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## Console Home Info

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**Welcome to AWS**

Getting started with

**AWS Health** Info

Open issues

**Cost and usage** Info

Current month Cost (\$)

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EC2 > Security Groups > Create security group

Create security group Info

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

**Basic details**

**Security group name** Info  
secgroup-2204159-homework  
Name cannot be edited after creation.

**Description** Info  
Security group for homework week 4, allows SSH and HTTP connections.

**VPC** Info  
vpc-01c3d3931e4969443

**Inbound rules** Info

Type	Protocol	Port range	Source	Description - optional
SSH	TCP	22	Anyw... 0.0.0.0/0	<small>Delete</small>
HTTP	TCP	80	Anyw... 0.0.0.0/0	<small>Delete</small>

**Add rule**

⚠ Rules with source of 0.0.0.0/0 or ::/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

**Outbound rules** Info

Type	Protocol	Port range	Destination	Description - optional
All traffic	All	All	Custom 0.0.0.0/0	<small>Delete</small>

**Add rule**

⚠ Rules with destination of 0.0.0.0/0 or ::/0 allow your instances to send traffic to any IPv4 or IPv6 address. We recommend setting security group rules to be more restrictive and to only allow traffic to specific known IP addresses.

**Tags - optional**  
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.  
No tags associated with the resource.

**Add new tag**  
You can add up to 50 more tags

**Create security group**

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EC2 | eu-w... ceu-de (8701-3740-0553) | pal\_bence@student.ceu.edu

aws Search [Option+S] EC2 > Key pairs > Import key pair

**Import key pair Info**

You can use a third-party tool to create your key pair, and then import the public key to Amazon EC2.

**Import settings**

**Name**  
publickey-2204159-homework

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

**Key pair file**

[Browse](#)  
ceu\_key.pub  
0.58 KB

Choose Browse and navigate to your public key. You may change the name of your key. Alternatively, paste the contents of your public key into the Public key contents text box.

```
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQgQCSeE0ms8p62Y49GQjL4ktD94gh+gVRVAaAJygzodWyt/fLvNYMiqUTdUn2U42HVAxznpqRp6EsHOECX4loxtRuzbLXXX4FE8hfx5QlCc2pyUhYK1gqCSH3LE85eG8hNFHF81Azb8A7pV83/mVFHqUkvwUEXY9Bbb/G+xri4rtJbyUUpcyCNjqxgAP+rAlZIP28suCRgLOAFBPA5HNG59lSdgT6FV2+WJfbTe5MHJ9gLSlhfjuDdd/GhPdhrMpp0FbSUOJfLd89rvZOCG1JkWqpvMiAttBCruwX/5hvxxhDcrHOf7ehZxOd980YN+|+xZ9tWopyCG+QEEBmY1wrUPjfGBCkSHsgsnKFMG7cMQFKKHgSt+ds4A18q5e8lyxoXUVGekdxqqhcYT1RPcl7msLsTLN9AyUrBsdMNGDcqSSaKIYoFU+kH14U+B4yAHiSmXNKEnzbYfdnNUYaZeVObJchCKleP81A5jAjegv6ITU5A/uTveo= vscode@codespaces-a69329
```

**Tags - optional**

No tags associated with the resource.

[Add new tag](#)

You can add up to 50 more tags.

[Cancel](#) [Import key pair](#)

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Launch an...

Search [Option+S]

EC2 > Instances > Launch an instance

**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  
instance-2204159-homework [Add additional tags](#)

**Application and OS Images (Amazon Machine Image) Info**

An AMI contains the operating system, application server, and applications for your instance. If you don't see a suitable AMI below, use the search field or choose [Browse more AMIs](#).

[Search our full catalog including 1000s of application and OS images](#)

**Recent** **Quick Start**

Amazon Linux macOS Ubuntu Windows Red Hat SUSE Linux Debian [Browse more AMIs](#)  
Including AMIs from AWS, Marketplace and the Community

**Amazon Machine Image (AMI)**

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type  
ami-049442a6cf8319180 (64-bit (x86)) / ami-068257194ae9d7ebf (64-bit (Arm))  
Virtualization: hvm ENA enabled: true Root device type: ebs [Free tier eligible](#)

**Description**  
Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Canonical, Ubuntu, 24.04, arm64 noble image

**Architecture** 64-bit (Arm) **AMI ID** ami-068257194ae9d7ebf **Publish Date** 2025-10-22 **Username** ubuntu [Verified provider](#)

