

# Cloud Computing Architecture - COS20019

## Assignment 1 - Part B

### Creating and deploying a Web Page

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## 1. Infrastructure deployment

Go to VPC -> Click “Create VPC”

The screenshot shows the AWS Management Console search results for 'VPC'. The search bar at the top contains the query 'VPC'. Below it, there are two main sections: 'Services' and 'Features'. The 'Services' section lists 'VPC' (Isolated Cloud Resources), 'AWS Firewall Manager', 'Detective', and 'Managed Services'. The 'Features' section lists 'Dashboard', 'VPC Reachability Analyzer', 'Subnet groups', 'Peering connections', and others. To the right of the search results, there is a sidebar titled 'Welcome to AWS' with links to 'Getting started with AWS', 'Training and certification', and 'What's new with AWS?'. Another sidebar titled 'AWS Health' displays 'Open issues' (0), 'Scheduled changes' (0), and 'Other notifications' (0). A third sidebar titled 'Find a solution' lists various AWS services and features.

The screenshot shows the AWS VPC Management Console VPC dashboard. At the top, there are buttons for 'Create VPC' and 'Launch EC2 Instances'. Below that, a note says 'Your instances will launch in the US East region.' On the left, a sidebar lists various VPC components: Virtual private cloud (Your VPCs, Subnets, 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 (Network ACLs, Security groups), DNS firewall (Rule groups, Domain lists), and Network Firewall (Firewalls, Firewall policies, Network Firewall rule). The main area displays 'Resources by Region' for the US East region, showing counts for VPCs (1), NAT Gateways (0), Subnets (6), Route Tables (1), Internet Gateways (1), Egress-only Internet Gateways (0), DHCP option sets (1), Elastic IPs (0), Endpoints (0), and Endpoint Services (0). To the right, there are sections for 'Service Health' (View complete service details), 'Settings' (Zones, Console Experiments), 'Additional Information' (VPC Documentation, All VPC Resources, Forums, Report an issue), 'AWS Network Manager' (AWS Network Manager provides tools and features to help you manage and monitor your network on AWS. Network Manager makes it easier to perform connectivity management, network monitoring and troubleshooting, IP management, and network security and governance. Get started with Network Manager), and 'Site-to-Site VPN Connections' (Amazon VPC enables you to use your own isolated resources within the AWS Cloud, and then connect those resources directly to your own datacenter using industry-standard encrypted IPsec VPN connections. Create VPN Connection).

## Rename to “NLeVPC”

VPC settings

Resources to create **info**  
Create only the VPC resource or the VPC and other networking resources.  
 VPC only  VPC and more

Name tag auto-generation **info**  
Enter a value for the Name tag. This value will be used to auto-generate Name tags for all resources in the VPC.  
 Auto-generate  
NLeVPC

IPv4 CIDR block **info**  
Determine the starting IP and the size of your VPC using CIDR notation.  
10.0.0.0/16 65,536 IPs

IPv6 CIDR block **info**  
 No IPv6 CIDR block  Amazon-provided IPv6 CIDR block

Tenancy **info**  
Default

Number of Availability Zones (AZs) **info**  
Choose the number of AZs in which to provision subnets. We recommend at least two AZs for high availability.  
1 2 3 ► Customize AZs

Number of public subnets **info**  
The number of public subnets to add to your VPC. Use public subnets for web.

Preview

VPC Show details Your AWS virtual network

Subnets (4) Subnets within this VPC

us-east-1a  
NLeVPC-subnet-public1-us-east-1a  
NLeVPC-subnet-private1-us-east-1a

us-east-1b  
NLeVPC-subnet-public2-us-east-1b  
NLeVPC-subnet-private2-us-east-1b

Route tables (3) Route network traffic to resources

NLeVPC-rtb-public  
NLeVPC-rtb-private1-us-east-1a  
NLeVPC-rtb-private2-us-east-1b

Network connections (2) Connections to other networks

NLeVPC-igw  
NLeVPC-vpc-e-s3

Change the subnet to match the requirements:

AZ A: Public: 10.0.1.0/24, Private: 10.0.3.0/24 – AZ B: Public: 10.0.2.0/24, Private: 10.0.3.0/24

Number of private subnets **info**  
The number of private subnets to add to your VPC. Use private subnets to secure backend resources that don't need public access.  
0 2 4

▼ Customize subnets CIDR blocks

Public subnet CIDR block in us-east-1a  
10.0.1.0/24 256 IPs

Public subnet CIDR block in us-east-1b  
10.0.2.0/24 256 IPs

Private subnet CIDR block in us-east-1a  
10.0.3.0/24 256 IPs

Private subnet CIDR block in us-east-1b  
10.0.4.0/24 256 IPs

NAT gateways (3) **info**  
Choose the number of Availability Zones (AZs) in which to create NAT gateways. Note that there is a charge for each NAT gateway.  
None In 1 AZ 1 per AZ

VPC endpoints **info**  
Endpoints can help reduce NAT gateway charges and improve security by accessing S3 directly from the VPC. By default, full access policy is used. You can customize this policy at any time.  
None S3 Gateway

DNS options **info**  
 Enable DNS hostnames  Enable DNS resolution

► Additional tags

Cancel Create VPC

Preview

VPC Show details Your AWS virtual network

Subnets (4) Subnets within this VPC

us-east-1a  
NLeVPC-subnet-public1-us-east-1a  
NLeVPC-subnet-private1-us-east-1a

us-east-1b  
NLeVPC-subnet-public2-us-east-1b  
NLeVPC-subnet-private2-us-east-1b

Route tables (3) Route network traffic to resources

NLeVPC-rtb-public  
NLeVPC-rtb-private1-us-east-1a  
NLeVPC-rtb-private2-us-east-1b

Network connections (2) Connections to other networks

NLeVPC-igw  
NLeVPC-vpc-e-s3

Success:

The screenshot shows the AWS VPC Management Console with the URL <https://us-east-1.console.aws.amazon.com/vpc/home?region=us-east-1#CreateVpcWizard>. The browser tab is titled "Create VPC workflow". The main content area displays a "Success" message and a list of completed steps under the "Details" section. A large orange "View VPC" button is at the bottom.

**Create VPC workflow**

**Success**

**Details**

- ✓ Create VPC
- ✓ Enable DNS hostnames
- ✓ Enable DNS resolution
- ✓ Verifying VPC creation
- ✓ Create S3 endpoint
- ✓ Create subnet
- ✓ Create subnet
- ✓ Create subnet
- ✓ Create internet gateway
- ✓ Attach internet gateway to the VPC
- ✓ Create route table
- ✓ Create route
- ✓ Associate route table
- ✓ Associate route table
- ✓ Create route table
- ✓ Associate route table
- ✓ Create route table
- ✓ Associate route table
- ✓ Associate route table
- ✓ Verifying route table creation
- ✓ Associate S3 endpoint with private subnet route tables

**View VPC**

## 1.2 - Security groups

Go to security groups -> create security group

The screenshot shows the AWS VPC Management Console with the 'Security Groups' page open. The left sidebar is collapsed, showing options like 'Virtual private cloud', 'Security', and 'DNS firewall'. The main area displays a table of security groups:

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules count	Outbound rules count
-	sg-05977bfacab3f98	default	vpc-061382834b8a931b0	default VPC security gr...	532941750742	1 Permission entry	1 Permission entry
-	sg-04a893f09a0fb601e	default	vpc-0952baff13c8c5c06	default VPC security gr...	532941750742	1 Permission entry	1 Permission entry
-	sg-08c7e2d93947ea87a	WebServer-SG	vpc-0952baff13c8c5c06	launch-wizard-1 create...	532941750742	3 Permission entries	1 Permission entry

Name: TestInstanceSG, VPC: NLe-VPC, Inbound rule: All traffic – Anywhere Ipv4

The screenshot shows the 'Create security group' wizard in the AWS VPC Management Console. The 'Basic details' step is completed with the following information:

- Security group name: **TestInstanceSG**
- Description: **Allows SSH access to developers**
- VPC: **vpc-061382834b8a931b0**

The 'Inbound rules' step shows one rule defined:

Type	Protocol	Port range	Source	Description - optional
All traffic	All	All	Anywhere-IPv4	0.0.0.0/0

The 'Outbound rules' step shows one rule defined:

Type	Protocol	Port range	Destination	Description - optional
All traffic	All	All	Custom	0.0.0.0/0

Create another:

Name: WebInstanceSG, VPC: NLe-VPC,

Inbound rule:

SSH, HTTP: Anywhere

ICMP: TestInstanceSG

**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  
WebServerSG  
Name cannot be edited after creation.

Description Info  
web server sg

VPC Info  
Q |  
vpc-0952baaff13c8c5c06  
172.31.0.0/16  
vpc-061502334b8a931b0 (NLeVPC-vpc)  
10.0.0.0/16

Type	Protocol	Port range	Source	Description - optional
SSH	TCP	22	Anywhere-IPv4	0.0.0.0/0
HTTP	TCP	80	Anywhere-IPv4	0.0.0.0/0
Custom ICMP - IPv4	All	Custom		

Add rule

**Outbound rules** Info

**Edit inbound rules** Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

**Inbound rules** Info

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-043a2359d3b106886	SSH	TCP	22	Custom	0.0.0.0/0
sgr-0b04576076a4ef20	All ICMP - IPv4	ICMP	All	Custom	sg-0a04663798b842584
sgr-095b8ca3f22025327	HTTP	TCP	80	Custom	0.0.0.0/0

Add rule

Cancel Preview changes Save rules

CloudShell Feedback Language © 2023, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

Create last one:

Name: DBServerSG, VPC: NLe-VPC,

Inbound rule:

MySQL: WebServerSG

VPC > 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](#)  
DBServerSG  
Name cannot be edited after creation.

