

Lab 7

ICS423 - Internet of Things

Jayant Kolapkar - 2021BCS0132

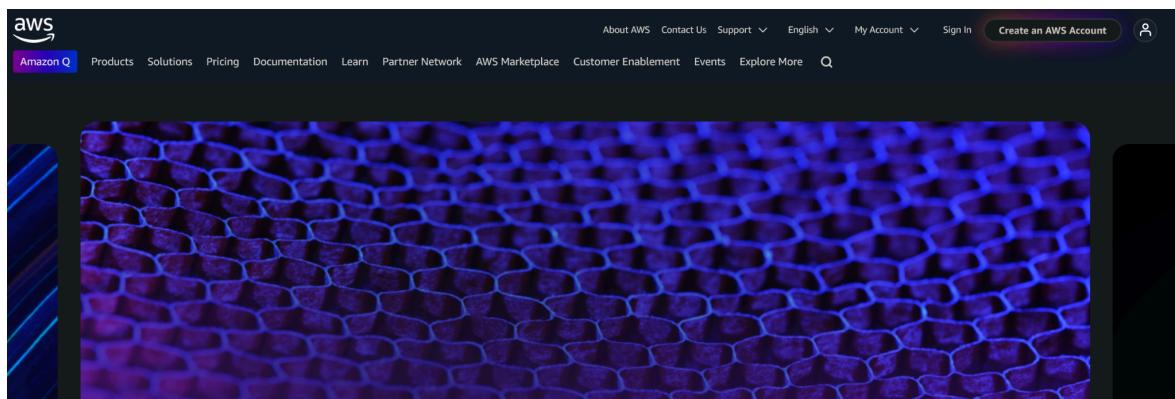
Question

Task 1: Establish an AWS account and run one EC2 instance on your name. (Don't forget to shutdown the VM instance before logging out of AWS account; only use free-tier versions)

Task 2: Connect your laptop as IoT device to AWS IoT core.

Task 1

Create an AWS account and sign up for the free plan



A screenshot of the AWS Console Home page. The top header shows the AWS logo, a search bar, and the region "Asia Pacific (Tokyo)". The main area has a dark theme with several cards: "Recently visited" (empty), "Applications (0)" (empty), "Cost and usage" (empty), "Welcome to AWS" (with a rocket icon and "Getting started with AWS"), "AWS Health" (with "Open issues 0" and "Past 7 days"), and "Cost breakdown" (with "Forecasted month end costs"). There are also "Reset to default layout" and "+ Add widgets" buttons at the top right.

Sign up for AWS

Select a support plan

Choose a support plan for your business or personal account. [Compare plans and pricing examples](#)
 You can change your plan anytime in the AWS Management Console.

Basic support - Free

- Recommended for new users just getting started with AWS
- 24x7 self-service access to AWS resources
- For account and billing issues only
- Access to Personal Health Dashboard & Trusted Advisor



Developer support - From \$29/month

- Recommended for developers experimenting with AWS
- Email access to AWS Support during business hours
- 12 (business)-hour response times



Business support - From \$100/month

- Recommended for running production workloads on AWS
- 24x7 tech support via email, phone, and chat
- 1-hour response times
- Full set of Trusted Advisor best-practice recommendations



Congratulations!

Thank you for signing up for AWS.

We are activating your account, which should only take a few minutes. You will receive an email when this is complete.

[Go to the AWS Management Console](#)

Launch a new instance using the given attributes

The screenshot shows the AWS EC2 Dashboard. On the left, a sidebar navigation includes: EC2 (selected), Dashboard, EC2 Global View, Events, 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, and Network & Security.

The main content area has a blue header bar with the message: "You can change your default landing page for EC2." It features sections for Resources, Launch instance, Service health, Account attributes, and Explore AWS.

Resources: Shows 0 Instances (running), 0 Auto Scaling Groups, 0 Capacity Reservations, 0 Dedicated Hosts, 0 Elastic IPs, 0 Instances, 0 Key pairs, 0 Load balancers, 0 Placement groups, 1 Security groups, 0 Snapshots, and 0 Volumes.