**Instance type Info | Get advice**

**Instance type** t4g.nano  
Family: t4g 2 vCPU 0.5 GiB Memory Current generation: true  
On-Demand Ubuntu Pro base pricing: 0.0081 USD per Hour  
On-Demand SUSE base pricing: 0.0046 USD per Hour  
On-Demand Linux base pricing: 0.0046 USD per Hour

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** [Select](#) [Create new key pair](#)

**Network settings Info** [Edit](#)

**Summary**

Number of instances [Info](#)  
1

**Software Image (AMI)**  
Canonical, Ubuntu, 24.04, arm6... [read more](#)  
ami-068257194ae9d7ebf

**Virtual server type (instance type)**  
t4g.nano

**Firewall (security group)**  
New security group

**Storage (volumes)**  
1 volume(s) - 8 GiB

**Free tier:** In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage (or t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet. Data transfer charges are not included as part of the free tier allowance.

[Cancel](#) [Launch instance](#) [Preview code](#)

Now announcing the Vantage AI Agent for automatic identification and remediation of cloud waste.												
Region	Pricing Unit	Cost	Reserved	Currency	Columns							
Region	Pricing Unit	Cost	Reserved	Currency	Columns							
Region	Pricing Unit	Cost	Reserved	Currency	Columns							
US East (N. Virginia)	Instance	Hourly	1-year - No Upfront	United States Dollar (\$)	Columns	Compare	Clear Filters	Export	Search...			
t4g	Filter API Name...	>=0	>=0	>=0	vCPUs	Network Performance	On Demand	Linux Reserved cost	Linux Spot Minimum ...	Windows On Dema		
T4G Double Extra Large	t4g.2xlarge	19,538.882	50.0 fps	32 GiB	8 vCPUs	Up to 5 Gigabit	\$0.2688 hourly	\$0.1686 hourly	\$0.0788 hourly	unavailable		
T4G Extra Large	t4g.xlarge	19,282.684	25.0 fps	16 GiB	4 vCPUs	Up to 5 Gigabit	\$0.1344 hourly	\$0.0843 hourly	\$0.0559 hourly	unavailable		
T4G Large	t4g.large	19,133.873	13.0 fps	8 GiB	2 vCPUs	Up to 5 Gigabit	\$0.0672 hourly	\$0.0421 hourly	\$0.0218 hourly	unavailable		
T4G Medium	t4g.medium	20,168.067	N/A	4 GiB	2 vCPUs	Up to 5 Gigabit	\$0.0336 hourly	\$0.0211 hourly	\$0.0169 hourly	unavailable		
T4G Micro	t4g.micro	19,781.089	N/A	1 GiB	2 vCPUs	Up to 5 Gigabit	\$0.0084 hourly	\$0.0053 hourly	\$0.0028 hourly	unavailable		
T4G Nano	t4g.nano	20,304.569	N/A	0.5 GiB	2 vCPUs	Up to 5 Gigabit	\$0.0042 hourly	\$0.0026 hourly	\$0.0014 hourly	unavailable		
T4G Small	t4g.small	19,709.612	N/A	2 GiB	2 vCPUs	Up to 5 Gigabit	\$0.0168 hourly	\$0.0105 hourly	\$0.0067 hourly	unavailable		

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Instances Launch an...

Search [Option+S]

EC2 Instances Launch an instance

**Amazon Machine Image (AMI)**

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type  
ami-049442a6cf8319180 (64-bit (x86)) / ami-068257194ae9d7ebf (64-bit (Arm))  
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

**Description**  
Ubuntu Server 24.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).  
Canonical, Ubuntu, 24.04, arm64 noble image

**Architecture** 64-bit (Arm) **AMI ID** ami-068257194ae9d7ebf **Publish Date** 2025-10-22 **Username** ubuntu **Verified provider**

**Instance type** t4g.nano

Family: t4g 2 vCPU 0.5 GiB Memory Current generation: true  
On-Demand Ubuntu Pro base pricing: 0.0081 USD per Hour  
On-Demand SUSE base pricing: 0.0046 USD per Hour  
On-Demand Linux base pricing: 0.0046 USD per Hour

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** publickey-2204159-homework **Create new key pair**

**Network settings** Info

**Network** Info vpc-01c5d3931e4969443  
**Subnet** Info No preference (Default subnet in any availability zone)  
**Auto-assign public IP** Info Enable  
Additional charges apply when outside of free tier allowance  
**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

We'll create a new security group called 'launch-wizard-8' with the following rules:

Allow SSH traffic from Anywhere 0.0.0.0/0  
 Allow HTTPS traffic from the internet To set up an endpoint, for example when creating a web server  
 Allow HTTP traffic from the internet To set up an endpoint, for example when creating a web server

**Summary**

Number of instances: 1

**Software Image (AMI)** Canonical, Ubuntu, 24.04, arm6...read more  
ami-068257194ae9d7ebf

**Virtual server type (instance type)** t4g.nano

**Firewall (security group)** New security group

**Storage (volumes)** 1 volume(s) - 8 GiB

**Free tier: In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage (or t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet. Data transfer charges are not included as part of the free tier allowance.**

**Launch instance** **Preview code**

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Instances Launch an...

