Migration of a containerized Legacy Application to the Cloud

Don't give up just because it's legacy

Michael Mitter, Patrick Koch

Today’s Agenda

1 **Introduction**

Who am I? My employer, our legacy software application

2 **What happened before the cloud?**

Once upon a time ... and it‘s still

3 **1st Challenge – Let’s do a PoC**

Why the hell Windows containers?

4 **Next logical step**

Linux containers, finally!

5 **Conclusion & Outlook**

What’s next? We are still at the beginning ...

AVL List GmbH

Founded **1948**

More than **11,000** worldwide

4,000 in **Graz (headquarters)**

45 affiliates worldwide

Export quota of **97%**

AVL List GmbH ("AVL") is the world's largest independent company **for development, simulation and testing in the automotive industry**, and in other sectors. Drawing on its pioneering spirit, the company provides concepts, solutions and methodologies to shape future mobility trends."

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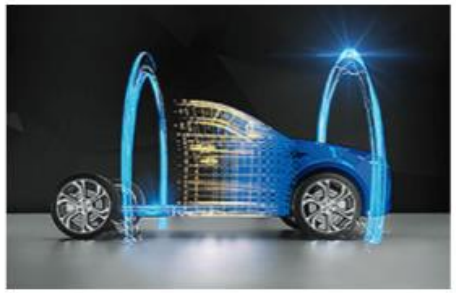
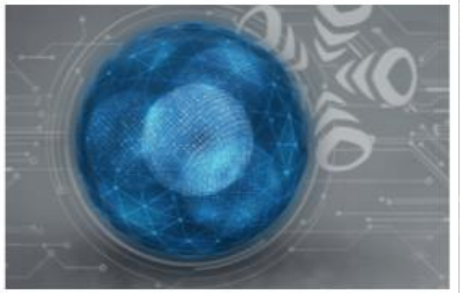


Electrification

Autonomous Driving / ADAS

Emission

Vehicle



Data Intelligence

Who are those guys?

Patrick Koch

DevOps / Integration Engineer Software

Specialized in:

CI/CD, Container, K8s, Cloud

- Improving CI/CD Pipelines
- Containerization of the Infrastructure/Software Components
- Establishing Cloud Solutions
- Development and Maintenance of our intern Testing Tools
- Provides good Suggestions for Department Events ;)

Michael Mitter

Senior Product Owner / Team Lead

Specialized in:

being an agile servant and having the overview

- Sprint & Iteration planning (SAFe), Spotify Squad framework
- Responsible for release & integration management
- Keeps an eye on DevOps / Test management / SW Quality /OSS Compliance
- Responsible for knowledge base (Confluence + Jira)
- In spare time doing lots of sports, renovating old house and listening to heavy music

AVL CONCERTO

Why legacy?

~ 8200 files

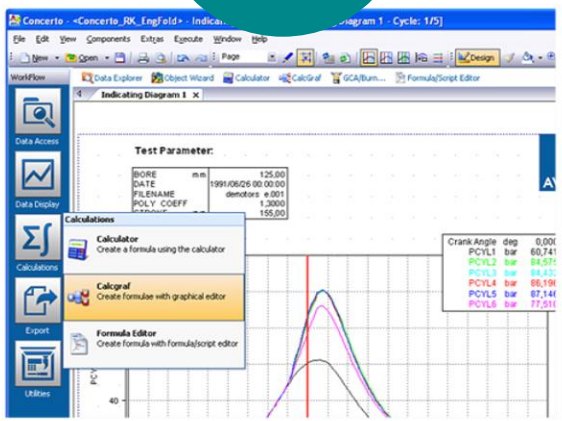
~ 2,9 Mio LOC

Windows® application

~ 800 customers

~ 23000 users

Started > 25 years ago



“A legacy system is outdated computing software and/or hardware that is still in use. ”

Source of icon: https://commons.wikimedia.org/wiki/File:Windows_Logo_(1992-2001).svg

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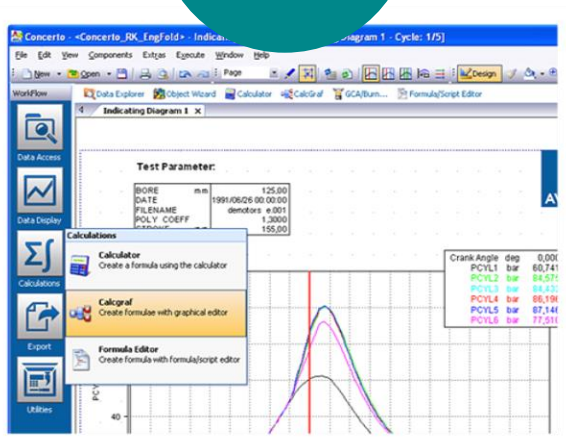


~ 800 customers

~ 23000 users

2014

(unmanaged legacy (C++) and managed (C#) code).

New Generation

Evolved to platform product

(component & full integration in internal products)

REST interface

Python support

Automation Framework

2018

Web components

Container, K8s

2022 ...

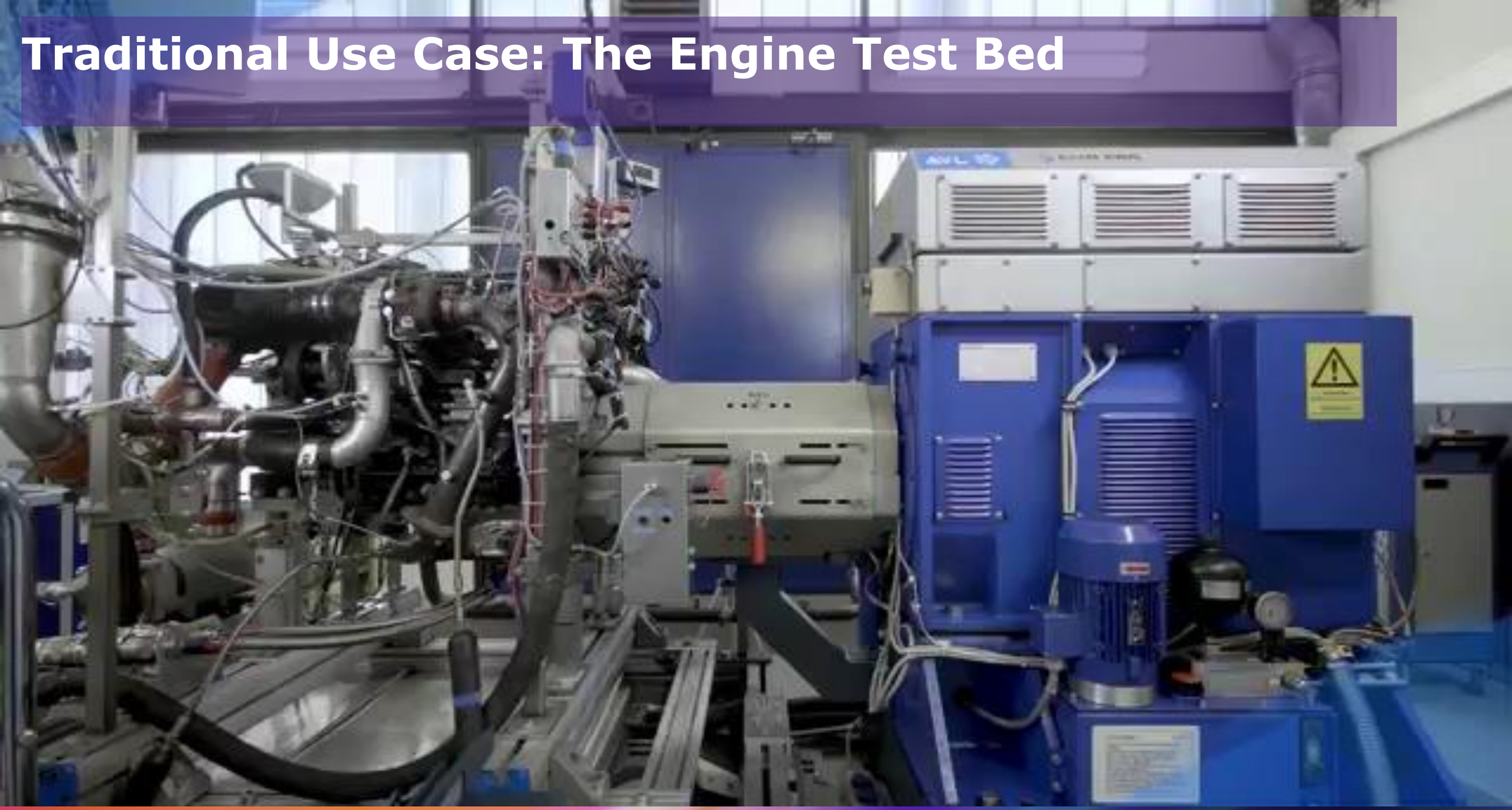
Linux components (data, Python)

