



# Infrastructure-as-Code

like a Boss

# About Esther

- **20+ years of Technical Consulting**

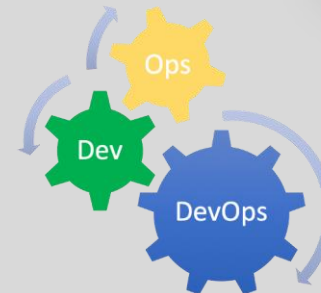
- Solutions Architect at **cognition IT**
- Design | Implement | Troubleshooting EUC

- **Community programs**

- Citrix Technology Professional (CTP)
- Microsoft Most Valuable Professional (MVP)
- CUGC Women in Tech mentorship program

- **DevOps & Cloud Automation**

- Automation of Windows | Citrix | Cloud
- REST APIs | JSON | YAML | PowerShell



Your Presenter:

Esther Barthel

Solutions Architect



@virtues\_IT



<https://www.linkedin.com/in/ebarthel>



<https://www.cloud-devops.ninja>

**COGNITION**  
LEARN IT. KNOW IT. SHARE IT.

# Agenda



- ❑ DevOps
  - ❑ Dev vs Ops
- ❑ Infrastructure-as-Code (IaC)
  - ❑ Imperative vs Declarative code
- ❑ Infrastructure-as-Code in the Cloud
  - ❑ Bicep (ARM Templates)
  - ❑ GO-EUC Framework
- ❑ Infrastructure-as-Code & Citrix



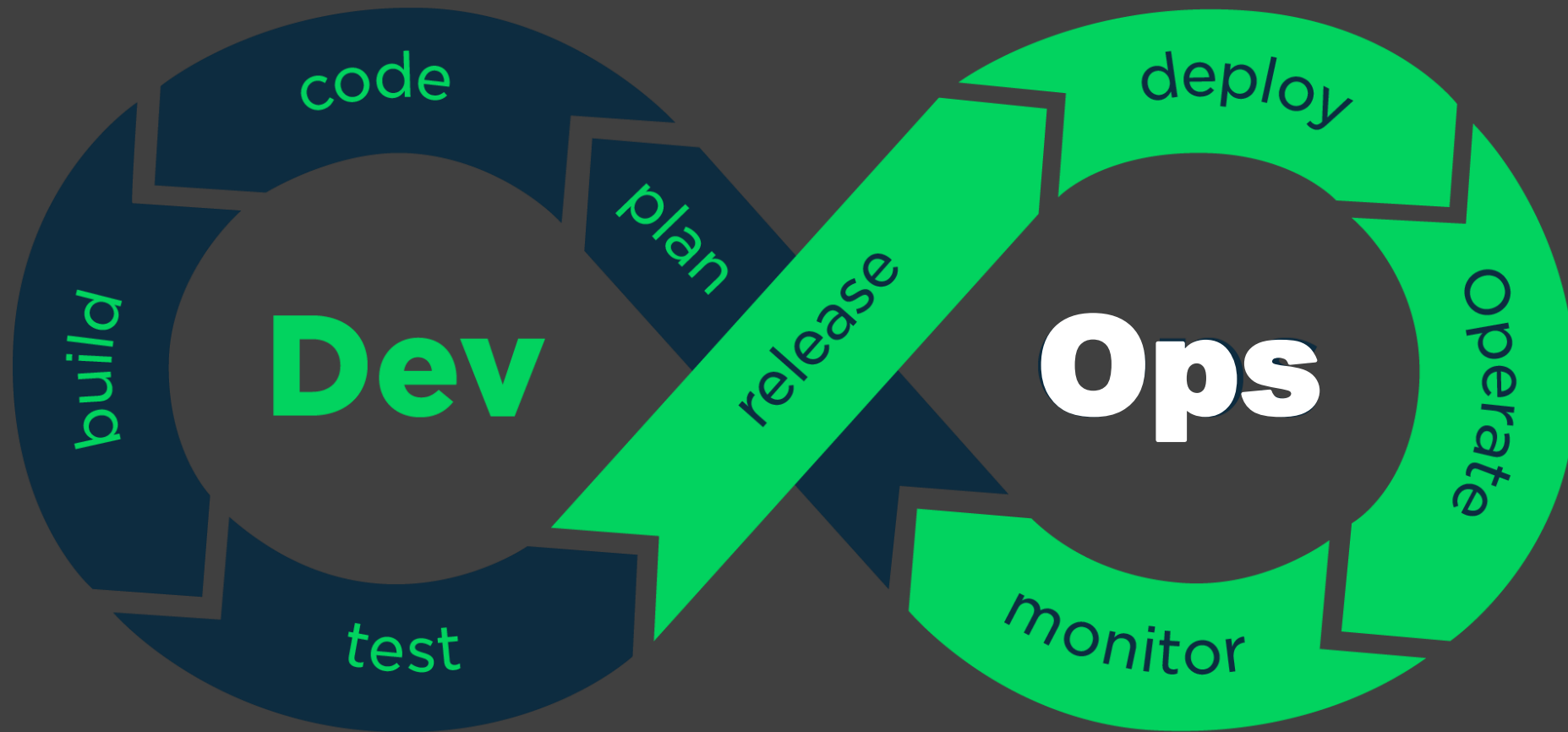
# DevOps

---

IS DEVOPS A 50/50 DEAL?

# DevOps

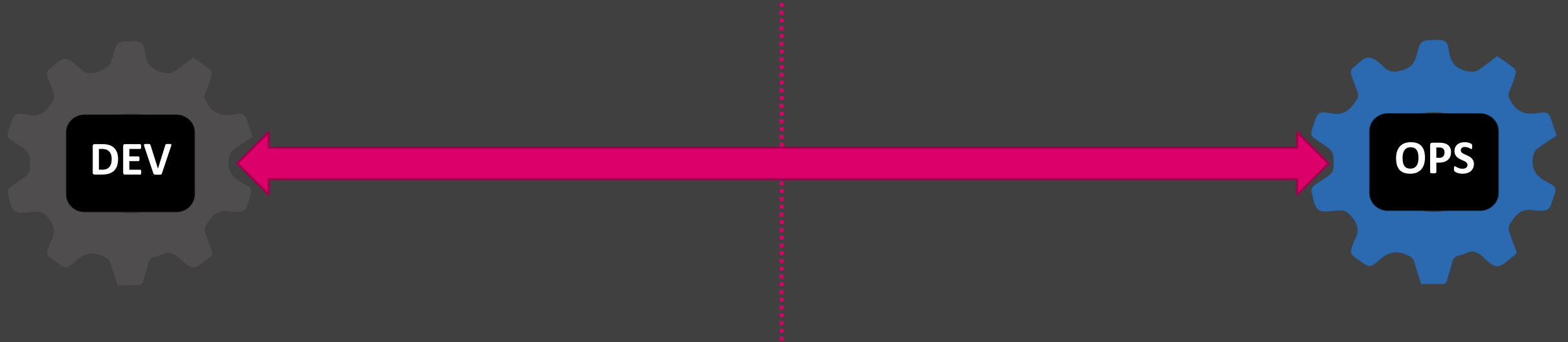
... a **set of practices** that combines software development (Dev) and IT operations (Ops).