EC2 > Instances > Launch an instance

Architecture: 64-bit (Arm) | AMI ID: ami-068257194ae9d7ebf | Publish Date: 2025-10-22 | Username: ubuntu | Verified provider

**Instance type** t4g.nano | Family: t4g | 2 vCPU | 0.5 GiB Memory | Current generation: true | On-Demand Ubuntu Pro base pricing: 0.0081 USD per Hour | On-Demand SUSE base pricing: 0.0046 USD per Hour | On-Demand Linux base pricing: 0.0046 USD per Hour

All generations | Compare instance types

**Key pair (login)** publickey-2204159-homework | Create new key pair

**Network settings**

Network: vpc-01c3d3931e4969443 | Subnet: No preference (Default subnet in any availability zone) | Auto-assign public IP: Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups): Select existing security group (secgroup-2204159-homework)

Common security groups: secgroup-2204159-homework sg-064bb2aeea4458aec

**Configure storage**

Root volume: 8 GiB gp3 | Advanced

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 instance store volumes, however the instance does not allow any instance store volumes. None of the instance store volumes from the AMI will be accessible from the instance

Click refresh to view backup information

**Summary**

Number of instances: 1

Software Image (AMI): Canonical, Ubuntu, 24.04, arm6...read more

Virtual server type (instance type): t4g.nano

Firewall (security group): secgroup-2204159-homework

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

Free tier: In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage (or t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet. Data transfer charges are not included as part of the free tier allowance.

Cancel | Launch instance | Preview code

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EC2 Instances i-04766ef756edb4bd

**Instance summary for i-04766ef756edb4bd (instance-2204159-homework) Info**

Updated less than a minute ago

<b>Instance ID</b> i-04766ef756edb4bd	<b>Public IPv4 address</b> 54.155.131.55   open address ↗	<b>Private IPv4 addresses</b> 172.31.20.63
<b>IPv6 address</b> -	<b>Instance state</b> Running	<b>Public DNS</b> ec2-54-155-131-55.eu-west-1.compute.amazonaws.com   open address ↗
<b>Hostname type</b> IP name: ip-172-31-20-63.eu-west-1.compute.internal	<b>Private IP DNS name (IPv4 only)</b> ip-172-31-20-63.eu-west-1.compute.internal	<b>Elastic IP addresses</b> -
<b>Answer private resource DNS name</b> IPv4 (A)	<b>Instance type</b> t4g.nano	<b>AWS Compute Optimizer finding</b> Opt-in to AWS Compute Optimizer for recommendations.   Learn more ↗
<b>Auto-assigned IP address</b> 54.155.131.55 [Public IP]	<b>VPC ID</b> vpc-01c3d3931e4969443 ↗	<b>Auto Scaling Group name</b> -
<b>IAM Role</b> -	<b>Subnet ID</b> subnet-0949c5e8a2a028629 ↗	<b>Managed</b> false
<b>IMDSv2</b> Required	<b>Instance ARN</b> arn:aws:ec2:eu-west-1:870137400553:instance/i-04766ef756edb4bd	
<b>Operator</b> -		

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

**Instance details Info**

<b>AMI ID</b> ami-068257194ae9d7ebf	<b>Monitoring</b> disabled	<b>Platform details</b> Linux/UNIX
<b>AMI name</b> ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-arm64-server-20251022	<b>Allowed image</b> -	<b>Termination protection</b> Disabled
<b>Stop protection</b> Disabled	<b>Launch time</b> Sat Nov 29 2025 11:15:05 GMT+0100 (Central European Standard Time) (1 minute)	<b>AMI location</b> amazon/ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-arm64-server-20251022
<b>Instance reboot migration</b> Default (On)	<b>Instance auto-recovery</b> Default	<b>Lifecycle</b> normal
<b>Stop-hibernate behavior</b> Disabled	<b>AMI Launch index</b> 0	<b>Key pair assigned at launch</b> publickey-2204159-homework
<b>State transition reason</b> -	<b>Credit specification</b> unlimited	<b>Kernel ID</b> -
<b>State transition message</b> -	<b>Usage operation</b> RunInstances	<b>RAM disk ID</b> -
<b>Owner</b> 870137400553	<b>Enclaves Support</b> Disabled	<b>Boot mode</b> uefi
<b>Current instance boot mode</b> uefi	<b>Allow tags in instance metadata</b> Disabled	<b>Use RBN as guest OS hostname</b> Disabled
<b>Answer RBN DNS hostname IPv4</b> Enabled		