Source of icon: https://commons.wikimedia.org/wiki/File:Windows_Logo_(1992-2001).svg

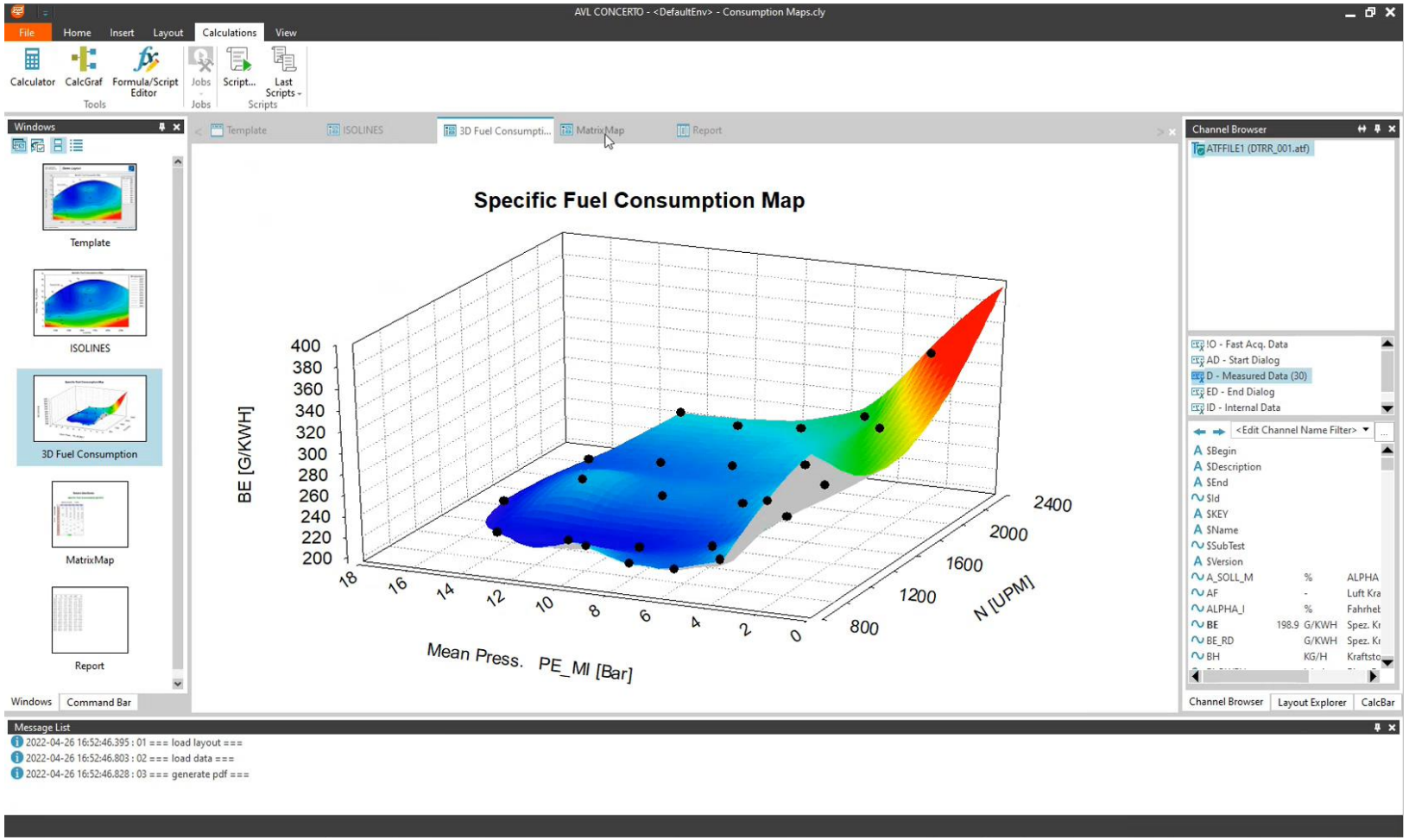
Once upon a time ...

What happened before
the cloud, k8s, container?

Traditional Use Case: The Engine Test Bed



Data Processing with Concerto on Windows 10 Client



how and why the 1st challenge started ...

An evolution happens – why even more automation?

Huge testbed for **single** unit under test (**UUT**)

1 Operator per testbed

Very **high costs**

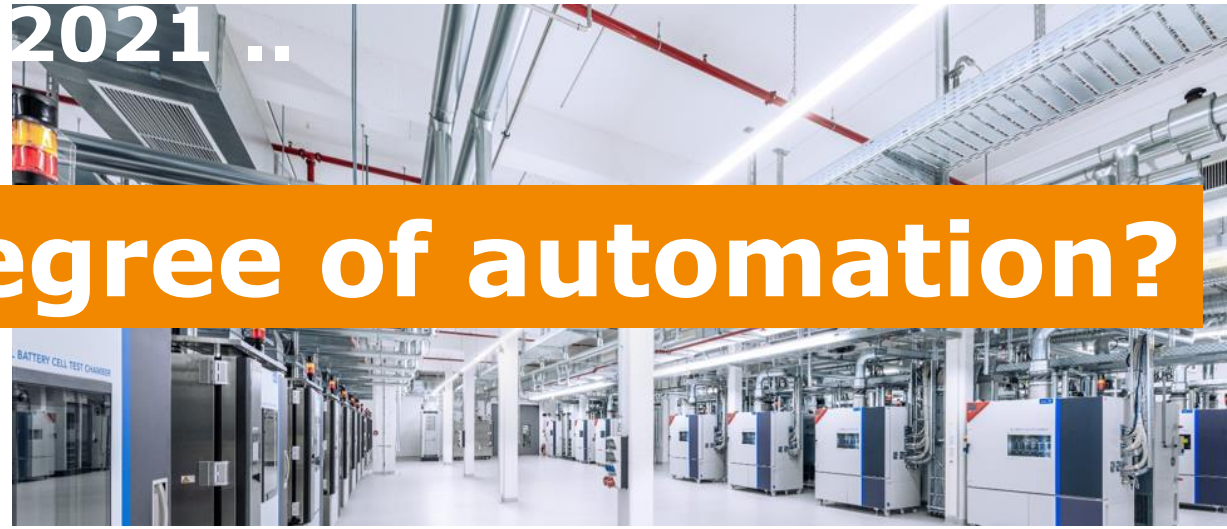
Exchanging of unit is **labour-intesive**

One testing unit for **multiple** UUTs (Battery Cells)