# Dev vs Ops

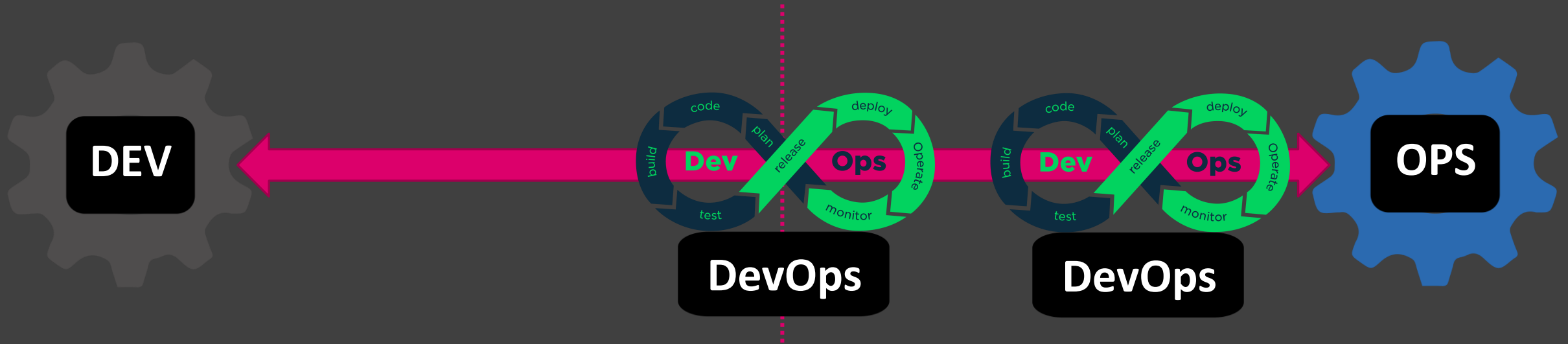
Where does DevOps sit?





# Dev vs Ops

Where does DevOps sit?





# Dev vs Ops

Where does DevOps sit?



**Aaron Parker**  
@stealthpuppy

Replying to @drtritsch

We are becoming developers

10:18 AM · Mar 19, 2022

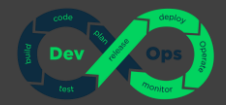
2 Quote Tweets   10 Likes



DEV

OPS





# Dev vs Ops

Where does DevOps sit?



**Tobias J. Kreidl**  
@tkreidl

Replying to @stealthpuppy and @drtritsch

This has actually been true to some extent for a long time. Repetitive, standardized processes have always been primary candidates for automation. The nice thing is that there now are better tools available to facilitate the process!

1:10 PM · Mar 19, 2022

2 Likes



DEV

OPS

## Collaborate

### Application Lifecycle Mgmt.



### Communication & ChatOps



### Knowledge Sharing



## Build

### SCM/VCS



### CI



### Build



### Database Management



## Test

### Testing



### Load Testing



## Deploy

### Deployment



### Config Mgmt. / Provisioning



### Artefact Management



## Run

### Cloud / IaaS / PaaS



### Orchestration & Scheduling



### BI / Monitoring / Logging





# Infrastructure-as-Code

---

CODE IS EVERYTHING

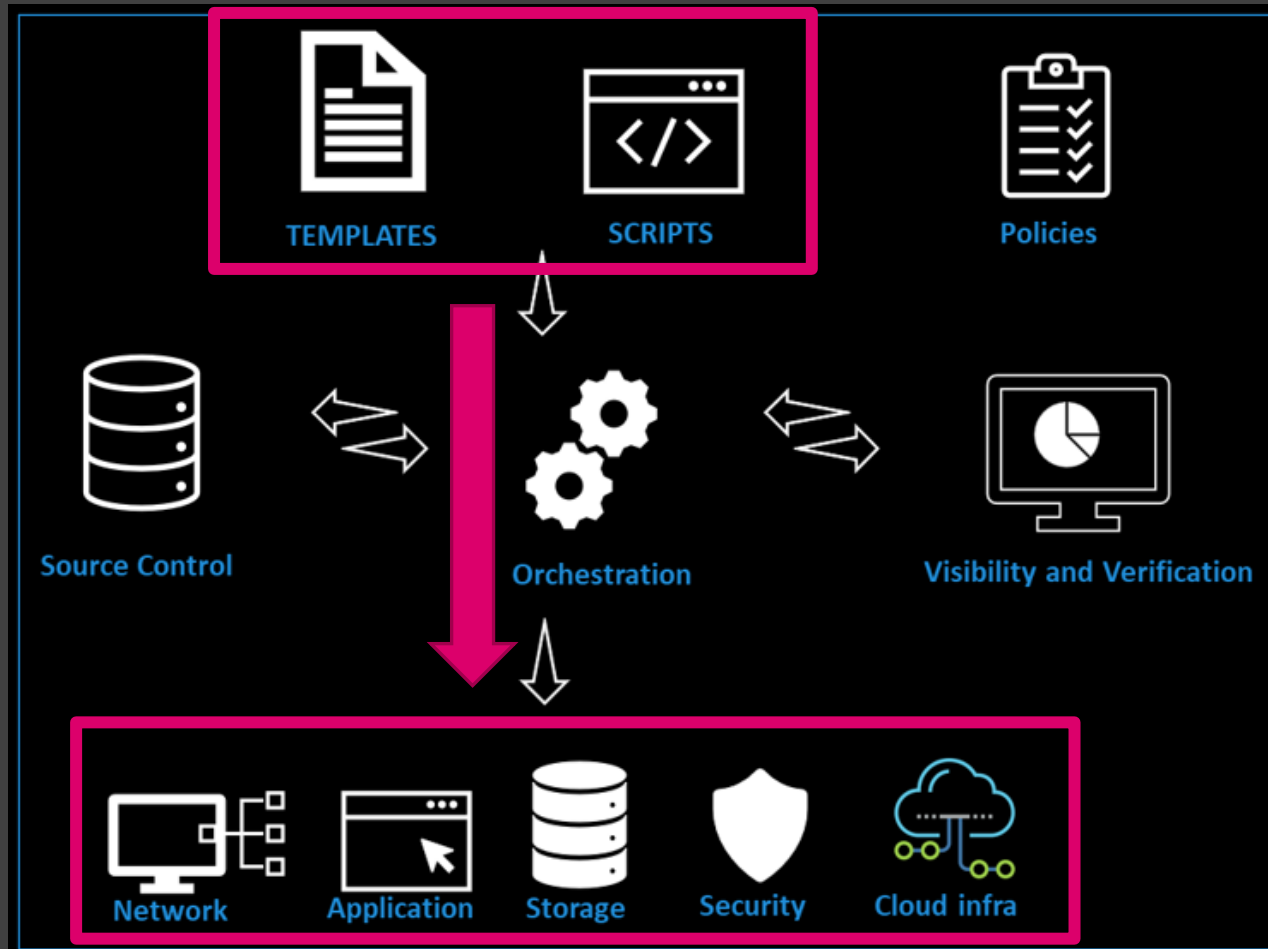
# Infrastructure as Code (IaC)

... the process of **provisioning infrastructure resources** similar to how software is deployed.