**Host and placement group Info**

<b>Host ID</b> -	<b>Affinity</b> -	<b>Placement group</b> -
---------------------	----------------------	-----------------------------

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Python 3.13.5

**AWS S3 Tutorial**

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS 18    JUPYTER

Codespaces: bash .devcontainer/setup-terminal.sh

```
@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) $ chmod 600 ./assignments/assignment1/ceu_key
@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) $ ssh -i ./assignments/assignment1/ceu_key ubuntu@54.155.131.55
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-1015-aws aarch64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Sat Nov 29 10:26:27 UTC 2025

 System load: 0.0 Temperature: -273.1 C
 Usage of /: 26.1% of 6.71GB Processes: 142
 Memory usage: 49% Users logged in: 0
 Swap usage: 0% IPv4 address for ens5: 172.31.20.63

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

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

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

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

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

ubuntu@ip-172-31-20-63:~$
```

CodeSpaces: expert halibut    Cell 1 of 20    Layout: German

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ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services [Codespaces: expert halibut]

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Python 3.13.5

AWS S3 Tutorial

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS 18    JUPYTER

Codespaces: bash .devcontainer/setup-terminal.sh

@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) \$ ssh -i ./assignments/assignment1/ceu\_key ubuntu@54.155.131.55

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

```
ubuntu@ip-172-31-20-63:~$ sudo apt-get update
Hit:1 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble InRelease
Get:2 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates InRelease [126 kB]
Get:3 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports InRelease [126 kB]
Get:4 http://ports.ubuntu.com/ubuntu-ports noble-security InRelease [126 kB]
Get:5 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/universe arm64 Packages [15.3 MB]
Get:6 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/universe Translation-en [5982 kB]
Get:7 http://ports.ubuntu.com/ubuntu-ports noble-security/main arm64 Packages [1440 kB]
Get:8 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/universe arm64 Components [3573 kB]
Get:9 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/arm64 c-n-f Metadata [295 kB]
Get:10 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/multiverse arm64 Packages [223 kB]
Get:11 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/multiverse Translation-en [118 kB]
Get:12 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/multiverse arm64 Components [31.6 kB]
Get:13 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble/multiverse arm64 c-n-f Metadata [7152 B]
Get:14 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 Packages [1712 kB]
Get:15 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main Translation-en [303 kB]
Get:16 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 Components [172 kB]
Get:17 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 c-n-f Metadata [15.5 kB]
Get:18 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/universe arm64 Packages [1448 kB]
Get:19 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/universe Translation-en [304 kB]
Get:20 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/universe arm64 Components [376 kB]
Get:21 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/universe arm64 c-n-f Metadata [30.2 kB]
Get:22 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/restricted arm64 Packages [3229 kB]
Get:23 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/restricted Translation-en [526 kB]
Get:24 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/restricted arm64 Components [212 B]
Get:25 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/multiverse arm64 Packages [30.4 kB]
Get:26 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/multiverse Translation-en [5808 B]
Get:27 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/multiverse arm64 Components [212 B]
Get:28 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/multiverse arm64 c-n-f Metadata [304 B]
Get:29 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports/main arm64 Packages [40.3 kB]
Get:30 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports/main Translation-en [9208 B]
Get:31 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports/main arm64 Components [3564 B]
Get:32 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports/main arm64 c-n-f Metadata [368 B]
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Get:35 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-backports/universe arm64 Components [11.0 kB]
```

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EXPLORER    ...