Launch instance: Includes a "Launch instance" button and a "Migrate a server" link. A note says: "Note: Your instances will launch in the Asia Pacific (Tokyo) Region".

Service health: Shows the AWS Health Dashboard with the status: "This service is operating normally."

Account attributes: Lists Default VPC (vpc-0f6b6aa7bac5efee), Settings (Data protection and security, Allowed AMIs, Zones, EC2 Serial Console), Default credit specification, and EC2 console preferences.

Explore AWS: Promotes AWS Graviton2, Get Up to 40% Better Price Performance, and 10 Things You Can Do Today to Reduce AWS Costs.

The screenshot shows the AWS EC2 Instances page. The sidebar navigation is identical to the dashboard.

The main content area shows a table titled "Instances info" with columns: Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, Public IPv4 DNS, and Public IPv4. A search bar at the top of the table says "Find Instance by attribute or tag (case-sensitive)".

A message at the top right indicates "Last updated less than a minute ago". Below the table, a message says "No matching instances found".

A section titled "Select an instance" is present at the bottom.

The screenshot shows the 'Launch an instance' wizard in the AWS Management Console. The top navigation bar includes 'Search' and 'EC2 > Instances > Launch an instance'. The main content area has a dark header 'Launch an instance' with a 'Info' link. Below it, a sub-header says 'Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.' A 'Name and tags' section shows 'Sample_Instance_2021BCS0123' in a text input field and a 'Add additional tags' button. The 'Application and OS Images (Amazon Machine Image)' section shows a search bar and a grid of OS icons: Amazon Linux, macOS, Ubuntu, Windows, Red Hat, SUSE Linux, and Debian. To the right, there's a 'Summary' box with 'Number of instances' set to 1, a 'Software Image (AMI)' section for 'Amazon Linux 2023 AMI 2023.6.2...', a 'Virtual server type (instance type)' section for 't2.micro', a 'Firewall (security group)' section for 'New security group', and a 'Storage (volumes)' section for '1 volume(s) - 8 GiB'. A note about the free tier is displayed in a callout box. At the bottom are 'Cancel', 'Launch instance', and 'Preview code' buttons.

This screenshot continues the 'Launch an instance' wizard. The top navigation bar remains the same. The main content area now includes a 'Subnet' section with 'No preference (Default subnet in any availability zone)', an 'Auto-assign public IP' section with 'Enable' checked, and a 'Firewall (security groups)' section where 'Create security group' is selected. Below these are configuration sections for 'Configure storage' (8 GiB gp3 volume), 'Configure networking' (using 'Launch wizard-1'), and 'Configure system' (with 'Advanced' options). The right side of the screen contains the same 'Summary' box and free tier note as the previous screenshot, along with 'Launch instance' and 'Preview code' buttons.

Here we see that our instance has been created

The screenshot shows the AWS EC2 'Launch an instance' success page. At the top, there's a green success banner stating 'Successfully initiated launch of instance (i-0634554a6def0f801)'. Below it, a 'Next Steps' section lists several actions with links: 'Create billing and free tier usage alerts', 'Connect to your instance', 'Connect an RDS database', 'Create EBS snapshot policy', 'Manage detailed monitoring', 'Create Load Balancer', 'Create AWS budget', and 'Manage CloudWatch alarms'. A search bar at the bottom of this section asks 'What would you like to do next with this instance, for example "create alarm" or "create backup"?'.

The screenshot shows the AWS EC2 Instances page. On the left, a navigation sidebar includes 'EC2' (selected), 'Dashboard', 'EC2 Global View', 'Events', 'Instances' (selected), 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances', 'Dedicated Hosts', 'Capacity Reservations', 'Images', 'AMIs', 'AMI Catalog', and 'Elastic Block Store' (selected), with 'Volumes' and 'Snapshots' listed under it. The main area displays a table titled 'Instances (1) Info' with one row: 'Sample_Instan...' (Instance ID: i-0634554a6def0f801, State: Running, Type: t2.micro, Status: Initializing). The 'Actions' dropdown menu for this instance shows options: 'Stop instance', 'Start instance', 'Reboot instance', 'Hibernate instance', and 'Terminate (delete) instance'.