1 Operator for **whole** lab

Costs per UUT are much **lower**

UUT **exchange** works **automated**

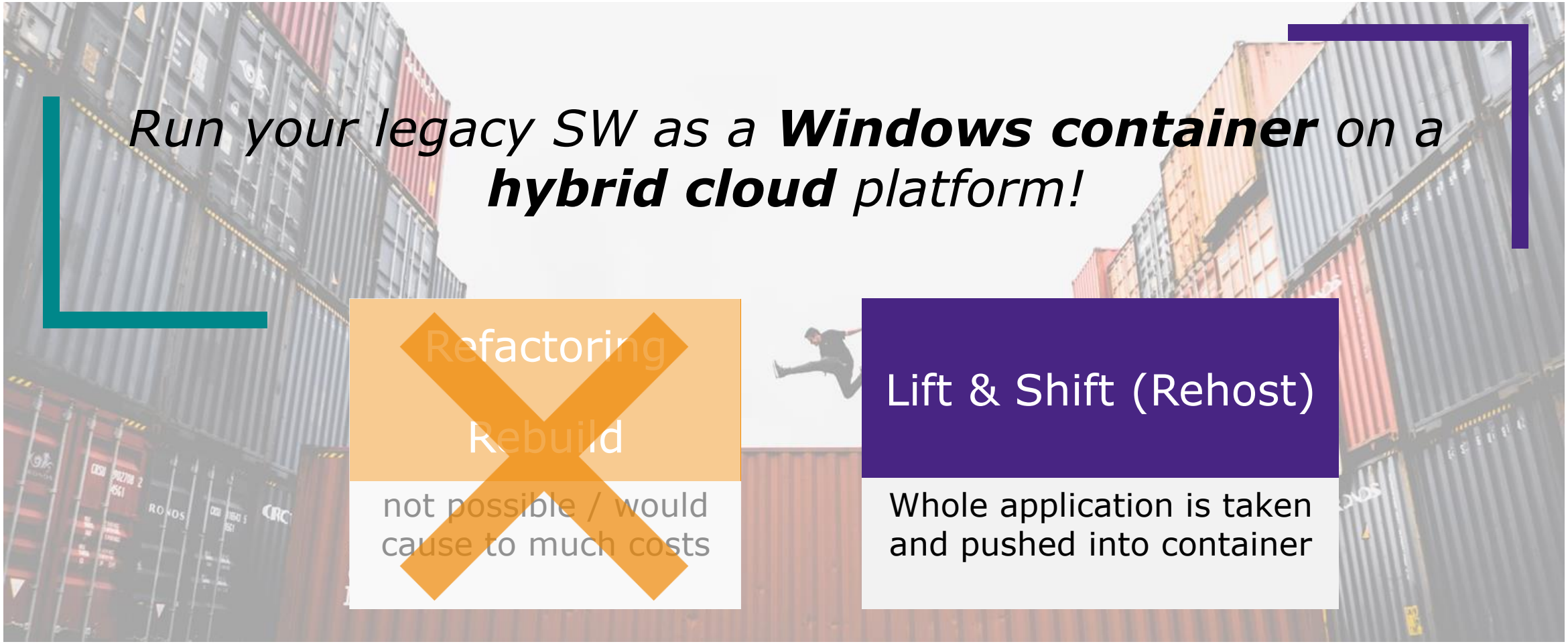


How to increase the degree of automation?

The Mission (impossible?)

Move** your custom legacy application into the **cloud**. Find a **migration strategy** that works! Right **now!