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Python 3.13.5

## AWS S3 Tutorial

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS 18    JUPYTER

Codespaces: bash .devcontainer/setup-terminal.sh

```
@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) $ ssh -i ./assignments/assignment1/ceu_key ubuntu@54.155.131.55
ubuntu@ip-172-31-20-63:~$ sudo apt-get install -y python3-pip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  binutils binutils-aarch64-linux-gnu binutils-common build-essential bzip2 cpp cpp-13 cpp-13-aarch64-linux-gnu cpp-aarch64-linux-gnu dpkg-dev fakeroot
  fontconfig fonts-dejavu-core fonts-dejavu-mono g++ g++-13 g++-13-aarch64-linux-gnu g++-aarch64-linux-gnu gcc gcc-13 gcc-13-aarch64-linux-gnu gcc-13-base
  gcc-aarch64-linux-gnu javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libbaom3 libasan8 libatomic1 libbinutils libc-dev-bin
  libc-devtools libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0 libctf0 libde265-0 libdeflate0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl
  libfontconfig1 libgcc-13-dev libgd3 libgomp1 libgprofng0 libheif-plugin-aomdec libheif-plugin-aomenc libheif-plugin-libde265 libheif1 libhwasan0 libisl23 libitm1
  libjbig0 libjpeg-turbo8 libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblrc4 liblsan0 libmpc3 libpython3-dev libpython3-stldev libpython3.12-dev
  libpython3.12-minimal libpython3.12-stldev libpython3.12t64 libsframe1 libsharpuyuv0 libstdc++-13-dev libtiff6 libtsan2 libubsan1 libwebp7 libxpm4 linux-libc-dev
  linux-tools-common lto-disabled-list make manpages-dev python3 python3-dev python3-minimal python3-wheel python3.12 python3.12-dev python3.12-minimal rpcsvc-proto
zlib1g-dev
Suggested packages:
  binutils-doc gprofng-gui bzip2-doc cpp-doc gcc-13-locales cpp-13-doc debian-keyring gcc-13-doc gcc-multilib autoconf automake libtool flex bison gdb gcc-doc
  gdb-aarch64-linux-gnu apache2 | lighttpd | httpd glibc-doc bzr libgd-tools libheif-plugin-x265 libheif-plugin-ffmpegdec libheif-plugin-jpegenc
  libheif-plugin-j2kdec libheif-plugin-j2kenc libheif-plugin-rav1e libheif-plugin-svtenc libstdc++-13-doc make-doc python3-doc python3-tk python3-venv python3.12-venv
  python3.12-doc binfmt-support
The following NEW packages will be installed:
  binutils binutils-aarch64-linux-gnu binutils-common build-essential bzip2 cpp cpp-13 cpp-13-aarch64-linux-gnu cpp-aarch64-linux-gnu dpkg-dev fakeroot
  fontconfig fonts-dejavu-core fonts-dejavu-mono g++ g++-13 g++-13-aarch64-linux-gnu g++-aarch64-linux-gnu gcc gcc-13 gcc-13-aarch64-linux-gnu gcc-13-base
  gcc-aarch64-linux-gnu javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libbaom3 libasan8 libatomic1 libbinutils libc-dev-bin
  libc-devtools libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0 libctf0 libde265-0 libdeflate0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl
  libfontconfig1 libgcc-13-dev libgd3 libgomp1 libgprofng0 libheif-plugin-aomdec libheif-plugin-aomenc libheif-plugin-libde265 libheif1 libhwasan0 libisl23 libitm1
  libjbig0 libjpeg-turbo8 libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblrc4 liblsan0 libmpc3 libpython3-dev libpython3.12-dev libsframe1 libsharpuyuv0
  libstdc++-13-dev libtiff6 libtsan2 libubsan1 libwebp7 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev python3-dev python3-pip python3-wheel python3.12-dev
  rpcsvc-proto zlib1g-dev
The following packages will be upgraded:
  libpython3-stldev libpython3.12-minimal libpython3.12-stldev libpython3.12t64 linux-tools-common python3 python3-minimal python3.12 python3.12-minimal
9 upgraded, 85 newly installed, 0 to remove and 17 not upgraded.
Need to get 90.5 MB of archives.
After this operation, 292 MB of additional disk space will be used.
Get:1 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 python3-minimal arm64 3.12.3-0ubuntu2.1 [27.4 kB]
Get:2 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 python3 arm64 3.12.3-0ubuntu2.1 [23.0 kB]
Get:3 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 libpython3.12t64 arm64 3.12.3-1ubuntu0.9 [2282 kB]
Get:4 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 python3.12 arm64 3.12.3-1ubuntu0.9 [651 kB]
Get:5 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 libpython3.12-stldev arm64 3.12.3-1ubuntu0.9 [2038 kB]
Get:6 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 python3.12-minimal arm64 3.12.3-1ubuntu0.9 [2235 kB]
Get:7 http://eu-west-1.ec2.ports.ubuntu.com/ubuntu-ports noble-updates/main arm64 libpython3.12-minimal arm64 3.12.3-1ubuntu0.9 [832 kB]
```

Codespaces: expert halibut    Cell 1 of 20    Layout: German

expert-halibut-x6jjw799vrxcpj4.github.dev

ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services [Codespaces: expert halibut]

EXPLORER    ...

serverless > 1\_s3.ipynb

Generate + Code + Markdown | Run All | Restart | Clear All Outputs | Jupyter Variables | Outline | ...

