VPC Endpoints

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Introducing Today's Project!

What is Amazon VPC?

Amazon VPC lets you create a private network within AWS, where you can launch resources like EC2 instances. It offers control over IP ranges, subnets, and security, providing isolation, customization, and secure connectivity to on - premises networks

How I used Amazon VPC in this project

I used VPC today to setup VPC endpoint, specially an S3 gateway. this provides direct, private access to another AWS services.

One thing I didn't expect in this project was...

One thing i didn't expect was to see my own access to the S3 bucket getting blocked once i saved my buckets new policy to block all access/traffic except traffic from my endpoint.

This project took me...

This project took me 1 hours and 30 minutes.

In the first part of my project...

Step 1 - Architecture set up

in this project, setting up the foundations of this project like launching VPC, EC2 instance and S3 bucket so that i can setup endpoint and test the setup in the last step of this project.

Step 2 - Connect to EC2 instance

In this step connecting directly to EC2 instance will help with accessing S3 and running commands later in this project.

Step 3 - Set up access keys

In this step will set up an a access key so EC2 instance will have access to AWS environment

Step 4 - Interact with S3 bucket

In this step i am applying access key credentials to EC2 instance and then using AWs CLI and EC2 instance to access Amazon s3.

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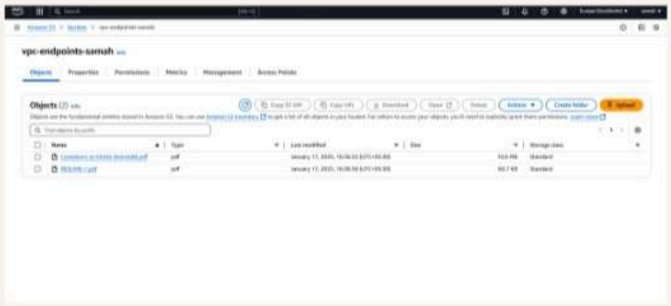
Architecture set up

Started project by launching three key resorces - a VPC, EC2 instance and S3 bucket.

I also setup an S3 bucket with two files inside,



Access keys

Credentials

To set up my EC2 instance to intract with my AWS environment ,i configured the AWS access key ID, secret access key that matches the key ID and default region type.

Access Keys are a set of security credentials used to authenticate programmatic access to AWS services via the AWS Command Line Interface (CLI) or APIs.

A Secret Access Key is the private part of AWS credentials, used with the Access Key ID to securely sign requests to AWS services. It acts like a password, so keep it safe and never share it to avoid unauthorized access.

Best practice

Although I'm using access keys in this project, a best practice alternative is to use IAM admin role instead. This means any necessary permissions will be attached to an IAM role will be associated with the relevant resources.

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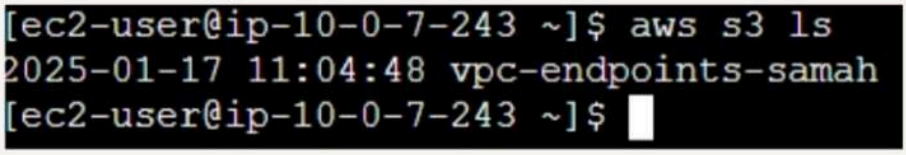
Connecting to my S3 bucket

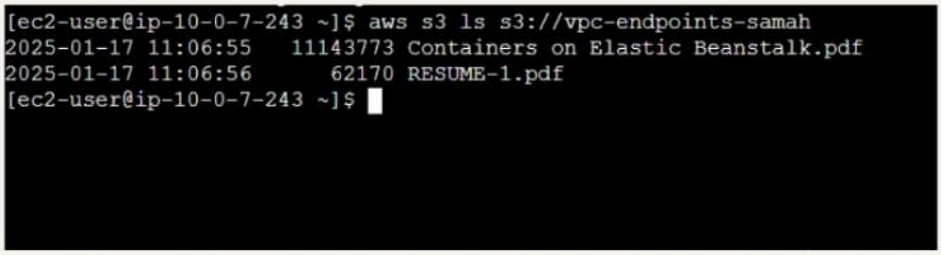
The command I ran was 'aws s3 ls. this command is used to list all buckets in an aws account.