Short-term approach for migrating to the cloud



*Run your legacy SW as a **Windows container** on a **hybrid cloud** platform!*

~~Refactoring~~

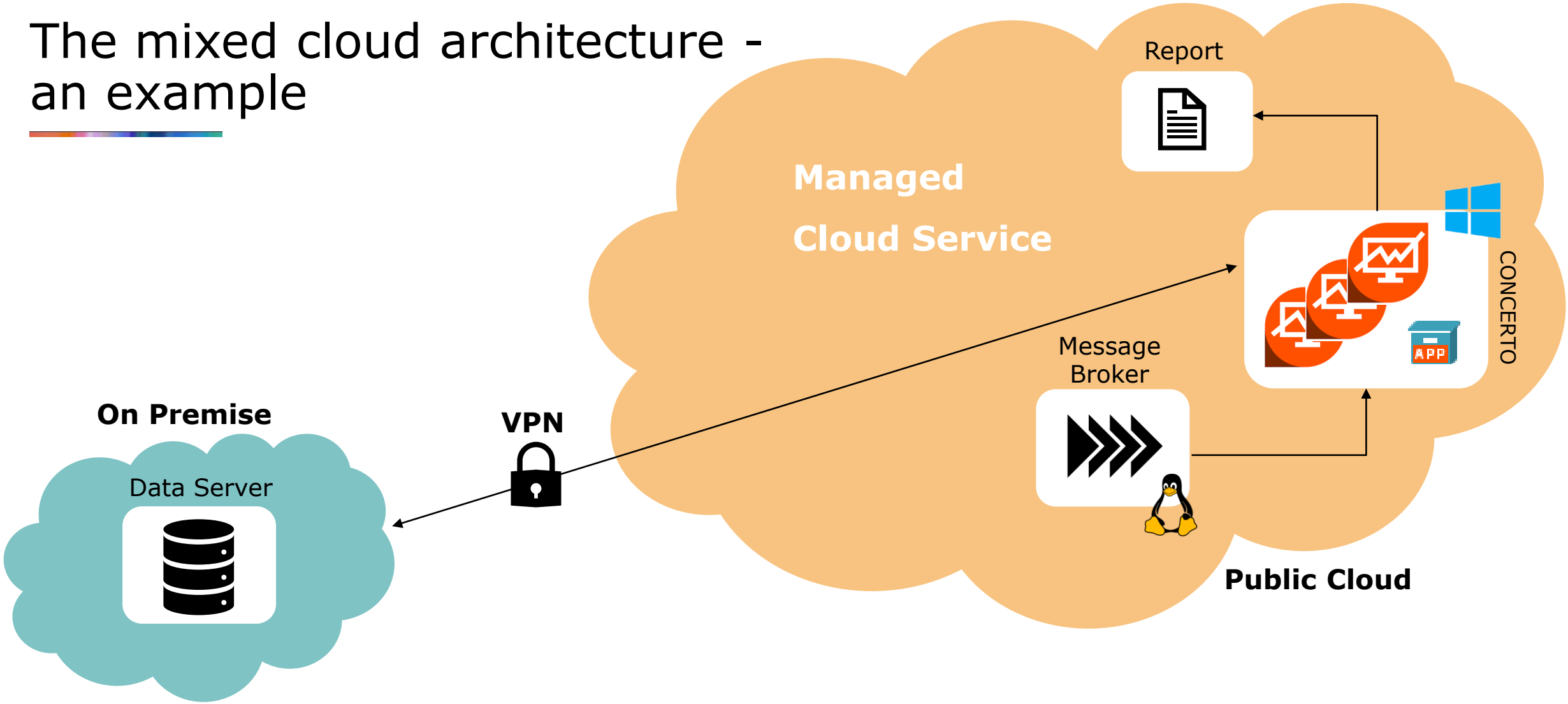
~~Rebuild~~

not possible / would cause to much costs

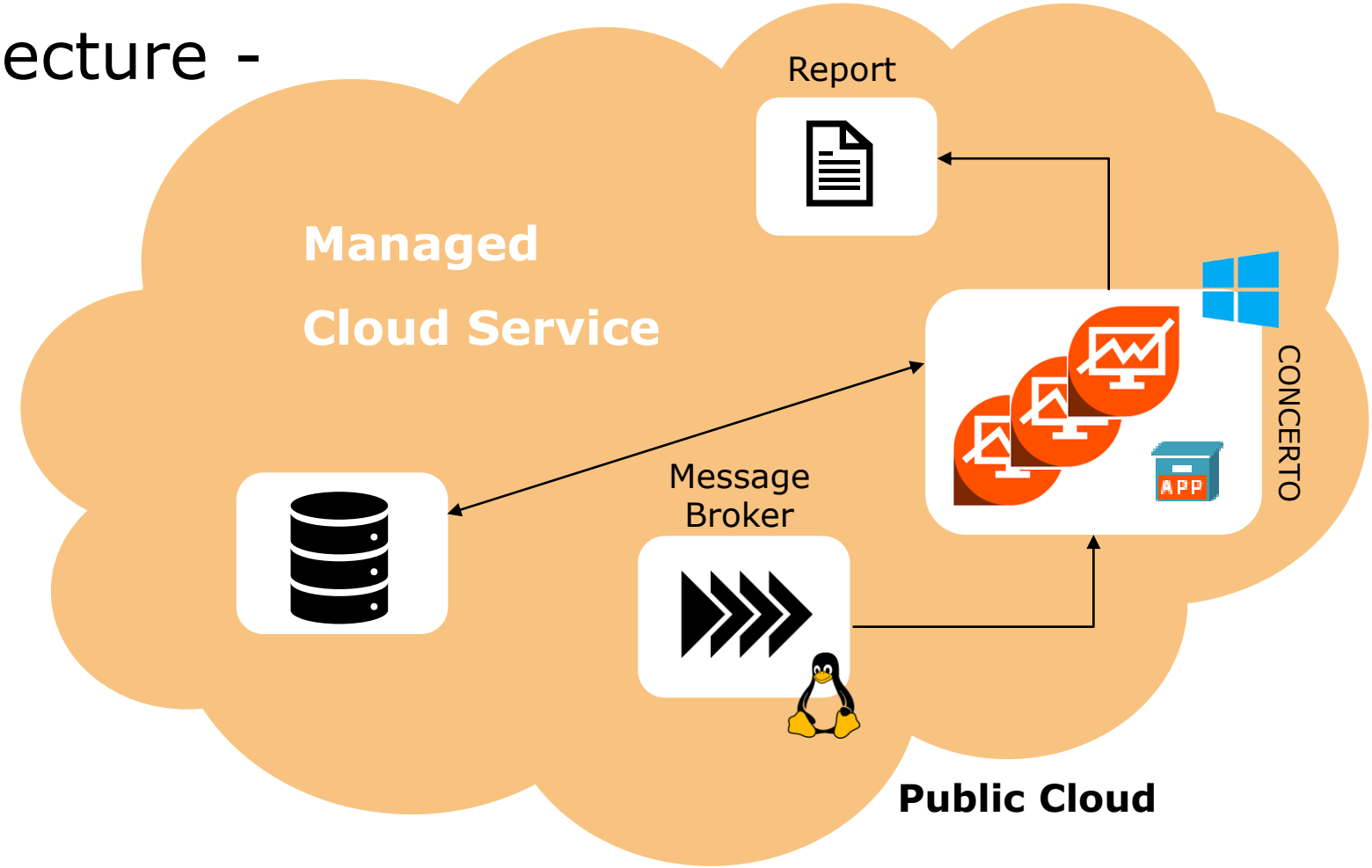
Lift & Shift (Rehost)

Whole application is taken and pushed into container

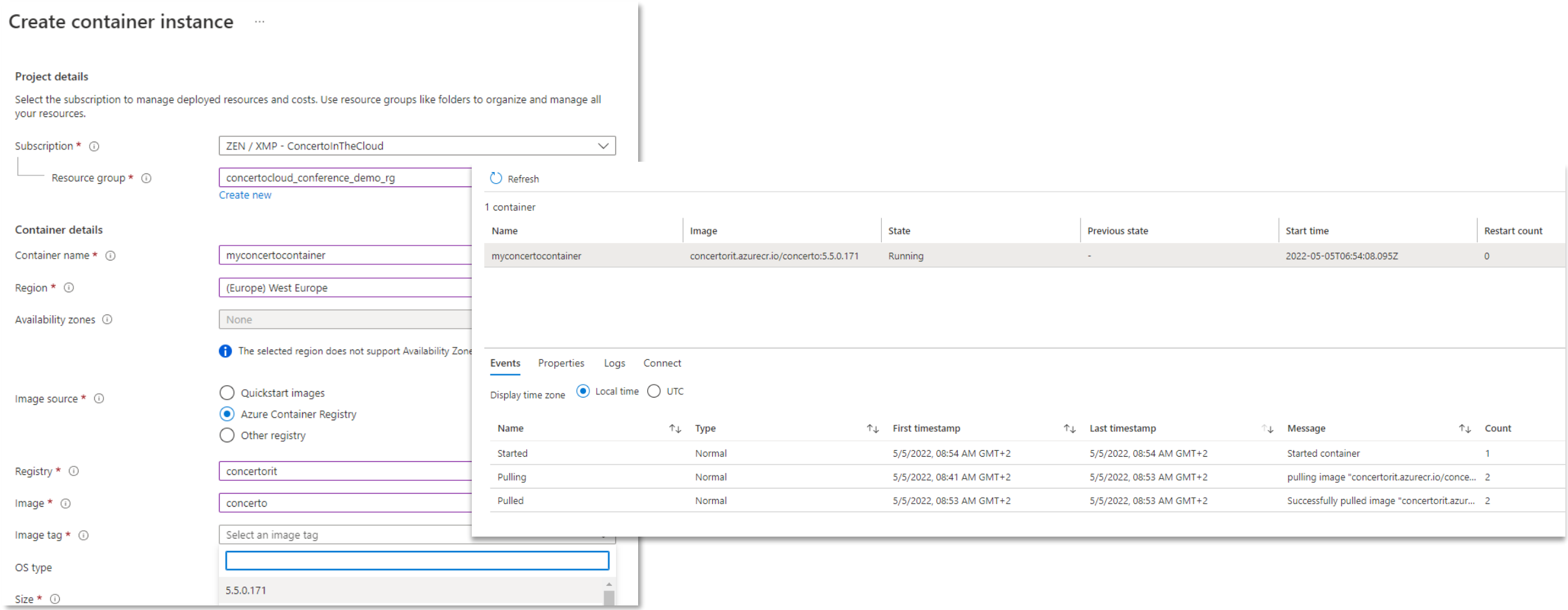
The mixed cloud architecture - an example