Python 3.13.5

AWS S3 Tutorial

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS 18    JUPYTER

Codespaces: bash .devcontainer/setup-terminal.sh

```
@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) $ ssh -i ./assignments/assignment1/ceu_key ubuntu@54.155.131.55
No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-20-63:~$ sudo pip3 install streamlit --break-system-packages
Collecting streamlit
  Downloading streamlit-1.51.0-py3-none-any.whl.metadata (9.5 kB)
Collecting altair!=5.4.0,!=5.4.1,<6,>=4.0 (from streamlit)
  Downloading altair-5.5.0-py3-none-any.whl.metadata (11 kB)
Requirement already satisfied: blinker<2,>=1.5.0 in /usr/lib/python3/dist-packages (from streamlit) (1.7.0)
Collecting cachetools<7,>=4.0 (from streamlit)
  Downloading cachetools-6.2.2-py3-none-any.whl.metadata (5.6 kB)
Requirement already satisfied: click<9,>=7.0 in /usr/lib/python3/dist-packages (from streamlit) (8.1.6)
Collecting numpy<3,>=1.23 (from streamlit)
  Downloading numpy-2.3.5-cp312-cp312-manylinux_2_27_aarch64.manylinux_2_28_aarch64.whl.metadata (62 kB)
Requirement already satisfied: packaging<26,>=20 in /usr/lib/python3/dist-packages (from streamlit) (24.0)
Collecting pandas<3,>=1.4.0 (from streamlit)
  Downloading pandas-2.3.3-cp312-cp312-manylinux_2_24_aarch64.manylinux_2_28_aarch64.whl.metadata (91 kB)
Collecting pillow<13,>=7.1.0 (from streamlit)
  Downloading pillow-12.0.0-cp312-cp312-manylinux_2_27_aarch64.manylinux_2_28_aarch64.whl.metadata (8.8 kB)
Collecting protobuf<7,>=3.20 (from streamlit)
  Downloading protobuf-6.33.1-cp39-abi3-manylinux2014_aarch64.whl.metadata (593 bytes)
Collecting pyarrow<22,>=7.0 (from streamlit)
  Downloading pyarrow-21.0.0-cp312-cp312-manylinux_2_28_aarch64.whl.metadata (3.3 kB)
Requirement already satisfied: requests<3,>=2.27 in /usr/lib/python3/dist-packages (from streamlit) (2.31.0)
Collecting tenacity<10,>=8.1.0 (from streamlit)
  Downloading tenacity-9.1.2-py3-none-any.whl.metadata (1.2 kB)
Collecting toml<2,>=0.10.1 (from streamlit)
  Downloading toml-0.10.2-py2.py3-none-any.whl.metadata (7.1 kB)
Requirement already satisfied: typing-extensions<5,>=4.4.0 in /usr/lib/python3/dist-packages (from streamlit) (4.10.0)
Collecting watchdog<7,>=2.1.5 (from streamlit)
  Downloading watchdog-6.0.0-py3-none-manylinux2014_aarch64.whl.metadata (44 kB)
Collecting gitpython!=3.1.19,<4,>=3.0.7 (from streamlit)
  Downloading gitpython-3.1.45-py3-none-any.whl.metadata (13 kB)
Collecting pydeck<1,>=0.8.0b4 (from streamlit)
  Downloading pydeck-0.9.1-py2.py3-none-any.whl.metadata (4.1 kB)
Collecting tornado!=6.5.0,<7,>=6.0.3 (from streamlit)
  Downloading tornado-6.5.2-cp39-abi3-manylinux_2_17_aarch64.manylinux2014_aarch64.whl.metadata (2.8 kB)
```

Codespaces: expert halibut    main\*    ⏪ 0 ⏹ 1 ⏵ 0 ⏷ 0 ⏸ 18    Cell 1 of 20    Layout: German

expert-halibut-x6jjw799vrxcpj4.github.dev

ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services [Codespaces: expert halibut]

EXPLORER    ...

serverless > 1\_s3.ipynb

Generate + Code + Markdown | Run All | Restart | Clear All Outputs | Jupyter Variables | Outline | ...