This screenshot is identical to the previous one, showing the AWS EC2 Instances page with a single running instance. The 'Actions' dropdown menu for the instance is open, and the 'Terminate (delete) instance' option is highlighted with a red box.

Stop instance

Stopping your instance allows you to reduce costs, modify settings, and troubleshoot problems.

Instance ID	Stop protection
<input type="checkbox"/> i-0634554a6def0f801 (Sample_Instance_2021BCS0132) [?]	<input checked="" type="checkbox"/> Off (Can stop instance)

⚠ You will be billed for associated resources
After you stop the instance, you are no longer charged usage or data transfer fees for it. However, you will still be billed for associated Elastic IP addresses and EBS volumes.

▶ Associated resources
You will continue to incur charges for these resources while the instance is stopped

Terminate (delete) instance?

⚠ 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.

Are you sure you want to terminate these instances?

Instance ID	Termination protection
<input type="checkbox"/> i-0634554a6def0f801 (Sample_Instance_2021BCS0132)	<input checked="" type="checkbox"/> Disabled

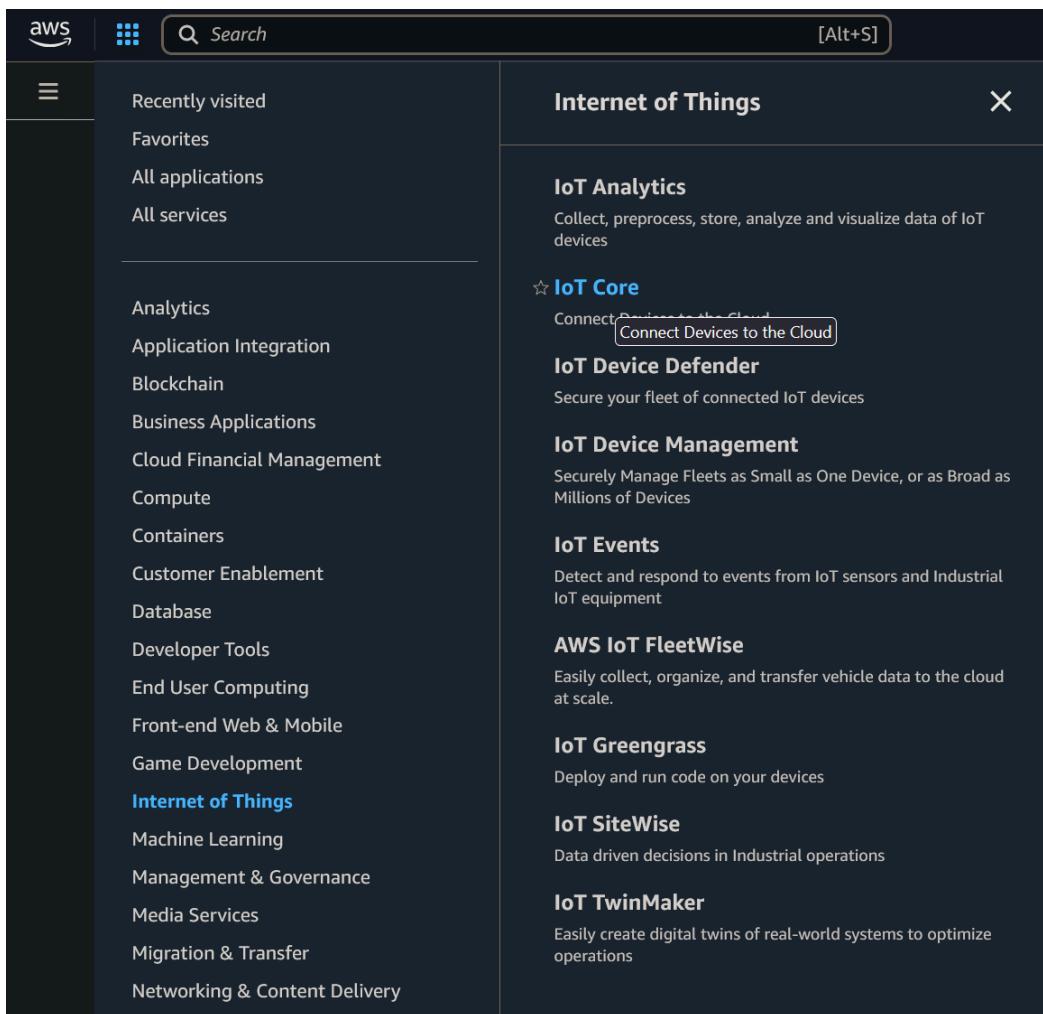
To confirm that you want to delete the instances, choose the terminate button below. Instances with termination protection enabled will not be terminated. Terminating the instance cannot be undone.