# Infrastructure as Code (IaC)

... the process of **provisioning infrastructure resources** similar to how software is deployed.







# Imperative vs Declarative code

---

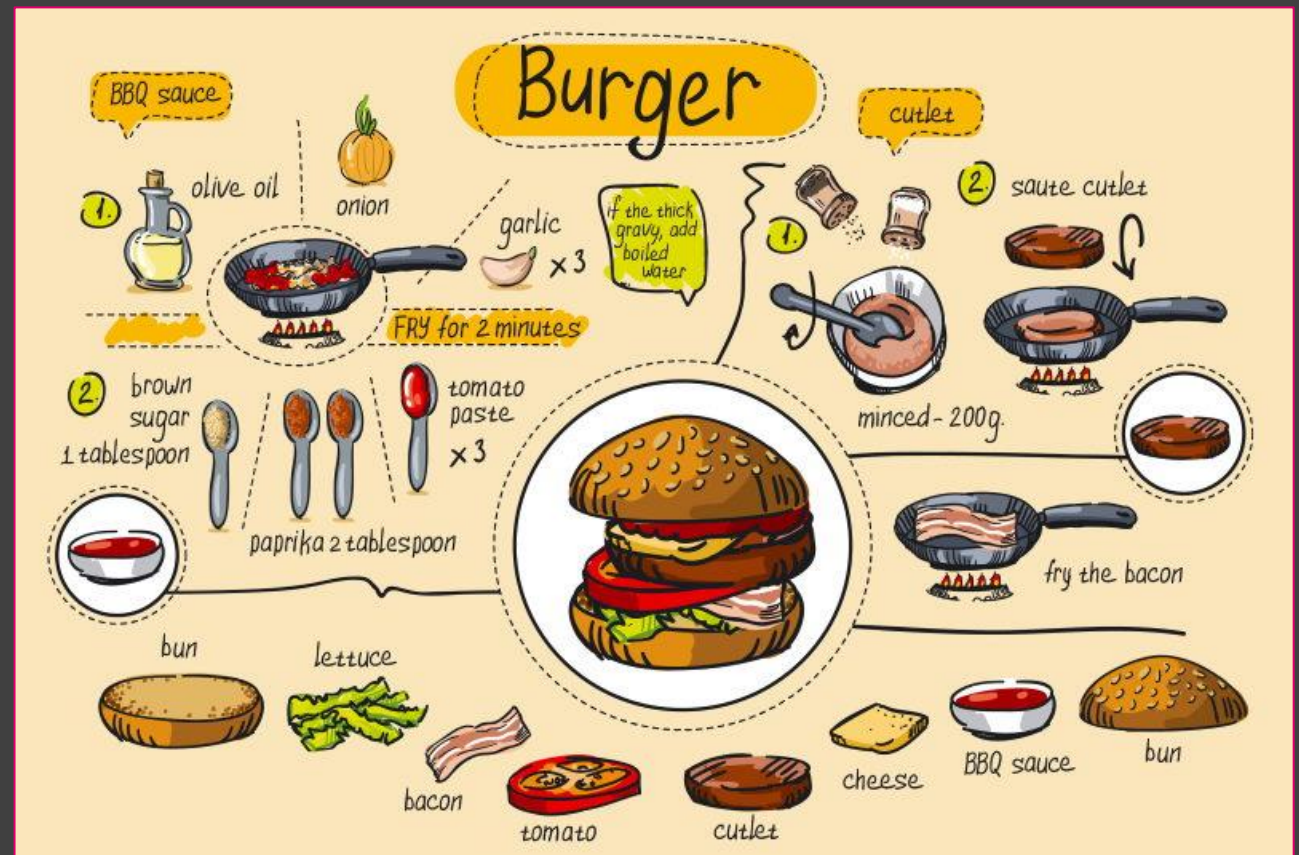
SCRIPTS VS TEMPLATES

# Imperative code

You **execute a sequence of commands**, in a specific order, to reach an end configuration.

This process defines what the code should accomplish, and it defines how to accomplish the task

like a **step-by-step instruction** manual.



# Imperative code

You **execute a sequence of commands**, in a specific order, to reach an end configuration.

using **scripts**

```
# Step 1: Create a new resource group in Azure
New-AzResourceGroup -Name "_rg-ctt-01" -Location "westeurope"

# Step 2: Create a new storage account in the resource group
New-AzStorageAccount -Name "sactt1ab01" `
    -ResourceGroupName "_rg-ctt-01" `
    -SkuName Standard_LRS `
    -Kind StorageV2 `
    -AccessTier Cool `
    -EnableHttpsTrafficOnly
```





# Declarative code

You **specify only the end configuration**. The code doesn't define how to accomplish the task.

like **ordering from a menu**



# Declarative code

You **specify only the end configuration**.

using **templates**

```
resource stg 'Microsoft.Storage/storageAccounts@2021-06-01' = {  
  name: stgname  
  location: stglocation  
  sku: {  
    name: 'Standard_LRS'  
  }  
  kind: 'StorageV2'  
  properties: {  
    accessTier: 'Hot'  
    supportsHttpsTrafficOnly: true  
  }  
  tags: {  
    environment: 'ctt-lab'  
  }  
}
```





