```
PS C:\Users\bened\.aws> aws s3 mb s3://aws723
make_bucket: aws723
PS C:\Users\bened\.aws> aws s3 list

usage: aws [options] <command> <subcommand> [<subcommand> ...] [
parameters]
To see help text, you can run:

  aws help
  aws <command> help
  aws <command> <subcommand> help

aws.exe: error: argument subcommand: Invalid choice, valid choic
es are:

ls                                        | website

cp                                        | mv

rm                                        | sync

mb                                        | rb

presign
```

```
PS C:\Users\bened> aws s3 sync .aws/ s3://aws723
Completed 921 Bytes/965 Bytes (3.4 KiB/s) with 2 file(s) remaini
upload: .aws\credentials to s3://aws723/credentials

Completed 921 Bytes/965 Bytes (3.4 KiB/s) with 1 file(s) remaini
Completed 965 Bytes/965 Bytes (1.3 KiB/s) with 1 file(s) remaini
upload: .aws\config to s3://aws723/config

PS C:\Users\bened>
```

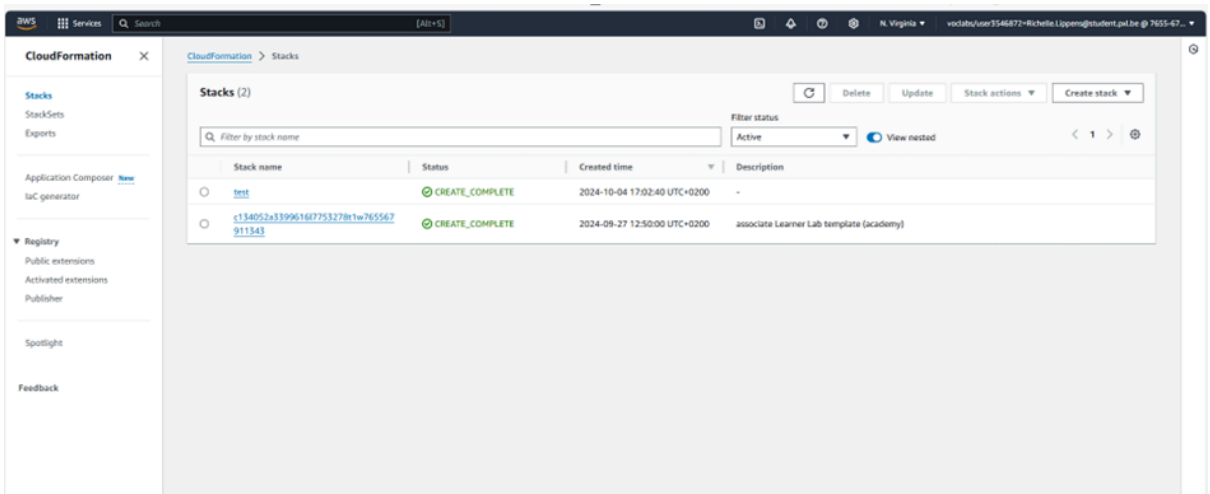
```
ost key verification failed.
S C:\Users\bened> ssh -i labsuser.pem ec2-user@44.204.176.106
arning: Identity file labsuser.pem not accessible: No such file
or directory.
he authenticity of host '44.204.176.106 (44.204.176.106)' can't
be established.
D25519 key fingerprint is SHA256:EW3AhDsw2eH7itL1oVerJXFGovbjDX
oARoIMyCkrGc.
his key is not known by any other names
re you sure you want to continue connecting (yes/no/[fingerprin
])? yes
arning: Permanently added '44.204.176.106' (ED25519) to the lis
 of known hosts.
c2-user@44.204.176.106: Permission denied (publickey,gssapi-key
x,gssapi-with-mic).
S C:\Users\bened> ssh -i labsuser.pem ec2-user@44.204.176.106
  ,     #_
  ~\_  ####_        Amazon Linux 2023
 ~~  \_#####\
 ~~     \###|
 ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2
23
  ~~       V~' '->
   ~~~         /
     ~~._.   _/
        _/ _/
      _/m/'
ec2-user@ip-172-31-88-4 ~]$
```

Lab: computed

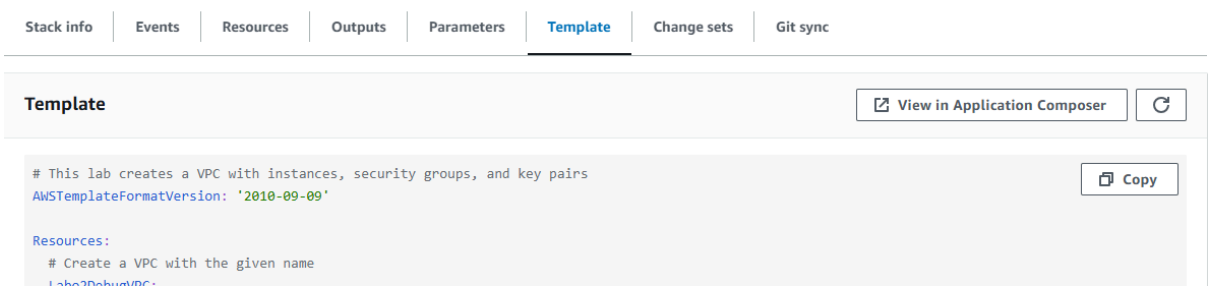
Token controleren	aws sts get-caller-identity

Computed

- What are the names of the 2 instances created?



- What is the name of the AMI that is used for both instances?



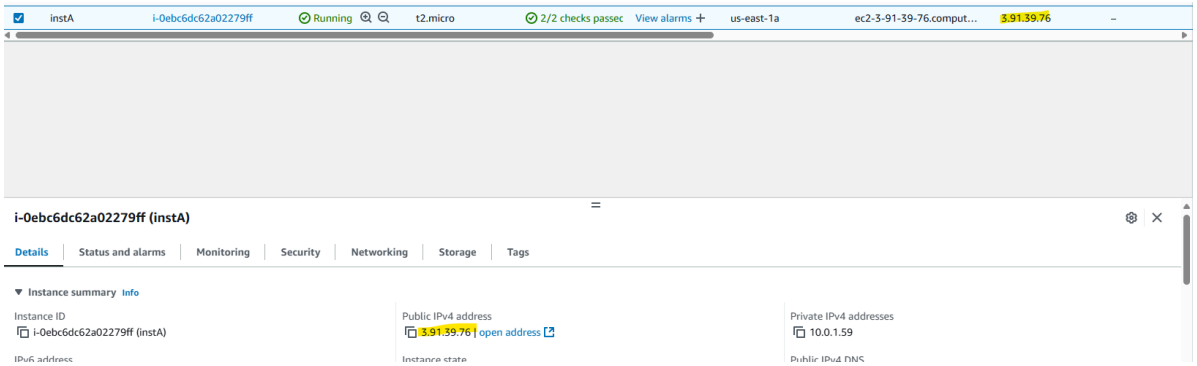

```
# Solution
# instance names: instA, instB
# AMI name: Amazon Linux 2 AMI (HVM), SSD Volume Type
# Instance types: t2.micro, t2.large
# Public Ipv4: variable
# Keypair names: exc1
# security group names: ec2 incomming http
# rules for security group: allow incoming HTTP traffic on port 80
# why cost so high? t2.large instance type
```

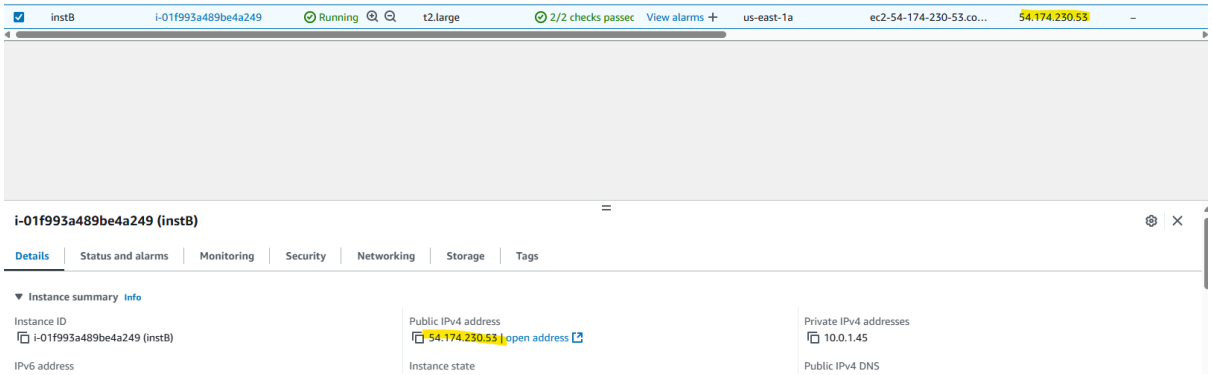
- What is the instance type for both machines?

```
# Solution
# instance names: instA, instB
# AMI name: Amazon Linux 2 AMI (HVM), SSD Volume Type
# Instance types: t2.micro, t2.large
# Public Ipv4: variable
# Keypair names: exc1
# security group names: ec2 incomming http
# rules for security group: allow incoming HTTP traffic on port 80
# why cost so high? t2.large instance type
```

- What is the public IPv4 address for InstA?

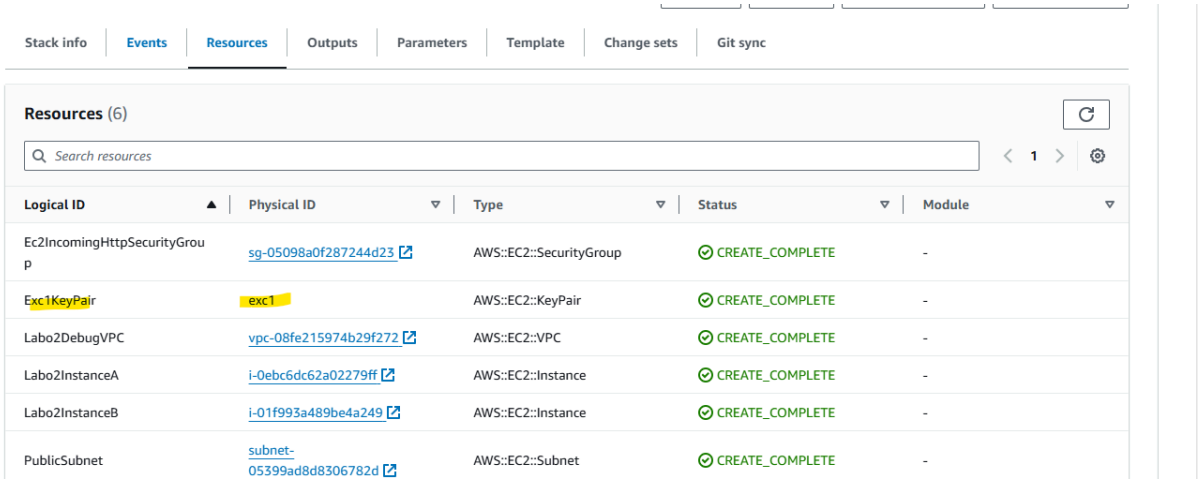
klik op jouw stack > resources > kies jouw instance klik op jouw physical id > selecteer jouw instance

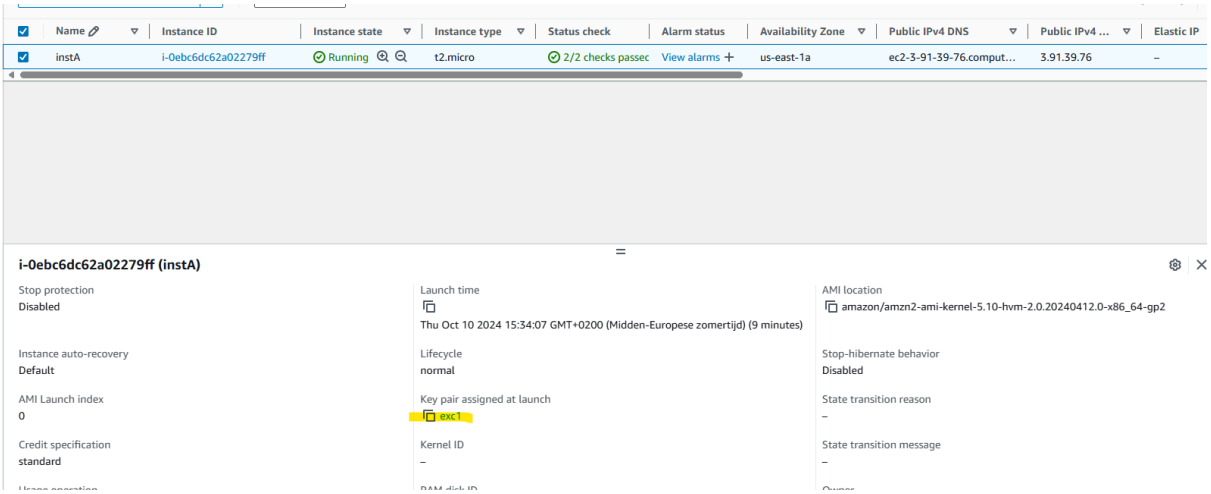




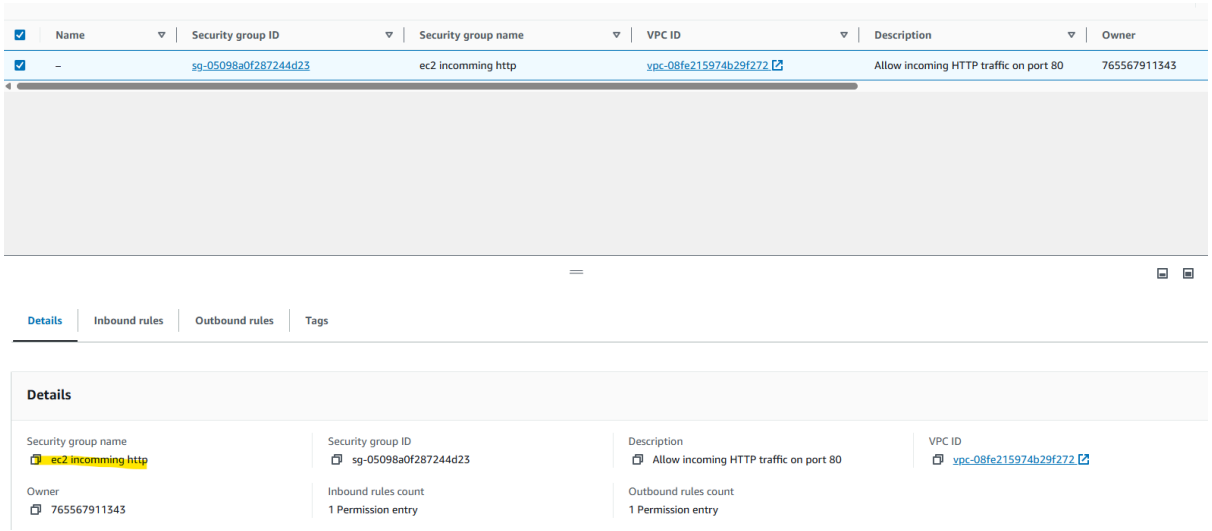
- What is the name for the keypair linked to both machines?

klik op jouw stack > resources > kijk naar jouw keypair > selecteer jouw instance (om te kijken of welk gekoppeld is)

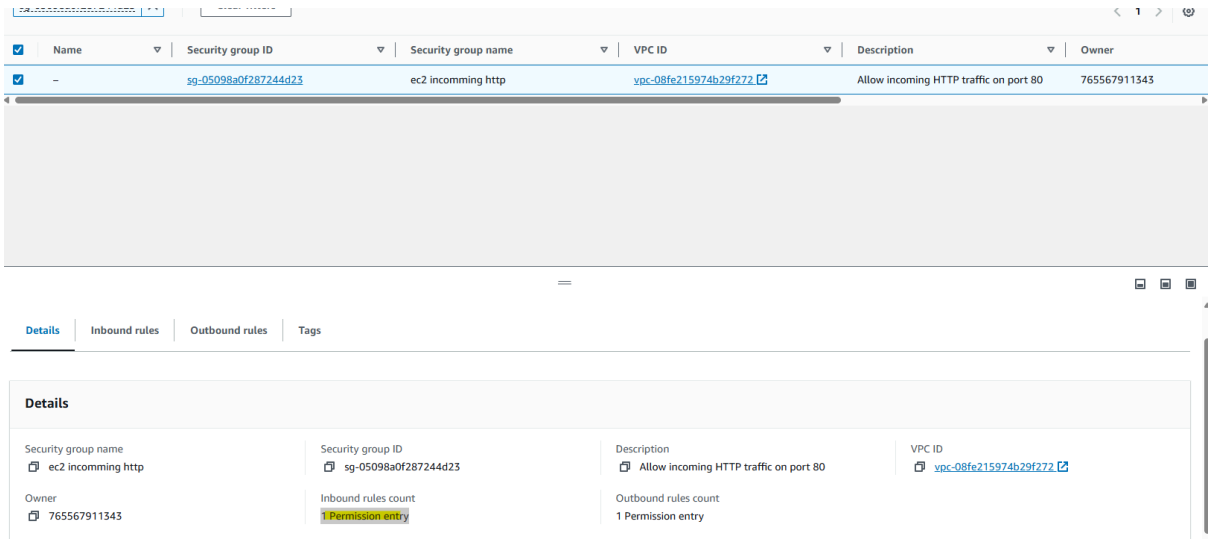




- Search for a linked security group. What is the name of this group?



- What rules are present in this security group?



- Our customer is complaining that the costs for his EC2 instances are expensive. What causes this issue and how would you fix this?

Verbinden met een instance	ssh -i /path/to/vockey.pem ec2-user@<public-ip-of-instance>
Controleer de cloud-init status	sudo cloud-init status --long
Bekijk de cloud-init logbestanden	sudo cat /var/log/cloud-init-output.log

Problemen met webserver

Stap1: verbinden met instance via ssh

