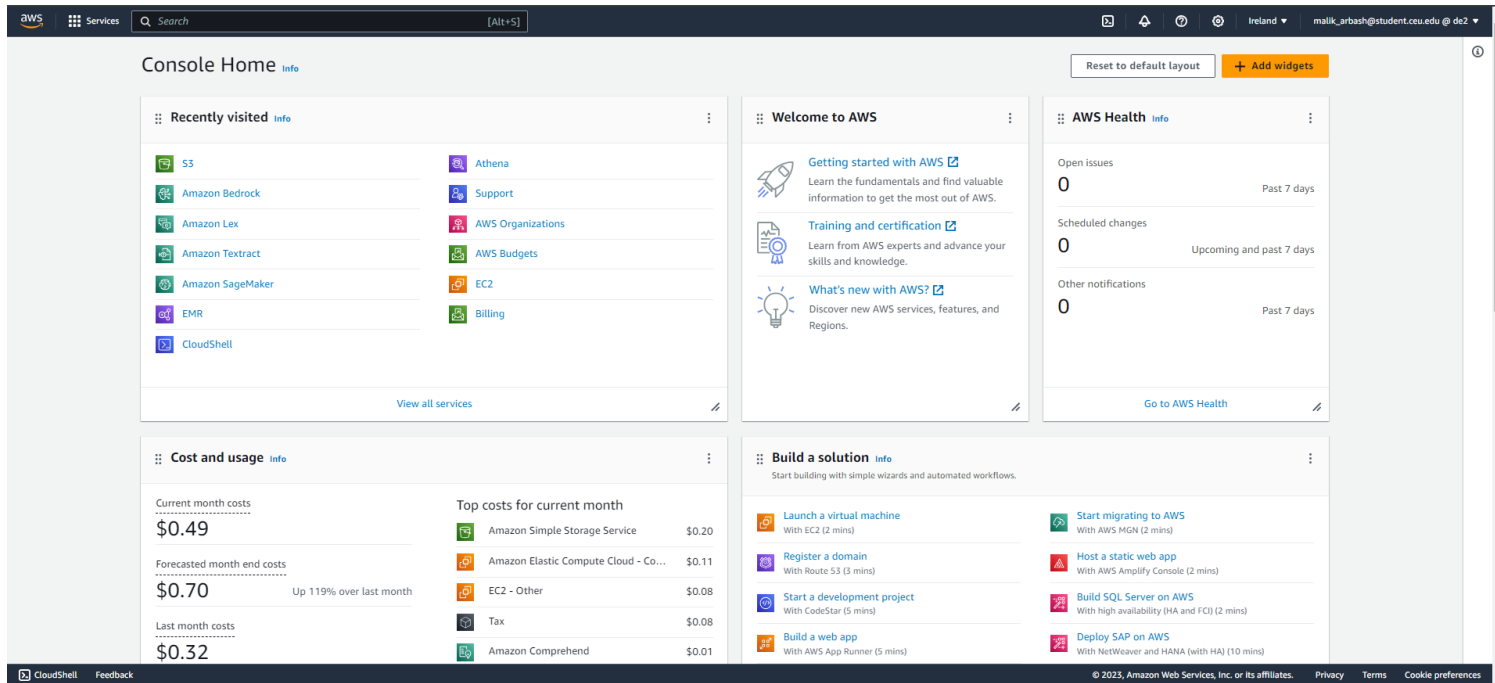


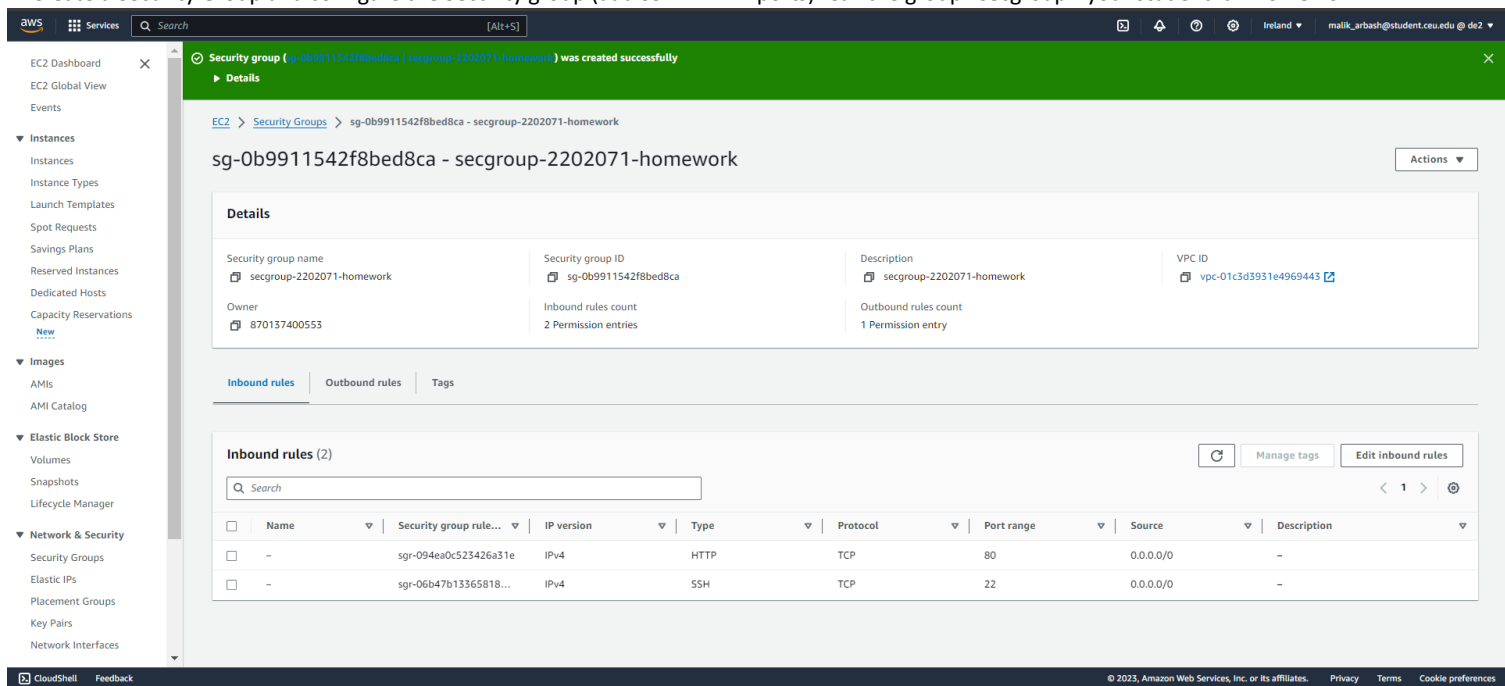
## Data Engineering 2 – Deliverable 2

Muhammad Arbash Malik – 2202071

1. Log in to AWS, screenshot the AWS landing page (the page you see after login)



2. Create a Security Group and configure the Security group (add SSH + HTTP ports). Call the group "secgroup-<your student id>-homework"



### 3. Upload your public key.

Successfully imported key pair

Key pairs (1) Info

Find Key Pair by attribute or tag

arbash X Clear filters

<input type="checkbox"/>	Name	Type	Created	Fingerprint	ID
<input type="checkbox"/>	2202071-arbashkeypair	rsa	2023/11/25 17:56 GMT+1	07:f4:e4:b8:36:e9:f0:7c:68:30:b3:6e:45:41:7c:01	key-0a8ff7a369d8fbc52

### 4. Start creating a t4g.nano instance using the Ubuntu AMI we used in the class.

Launch an instance Info

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.