# Creating templates

---

USING BICEP FOR AZURE DEPLOYMENTS, THE EASY WAY

# Bicep on Tour!

Azure Tech Groups

Microsoft  
**AZURE**  
USER GROUP  
+ S W E D E N

**Freek Berson**  
Remoting Windows Enthusiast  
& Microsoft MVP

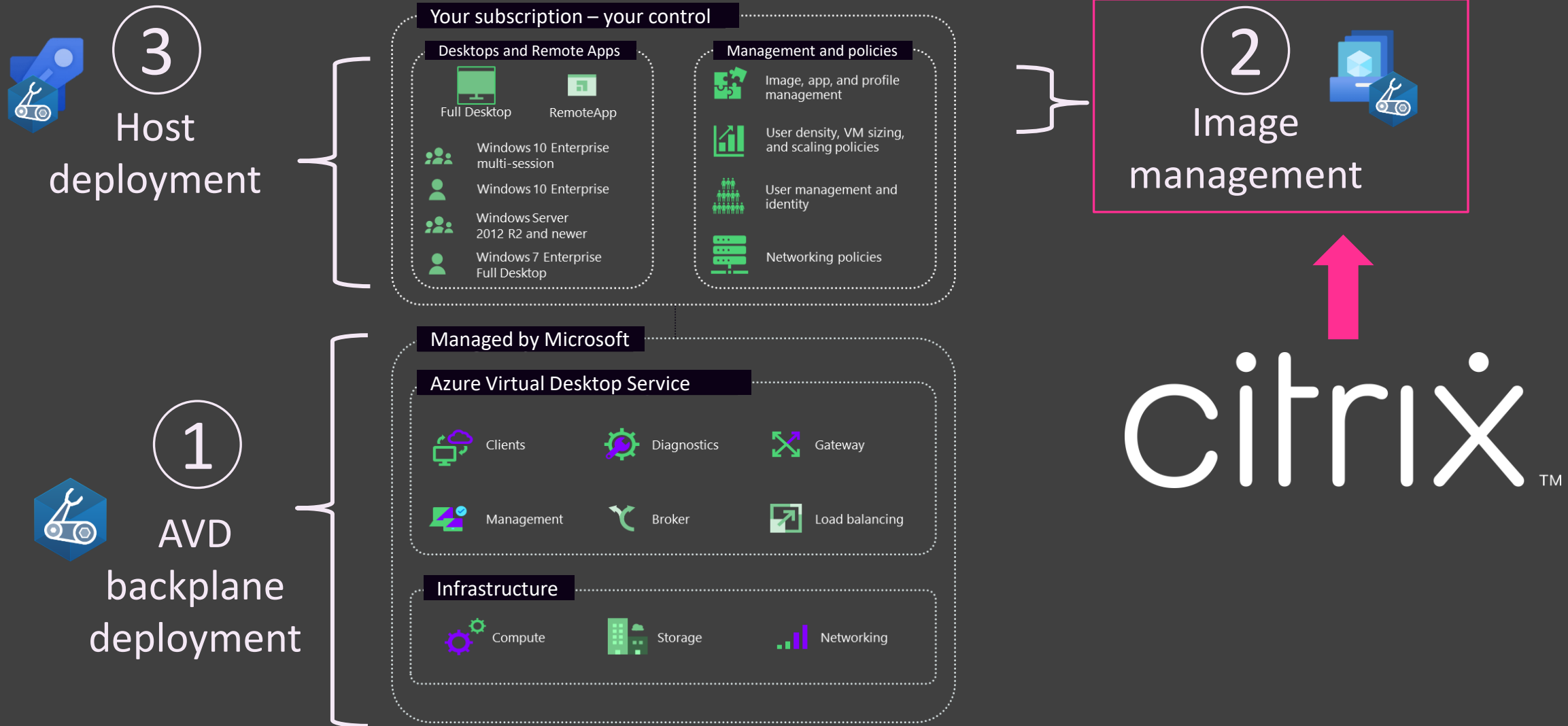
**Esther Barthel**  
Solutions Architect @ Cognition IT

**Infrastructure as Code  
with Bicep on Tour!**

meetup

**YouTube:** <https://www.youtube.com/live/qHcZ7RGB1M4?feature=share>

# Putting Bicep into AVD (GitHub) Action



# Bicep Image Management repo (by Freek Berson)

fberson / Empowering-AVD-Image-deployments-with-Azure-Pipelines-and-Liquit Public

<> Code Issues Pull requests Actions Projects Security Insights

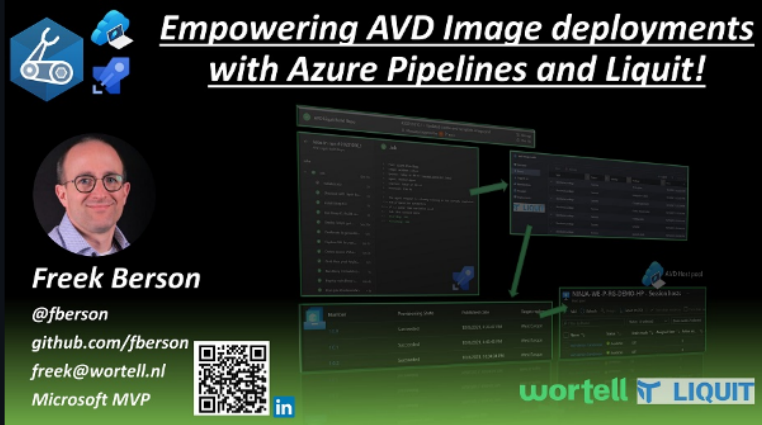
main 1 branch 0 tags

README.md

## Empowering-AVD-Image-deployments-with-Azure-Pipelines-and-Liquit

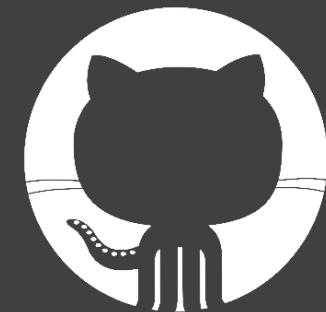
This repository contains source codes, samples and videos presented in the session "Empowering AVD Image deployments with Azure Pipelines and Liquit!"

You catch the recording of the session here : [https://www.youtube.com/watch?v=t\\_Yy0l9Acdk](https://www.youtube.com/watch?v=t_Yy0l9Acdk)



**Freek Berson**  
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github.com/fberson  
freek@wortell.nl  
Microsoft MVP


wortell LIQUIT







# Getting started with Bicep

(by Freek Berson)



Deliver to  
**Netherlands**

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Kindle eBooks › Education &amp; Reference › Education



## Getting started with Bicep: Infrastructure as code on Azure Kindle Edition

by [Freek Berson](#) (Author) | Format: Kindle Edition

★★★★★ ▾ 31 ratings

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**This book is your guide to mastering Bicep! It contains practical solutions and examples to help you jump start your journey towards Infrastructure as Code for Azure!**

Follow the author



[Freek Berson](#) Follow

Print length

1. 