Description [Info](#)  
Allows SSH access to developers

VPC [Info](#)  
Q  
vpc-0952ba1ff13c8c5c06 (default)  
172.31.0.0/16  
vpc-061382834b8a931b0 (NLeVPC-vpc)  
10.0.0.0/16

Type [Info](#) Protocol [Info](#) Port range [Info](#) Source [Info](#) Description - optional [Info](#)  
MySQL/Aurora TCP 3306 Custom  Delete  
Add rule

**Outbound rules** [Info](#)

Type [Info](#) Protocol [Info](#) Port range [Info](#) Destination [Info](#) Description - optional [Info](#)  
All traffic All All Custom  0.0.0.0/0 Delete  
Add rule

VPC > Security Groups > 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

**Basic details**

Security group name [Info](#)  
DBServerSG  
Name cannot be edited after creation.

Description [Info](#)  
Allows SSH access to developers

VPC [Info](#)  
Q vpc-061382834b8a931b0

**Inbound rules** [Info](#)

Type [Info](#) Protocol [Info](#) Port range [Info](#) Source [Info](#)  
MySQL/Aurora TCP 3306 Custom  Delete  
Add rule

**Outbound rules** [Info](#)

Type [Info](#) Protocol [Info](#) Port range [Info](#) Destination [Info](#) Description - optional [Info](#)  
All traffic All All Custom  0.0.0.0/0 Delete  
Add rule

### 3 security groups created:

The screenshot shows the AWS VPC Management Console with the 'Security Groups' page open. On the left, there's a navigation sidebar with sections like 'Virtual private cloud', 'Security', 'DNS firewall', and 'Network Firewall'. The main area displays a table of security groups with the following data:

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules count	Outbound rules count
sg-05977fb5acab3f98	vpc-061382834b8a931b0	default	default VPC security gr...	532941750742	1 Permission entry	1 Permission entry	
sg-0a4663798b842584	vpc-061382834b8a931b0	TestinstanceSG	test instance SG	532941750742	1 Permission entry	1 Permission entry	
sg-04a893f09af0b601e	vpc-0952baff13c8c5c06	default	default VPC security gr...	532941750742	1 Permission entry	1 Permission entry	
sg-08c7e2d93947ea87a	vpc-0952baff13c8c5c06	WebServer-SG	launch-wizard-1-create...	532941750742	3 Permission entries	1 Permission entry	
sg-09155841ff8cf0f6ed	vpc-061382834b8a931b0	DBServerSG	db server sg	532941750742	1 Permission entry	1 Permission entry	
sg-015108251231f5c9e	vpc-061382834b8a931b0	WebServerSG	web server sg	532941750742	3 Permission entries	1 Permission entry	

## 1.3 – EC2 virtual machine

Go to EC2->instances to create new instances

The screenshot shows the AWS EC2 Management Console with the 'Instances' page open. On the left, there's a navigation sidebar with sections like 'Instances', 'Images', and 'Elastic Block Store'. The main area displays a table of instances with the following data:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Assignment 1a	i-0811654cf68a5095	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b	ec2-35-171-4-56

## Bastion/Web server

### Linux 2 AMI

Name and tags [Info](#)

Name  
Bastion/Web server [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 S > [Browse more AMIs](#)

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type  
ami-090e0fc566929d98b (64-bit (x86)) / ami-0dd13bd6eb6a9effe (64-bit (Arm))  
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Number of instances [Info](#)

1

Software Image (AMI)  
Amazon Linux 2 Kernel 5.10 AMI... [read more](#)  
ami-090e0fc566929d98b

Virtual server type (instance type)  
t2.micro

Firewall (security group)  
WebServerSG

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

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the [Baseline in vehicles & servers](#))

Cancel [Launch instance](#) Review commands

Instance: t2 micro, keypair: assign1a (the keypair we use for assignment 1a)

Verified provider

64-bit (x86)

▼ Instance type [Info](#)

Instance type  
t2.micro  
Family: t2 1 vCPU 1 GiB Memory Current generation: true  
On-Demand Windows pricing: 0.0162 USD per Hour  
On-Demand SUSE pricing: 0.0116 USD per Hour  
On-Demand RHEL pricing: 0.0716 USD per Hour  
On-Demand Linux pricing: 0.0116 USD per Hour

Free tier eligible

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  
assign1a [Create new key pair](#)

▼ Network settings [Info](#)

Number of instances [Info](#)

1

Software Image (AMI)  
Amazon Linux 2 Kernel 5.10 AMI... [read more](#)  
ami-090e0fc566929d98b

Virtual server type (instance type)  
t2.micro

Firewall (security group)  
WebServerSG

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

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the [Baseline in vehicles & servers](#))

Cancel [Launch instance](#) Review commands

VPC: change to the new VPC. Subnet: choose public-us-east-1b to match the diagram. Security group: WebServerSG

The screenshot shows the AWS EC2 Management Console with the URL <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances>. The left sidebar shows services like CloudShell, Feedback, and Language. The main area displays the 'Network settings' section for launching an instance. It includes fields for VPC (selected: vpc-061382834b8a931b0), Subnet (selected: subnet-0f0d552875c6bc577, NLeVPC-subnet-public2-us-east-1b), and Auto-assign public IP (disabled). Under Firewall (security groups), the 'Select existing security group' button is highlighted. Common security groups show 'WebServerSG sg-015108251231f5c9e'. The right side shows the 'Summary' section with 1 instance, Software Image (Amazon Linux 2 Kernel 5.10 AMI), Virtual server type (t2.micro), Firewall (WebServerSG), and Storage (1 volume(s) - 8 GiB). A 'Launch instance' button is prominently displayed.

## Go to Elastic IP -> Allocate Elastic IP address

The screenshot shows the AWS EC2 Management Console with the URL <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Addresses>. The left sidebar has sections for Images, Elastic Block Store, Network & Security (with 'Elastic IPs' selected), Load Balancing, and Auto Scaling. The main area is titled 'Elastic IP addresses' and shows a table with columns: Name, Allocated IPv4 address, Type, Allocation ID, and Reverse DNS record. A search bar at the top is empty, and a message below the table states 'No Elastic IP addresses found in this account'. Buttons for Actions and Allocate Elastic IP address are visible.

The screenshot shows the AWS EC2 console with the path: EC2 > Elastic IP addresses > Allocate Elastic IP address. The main section is titled "Allocate Elastic IP address settings". It includes a "Network Border Group" dropdown set to "us-east-1", a "Public IPv4 address pool" section with three options (Amazon's pool, Public IPv4 address from account, Customer owned pool), a "Global static IP addresses" section with a note about AWS Global Accelerator, and a "Create accelerator" button. Below these is a "Tags - optional" section. At the bottom of the page are links for CloudShell, Feedback, Language, and copyright information.

## Associate IP Address:

The screenshot shows the AWS EC2 Management Console with the path: EC2 > Elastic IP addresses. A green success message box displays "Elastic IP address allocated successfully. Elastic IP address 52.204.188.249". The main table lists one item: "52.204.188.249" (Allocated IPv4 address: 52.204.188.249, Type: Public IP, Allocation ID: eipalloc-079f8b765a9387bc1). Action buttons include "Associate this Elastic IP address" (highlighted in orange) and "Allocate Elastic IP address". Below the table is a detailed view for the IP address 52.204.188.249, showing tabs for "Summary" and "Tags". The left sidebar shows navigation links for EC2 Dashboard, EC2 Global View, Events, Limits, Instances, Images, and Elastic Block Store.

## Choose Bastion/Web server

The screenshot shows the 'Associate Elastic IP address' wizard. The first step, 'Choose the instance or network interface to associate to this Elastic IP address (52.204.188.249)', is displayed. Under 'Resource type', 'Instance' is selected. A note states: 'If you associate an Elastic IP address with an instance that already has an Elastic IP address associated, the previously associated Elastic IP address will be disassociated, but the address will still be allocated to your account.' Below this, it says: 'If no private IP address is specified, the Elastic IP address will be associated with the primary private IP address.' In the 'Instance' section, a search bar shows 'Choose an instance' and lists two options: 'i-0811654cf68a5095 (Assignment 1a) - running' and 'i-0c3068058f870730f (Bastion/Web server) - running'. There is also a 'Choose a private IP address' option. Under 'Reassociation', there is a checkbox 'Allow this Elastic IP address to be reassigned'. At the bottom, there are links for CloudShell, Feedback, Language, and a footer with 2023 copyright information.

The screenshot shows the EC2 Management Console. The left sidebar includes 'New EC2 Experience' (selected), 'EC2 Dashboard', 'EC2 Global View', 'Events', 'Limits', 'Instances' (selected), 'Images', and 'Elastic Block Store'. The main area displays a green success message: 'Elastic IP address associated successfully. Elastic IP address 52.204.188.249 has been associated with instance i-0c3068058f870730f'. Below this, the 'Elastic IP addresses (1/1)' table shows one entry: 'Public IPv4 address: 52.204.188.249' (Associated), 'Name: -', 'Allocated IPv4 address: 52.204.188.249', 'Type: Public IP', 'Allocation ID: eipalloc-079f8b765a9387bc1', and 'Reverse DNS record: -'. A detailed view for '52.204.188.249' is shown at the bottom, with tabs for 'Summary' and 'Tags'. The footer includes CloudShell, Feedback, Language, and 2023 copyright information.