The mixed cloud architecture - an example

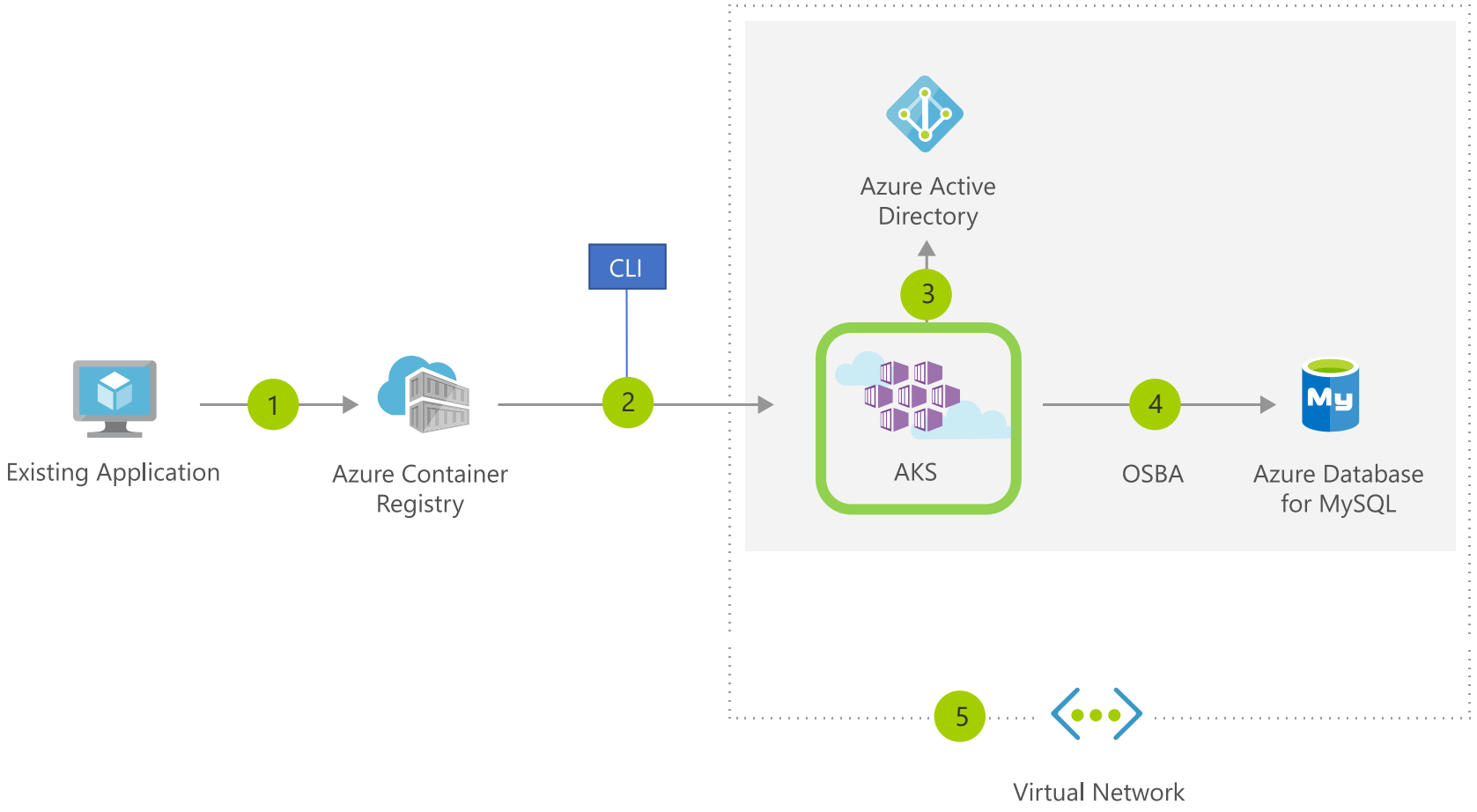


Start lightweight - Serverless



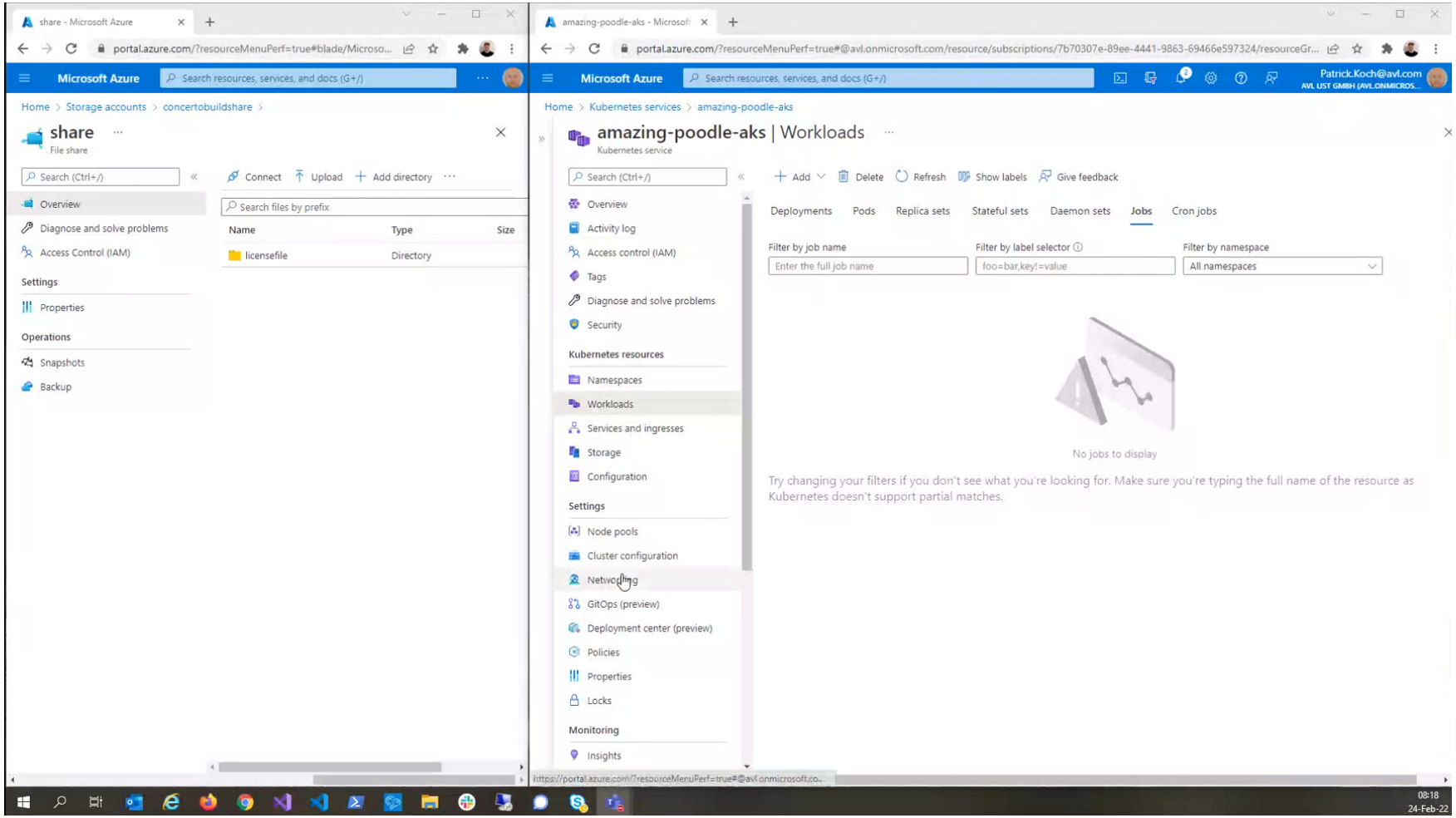
Azure K8s Service – Deployment of a Kubernetes Workload

"Easily migrate existing application to container(s) and run within the Azure managed Kubernetes service (AKS)"