```
ssh -i /path/to/vockey.pem ec2-user@<public-ip-of-instance>
```

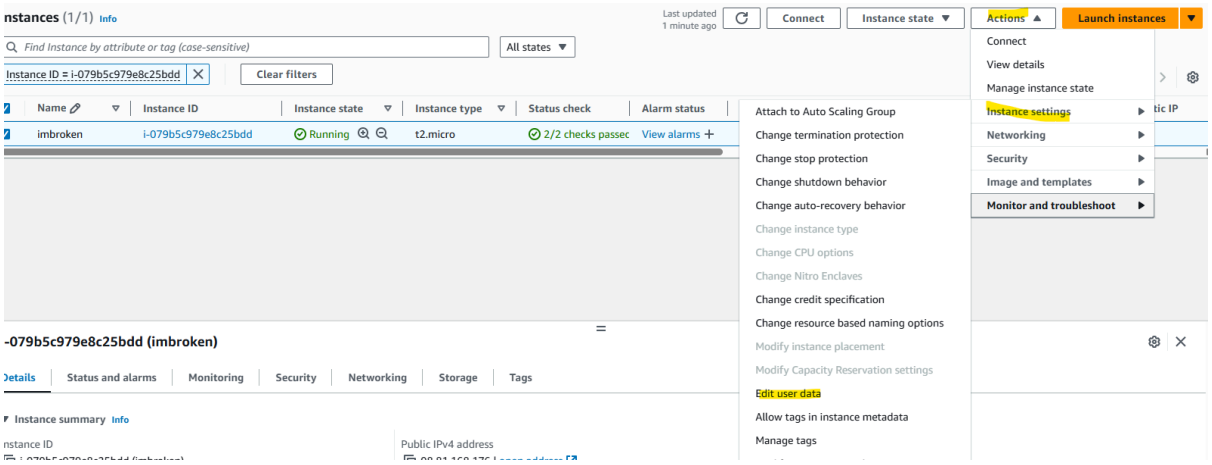
stap 2: kijk in de log file en zoek naar de foutmelding

```
sudo cat /var/log/cloud-init-output.log
```

```
Complete!
starting httpd service
Unknown operation 'starthttpd'.
enable httpd service
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service to /usr/lib/systemd/syste
Cloud-init v. 19.3-46.amzn2.0.1 finished at Thu, 10 Oct 2024 13:55:11 +0000. Datasource DataSourceEc2.
```

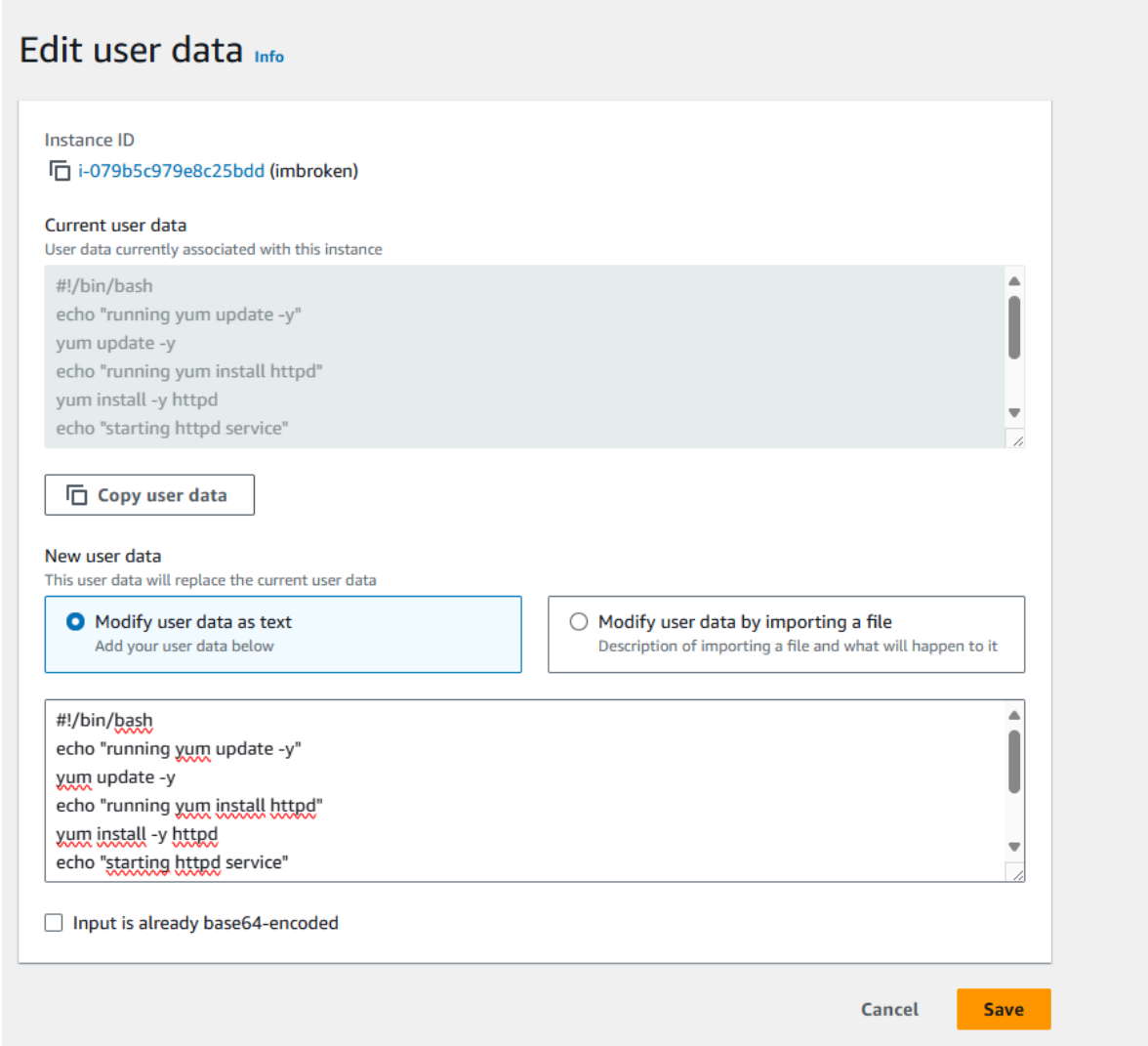
stap 3: kijk in de console

resources > physical id > klik op de id van jouw instance > selecteer jouw instance > actions > instance settings > edit user data

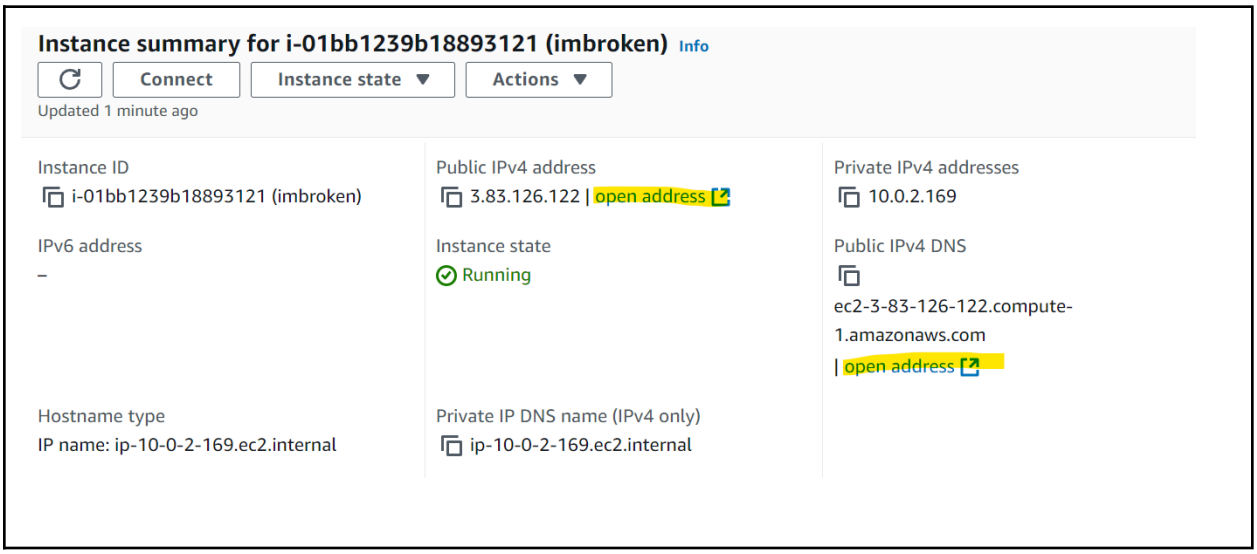


stap 4: stop de intance, herlaad, en pas de user data correct aan

```
#!/bin/bash
echo "running yum update -y"
yum update -y
echo "running yum install httpd"
yum install -y httpd
echo "starting httpd service"
systemctl start httpd
echo "enable httpd service"
systemctl enable httpd
```



stap 5: open server en verwijder **s** in https



Automatische software installeren met instance

stap1: launch an EC2 instance

stap2: ga naar advaced details ga onderaan naar User Data

stap3: vul een script in die automatische software installeert (bv. docker) en launch the instance

```
#!/bin/bash
sudo yum update -y
sudo yum install -y docker
sudo service docker start
docker run hello-world
```

Stap4: log in op ssh instance en voer volgend commando uit om te controleren

```
sudo cat /var/log/cloud-init-output.log
```

```
Digest: sha256:d211f485f2dd1dee407a80973c8f129f00d54604d2c90732e8e320e5038a0348
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
```

stap5: controller docker image

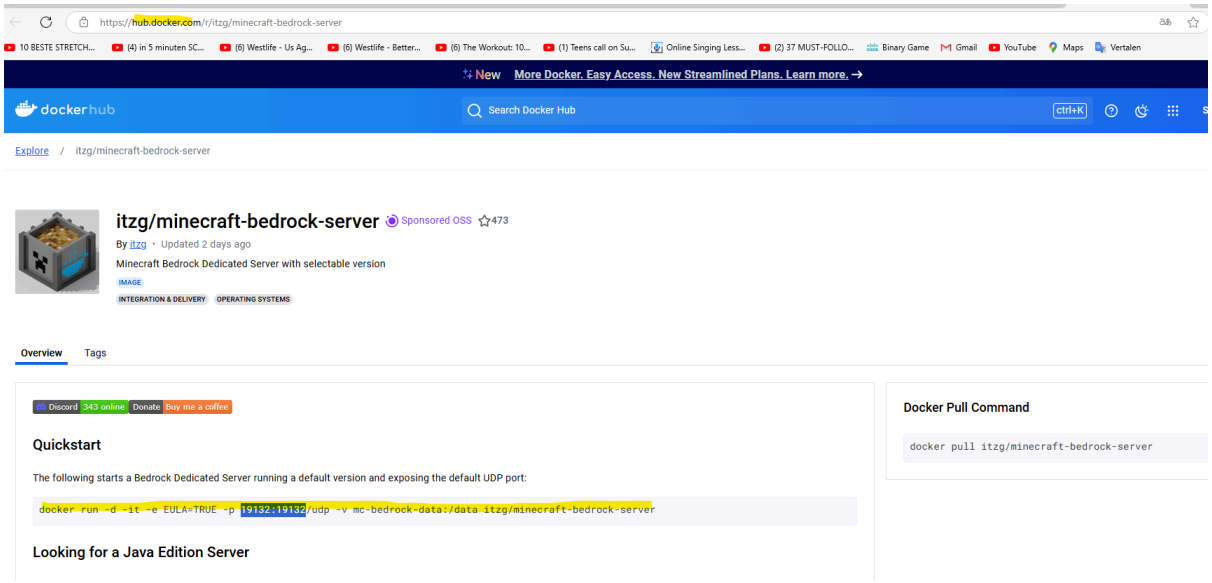
```
sudo docker container ls -a
```

