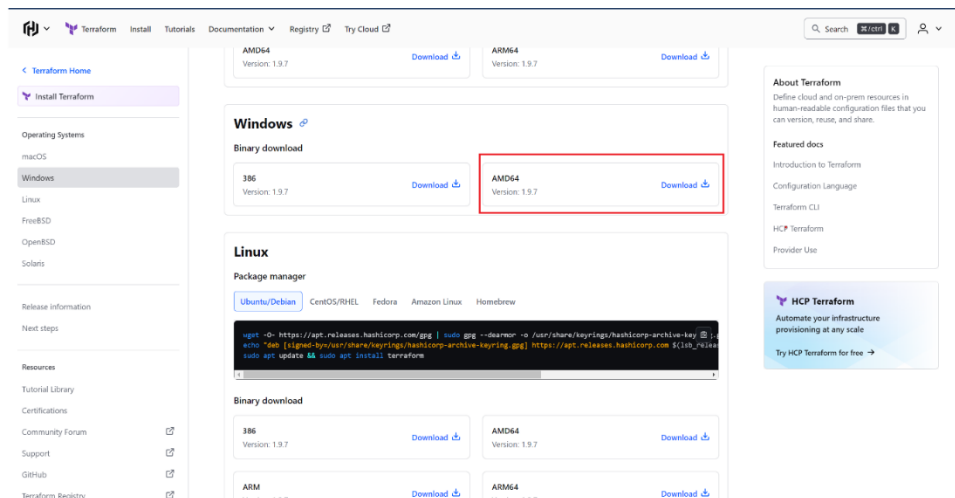


# Terraform guideline

## Terraform

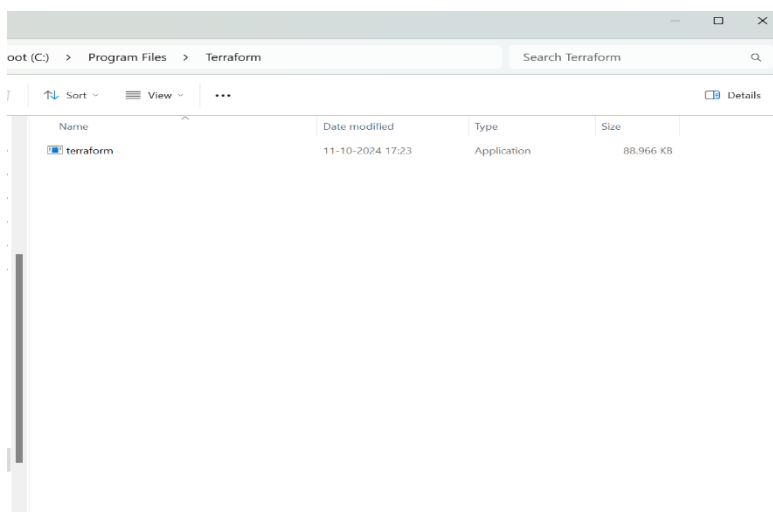
### Stap 1: Download Terraform

Download Terraform, afhankelijk van je systeem (Windows, macOS, Linux). Zorg ervoor dat je de juiste versie hebt voor jouw besturingssysteem.



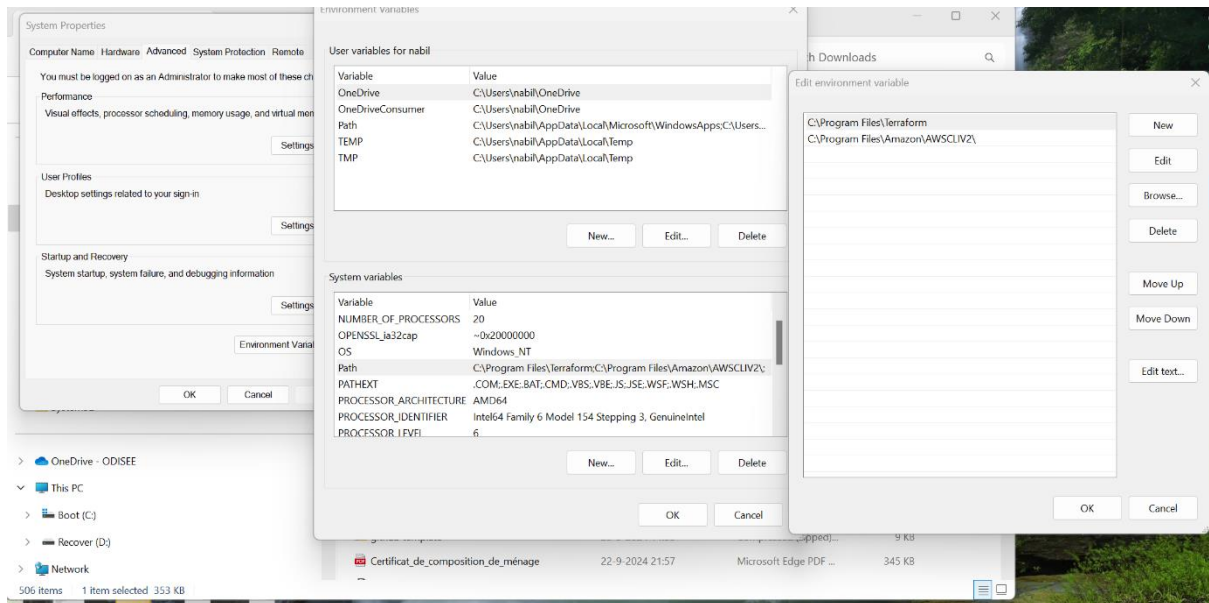
### Stap 2: Verplaats Terraform.exe

Plaats het gedownloade terraform.exe bestand in de map C:\Program Files\Terraform (maak de map aan als deze nog niet bestaat).



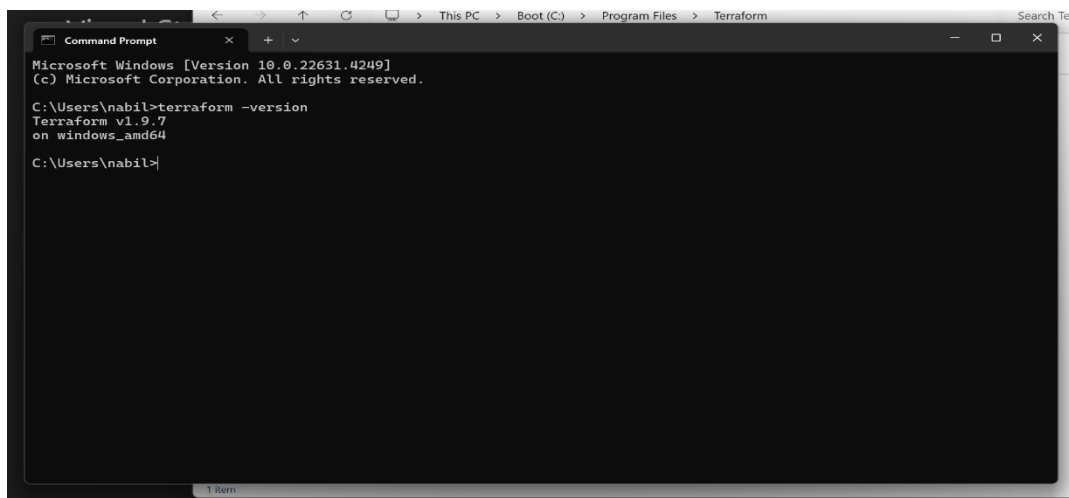
### Stap 3: Aanpassen van Systeemvariabelen

1. Ga naar "edit the system environment variables/Systeemomgevingsvariabelen bewerken" door te zoeken in de startbalk.
2. Klik op "environment variables /Omgevingsvariabelen" en zoek "Path" onder systeemvariabelen.
3. Voeg het pad toe waar je terraform.exe hebt geplaatst, bijvoorbeeld: C:\Program Files\Terraform.