291 pages ▾

Language



English

Sticky notes



On Kindle Scribe ▾

Publication date



13 July 2021

File size



17384 KB





Infra-as-Code

---

citrix





Infra-as-Code

---

net>scaler<sup>TM</sup>

# net>scaler-as-code

[Home](#) > [Automation](#) > [Article](#)

## Get Started with NetScaler Automation using Terraform

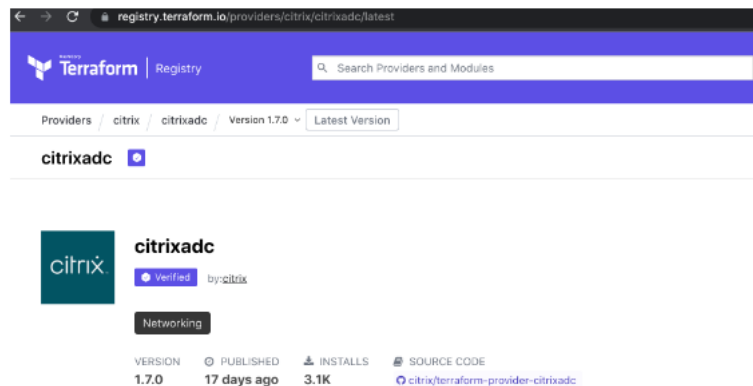


**Mayur Vadhar**

6/13/2022, 07:04 AM

CATEGORY : [AUTOMATION](#), [TERRAFORM](#)

HashiCorp Terraform is an infrastructure-as-code software tool used to orchestrate and manage IT infrastructure, including networking. Terraform codifies infrastructure into declarative configuration files for easier provisioning, compliance, and management. [NetScaler Terraform provider allows](#) users to configure NetScaler's for various use-cases such as global server load balancing, SSL offloading, web application firewall policies, and more. With Terraform, you can share and reuse your NetScaler configurations across your environments — a key time saver when migrating applications from your data center to any public cloud.




source: <https://community.netscaler.com/s/article/Get-Started-with-NetScaler-Automation-using-Terraform>

# net>scaler-as-code

**Prerequisites:** NetScaler appliance is configured with a NSIP.

## ☐ Install Terraform





# Install Terraform

Install or update to v1.4.6 (latest version) of Terraform to get started.

**Operating System**

macOS **Windows** Linux FreeBSD OpenBSD

 1.4.6 (latest) 



# GO-EUC Framework

---

EUC LAB-AS-CODE!

A photograph of a person standing on a rocky mountain peak, looking out over a vast landscape of clouds. The sky is a deep blue, and the clouds are thick and white, filling the lower half of the image. The person is silhouetted against the sky.

Research is creating  
new knowledge

*"Neil Armstrong"*

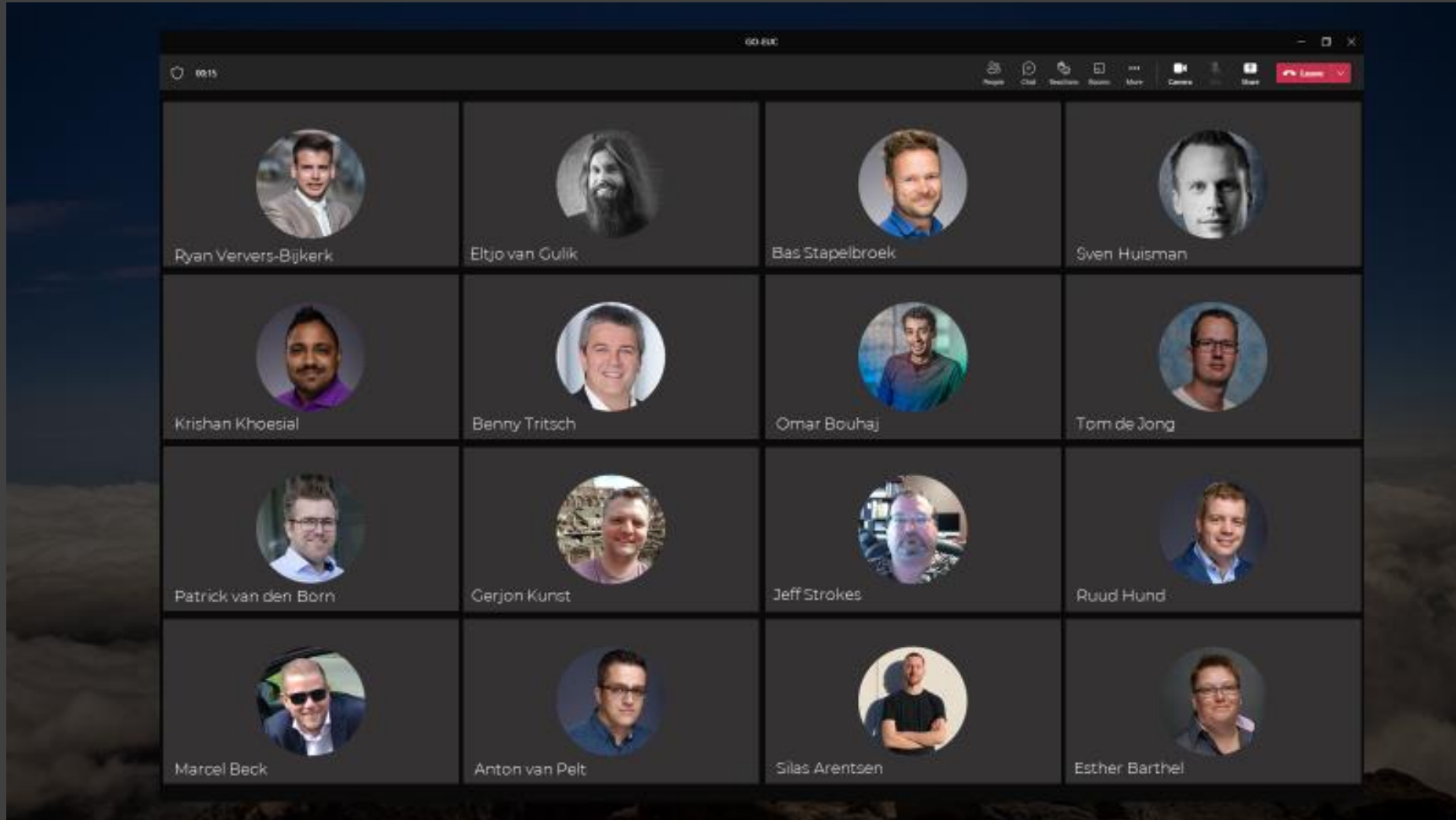
# GO-EUC

---

A person stands on a rocky peak, looking out over a vast landscape of clouds. The scene is captured in a dark, moody style, with the person's silhouette standing out against the lighter clouds. The text is overlaid on this image.

Our mission is to facilitate the  
~~individual with~~ research  
~~capabilities~~ for exploring new  
technologies, to inspire and  
serve the community by  
providing new knowledge.