Name and tags Info

Name

Arbashinstance Add additional tags

Application and OS Images (Amazon Machine Image) Info

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

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

Recents Quick Start

Amazon Linux macOS Ubuntu Windows Red Hat SUSE Linux

Amazon Machine Image (AMI)

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

Summary

Number of instances Info

1

Software Image (AMI)

Canonical, Ubuntu, 22.04 LTS, ...read more  
ami-0d3407241b2b6ec62

Virtual server type (instance type)

t4g.nano

Firewall (security group)

secgroup-2202071-homework

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance Review commands

## 5. Check the price of this instance on ec2instances.info

Vantage									
Automate AWS cost reporting with Terraform →									
Region	Pricing Unit	Cost	Reserved						
EU (Ireland)	Instance	Hourly	1-year - No Upfront	Columns	Compare	Clear Filters	Export	Search...	
Name	API Name	Instance Memory	vCPUs	Instance Storage	Network Performance	On Demand	Linux Reserved cost	Linux Spot Minimum cost	Windows On Demand cost
Filter...	Filter...	Min Mem: 0	Min vCPUs: 0	Min Storage: 0	Filter...	Filter...	Filter...	Filter...	Filter...
T4G Nano	t4g.nano	0.5 GiB	2 vCPUs for a 1h 12m burst	EBS only	Up to 5 Gbit	\$0.0046 hourly	\$0.0029 hourly	\$0.0021 hourly	unavaila

## 6. Select your security group

### Firewall (security groups) info

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

☐ Create security group

☒ Select existing security group

Common security groups info

Select security groups

secgroup-2202071-homework sg-0b9911542f8bed8ca X

VPC: vpc-01c3d3931e4969443

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

Compare security group rules

### Configure storage info

Advanced

1x 8 GiB gp2 Root volume (Not encrypted)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

Add new volume

The selected AMI contains more instance store volumes than the instance allows. Only the first 0 instance store volumes from the AMI will be accessible from the instance

Click refresh to view backup information

The tags that you assign determine whether the instance will be backed up by any Data Lifecycle Manager policies.

0 x File systems

Edit

Advanced details info

### Summary

Number of instances info

1

Software image (AMI)

Canonical, Ubuntu, 22.04 LTS, ...read more

ami-0d3407241b2b6ec62

Virtual server type (instance type)

t4g.nano

Firewall (security group)

secgroup-2202071-homework

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel

Launch instance

Review commands

## 7. Select your keypairs and start the instance

### Architecture

AMI ID

ami-0d3407241b2b6ec62

Verified provider

### Instance type info

Instance type

t4g.nano

Family: t4g 2 vCPU 0.5 GiB Memory Current generation: true

On-Demand SUSE base pricing: 0.0046 USD per Hour

On-Demand Linux base pricing: 0.0046 USD per Hour

Additional costs apply for AMIs with pre-installed software

All generations

Compare instance types

### Key pair (login) info

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

Key pair name - required

2202071-arbashkeypair

Create new key pair

### Network settings info

Edit

Network info

vpc-01c3d3931e4969443

Subnet info

No preference (Default subnet in any availability zone)

### Summary

Number of instances info

1

Software image (AMI)

Canonical, Ubuntu, 22.04 LTS, ...read more

ami-0d3407241b2b6ec62

Virtual server type (instance type)

t4g.nano

Firewall (security group)

