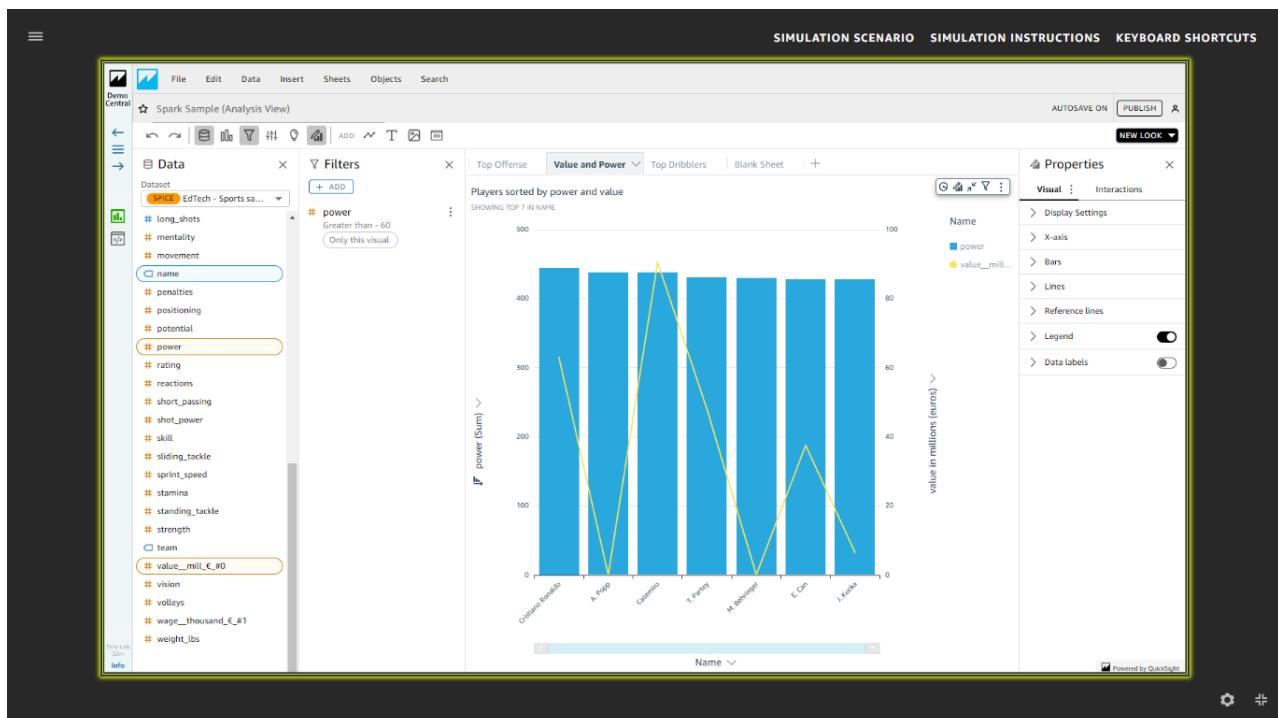


Job 2: Analyze the Value and Power sheet to pick a player that has high power and good financial value.

1. Choose the **Value and Power** tab.

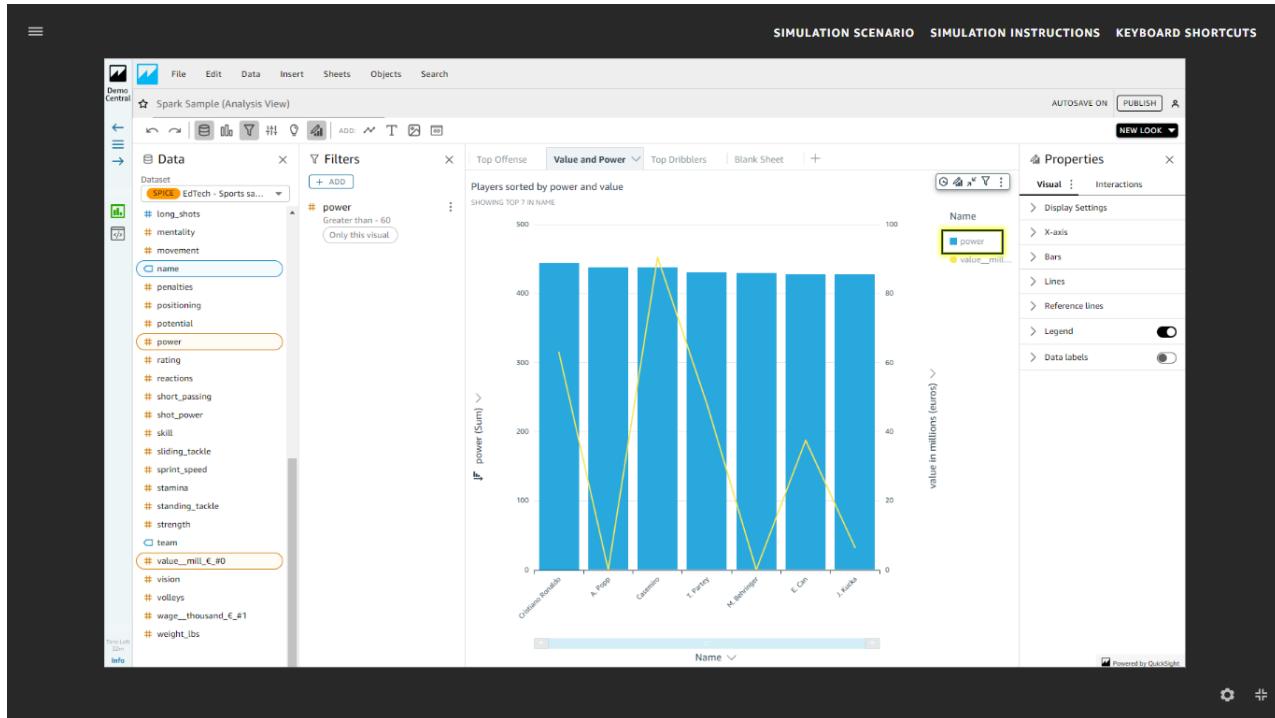


2. Choose the maximize icon to resize the visualization and make it full screen.

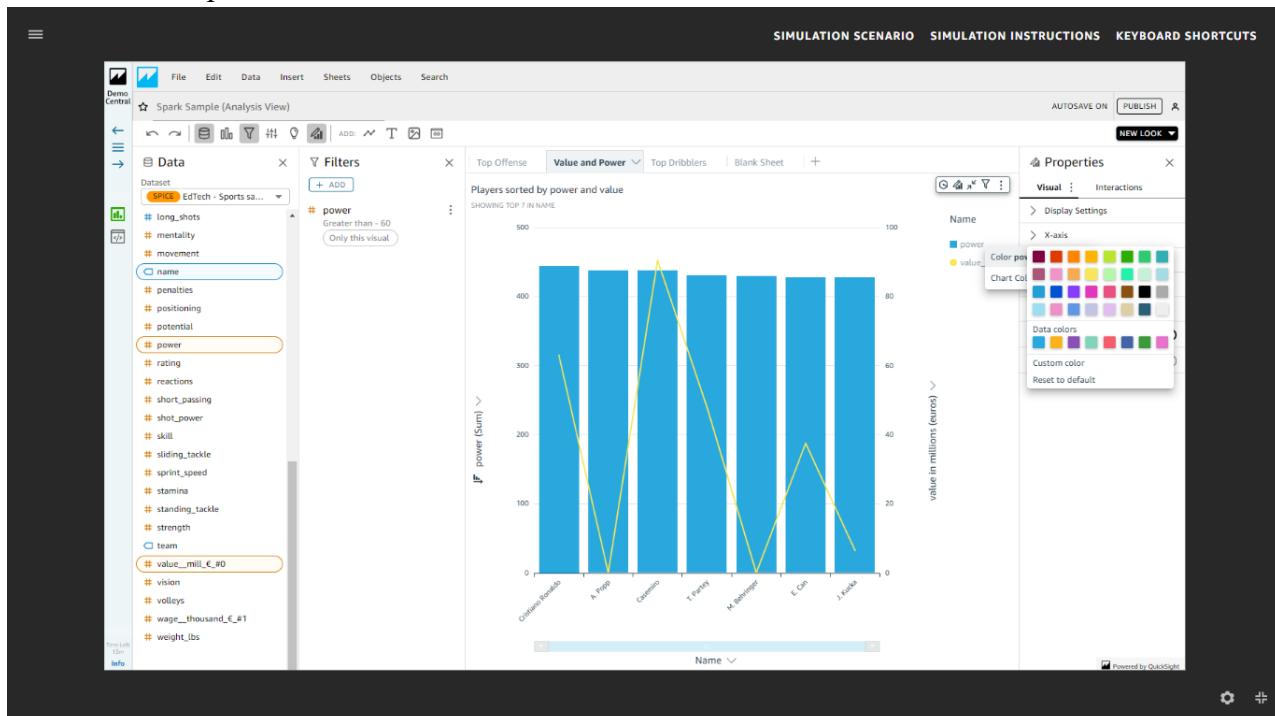


The color scheme is a bit too difficult to read, so let's customize the colors being used. Start with the bar graph.

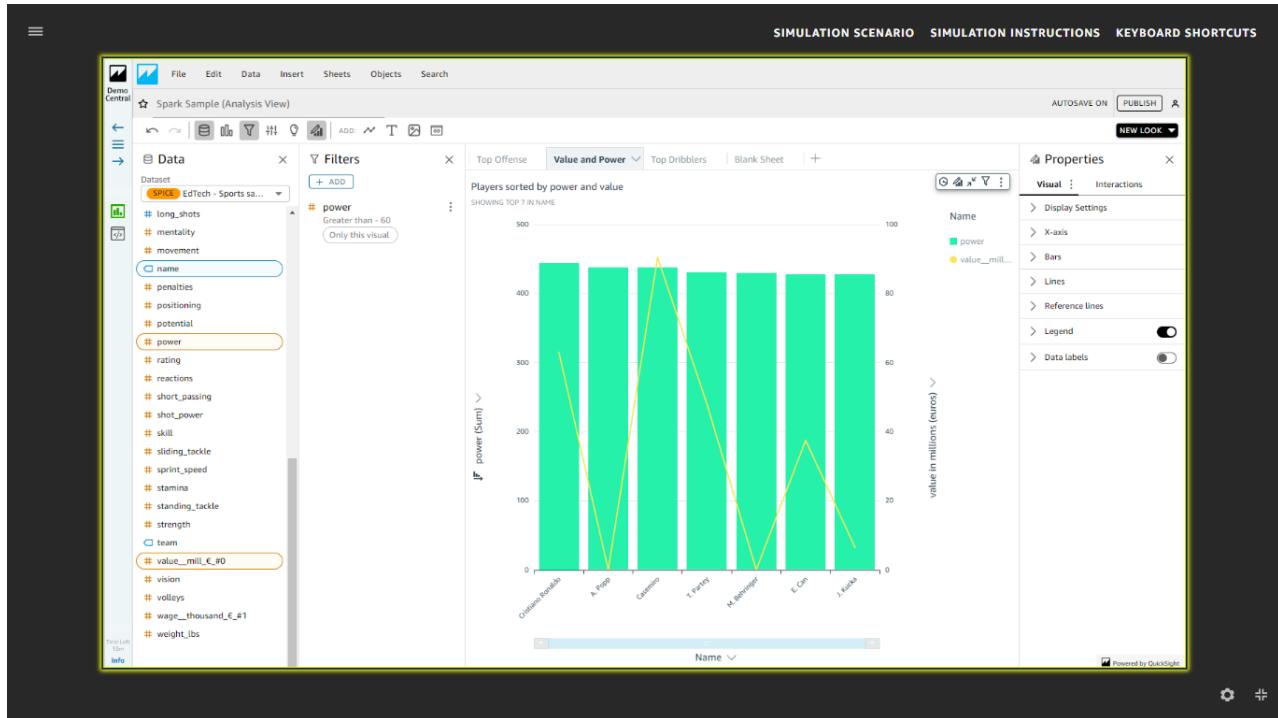
3. Choose the **power** option on the visualization key.



4. Choose **Color power** to change the color.
5. Choose the **bright green color swatch**. This is the sixth swatch in the second row from the top.

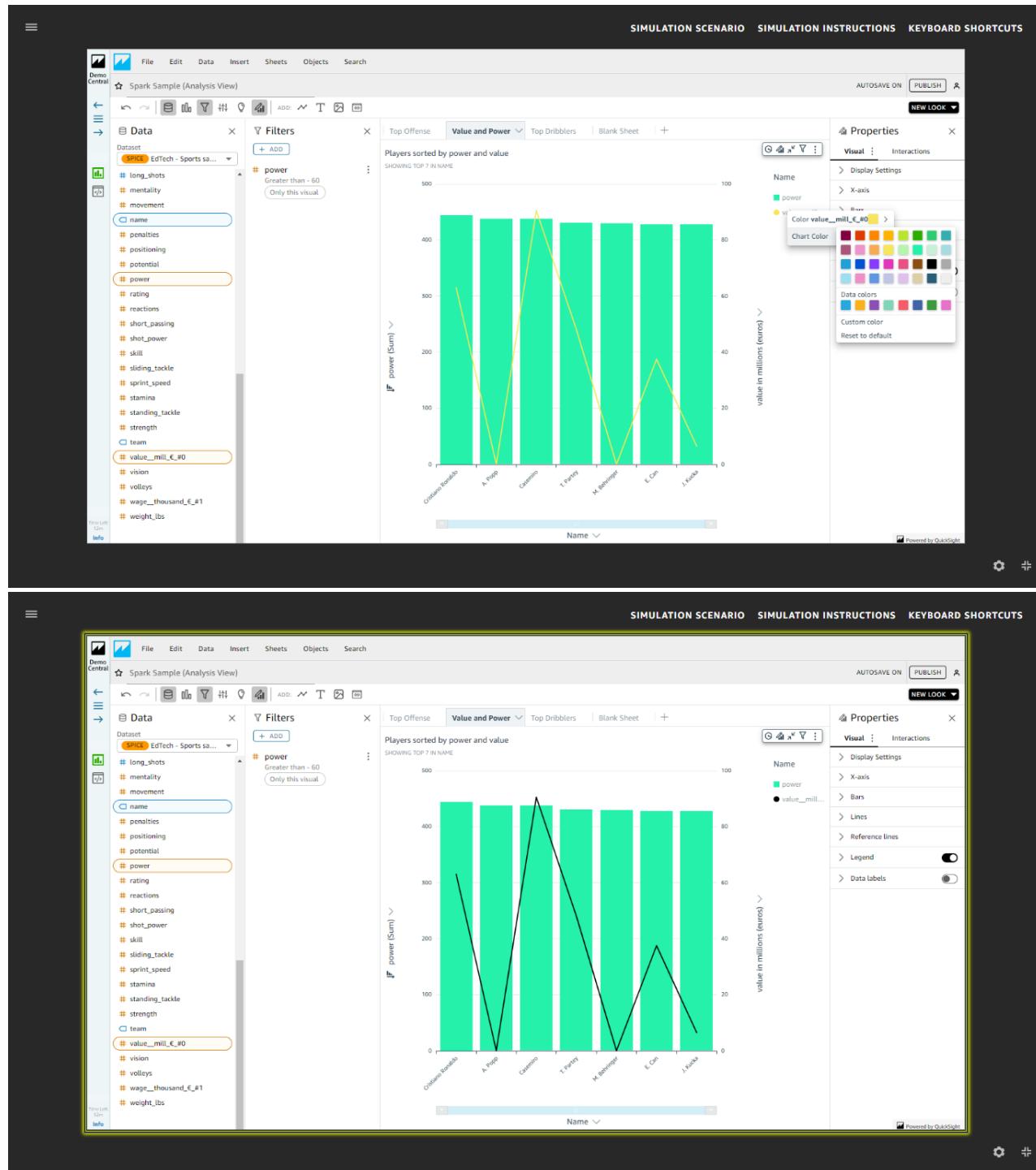


The bars are now a brighter, different color, but the line graph is now hard to read. Pick a contrasting color so that it really shows.