### Stap 4: Controleer Terraform Installatie

Open de command prompt en typ `terraform --version` om te controleren of de installatie gelukt is.



## Stap 5: AWS CLI Installeren

Voer dezelfde stappen uit voor het installeren van de AWS CLI. Volg de instructies van de officiële AWS-website ([link](#)) en voeg de locatie van `aws.exe` toe aan je system environment variables /omgevingsvariabelen.

### ▼ Windows

#### Install and update requirements

- We support the AWS CLI on Microsoft-supported versions of 64-bit Windows.
- Admin rights to install software

#### Install or update the AWS CLI

To update your current installation of AWS CLI on Windows, download a new installer each time you update to overwrite previous versions. AWS CLI is updated regularly. To see when the latest version was released, see the [AWS CLI version 2 Changelog](#) on [GitHub](#).

1. Download and run the AWS CLI MSI installer for Windows (64-bit):

<https://awscli.amazonaws.com/AWSCLIV2.msi>

Alternatively, you can run the `msiexec` command to run the MSI installer.

```
C:\> msiexec.exe /i https://awscli.amazonaws.com/AWSCLIV2.msi
```

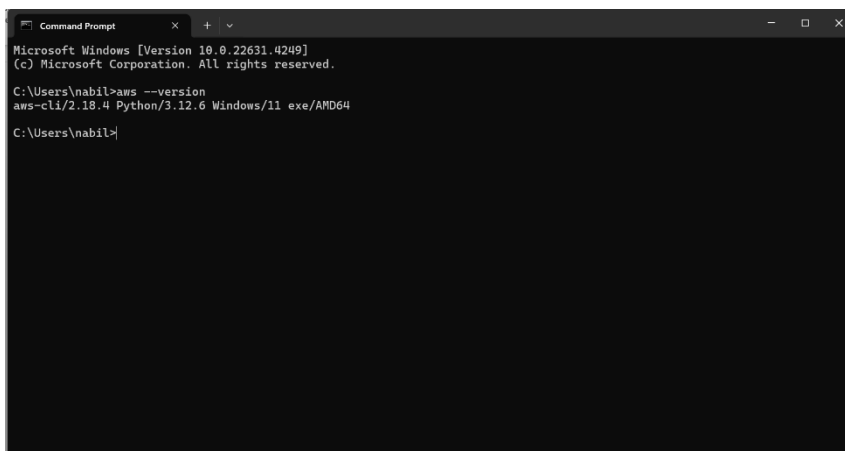
For various parameters that can be used with `msiexec`, see [msiexec](#) on the *Microsoft Docs* website. For example, you can use the `/qn` flag for a silent installation.

```
C:\> msiexec.exe /i https://awscli.amazonaws.com/AWSCLIV2.msi /qn
```

2. To confirm the installation, open the **Start** menu, search for `cmd` to open a command prompt window, and at the command prompt use the `aws --version` command.

```
C:\> aws --version
aws-cli/2.17.20 Python/3.11.6 Windows/10 exe/AMD64 prompt/off
```

Controleer de installatie met `aws --version` in de command prompt.



```
Command Prompt
Microsoft Windows [Version 10.0.22631.4249]
(c) Microsoft Corporation. All rights reserved.

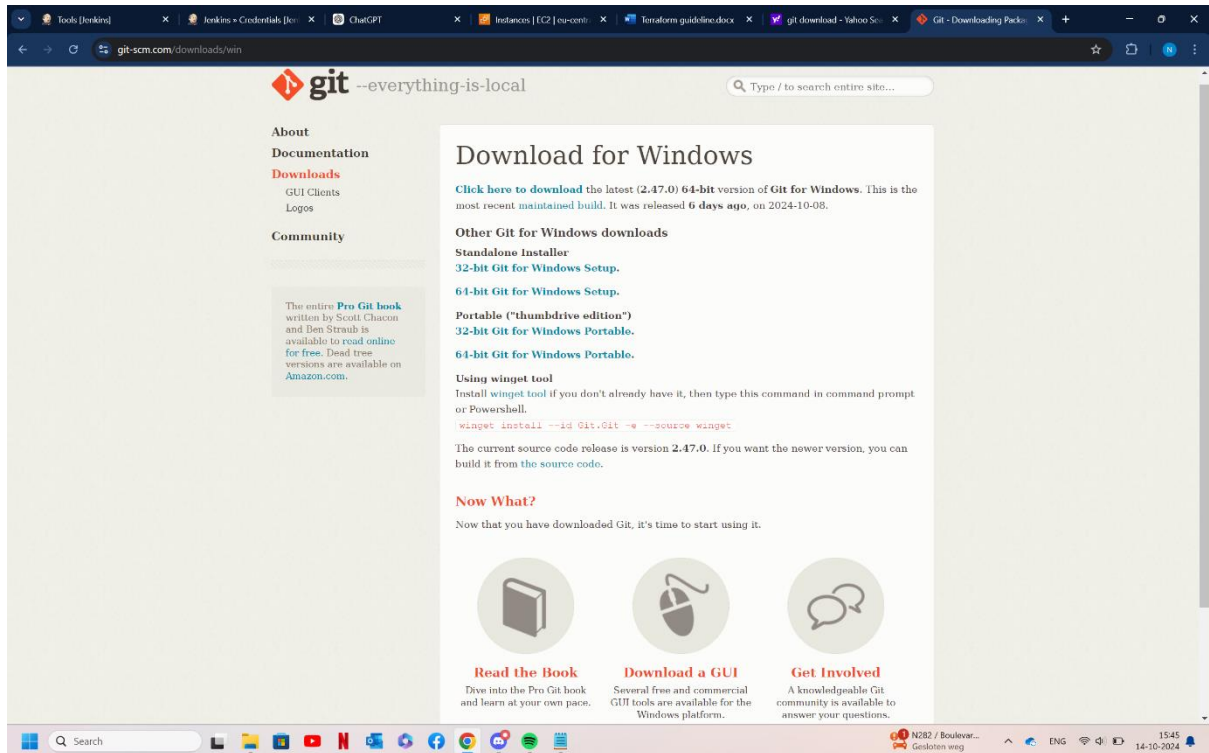
C:\Users\nabil>aws --version
aws-cli/2.18.4 Python/3.12.6 Windows/11 exe/AMD64

C:\Users\nabil>
```