```
[ec2-user@ip-172-31-39-82 ~]$ sudo docker container ls -a
CONTAINER ID   IMAGE         COMMAND    CREATED         STATUS                     PORTS     NAMES
6d287a96df43   hello-world   "/hello"   6 minutes ago   Exited (0) 6 minutes ago             sad_kalam
```

Image open in docker

Stap 1: voer commando uit om minecraft image te krijgen

docker run -d -it -e EULA=TRUE -p 25565:25565/udp -v mc-bedrock-data:/data itzg/minecraft-bedrock-server



Stap 2: voeg unbound rules toe aan groups security

Auto-assigned IP address
54.164.97.46 [Public IP]

IAM Role
–

IMDSv2
Required

VPC ID
vpc-00062b62298760fe7

Subnet ID
subnet-01f012b46b6b4d1f4

Instance ARN
arn:aws:ec2:us-east-1:765567911343:instance/i-0a959de15cedf9520

AWS Compute Optimizer finding
Opt-in to AWS Compute Optimizer for recom

Auto Scaling Group name
–

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

▼ Security details

IAM Role
–

Security groups
sg-08bb09e76ca95edd1 (launch-wizard-3)

Owner ID
765567911343

Launch time
Thu Oct 10 2024 16:58:11 GMT+0200 (Midden-

▼ Inbound rules

Filter rules

Name	Security group rule ID	Port range	Protocol	Source	Security groups
–	sgr-0f0b1952442a93743	22	TCP	0.0.0.0/0	launch-wizard-3

▼ Outbound rules

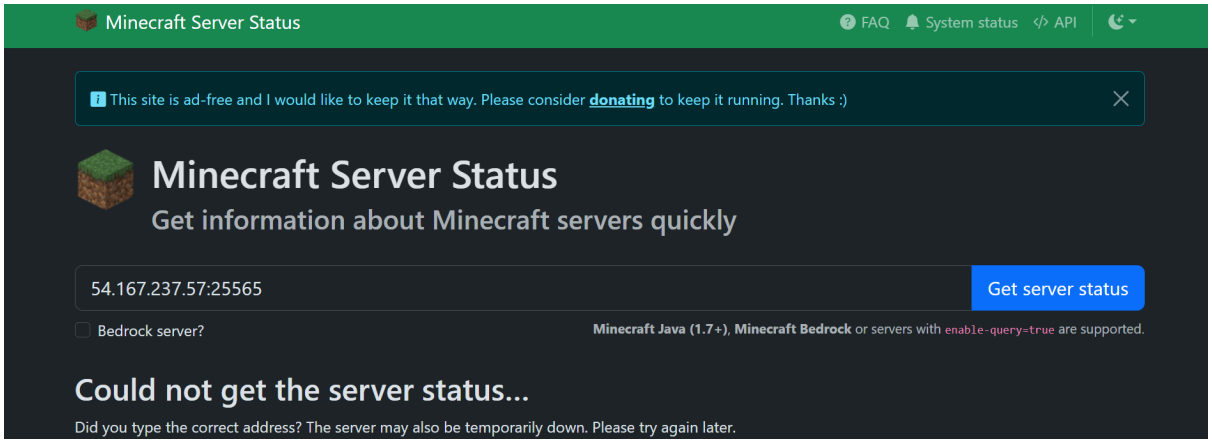
Filter rules

Inbound rules Info

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info		Description - optional Info	
sgr-0aecfeca8af2e524b	Custom TCP	TCP	25565	An…	0.0.0.0/0		Delete
sgr-0b339356c575d7386	Custom TCP	TCP	25565	An…	::/0		Delete
sgr-0e5a81994a67144b5	SSH	TCP	22	Cus…	0.0.0.0/0		Delete

Add rule

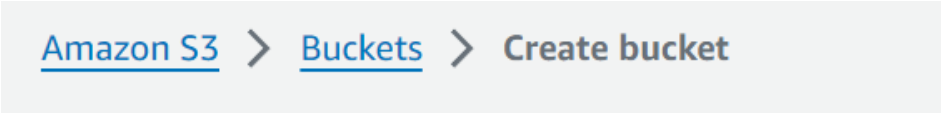
Stap3: check of alles werkt. Conclusie het werkt niet en we mogen het nog eens vragen aan de leerkracht



Storage

Creating a Default S3 Bucket for Internal Data Storage

stap1: Open console >

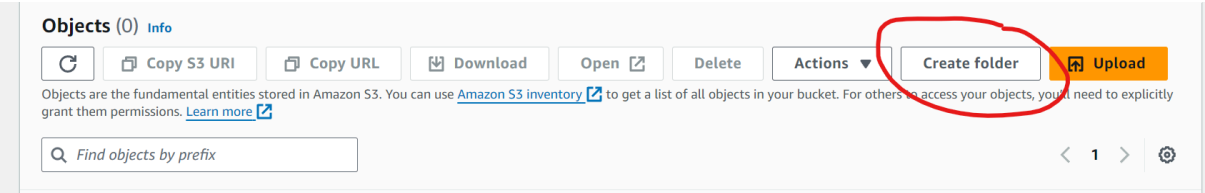


stap2: geef unique naam zonder hoofdletters

stap3: laat de rest staan

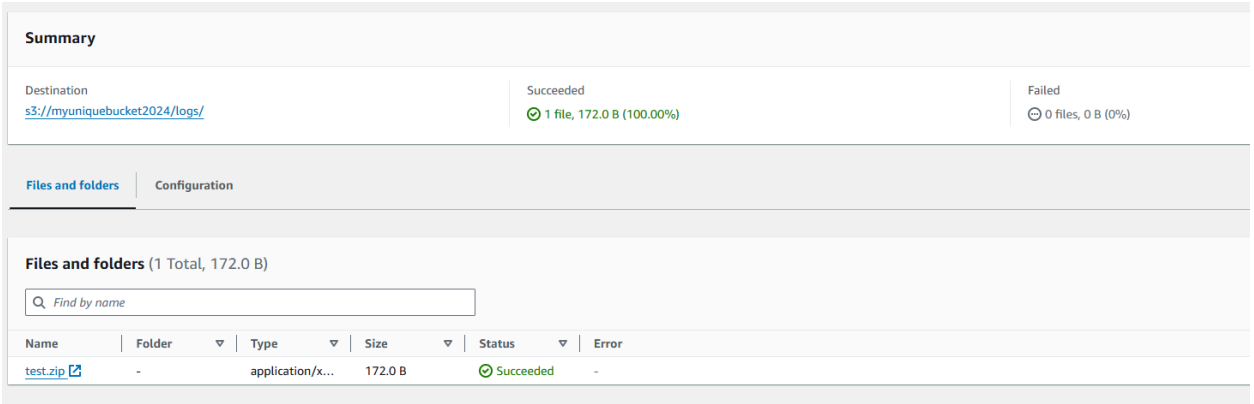
Uploading Files

stap 1 : klik op de bucket
stap 2 : Create folder



stap 3 : Upload een file in je folder

Zie hier S3 and HTTP endpoints



Controleer de setup met volgende commando's (kijk of het lijkt op de screenshot)

```
aws s3 ls
aws s3 ls s3://my-bucket/my-folder/
```

```
PS C:\Users\12101041\Desktop\Prive\CloudEssentials> aws s3 ls
2024-10-04 17:02:12 cf-templates-p1w9b7g7o5s1-us-east-1
2024-10-17 15:38:17 myuniquebucket2024
PS C:\Users\12101041\Desktop\Prive\CloudEssentials> aws s3 ls s3://myuniquebucket2024/logs/
2024-10-17 15:39:50          0
2024-10-17 15:41:52        172 test.zip
PS C:\Users\12101041\Desktop\Prive\CloudEssentials>
```

Setting Up a Static Website on S3 Using the AWS CLI

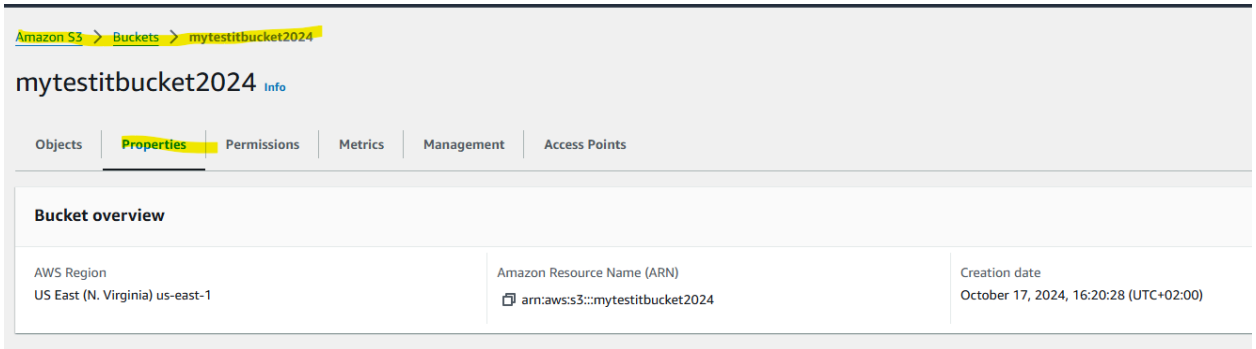
1) Create a new S3 bucket

```
aws s3 mb s3://your-bucket-name
```

```
PS C:\Users\12101041\Desktop\Prive\CloudEssentials> aws s3 mb s3://myuniquebucket2024/
make_bucket: myuniquebucket2024
```

2) Enable Static Website Hosting

```
aws s3 website s3://your-bucket-name/ --index-document index.html
```



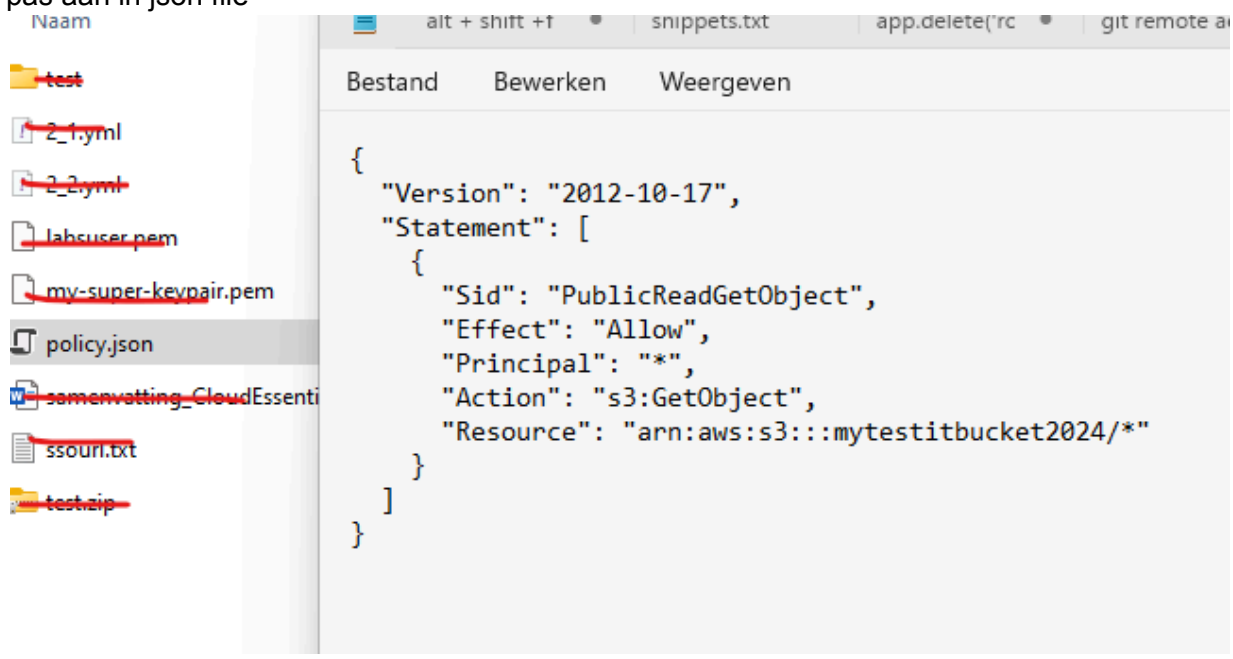
3) Disable Block Public Access

```
aws s3api put-public-access-block --bucket mytestitbucket2024
--public-access-block-configuration
"BlockPublicAcls=false,IgnorePublicAcls=false,BlockPublicPolicy=false,RestrictPublicBuckets
=false"
```

4) Add a Public Read Policy

```
aws s3api get-bucket-policy --bucket bucketname --query Policy --output text > policy.json
```

pas aan in json file




```
aws s3api put-bucket-policy --bucket bucketname --policy file://policy.json
```

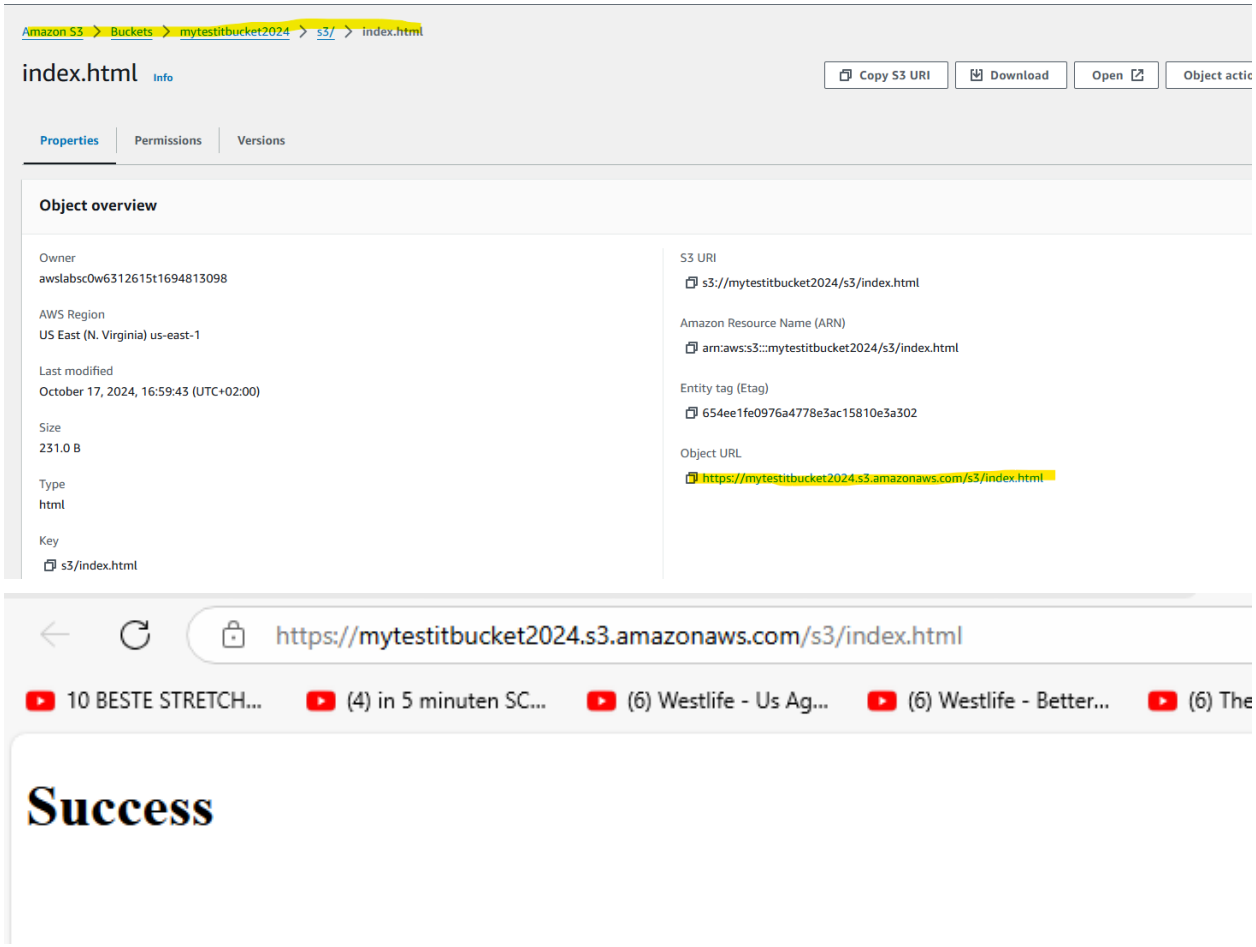
5) Upload Your Website Content

Stap 1: creëer een html file

open powershell > voer commando **code .** in > maak een file index.html > voer commando ! + tab in

```
aws s3 sync . s3://bucketname
```

6) Test Your Static Website



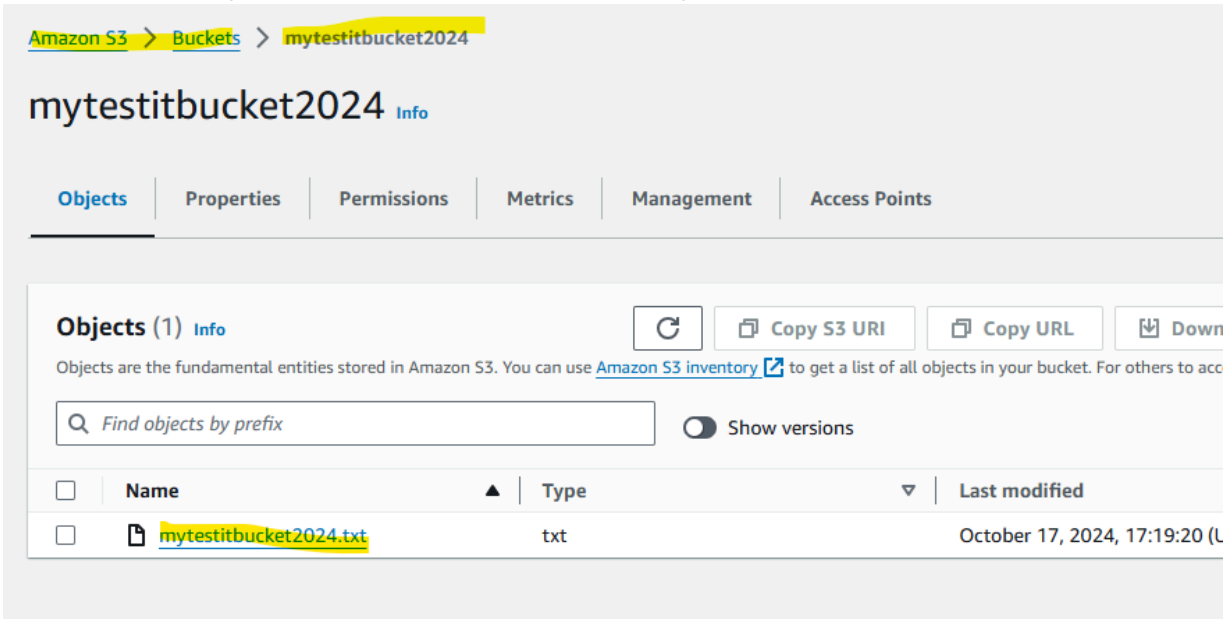
Enabling Bucket Versioning and Using Pre-Signed URLs

Enable versioning on your bucket using the AWS CLI