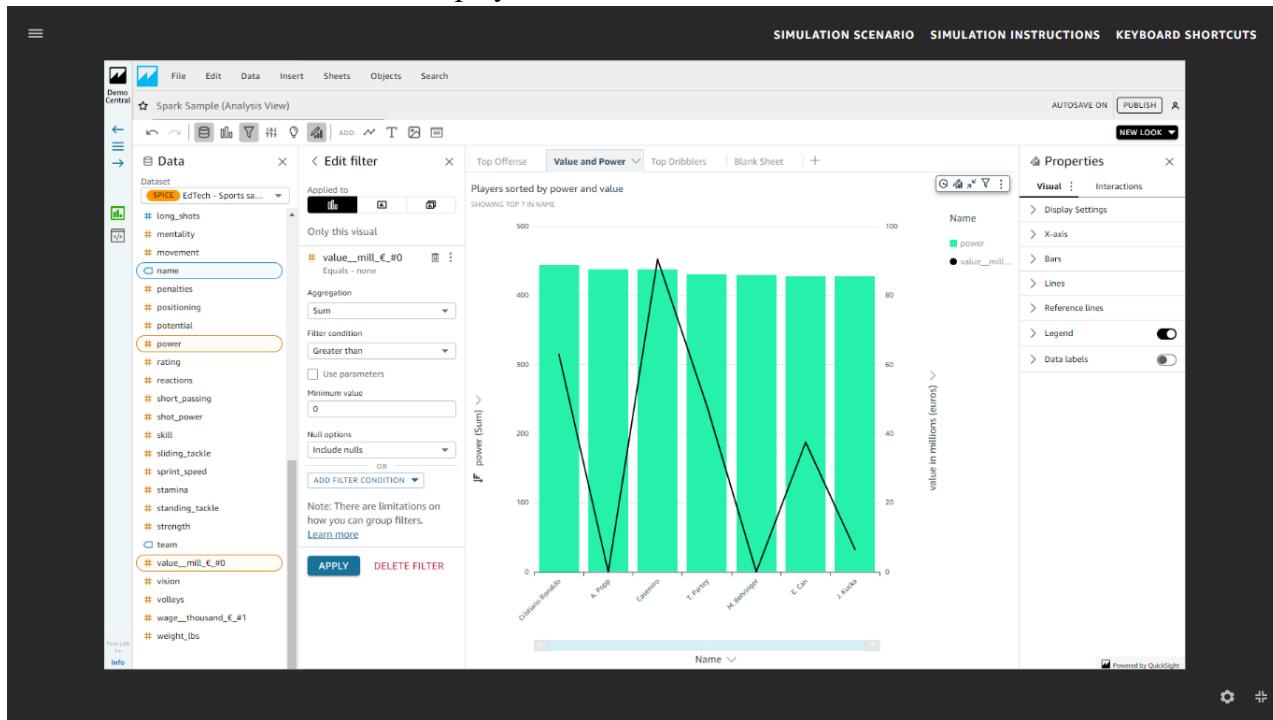
6. Choose the **value...** option on the visualization key.
7. Choose **Color value...** to change the color.
8. Choose the black color swatch. This is the seventh swatch in the third row from the top.

The bars and lines are now contrasting well against each other, making it easier to read. Now it's time to add a filter.

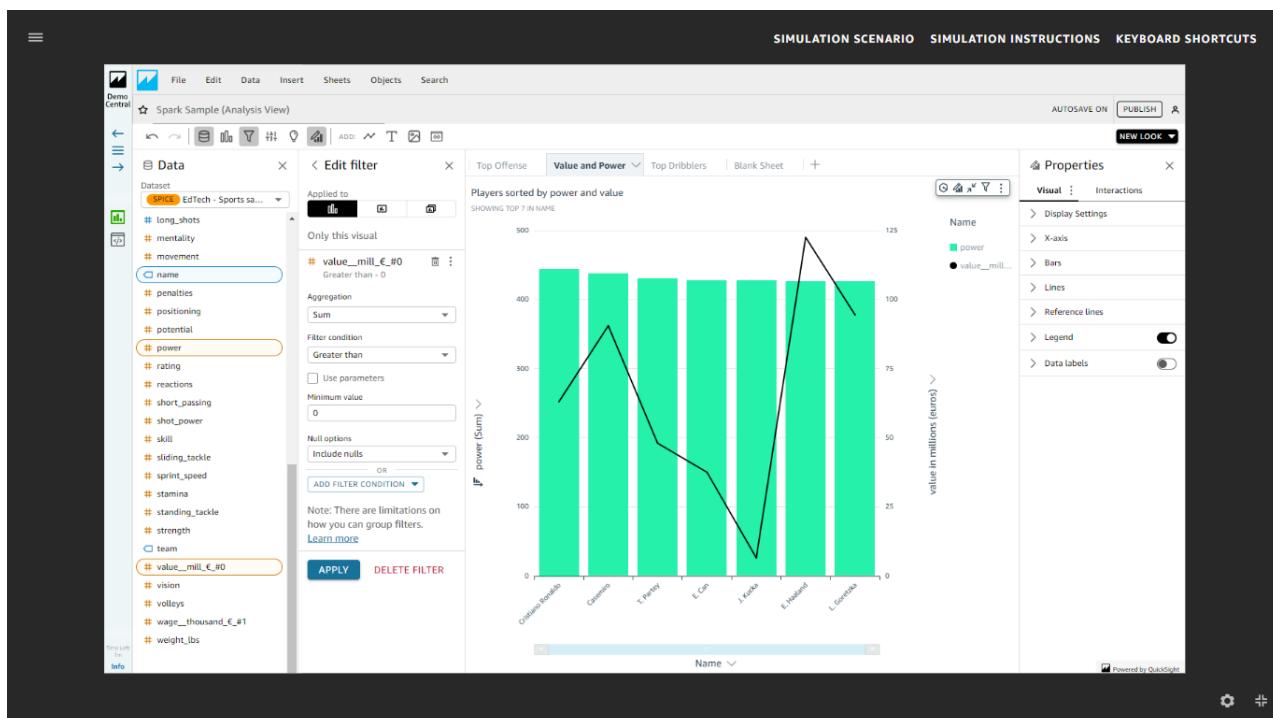


9. In the **Filters** pane, choose **+ADD**.
10. Use the scroll bar in the dropdown to navigate down to **value_mill_€_#0**.
11. Choose **value_mill_€_#0**.
12. In the **Filters** pane, choose the three dots next to **value_mill_€_#0**.
13. Choose **Edit**.

14. Choose the dropdown under **Filter condition**.
15. Choose **Greater than**.
16. Choose the **Minimum value** text entry field.
17. Enter **0** as the value. You only want to see players who have a value based on a current contract. This will exclude players who do not have a current value amount.



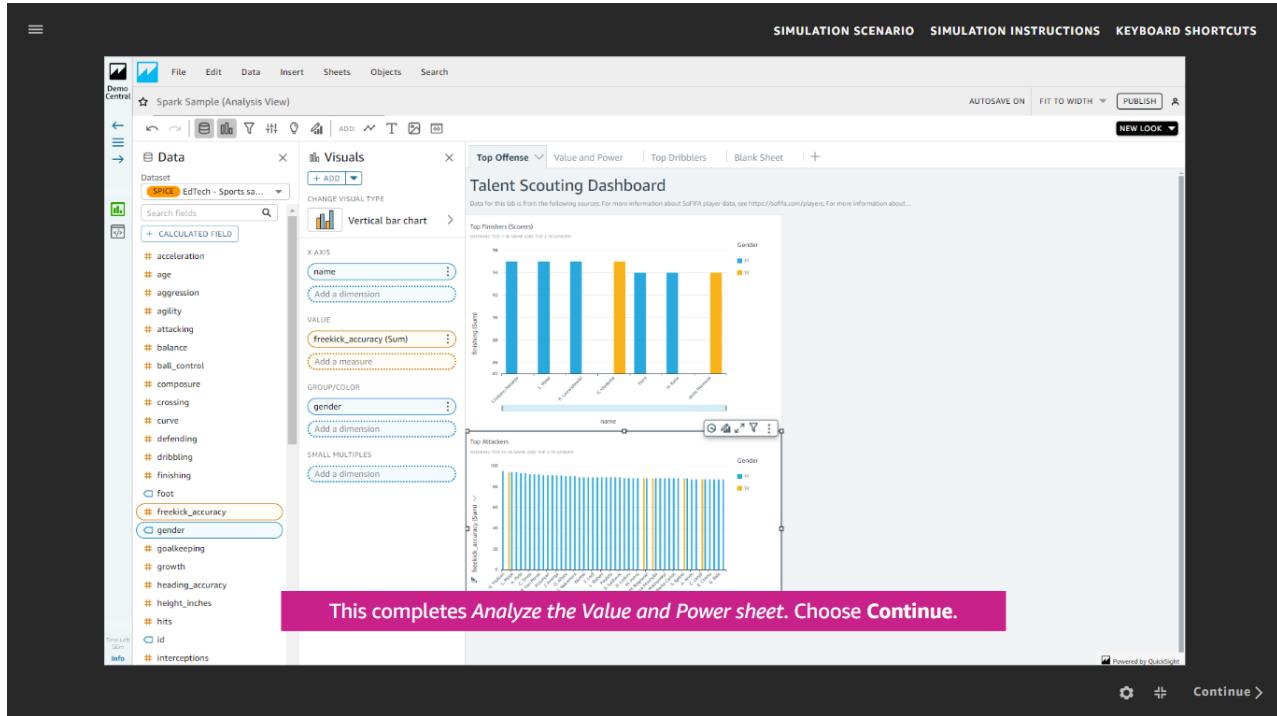
18. Choose **APPLY**.



19. Choose the X next to **Edit filter** to close the **Filters** pane.
20. Choose the X next to **Properties** to close the **Properties** pane.

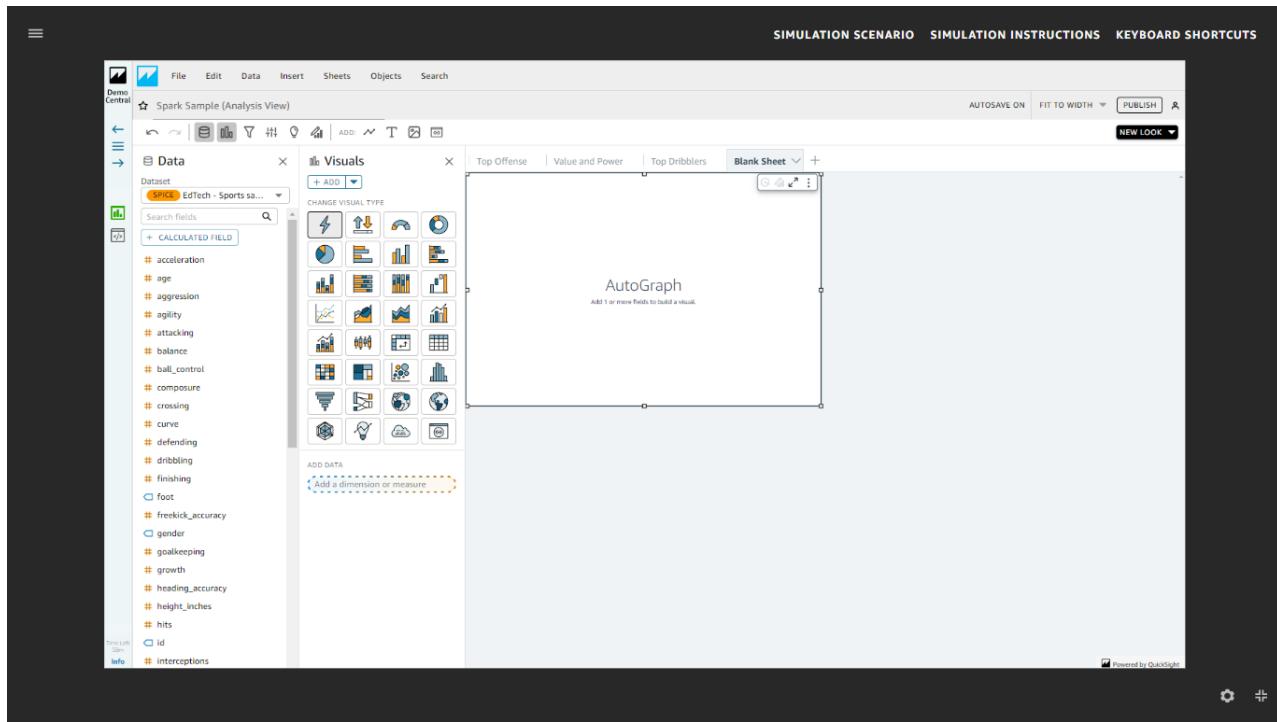
Take a moment to look over the **Value and Power** visualization.

21. You have successfully prepared the **Value and Power** visualization for analysis.
Choose the **Top Offense** tab to return to the job selection screen.
22. Choose **Continue** to complete this job.

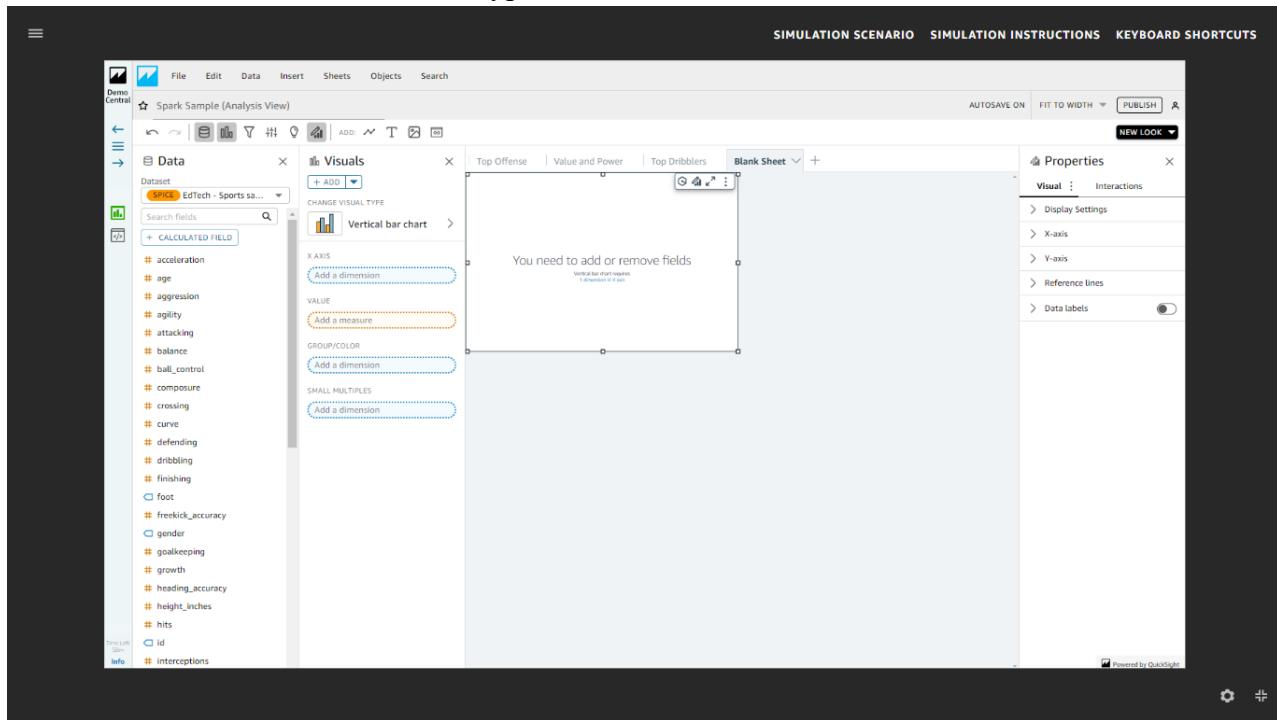


Job 3: Make a sheet dedicated to defense metrics so that you can pick a top defensive player.