## Stap 6: Git Installeren

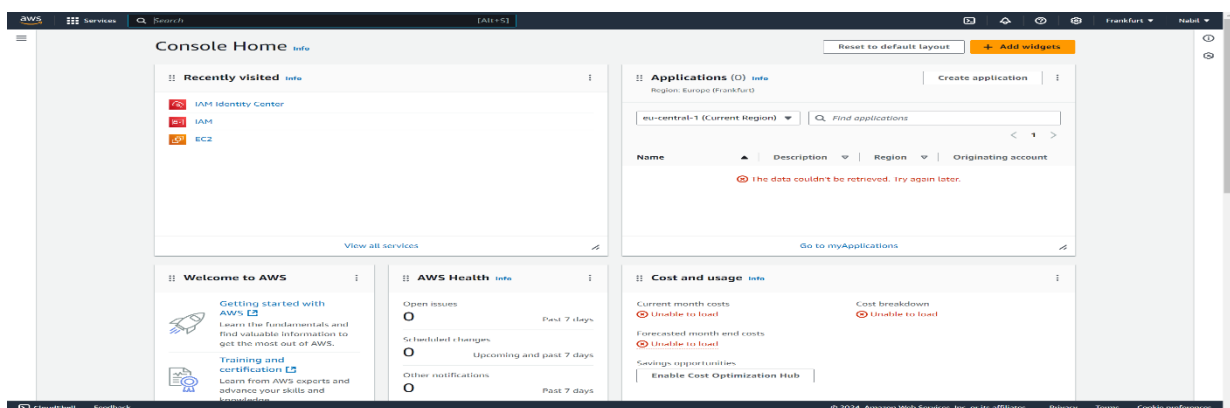
Als je Git nog niet hebt, download het via [Git voor Windows](https://git-scm.com/downloads/win) en installeer het. Controleer de installatie door `git --version` in te voeren in de command prompt.

De link: <https://git-scm.com/downloads/win>



## Stap 7: AWS Account Aanmaken

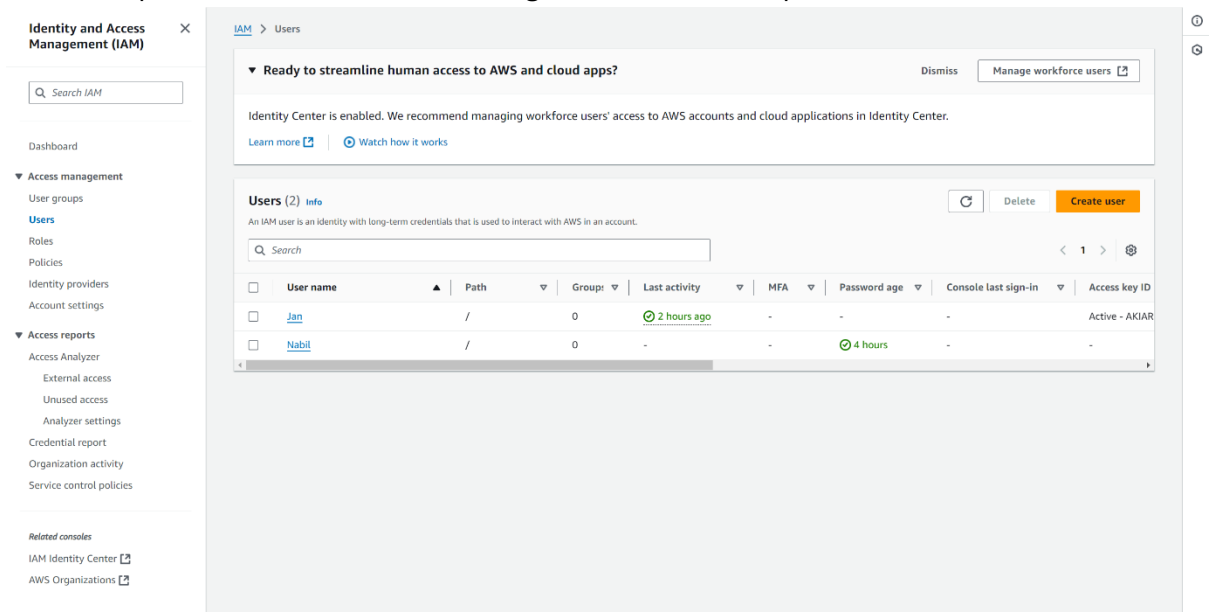
Ga naar de AWS-website, ([link](#)) meld je aan of registreer je. Maak je geen zorgen over kosten, je kunt beginnen met de gratis tier van AWS.



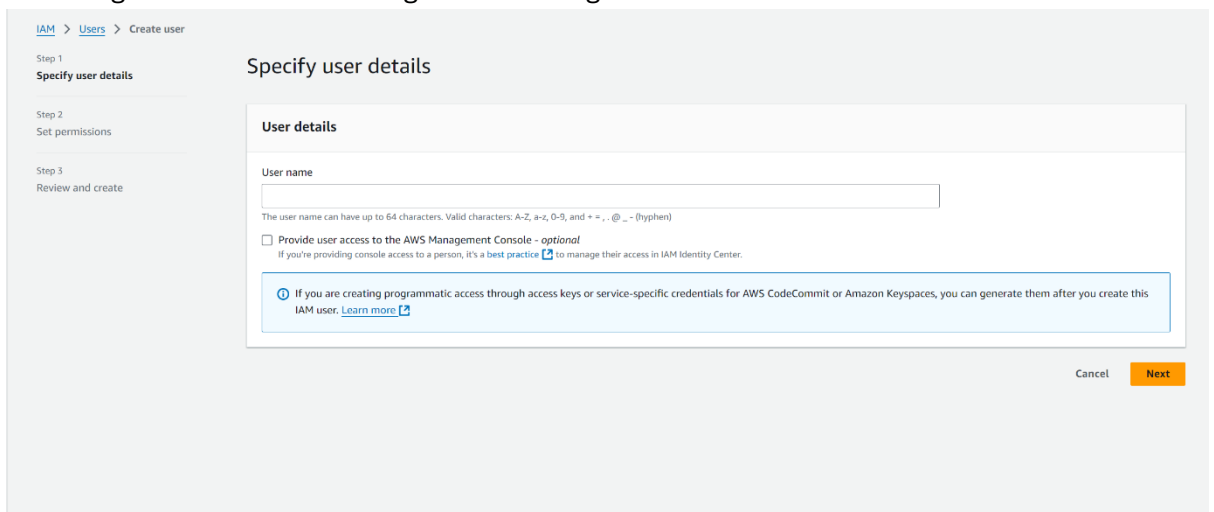
Ps. Maak u geen zorgen dit is gratis en zal geen 1 euro afnemen van u account.

## Stap 8: IAM User Aanmaken

1. Zoek naar "IAM" in de zoekbalk van AWS.
2. Klik links op "Users" en maak een nieuwe gebruiker aan door op "Create User" te klikken.



3. Geef de gebruiker een naam en ga naar het volgende scherm.



4. Bij "Permissions", klik je op "Attach policies directly" en selecteer je **AmazonEC2FullAccess**.

## Set permissions

Add user to an existing group or create a new one. Using groups is a best-practice way to manage user's permissions by job functions. [Learn more](#)

### Permissions options

☐ Add user to group  
Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.

☐ Copy permissions  
Copy all group memberships, attached managed policies, and inline policies from an existing user.

☒ Attach policies directly  
Attach a managed policy directly to a user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.

### Permissions policies (1240)

Choose one or more policies to attach to your new user.

Filter by Type

All types

☐ Policy name
 

Type

Attached entities

5. Voltooi de setup door op "Create User" te klikken.

6.