```
aws s3api put-bucket-versioning --bucket mytestitbucket2024
--versioning-configuration Status=Enabled
```

Upload a file to your bucket

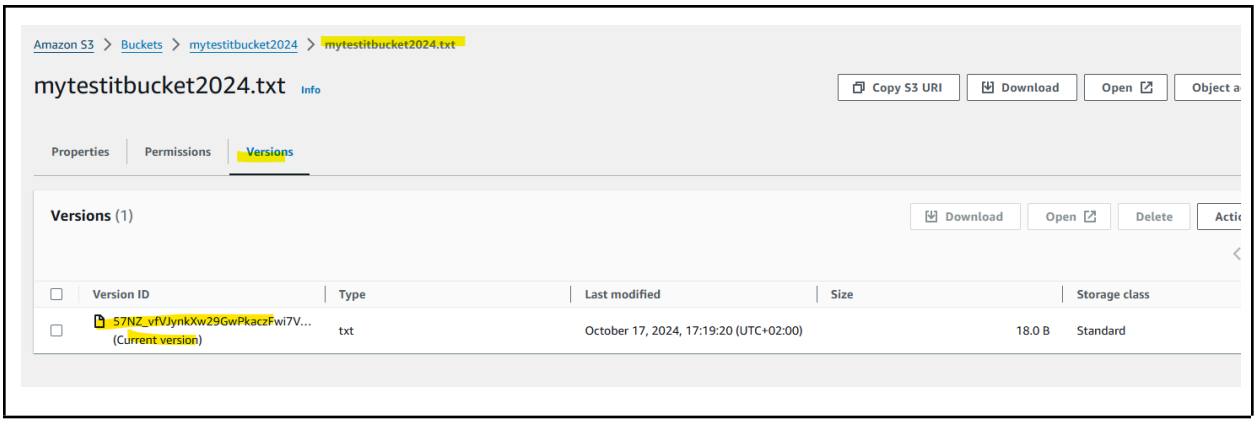
aws s3 cp .\mytestitbucket2024.txt s3://mytestitbucket2024

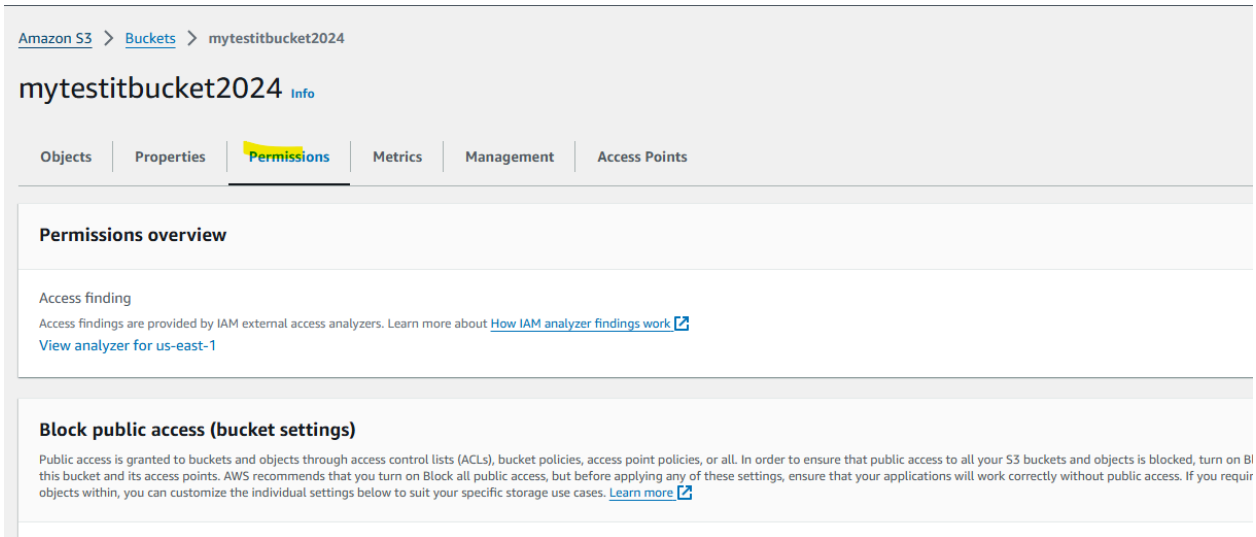


List all the versions of the file stored in your bucket

aws s3api list-object-versions --bucket bucketname --prefix filename.txt

```
PS C:\Users\12101041\Desktop\Prive\CloudEssentials>    aws s3api list-object-versions --bucket mytestitbucket2024 --prefix myte
stitbucket2024.txt
{
    "Versions": [
        {
            "ETag": "\"8ce0b6f65a26656c9839b2a7d435e838\"",
            "Size": 18,
            "StorageClass": "STANDARD",
            "Key": "mytestitbucket2024.txt",
            "VersionId": "57NZ_vfVJynkXw29GwPkaczFwi7VJKPd",
            "IsLatest": true,
            "LastModified": "2024-10-17T15:19:20+00:00",
            "Owner": {
                "DisplayName": "awslabsc0w6312615t1694813098",
                "ID": "9a29fa52b845ade2874f1c3693a260a23e1bb4db4fcac38b2212301d30184df8"
            }
        }
    ],
    "RequestCharged": null
}
```






```
aws s3 cp mytestitbucket2024.txt
s3://mytestitbucket2024/mytestitbucket2024.txt --acl private
```

mytestitbucket2024.txt Info

Copy S3 URI | Download | Open | Object actions

Properties | Permissions | Versions

Access control list (ACL)

Grant basic read/write permissions to AWS accounts. Learn more

Edit

This bucket has the bucket owner enforced setting applied for Object Ownership
When bucket owner enforced is applied, use bucket policies to control access. Learn more

Grantee	Object	Object ACL
Object owner (your AWS account) Canonical ID: 9a29fa52b845ade2874f1c3693a260a23e1bb4db4fcac38b2212301d30184df8	Read	Read, Write
Everyone (public access) Group: http://acs.amazonaws.com/groups/global/AllUsers	-	-
Authenticated users group (anyone with an AWS account) Group: http://acs.amazonaws.com/groups/global/AuthenticatedUsers	-	-

Amazon S3 > Buckets > mytestitbucket2024 > Edit Object Ownership

Edit Object Ownership Info

Object Ownership

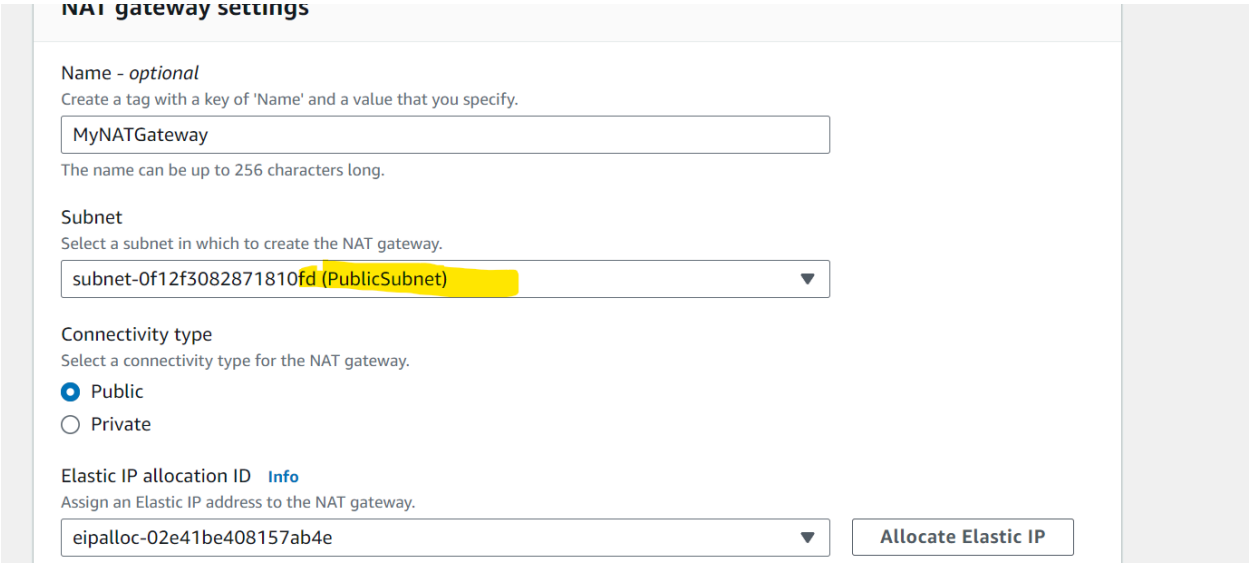
Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

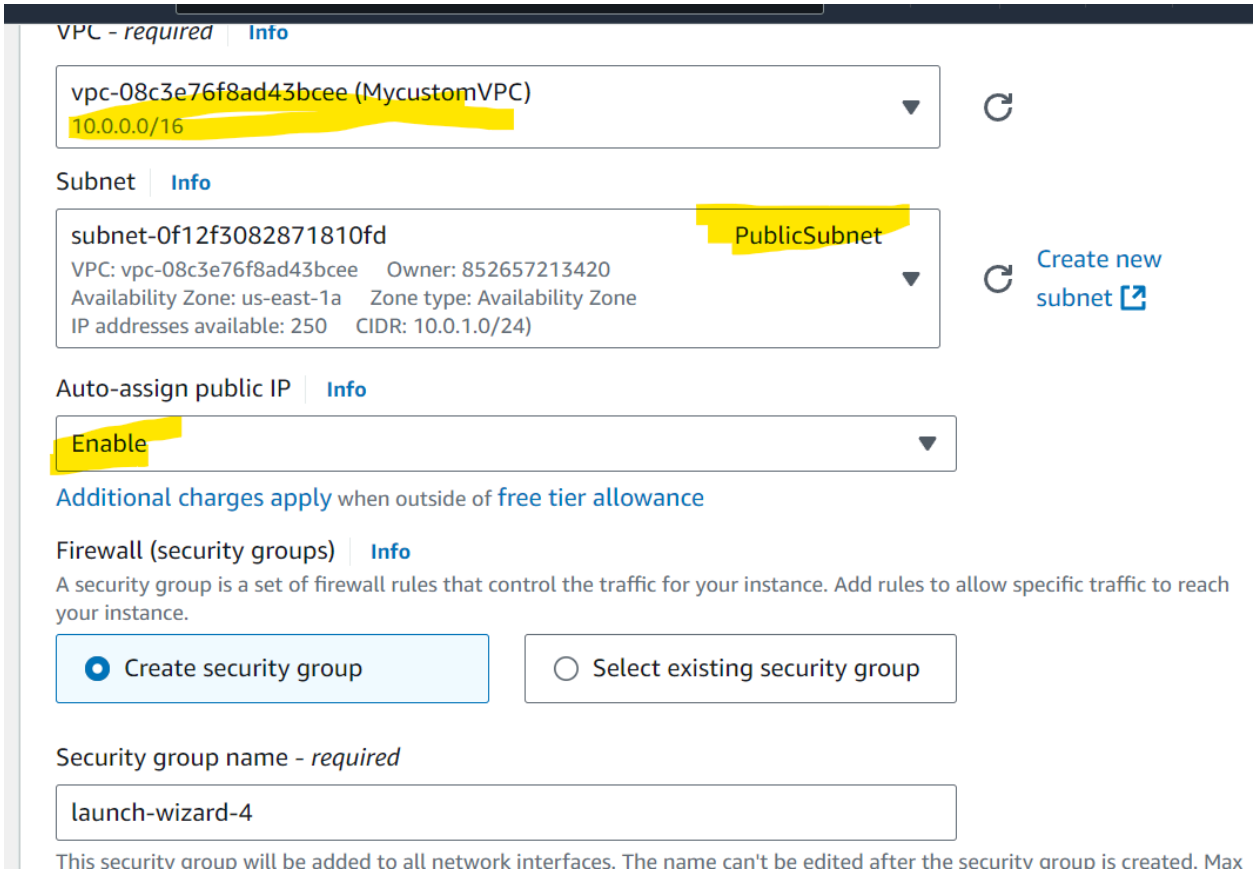
- (●) **ACLs disabled (recommended)**
  All objects in this bucket are owned by this account. Access to this bucket and its objects is specified using only policies.
- ( ) **ACLs enabled**
  Objects in this bucket can be owned by other AWS accounts. Access to this bucket and its objects can be specified using ACLs.

Object Ownership

Bucket owner enforced

Cancel | Save changes


NAT gateway settings
Name - optional
Create a tag with a key of 'Name' and a value that you specify.
MyNATGateway
The name can be up to 256 characters long.
Subnet
Select a subnet in which to create the NAT gateway.
subnet-0f12f3082871810fd (PublicSubnet)
Connectivity type
Select a connectivity type for the NAT gateway.
Public
Private
Elastic IP allocation ID Info
Assign an Elastic IP address to the NAT gateway.
eipalloc-02e41be408157ab4e
Allocate Elastic IP


VPC - required Info
vpc-08c3e76f8ad43bcee (MycustomVPC)
10.0.0.0/16
Subnet Info
subnet-0f12f3082871810fd
PublicSubnet
VPC: vpc-08c3e76f8ad43bcee Owner: 852657213420
Availability Zone: us-east-1a Zone type: Availability Zone
IP addresses available: 250 CIDR: 10.0.1.0/24)
Create new subnet
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
Security group name - required
launch-wizard-4
This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max

Networking

Create a VPC (Virtual Private Cloud)

- Go to the VPC Dashboard in the AWS Console.
- Click on **Create VPC**.
- In the VPC settings, choose **VPC only** and enter:
    - Name tag: **`MyCustomVPC`**.
    - IPv4 CIDR block: **`10.0.0.0/16`**. > Type dit zelf!!!!
    - Leave everything else as default and click Create VPC.

Create Subnets

1. Go to Subnets under the VPC Dashboard.
2. Click Create subnet.
3. In the Create subnet section:
    - Select the VPC you just created (**`MyCustomVPC`**)
    - Subnet 1 (Public Subnet):
        - Name: **`PublicSubnet`**
        - Availability Zone: Select **`us-east-1a`**.
        - IPv4 CIDR block: **`10.0.1.0/24`**
        - Click Add another subnet.
    - Subnet 2 (Private Subnet):
        - Name: **`PrivateSubnet`**
        - Availability Zone: Use the same as the Public Subnet
        - IPv4 CIDR block: **`10.0.2.0/24`**
4. Click Create subnet.

Create and Attach an Internet Gateway

1. Go to Internet Gateways under the VPC Dashboard.
2. Click Create Internet Gateway.
3. Provide the following details:
    - Name tag: **`MyIGW`**.
4. Click Create internet gateway.
5. After creation, select the new Internet Gateway and click Actions > Attach to VPC.
6. Choose the VPC (**`MyCustomVPC`**)
7. Click Attach Internet Gateway

Create a Route Table for the Public Subnet

1. Go to Route Tables under the VPC Dashboard.
2. Click Create Route Table.
3. Provide the following details:
    - Name tag: **`PublicRouteTable`**.
    - VPC: Select **`MyCustomVPC`**.
4. Click Create route table.
5. After creation, select the PublicRouteTable and go to the Routes tab.
6. Click Edit routes and add a route:
    - Destination: **`0.0.0.0/0`**.
    - Target: Select **Internet Gateway** and choose **`MyIGW`**.
7. Click Save routes.
8. Now go to the Subnet Associations tab.
9. Click Edit subnet associations, select **PublicSubnet**,
10. click Save associations.

Create a NAT Gateway for the Private Subnet

1. Go to Elastic IPs under the VPC Dashboard.
2. Click Allocate Elastic IP address and then

3. click Allocate.
4. Go to NAT Gateways under the VPC Dashboard.
5. Click Create NAT Gateway and provide the following details:
    - Name tag: **`MyNATGateway`**.
    - Subnet: Select **`PublicSubnet`**.
    - Elastic IP Allocation ID: Select the Elastic IP you just allocated.
6. Click Create NAT Gateway and wait until it becomes available.

Create a Route Table for the Private Subnet

1. Go to Route Tables under the VPC Dashboard.
2. Click Create Route Table.
3. Provide the following details:
    - Name tag: **`PrivateRouteTable`**.
    - VPC: Select **`MyCustomVPC`**.
4. Click Create route table.
5. After creation, select the PrivateRouteTable and go to the Routes tab.
6. Click Edit routes and add a route:
    - Destination: **`0.0.0.0/0`**.
    - Target: Select NAT Gateway and choose **`MyNATGateway`**.
7. Click Save routes.
8. Now go to the Subnet Associations tab.
9. Click Edit subnet associations, select PrivateSubnet, and click Save associations.

Test Connectivity

Step 1: Launch an EC2 Instance in the Public Subnet

10. Go to EC2 Dashboard and click Launch **Instance**..
11. Provide the following details:
    - Name: **`PublicInstance`**
    - AMI: Select Amazon Linux
    - Instance Type: **`t2.micro`** (Free tier eligible)
    - **Edit** Network settings:
        i. VPC: Select **`MyCustomVPC`**
        ii. Subnet: Select **`PublicSubnet`**
        iii. Auto-assign Public IP: **Enabled**
    - Security Group:

      i. **Create security group** allowing SSH (port 22) from your IP address. (**My ip)**

12. Launch the instance and wait for it to be running.

Step 2: Launch an EC2 Instance in the Private Subnet

1. Go back to the EC2 Dashboard and click Launch Instance.
2. Provide the following details:
    - Name: **`PrivateInstance`**.
    - AMI: Select Amazon Linux.
    - Instance Type: **`t2.micro`** (Free tier eligible).
    - Select **Vockey**
    - **Edit** Network settings:
        - VPC: Select **`MyCustomVPC`**.
        - Subnet: Select **`PrivateSubnet`**.
        - Auto-assign Public IP: Disabled.

    - Security Group: Create a new security group allowing SSH (port 22) from ANY address.
3. Launch the instance and wait for it to be running.
4. SSH into the PublicInstance (using its public IP) and then SSH into the
5. ssh ec2-user@<pubIP> -i "C:\Users\Josephine\Downloads\labsuser.pem"
6. PrivateInstance from the PublicInstance using the private IP of the private instance:
7. ssh ec2-user@<privateIP> -i "C:\Users\Josephine\Downloads\labsuser.pem"

Exercises Networking I

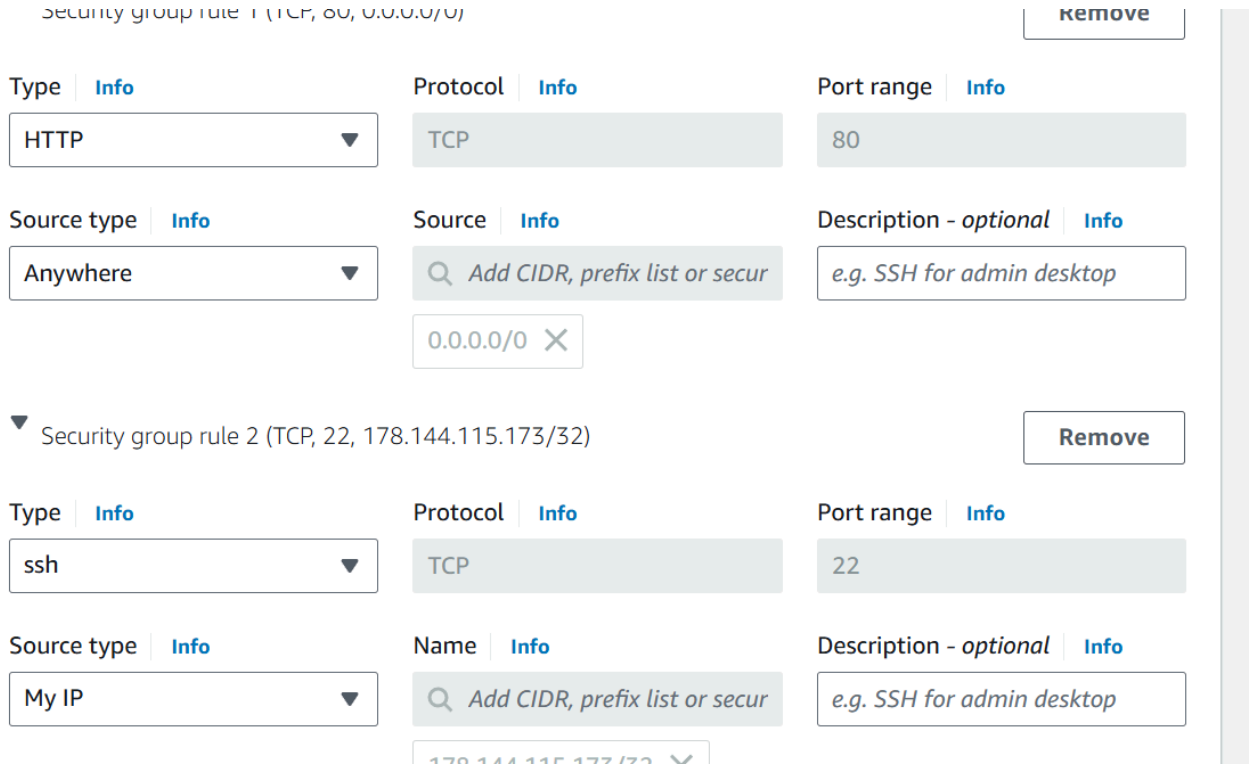
Exercise 1: Configuring Security Groups for a Web Server

1. Launch an EC2 instance in the **PublicSubnet**:
    - Name: **`WebServerInstance`**.
    - AMI: Amazon Linux 2.
    - Instance Type: **`t2.micro`**.
    - Key pair: **vockey**
    - Subnet: **`PublicSubnet`**.
    - Auto-assign Public IP: Enabled.
2. Configure the security group for the instance:
    - Allow HTTP (port 80) traffic from anywhere (**`0.0.0.0/0`**).
    - Allow SSH (port 22) only from your IP address.
3. Install a web server:
    - SSH into the instance and run:
    - **`sudo yum update -y sudo yum install httpd -y sudo systemctl start httpd sudo systemctl enable httpd`**
    -

- Verify the web server is running by accessing the instance's public IP in a browser: **`http://<public-ip>`**.

4. Test: Ensure that the HTTP traffic is accessible publicly but SSH is restricted to your IP. → kun je niet checken

Problemen: SSH wel toegang mag niet waarom?