Cancel **Terminate (delete)**

The instance is now terminated and will not be billed.

Task 2

Go to IoT core and create a new ‘Thing’



1. Set Up Your Laptop

- **Install Git:** Verify if Git is installed by running `git --version` in your command line. If not installed, download and install it from the [Git website](#).
- **Install Python:** Check for Python installation with `python -V`. AWS IoT Core requires Python version 3.7 or later. If not installed, download and install the latest version from the [Python website](#).

2. Install the AWS IoT Device SDK for Python

The AWS IoT Device SDK for Python enables your laptop to communicate with AWS IoT Core using MQTT.

```
jayant@Jayant-sAcerP:~$ git --version
git version 2.34.1
jayant@Jayant-sAcerP:~$ python3 -V
Python 3.10.12
jayant@Jayant-sAcerP:~$ pip install awsiotsdk
Defaulting to user installation because normal site-packages is not writeable
Collecting awsiotsdk
  Downloading awsiotsdk-1.22.1-py3-none-any.whl (75 kB)
    75.3/75.3 KB 1.2 MB/s eta 0:00:00
Collecting awscrt==0.23.5
  Downloading awscrt-0.23.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (8.7 MB)
    8.7/8.7 MB 4.2 MB/s eta 0:00:00
Installing collected packages: awscrt, awsiotsdk
Successfully installed awscrt-0.23.5 awsiotsdk-1.22.1
jayant@Jayant-sAcerP:~$ |
```

Prepare your device

1. Turn on your device and make sure it's connected to the internet.
2. Choose how you want to load files onto your device.
 1. If your device supports a browser, open the AWS IoT console on your device and run this wizard. You can download the files directly to your device from the browser.
 2. If your device doesn't support a browser, choose the best way to transfer files from the computer with the browser to your device. Some options to transfer files include using the file transfer protocol (FTP) and using a USB memory stick.
3. Make sure that you can access a command-line interface on your device.
 1. If you're running this wizard on your IoT device, open a terminal window on your device to access a command-line interface.
 2. If you're not running this wizard on your IoT device, open an SSH terminal window on this device and connect it to your IoT device.
4. From the terminal window, enter this command:

```
ping a14gmez3k91qqg-ats.iot.ap-northeast-1.amazonaws.com
```

 Copy

After you complete these steps and get a successful ping response, you're ready to continue and connect your device to AWS IoT.

```

jayant@Jayant-sAcerP:~$ ping a14gmez3k91qqg-ats.iot.ap-northeast-1.amazonaws.com
PING a14gmez3k91qqg-ats.iot.ap-northeast-1.amazonaws.com (3.114.240.159) 56(84) bytes of data.
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=1 ttl=242 time=119 ms
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=2 ttl=242 time=119 ms
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=3 ttl=242 time=119 ms
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=4 ttl=242 time=119 ms
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=5 ttl=242 time=119 ms
64 bytes from ec2-3-114-240-159.ap-northeast-1.compute.amazonaws.com (3.114.240.159): icmp_seq=6 ttl=242 time=120 ms
^C
--- a14gmez3k91qqg-ats.iot.ap-northeast-1.amazonaws.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5007ms
rtt min/avg/max/mdev = 118.870/119.199/119.640/0.270 ms
jayant@Jayant-sAcerP:~$ |

```

Thing properties

Create a new thing Choose an existing thing

Thing name
Laptop_2021BCS0132

Enter a unique name containing only: letters, numbers, hyphens, colons, or underscores. A thing name can't contain any spaces.