Users (2) Info

Refresh

Delete

Create user

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

< 1 > ⚙

| <input type="checkbox"/> | User name             | Path | Group | Last activity | MFA | Password age | Console last sign-in | Access key ID  |
|--------------------------|-----------------------|------|-------|---------------|-----|--------------|----------------------|----------------|
| <input type="checkbox"/> | <a href="#">Jan</a>   | /    | 0     | 2 hours ago   | -   | -            | -                    | Active - AKIAR |
| <input type="checkbox"/> | <a href="#">Nabil</a> | /    | 0     | -             | -   | 4 hours      | -                    | -              |

## Stap 9: IAM Toegangsgegevens Opslaan

1. Ga naar de tab "Security Credentials" en maak een nieuwe Access Key aan.
2. Kopieer de Access Key ID en Secret Access Key en **bewaar** deze veilig, bijvoorbeeld in een Notepad-bestand.

### Access key best practices & alternatives Info

Avoid using long-term credentials like access keys to improve your security. Consider the following use cases and alternatives.

Use case

☒ Command Line Interface (CLI)  
You plan to use this access key to enable the AWS CLI to access your AWS account.

☐ Local code  
You plan to use this access key to enable application code in a local development environment to access your AWS account.

☐ Application running on an AWS compute service  
You plan to use this access key to enable application code running on an AWS compute service like Amazon EC2, Amazon ECS, or AWS Lambda to access your AWS account.

☐ Third-party service  
You plan to use this access key to enable access for a third-party application or service that monitors or manages your AWS resources.

☐ Application running outside AWS  
You plan to use this access key to authenticate workloads running in your data center or other infrastructure outside of AWS that needs to access your AWS resources.

☐ Other  
Your use case is not listed here.

⚠ Alternatives recommended

- Use [AWS CloudShell](#), a browser-based CLI, to run commands. [Learn more](#)

## Retrieve access keys [Info](#)

### Access key

If you lose or forget your secret access key, you cannot retrieve it. Instead, create a new access key and make the old key inactive.

Access key



AKIARHQBNDUCUQ7BZORNX

Secret access key



zGrERgqOlFmzDbbJUKdZYwtodbNA3YTPNOV4lODb [Hide](#)

## Stap 10: Terraform Project Instellen in Visual Studio Code

1. Maak een nieuwe map, bijvoorbeeld C:\Users\us\Desktop\terraform-demo.
2. Open deze map in Visual Studio Code.
3. Maak een nieuw bestand aan genaamd `main.tf`.

## Stap 11: Basis Terraform Configuratie

Gebruik de volgende configuratie in je `main.tf` bestand om een EC2-instance aan te maken:

```
provider "aws" {  
  region = (de regio waarin je ben)  
}  
resource "aws_instance" "AWS_rnummer_naam" {  
  ami =  
  instance_type =  
  tags = {  
    Name = "AWS_rnummer_naam" #naam voor de instance  
  }  
}  
output "instance_ip" {  
  value = aws_instance.AWS_rnummer.public_ip  
}
```

PS: eens dit gedaan ga na terug naar AWS maar deze keer zoek je naar `ec2`.

Klik je op Launch Instance boven recht zie je u regio staan dit moet dezelfde zijn als bij je VS Code zijn. Eens dit gedaan scroll je beneden en klik de operating system die je wilt gebruiken onder de operating system zie je AMI ID staan voorbeeld code:(ami-0084a47cc718c111a)

**Resources**

You are using the following Amazon EC2 resources in the Europe (Frankfurt) Region:

|                     |   |                     |   |                       |   |
|---------------------|---|---------------------|---|-----------------------|---|
| Instances (running) | 2 | Auto Scaling Groups | 0 | Capacity Reservations | 0 |
| Dedicated Hosts     | 0 | Elastic IPs         | 0 | Instances             | 2 |
| Key pairs           | 0 | Load balancers      | 0 | Placement groups      | 0 |
| Security groups     | 1 | Snapshots           | 0 | Volumes               | 2 |

**Launch instance**

To get started, launch an Amazon EC2 Instance, which is a virtual server in the cloud.

[Launch instance](#) [Migrate a server](#)

Note: Your instances will launch in the Europe (Frankfurt) Region

**Service health**

[AWS Health Dashboard](#)

Region: Europe (Frankfurt)

Status: ✔ This service is operating normally.

**Zones**

| Zone name     | Zone ID       |
|---------------|---------------|
| eu-central-1a | eu-central-1a |
| eu-central-1b | eu-central-1b |
| eu-central-1c | eu-central-1c |

**Instance alarms**

[View in CloudWatch](#)

0 in alarm ✔ 0 OK ○ 0 insufficient data

[Instances in alarm](#)

**Scheduled events**

[Enable additional Zones](#)

**EC2 Free Tier**

Offers for all AWS Regions.

0 EC2 free tier offers in use

End of month forecast

⚠ 0 offers forecasted to exceed free tier limit.

Exceeds free tier

⚠ 0 offers exceeded and is now pay-as-you-go pricing.

[View Global EC2 resources](#)

[View all AWS Free Tier offers](#)

**Account attributes**

[Default VPC](#)

vpc-0e78d76f039323c21

**Settings**

[Data protection and security](#)

[Zones](#)

[EC2 Serial Console](#)

[Default credit specification](#)

[EC2 console preferences](#)

**Explore AWS**

[Enable Best Price-Performance with AWS Graviton2](#)

**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

**Recents** **Quick Start**

**Amazon Linux** **macOS** **Ubuntu** **Windows** **Red Hat** **SUSE Linux**

**Amazon Machine Image (AMI)**

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type Free tier eligible

ami-0084a47cc718c111a (64-bit (x86)) / ami-099a546c02844706e (64-bit (Arm))

Virtualization: hvm ENA enabled: true Root device type: ebs

**Description**

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

**Architecture** **AMI ID** **Username**

64-bit (x86) **ami-0084a47cc718c111a** ubuntu Verified provider

Die code moet je kopiëren en plakken op vsc waar ami staat

```
ami = "ami-0084a47cc718c111a" # Dit is een Amazon Linux 2 AMI
instance_type = "t2.micro"
```

Daarnaast verander je de Regio zoals in de AWS:

```
region = "eu-central-1"
```



```
Name = "TerraformDemoInstance"
```

Als je op een error komt check nog is als je aws.cli en Terraform goed gedownload is of sluit VS Code is toe en terug aan soms zijn er wat bugs

## Stap 12: Terraform Commando's Uitvoeren

Open de terminal in Visual Studio Code en voer de volgende commando's uit:

1. terraform init
2. terraform plan
3. terraform apply (voer yes in als bevestiging)

## Stap 13: AWS CLI Configureren (Foutafhandeling):

Als je een foutmelding krijgt, voer dan het commando `aws configure` uit en vul de volgende gegevens in:

- AWS Access Key ID: [je Access Key ID]
- AWS Secret Access Key: [je Secret Access Key]
- Default region name: eu-central-1
- Default output format: json

```
Error: No valid credential sources found

with provider["registry.terraform.io/hashicorp/aws"],
on main.tf line 1, in provider "aws":
1: provider "aws" {

Please see https://registry.terraform.io/providers/hashicorp/aws
for more information about providing credentials.

Error: failed to refresh cached credentials, no EC2 IMDS role found, operation error ec2imds: GetMetadata, exceeded maximum number of attempts, 3, request send failed, Get
"http://169.254.169.254/latest/meta-data/iam/security-credentials/": dial tcp 169.254.169.254:80: connectex: A socket operation was attempted to an unreachable network.
```

## Retrieve access keys [Info](#)

### Access key

If you lose or forget your secret access key, you cannot retrieve it. Instead, create a new access key and make the old key inactive.