# GO-EUC







# GO-EUC.com – research articles



**GO-EUC**

THE PAST  
HOME ABOUT ▾ MEMBERSHIP ▾

THE FUTURE  
SPONSORS PRESENTATIONS

## Microsoft Teams optimization in a virtual desktop

15 Dec 2022  



FOLLOW GO-EUC



Q SEARCH

search...

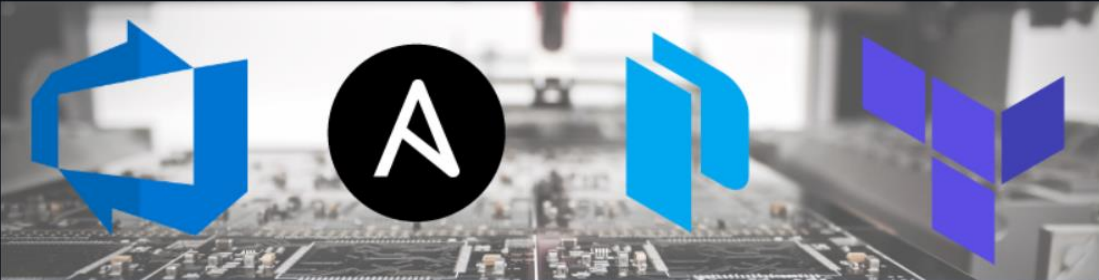


# GO-EUC Framework

GO-EUC / go-euc-labPublic

<> CodeIssuesPull requestsActionsProjectsSecurityInsights

README.md



Welcome to the GO-EUC lab configuration repository. This repository showcases how the GO-EUC lab is set up and is used as the primary deployment method for the GO-EUC platform.

### Technology Stack

The following technology stack in this project:


| Tech         | Purpose   |
|--------------|---|
| Azure DevOps | Primary deployment pipeline, can be replaced by GitHub actions or other DevOps solutions. |
| Terraform    | Infrastructure provisioning.  |
| Packer       | Golden image management.  |
| Ansible      | Desired State Configuration.  |
| Docker       | Containers, primarily used for Azure DevOps agent and GO-EUC web services.                |

### About

The GO-EUC Infrastructure as Code (IaC) repository for lab deployment

awsansibledevopscloudvmwareazureterraformgpcicitrixeucazure-devops

### Contributors 5



### Languages

HCL69.9%PowerShell28.3%Shell1.8%



# GO-EUC Framework

Define your DevOps principles



Collaboration and recognition



Automation and reproducibility



Continuous improvement



Think big, start small



# GO-EUC Framework

Start with a declarative approach!

Infra-as-Code



# GO-EUC Framework

Start with a declarative approach!