Python 3.13.5

AWS S3 Tutorial

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS 19    JUPYTER

Codespaces: bash .devcontainer/setup-terminal.sh

```
@PalBence → /workspaces/ECBS-5147-Data-Engineering-Cloud-Computing-Managed-AI-Services (main) $ ssh -i ./assignments/assignment1/ceu_key ubuntu@54.155.131.55
Downloading tenacity-9.1.2-py3-none-any.whl (28 kB)
Downloading toml-0.10.2-py2.py3-none-any.whl (16 kB)
Downloading tornado-6.5.2-cp39-abi3-manylinux_2_17_aarch64.manylinux2014_aarch64.whl (444 kB)
  444.3/444.3 kB 35.0 MB/s eta 0:00:00
Downloading watchdog-6.0.0-py3-none-manylinux2014_aarch64.whl (79 kB)
  79.1/79.1 kB 8.1 MB/s eta 0:00:00
Downloading gitdb-4.0.12-py3-none-any.whl (62 kB)
  62.8/62.8 kB 6.3 MB/s eta 0:00:00
Downloading narwhals-2.12.0-py3-none-any.whl (425 kB)
  425.0/425.0 kB 32.1 MB/s eta 0:00:00
Downloading tzdata-2025.2-py2.py3-none-any.whl (347 kB)
  347.8/347.8 kB 26.9 MB/s eta 0:00:00
Downloading smmap-5.0.2-py3-none-any.whl (24 kB)
Installing collected packages: watchdog, tzdata, tornado, toml, tenacity, smmap, pyarrow, protobuf, pillow, numpy, narwhals, cachetools, pydeck, pandas, gitdb, altair, gitpython, streamlit
Successfully installed altair-5.5.0 cachetools-6.2.2 gitdb-4.0.12 gitpython-3.1.45 narwhals-2.12.0 numpy-2.3.5 pandas-2.3.3 pillow-12.0.0 protobuf-6.33.1 pyarrow-21.0.0 pydeck-0.9.1 smmap-5.0.2 streamlit-1.51.0 tenacity-9.1.2 toml-0.10.2 tornado-6.5.2 tzdata-2025.2 watchdog-6.0.0
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to use a virtual environment instead: https://pip.pypa.io/warnings/venv
ubuntu@ip-172-31-20-63:~$ sudo streamlit hello --server port 80 --server.address 0.0.0.0
Usage: streamlit hello [OPTIONS]
Try 'streamlit hello --help' for help.

Error: No such option: --server (Possible options: --server.address, --server.headless, --server.port)
ubuntu@ip-172-31-20-63:~$ sudo streamlit hello --server.port 80 --server.address 0.0.0.0

Collecting usage statistics. To deactivate, set browser.gatherUsageStats to false.

Welcome to Streamlit. Check out our demo in your browser.

URL: http://0.0.0.0:80

Ready to create your own Python apps super quickly?
Head over to https://docs.streamlit.io

May you create awesome apps!
```

Codespaces: expert halibut    main\*    0 1↑    0 △ 0    19

Cell 1 of 20    Layout: German

us-east-1.console.aws.amazon.com

aws pal\_bence@student.ceu.edu

Route 53 > Hosted zones > ceu-data.com > Create record

## Create record Info

**Quick create record** Switch to wizard

**Record name** Info  .ceu-data.com Delete

Keep blank to create a record for the root domain.

Alias

**Value** Info

Enter multiple values on separate lines.

**TTL (seconds)** Info  Recommended values: 60 to 172800 (two days) 1m 1h 1d

**Routing policy** Info

**Add another record**

**Cancel** **Create records**

**View existing records**

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Pages

Hello

DataFrame demo

Plotting demo

Mapping demo

Animation demo

Not Secure — 2204159.ceu-data.com

Course: ECBS5146 - Data E...

CEU in-class exercise and...

2nd Homewrok - Week 4 -...

how to install nginx to ubun...

3rd Homewrok - Week 5 -...

CEU in-class exercise and...

Hello

# Welcome to Streamlit! 🙌

Streamlit is an open-source app framework built specifically for machine learning and data science projects.

👉 Select a demo from the sidebar to see some examples of what Streamlit can do!

## Want to learn more?

- Check out [streamlit.io](#)
- Jump into our [documentation](#)
- Ask a question in our [community forums](#)

## See more complex demos

- Use a neural net to [analyze the Udacity Self-driving Car Image Dataset](#)
- Explore a [New York City rideshare dataset](#)

Route 53 > Hosted zones > ceu-data.com

Records (33) Accelerated recovery DNSSEC signing Hosted zone tags (0)

Delete selected record?