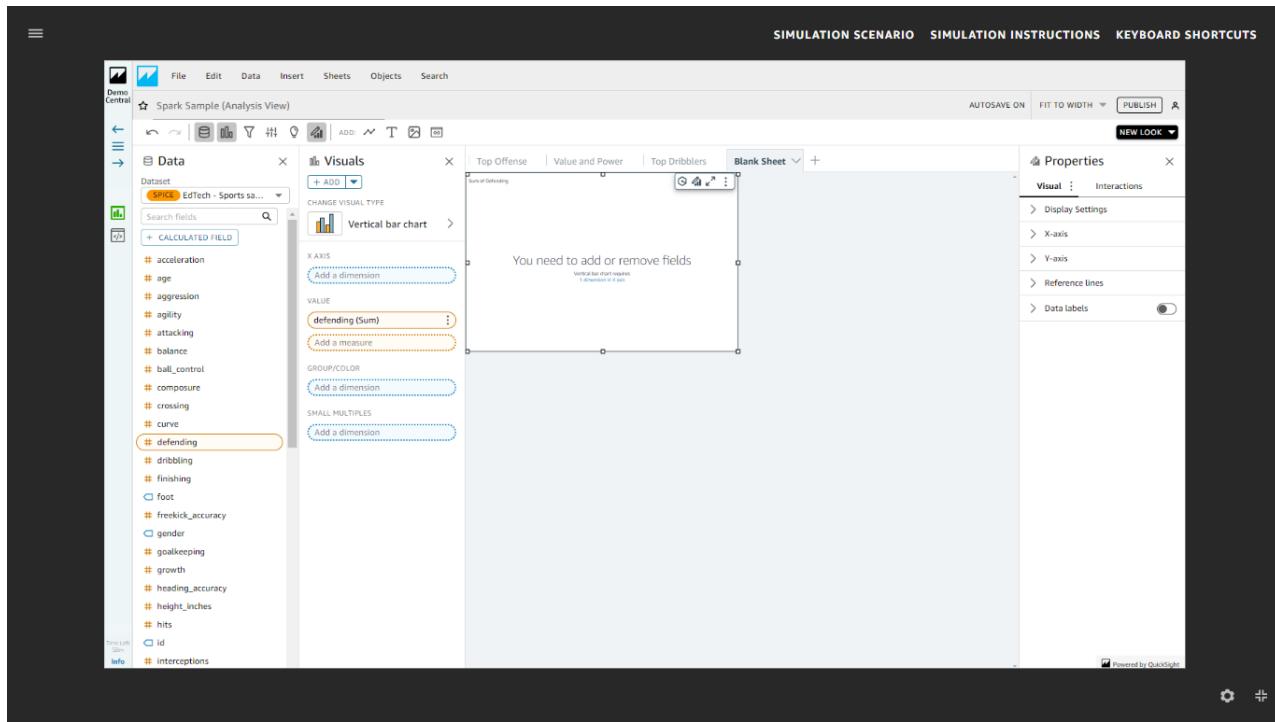
1. Choose the **Blank Sheet** tab.



2. Select the visualization type. For this visualization, choose the vertical bar chart.

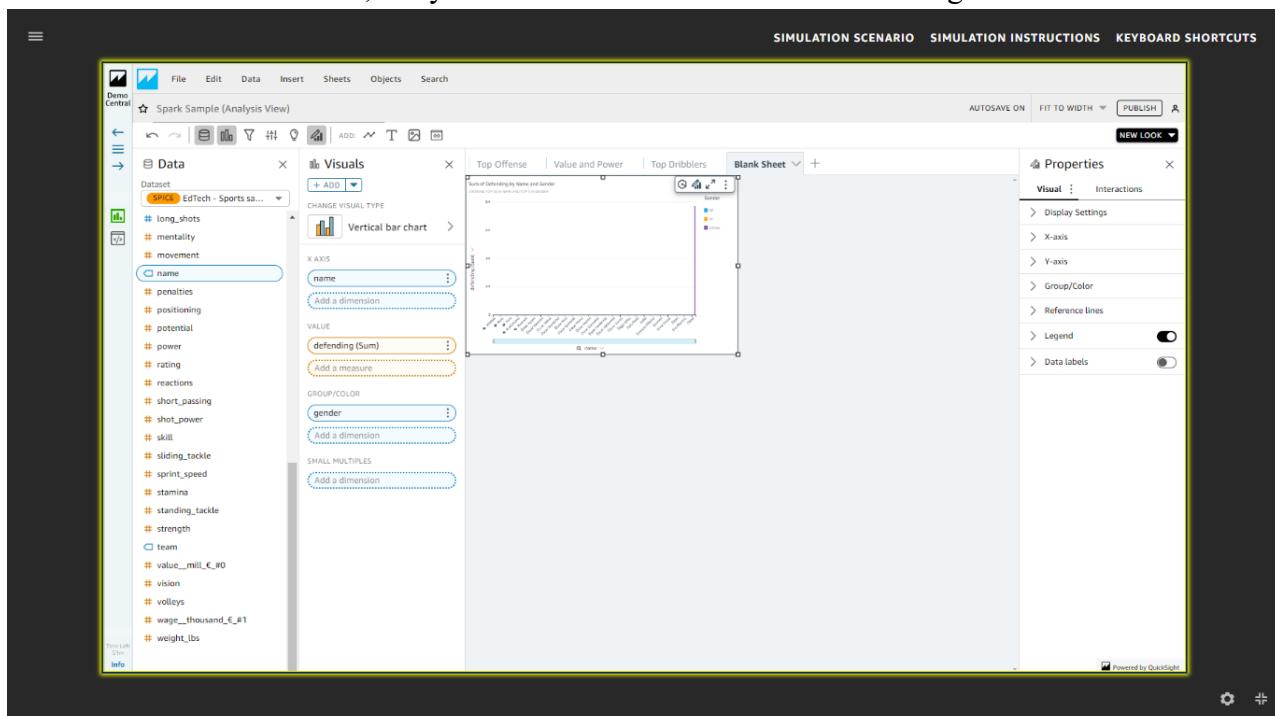


3. From the available **Dataset** fields, choose **defending** as the value for this chart.



4. Next, select the Group/Color field. For this, choose **gender** to group players by men's and women's leagues.
5. Now select the x-axis. To do this, choose the **Dataset** pane scroll bar to scroll down to **name**.
6. Choose **name**.

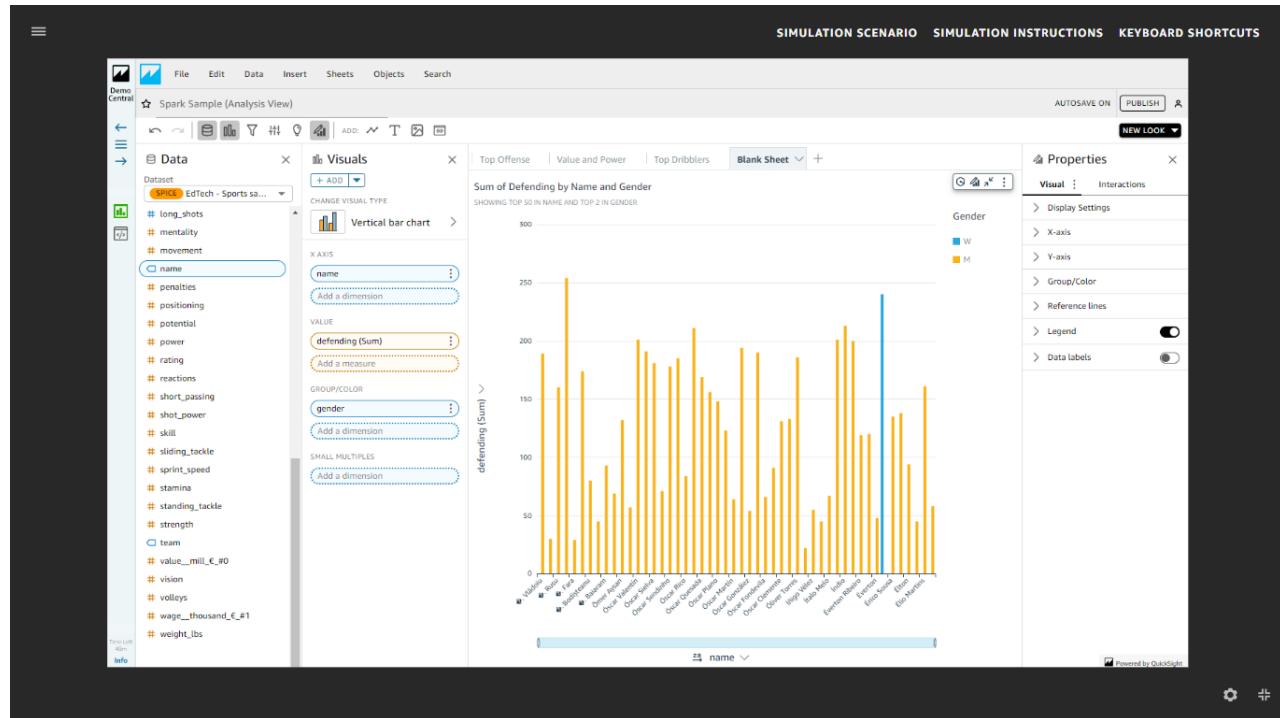
Your data has been selected, but your visualization needs some fine tuning.



7. Choose the maximize icon to resize your visualization to full size.

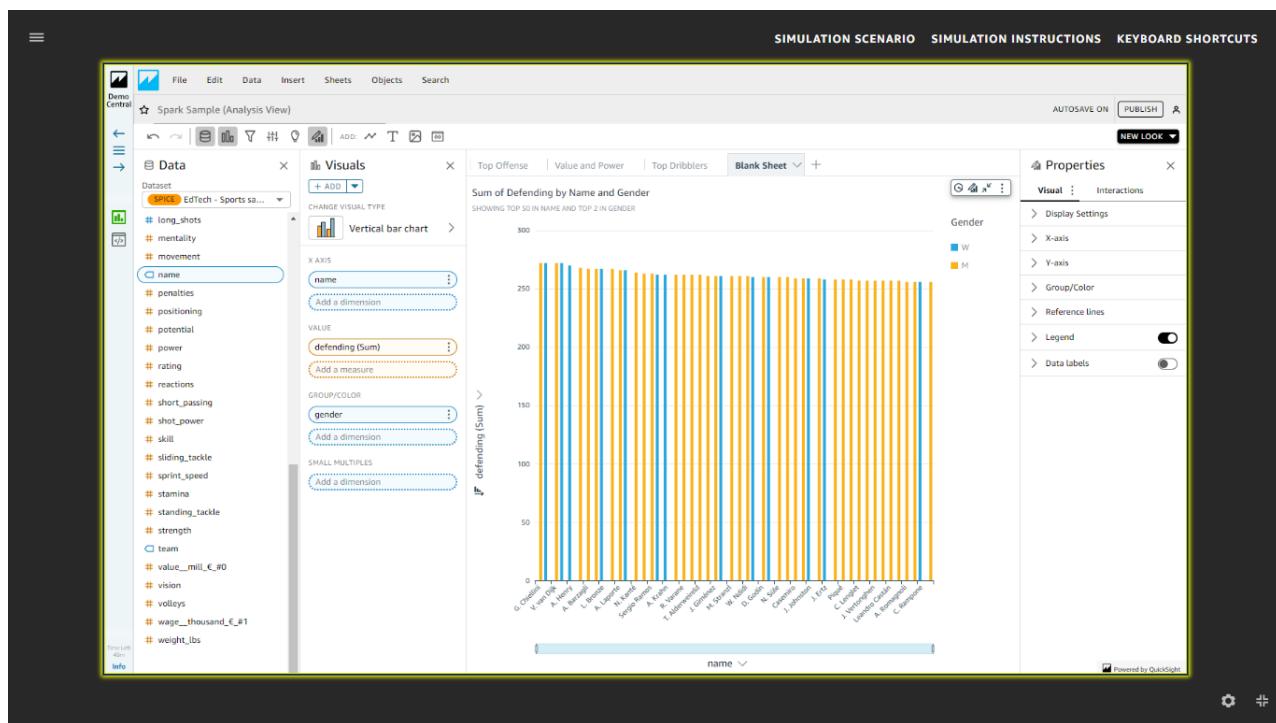
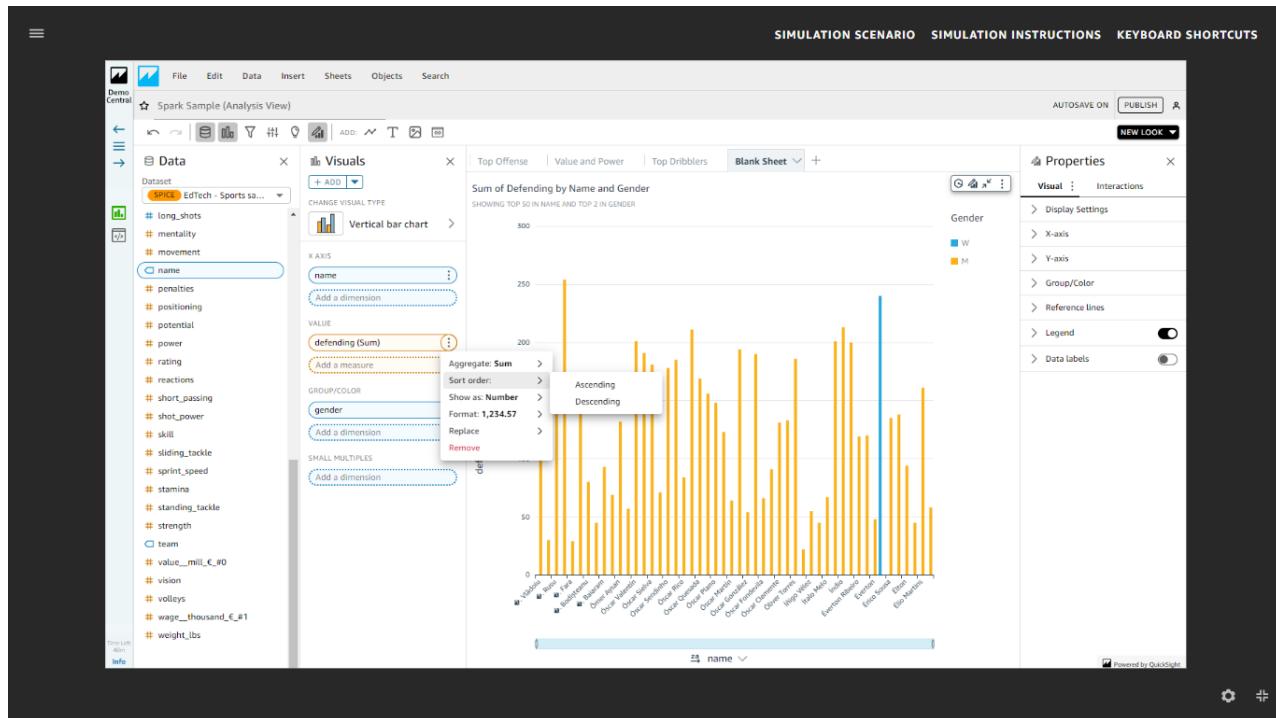
Because the dataset is so large, there is a lot of data being displayed that might not apply to you. In the visualization key, you see **Other**. Because you are specifically looking at players in men's and women's leagues, you can remove **Other** as a visualized option.