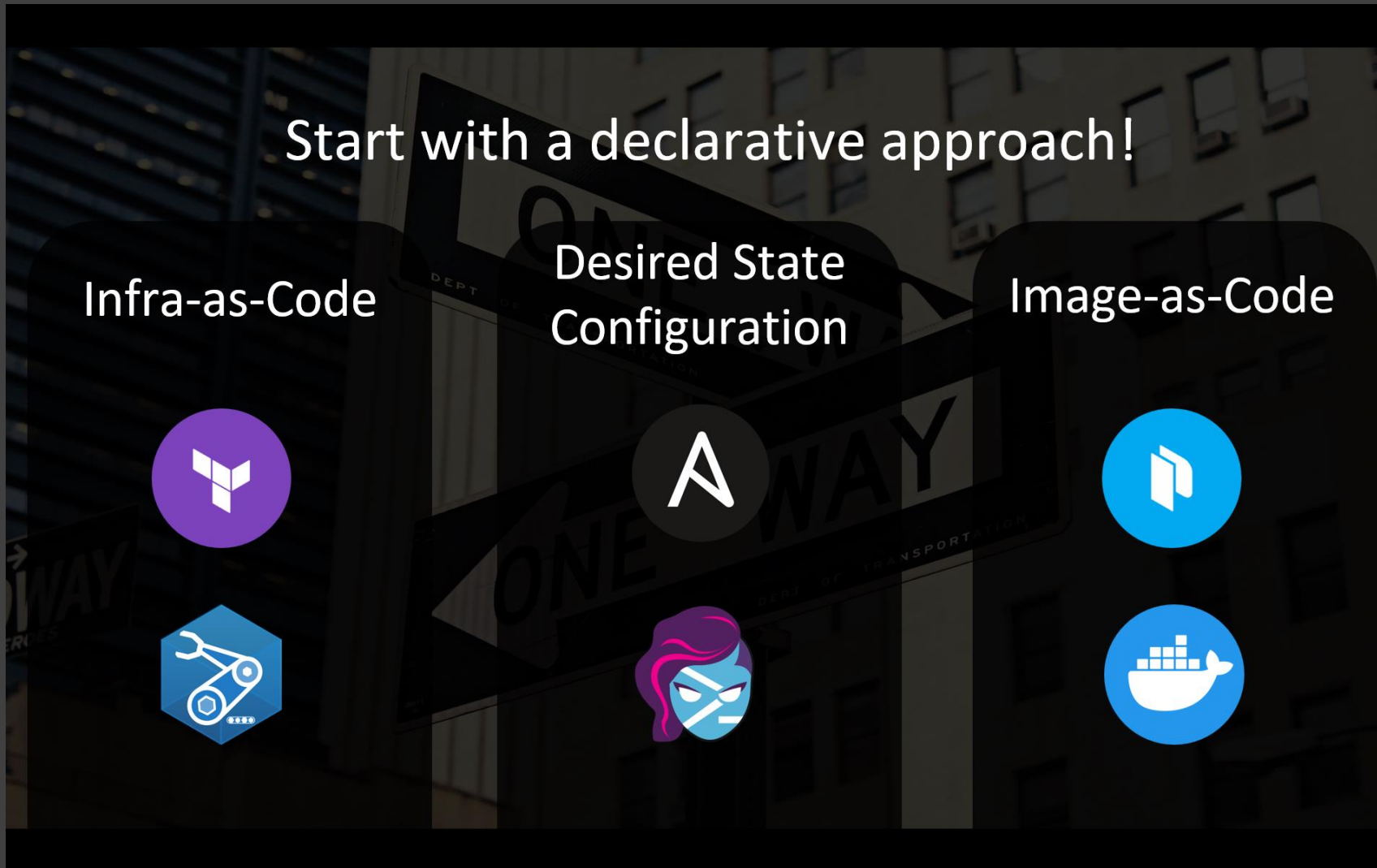
Infra-as-Code



Image-as-Code



# GO-EUC Framework



# GO-EUC Framework





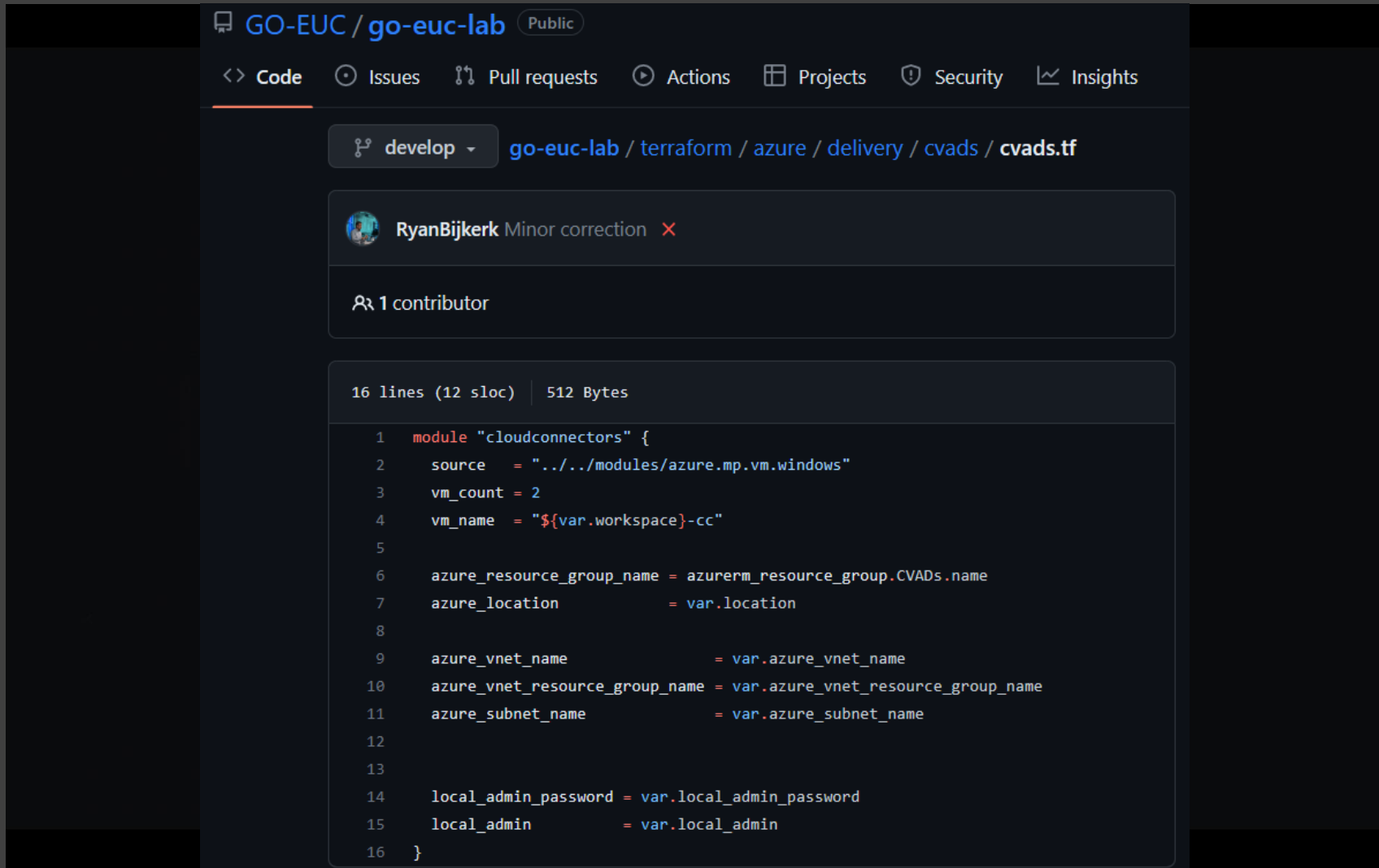
# GO-EUC Framework

---



THE  
JOURNEY  
IS ON

# GO-EUC Framework – Infra-as-Code



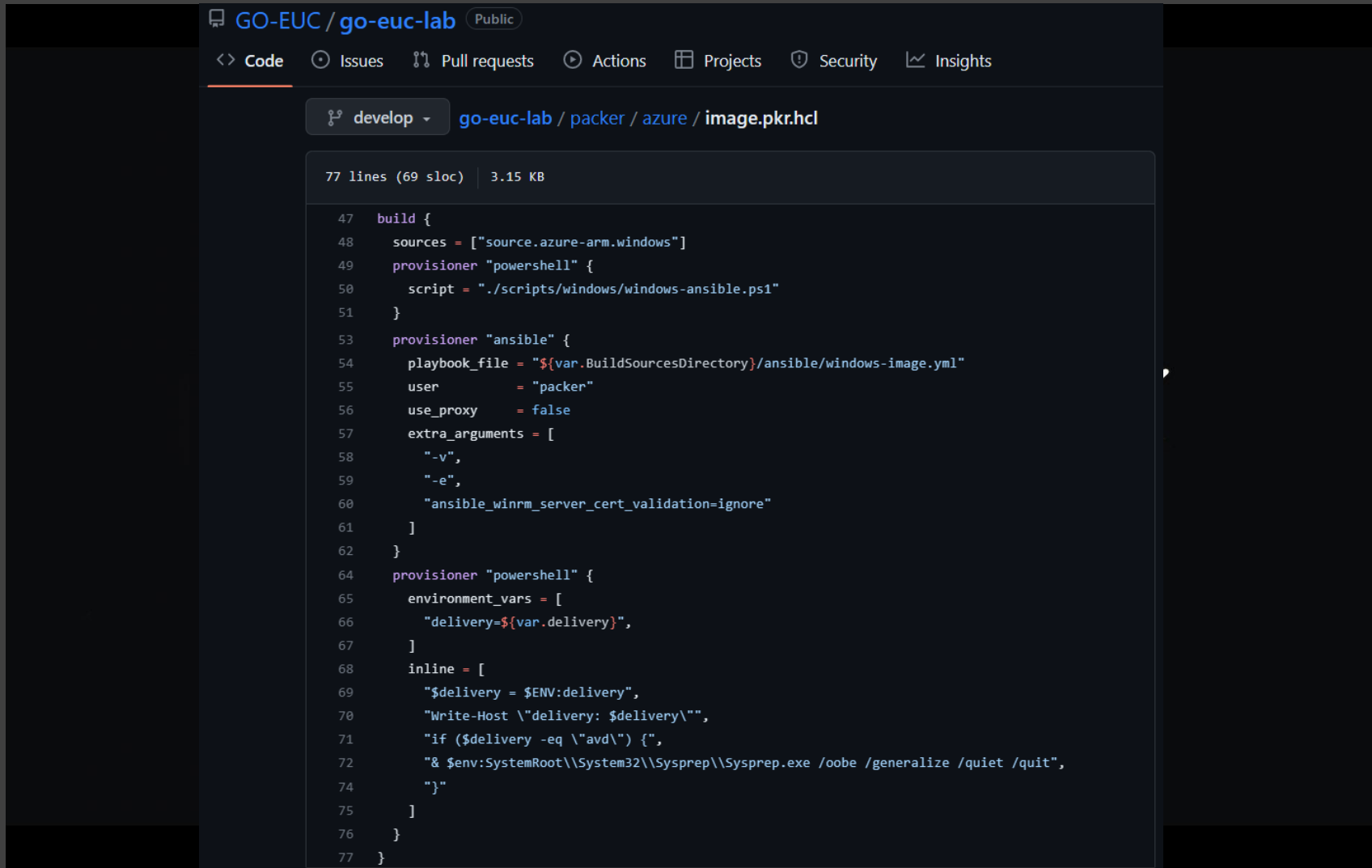
The screenshot shows a GitHub repository for **GO-EUC / go-euc-lab** (Public). The navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Security, and Insights. The current view is the **develop** branch, showing the file **go-euc-lab / terraform / azure / delivery / cvads / cvads.tf**. A pull request by **RyanBijkerk** is shown with the title "Minor correction" and a status of "1 contributor". The file details indicate it is 16 lines (12 sloc) and 512 Bytes. The code content is as follows:

```
1 module "cloudconnectors" {
2   source = "../../modules/azure.mp.vm.windows"
3   vm_count = 2
4   vm_name = "${var.workspace}-cc"
5
6   azure_resource_group_name = azurerm_resource_group.CVADs.name
7   azure_location            = var.location
8
9   azure_vnet_name            = var.azure_vnet_name
10  azure_vnet_resource_group_name = var.azure_vnet_resource_group_name
11  azure_subnet_name          = var.azure_subnet_name
12
13
14  local_admin_password = var.local_admin_password
15  local_admin          = var.local_admin
16 }
```