```
PS C:\Users\Josephine> ssh  ec2-user@178.144.115.173 -i "C:\Users\Josephine\Downloads\labsuser.pem"
ssh: connect to host 178.144.115.173 port 22: Connection timed out
```

▼ Inbound rules

Filter rules

Security group rule ID	Port range	Protocol	Source	Security groups
sgr-035089ab9ee51ac9f	22	TCP	178.144.115.173/32	launch-wizard-3
sgr-0e1deb6eecf7bd67a	80	TCP	0.0.0.0/0	launch-wizard-3

Exercises Networking II

Task 1: Add the instances to the Load Balancer

- Choose Create target group
- Choose a target type: Instances
- Target group name, enter: MyLabGroup
- Select my-VPC from the VPC drop-down menu.
- Choose Next. The Register targets screen appears.
  Note: Targets are the individual instances that will respond to requests from the Load Balancer.
- select the 5 EC2s
- Include as pending below 5 EC2s –
- Create target group

Task 2: Create a Load Balancer

- Create load balancer
- choose Application Load Balancer
- vul **name** in en kies **my-vpc**
- **selecteer de 5 availability zones**

peering. To confirm the VPC for your targets, vi

my-vpc
vpc-0919554da08330594
IPv4 VPC CIDR: 10.0.0.0/16

Mappings | Info

Select at least two Availability Zones and one su
in these Availability Zones only. Availability Zon
are not available for selection.

Availability Zones

- [ ] us-east-1a (use1-az2)
- [ ] us-east-1b (use1-az4)
- [ ] us-east-1c (use1-az6)
- [ ] us-east-1d (use1-az1)
- [ ] us-east-1f (use1-az5)

- selecteer een default security group als dat er is anders volg de stap beneden

1. Create a Security Group for the Load Balancer

- **Name**: `LoadBalancer-SG`
- **Inbound Rule**: Allow HTTP (port 80) traffic from the internet
  - Protocol: HTTP
  - Port Range: 80
  - Source: 0.0.0.0/0 (to allow all incoming traffic on port 80)
- **Outbound Rule**: Default (Allow all outbound traffic, or restrict as per requirement)

2. Create a Security Group for the Web Application Instances

- **Name**: `WebAppInstances-SG`
- **Inbound Rule**: Allow traffic from the Load Balancer on HTTP (port 80)
  - Protocol: HTTP
  - Port Range: 80
  - **Source**: `LoadBalancer-SG` (select the ID of the `LoadBalancer-SG` security group as the source)
- **Outbound Rule**: Default (Allow all outbound traffic, or restrict as per requirement)

- ga terug naar vorige tabblad en selecteer de nieuwe security group
- Listener HTTP:80 row, set the Default action to forward to MyLabGroup.
- create

EC2 > Load balancers > LabELB

LabELB

Actions

Details

Load balancer type	Status	VPC	Load balancer IP address type
Application	Active	vpc-0919554da08330594	IPv4
Scheme	**Hosted zone**	**Availability Zones**	**Date created**
Internet-facing	Z35SXDOTRQ7X7K	subnet-05b375b925fcb2e26 us-east-1f (use1-az5) subnet-0160f4124a02faa4d us-east-1d (use1-az1) subnet-0c0ae3c947e887dfa us-east-1a (use1-az2) subnet-078422f599611ec82 us-east-1b (use1-az4) subnet-034774c6dc3f120e1 us-east-1c (use1-az6)	November 4, 2024, 10:44 (UTC+01:00)

Load balancer ARN

arn:aws:elasticloadbalancing:us-east-1:852657213420:loadbalancer/app/LabELB/2c3

DNS name Info

LabELB-1882714066.us-east-1.elb.amazonaws.com (A Record)

Database

Task 1: Create an RDS postgreSQL database

RDS > Create DB

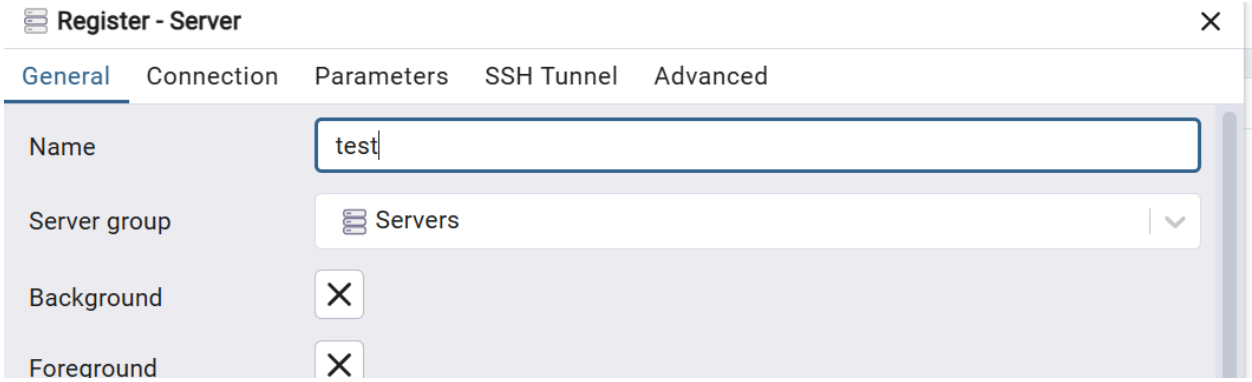
- kies standaard DB
- PostgreSQL
- For this exercise, use the "Free Tier" template
- Settings> Master Username → kies een username en write down the hostname to use later.
- kies “self managed” en stel een root password voor the database in schrijf het op! **(toorPostgreSQL)**
- Make sure it can connect to EC2 instances, especially the one in the "Labo5DebugVPC" (staat onder connectivity)
    - duid “Connect to an EC2 compute resource” aan
    - vul de EC2 instance in in de drop zone
- Once created

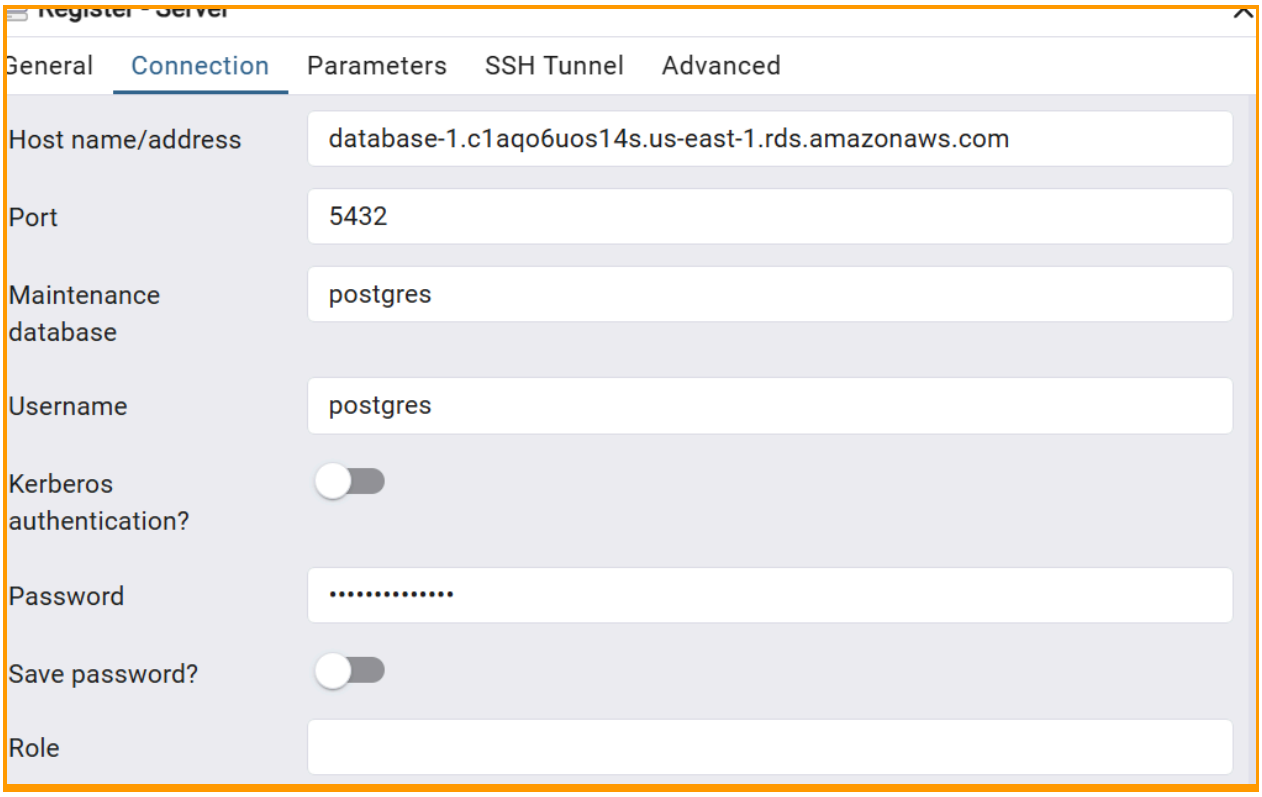
Task 2: Create a db connection in pgadmin4

- Lookup the public IP of the EC2 in the Labo5DebugVPC.
- Open the IP in your browser **HTTP! Doe s weg!**

log in to the pgadmin4 app with following credentials:

- User email: student@pxl.be
- Password: SuperSecret
- "add new server" and use the hostname, login&password you write down earlier for the database.


Register - Server
General
Connection
Parameters
SSH Tunnel
Advanced
Name
test
Server group
Servers
Background
Foreground


General
Connection
Parameters
SSH Tunnel
Advanced
Host name/address
database-1.c1aqo6uos14s.us-east-1.rds.amazonaws.com
Port
5432
Maintenance database
postgres
Username
postgres
Kerberos authentication?
Password
Save password?
Role

Lambda functies

Algemene kennis lambda

lambda > create function

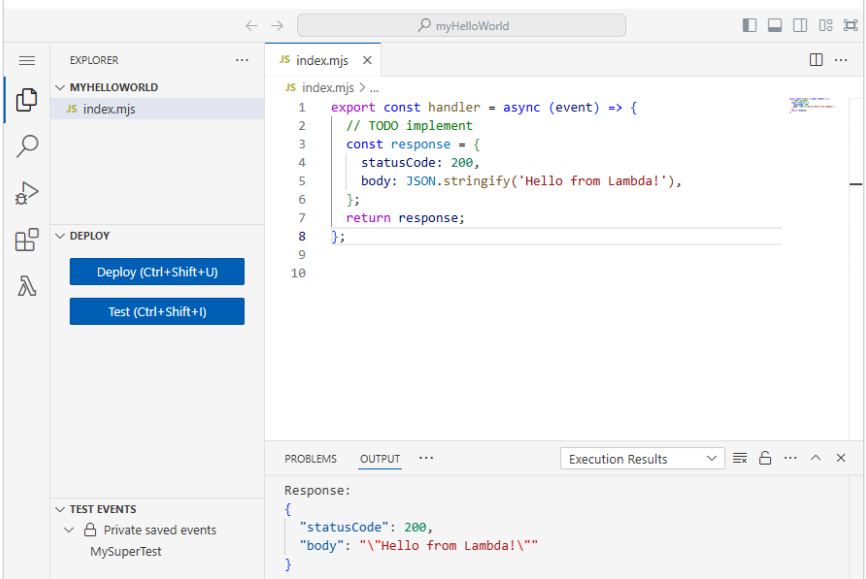
- Another from scratch
- Geef een functienaam
- kies je taal in dit geval runtime Node.js 22x
- architecture > x86_64

Change default execution role

- use an existing role > **LabRole**

Create function

Je krijgt deze scherm

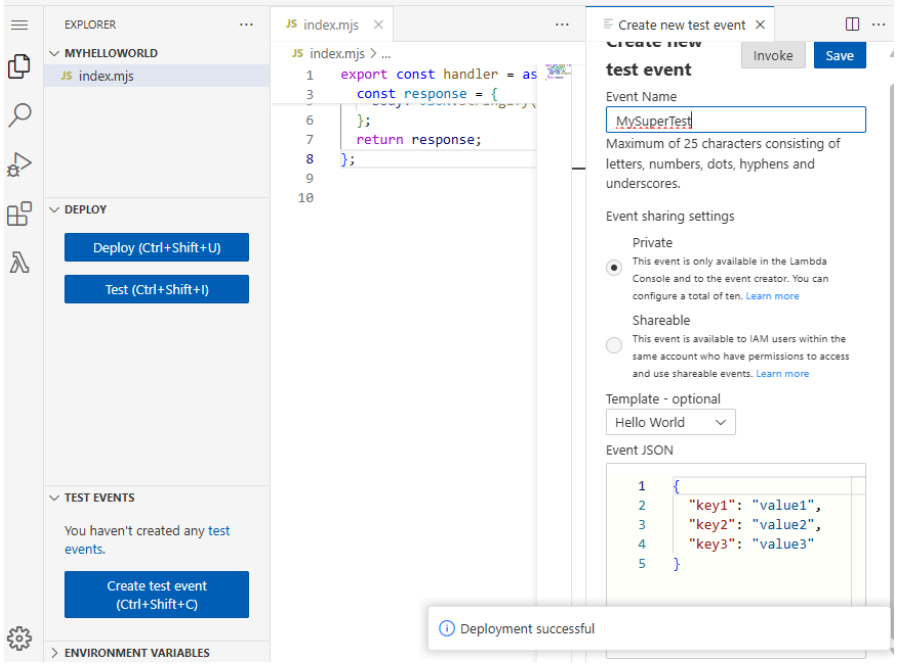


Tip om zwart balkje weg te halen in code > **esc**

- Schrijf je code
- Druk op deploy

Wil je testen

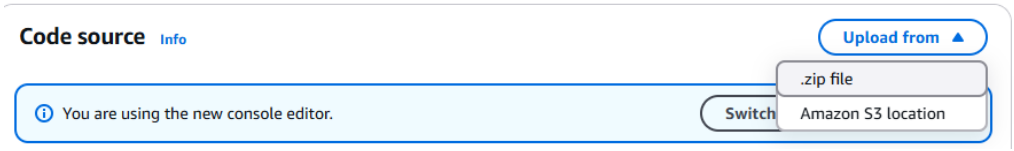
- Druk op Create test event of op + (onder events)
- zie een rechterscherm > geef naam van test en selecteer een template (s3 put, …)
- Druk op save



- Druk op test onder deploy om te testen of het gerund heeft

Handige tips

- monitor > kun je gegevens analyseren
- monitor > view cloudwatch logs
- bovenaan vind je een tab upload from. Je kan een zip bestand uploaden (doen we niet kan wel)



Exercise 1

- maak een lambda event aan (**zie algemene info**)
- maak een test en kies template hello world
- plaats jouw json request erin