#### Access key

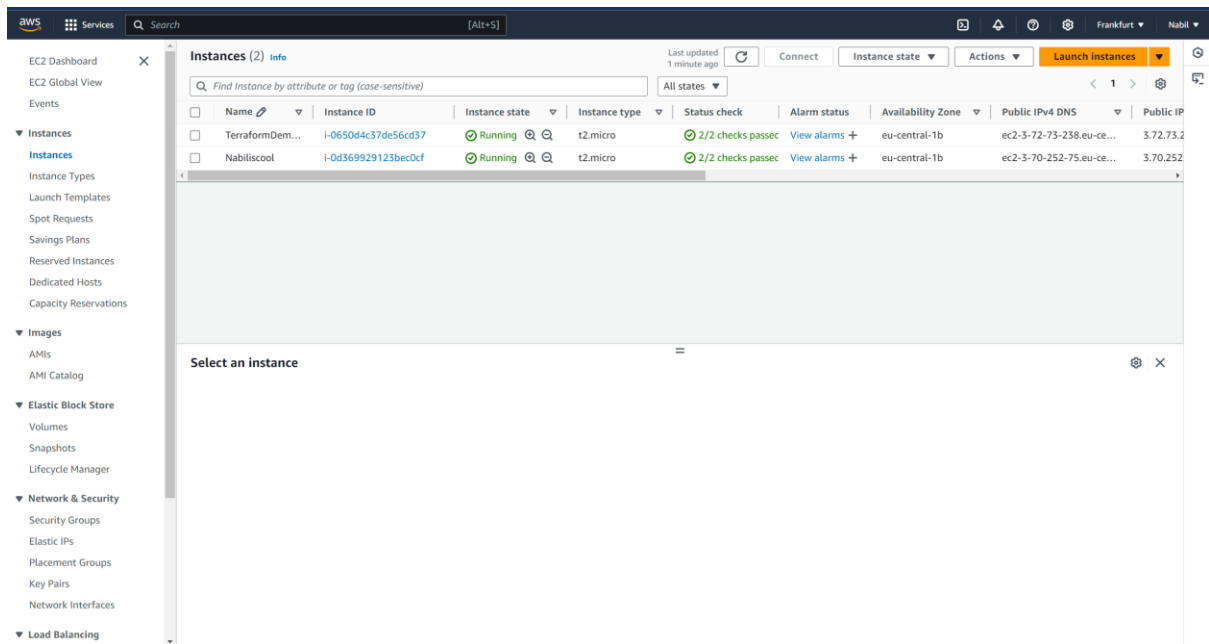
AKIARHQBNDCUQ7BZORNX

#### Secret access key

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 [Hide](#)

## Stap 14: Instance Controleren

Ga naar [AWS EC2 Console](#) en je zou je instance moeten zien.

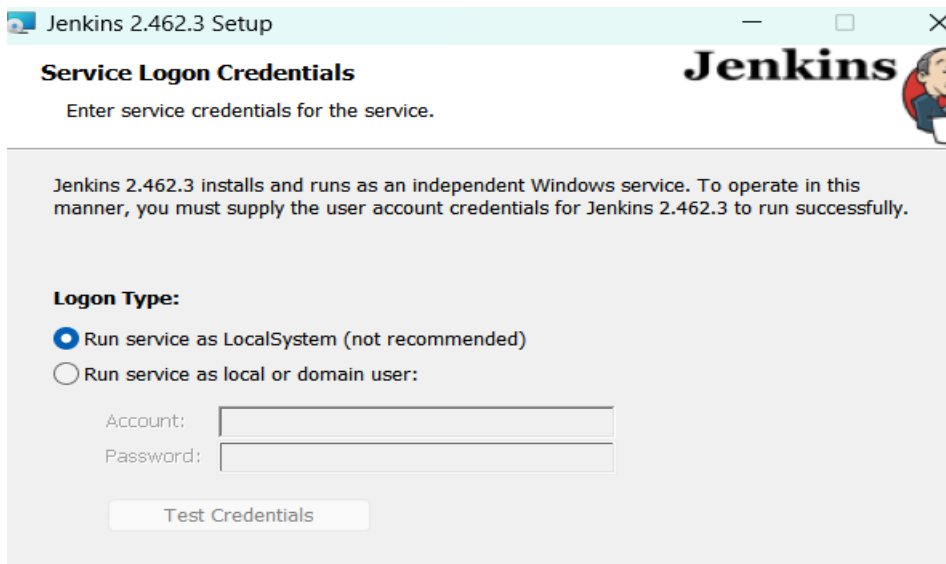


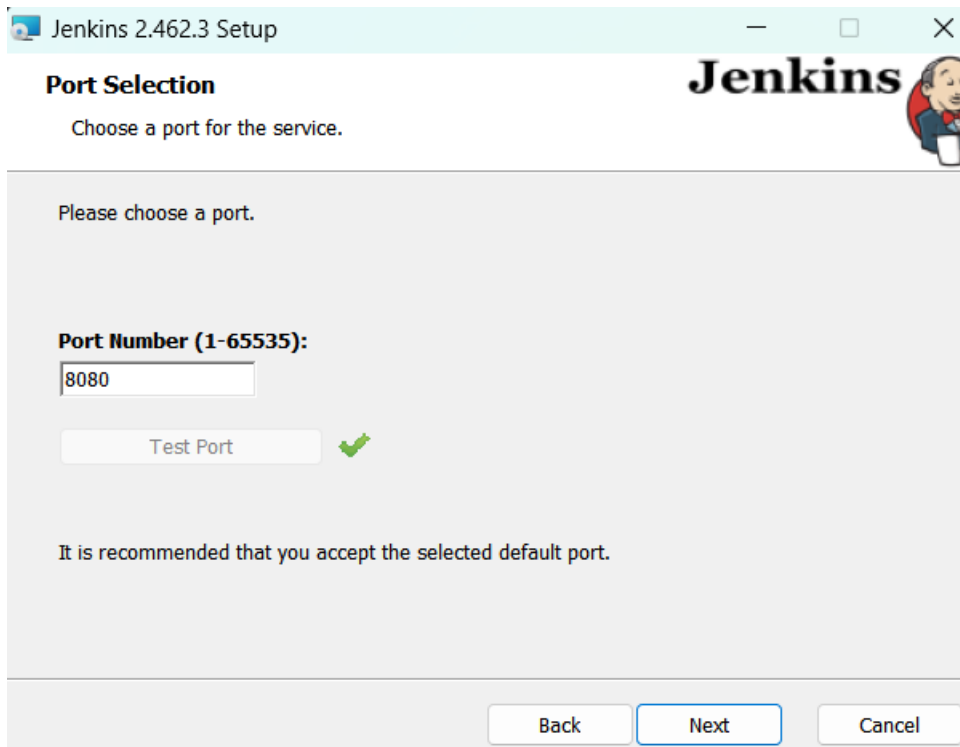
Hier moet dan jouw “AWS\_rnummer\_naam” komen

## Jenkins

### Stap 1: Jenkins Pipeline Setup

Download en installeer Jenkins





## Stap 2: Download en installeer Java21.

Java 21 downloaden als je niet heb (makkelijkste x64 MSI Installer):

<https://www.oracle.com/be/java/technologies/downloads/#jdk21-windows>

## Stap 3: localhost en admin.

Ga naar <http://localhost:8080/> en voer het Admin-wachtwoord in dat je in Jenkins hebt gegenereerd.