8. Choose **Other** in the visualization key to view options.
9. Choose **Hide "other" categories** from the option menu.



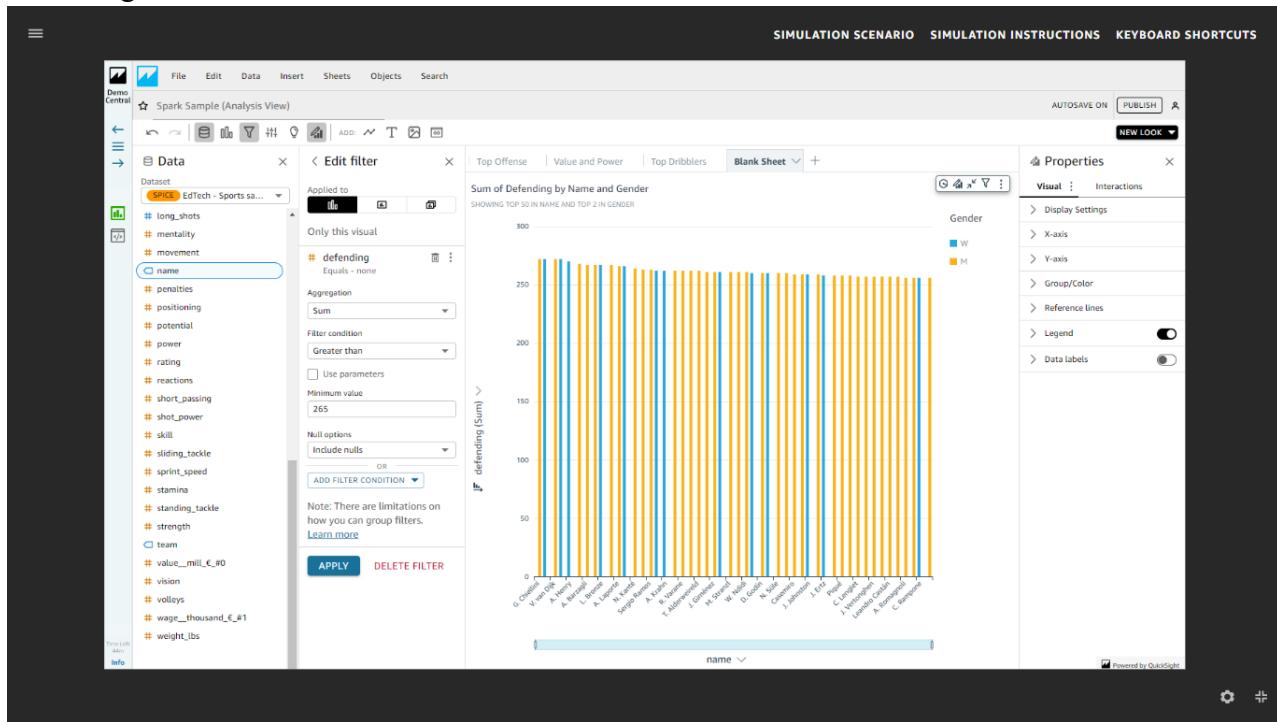
10. Choose the three dots next to **defending (Sum)**.
11. Choose **Sort order**.
12. Choose **Descending**.

This is great, but it's still a lot of information. Filter it down to the elite defenders.



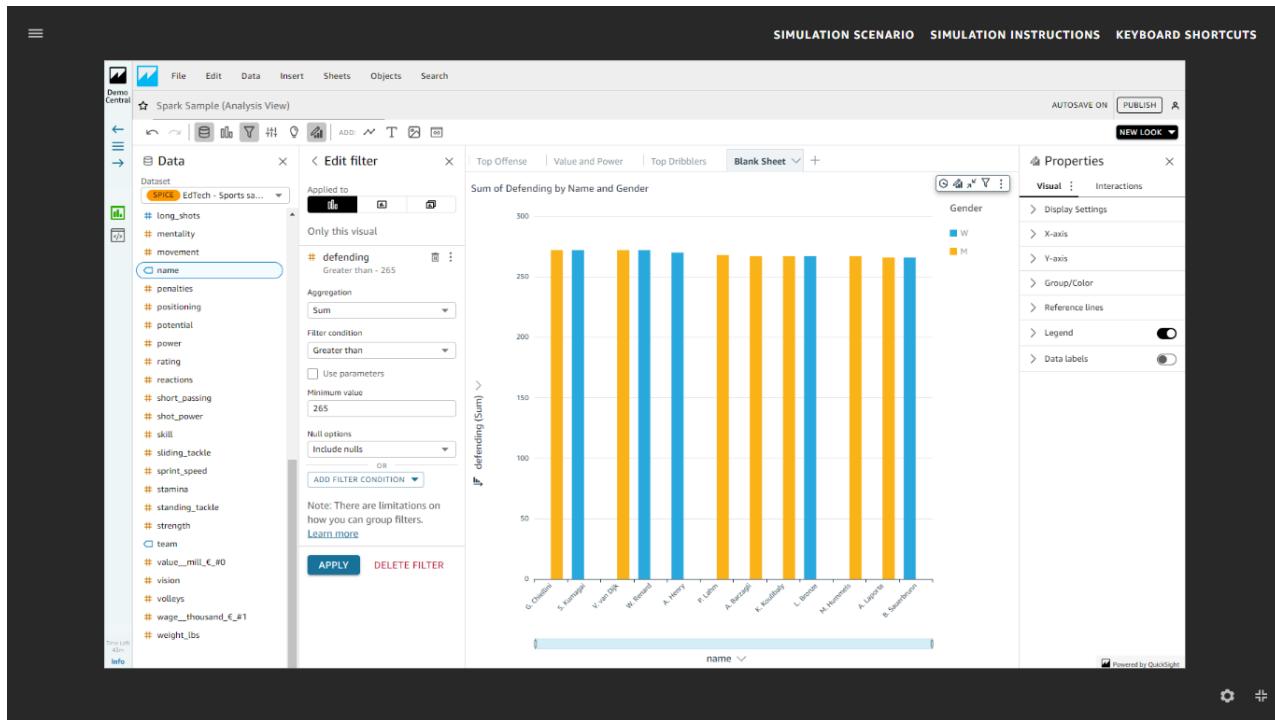
13. Choose the filter icon.
14. Choose **+ADD**.
15. Choose **defending**.
16. Choose the three dots next to **defending**.
17. Choose **Edit**.

18. Choose the dropdown under **Filter condition**.
19. Choose **Greater than**.
20. Choose the **Minimum value** text entry field.
21. Enter **256** as the value. You only want to see elite players who have a value above this rating.

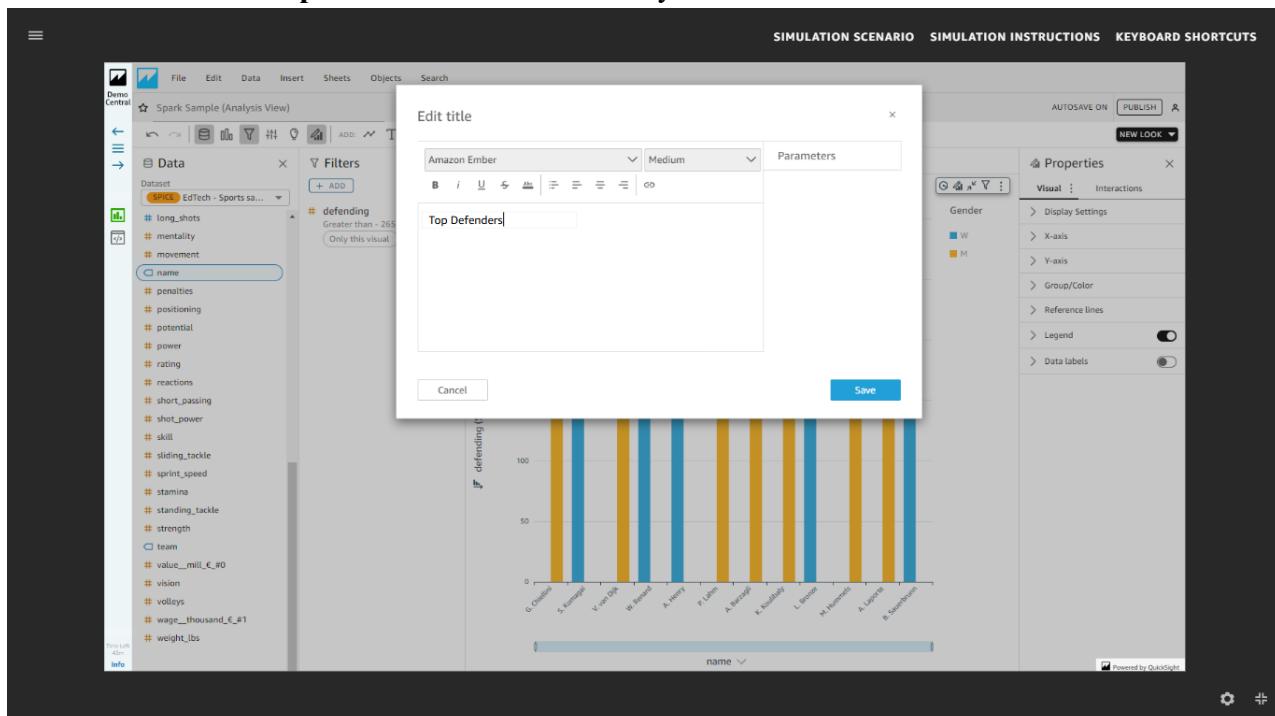


22. Choose **APPLY**.

Now that the chart is sorted and filtered, change the title of the visualization to specify what is being measured

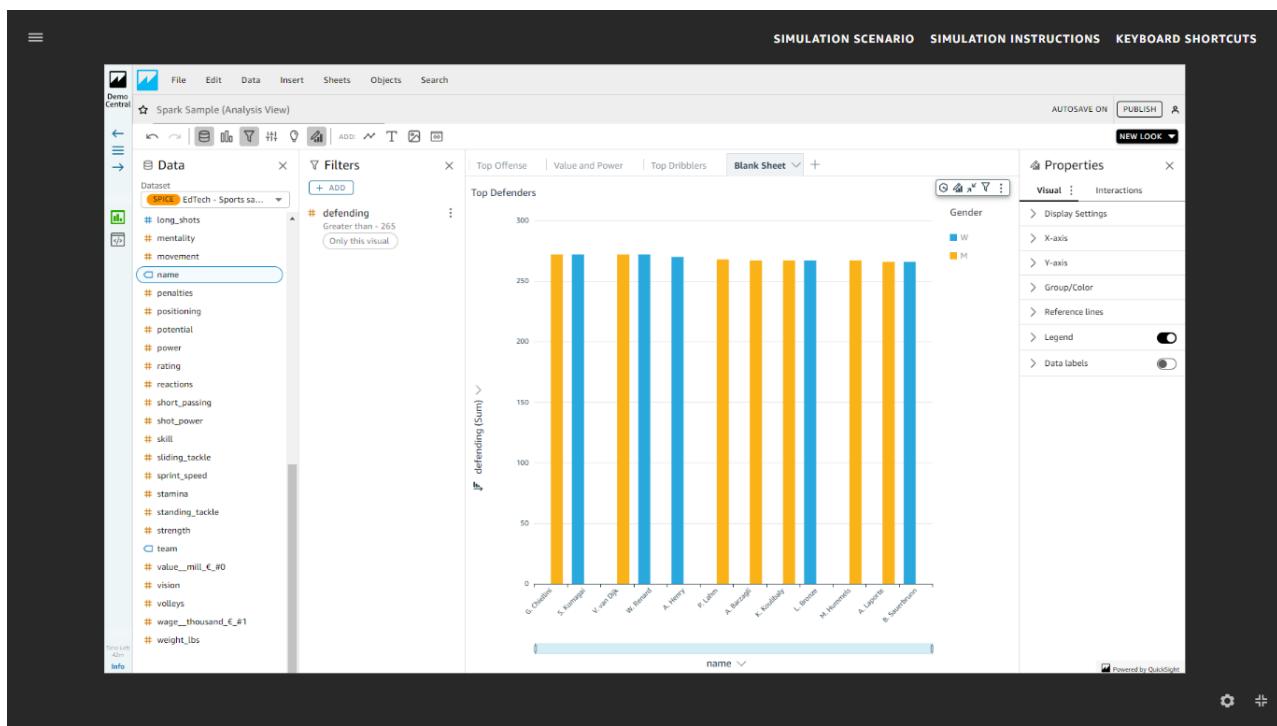


23. Choose the title of the visualization to change it.
24. Choose the text entry box in the **Edit title** pop-up.
25. Enter **Top Defenders** in the text entry box. This will be the new title.