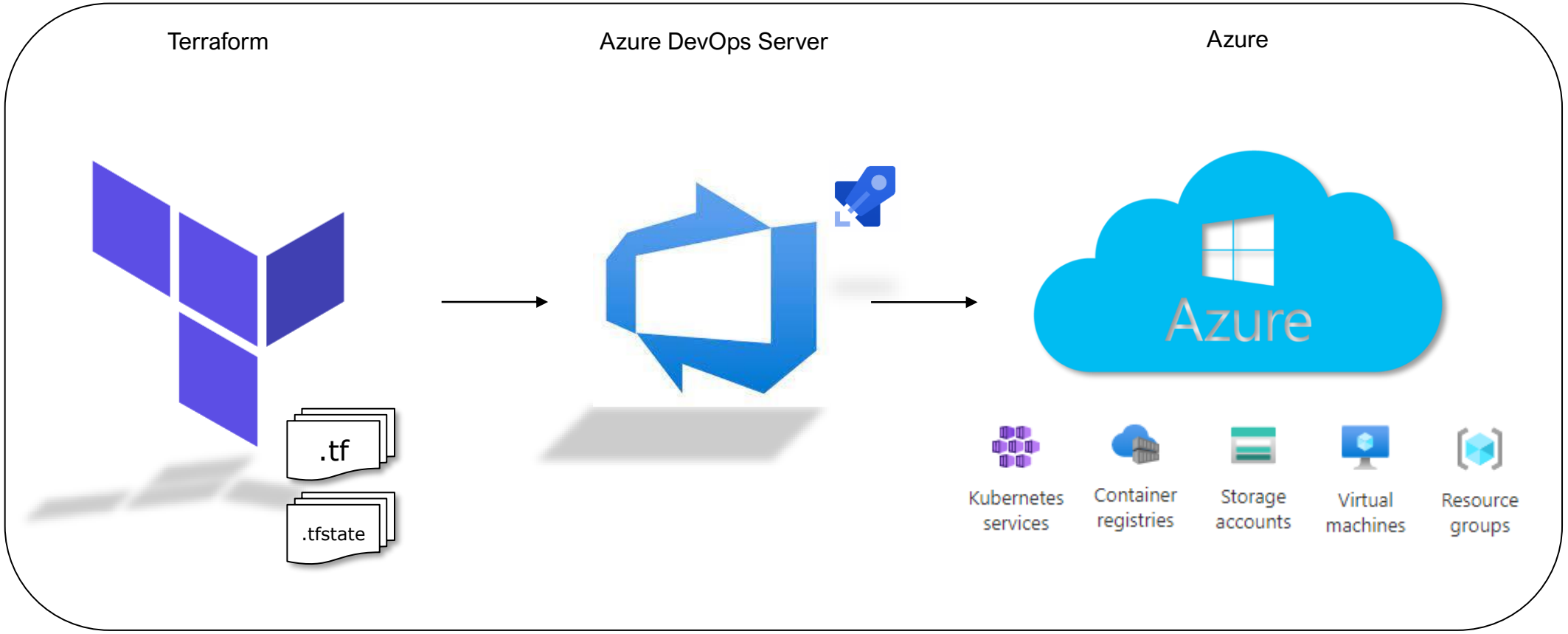


Source: https://docs.microsoft.com/de-de/azure/architecture/solution-ideas/articles/migrate-existing-applications-with-aks