secgroup-2202071-homework

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel

Launch instance

Review commands

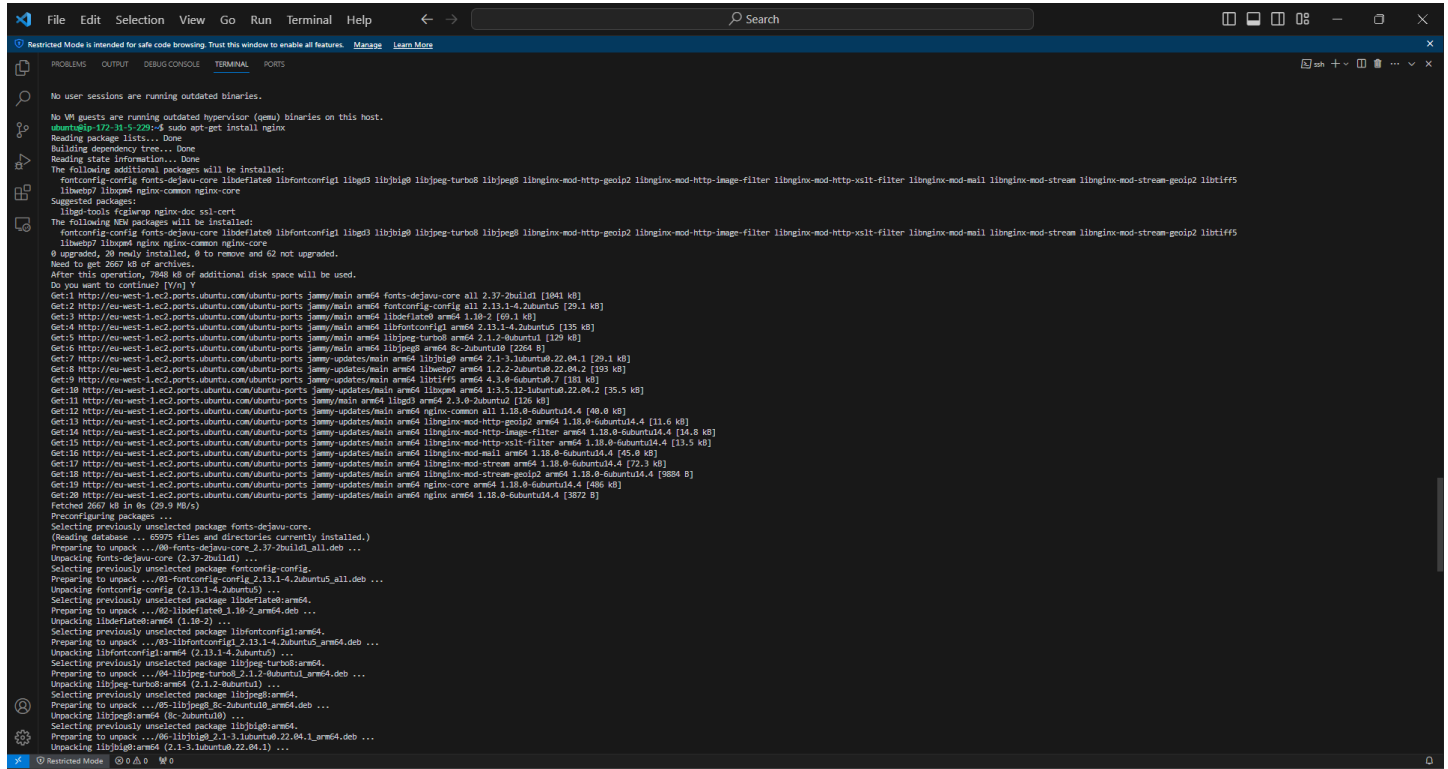
## 8. Go to the instance page of your instance

The screenshot shows the AWS Management Console interface for an EC2 instance. The top navigation bar includes the AWS logo, 'Services', a search bar, and the user's account information. The left sidebar contains a navigation menu with categories like 'Instances', 'Images', 'Elastic Block Store', 'Network & Security', and 'Load Balancing'. The main content area displays the 'Instance summary for i-0e60f09c20a548805 (Arbashinstance)'. The instance is in the 'Running' state. Below the summary, there are tabs for 'Details', 'Status and alarms', 'Monitoring', 'Security', 'Networking', 'Storage', and 'Tags'. The 'Details' tab is selected, showing various instance attributes such as Platform (Ubuntu), Platform details (Linux/UNIX), Stop protection (Disabled), Instance auto-recovery (Default), AMI Launch index (0), Credit specification, AMI ID (ami-0d5407241b2b6ec62), AMI name (ubuntu/images/hvm-ssd/ubuntu-jammy-22.04-arm64-server-20230919), Launch time (Sat Nov 25 2023 18:05:59 GMT+0100), Lifecycle (normal), Key pair assigned at launch (2202071-arbashkeypair), Kernel ID, Monitoring (disabled), Termination protection (Disabled), AMI location (amazon/ubuntu/images/hvm-ssd/ubuntu-jammy-22.04-arm64-server-20230919), Stop-hibernate behavior (Disabled), State transition reason, and State transition message.