Delete the record permanently? This action cannot be undone. Your domain might become unavailable on the internet.

Record name	Type	Value/Route traffic to
2204159.ceu-data.c...	A	54.155.131.55
abdu...		
alina.ceu...	A	Simple
allan.ceu...	A	Simple
ambrus.ceu...	A	Simple
andrea.ceu...	A	Simple

Cancel Delete

Record details

Record name: 2204159.ceu-data.com

Record type: A

Value: 54.155.131.55

Alias: No

TTL (seconds): 300

Routing policy: Simple

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eu-west-1.console.aws.amazon.com

**EC2 Instances**

Instances (1/1) Info

Last updated 1 minute ago

Name = instance-2204159-homework

All states

Clear filters

Name	Instance ID	Status	Public IPv4 DNS	Public IP...	Elastic IP	IPv6 IPs	Monitor...	Security group...	Key name	Launch time	
instance-2...	i-04766ef756edb...	Running	3/3 checks pa	eu-west-1b	ec2-54-155-131-...	54.155.131...	-	disabled	secgroup-220415...	publickey-...	2025/11/29 11:15 GMT+1

**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
i-04766ef756edb4bd (instance-2204159-homework)	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.

**Skip OS shutdown**

This option skips the graceful OS shutdown process. Use only when your instance must be stopped immediately, such as during an emergency or failover.

Skip OS shutdown

**Cancel** **Terminate (delete)**

**Private IPv4 addresses**

172.31.20.63

**Public DNS**

ec2-54-155-131-55.eu-west-1.compute.amazonaws.com | open address ↗

**Elastic IP addresses**

**AWS Compute Optimizer finding**

Opt-in to AWS Compute Optimizer for recommendations. | Learn more ↗

**Auto Scaling Group name**

-

**Managed**

false

**Platform details**

Linux/UNIX

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

**Instance summary**

Instance ID: i-04766ef756edb4bd

IPv6 address:

Hostname type: IP name: ip-172-31-20-63.eu-west-1.compute.internal

Answer private resource DNS name: IPv4 (A)

Auto-assigned IP address: 54.155.131.55 [Public IP]

IAM Role: -

IMDSv2 Required

Operator: -

**Instance details**

AMI ID: ami-068257194ae9d7ebf

Monitoring: disabled

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eu-west-1.console.aws.amazon.com

aws Search [Option+S] SecurityGr... eu-de (8701-3740-0553) pal\_bence@student.ceu.edu

EC2 > Security Groups

Security Groups (1/1) Info

Find security groups by attribute or tag

Security group name = secgroup-2204159-homework | Clear filters

Name	Security group ID	VPC ID	Description	Owner	Inbound rules count	Outbound rules count
-	sg-064bb2aeaa4458aec	vpc-01c3d3931e4969443	Security group for homework ...	870137400553	2 Permission entries	1 Permission entry

Actions Export security groups to CSV Create security group

Instances

Images

Elastic Block Store

Network & Security

Auto Scaling

Load Balancing

Settings

Details

Inbound rules

Outbound rules

Sharing - new

VPC associations - new

Tags

Delete security groups

Are you sure that you want to delete this security group?

- sg-064bb2aeaa4458aec - secgroup-2204159-homework

Cancel Delete

sg-064bb2aeaa4458aec - secgroup-2204159-homework

Details

Security group name: secgroup-2204159-homework

Security group ID: sg-064bb2aeaa4458aec

Description: Security group for homework week 4, allows SSH and HTTP connections.

VPC ID: vpc-01c3d3931e4969443

Owner: 870137400553

Inbound rules count: 2 Permission entries

Outbound rules count: 1 Permission entry

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aws Search [Option+S] EC2 > Key pairs

Key pairs (1/2) Info Actions Create key pair

Name	Type	Created	Fingerprint	ID
FarangizKeyPair	rsa	2025/11/26 16:39 GMT+1	d0:0d:57:4c:95:a2:39:27:05:9b:6b:f7:31:07:37:4c	key-08f663c5207d2028c
publickey-2204159-homework	rsa	2025/11/29 11:05 GMT+1	76:9a:02:c0:fc:f8:f1:47:3c:e8:30:ab:95:24:a5:c8	key-0c9f71575d8808c1

publickey-2204159-homework could be associated with one or more instances.

Delete publickey-2204159-homework  
To confirm deletion, type Delete in the field

Delete Cancel Delete

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