Azure K8s Service – Deployment of a Kubernetes Workload

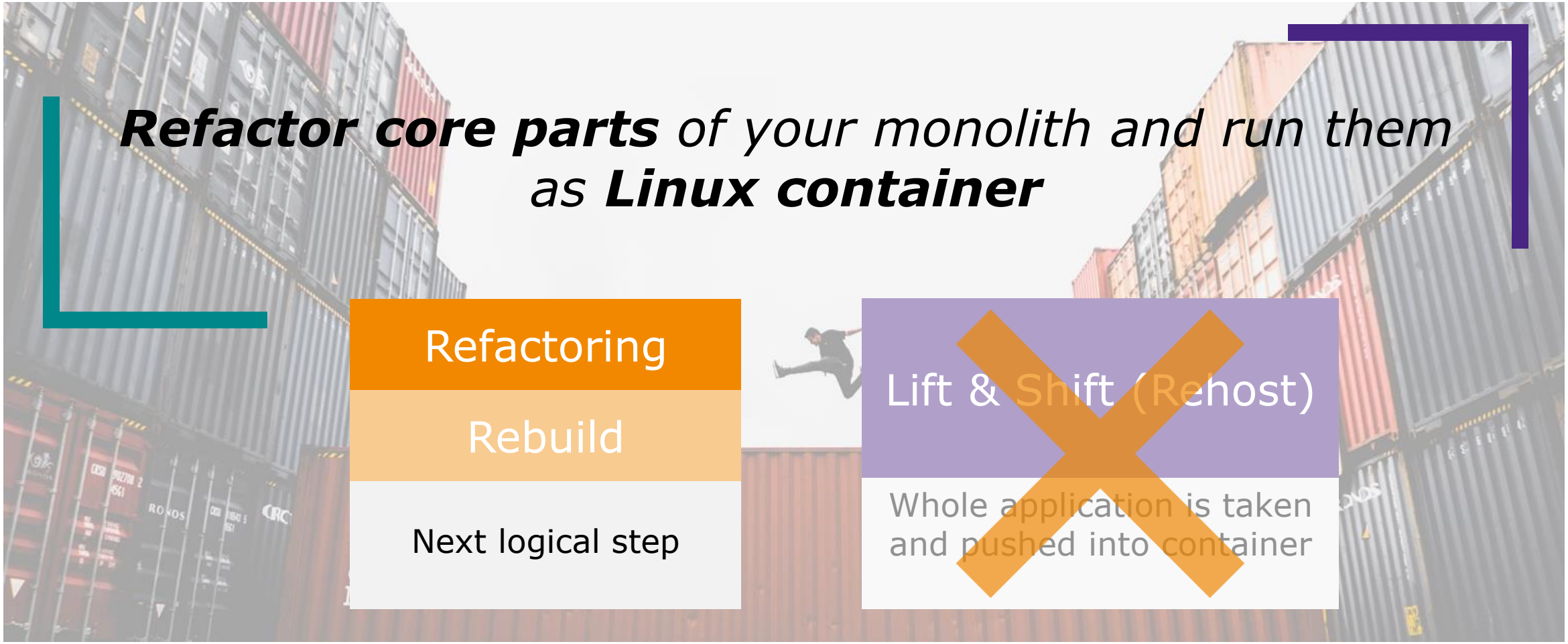


Azure – Automated Resource Provisioning with Azure DevOps Server and Terraform

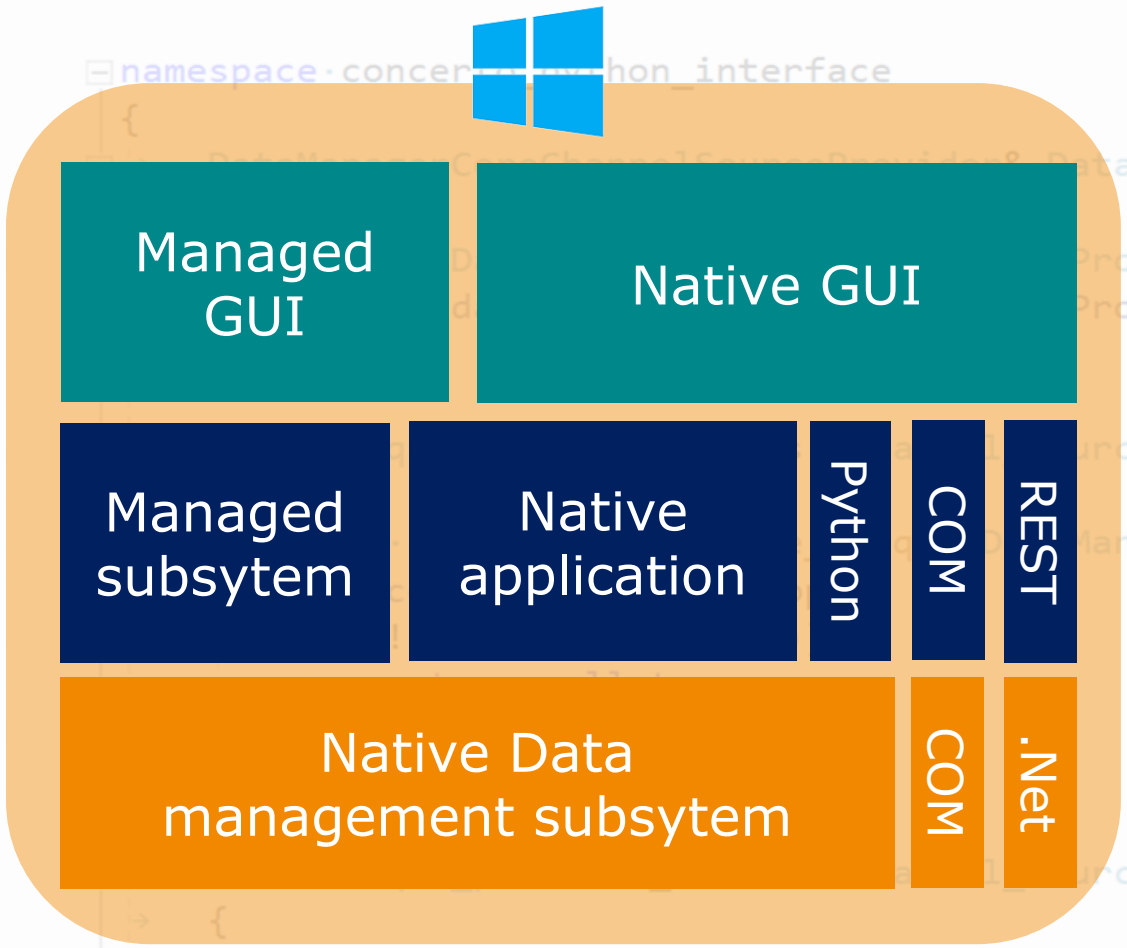


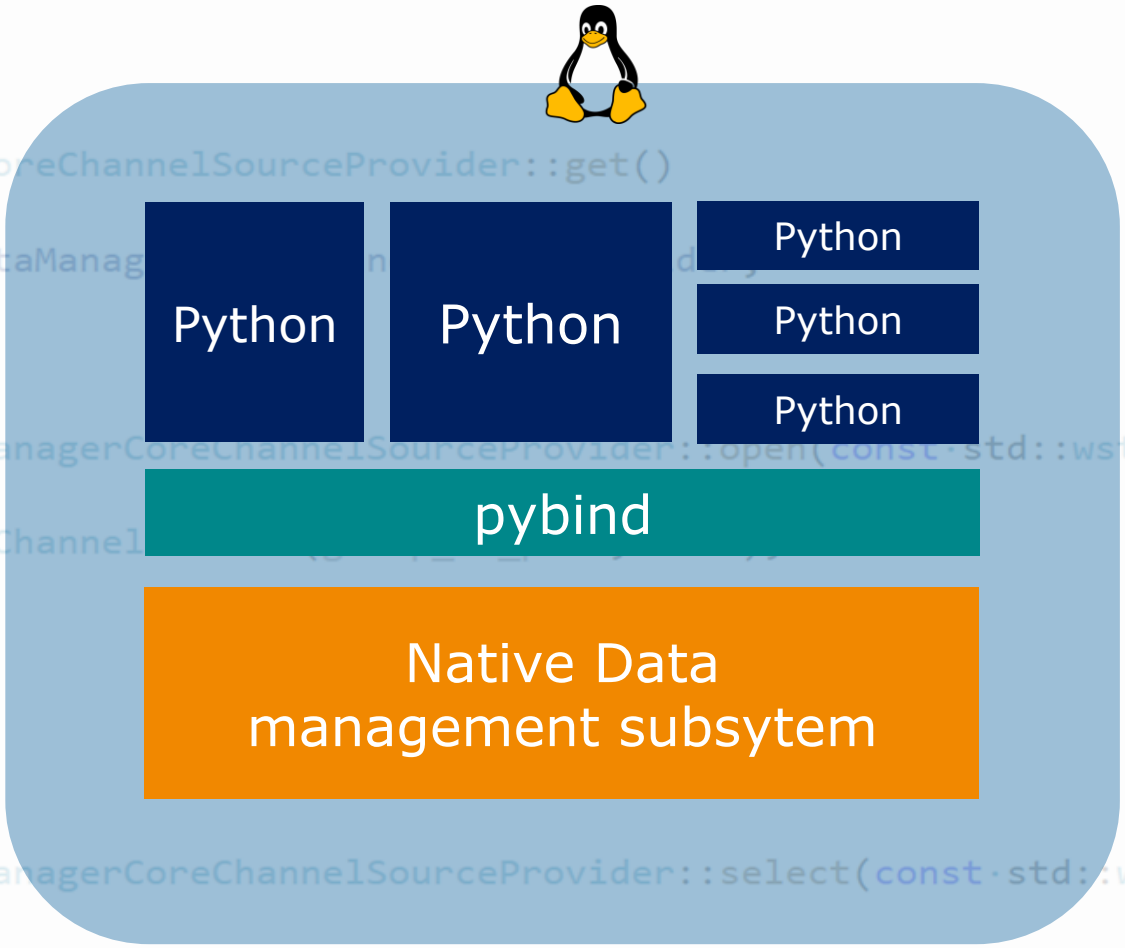

AVL
What’s next?
Cloud
Windows Containers
Public

mid-term approach for migrating to the cloud & automation

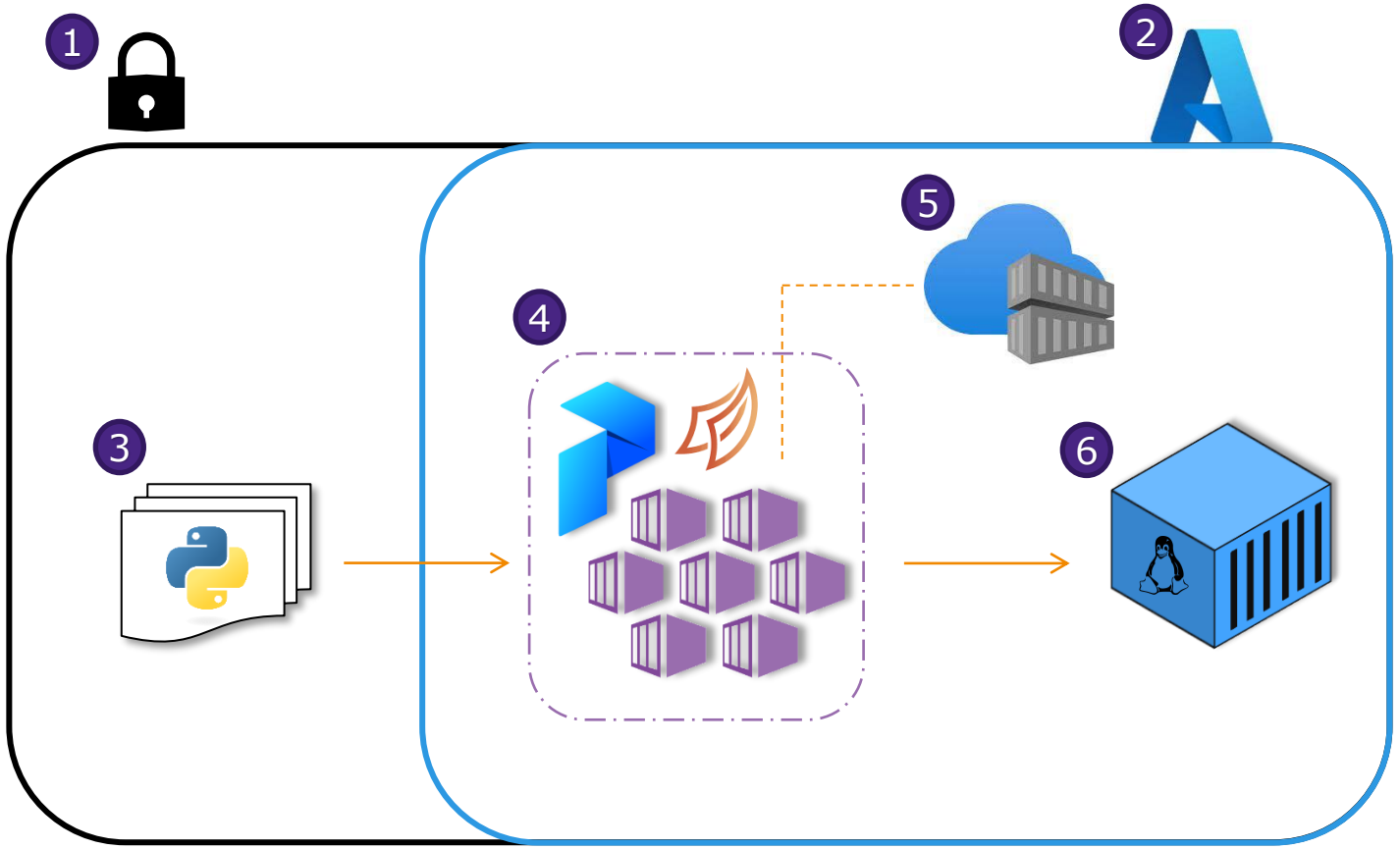


Determine the core components selected for refactoring



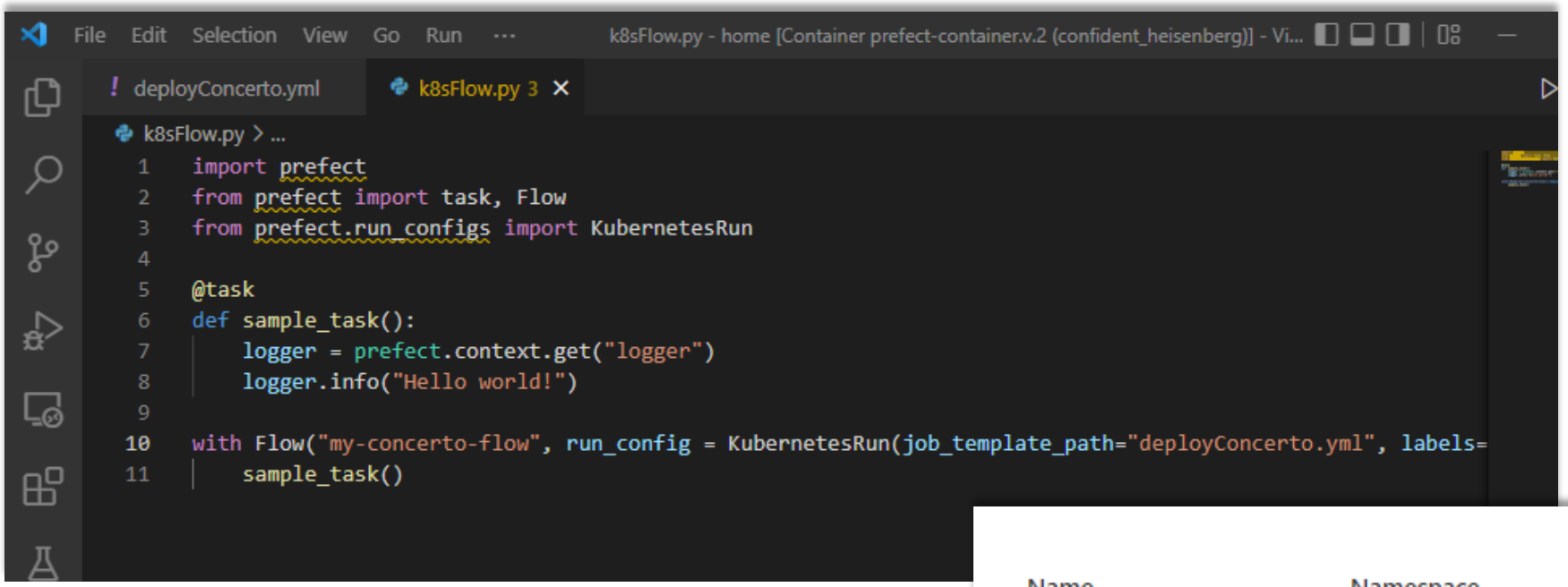


Future Use Case: Architecture



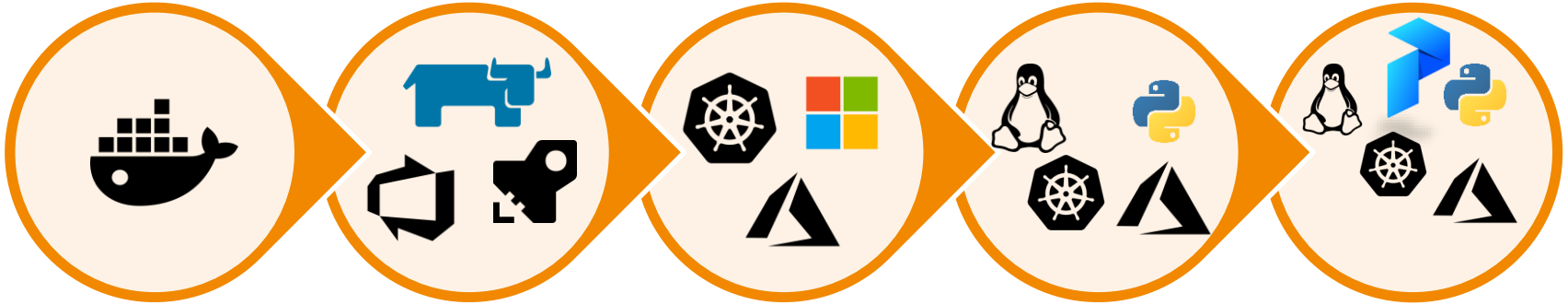
Logo/Picture Sources:
Azure: azure.microsoft.com | Prefect: docs.prefect.io | AKS: sharepointeurope.com | ACR: azure.microsoft.com
Linux: linuxfoundation.org | Python: python.org | docs.dask.org

Prefect Flow as Kubernetes Job



Name	Namespace	Status	Completions
prefect-server-create-te...	prefect-server	Completed	1/1
prefect-job-64f8f8d6	prefect-server	Running	0/1

Outlook / Roadmap



2019	2020	2021	2022	2023 – 202?
• Containerization • Concerto runs within a (Windows) Container	• Deployment and Hosting at Rancher • CI/CD Pipeline Integration for Container at Azure DevOps	• Proof of Concept at Microsoft's Kubernetes Service within Azure Cloud with Windows and Linux Container Workloads	• First