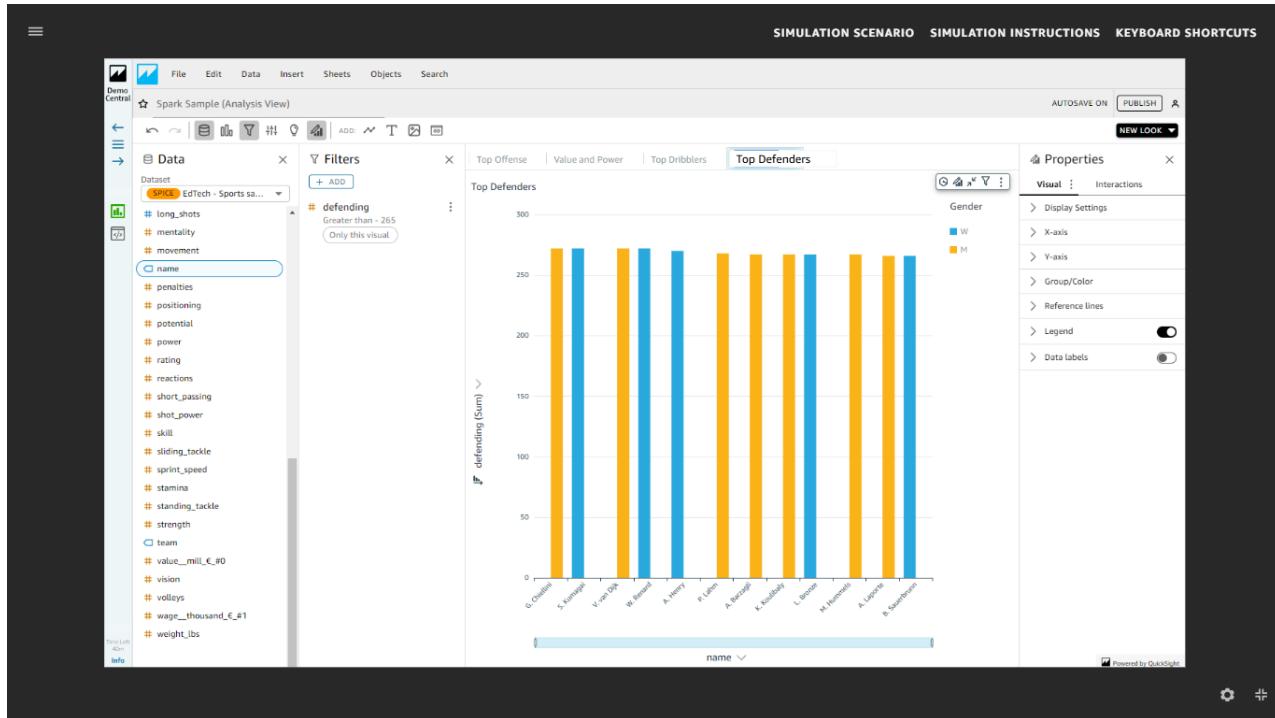


26. Choose **Save**.

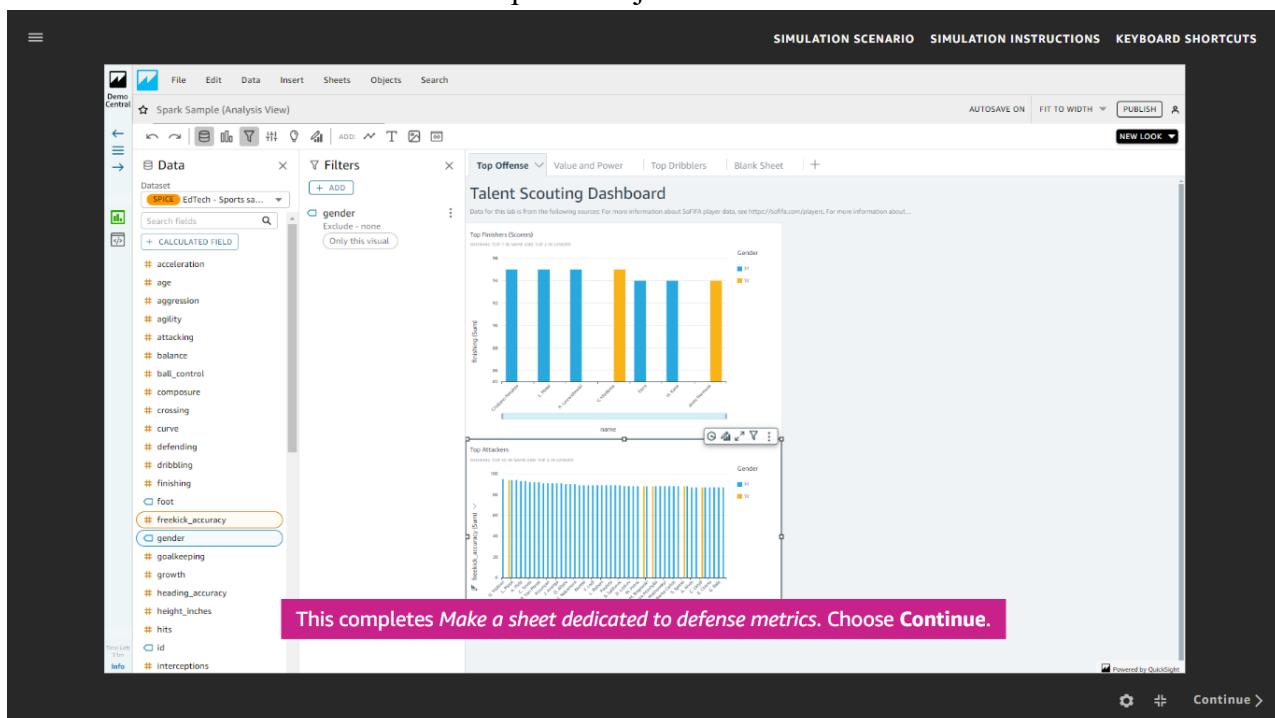
Finally, it's time to rename to tab.



27. Choose the options dropdown arrow on the **Blank Sheet** tab.
28. Choose **Rename**.
29. Select the highlighted text in the tab.
30. In the text entry box, enter **Top Defenders** as the value.

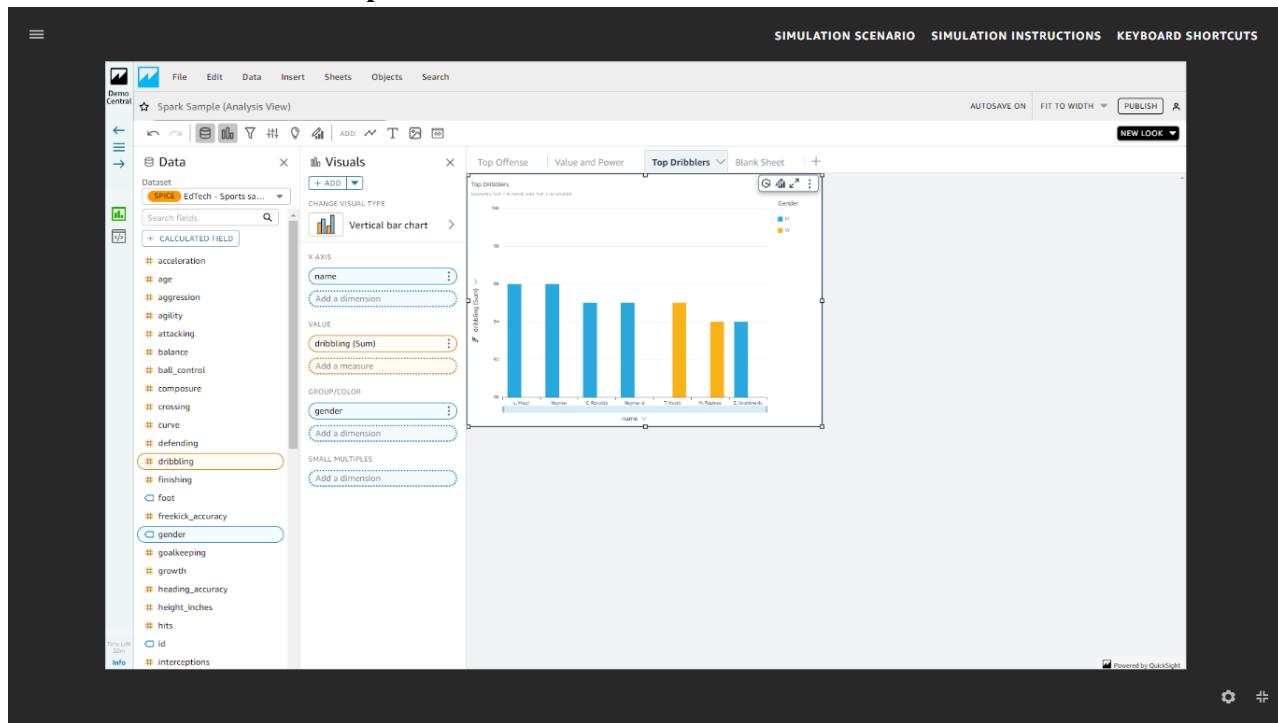


31. You have successfully created a new visualization for defense. Choose the **Top Offense** tab to return to the job selection screen.
32. Choose **Continue** to complete this job.



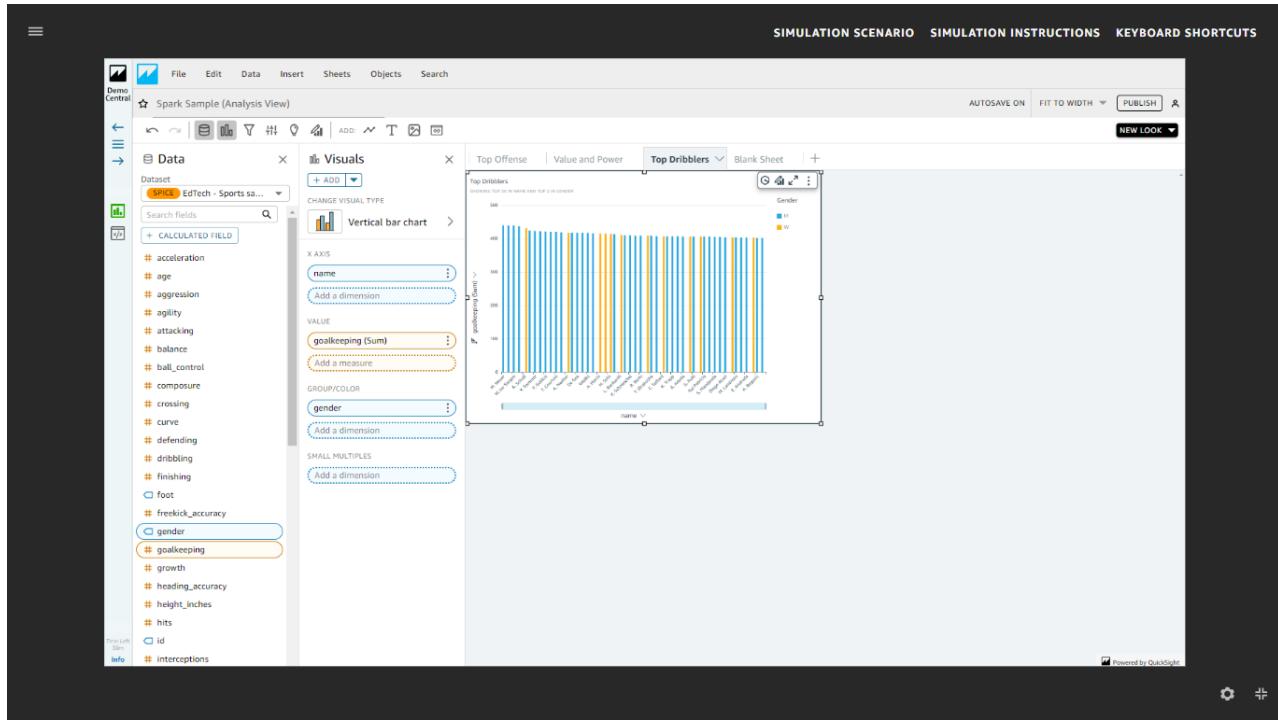
Job 4: Modify an existing visualization to look at the goal- keeping metric and pick out a goalie to recruit.

1. Choose the **Top Dribblers** tab.



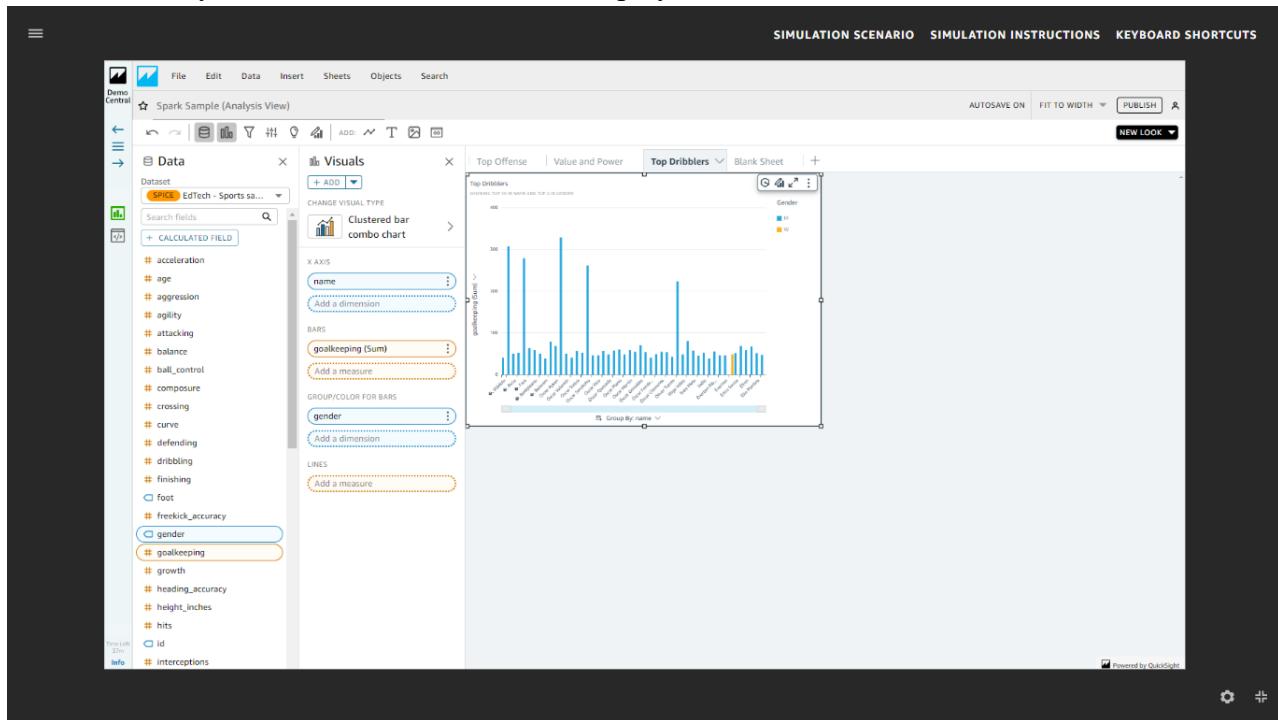
2. From the **Dataset** pane, choose the **goalkeeping** field.
3. Choose the three dots next to **goalkeeping (Sum)**.
4. Choose **Sort order**.
5. Choose **Descending**.

You want to change the visual type of chart because you also want to measure the best value for an elite goaltender.



6. Under **CHANGE VISUAL TYPE**, choose **Vertical bar chart**.
7. Choose the clustered bar combo chart icon. It's the fourth icon in the fourth row.

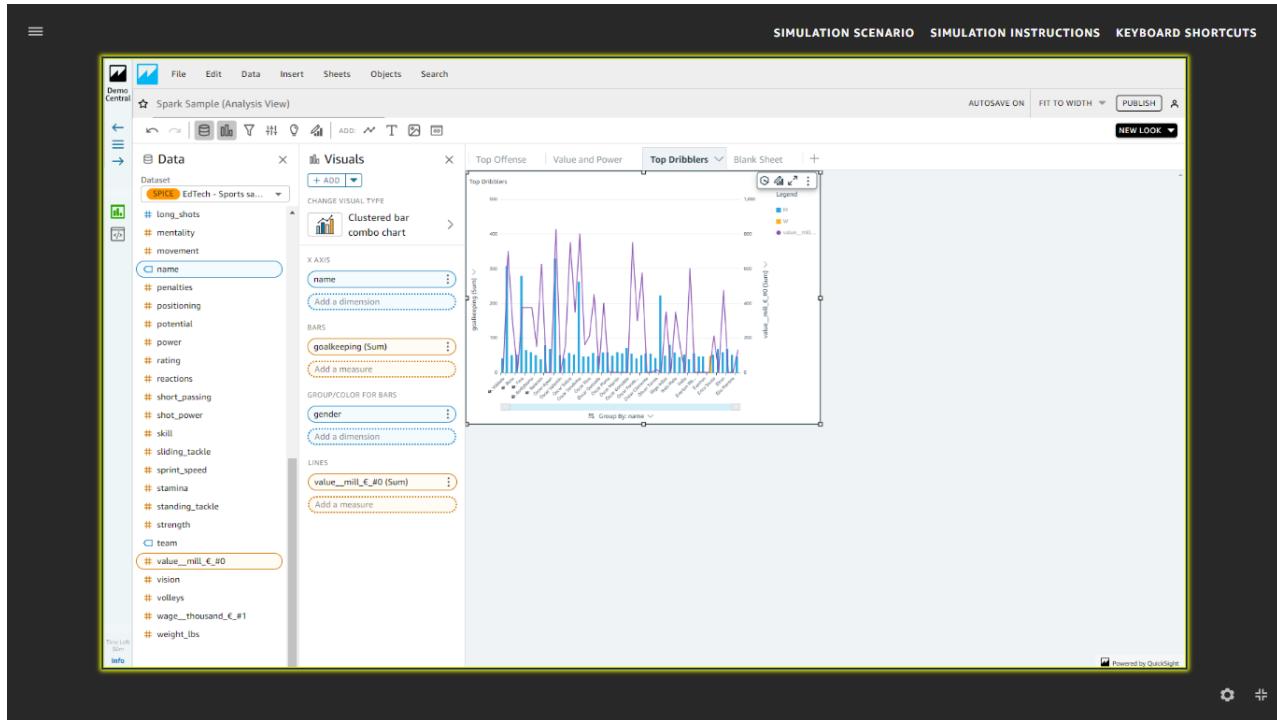
The x-axis is set, as are the bars because they carry over. You now have to add the field for the lines. For this, you want to add the value of the player's contract.