## Go back to EC2 – Instances to create Test instance:

The screenshot shows the 'Name and tags' section of the EC2 Management Console. A text input field contains the value 'Test'. To the right, there is a link to 'Add additional tags'.

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

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

Recent AMIs: Amazon Linux, macOS, Ubuntu, Windows, Red Hat, S...

Quick Start: Amazon Machine Image (AMI), Amazon Linux 2023 AMI, ami-022e1a32d3f742bd8 (64-bit (x86)) / ami-0b54418bdd76353ce (64-bit (Arm))

Virtualization: hvm, FNA enabled: true, Root device type: ebs

Free tier eligible

**Summary**

Number of instances: 1

Software Image (AMI): Amazon Linux 2023 AMI 2023.0.2...  
ami-022e1a32d3f742bd8

Virtual server type (instance type): t2.nano

Firewall (security group): New security group

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

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the...  
Details in included 87 minutes in

Cancel, Launch instance, Review commands

The screenshot shows the 'Verified provider' section where 'ami-022e1a32d3f742bd8' is selected. Below it, the 'Instance type' section shows 't2.nano' selected as the instance type. Other options include 'All generations' and 'Compare instance types'.

**Summary**

Number of instances: 1

Software Image (AMI): Amazon Linux 2023 AMI 2023.0.2...  
ami-022e1a32d3f742bd8

Virtual server type (instance type): t2.nano

Firewall (security group): New security group

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

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the...  
Details in included 87 minutes in

Cancel, Launch instance, Review commands

**Network settings**

- VPC - required: vpc-061382834b8a931b0 (NLeVPC-vpc)
- Subnet: subnet-0e0c502fa938f574 (NLeVPC-subnet-private-2-us-east-1b)
- Auto-assign public IP: Disable
- Firewall (security groups): Select existing security group (TestInstanceSG)
- Common security groups: sg-0a04663798b842584

**Summary**

- Number of instances: 1
- t2.nano
- Firewall (security group): TestInstanceSG
- 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 GiB of snapshots, and 100 GiB of bandwidth to the internet.

**Actions:** Cancel, Launch instance, Review commands

Connect to Bastion to ping:

**Instances (1/3) info**

Name	Instance ID
Assignment 1a	i-0811654c
Bastion/Web s...	i-0c306805f870730f
Test	i-0664fc769

**PUTTY Configuration**

Session

- Host Name (or IP address): 52.204.188.249.compute-1.amazonaws.com
- Port: 22
- Connection type: SSH

Load, save or delete a stored session

Default Settings

Private IPv4 addresses

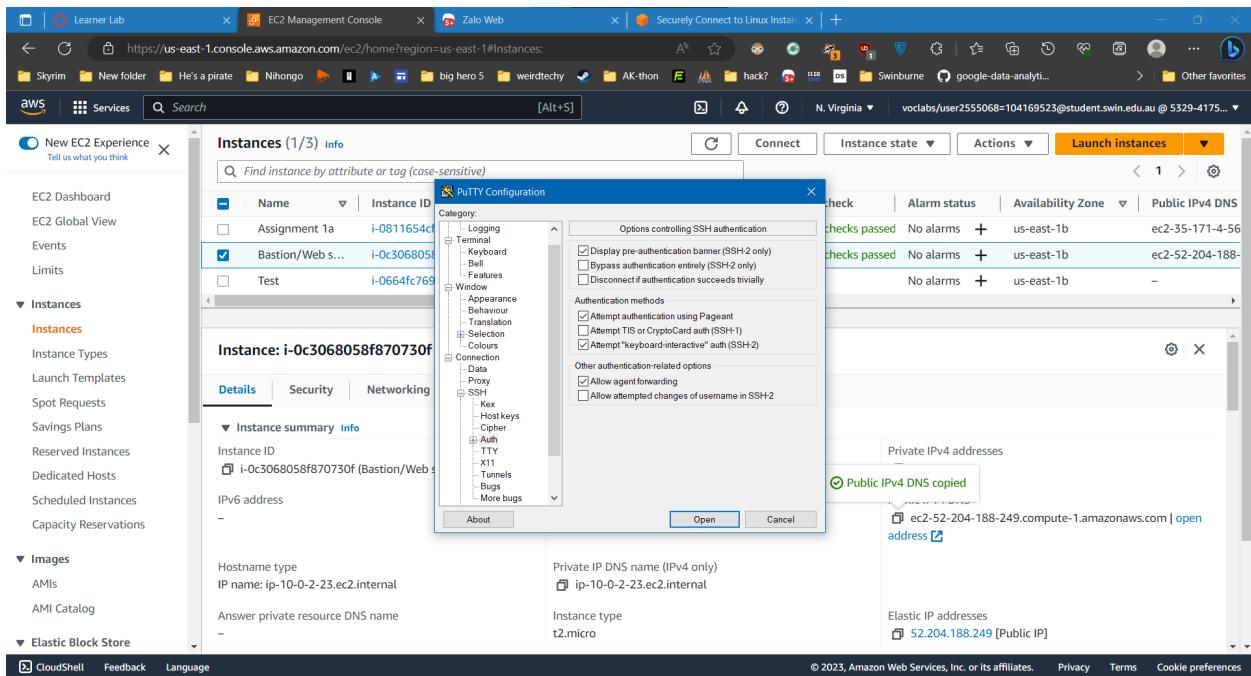
Public IPv4 DNS copied

ec2-52-204-188-249.compute-1.amazonaws.com | open address

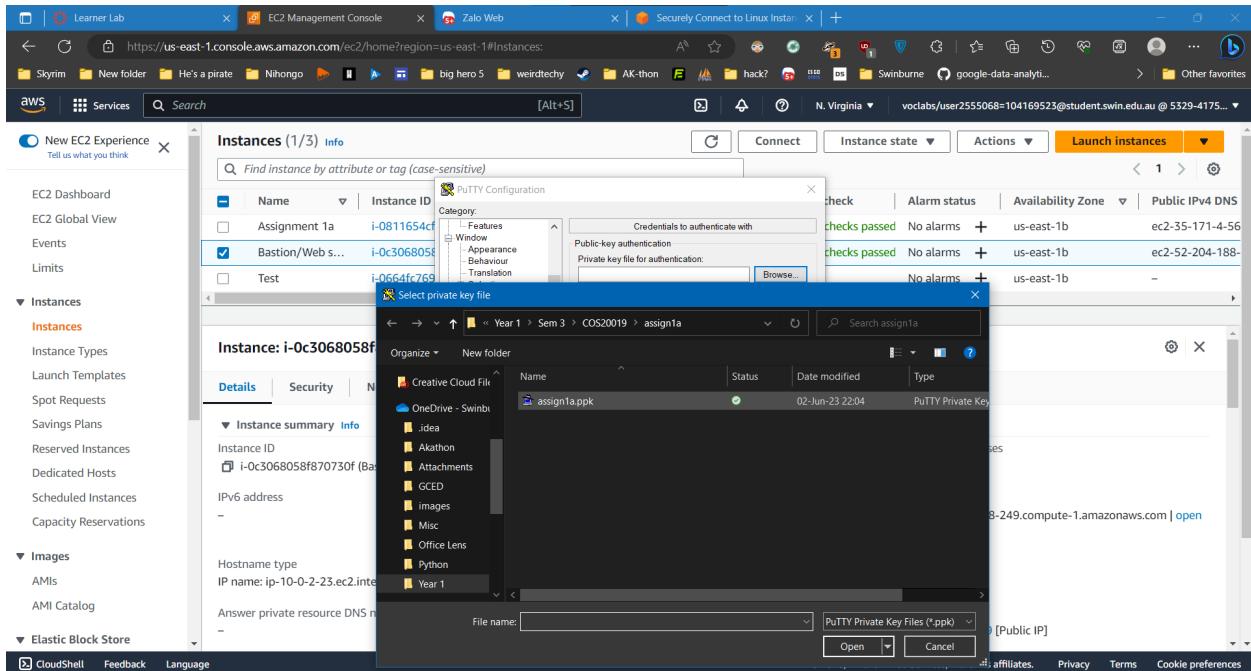
Elastic IP addresses

52.204.188.249 [Public IP]

## Allow agent forwarding – tick:



## Use the .ppk key of assignment 1a



Learner Lab | EC2 Management Console | Zalo Web | Securely Connect to Linux Instan... | +

https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:

New EC2 Experience Tell us what you think

EC2 Dashboard | EC2 Global View | Events | Limits

**Instances**

- Instances**
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts
- Scheduled Instances
- Capacity Reservations

**Images**

- AMIs
- AMI Catalog

**Elastic Block Store**

CloudShell Feedback Language

Instances (1/3) Info

Connect Instance state Actions Launch instances

Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
t2.micro	2/2 checks passed	No alarms	+ us-east-1b	ec2-35-171-4-56
t2.micro	2/2 checks passed	No alarms	+ us-east-1b	ec2-52-204-188-249
t2.micro	-	No alarms	+ us-east-1b	-