Additional configurations
You can use these configurations to add detail that can help you to organize, manage, and search your things.

► Thing type - *optional*

► Searchable thing attributes - *optional*

► Thing groups - *optional*

► Billing group - *optional*

i Certificate and policy for your device
Your device requires a unique device certificate to securely authenticate its identity to AWS IoT, and an AWS IoT policy that authorizes it to send and receive messages. We'll create these resources for your device automatically. You can review and edit their properties later, if necessary.

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

Platform and SDK

Choose the platform OS and AWS IoT Device SDK that you want to use for your device.

Device platform operating system

This is the operating system installed on the device that will connect to AWS.

Linux / macOS

Linux version: any
macOS version: 10.13+

Windows

Version 10

AWS IoT Device SDK

Choose a Device SDK that's in a language your device supports.

Node.js

Version 10+
Requires Node.js and npm to be installed

Python

Version 3.6+
Requires Python and Git to be installed

Java

Version 8
Requires Java JDK, Maven, and Git to be installed

Connection kit

Certificate

Laptop_2021BCS0132.cert.pem

Private key

Laptop_2021BCS0132.private.key

AWS IoT Device SDK

Python

Script to send and receive

messages

start.sh

Policy

Laptop_2021BCS0132-Policy

[View policy](#)

Download

If you are running this from a browser on the device, after you download the connection kit, it will be in the browser's download folder.

If you are not running this from a browser on your device, you'll need to transfer the connection kit from your browser's download folder to your device using the method you tested when you prepared your device in step 1.

 [Download connection kit](#)

Unzip connection kit on your device

After the connection kit is on your device, unzip it using this command:



```
unzip connect_device_package.zip
```

Copy

```
jayant@Jayant-sAcerP:~$ cd /mnt/c/Users/Jayant/Downloads
jayant@Jayant-sAcerP:/mnt/c/Users/Jayant/Downloads$ unzip connect_device_package.zip
Archive: connect_device_package.zip
  extracting: Laptop_2021BCS0132.cert.pem
  extracting: Laptop_2021BCS0132.public.key
  extracting: Laptop_2021BCS0132.private.key
  extracting: Laptop_2021BCS0132-Policy
  extracting: start.sh
```

```
jayant@Jayant-sAcerP:/mnt/c/Users/Jayant/Downloads$ chmod +x start.sh
jayant@Jayant-sAcerP:/mnt/c/Users/Jayant/Downloads$ ./start.sh

Downloading AWS IoT Root CA certificate from AWS...
% Total    % Received % Xferd  Average Speed   Time     Time      Current
          Dload  Upload Total Spent   Left Speed
100 1188 100 1188    0     0  6188      0 --:--:-- --:--:-- --:--:-- 6219

Cloning the AWS SDK...
Cloning into 'aws-iot-device-sdk-python-v2'...
remote: Enumerating objects: 2715, done.
remote: Counting objects: 100% (957/957), done.
remote: Compressing objects: 100% (263/263), done.
remote: Total 2715 (delta 826), reused 710 (delta 694), pack-reused 1758 (from 3)
Receiving objects: 100% (2715/2715), 2.32 MiB | 7.51 MiB/s, done.
Resolving deltas: 100% (1742/1742), done.
Updating files: 100% (188/188), done.

Running pub/sub sample application...
Connecting to a14gmez3k91qqg-ats.iot.ap-northeast-1.amazonaws.com with client ID 'basicPubSub'...
Connection Successful with return code: 0 session present: False
Connected!
Subscribing to topic 'sdk/test/python'...
Subscribed with QoS.AT_LEAST_ONCE
Sending messages until program killed
Publishing message to topic 'sdk/test/python': Hello World! [1]
Received message from topic 'sdk/test/python': b'"Hello World! [1]"'
Publishing message to topic 'sdk/test/python': Hello World! [2]
Received message from topic 'sdk/test/python': b'"Hello World! [2]"'
Publishing message to topic 'sdk/test/python': Hello World! [3]
Received message from topic 'sdk/test/python': b'"Hello World! [3]"'
Publishing message to topic 'sdk/test/python': Hello World! [4]
Received message from topic 'sdk/test/python': b'"Hello World! [4]"'
```