```
{
  "name": "Richelle"
}
```

- voeg een lambda-event aan toe in je code. Voor gemak maak een **try-catch**

In de oefening wordt gevraagd om een event op te halen. Door het event te verwerken en een variabele aan te maken, kun je de JSON-body uitlezen. Vervolgens maak je een response waarin je een bericht opneemt dat je wilt versturen. Dit zorgt ervoor dat er een JSON-response wordt teruggestuurd.

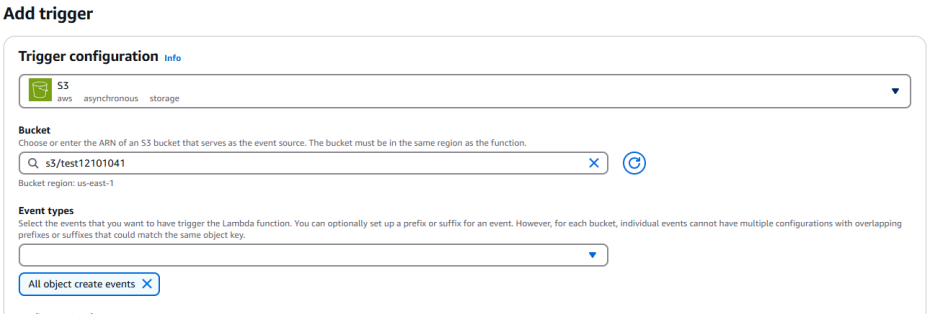
```
export const handler = async (event) => {
  try {
    const requestBody = event;
    console.log("Received request:", requestBody);
    const response = {
      message: `Hello, ${requestBody.name}!`,
    };

    return response;
  } catch (err) {
    console.error("Error parsing request body:", err);
    return {
      message: "Invalid request format",
    };
  }
};
```

- maak een deploy en test

```
Status: Succeeded
Test Event Name: test

Response:
{
  "message": "Hello, Richelle!"
}
```

Exercise 2

- Maak een S3 bucket. **Zorg dat je permissies juist zijn**. (Zie eerdere s3 bucket)
- Druk op Add trigger
- maak een trigger: kies S3, je gekozen bucket en vink rechten aan



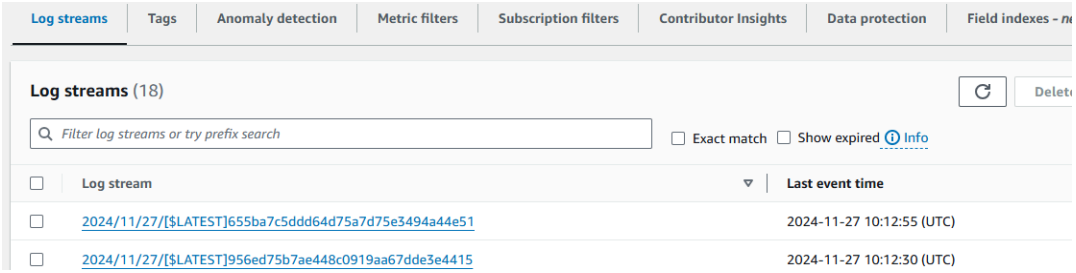
- Schrijf een code
  - je hoeft geen response te krijgen om het antwoord te weten of het gelogd heeft

```
export const handler = async (event) => {
  try {
    const bucketname = event.Records[0].s3.bucket.name;
    const key = event.Records[0].s3.object.key;
    const size = event.Records[0].s3.object.size;
    console.log(`Bestand geüpload: ${key}, Grootte: ${size} bytes,
Bucket: ${bucketname}`)
  }catch(err){
    console.log('Mislukt')
  }

};
```

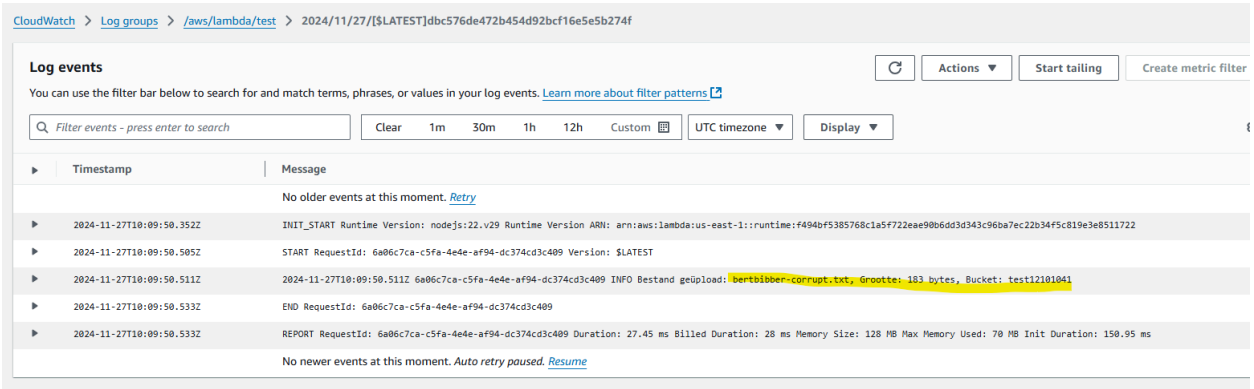
- maak een test van en kies s3 put om te gaan testen.
  - verander de key value in een .txt file dat maakt het overzichtelijker
- voeg een file toe in je gekozen s3 bucket

Om te zien of het gelukt is

- ga naar monitor
- Druk op View CloudWatch logs
- ga naar logs > logs groups > kies je lambda functie
- nu ga je naar log streams > de eerste log stream is de meest recente
- Druk op de eerste link



- Je vind je log gegevens daar



Exercise 3

- maak een dynamodb aan. Druk op create tabel
- Geef de table name Todos
- Partition key geef de naam id
- Create table

Maak een lambda aan

- plaats de node.js code erin

```
import { DynamoDBClient } from "@aws-sdk/client-dynamodb";
import {
  DynamoDBDocumentClient,
  PutCommand,
} from "@aws-sdk/lib-dynamodb";

const client = new DynamoDBClient({});

const dynamo = DynamoDBDocumentClient.from(client);

export const handler = async (event) => {
  const item = {
```

```
    id: event.id,
    task: event.task,
    status: event.status
  }
  await dynamo.send(new PutCommand({
    TableName: "Todos",
    Item: item
  }));
};
```

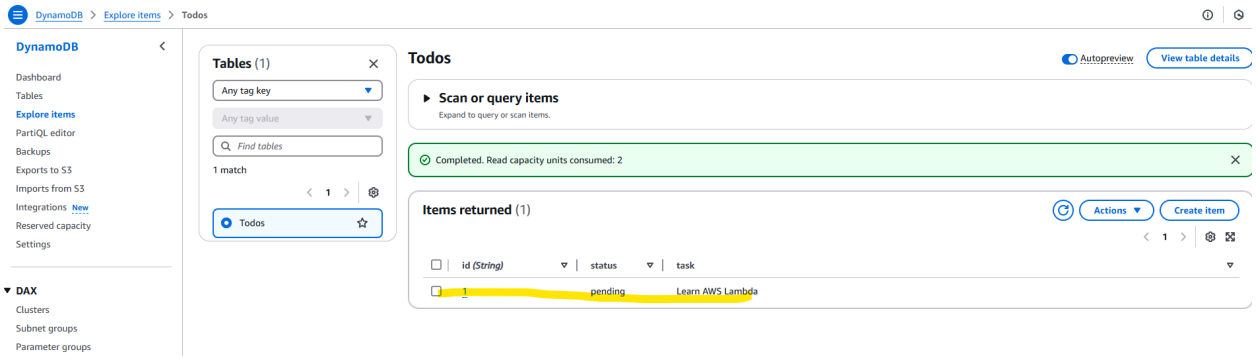
- Maak vervolgens een test. Hier plaats je put gegevens erin. Geef het een naam en druk op save

```
{
  "id": "1",
  "task": "Learn AWS Lambda",
  "status": "pending"
}
```

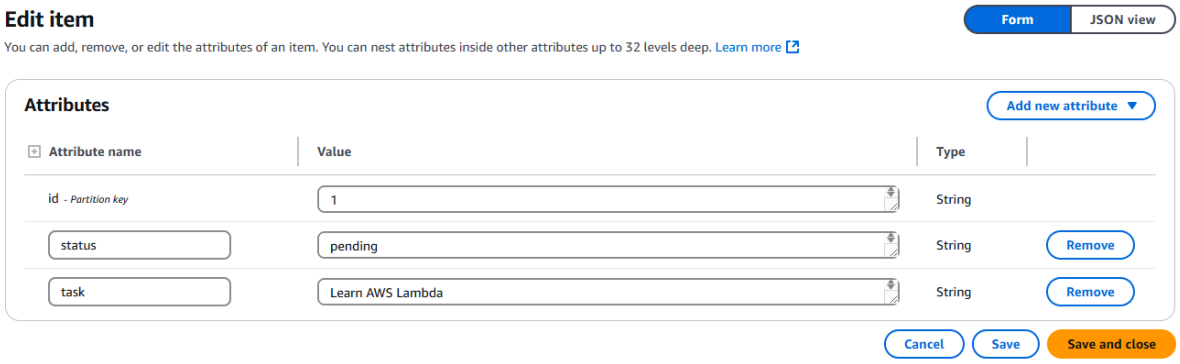
- Vervolgens deploy en test je dat

controle of het gewerkt heeft

- ga naar Explore items > selecteer Todos (je dynamodb)
- Je vind een id 1



- Druk op 1
- Daar vind je je aangemaakte tabel



Exercise 4

- maak een lambda functie aan (**zie algemene oefening**)
- Maak een ec2 server aan (**zie eerdere documentatie**)
- voeg code toe aan lambda functie

```
import { DescribeInstancesCommand, EC2Client } from
"@aws-sdk/client-ec2";
export const handler = async (event) => {
    const ec2Client = new EC2Client({ region: event.region });
    const instanceId = event.detail["instance-id"];
    try {
        const command = new DescribeInstancesCommand({
            InstanceIds: [instanceId],
        });
        const response = await ec2Client.send(command);
        const publicIp =
response.Reservations[0].Instances[0].PublicIpAddress;

        console.log(`Public IP of instance ${instanceId}: ${publicIp}`);
        return {
            statusCode: 200,
            body: `Public IP logged: ${publicIp}`,
        };
    } catch (error) {
        console.error("Error fetching instance data: ", error);
        throw error;
    }
};
```

```
import { DescribeInstancesCommand, EC2Client } from
"@aws-sdk/client-ec2";
export const handler = async (event) => {
  try {
    const client = new EC2Client({ region: event.region });
    const input = { // DescribeInstancesRequest
      InstanceIds: [ // InstanceIdStringList
        event.detail["instance-id"],
      ],
    };
    const command = new DescribeInstancesCommand(input);
    const response = await client.send(command);
    const Ipadress =
response.Reservations[0].Instances[0].PublicIpAddress
    console.log(Ipadress)
    return Ipadress;
  } catch (error) {
    console.log(error)
  }
};
```

- Om te weten te komen waar je de public ip adres te vinden is
  → `const publicIp = response.Reservations[0].Instances[0].PublicIpAddress;`
- doe het volgende

```
import { DescribeInstancesCommand, EC2Client } from
"@aws-sdk/client-ec2";

export const handler = async (event) => {
    const ec2Client = new EC2Client({ region: event.region });
    const instanceId = event.detail["instance-id"];

    try {
        const command = new DescribeInstancesCommand({
            InstanceIds: [instanceId],
        });
```

```
        const response = await ec2Client.send(command);
        return {
            statusCode: 200,
            message: response
        };
    } catch (error) {
        console.error("Error fetching instance data: ", error);
        throw error;
    }
};
```

- in de response data zie je


```
Response:
{
  "statusCode": 200,
  "message": {
    "$metadata": {
      "httpStatusCode": 200,
      "requestId": "2ba59fb4-5c75-4d39-8c67-91a905d330f2",
      "attempts": 1,
      "totalRetryDelay": 0
    },
    "Reservations": [
      {
        "Groups": [],
        "Instances": [
          {
            "AmiLaunchIndex": 0,
            "ImageId": "ami-0453ec754f44f9a4a",
            "InstanceId": "i-07b9d918db3cd6b95",
            "InstanceType": "t2.micro",
            "KeyName": "vockey",
            "LaunchTime": "2024-12-01T08:56:52.000Z",
            "Monitoring": {
              "State": "disabled"
            },
            "Placement": {
```