## 9. Use Codespace to ssh into your instance, (screenshot once you are logged in)

The screenshot shows a VS Code terminal window with a dark theme. The terminal output displays the results of an SSH connection to an Ubuntu instance. It starts with a welcome message and system information, including the OS version (Ubuntu 22.04.3 LTS), kernel (GNU/Linux 6.8.0-1012-aws), and system load. The user then runs 'sudo apt-get update', which outputs a list of updates. Finally, the user runs 'sudo apt-get install moon-buggy', which outputs the package lists and the installation progress.

## 10. Install nginx



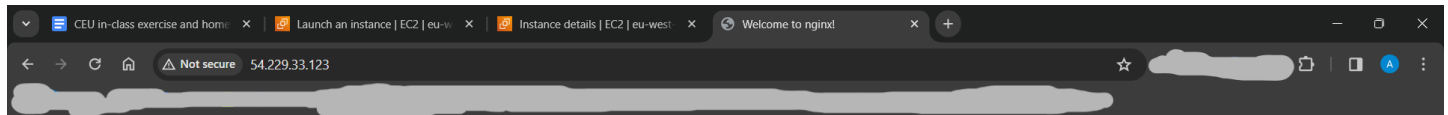
```
File Edit Selection View Go Run Terminal Help
Restricted Mode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-5-229:~$ sudo apt-get install nginx
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  fontconfig-config fonts-dejavu-core libfontconfig1 libjpeg-turbo8 libjpeg8 libpng16-0 libssl1.1 libxml2
Suggested packages:
  libgd-tools fcgiwrap nginx-doc ssl-cert
The following NEW packages will be installed:
  fontconfig-config fonts-dejavu-core libfontconfig1 libjpeg-turbo8 libjpeg8 libpng16-0 libssl1.1 libxml2
0 upgraded, 8 newly installed, 0 to remove and 62 not upgraded.
Need to get 2667 kB of archives.
After this operation, 7848 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 fonts-dejavu-core all 2.37-2build1 [1041 kB]
Get:2 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 fontconfig-config all 2.13.1-4.2ubuntu5 [29.1 kB]
Get:3 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 libfontconfig1 arm64 2.13.1-4.2ubuntu5 [135 kB]
Get:4 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 libjpeg-turbo8 arm64 2.1.2-0ubuntu1 [129 kB]
Get:5 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 libjpeg8 arm64 8c-2ubuntu0 [2064 B]
Get:6 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libpng16-0 arm64 1.2.2-2ubuntu0.22.04.1 [29.1 kB]
Get:7 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libssl1.1 arm64 3.0.2-0ubuntu0.22.04.1 [384 kB]
Get:8 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libxml2 arm64 2.9.12-2ubuntu0.22.04.2 [35.5 kB]
Get:9 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy/main arm64 libjpeg8 arm64 8c-2ubuntu0 [2064 B]
Get:10 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libfontconfig1 arm64 2.13.1-4.2ubuntu5 [135 kB]
Get:11 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libjpeg-turbo8 arm64 2.1.2-0ubuntu1 [129 kB]
Get:12 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libjpeg8 arm64 8c-2ubuntu0 [2064 B]
Get:13 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libpng16-0 arm64 1.2.2-2ubuntu0.22.04.1 [29.1 kB]
Get:14 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libssl1.1 arm64 3.0.2-0ubuntu0.22.04.1 [384 kB]
Get:15 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libxml2 arm64 2.9.12-2ubuntu0.22.04.2 [35.5 kB]
Get:16 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-core arm64 1.18.0-6ubuntu14.4 [14.8 kB]
Get:17 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-common arm64 1.18.0-6ubuntu14.4 [11.6 kB]
Get:18 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-doc arm64 1.18.0-6ubuntu14.4 [13.5 kB]
Get:19 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-geoip2 arm64 1.18.0-6ubuntu14.4 [45.0 kB]
Get:20 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-mod-http-image-filter arm64 1.18.0-6ubuntu14.4 [72.3 kB]
Get:21 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-mod-http-sxlt-filter arm64 1.18.0-6ubuntu14.4 [3684 B]
Get:22 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-mod-mail arm64 1.18.0-6ubuntu14.4 [486 kB]
Get:23 http://eu-west-1-ec2.ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 nginx-mod-stream arm64 1.18.0-6ubuntu14.4 [3872 B]
Fetched 2667 kB in 0s (29.9 MB/s)
Preconfiguring packages ...
Selecting previously unselected package fonts-dejavu-core.
(Reading database ... 5575 files and directories currently installed.)