## Getting Started

# Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log ([not sure where to find it?](#)) and this file on the server:

`C:\ProgramData\Jenkins\.jenkins\secrets\initialAdminPassword`

Please copy the password from either location and paste it below.

Administrator password

Maak een Admin-account aan.

Copypaste de PATH: C:\ProgramData\Jenkins\.jenkins\secrets\ op file folder en dan moet je hier beland zijn

| <input type="checkbox"/> | Name                            | Date modified    | Type           | Size |
|--------------------------|---------------------------------|------------------|----------------|------|
| <input type="checkbox"/> | initialAdminPassword            | 12/10/2024 14:29 | File           | 1 KB |
| <input type="checkbox"/> | jenkins.model.Jenkins.crumbSalt | 12/10/2024 14:29 | CRUMBSALT File | 1 KB |
| <input type="checkbox"/> | master.key                      | 12/10/2024 14:29 | KEY File       | 1 KB |

Open de file op notepad en copypaste de wachtwoord op de browser  
Kies voor suggested

## Customize Jenkins

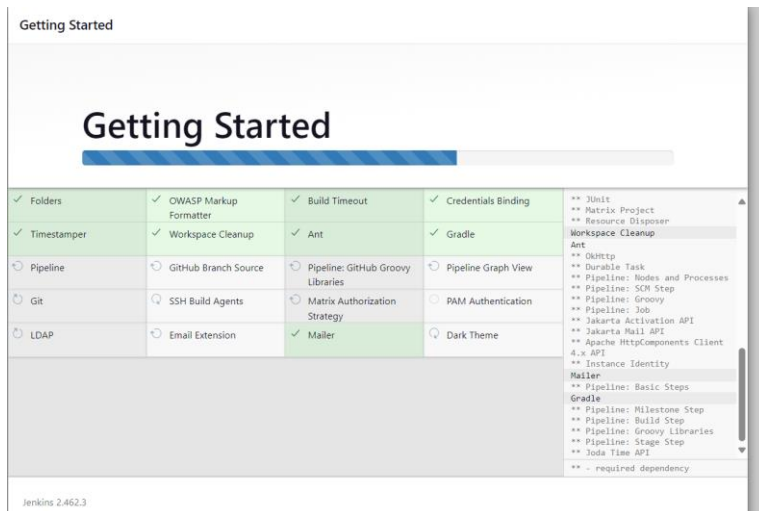
Plugins extend Jenkins with additional features to support many different needs.

### Install suggested plugins

Install plugins the Jenkins community finds most useful.

### Select plugins to install

Select and install plugins most suitable for your needs.



Hier default URL is goed

## Instance Configuration

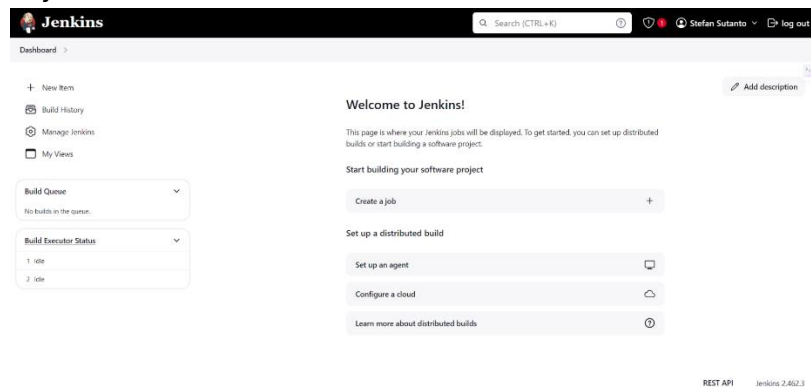
Jenkins URL:

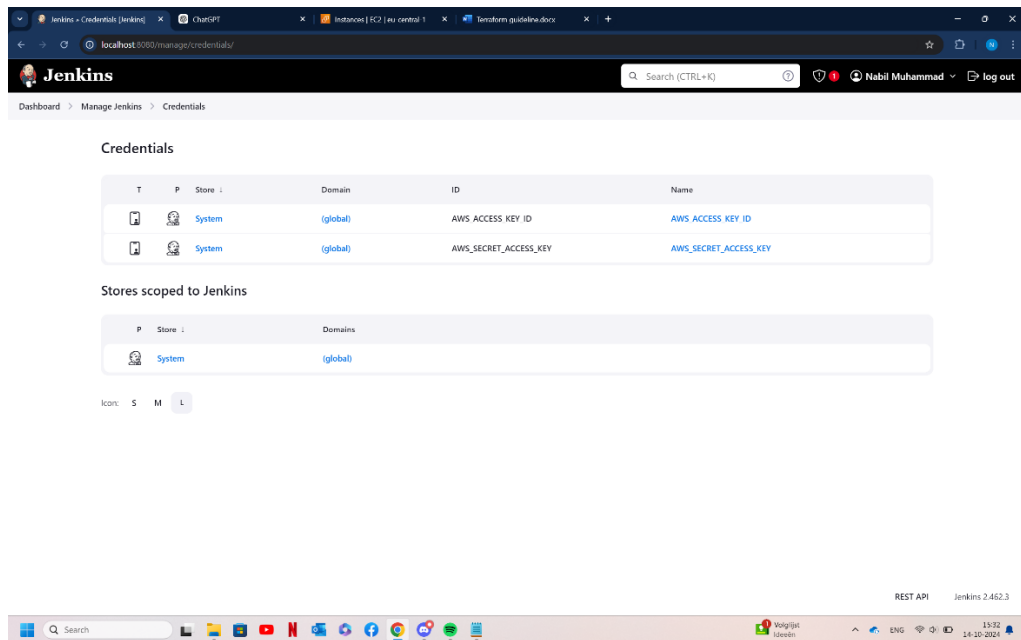
<http://localhost:8080/>

The Jenkins URL is used to provide the root URL for absolute links to various Jenkins resources. That means this value is:

### Stap 4: Credentials AWS access key en secret access key.

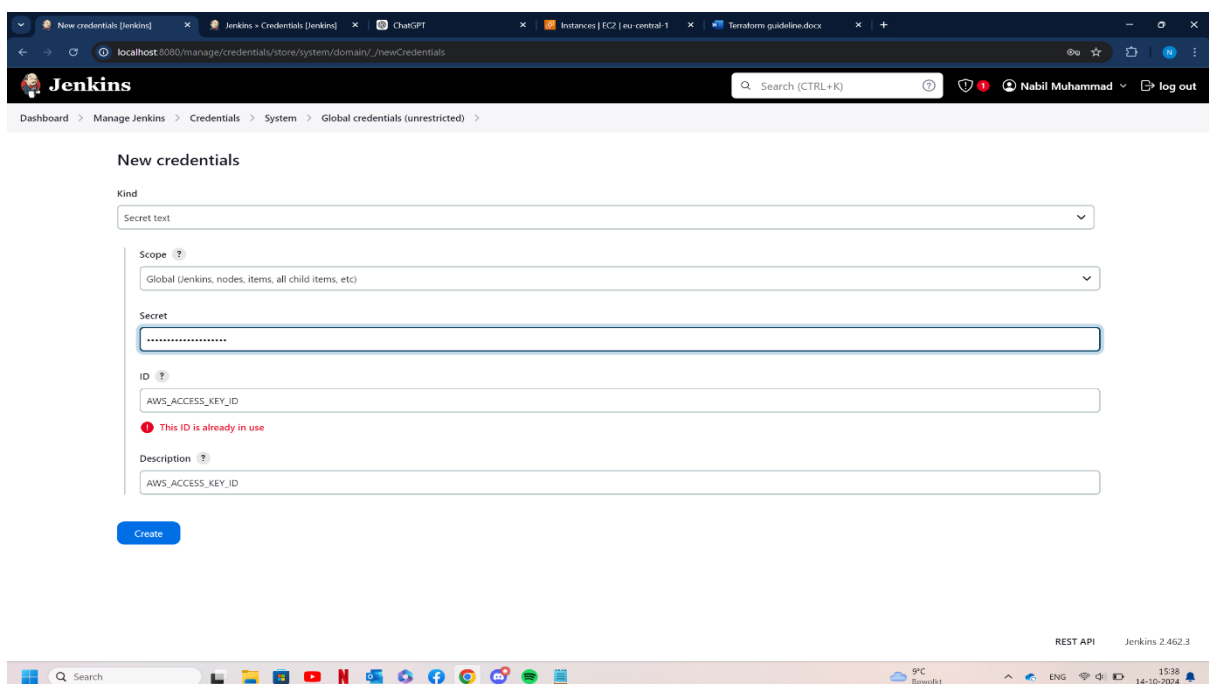
Ga naar **Manage Jenkins > Credentials** en voeg je AWS Access Key en Secret Access Key toe als "Global" credentials.





Klik je op global bij (Stores scoped to Jenkins) en add credentials dan krijg je deze pagina volg zet exact dezelfde ding dat op de afbeelding staat(vergeet niet bij secret zet je u acces key en secret key (zie hier beneden):

Dit is acces key (AWS\_ACCESS\_KEY\_ID):



Dit is secret key (AWS\_SECRET\_ACCESS\_KEY):

New credentials

Kind: Secret text

Scope: Global (Jenkins, nodes, items, all child items, etc)

Secret: [Masked]

ID: AWS\_SECRET\_ACCESS\_KEY  
**This ID is already in use**

Description: AWS\_SECRET\_ACCESS\_KEY

Create

Dit is de code die je bij secret moet zetten dit moest je opslaan als je dit niet meer hebt moet je terug naar boven waar je een user moet aanmaken op IAM.

## Retrieve access keys [Info](#)

### Access key

If you lose or forget your secret access key, you cannot retrieve it. Instead, create a new access key and make the old key inactive.

#### Access key

AKIARHQBNDCUQ7BZORNX

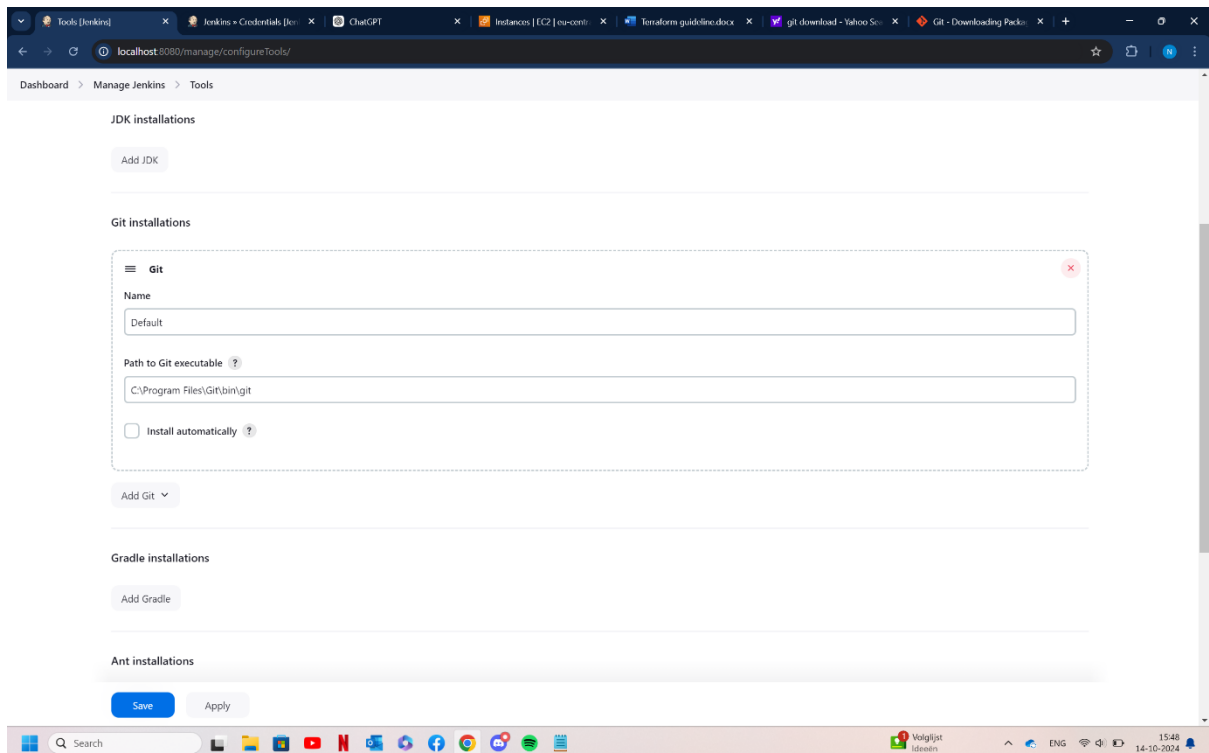
#### Secret access key

zGrERgqOIfMzDbbJUKdZYwtodbNA3YTPNOV4lODb [Hide](#)

Dan druk je op save en ga je naar tools ook in configure jenkins>tools daar doe je de volgende

## Stap 5: Gitpath

Zet u git path binnen de git installations(als je geen git hebt zie boven)



## Stap 6: Nieuwe pipeline

Maak een nieuwe pipeline bij dashboard op new item en geef een naam en op pipeline drukken



Hier schrijf je de script



## Pipeline

### Definition

Pipeline script

Script ?

1

try sample Pipeline... ▼

☒ Use Groovy Sandbox ?