```
            "AvailabilityZone": "us-east-1a",
            "GroupName": "",
            "Tenancy": "default"
          },
          "PrivateDnsName": "ip-172-31-26-18.ec2.internal",
          "PrivateIpAddress": "172.31.26.18",
          "ProductCodes": [],
          "PublicDnsName": "ec2-54-85-79-58.compute-1.amazonaws.com",
          "PublicIpAddress": "54.85.79.58",
          "State": {
            "Code": 16,
            "Name": "running"
          },
          "StateTransitionReason": "",
          "SubnetId": "subnet-0f9a40ec0716a8f67",
          "VpcId": "vpc-0d0a9b2daae79adaa",
          "Architecture": "x86_64",
          "BlockDeviceMappings": [
            {
              "DeviceName": "/dev/xvda",
              "Ebs": {
                "AttachTime": "2024-12-01T08:48:11.000Z",
                "DeleteOnTermination": true,
                "Status": "attached",
                "VolumeId": "vol-04e040d149d497f7e"
              }
            }
          ],
          "ClientToken": "bf9c8a51-25d6-42b5-a952-f37badc7e1fd",
          "EbsOptimized": false,
          "EnaSupport": true,
          "Hypervisor": "xen",
          "NetworkInterfaces": [
            {
              "Association": {
                "IpOwnerId": "amazon",
                "PublicDnsName":
"ec2-54-85-79-58.compute-1.amazonaws.com",
                "PublicIp": "54.85.79.58"
```

```
                },
                "Attachment": {
                  "AttachTime": "2024-12-01T08:48:11.000Z",
                  "AttachmentId": "eni-attach-0365b4c3b0112bf5f",
                  "DeleteOnTermination": true,
                  "DeviceIndex": 0,
                  "Status": "attached",
                  "NetworkCardIndex": 0
                },
                "Description": "",
                "Groups": [
                  {
                    "GroupName": "launch-wizard-1",
                    "GroupId": "sg-026b35328c0e724b4"
                  }
                ],
                "Ipv6Addresses": [],
                "MacAddress": "0a:ff:c5:e3:e5:e7",
                "NetworkInterfaceId": "eni-0d841ff317ca42c33",
                "OwnerId": "765567911343",
                "PrivateDnsName": "ip-172-31-26-18.ec2.internal",
                "PrivateIpAddress": "172.31.26.18",
                "PrivateIpAddresses": [
                  {
                    "Association": {
                      "IpOwnerId": "amazon",
                      "PublicDnsName":
"ec2-54-85-79-58.compute-1.amazonaws.com",
                      "PublicIp": "54.85.79.58"
                    },
                    "Primary": true,
                    "PrivateDnsName": "ip-172-31-26-18.ec2.internal",
                    "PrivateIpAddress": "172.31.26.18"
                  }
                ],
                "SourceDestCheck": true,
                "Status": "in-use",
                "SubnetId": "subnet-0f9a40ec0716a8f67",
                "VpcId": "vpc-0d0a9b2daae79adaa",
```

```
            "InterfaceType": "interface"
          }
        ],
        "RootDeviceName": "/dev/xvda",
        "RootDeviceType": "ebs",
        "SecurityGroups": [
          {
            "GroupName": "launch-wizard-1",
            "GroupId": "sg-026b35328c0e724b4"
          }
        ],
        "SourceDestCheck": true,
        "Tags": [
          {
            "Key": "Name",
            "Value": "testInstance"
          }
        ],
        "VirtualizationType": "hvm",
        "CpuOptions": {
          "CoreCount": 1,
          "ThreadsPerCore": 1
        },
        "CapacityReservationSpecification": {
          "CapacityReservationPreference": "open"
        },
        "HibernationOptions": {
          "Configured": false
        },
        "MetadataOptions": {
          "State": "applied",
          "HttpTokens": "required",
          "HttpPutResponseHopLimit": 2,
          "HttpEndpoint": "enabled",
          "HttpProtocolIpv6": "disabled",
          "InstanceMetadataTags": "disabled"
        },
        "EnclaveOptions": {
          "Enabled": false
```

```
            },
            "BootMode": "uefi-preferred",
            "PlatformDetails": "Linux/UNIX",
            "UsageOperation": "RunInstances",
            "UsageOperationUpdateTime": "2024-12-01T08:48:11.000Z",
            "PrivateDnsNameOptions": {
              "HostnameType": "ip-name",
              "EnableResourceNameDnsARecord": true,
              "EnableResourceNameDnsAAAARecord": false
            },
            "MaintenanceOptions": {
              "AutoRecovery": "default"
            },
            "CurrentInstanceBootMode": "legacy-bios"
          }
        ],
        "OwnerId": "765567911343",
        "ReservationId": "r-08bd77e41480be412"
      }
    ]
  }
}
```


- Hier kun je response ip adres zoeken en toevoegen

Nu ga je testen

- maak een test aan gebruik **cloudwatch**
- Verander **region** naar jouw eigen regio en pas de detail-eigenschap aan op basis van de detail-structuur in jouw lab-map. Vervolgens vervang je de **instance-id** door het ID van jouw eigen aangemaakte instance.


```
{
  "id": "cdc73f9d-aea9-11e3-9d5a-835b769c0d9c",
  "detail-type": "Scheduled Event",
  "source": "aws.events",
  "account": "123456789012",
  "time": "1970-01-01T00:00:00Z",
  "region": "us-east-1",
  "resources": [
```

```
    "arn:aws:events:us-east-1:123456789012:rule/ExampleRule"
  ],
  "detail": {
    "instance-id": "i-07b9d918db3cd6b95"
  }
}
```

- Druk op deploy en vervolgens test

```
Test Event Name: details

Response:
{
  "statusCode": 200,
  "body": "Public IP logged: 54.85.79.58"
}
```

- ga nu naar monitor > cloudwatch logs > logs > log groups > log streams
- Je vindt daar je logs. Ik weet niet waarom (moeten vragen) maar je laatste testen worden bij de eerste logs toegevoegd

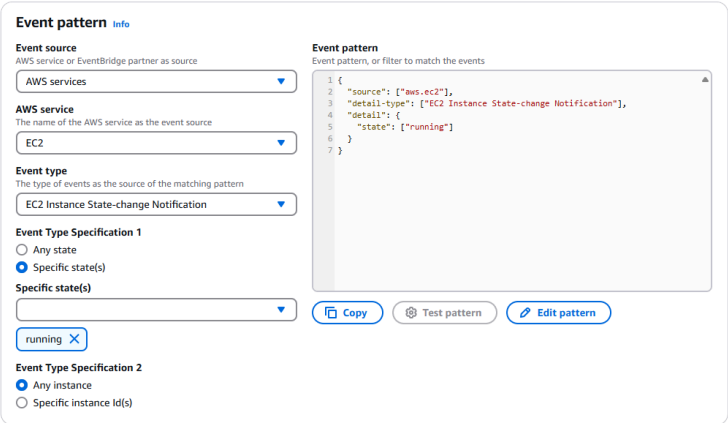
No older events at this moment. *Retry*

2024-12-01T08:54:24.462Z	INIT_START Runtime Version: nodejs:22.v29 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:f494bf5385768c1a5f722eae90b6dd3d343c96ba7ec22b34f5c819e3e8511722
2024-12-01T08:54:25.332Z	START RequestId: 7de11573-983f-4748-8a08-560af41c89eb Version: $LATEST
2024-12-01T08:54:26.719Z	2024-12-01T08:54:26.719Z 7de11573-983f-4748-8a08-560af41c89eb INFO Public IP of instance i-07b9d918db3cd6b95: 54.234.253.205
2024-12-01T08:54:26.743Z	END RequestId: 7de11573-983f-4748-8a08-560af41c89eb
2024-12-01T08:54:26.743Z	REPORT RequestId: 7de11573-983f-4748-8a08-560af41c89eb Duration: 1408.92 ms Billed Duration: 1409 ms Memory Size: 128 MB Max Memory Used: 123 MB Init Duration: 866.81 ms
2024-12-01T08:58:19.320Z	START RequestId: 3cea7836-1aad-44b9-9ee5-5a408c51d04e Version: $LATEST
2024-12-01T08:58:20.119Z	2024-12-01T08:58:20.119Z 3cea7836-1aad-44b9-9ee5-5a408c51d04e INFO Public IP of instance i-07b9d918db3cd6b95: 54.85.79.58
2024-12-01T08:58:20.162Z	END RequestId: 3cea7836-1aad-44b9-9ee5-5a408c51d04e

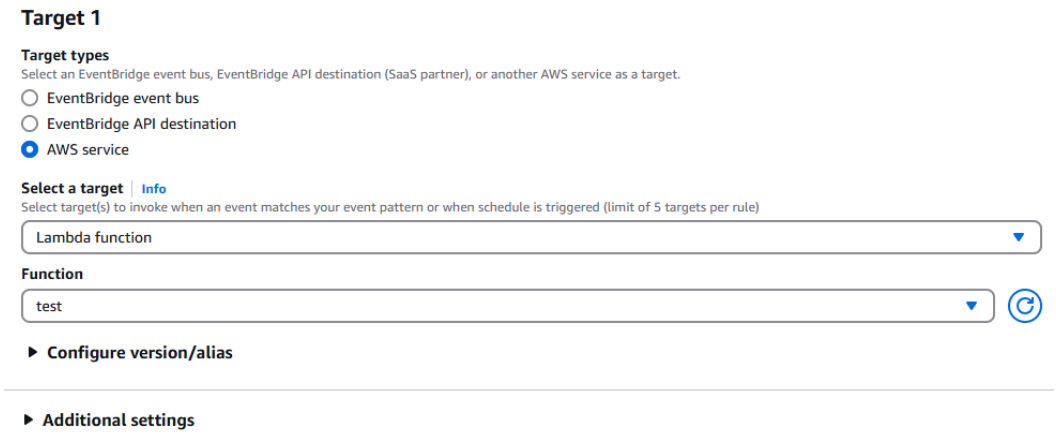
Nu wil je dat de ec2 instance **automatisch** worden gelogd en niet via testen

- Serve nu naar Amazon EventBridge
- Druk op create rule

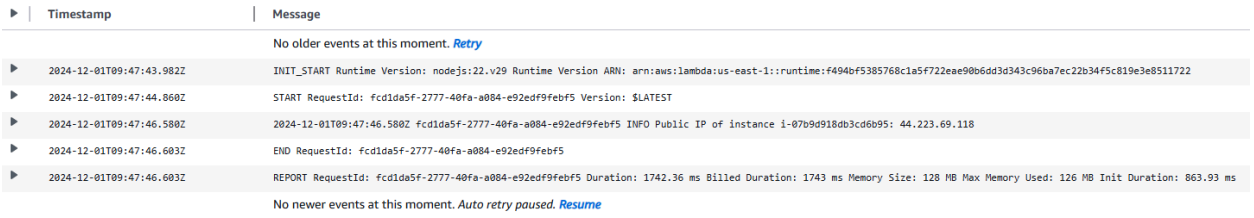
- Kies een naam en description. In dit geval
    - naam: EC2RunningStateLambdaTrigger
    - description: EC2 Instance State-change Notification
- Druk op next
- laat alles staan in event source en sample event
- Maak hetzelfde event pattern aan als wat er in de lab staat



- Druk op next
- target selecteer lambda functie en naam van function bijvoorbeeld test



- Druk de hele tijd op next en daarna op create rule
- stop nu je instance en herstart het. Ga vervolgens naar logstream. neem de eerste stream. Zonder te testen krijg je vind je je instance log al staan



Timestamp	Message
	No older events at this moment. *Retry*
2024-12-01T09:47:43.982Z	INIT_START Runtime Version: nodejs:22.v29 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:f494bf5385768c1a5f722eae90b6dd3d343c96ba7ec22b34f5c819e3e8511722
2024-12-01T09:47:44.860Z	START RequestId: fcd1da5f-2777-40fa-a084-e92edf9febf5 Version: $LATEST
2024-12-01T09:47:46.580Z	2024-12-01T09:47:46.580Z fcd1da5f-2777-40fa-a084-e92edf9febf5 INFO Public IP of instance i-07b9d918db3cd6b95: 44.223.69.118
2024-12-01T09:47:46.603Z	END RequestId: fcd1da5f-2777-40fa-a084-e92edf9febf5
2024-12-01T09:47:46.603Z	REPORT RequestId: fcd1da5f-2777-40fa-a084-e92edf9febf5 Duration: 1742.36 ms Billed Duration: 1743 ms Memory Size: 128 MB Max Memory Used: 126 MB Init Duration: 863.93 ms
	No newer events at this moment. *Auto retry paused.* *Resume*

Api Gateway

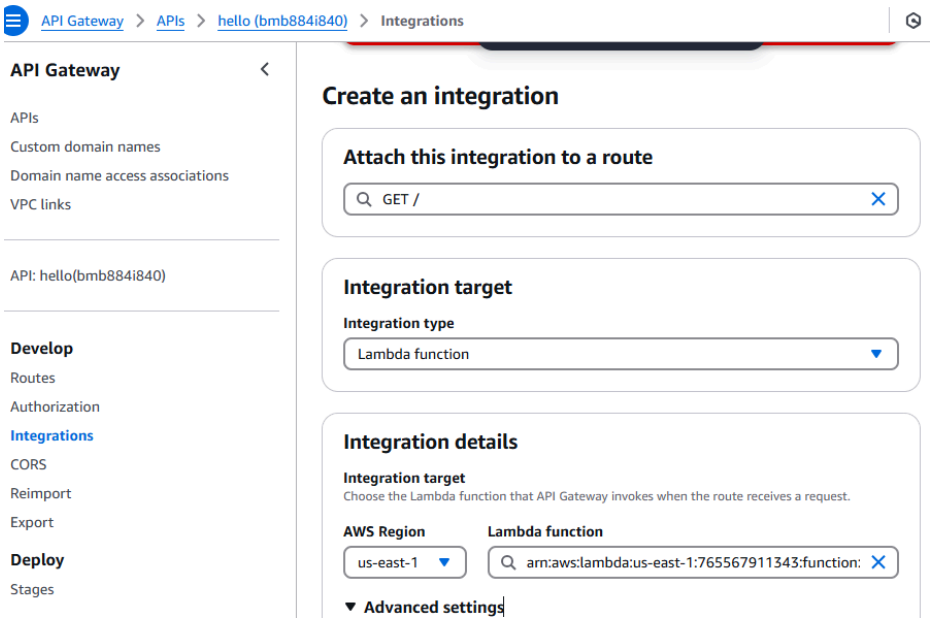
Exercise 1

- create api
- HTTP API > build
- Geef een api naam en druk op next
- druk overal op next en vervolgens cerate
- develop > routes > create
- neem GET /

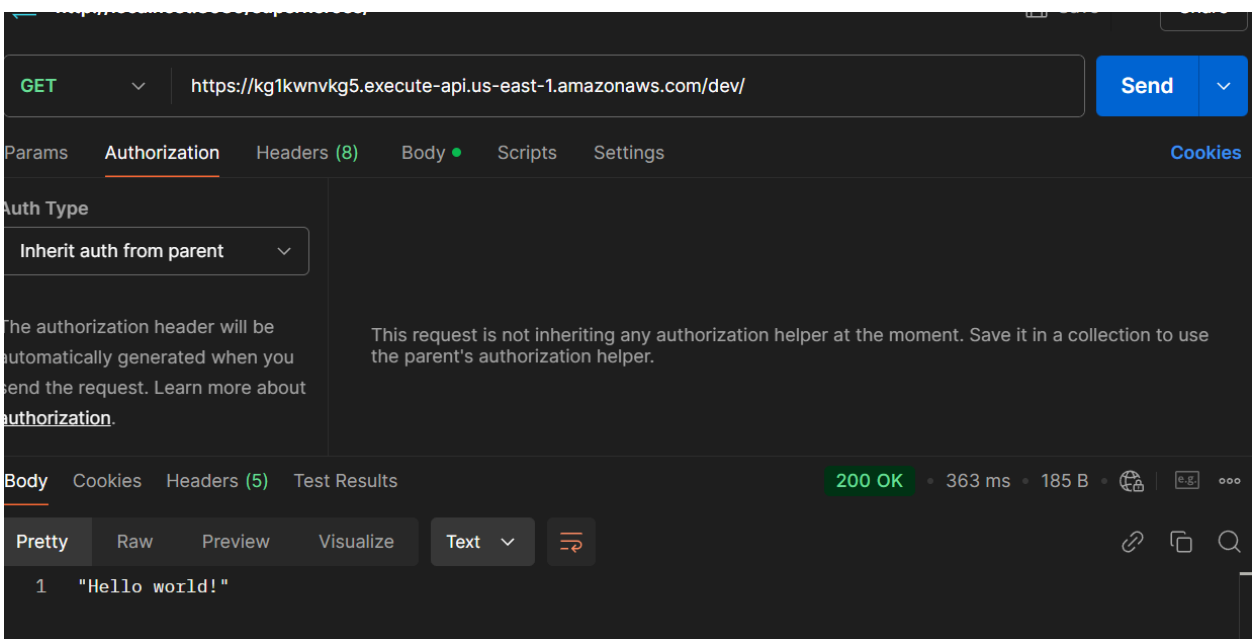
Maak een lambda zie **eerdere documentatie**