Preparing to unpack .../00-fonts-dejavu-core-2.37-2build1.all.deb ...
Unpacking fonts-dejavu-core (2.37-2build1) ...
Selecting previously unselected package fontconfig-config.
Preparing to unpack .../01-fontconfig-config-2.13.1-4.2ubuntu5.all.deb ...
Unpacking fontconfig-config (2.13.1-4.2ubuntu5) ...
Selecting previously unselected package libfontconfig1:arm64.
Preparing to unpack .../02-libfontconfig1-2.13.1-4.2ubuntu5.arm64.deb ...
Unpacking libfontconfig1:arm64 (2.13.1-4.2ubuntu5) ...
Selecting previously unselected package libjpeg-turbo8:arm64.
Preparing to unpack .../03-libjpeg-turbo8-2.1.2-0ubuntu1.arm64.deb ...
Unpacking libjpeg-turbo8:arm64 (2.1.2-0ubuntu1) ...
Selecting previously unselected package libjpeg8:arm64.
Preparing to unpack .../04-libjpeg8-8c-2ubuntu0.arm64.deb ...
Unpacking libjpeg8:arm64 (8c-2ubuntu0) ...
Selecting previously unselected package libpng16-0:arm64.
Preparing to unpack .../05-libpng16-0-1.2.2-2ubuntu0.22.04.1.arm64.deb ...
Unpacking libpng16-0:arm64 (1.2.2-2ubuntu0.22.04.1) ...
Selecting previously unselected package libssl1.1:arm64.
Preparing to unpack .../06-libssl1.1-3.0.2-0ubuntu0.22.04.1.arm64.deb ...
Unpacking libssl1.1:arm64 (3.0.2-0ubuntu0.22.04.1) ...
Selecting previously unselected package libxml2:arm64.
Preparing to unpack .../07-libxml2-2.9.12-2ubuntu0.22.04.2.arm64.deb ...
Unpacking libxml2:arm64 (2.9.12-2ubuntu0.22.04.2) ...
Selecting previously unselected package nginx-core:arm64.
Preparing to unpack .../08-nginx-core-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-core:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-common:arm64.
Preparing to unpack .../09-nginx-common-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-common:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-doc:arm64.
Preparing to unpack .../10-nginx-doc-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-doc:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-geoip2:arm64.
Preparing to unpack .../11-nginx-geoip2-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-geoip2:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-mod-http-image-filter:arm64.
Preparing to unpack .../12-nginx-mod-http-image-filter-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-mod-http-image-filter:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-mod-http-sxlt-filter:arm64.
Preparing to unpack .../13-nginx-mod-http-sxlt-filter-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-mod-http-sxlt-filter:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-mod-mail:arm64.
Preparing to unpack .../14-nginx-mod-mail-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-mod-mail:arm64 (1.18.0-6ubuntu14.4) ...
Selecting previously unselected package nginx-mod-stream:arm64.
Preparing to unpack .../15-nginx-mod-stream-1.18.0-6ubuntu14.4.arm64.deb ...
Unpacking nginx-mod-stream:arm64 (1.18.0-6ubuntu14.4) ...
Setting up fonts-dejavu-core (2.37-2build1) ...
Setting up fontconfig-config (2.13.1-4.2ubuntu5) ...
Setting up libfontconfig1:arm64 (2.13.1-4.2ubuntu5) ...
Setting up libjpeg-turbo8:arm64 (2.1.2-0ubuntu1) ...
Setting up libjpeg8:arm64 (8c-2ubuntu0) ...
Setting up libpng16-0:arm64 (1.2.2-2ubuntu0.22.04.1) ...
Setting up libssl1.1:arm64 (3.0.2-0ubuntu0.22.04.1) ...
Setting up libxml2:arm64 (2.9.12-2ubuntu0.22.04.2) ...
Setting up nginx-core:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-common:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-doc:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-geoip2:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-mod-http-image-filter:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-mod-http-sxlt-filter:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-mod-mail:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx-mod-stream:arm64 (1.18.0-6ubuntu14.4) ...
Setting up nginx (1.18.0-6ubuntu14.4) ...
Processing triggers for libc-bin (2.34-0ubuntu2) ...
```