Tags

Private IPv4 addresses

Public IPv4 DNS copied

ec2-52-204-188-249.compute-1.amazonaws.com | open address

Elastic IP addresses

52.204.188.249 [Public IP]

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Learner Lab | EC2 Management Console | Zalo Web | Securely Connect to Linux Instan... | +

https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:

New EC2 Experience Tell us what you think

EC2 Dashboard | EC2 Global View | Events | Limits

**Images**

- AMIs
- AMI Catalog

**Elastic Block Store**

- Volumes
- Snapshots
- Lifecycle Manager

**Network & Security**

- Security Groups
- Elastic IPs
- Placement Groups
- Key Pairs
- Network Interfaces

**Load Balancing**

- Load Balancers
- Target Groups

**Auto Scaling**

- Auto Scaling Groups

CloudShell Feedback Language

Instances (1/3) Info

Connect Instance state Actions Launch instances

Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
t2.micro	2/2 checks passed	No alarms	+ us-east-1b	ec2-35-171-4-56
t2.micro	2/2 checks passed	No alarms	+ us-east-1b	ec2-52-204-188-249
t2.micro	-	No alarms	+ us-east-1b	-

Tags

Private IPv4 addresses

10.0.2.23

Public IPv4 DNS

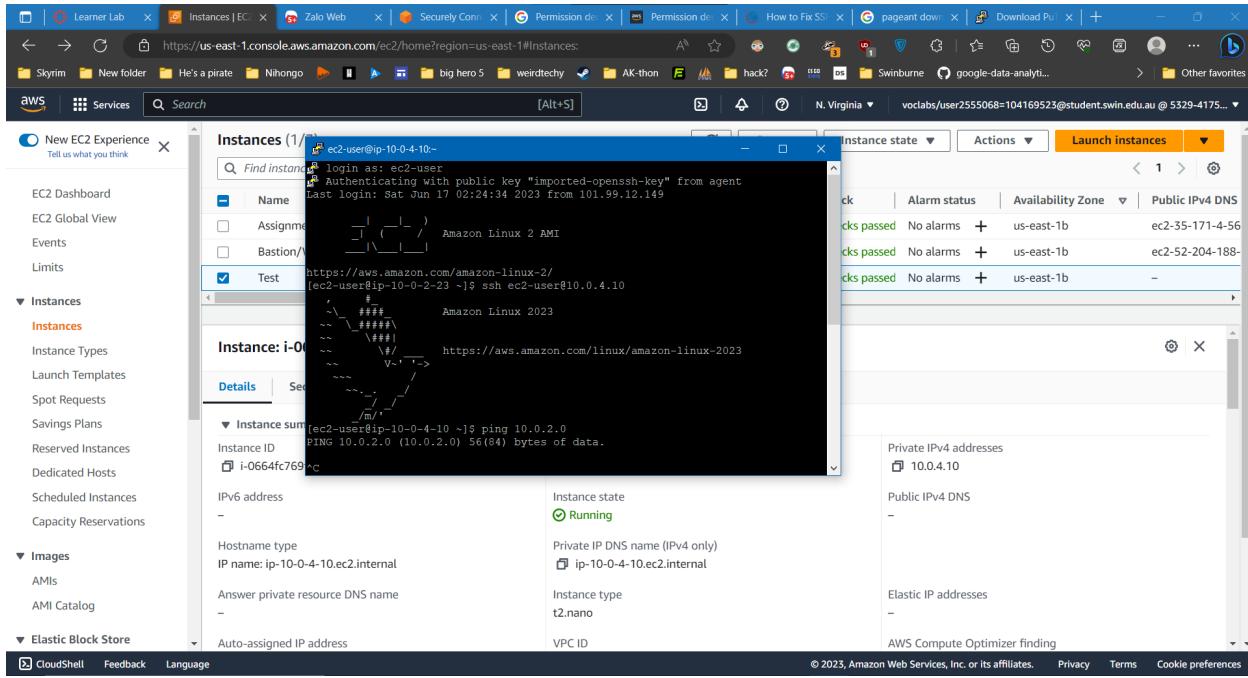
ec2-52-204-188-249.compute-1.amazonaws.com | open address

Elastic IP addresses

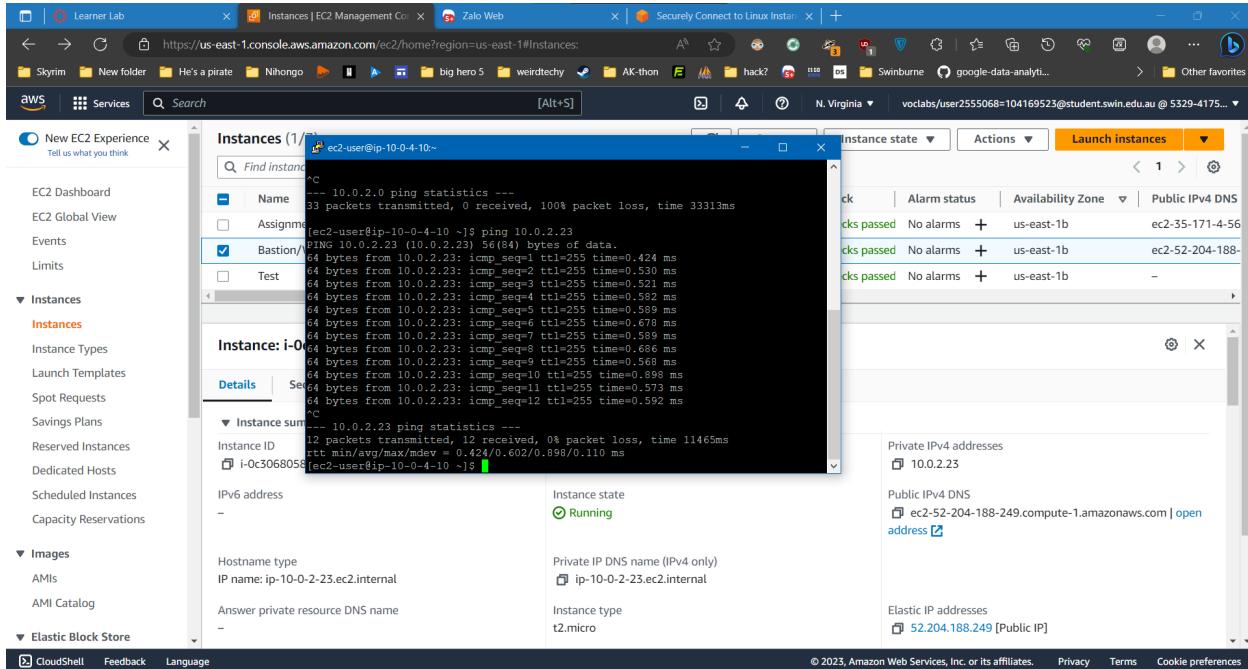
52.204.188.249 [Public IP]

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SSH to test instance:



## Ping back the Bastion:



## 1.4 – RDS database instance

### Create DB subnet group

The screenshot shows the AWS RDS Management Console interface for creating a new DB subnet group. The left sidebar navigation bar includes links for Dashboard, Databases, Query Editor, Performance insights, Snapshots, Exports in Amazon S3, Automated backups, Reserved instances, Proxies, Subnet groups (selected), Parameter groups, Option groups, Custom engine versions, Events, and Event subscriptions. The main content area has a title 'Create DB subnet group' and a sub-section 'Subnet group details'. It contains fields for 'Name' (set to 'db subnet group'), 'Description' (empty), and 'VPC' (set to 'NLeVPC-vpc (vpc-061382834b8a931b0)'). Below this is a 'Add subnets' section where 'us-east-1b' and 'us-east-1a' availability zones are selected. Under 'Subnets', two subnets are chosen: 'subnet-0e0c502fa938f5574 (10.0.4.0/24)' and 'subnet-01265616e86538e0a (10.0.3.0/24)'. A note states: 'For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.' At the bottom right are 'Cancel' and 'Create' buttons.

## Create new DB instance:

MySQL 8.0.28

The screenshot shows the AWS RDS MySQL creation interface. On the left, there's a sidebar with 'Edition' set to 'MySQL Community'. Below it, under 'Known issues/limitations', there are two sections: 'Show versions that support the Multi-AZ DB cluster' and 'Show versions that support the Amazon RDS Optimized Writes'. Under 'Engine Version', 'MySQL 8.0.28' is selected. In the center, there's a 'Templates' section with three options: 'Production', 'Dev/Test', and 'Free tier', where 'Free tier' is highlighted. On the right, a 'MySQL' panel provides general information about MySQL and lists its features.

**Edition**  
MySQL Community

**Known issues/limitations**  
Review the [Known issues/limitations](#) to learn about potential compatibility issues with specific database versions.

**Show filters**

Show versions that support the Multi-AZ DB cluster [Info](#)  
Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show versions that support the Amazon RDS Optimized Writes [Info](#)  
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

**Engine Version**  
MySQL 8.0.28

**Templates**  
Choose a sample template to meet your use case.

Production  
 Dev/Test  
 Free tier

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## Template free tier:

The screenshot shows the AWS RDS MySQL creation interface with the 'Free tier' template selected. It includes sections for 'Deployment options', 'Availability and durability', and 'Settings'. The 'Deployment options' section lists three options: 'Multi-AZ DB Cluster - new', 'Multi-AZ instance (not supported for Multi-AZ DB cluster snapshot)', and 'Single DB instance (not supported for Multi-AZ DB cluster snapshot)'. The 'Availability and durability' section contains a table with deployment options and their descriptions. The 'Settings' section is currently empty. The right side of the screen displays the same MySQL information and features panel as the previous screenshot.