```
export const handler = async (event) => {
  // TODO implement
  const response = {
    statusCode: 200,
    body: JSON.stringify("Hello, World!")
  };
  return response;
};
```

- ga naar develop > integration en druk op get
- neem create and attach an integration
- Kies lambda en neem jouw gemaakte lambda functie
- druk op create



- ga naar deploy > stages
- druk op create
- geef stage naam dev en enable stage development
- Druk op Deploy



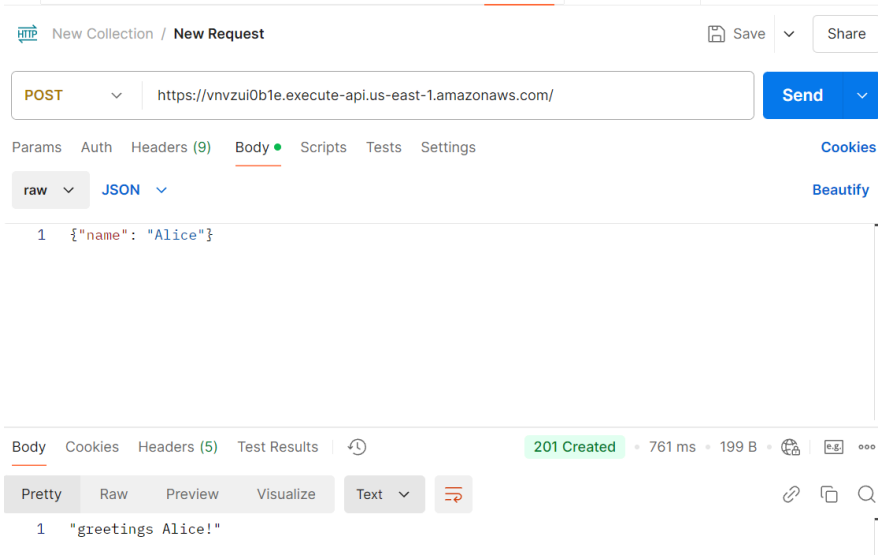
Exercise 2

- Druk op build http API
- Geef een naam en druk de hele tijd op next en dan create
- ga naar route > create
- neem een **post** en geef eventueel een naam in dit geval laten we gewoon **/**
- Druk op create

- Maak een lambda functie

```
export const handler = async (event) => {
  let body = JSON.parse(event.body);
  const name = body.name || "World";

  const response = {
    statusCode: 201,
    body: JSON.stringify(`greetings ${name}!`),
  };
  return response;
};
```

- ga naar integrations > post > create and attach an integration
- kies lambda function > en vervolgens een naam
- Druk op create
- ga naar stages > neem default link > https://vnvzui0b1e.execute-api.us-east-1.amazonaws.com



Exercise 3

Step 1: Create a DynamoDB table

- Kies Create table.
- Vul de Tafel naam in, vul http-crud-tutorial-items in.
- Voor Partition key, vul “id” in.
- Choose Create table.

Step 2: Create a Lambda function

- Kies Create function.
- Voor Function name, voer in: http-crud-tutorial-function
- Voor Runtime, kies de nieuwste ondersteunde versie van Node.js of Python.
- Onder Permissions selecteer je Change default execution role.
- Klik op Create function.
- Open de Lambda-functie in de code-editor van de console en vervang de inhoud met de volgende code. Kies vervolgens Deploy om je functie bij te werken.

```
import { DynamoDBClient } from "@aws-sdk/client-dynamodb";
import {
  DynamoDBDocumentClient,
  ScanCommand,
  PutCommand,
  GetCommand,
  DeleteCommand,
} from "@aws-sdk/lib-dynamodb";

const client = new DynamoDBClient({});

const dynamo = DynamoDBDocumentClient.from(client);

const tableName = "http-crud-tutorial-items";

export const handler = async (event, context) => {
  let body;
  let statusCode = 200;
  const headers = {
    "Content-Type": "application/json",
  };

  try {
    switch (event.routeKey) {
```

```
    case "DELETE /items/{id}":
      await dynamo.send(
        new DeleteCommand({
          TableName: tableName,
          Key: {
            id: event.pathParameters.id,
          },
        })
      );
      body = `Deleted item ${event.pathParameters.id}`;
      break;
    case "GET /items/{id}":
      body = await dynamo.send(
        new GetCommand({
          TableName: tableName,
          Key: {
            id: event.pathParameters.id,
          },
        })
      );
      body = body.Item;
      break;
    case "GET /items":
      body = await dynamo.send(
        new ScanCommand({ TableName: tableName })
      );
      body = body.Items;
      break;
    case "PUT /items":
      let requestJSON = JSON.parse(event.body);
      await dynamo.send(
        new PutCommand({
          TableName: tableName,
          Item: {
            id: requestJSON.id,
            price: requestJSON.price,
            name: requestJSON.name,
          },
        })
```

```
        );
        body = `Put item ${requestJSON.id}`;
        break;
      default:
        throw new Error(`Unsupported route: "${event.routeKey}"`);
    }
  } catch (err) {
    statusCode = 400;
    body = err.message;
  } finally {
    body = JSON.stringify(body);
  }

  return {
    statusCode,
    body,
    headers,
  };
};
```

Stap 3: Een HTTP API maken:

- Kies API create en selecteer vervolgens HTTP API en klik op build.
- Voer bij API-naam de naam http-crud-tutorial-api in.
- Klik op next.
- Bij Routes configureren, klik op next om het maken van routes over te slaan. Je maakt de routes later.
- Bekijk het stadium dat API Gateway automatisch voor je aanmaakt en klik vervolgens op next.
- Klik op create.

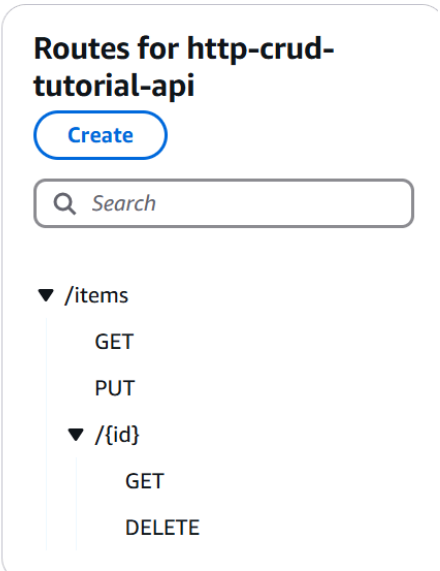
stap 4 Routes maken

voorbeeld routes

Om routes te maken:

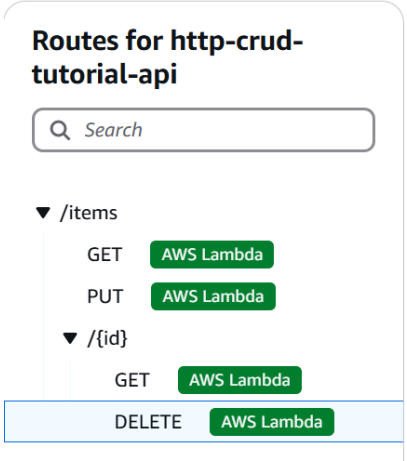
- Kies je API.

- Kies Routes.
- Klik op create.
- Voor Methode, selecteer GET.
- Voor het pad voer je **/items/{id}** in.
- Klik op create.
- Herhaal stappen 4-7 voor de volgende routes:
    - GET /items
    - DELETE /items/{id}
    - PUT /items.



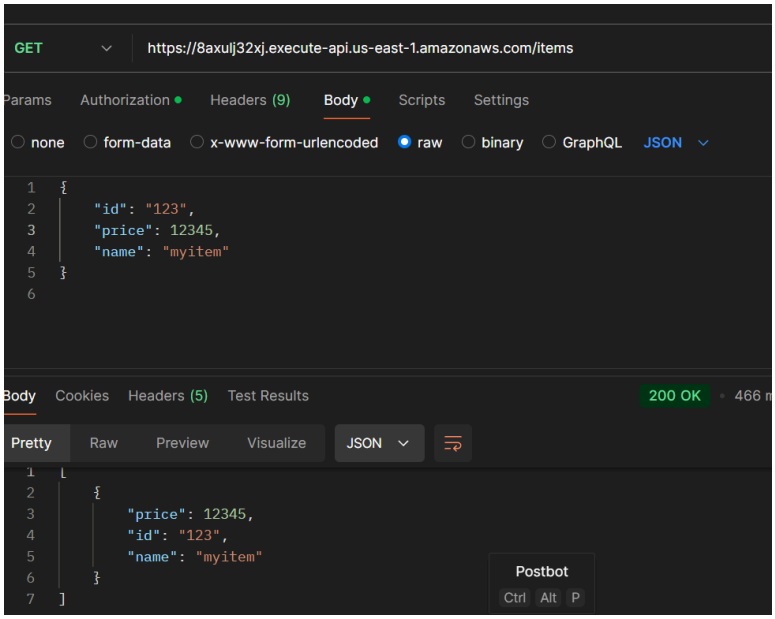
stap 5: Een integratie maken:

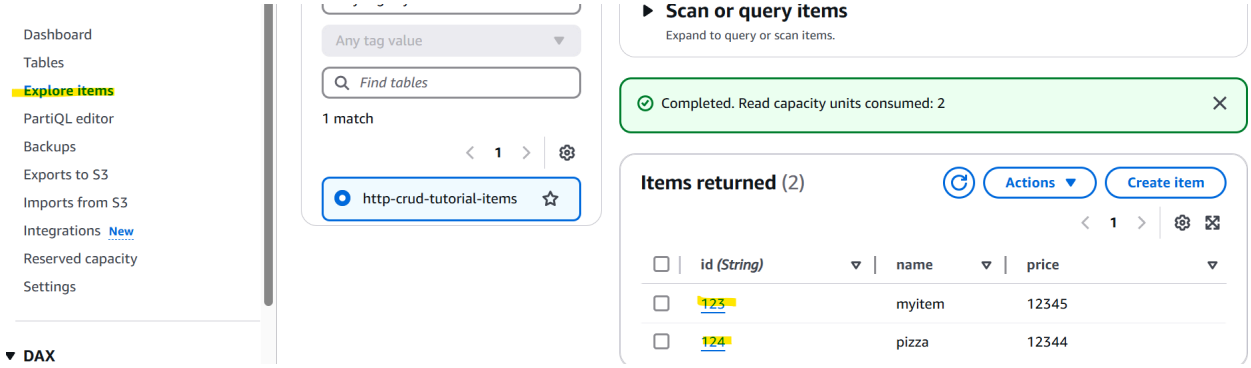
- Kies je API.
- Kies Integrations.
- Kies Manage integrations en vervolgens Create.
- Sla Attach this integration to a route over. Dit wordt in een latere stap voltooid.
- Voor Integration type, selecteer Lambda function.
- Voor Lambda function, voer in: http-crud-tutorial-function.
- Kies Create.
- Herhaal stap 4-5 met alle api's



stap 6: testen

- ga naar stages en vervolgens neem je default url
- Open postman om vervolgens te testen
- let op neem de juiste CRUD en de juiste url bijvoorbeeld /items





Exercise 4

- Maak een 2 lambda aan

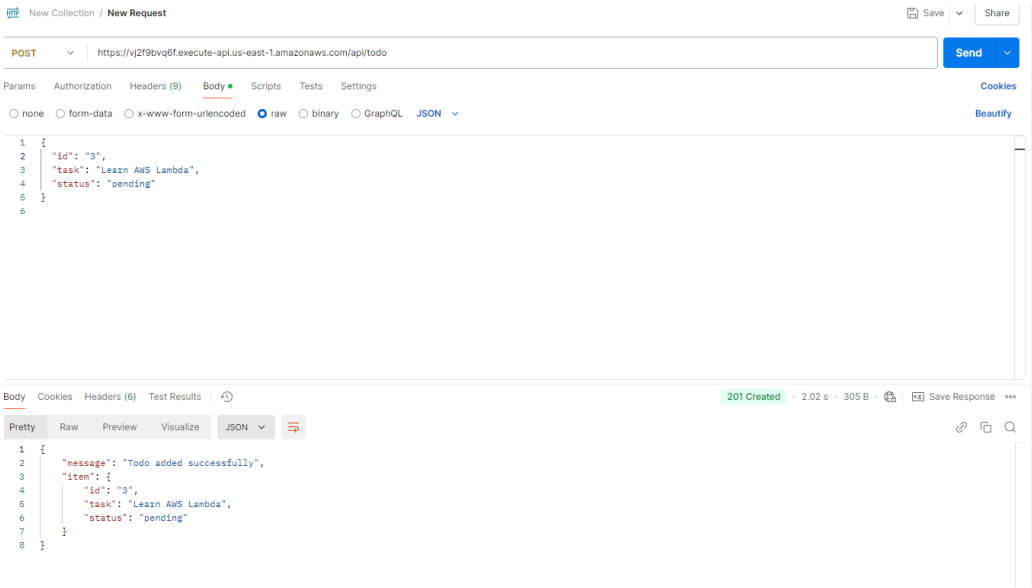
Get request	Post request

`import { DynamoDBClient } from "@aws-sdk/client-dynamodb";`
`import { DynamoDBDocumentClient, ScanCommand } from "@aws-sdk/lib-dynamodb";`
 	
`const client = new DynamoDBClient({});`
`const dynamo = DynamoDBDocumentClient.from(client);`
 	
`const tableName = "Todos";`
 	
`export const handler = async () => {`
`  let response;`
`  try {`
`  const result = await dynamo.send(new ScanCommand({ TableName: tableName }));`
`  response = {`
`  statusCode: 200,`
`  body:`
	`import { DynamoDBClient } from "@aws-sdk/client-dynamodb";`
	`import { DynamoDBDocumentClient, PutCommand } from "@aws-sdk/lib-dynamodb";`
	
	`const client = new DynamoDBClient({});`
	`const dynamo = DynamoDBDocumentClient.from(client);`
	
	`const tableName = "Todos";`
	
	`export const handler = async (event) => {`
	`  let response;`
	`  try {`
	`  const body = JSON.parse(event.body);`
	`  const item = {`
	`  id: body.id,`
	`  task: body.task,`
	`  status: body.status,`

```
JSON.stringify(result.Items),
            headers: {
                "Content-Type":
"application/json",

"Access-Control-Allow-Origin": "*",
            },
        };
    } catch (error) {
        response = {
            statusCode: 500,
            body: JSON.stringify({
error: error.message }),
            headers: {
                "Content-Type":
"application/json",

"Access-Control-Allow-Origin": "*",
            },
        };
    }
    return response;
};
```

```
        };

        await dynamo.send(
            new PutCommand({
                TableName:
tableName,
                Item: item,
            })
        );

        response = {
            statusCode: 201,
            body: JSON.stringify({
message: "Todo added successfully",
item }),
            headers: {
                "Content-Type":
"application/json",

"Access-Control-Allow-Origin": "*",
            },
        };
    } catch (error) {
        response = {
            statusCode: 500,
            body: JSON.stringify({
error: error.message }),
            headers: {
                "Content-Type":
"application/json",

"Access-Control-Allow-Origin": "*",
            },
        };
    }
    return response;
};
```

- In de oefening staat dat CORS origin enabled staat. Zorg er dus voor dat je `"Access-Control-Allow-Origin": "*",` toevoegt in de header
- maak een dynamoDB aan (**Zie eerdere oefening**)
- Maak een api-gateway aan
- Zorg ervoor dat je in route POST /api/todo en GET /api/todo instelt
- Voeg via integration je lambda toe
- ga naar default stage kies link en test in POST



New Collection / **New Request**

GET https://vj2f9bvq6f.execute-api.us-east-1.amazonaws.com/api/todo

Params Authorization Headers (9) Body Scripts Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

Body Cookies Headers (6) Test Results 200

Pretty Raw Preview Visualize JSON


```
[
    {
        "id": "2",
        "task": "Learn AWS Lambda",
        "status": "pending"
    },
    {
        "id": "1"
    },
    {
        "id": "4",
        "task": "Learn AWS Lambda",
        "status": "pending"
```