# GO-EUC Framework – Image-as-Code



```
GO-EUC / go-euc-lab Public
<> Code Issues Pull requests Actions Projects Security Insights
develop go-euc-lab / packer / azure / image.pkr.hcl
77 lines (69 sloc) 3.15 KB
47 build {
48   sources = ["source.azure-arm.windows"]
49   provisioner "powershell" {
50     script = "./scripts/windows/windows-ansible.ps1"
51   }
52   provisioner "ansible" {
53     playbook_file = "${var.BuildSourcesDirectory}/ansible/windows-image.yml"
54     user = "packer"
55     use_proxy = false
56     extra_arguments = [
57       "-v",
58       "-e",
59       "ansible_winrm_server_cert_validation=ignore"
60     ]
61   }
62 }
63 provisioner "powershell" {
64   environment_vars = [
65     "delivery=${var.delivery}",
66   ]
67   inline = [
68     "$delivery = $ENV:delivery",
69     "Write-Host \"delivery: $delivery\"",
70     "if ($delivery -eq \"avd\") {",
71     "& $env:SystemRoot\\System32\\Sysprep\\Sysprep.exe /oobe /generalize /quiet /quit",
72     "}"
73   ]
74 }
75 }
76 }
77 }
```



# GO-EUC Framework – DSC-as-Code

GO-EUC / go-euc-lab Public

<> Code Issues Pull requests Actions Projects Security Insights

features/vsphe... go-euc-lab / ansible / roles /

RyanBijkerk Added skip to prevent an error History

|                                  |  |              |
|----------------------------------|--|--------------|
| citrix-cloud                     | Combined both Citrix Cloud Connector installation and configuration i... | 3 months ago |
| citrix-delivery-controller/tasks | Added logic to add a hosting connection to the Citrix environment, on... | 3 months ago |
| citrix-license-server/tasks      | Cleanup license server install   | 3 months ago |
| citrix-optimizer/tasks           | Removed the downloads of Citrix binaries due to the MFA of Citrix        | 3 months ago |
| citrix-receiver/tasks            | Cleanup of the yaml files using yamllint                                 | 3 months ago |
| citrix-storefront                | Removed the downloads of Citrix binaries due to the MFA of Citrix        | 3 months ago |
| citrix-studio/tasks              | Removed the download for studio  | 3 months ago |
| citrix-vda/tasks                 | Removed the downloads of Citrix binaries due to the MFA of Citrix        | 3 months ago |
| domain-controller                | Major overhaul in the domain creation                                    | 2 months ago |
| domain-join/tasks                | Fix in the domain join   | 2 months ago |
| file-share/tasks                 | Update in the file share   | 2 months ago |



# GO-EUC Framework

GO—EUC



# GO-EUC Framework – lessons learned



Tools



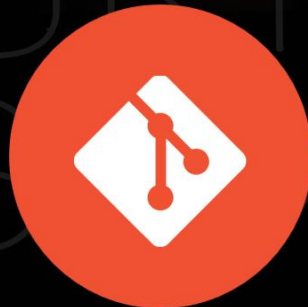
Fail fast



Visual Studio Code



Learn



Source  
Control



Pipeline


# GO-EUC Framework – create YOUR journey!

✓ #20230502.1 - From zero to an automation hero by using Infrastructure as Code (IaC)









Cancel

⋮

Summary

Trigger by  BeLux CUGC (May 2023)

View change

|   |   |  |  |
|---|---|--|--|
| Repository and version  | Time started and elapsed  | Related  | Test and coverage  |
|  GO-EUC/go-euc-lab   |  Today at 10:00 AM |  0 work items |  100% passed  |
|  features/belux-cugc |  13m 37s           |  0 artifacts  |  100% covered |

Stages

Jobs

✓ About GO-EUC

1 job completed

5m 30s

✓ Why DevOps & IaC?

1 job completed

10m 35s

✓ Our DevOps project

5 jobs completed

25m 35s

✓ How to get started

1 job completed

15m 25s

✓ Our DevOps strategy

1 job completed

5m 37s

✓ Next steps

1 job completed

5m 15s



## Collaborate

### Application Lifecycle Mgmt.



### Communication & ChatOps



### Knowledge Sharing



## Build

### SCM/VCS



### CI



### Build



### Database Management



## Test

### Testing



### Load Testing



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### Config Mgmt. / Provisioning



### Artefact Management



## Run

### Cloud / IaaS / PaaS



### Orchestration & Scheduling



### BI / Monitoring / Logging





# Thank you



Presented by:



@virtuEs\_IT

Esther Barthel



<https://www.linkedin.com/in/ebarthel>

Solutions Architect



<https://www.cloud-devops.ninja>

**COGNITION**  
LEARN IT. KNOW IT. SHARE IT.



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@virtuEs\_IT

Esther Barthel



<https://www.linkedin.com/in/ebarthel>

Solutions Architect



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