### Stap 7: Jenkins Pipeline Script

Hierbij de code voor de pipeline script :

```
pipeline {
  agent any
  stages {
    stage('Prepare') {
      steps {
        writeFile file: 'main.tf', text: ""
        variable "aws_access_key" {
          description = "AWS Access Key"
          type        = string
        }

        variable "aws_secret_key" {
          description = "AWS Secret Key"
          type        = string
        }

        provider "aws" {
          region    = "eu-central-1"
          access_key = var.aws_access_key
          secret_key = var.aws_secret_key
        }

        resource "aws_instance" "JEN_rnummer_naam" {
          ami          = "" // Vervang dit door een geldige AMI in eu-central-1
          instance_type = "t2.micro"
        }
      }
    }
  }
}
```

```

        tags = {
            Name = "" // Geef hier een naam op voor je instantie
        }
    }
    ""

}
}

stage('Init') {
    steps {

        bat "C:\\Program Files\\Terraform\\terraform.exe" init'
    }
}

stage('Plan') {
    steps {

        bat ""
        "C:\\Program Files\\Terraform\\terraform.exe" plan \\
        -var aws_access_key="AKIARHQBNDUCUVMHZICFC" \\
        -var aws_secret_key="F2U9QKsinXIHlv/M+OLoKG5711r3w2ey9LJS+epO "
        ""
    }
}

stage('Apply') {
    steps {

        bat ""
        "C:\\Program Files\\Terraform\\terraform.exe" apply -auto-approve \\
        -var aws_access_key=" AKIARHQBNDUCUVMHZICFC " \\
        -var aws_secret_key=" F2U9QKsinXIHlv/M+OLoKG5711r3w2ey9LJS+epO "
        ""
    }
}
}
}
}
}

```

PS:

Er moet een paar dingens aangepast worden binnen deze code de

```

-var aws_access_key="AKIARHQBNDUCUVMHZICFC" \ dit moet jou aws accescode zijn
-var aws_secret_key="F2U9QKsinXIHlv/M+OLoKG5711r3w2ey9LJS+epO" dit moet jou aws
secret code zijn

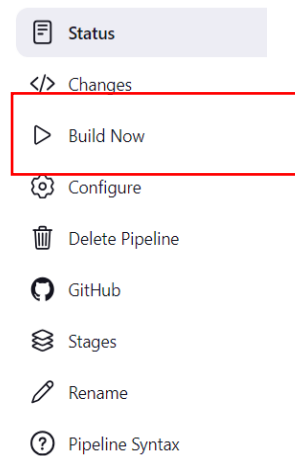
```

`ami = "ami-0084a47cc718c111a" // Vervang dit door een geldige AMI in Frankfurt` **ami als je een andere hebt gebruikt dan ubuntu vervang de ami met de jouwe**

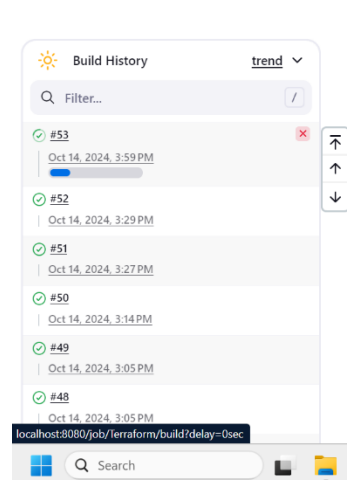
`Name = ""` // Geef hier een naam op voor je instantie **hier moet je JEN\_rnummer\_naam plaatsen**

## Stap 8: Jenkins Build

Eens geplakt klik je op Save en dan zie je links build now staan klik erop en wacht :



Tot dat dit laadt



Eens geladen ga je naar <https://eu-central-1.console.aws.amazon.com/ec2/home?region=eu-central-1#Instances>: en daar zal je u instance zien staan

| Instances (1/5) <small>Info</small>                |                 |                     |                |               |                   |               |                   |                          |        |  |
|--|-----------------|---------------------|----------------|---------------|-------------------|---------------|-------------------|--------------------------|--------|--|
| Find Instance by attribute or tag (case-sensitive) |                 |                     |                | All states    |                   |               |                   |                          |        |  |
|  | Name            | Instance ID         | Instance state | Instance type | Status check      | Alarm status  | Availability Zone | Public IPv4 DNS          | Public |  |
| <input type="checkbox"/>                           | MijnEC2Instance | i-01246c23e7d9f9355 | Running        | t2.micro      | 2/2 checks passed | View alarms + | eu-central-1b     | ec2-3-66-157-155.eu-c... | 3.66.1 |  |
| <input type="checkbox"/>                           | TerraformDem... | i-0650d4c37de56cd37 | Running        | t2.micro      | 2/2 checks passed | View alarms + | eu-central-1b     | ec2-3-72-73-238.eu-ce... | 3.72.7 |  |
| <input type="checkbox"/>                           | Nabiliscool     | i-0d369929123bec0cf | Running        | t2.micro      | 2/2 checks passed | View alarms + | eu-central-1b     | ec2-3-70-252-75.eu-ce... | 3.70.2 |  |
| <input checked="" type="checkbox"/>                | NabilMuhamm...  | i-0a9610d36e367d4da | Running        | t2.micro      | 2/2 checks passed | View alarms + | eu-central-1b     | ec2-52-59-201-65.eu-c... | 52.59. |  |
| <input type="checkbox"/>                           | MijnEC2Instance | i-0816658f89f7e699c | Running        | t2.micro      | 2/2 checks passed | View alarms + | eu-central-1b     | ec2-54-93-89-54.eu-ce... | 54.93. |  |

## Eindresultaat:

Dit is het resultaat dat jullie moeten doorsturen via github: naam repository:

**Terraform\_rnummer\_naam**

Screenshot van de EC2 Instances, **copypaste** de file (.tf, .hcl, tf.state. en .tf.state.backup), screenshot van Jenkins Output) en URL van repository delen via email aan leerkracht

File Edit View Repository Branch Help

Current repository  
**Voorbeeld-Bewijs-Terraform-L...**

Current branch  
**main**

Fetch origin  
Never fetched

Changes 6

History

console output Jenkins.txt

6 changed files

✓

✓

✓

✓

✓

✓

✓

1

2

3

4

5

6

7

8

9

10

+ Started by user Stefan Sutanto

+ [Pipeline] Start of Pipeline

+ [Pipeline] node

+ Running on Jenkins

+ in C:\ProgramData\Jenkins\.jenkins\workspace\Test1

+ [Pipeline] {

+ [Pipeline] stage

+ [Pipeline] { (Prepare)

+ [Pipeline] writeFile

.terraform.lock.hcl

Console Output Jenkins.jpeg

Screenshot\_14-10...s.amazon.com.jpeg

main.tf

terraform.tfstate

terraform.tfstate.backup

Vb screenshot Jenkins output:

✓ Console Output

```

Started by user Stefan Sutanto
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in C:\ProgramData\Jenkins\.jenkins\workspace\Test1
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Prepare)
[Pipeline] writeFile

```

Vb screenshot Instance:

Instances (1/4) [info](#)

Last updated  
34 minutes ago

Co

Find Instance by attribute or tag (case-sensitive)

Instance state = running

X

Clear filters

|                                     | Name             | Instance ID         | Instance state | Instance type |
|-------------------------------------|------------------|---------------------|----------------|---------------|
| <input checked="" type="checkbox"/> | TestTerraJenkins | i-Of400cc70b89e39e1 | Running        | t2.micro      |
| <input type="checkbox"/>            | TestMetJenkins   | i-0735c86131d418e04 | Running        | t2.micro      |
| <input type="checkbox"/>            | JEN_r0891534     | i-08592a04880f09073 | Running        | t2.micro      |
| <input type="checkbox"/>            | AWS_r089153...   | i-0aecc8364dd042605 | Running        | t2.micro      |