**Deployment options** [Info](#)  
The deployment options below are limited to those supported by the engine you selected above.

Multi-AZ DB Cluster - new  
Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.

Multi-AZ instance (not supported for Multi-AZ DB cluster snapshot)  
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 (not supported for Multi-AZ DB cluster snapshot)  
Creates a single DB instance with no standby DB instances.

**Availability and durability**

Deployment option	Description
Multi-AZ DB Cluster - new	Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.
Multi-AZ instance (not supported for Multi-AZ DB cluster snapshot)	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 (not supported for Multi-AZ DB cluster snapshot)	Creates a single DB instance with no standby DB instances.

**Settings**

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## VPC: NLe-VPC, db subnet group, Public access: No

The screenshot shows the AWS RDS MySQL creation wizard. In the left sidebar, under 'Virtual private cloud (VPC) Info', the VPC 'NLeVPC-vpc (vpc-061382834b8a931b0)' is selected. A note states: 'After a database is created, you can't change its VPC.' Under 'DB subnet group Info', it says '2 Subnets, 2 Availability Zones'. In the 'Public access' section, the 'No' option is selected, with a note: 'RDS doesn't assign a public IP address to the database. Only Amazon EC2 Instances and other resources inside the VPC can connect to your database.' The right panel displays information about MySQL, including its popularity and features like support for up to 64 TiB and automated backups.

## VPC security group: DBServerSG

The screenshot shows the AWS RDS MySQL creation wizard. In the left sidebar, under 'VPC security group (firewall) Info', the 'Choose existing' option is selected, with 'DBServerSG' chosen from the dropdown. The right panel displays information about MySQL, including its popularity and features like support for up to 64 TiB and automated backups.

## Installing phpMyAdmin on a Linux EC2 instance

## 1. Download phpMyAdmin onto your Linux EC2:

- SSH into your EC2 instance using Putty.
- Navigate to the Apache document root directory:  
`cd /var/www/html`
- Download phpMyAdmin source file:

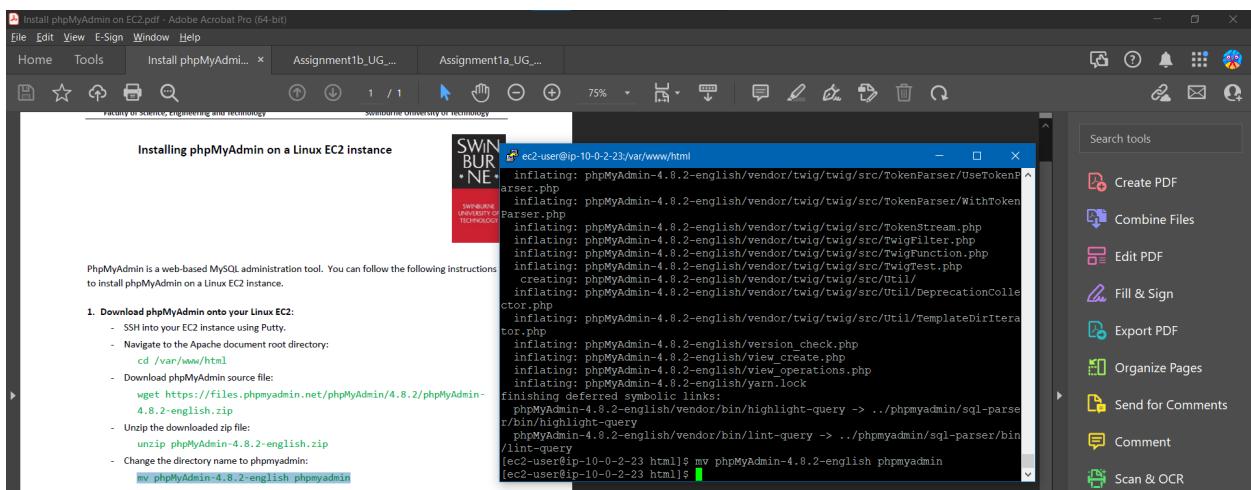
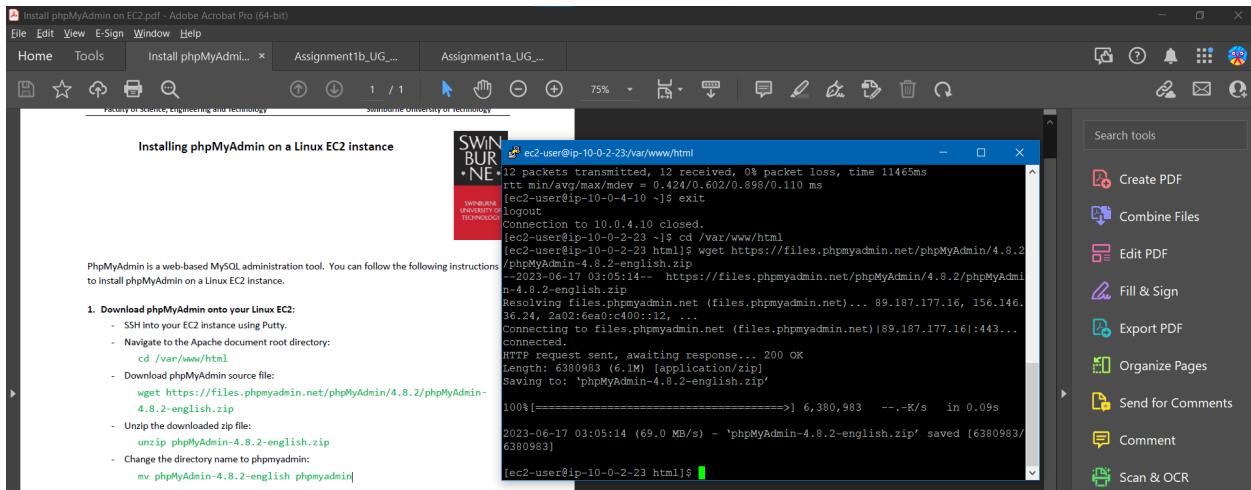
```
wget https://files.phpmyadmin.net/phpMyAdmin/4.8.2/phpMyAdmin-4.8.2-english.zip
```

- Unzip the downloaded zip file:

```
unzip phpMyAdmin-4.8.2-english.zip
```

- Change the directory name to phpmyadmin:

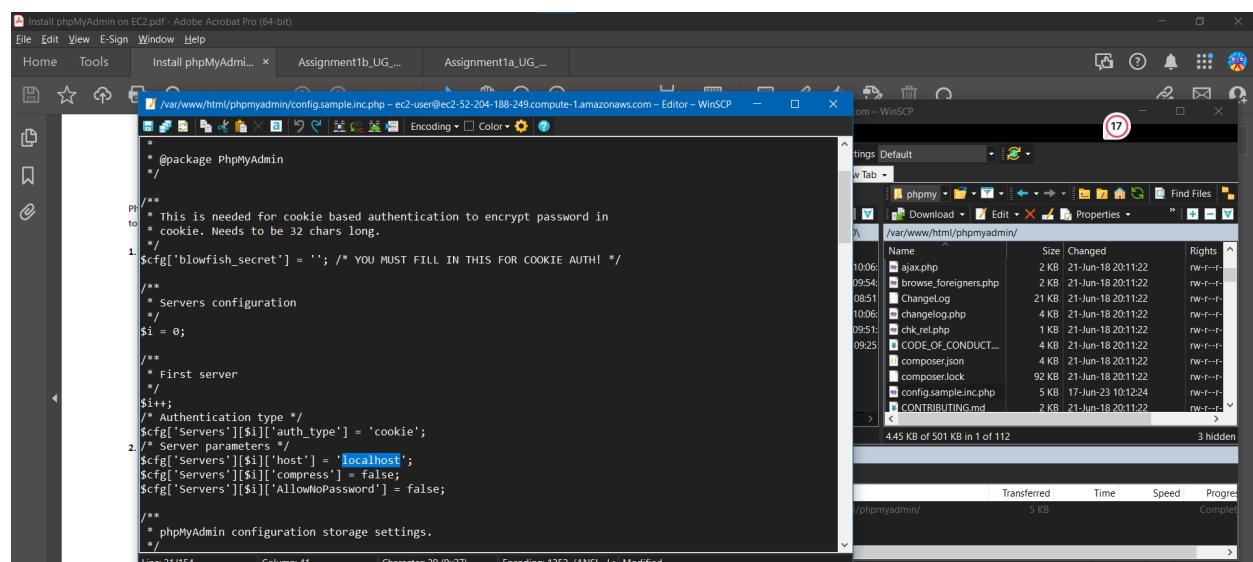
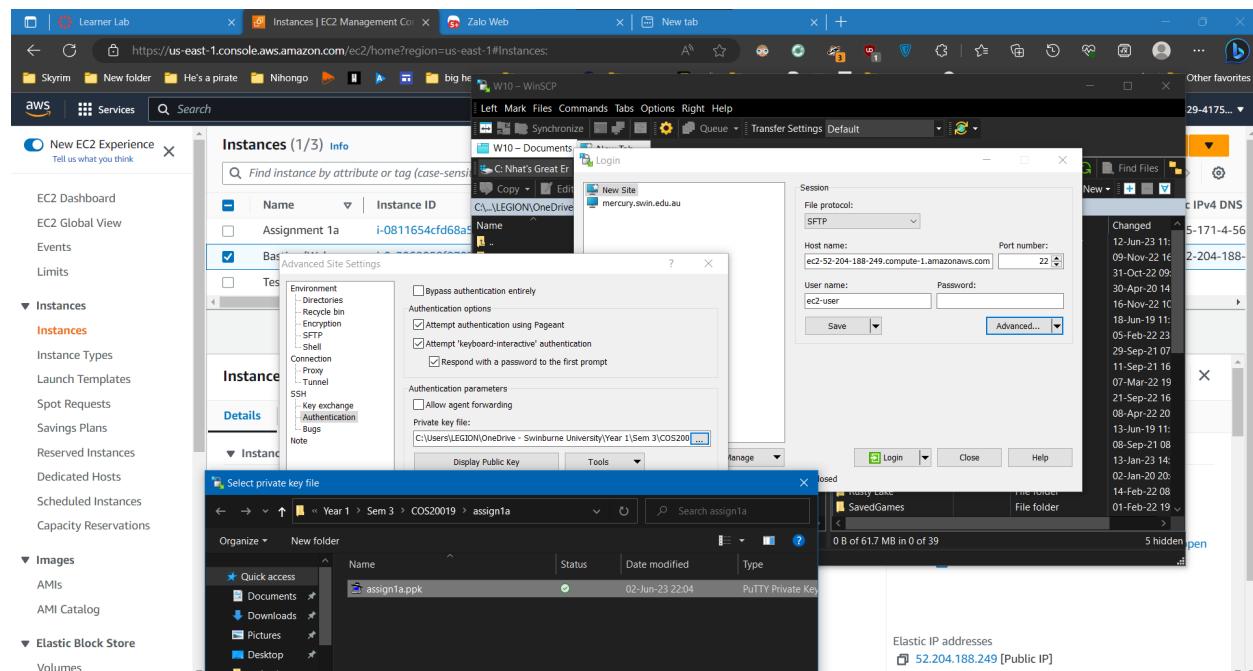
```
mv phpMyAdmin-4.8.2-english phpMyAdmin
```