Subscriptions	sdk/test/python	Pause	Clear
sdk/test/python			
	▼ sdk/test/python	February 24, 2025, 21:27:44 (UTC+05:30)	
	"Hello World! [36]"		
	▼ sdk/test/python	February 24, 2025, 21:27:43 (UTC+05:30)	
	"Hello World! [35]"		
	▼ sdk/test/python	February 24, 2025, 21:27:42 (UTC+05:30)	
	"Hello World! [34]"		
	▼ sdk/test/python	February 24, 2025, 21:27:41 (UTC+05:30)	
	"Hello World! [33]"		

Device is connected

Your device is now connected. There are many services you can explore.



Device connected to AWS IoT Explore AWS services

As we see, the laptop is connected as a ‘Thing’ under AWS IoT Core

AWS IoT successfully created thing resource Laptop_2021BCS0132 and generated your connection kit.

AWS IoT > Manage > Things

Things (1) [Info](#) [C](#) Advanced search Run aggregations Run connectivity status query Edit Delete Create things

An IoT thing is a representation and record of your physical device in the cloud. A physical device needs a thing record in order to work with AWS IoT.

Filter things by: name, type, group, billing, or searchable attribute.

Name	Thing type
Laptop_2021BCS0132	-

AWS IoT successfully created thing resource Laptop_2021BCS0132 and generated your connection kit.

AWS IoT > Manage > Things > Laptop_2021BCS0132

IoT security audit is off [Info](#) Automate your security audit by enabling daily checks on your fleet from AWS IoT Device Defender. The audit evaluates your IoT configurations against security best practices, including checks for identities and access policies. [View pricing](#) [Learn more](#)

Laptop_2021BCS0132 Connectivity indexing is not enabled [Info](#) [Create secure tunnel](#) [Edit](#) [Delete](#)

Thing details

Name	Type
Laptop_2021BCS0132	-
ARN	Billing group
arn:aws:iot:ap-northeast-1:032218022121:thing/Laptop_2021BCS0132	-

To delete the thing, follow these steps

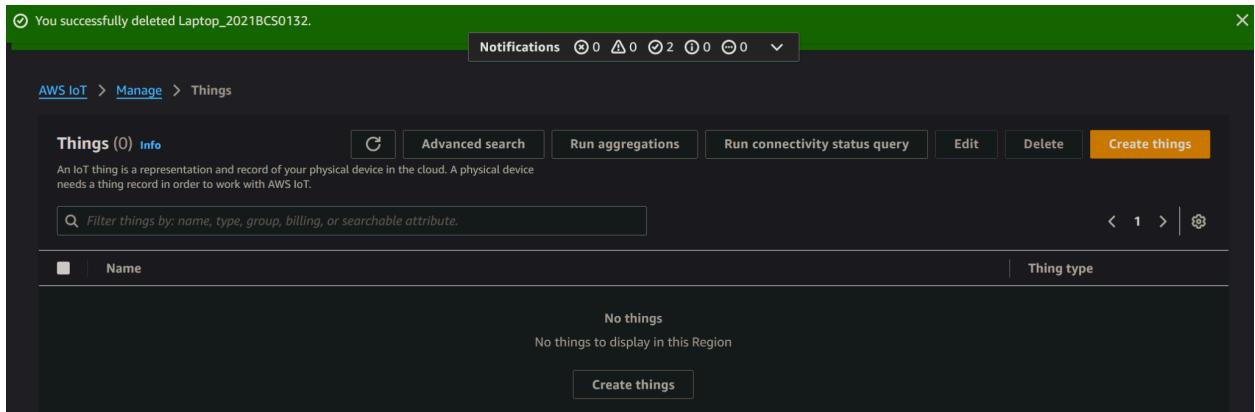
Delete Laptop_2021BCS0132?

Are you sure you want to delete Laptop_2021BCS0132? This action can't be undone.

- Laptop_2021BCS0132

To confirm deletion, enter Laptop_2021BCS0132

Cancel [Delete](#)



The Thing has been deleted and no longer exists.