The terminal responded with list of my accounts S3 buckets. This indicated that the access keys I set up correctly give my EC2 instance to my AWS account and environment.



Connecting to my S3 bucket

I also tested the command aws s3 ls s3://vpc-endpoint-samah. which returned a list of all the objects inside that S3 bucket.

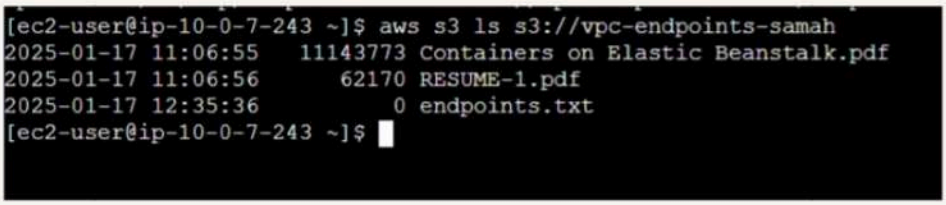


Uploading objects to S3

To upload a new file to my bucket, I first ran the command sudo touch /tmp/endpoints.txt. This command creates an empty file named endpoints.txt and saves locally in the EC2 instance.

The second command I ran was aws s3 cp /tmp/endpoints.txt s3://vpc-endpoints-samah. This command will copy the file i created i.e. endpoints.txt and upload to my S3 bucket.

The third command I ran was aws s3 ls s3://vpc-endpoints-samah which validated that a new file was created and uploaded into my S3 bucket.



In the second part of my project...

Step 5 - Set up a Gateway

In this i am setting up a vpc endpoint so that communication between VPC and other services is direct and secure.

Step 6 - Bucket policies

In this step i am testing endpoint connection by blocking off all traffic to S3 bucket except for traffic coming from endpoint.

Step 7 - Update route tables

In this step i am testing endpoint connection between bucket and EC2 instance.

Step 8 - Validate endpoint conection

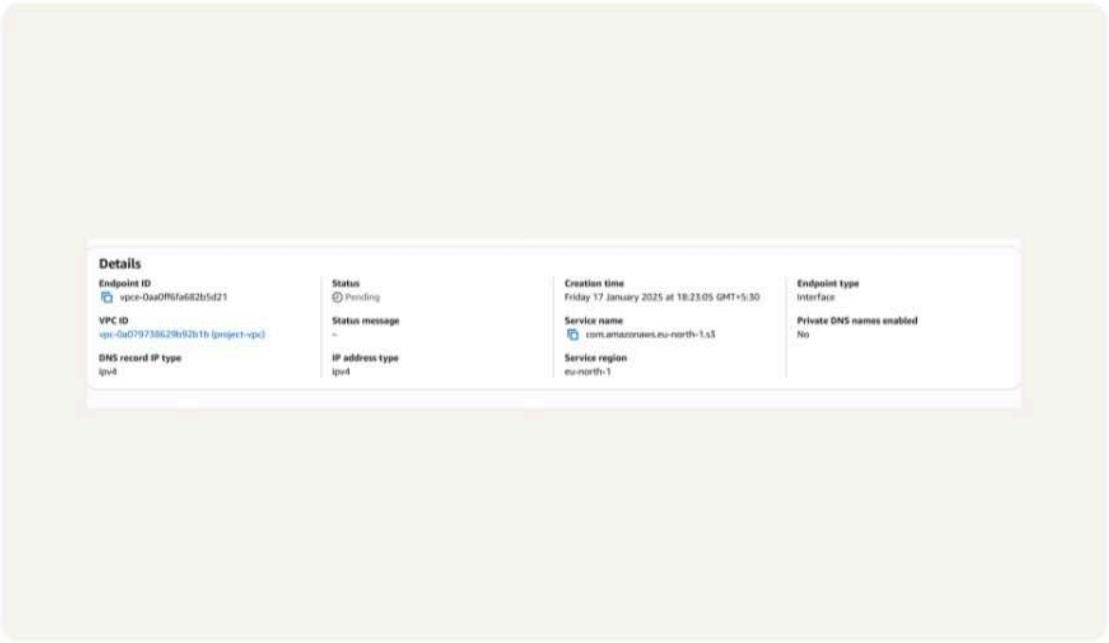
In this step i am going to validate VPC endpoint set up one more time. i am aslo going to use endpoint policies to restrict access EC2 instance's access to our AWS environment.