## 2. Reconfigure phpMyAdmin:

- Open WinSCP and navigate to `phpmyadmin` directory (`/var/www/html/phpmyadmin`)
- Change the name of `config.sample.inc.php` file to `config.inc.php`
- Open `config.inc.php` file and look for this line:  
`$cfg['Servers'][$i]['host'] = 'localhost';`
- Replace 'localhost' with the **endpoint of your RDS instance**.

```
$cfg['Servers'][$i]['host'] = 'your_rds_endpoint';
```



The screenshot shows a browser window with two tabs open. The left tab is the 'Database Details - RDS Manager' page for a database named 'database-1'. The right tab is a terminal window titled '/var/www/html/phpmyadmin/config.sample.inc.php' showing the configuration code for phpMyAdmin. The configuration file includes settings for cookie-based authentication, server configuration, and networking.

```

/*
 * @package PhpMyAdmin
 */

/*
 * This is needed for cookie based authentication to encrypt password in
 * cookie. Needs to be 32 chars long.
 */
$cfg['blowfish_secret'] = ''; /* YOU MUST FILL IN THIS FOR COOKIE AUTH! */

/*
 * Servers configuration
 */
$i = 0;
/*
 * First server
 */
$i++;
/* Authentication type */
$cfg['Servers'][$i]['auth_type'] = 'cookie';
/* Server parameters */
$cfg['Servers'][$i]['host'] = 'database-1.cusminbqdrqa.us-east-1.rds.amazonaws.com';
$cfg['Servers'][$i]['compress'] = false;
$cfg['Servers'][$i]['AllowNoPassword'] = false;

/*
 * phpMyAdmin configuration storage settings.
 */

```

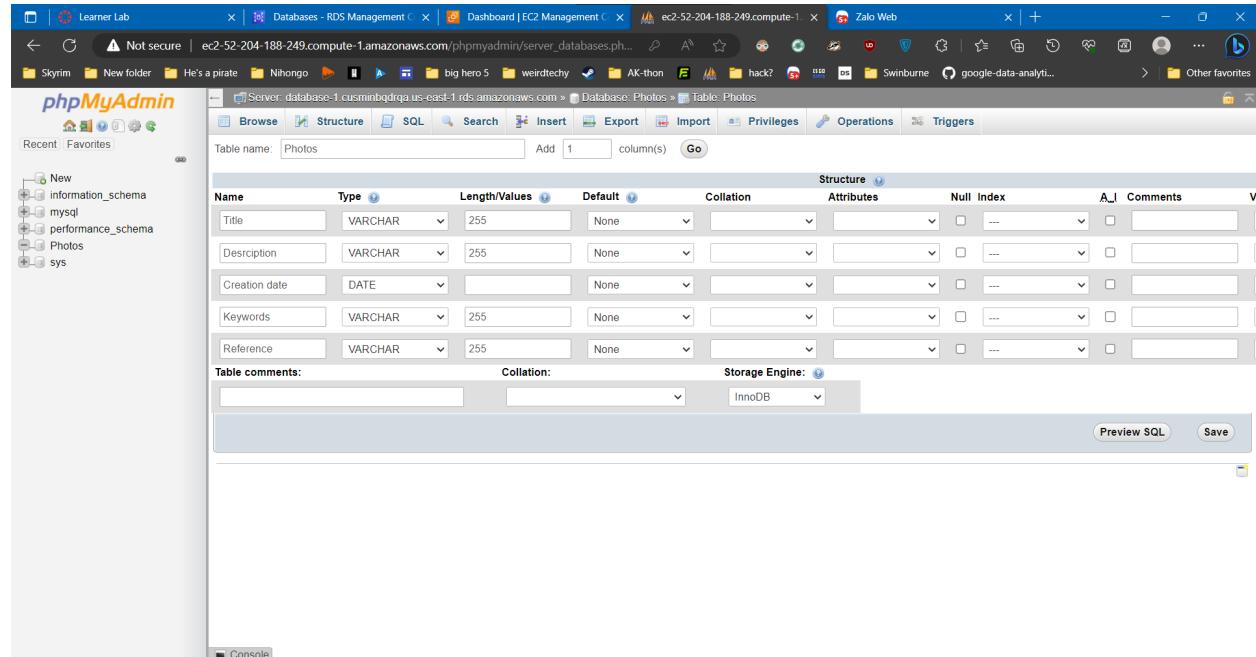
### 3. Access phpMyAdmin from your local machine:

- From a browser on your local machine, visit <http://your-ec2-public-dns.compute.amazonaws.com/phpmyadmin/>
- Enter the username and password of your DB.

The screenshot shows a browser window displaying the phpMyAdmin login page. The title bar indicates the URL is 'Not secure | ec2-52-204-188-249.compute-1.amazonaws.com/phpmyadmin/'. The page features the phpMyAdmin logo and a 'Welcome to phpMyAdmin' message. A login form is present with fields for 'Username:' and 'Password:', and a 'Go' button.

Create a database in your RDS instance with a table called **photos** that stores meta-data about the photos stored in the S3 bucket. This table should have the following columns:

- Photo title (*varchar(255)* type)
- Description (*varchar(255)* type)
- Creation date (*date* type)
- Keywords (*varchar(255)* type)
- Reference to the photo object in S3 (*varchar(255)* type)



The screenshot shows the 'Structure' tab for creating a new table named 'Photos'. The table has five columns: 'Title' (VARCHAR, 255), 'Description' (VARCHAR, 255), 'Creation date' (DATE), 'Keywords' (VARCHAR, 255), and 'Reference' (VARCHAR, 255). The storage engine is set to InnoDB. A screenshot of the 'Relation view' tab is also shown, displaying the same table structure with five columns: 'Name', 'Type', 'Collation', 'Attributes', and 'Extra'.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
1	Title	varchar(255)	utf8mb4_0900_ai_ci	No	None			<a href="#">Change</a> <a href="#">Drop</a> <a href="#">More</a>
2	Description	varchar(255)	utf8mb4_0900_ai_ci	No	None			<a href="#">Change</a> <a href="#">Drop</a> <a href="#">More</a>
3	Creation date	date		No	None			<a href="#">Change</a> <a href="#">Drop</a> <a href="#">More</a>
4	Keywords	varchar(255)	utf8mb4_0900_ai_ci	No	None			<a href="#">Change</a> <a href="#">Drop</a> <a href="#">More</a>
5	Reference	varchar(255)	utf8mb4_0900_ai_ci	No	None			<a href="#">Change</a> <a href="#">Drop</a> <a href="#">More</a>

## 1.5 – Network ACL

### Create new network ACL

The screenshot shows two browser windows side-by-side. The left window displays the 'Network ACLs' list in the AWS VPC Management console. It shows two existing Network ACLs: 'acl-0991b78b25f7991cb' associated with 4 Subnets and 'acl-0912e4bfad15bb78c' associated with 6 Subnets. The right window shows the 'Create network ACL' wizard.