8. Choose the **Dataset** pane scroll bar to scroll down to **value__mill_€_#0**.

9. Choose **value_mill_€_#0**.

The chart now shows the goaltenders by score, and their associated value. Time to filter the results down.



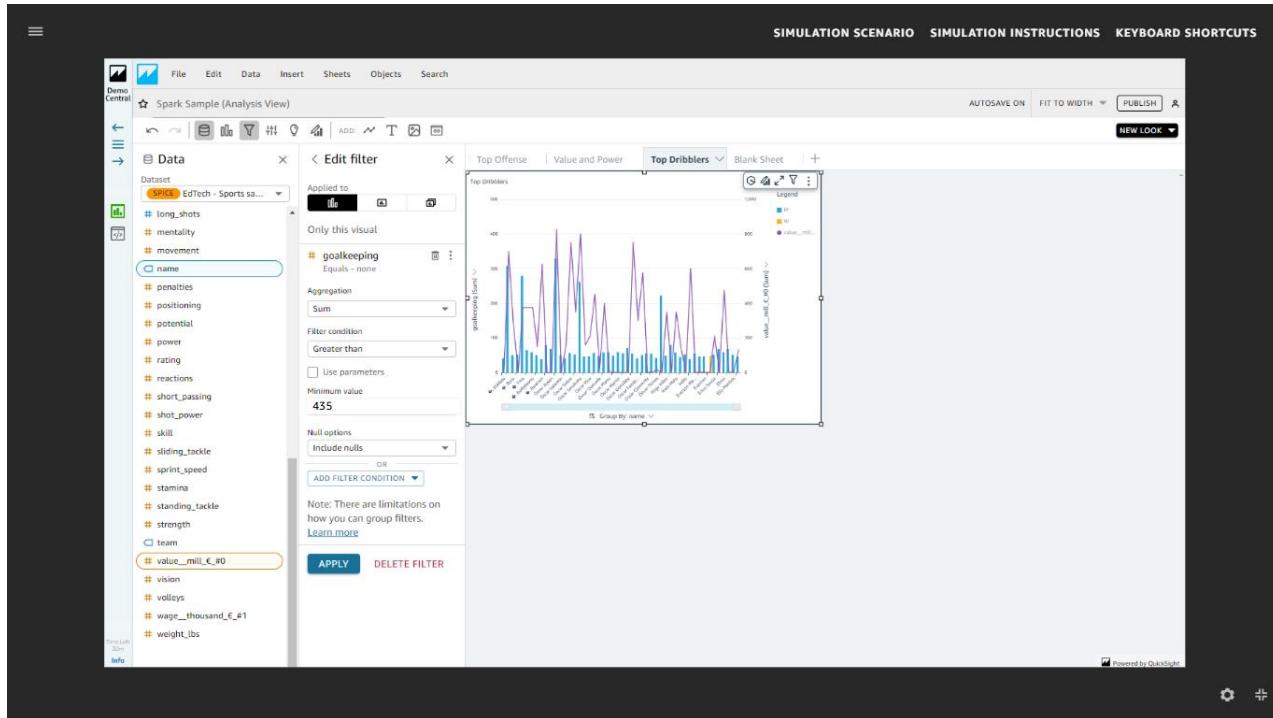
10. Choose the filter icon.

11. Choose **+ADD**.

12. Use the scroll bar in the dropdown to scroll down to **goalkeeping**.

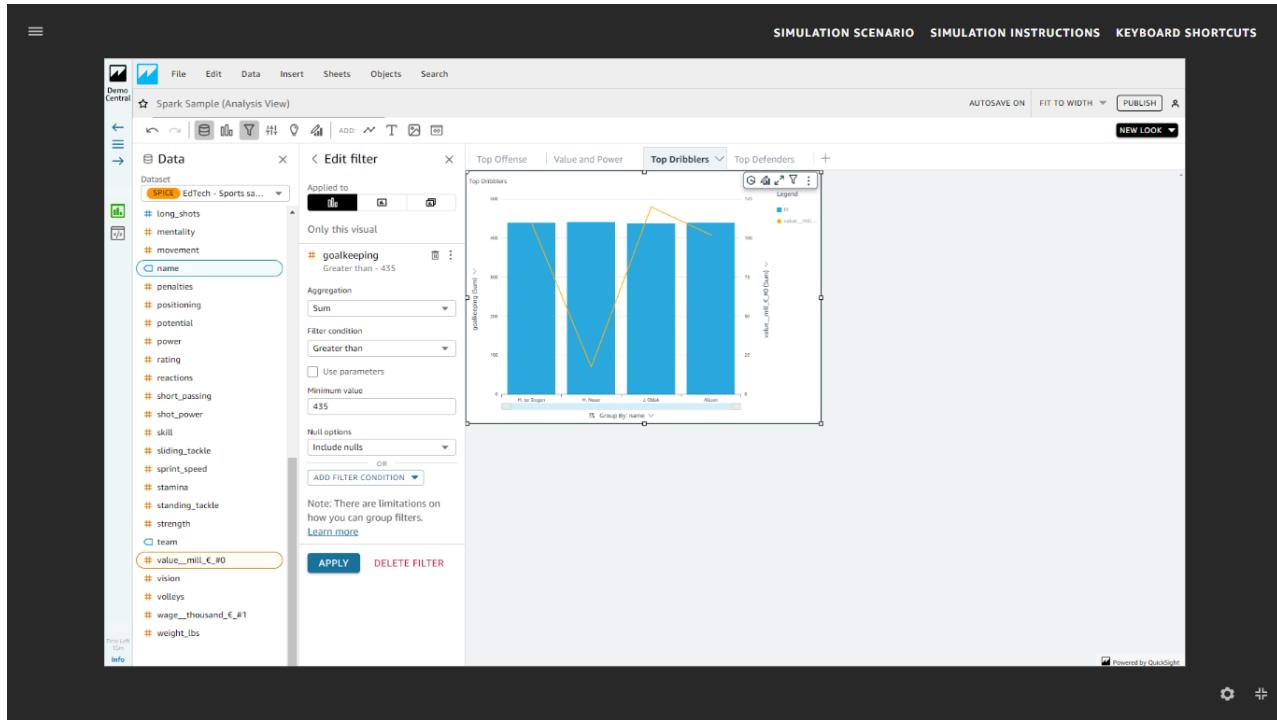
13. Choose **goalkeeping**.

14. In the **Filters** pane, choose the three dots next to **goalkeeping**.
15. Choose **Edit**.
16. Choose the dropdown under **Filter condition**.
17. Choose **Greater than**.
18. Choose the **Minimum value** text entry field.
19. Enter **435** as the value. You only want to see the elite goaltenders on this chart who exceed this rating.

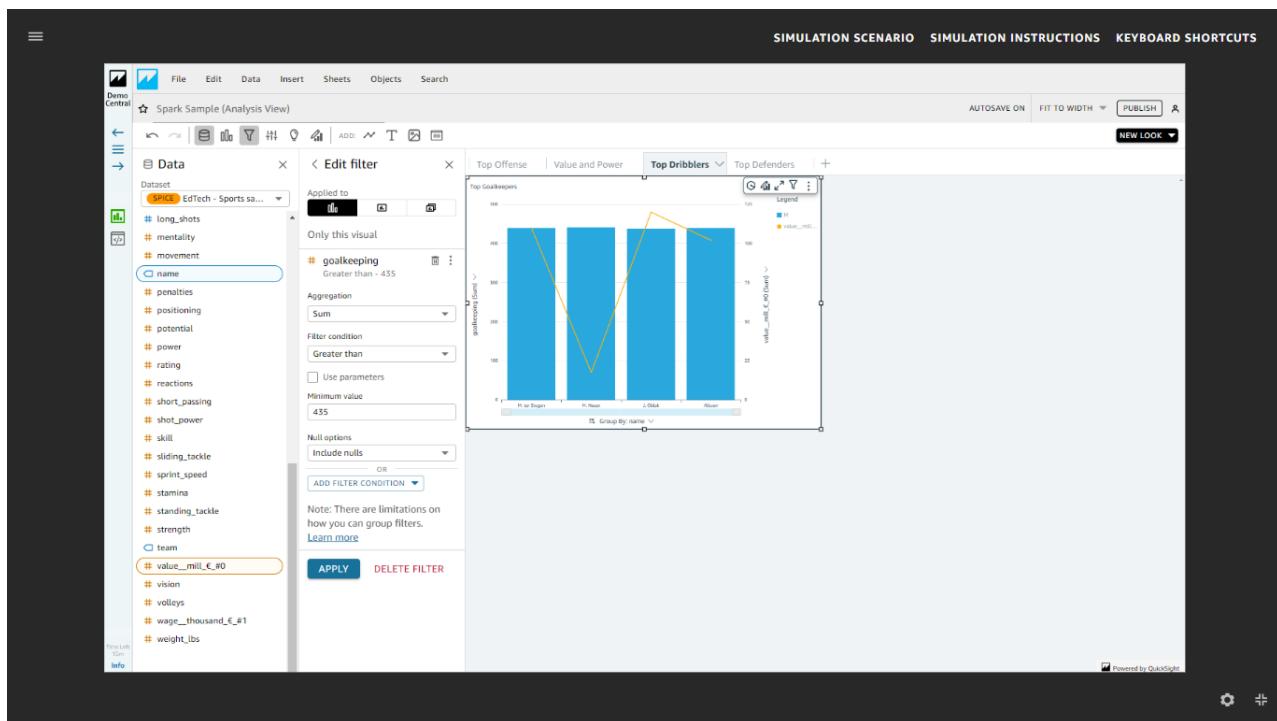


20. Choose **APPLY**.

Now that the chart has been revised, change the title of the visualization to specify what is being measured.

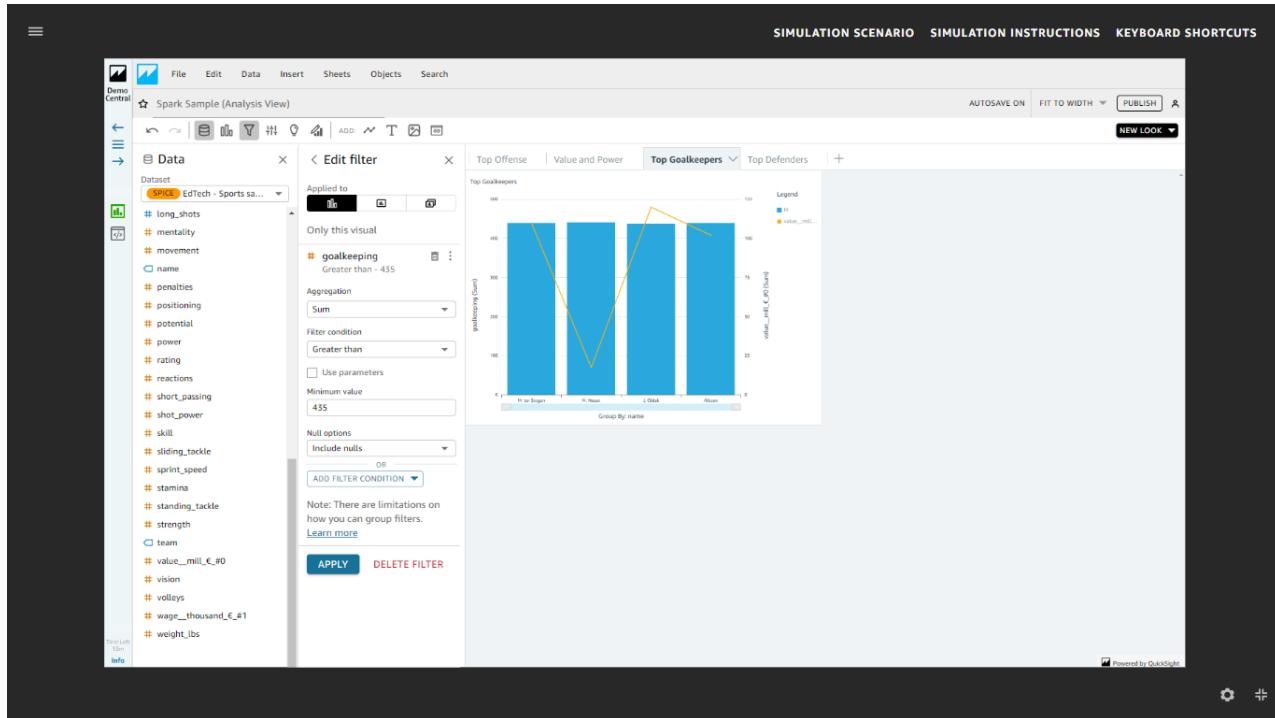


21. Choose the title of the visualization to change it.
22. Choose the text entry box in the **Edit title** popup. You will keep the **Top** part and just change the term for what is being visualized.
23. Enter **Goalkeepers** in the text entry box. This will be the new title.
24. Choose **Save**.

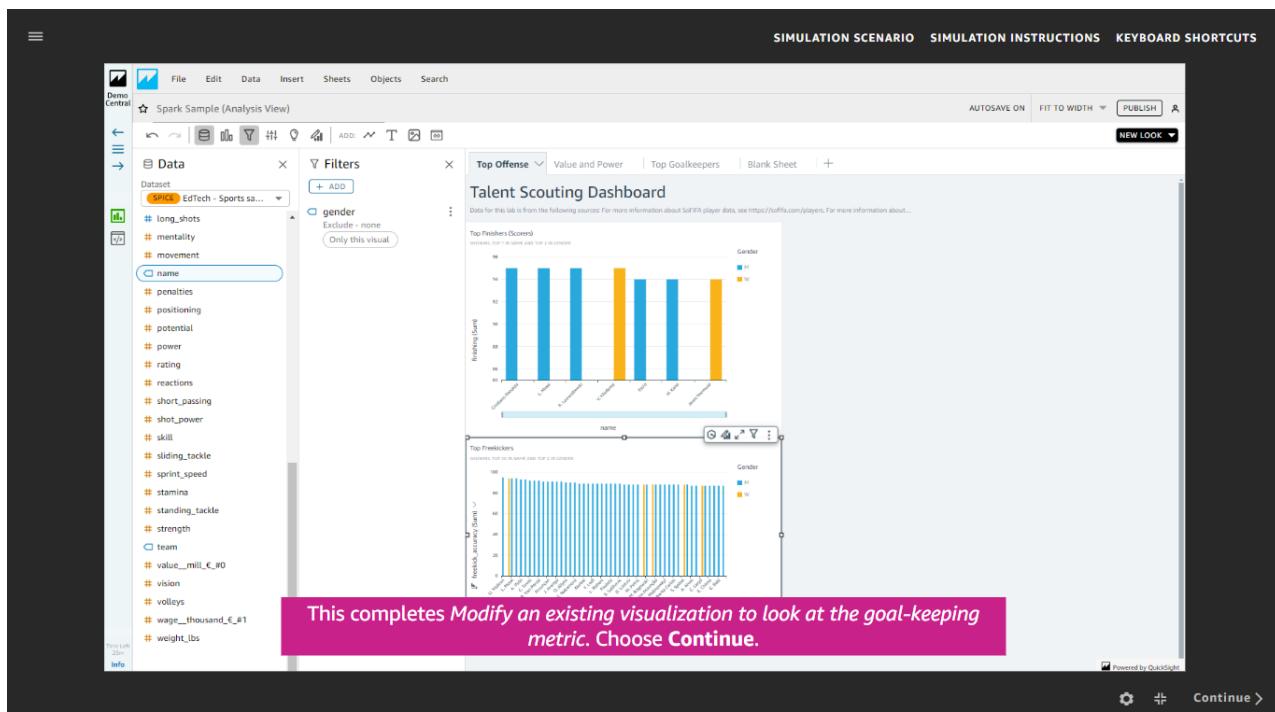


The last step is to rename the tab.