## 11. Open a browser and open your EC2 instance by connecting to its public ip (it must show the default nginx page)



### Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to [nginx.org](https://nginx.org).  
Commercial support is available at [nginx.com](https://nginx.com).

Thank you for using nginx.

## 12. Terminate the instance

The screenshot shows the AWS Management Console interface. On the left, the navigation menu is visible with categories like EC2 Dashboard, Instances, Images, Elastic Block Store, Network & Security, and Load Balancing. The main content area displays the 'Instance summary' for instance `i-Oe60F09c20a548805` (ArbashInstance). The instance is in the 'Running' state. A 'Terminate instance?' dialog box is open in the center, asking for confirmation to terminate the instance. The dialog includes a warning about EBS-backed instances and a section for 'Termination protection', which is currently 'Disabled'. The 'Terminate' button is highlighted in orange.

## 13. delete the security group

The first screenshot shows the 'Details' page for security group `sg-0b9911542f8bed8ca` (sgroup-2202071-homework). The 'Inbound rules' tab is selected, showing two rules: one for HTTP on port 80 and one for SSH on port 22. An 'Actions' menu is open, showing options like 'Edit inbound rules', 'Edit outbound rules', 'Manage tags', 'Copy to new security group', and 'Delete security groups'. The 'Delete security groups' option is highlighted.

The second screenshot shows the same security group page, but with the 'Delete security groups' dialog box open. The dialog asks for confirmation to delete the security group `sg-0b9911542f8bed8ca`. The 'Delete' button is highlighted in orange.

## 14. delete the key pair

The screenshot shows the AWS Management Console interface. The left sidebar contains navigation links for various AWS services, including Instances, Images, Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The main content area displays the 'Key pairs' page. A modal dialog is open, asking for confirmation to delete the key pair '2202071-arbashkeypair'. The dialog text reads: '2202071-arbashkeypair could be associated with one or more instances. Delete 2202071-arbashkeypair To confirm deletion, type Delete in the field'. Below the text is a text input field containing the word 'Delete' and two buttons: 'Cancel' and 'Delete'.

Key pairs (1/1) [Info](#)

Find Key Pair by attribute or tag

Name	Type	Created	Fingerprint	ID
2202071-arbashkeypair	rsa	2023/11/25 17:06 GMT+1	87f4e63b536c3f057c9839338640c437c2d1	key-0a8f7b3d9e0f0c3d

2202071-arbashkeypair could be associated with one or more instances. ×

Delete 2202071-arbashkeypair  
To confirm deletion, type *Delete* in the field

Cancel Delete

CloudShell Feedback

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Key pairs (2) [Info](#)

Find Key Pair by attribute or tag

Name	Type	Created	Fingerprint	ID
Marcell-Public-Key	rsa	2023/11/22 17:03 GMT+1	95f6051b397d4815b7b847d9b05a2ea75	key-08bca55531102d003
2200442_pub	rsa	2023/11/25 15:58 GMT+1	2a2dd280678bc429ae55534c53febe29	key-025723fbc725444d1

CloudShell Feedback

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