**Network ACLs (2) Info**

Name	Network ACL ID	Associated with	Default	VPC ID	In
-	acl-0991b78b25f7991cb	4 Subnets	Yes	vpc-061382834b8a931b0 / NLeVPC-vpc	2 I
-	acl-0912e4bfad15bb78c	6 Subnets	Yes	vpc-0952baff13c8c5c06	2 I

**Select a network ACL**

**Create network ACL Info**

A network ACL is an optional layer of security that acts as a firewall for controlling traffic in and out of a subnet.

**Network ACL settings**

**Name - optional**  
Creates a tag with a key of 'Name' and a value that you specify.

**VPC**  
VPC to use for this network ACL.

**Tags**  
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.

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="PublicSubnet2NACL"/>

**Add tag**  
You can add 49 more tags

**Create network ACL**

## Edit network ACL inbound rules:

To be specific, the NACL:

- must ALLOW SSH(22) traffic from anywhere so that you can access the WebServer instance.
- must ALLOW ICMP traffic *only* from the subnet that contains the Test instance.
- must ALLOW other necessary traffic so that the Photo Album website is fully functional for users from anywhere.

## Associate ACL to public subnet 2:

Screenshot of the AWS VPC Network ACLs page showing the association of a public subnet's ACL.

**Network ACLs (1/3) - acl-0f4e9df6b527479cc / PublicSubnet2NACL**

Name	Network ACL ID	Associated with	Default	VPC ID
acl-0991b78b25f7991cb	acl-0f4e9df6b527479cc	3 Subnets	Yes	vpc-061382834b8a931b0 / NLeVPC-vpc
PublicSubnet2NACL	acl-0f4e9df6b527479cc	subnets-0fd552875c6bc577 / NLeVPC-subnet-...	No	vpc-061382834b8a931b0 / NLeVPC-vpc
acl-0912e4bfad15bb78c	acl-0912e4bfad15bb78c	6 Subnets	Yes	vpc-0952baff13c8c5c06

**Subnet associations (1)**

Name	Subnet ID	Associated with	Availability Zone	IPv4 CIDR	IPv6 CIDR
NLeVPC-subnet-public2-us...	subnet-0fd552875c6bc577	acl-0f4e9df6b527479cc / PublicSubnet2NACL	us-east-1b	10.0.2.0/24	-

Screenshot of the AWS VPC Edit subnet associations page.

**Edit subnet associations - acl-0f4e9df6b527479cc / PublicSubnet2NACL**

Change which subnets are associated with this network ACL.

**Available subnets (1/4)**

Name	Subnet ID	Associated with	Availability Zone	IPv4 CIDR	IPv6 CIDR
NLeVPC-subnet-public2-us...	subnet-0fd552875c6bc577	acl-0f4e9df6b527479cc / PublicSubnet2NACL	us-east-1b	10.0.2.0/24	-
NLeVPC-subnet-private2-us...	subnet-0e0c502fa938f5574	acl-0991b78b25f7991cb	us-east-1b	10.0.4.0/24	-
NLeVPC-subnet-public1-us...	subnet-08fc47a70a45a130f	acl-0991b78b25f7991cb	us-east-1a	10.0.1.0/24	-
NLeVPC-subnet-private1-us...	subnet-01265616e86538e0a	acl-0991b78b25f7991cb	us-east-1a	10.0.3.0/24	-

**Selected subnets**

- subnet-0fd552875c6bc577 / NLeVPC-subnet-public2-us-east-1b

**Actions**

- Cancel
- Save changes

## 2. Functional requirements of Photo Album website

### 2.1 – Photo storage

Create an S3 bucket to store your photos. Manually upload some photos onto S3 bucket that you just created and ensure they have been successfully uploaded.

*Ideally, SSH(22) traffic should only be allowed from your home network's public IPv4 address range since common users do not need to access the web server. But for simplicity, you can allow SSH from anywhere in this assignment.*

All objects (photos) in this S3 bucket must become publicly available. To accomplish this task, you MUST use an appropriate access policy to enable public access to all available objects in this S3 Bucket

The screenshot shows the AWS S3 Management Console interface. On the left, a sidebar menu is open under 'Amazon S3' with the 'Buckets' option selected. The main content area is titled 'Amazon S3 > Buckets'. It features an 'Account snapshot' section with a message: 'Storage lens provides visibility into storage usage and activity trends. Learn more'. Below this is a 'Buckets' table header with columns: Name, AWS Region, Access, and Creation date. A large 'Create bucket' button is located at the top right of the table area. The message 'No buckets' is displayed, followed by the sub-message 'You don't have any buckets.' and another 'Create bucket' button. At the bottom of the page, there are links for CloudShell, Feedback, Language, Privacy, Terms, and Cookie preferences.

## Create S3 Bucket:

The screenshot shows the 'Create bucket' page in the AWS S3 console. In the 'General configuration' section, the 'Bucket name' field is set to 'photobucket1b'. The 'AWS Region' dropdown is set to 'US East (N. Virginia) us-east-1'. Under 'Object Ownership', the 'ACLs disabled (recommended)' option is selected. At the bottom of the page, there are links for CloudShell, Feedback, and Language, along with a copyright notice for 2023, Amazon Web Services, Inc. or its affiliates.