Setting up a Gateway

I set up an S3 Gateway, which is a type of endpoint specifically designed for Amazon S3. Gateways work by updating the route table of associated subnets, so that S3 bound traffic goes through the Gateway instead of the internet.

What are endpoints?

An endpoint is a connection point that allows your resources (like EC2 instances or VPCs) to securely connect to AWS services, such as S3 or DynamoDB.



Bucket policies

A bucket policy in AWS is a set of permissions attached to an S3 bucket. It defines who can access the bucket's data and what actions they can perform (like read, write, delete), helping control access to the stored files.

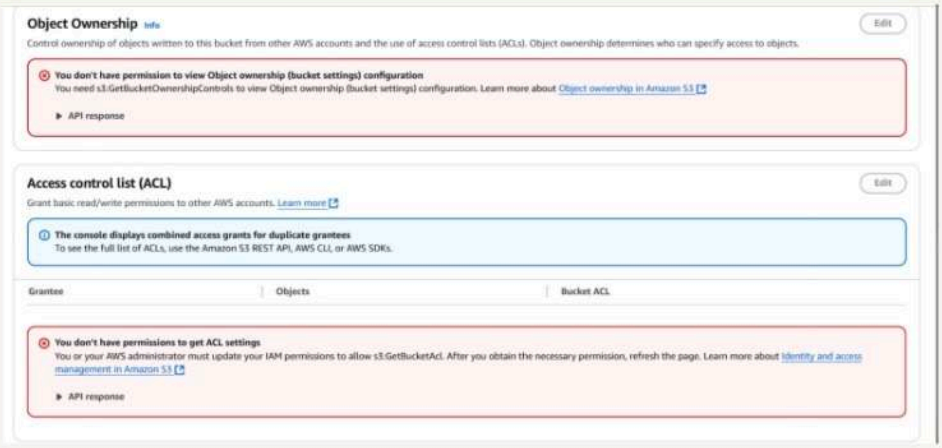
My bucket policy will deny traffic from all sources except for traffic coming from Vpc endpoint.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:*",
            "Resource": [
                "arn:aws:s3:::vpc-endpoints-samah",
                "arn:aws:s3:::vpc-endpoints-samah/*"
            ],
            "Condition": {
                "StringNotEquals": {
                    "aws:sourceVpce": "vpce-0aa0ff6fa682b5d21"
                }
            }
        }
    ]
}
```

Bucket policies

Right after saving my bucket policy, my S3 bucket page showed 'denied access' warnings. This was because my bucket is denying all traffic that doesn't come from my endpoint i.e the policy denies traffic from AWS management console.

I also had to update my route table because my route table by default didn't provide a route for traffic in my public subnet to the VPC endpoint.



Route table updates

To update my route table i visited the endpoints page of my VPC console and modified the the routetable from there associate VPC's public subnet.

After updating my public subnet's route table, my terminal could connect with S3 bucket , access was no longer denied.

Endpoint policies

An endpoint policy is type of policy designed for specifying the range of resources and actions permitted by an endpoint.

I updated my endpoint's policy by the changing the effect from 'allow' to 'deny', i could see the effect right away because my EC2 was again denied access to S3 when i tried to run 'aws s3' command.

```
{
    "Version": "2008-10-17",
    "Statement": [
        {
            "Effect": "Deny",
            "Principal": "*",
            "Action": "*",
            "Resource": "*"
        }
    ]
}
```