33. Choose the options dropdown arrow on the **Top Dribblers** tab.
34. Choose **Rename**.
35. Choose the highlighted text in the tab.
36. In the text entry box, enter **Top Goalkeepers** as the value.



37. You have successfully revised an existing visualization. Choose the **Top Offense** tab to return to the job selection screen.
38. Choose **Continue** to complete this job.



SIMULATION SCENARIO **SIMULATION INSTRUCTIONS** **KEYBOARD SHORTCUTS**

AUTO SAVE ON FIT TO WIDTH **PUBLISH** NEW LOOK

This completes Task 2: Customize your dashboard. Choose Continue.

Task 3: Download your dashboard and select players

After you have completed all these tasks, it's time for you to publish your dashboard. You can then download your visualizations and use them to determine which top three players you want to pick up for your team.

SIMULATION SCENARIO **SIMULATION INSTRUCTIONS** **KEYBOARD SHORTCUTS**

AUTO SAVE ON FIT TO WIDTH **PUBLISH** NEW LOOK

Filters

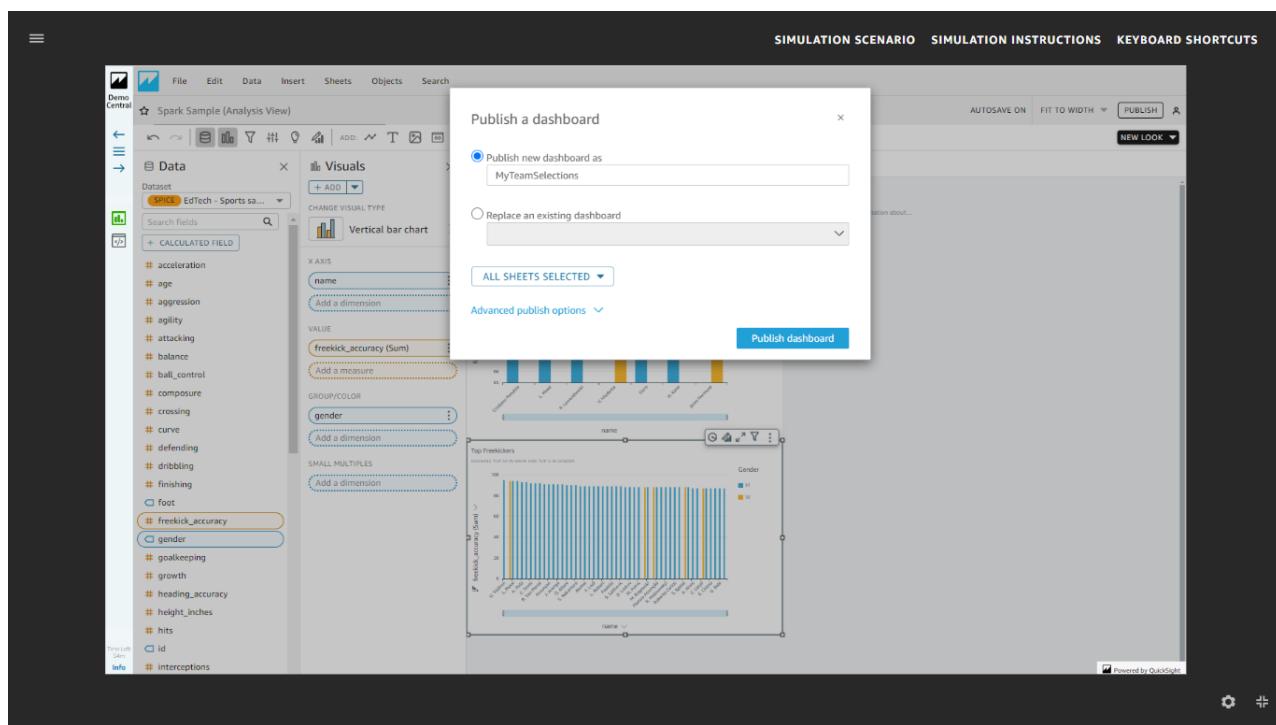
Top Offense Value and Power Top Goalkeepers Top Defenders

Talent Scouting Dashboard

Top Defenders Scored

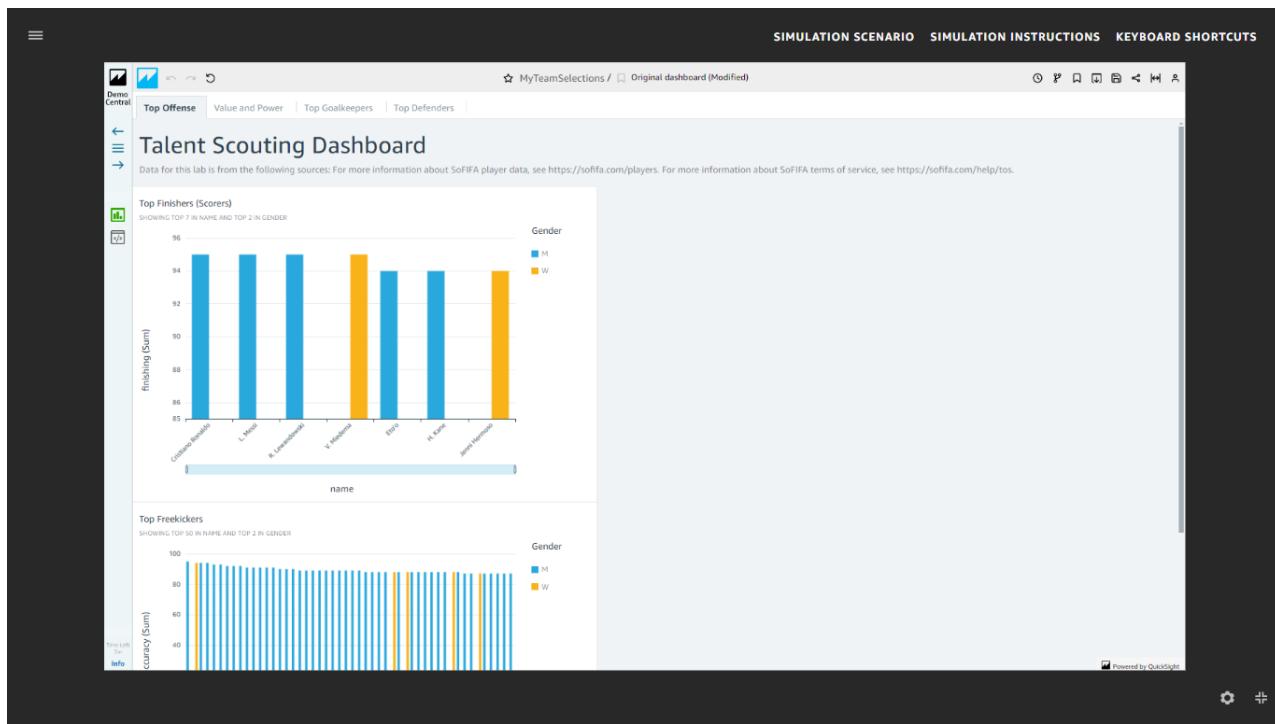
Top Freekickers

1. Publish your dashboard to see it in your browser. Choose the **Publish** button in the upper-right corner.
2. Select the **Publish new dashboard as** text entry field in the **Publish a Dashboard** pop-up.
3. In the text field, enter **MyTeamSelections**.



4. Choose **Publish dashboard**.

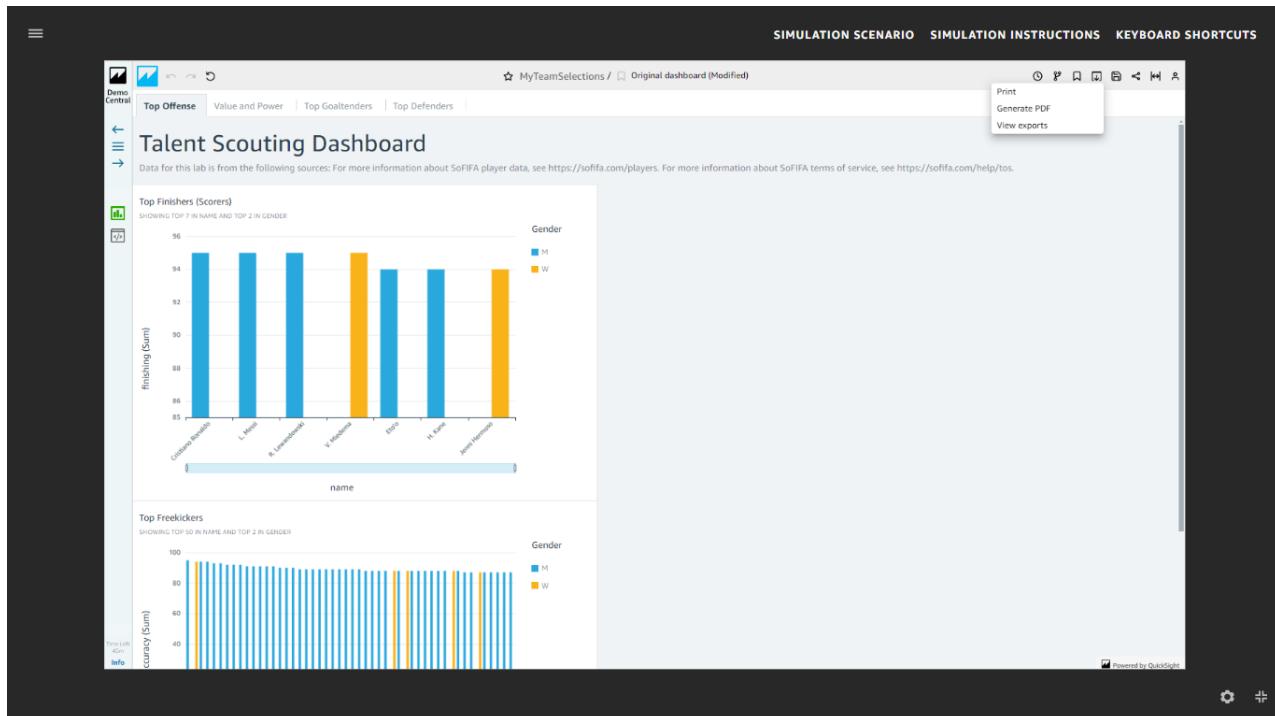
You now see all your visualizations in a nicely formatted view. This is your dashboard.



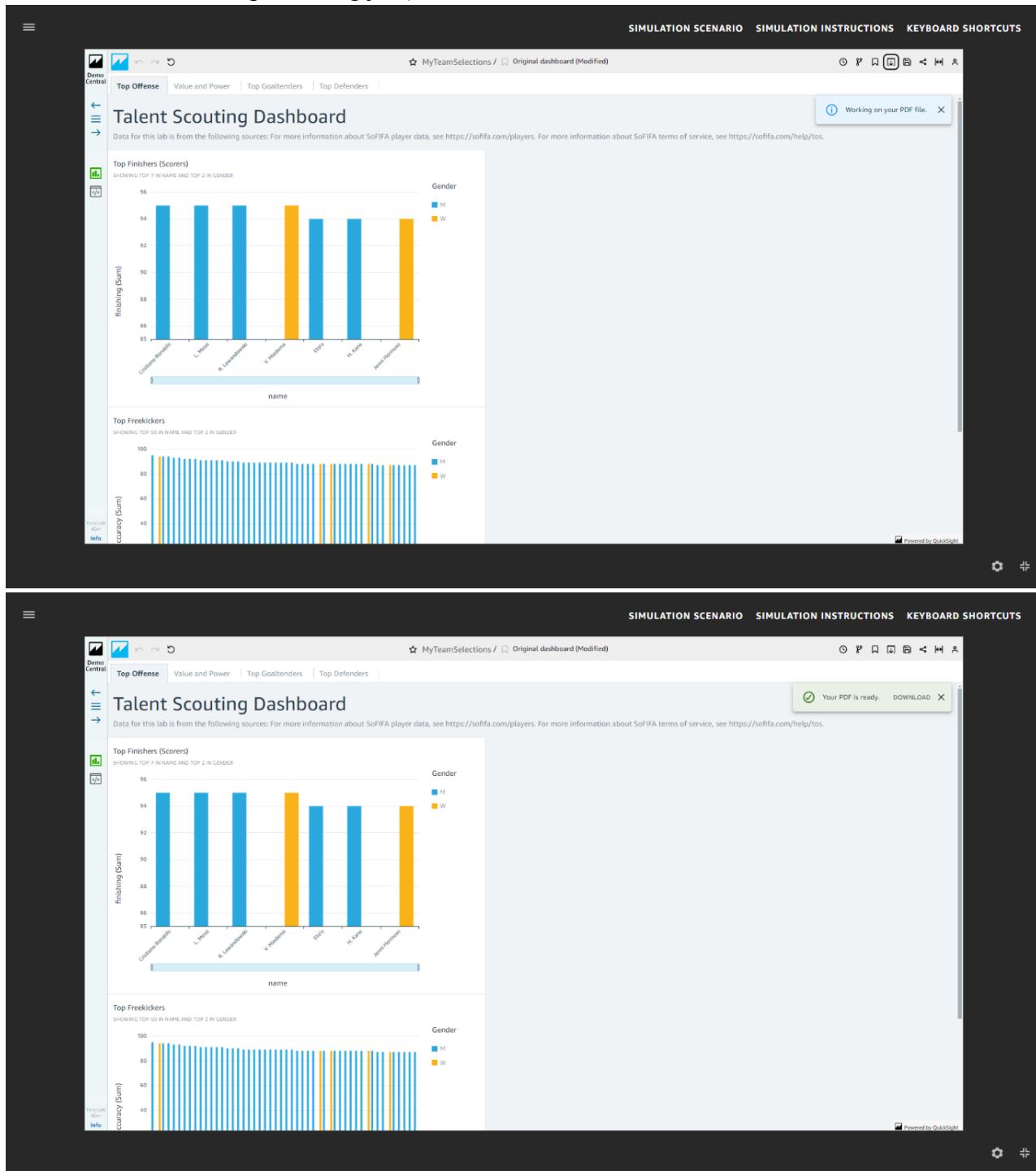
- Choose each of the tabs to view your different visualizations. When you are finished, return to the **Top Offense** tab.

You can also save your dashboard as a PDF for viewing outside of QuickSight.

- On the upper-right menu bar, choose the export icon.
- Choose **Generate PDF**.



8. You will see a **Working on your PDF file** banner. Choose **X** to close the banner. (This will not affect the PDF processing job.)