## Uncheck block public access, Edit bucket policy:

The screenshot shows the 'Create bucket' page in the AWS S3 console. The 'Block all public access' checkbox is unselected. Below it, several other options are listed under 'Block public access to buckets and objects granted through new access control lists (ACLs)': 'Block public access to buckets and objects granted through any access control lists (ACLs)', 'Block public access to buckets and objects granted through any access control policies', 'Block public access to buckets and objects granted through new public bucket or access point policies', and 'Block public and cross-account access to buckets and objects through any public bucket or access point policies'. A warning message states: 'Turning off block all public access might result in this bucket and the objects within becoming public. AWS recommends that you turn on block all public access, unless public access is required for specific and verified use cases such as static website hosting.' A checkbox below the message is checked, indicating acknowledgement of the risk. At the bottom of the page, there is a 'Bucket Versioning' section and a footer with links for CloudShell, Feedback, Language, Privacy, Terms, and Cookie preferences.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": "*",
      "Action": "s3:GetObject",
      "Resource": "arn:aws:s3:::photobucket1b/*"
    }
  ]
}
```

## 2.2 – Photo meta-data in RDS Database

Upload the pictures to bucket:

The screenshot shows the AWS S3 Management Console with the path `Amazon S3 > Buckets > photobucket1b > Upload`. In the center, there's an 'Upload' section with a message: 'Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, S3 REST API. Learn more.' Below this is a 'Files and folders (0)' table with a 'Find by name' search bar. At the bottom, it says 'No files or folders' and 'You have not chosen any files or folders to upload.' A file selection dialog box is open over the interface, showing a list of files from the local desktop. The files listed are: Attachments, GCED, images, Misc, Office Lens, Python, Year 1, This PC, 3D Objects, Desktop, Documents, Downloads. Specific files highlighted include 'amazonlogo.png', 'awslogo.jpg', and 'CapCut'. The dialog has a 'File name' field containing 'amazonlogo.png', 'awslogo.jpg', and 'primelogo.png', and 'Open' and 'Cancel' buttons.

<https://photobucket1b.s3.amazonaws.com/amazonlogo.png>

<https://photobucket1b.s3.amazonaws.com/awslogo.jpg>

<https://photobucket1b.s3.amazonaws.com/primelogo.png>

## Insert some values:

The screenshot shows the phpMyAdmin interface for the 'Photos' table. There are two sets of input fields for inserting data:

Column	Type	Function	Null Value
Title	varchar(255)		Amazon Logo
Description	varchar(255)		Logo of Amazon
Creation date	date		2023-06-01
Keywords	varchar(255)		logo, amazon
Reference	varchar(255)		<a href="https://photobucket1b.s3.amazonaws.com/amazonlogo.png">https://photobucket1b.s3.amazonaws.com/amazonlogo.png</a>

Column	Type	Function	Null Value
Title	varchar(255)		Prime Video Logo
Description	varchar(255)		Logo of Amazon Prime Video
Creation date	date		2023-06-15
Keywords	varchar(255)		logo, amazon, prime, video
Reference	varchar(255)		<a href="https://photobucket1b.s3.amazonaws.com/primevideo/logo.png">https://photobucket1b.s3.amazonaws.com/primevideo/logo.png</a>

Below the tables are 'Go' and 'Ignore' buttons.

The screenshot shows the phpMyAdmin interface for the 'Photos' table. There are three sets of input fields for inserting data:

Column	Type	Function	Null Value
Title	varchar(255)		AWS logo
Description	varchar(255)		Logo of AWS
Creation date	date		2023-06-17
Keywords	varchar(255)		logo, aws, cloud, web, amazon
Reference	varchar(255)		<a href="https://photobucket1b.s3.amazonaws.com/awslogo.jpg">https://photobucket1b.s3.amazonaws.com/awslogo.jpg</a>

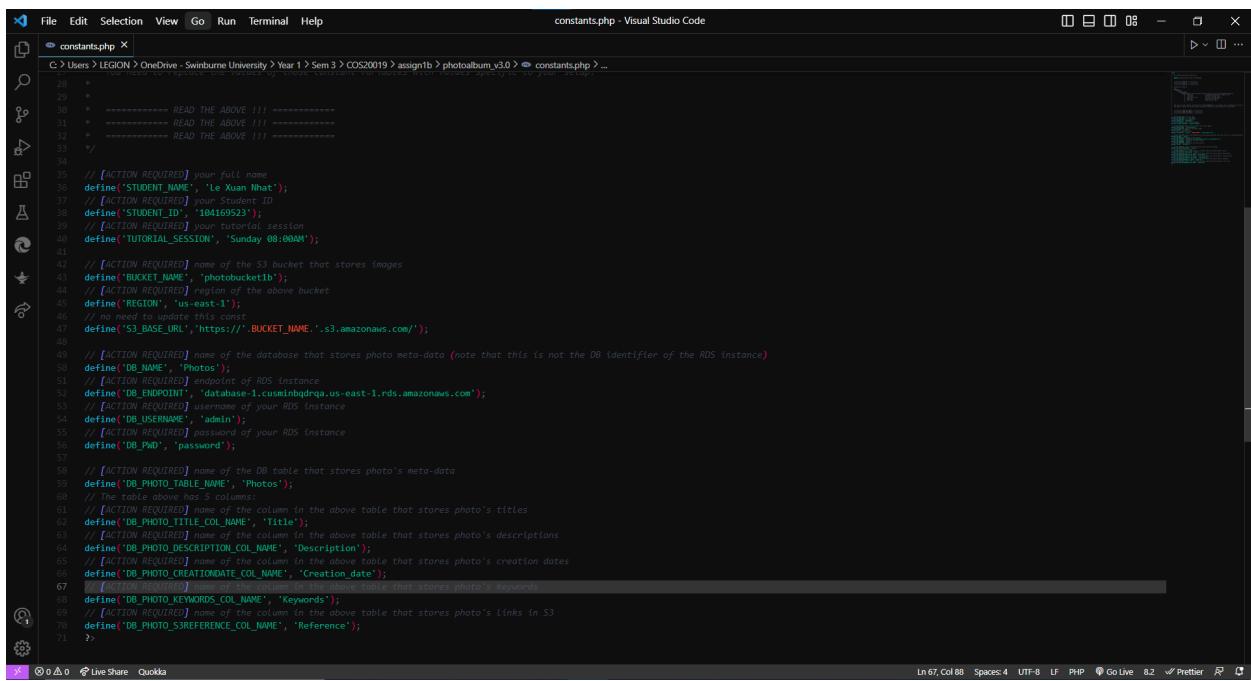
Below the tables are 'Go', 'Preview SQL', and 'Reset' buttons. A message at the bottom says 'Insert as new row' and 'and then'. It also shows 'Continue insertion with 3 rows' and a 'Console' tab.

## 2.3 – Photo Album website functionality

The website must be able to list all the photos (stored in the S3 bucket) along with their meta-data (stored in the database). The full source code has been provided to you ([photoalbum\\_v3.0.zip](#)).

Modify the `constants.php` file in the provided code (carefully read the comments in the file) using available information from the S3 bucket and RDS database that you created in the previous steps.

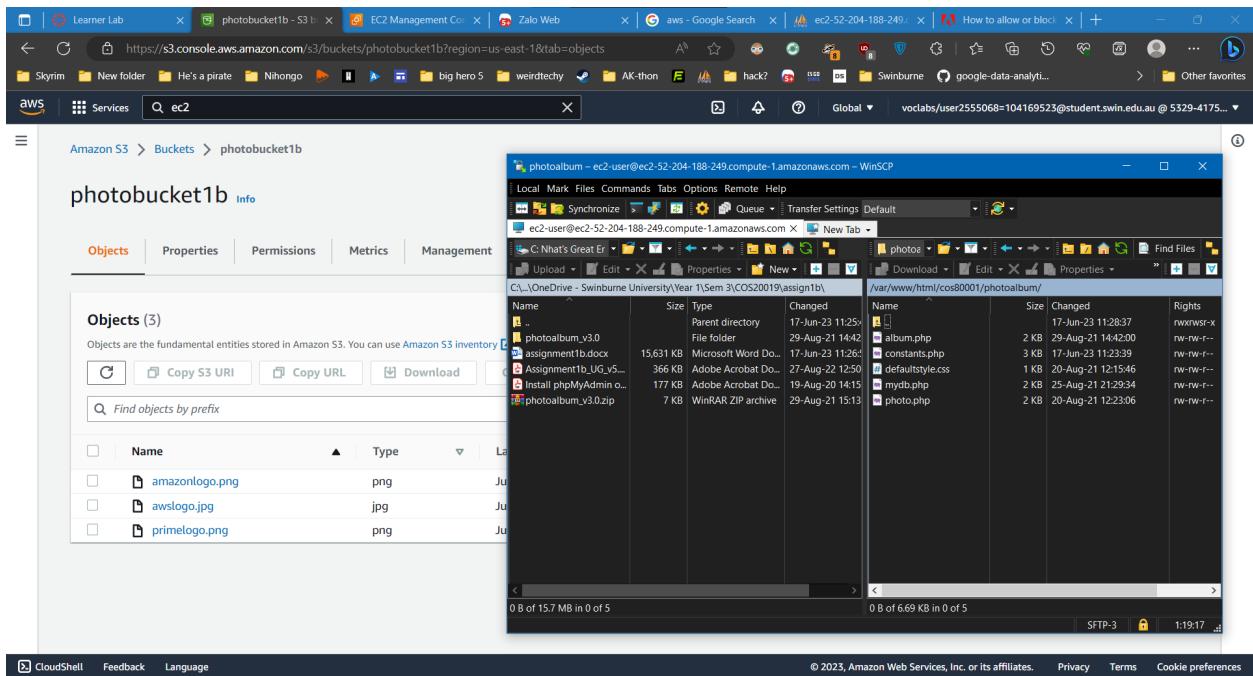
**NOTE:** in constants.php file, variables/names that you add must not include space. You may use underscore “\_” instead of space.



A screenshot of the Visual Studio Code interface showing the `constants.php` file. The code defines various constants for a photo album application, including student names, IDs, session details, and database and S3 configurations. The code uses PHP's `define` function and includes many comments starting with `/// [ACTION_REQUIRED]`. The code is well-formatted with line numbers and syntax highlighting.

```
File Edit Selection View Go Run Terminal Help constants.php - Visual Studio Code
constants.php X
C:\Users\LEGION\OneDrive - Swinburne University\Year 1\Sem 3\COS20019\assign1b\photoalbum_v3.0> constants.php ...
28 *
29 *
30 * ----- READ THE ABOVE !!! -----
31 * ----- READ THE ABOVE !!! -----
32 * ----- READ THE ABOVE !!! -----
33 */
34
35 // [ACTION_REQUIRED] your full name
36 define('STUDENT_NAME', 'Le Xuan Nhut');
37 // [ACTION_REQUIRED] your student ID
38 define('STUDENT_ID', '104169523');
39 // [ACTION_REQUIRED] your tutorial session
40 define('TUTORIAL_SESSION', 'Sunday 08:00AM');
41
42 // [ACTION_REQUIRED] name of the S3 bucket that stores images
43 define('BUCKET_NAME', 'photobucket1b');
44 // [ACTION_REQUIRED] region of the above bucket
45 define('REGION', 'us-east-1');
46 // no need to update this const
47 define('S3_BASE_URL', "https://.s3.amazonaws.com/");
48
49 // [ACTION_REQUIRED] name of the database that stores photo meta-data (note that this is not the DB identifier of the RDS instance)
50 define('DB_NAME', 'Photos');
51 // [ACTION_REQUIRED] endpoint of RDS instance
52 define('DB_ENDPOINT', 'database-1.cusminhqdrqa.us-east-1.rds.amazonaws.com');
53 // [ACTION_REQUIRED] username of your RDS instance
54 define('DB_USERNAME', 'admin');
55 // [ACTION_REQUIRED] password of your RDS instance
56 define('DB_PWD', 'password');
57
58 // [ACTION_REQUIRED] name of the DB table that stores photo's meta-data
59 define('DB_PHOTO_TABLE_NAME', 'Photos');
60 // [ACTION_REQUIRED] name of the column in the above table that stores photo's titles
61 // [ACTION_REQUIRED] name of the column in the above table that stores photo's descriptions
62 define('DB_PHOTO_TITLE_COL_NAME', 'Title');
63 // [ACTION_REQUIRED] name of the column in the above table that stores photo's creation dates
64 define('DB_PHOTO_DESCRIPTION_COL_NAME', 'Description');
65 // [ACTION_REQUIRED] name of the column in the above table that stores photo's creation dates
66 define('DB_PHOTO_CREATIONDATE_COL_NAME', 'Creation_date');
67 // [ACTION_REQUIRED] name of the column in the above table that stores photo's keywords
68 define('DB_PHOTO_KEYWORDS_COL_NAME', 'Keywords');
69 // [ACTION_REQUIRED] name of the column in the above table that stores photo's Links in S3
70 define('DB_PHOTO_SREFERENCE_COL_NAME', 'Reference');
71
Ln 67, Col 88 Spaces: 4 UTF-8 LF PHP Go Live 8.2 ✎ Prettier ⌂
```

## Add photoalbum to Win\_SCP:



## Test connection:

Student name: Le Xuan Nhat  
 Student ID: 104169523  
 Tutorial session: Sunday 08:00AM

Uploaded photos:

Photo	Name	Description	Creation date	Keywords
	Amazon Logo	Logo of Amazon	2023-06-01	logo, amazon
	Prime Video Logo	Logo of Amazon Prime Video	2023-06-15	logo, amazon, prime, video
	AWS logo	Logo of AWS	2023-06-17	logo, aws, cloud, web, amazon