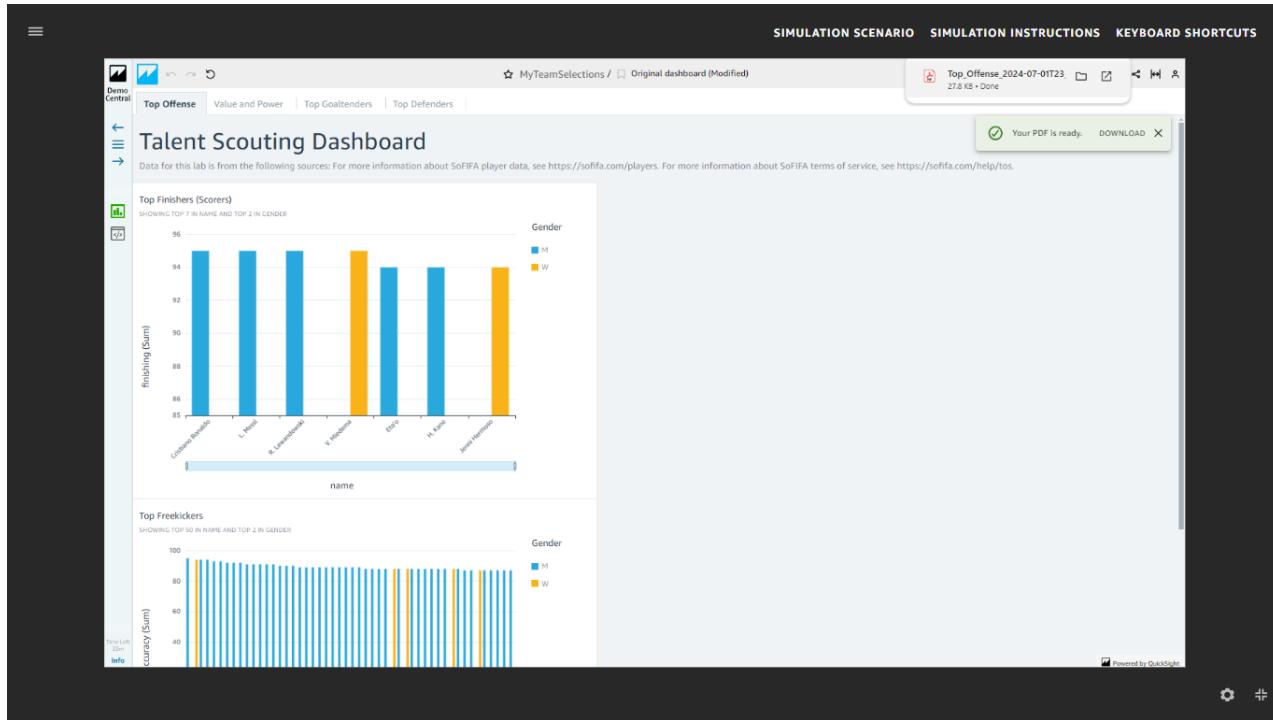


9. You will see a **Your PDF is ready** banner. Choose **DOWNLOAD** to save the PDF file to your computer.

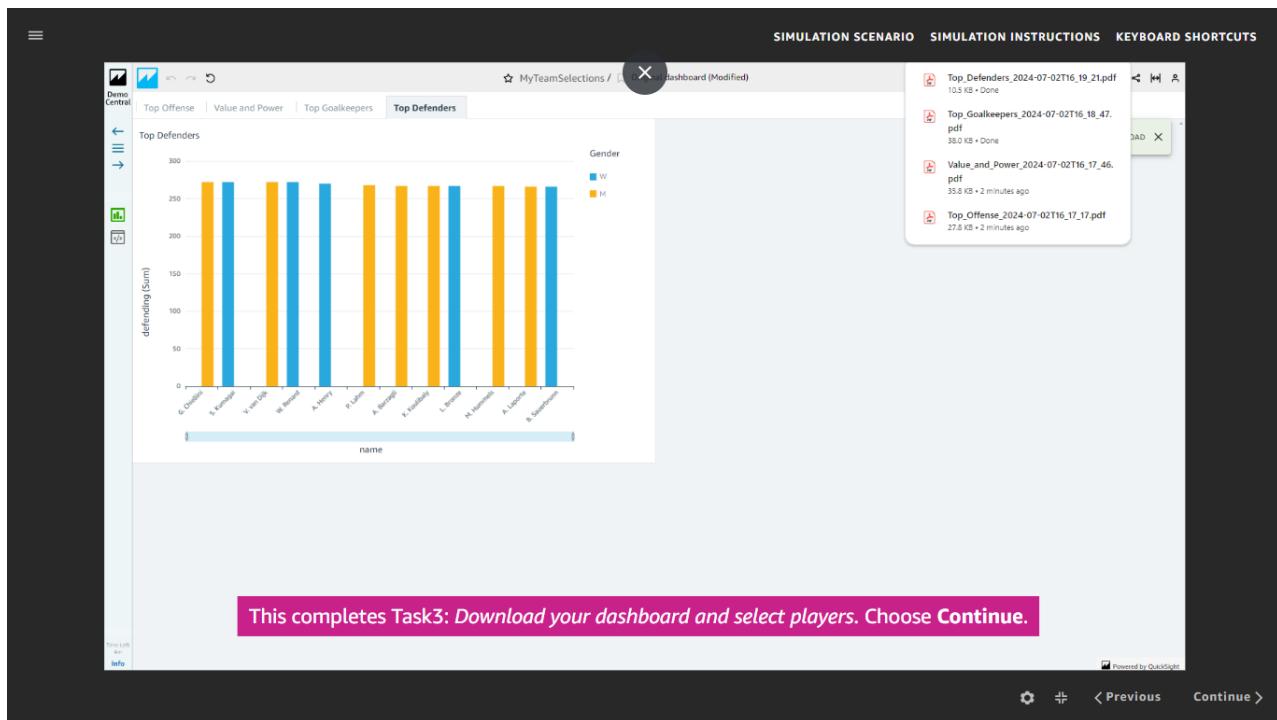
Note: QuickSight will save the current visualization that you are viewing as an individual PDF. You need to repeat this process for each visualization as you view each tab. For this simulation,

the four individual visualization tabs have been saved to one PDF for your convenience.

10. A pop-up will show that the file is downloaded. Choose the Open icon for the PDF file to view your visualizations in PDF format.



11. Use the PDF to look over your data and finalize your choice for the three players to recruit.
12. Write down your three players on a separate sheet of paper. You should be able to provide evidence from the visualizations on why you chose these players.
13. When you have finished, choose **Continue** to complete this task.



Practical 10: Case Study

Sep 10, 2025

1. Analyze media content using AWS AI services

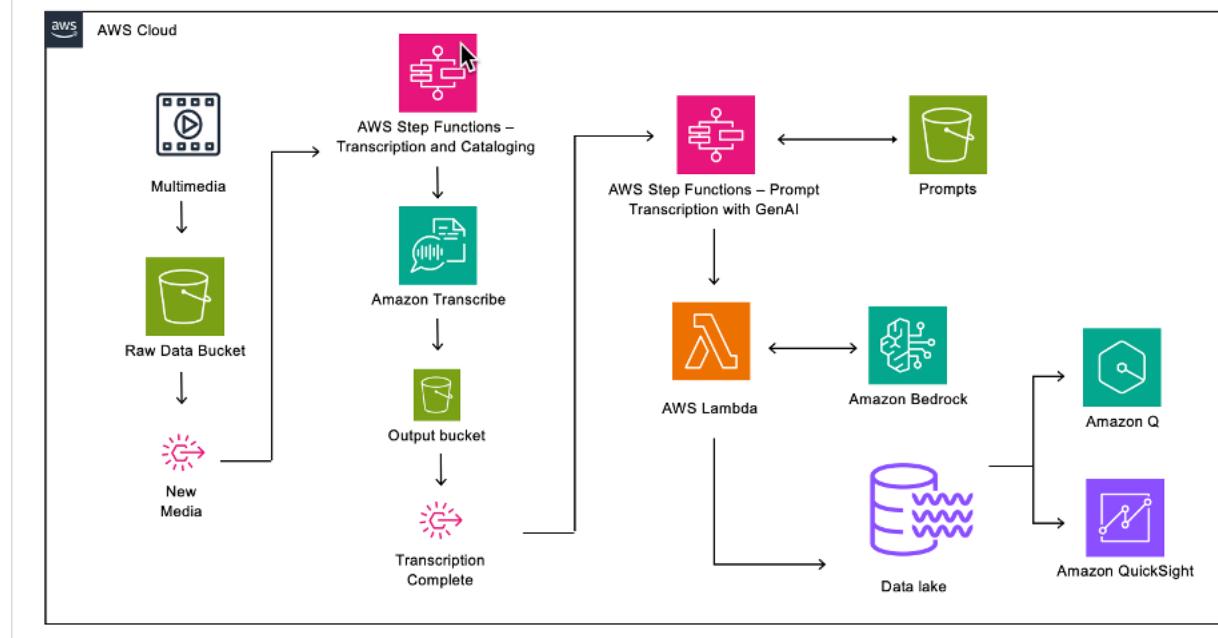
<https://aws.amazon.com/blogs/architecture/analyze-media-content-using-aws-ai-services/>

Organizations struggle to derive value from large archives of audio and video content. A key challenge is the inability to efficiently analyze vast amounts of unstructured media, such as radio broadcasts, to perform tasks like verifying ad placements, identifying specific segments, or understanding audience engagement.

The proposed solution is an event-driven media analysis pipeline that processes unstructured media files and transforms them into searchable, analyzable data. This pipeline automatically transcribes audio, extracts insights, and prepares the data for visualization and natural language querying.

Technologies Used

- **Amazon Transcribe:** Converts speech from audio and video into text.
- **Amazon Bedrock:** Uses foundation models to analyze transcribed content and extract specific insights, such as identifying commercial or interview segments.
- **Amazon QuickSight:** Creates interactive dashboards and visualizations for data analysis and decision-making.
- **Amazon Q:** Functions as a front-end and Retrieval Augmented Generation (RAG) engine, allowing users to query the media archive using natural language.
- **Amazon S3 (Simple Storage Service):** Stores raw media files, transcripts, and processed data.
- **AWS Step Functions:** Orchestrates and manages the content processing workflow.
- **Amazon EventBridge:** Triggers workflows when new media files are uploaded or when transcription is completed.
- **AWS Lambda:** Executes custom code within the workflow.
- **Amazon Athena:** Provides a data exploration tool to query the data lake.



2. Manufacturing Reference Architecture for Supply Chain

<https://pages.awscloud.com/rs/112-TZM-766/images/HMI-2023-reference-architectures%20%281%29.pdf>

Modern supply chains face several challenges:

- Disconnected systems (ERP, SCM, IoT, documents, etc.)
- Lack of real-time visibility into operations and demand signals.
- Inefficient data flow between stakeholders and systems (ERP, logistics, business users).
- Poor forecasting and insights, leading to inventory issues or delays.
- Complex integration of partner applications and internal data lakes.

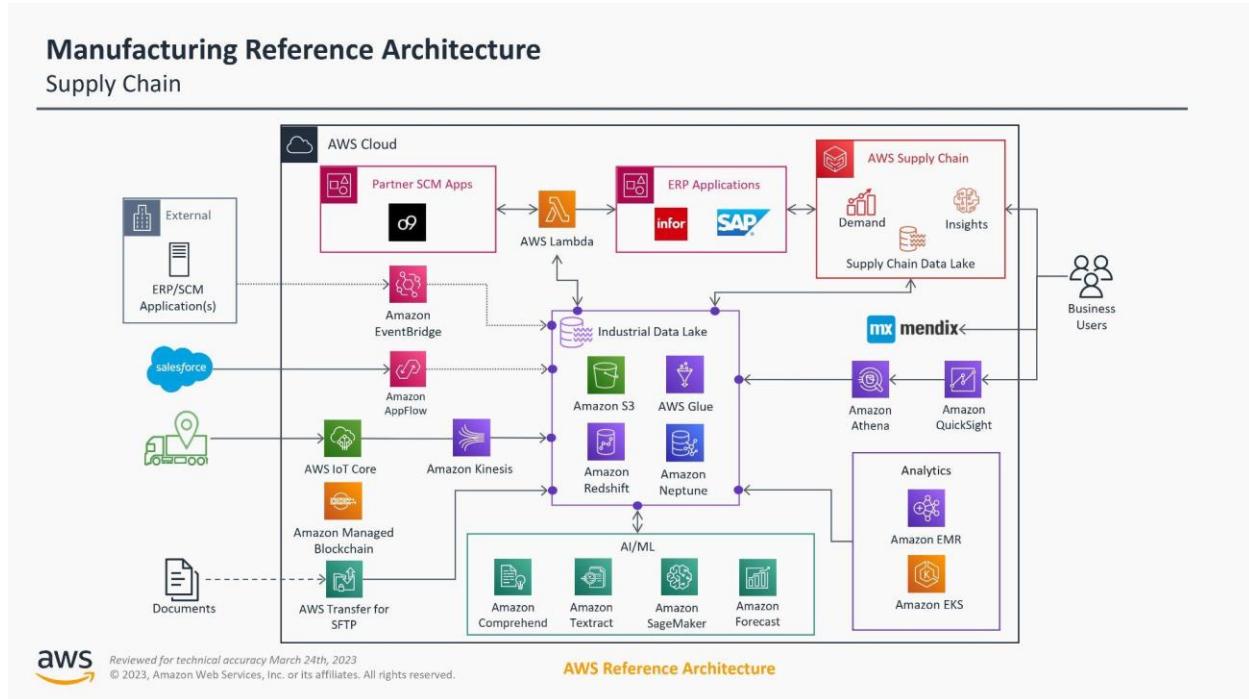
This AWS architecture solves the problem by creating a connected, data-driven supply chain platform using cloud-native services.

- Unified data lake for supply chain data integration.
- Real-time data ingestion from ERP, IoT, partner apps, Salesforce, etc.
- AI/ML-powered analytics for forecasting and decision-making.
- Interactive dashboards and analytics tools for business users.
- Scalable, serverless architecture to support changing business needs.

Technologies Used

- Amazon EventBridge / AppFlow: For integrating external ERP/SCM apps and Salesforce.
- AWS IoT Core: For ingesting real-time logistics/tracking data.

- AWS Transfer for SFTP: For uploading document-based data (e.g., invoices).
- AWS Lambda: For transforming data and triggering workflows.
- Amazon S3: Central data repository.
- AWS Glue: For data cataloging and ETL.
- Amazon Redshift / Neptune: For analytics and graph-based supply chain relationships.
- Amazon Comprehend: Natural Language Processing (NLP).
- Amazon Textract: Extracting structured data from documents.
- Amazon SageMaker: Building custom ML models.
- Amazon Forecast: Demand forecasting.
- Amazon Athena: Querying data in S3.
- Amazon QuickSight: Dashboards and reporting for business users.
- Amazon EMR / EKS: Scalable analytics processing.
- Partner SCM Apps (e.g., Salesforce, other vendor tools)
- ERP Applications (e.g., SAP, Infor)
- Mendix: Low-code development platform for custom apps.
- AWS Supply Chain: Built-in capabilities for demand planning and insights.



3. AWS Architecture for a STARTUP

<https://thetecktalk.com/architecture/aws-architecture-design-a-start-up-case-study/>

The startup's main challenges are related to launching a new application and ensuring it can handle uncertain demand and growth. Specifically, they need to address:

- Scaling: The ability to handle demand spikes without over-provisioning resources.
- Disaster Recovery: A plan to ensure application availability and data integrity in case of an outage.
- Performance & Load: Ensuring the application remains responsive under heavy traffic and distributing the load effectively.
- Security: Protecting infrastructure and user data.
- Management: The need for a self-healing infrastructure, managing user identities, and easily replicating environments.

The proposed solution in the article is a highly available, scalable, fault-tolerant, and secure AWS architecture that supports the startup's growth. The design focuses on:

- Elasticity: Utilizing services that automatically scale to match demand.
- Resilience: Implementing a "Warm Standby" strategy for disaster recovery to ensure business continuity.
- Automation: Using an Infrastructure as Code (IaC) approach to simplify environment management and replication.

Technologies Used

- Amazon Elastic Beanstalk & EC2 Auto Scaling: For automatically scaling the application layer.
- Amazon Aurora Serverless: Provides an auto-scaling relational database.
- Amazon RDS Proxy: Manages database connection pooling to handle traffic surges.
- Amazon Route 53: Manages DNS and facilitates failover for disaster recovery.
- Amazon Cognito: Manages user identity, authentication, and data syncing.
- AWS CloudFormation: Implements an Infrastructure as Code approach for environment management.
- AWS KMS & SSL/TLS: Used for data encryption at rest and in transit.
- AWS IAM (Identity and Access Management): Controls access to the AWS environment.
- Amazon Pinpoint & QuickSight: For handling notifications and data analytics.