development of Linux container • Python Integration • Prefect as Workflow Automation •Established IaC	• Become a Data Analytics Platform based on Python and Linux • SaaS • Less focus on Windows desktop

Key Learnings of Social and Technical Aspects

Neglect of cloud security

Skills deficit

WHICH SERVICES TO CHOOSE?

STAY CURIOUS

WORKLOAD: PROPER DEPLOYMENT RULES

DON'T COPY/REBUILD ESTABLISHED TOOLS

ARCHITECTURE DRIVEN BY BUSINESS

Internal resistance to adoption

DON'T REINVENT THE WHEEL

AKS: CONTAINER IMAGE CAN NOT BE PULLED

MVP FIRST

GET OUT OF YOUR COMFORT ZONE

INFRASTRUCTURE AS CODE

Adopt due to wrong reasons

DO NOT WAIT, START IMMEDIATELY

Thank you

www.avl.com

Change is the Essence of Innovation.

Icon/Picture Sources

Slide 5:

Windows: https://commons.wikimedia.org/wiki/File:Windows_Logo_(1992-2001).svg

GCP: https://cloud.google.com, https://www.unbelievable-machine.com/google-cloud-platform/

AWS: https://de.wikipedia.org/wiki/Amazon_Web_Services

Azure: https://www.itprotoday.com/iaaspaas/microsoft-azure-cloud-platform-what-works-what-s-needed

PCs: https://www.impulse.de/wp-content/uploads/2015/10/gebrauchte-hardware_fotolia620-620x340.jpg

Slide 9:

https://pixabay.com/de/photos/geb%C3%A4ude-kran-baustelle-ger%C3%BCstbau-1804030/

Slide 10:

Engine Testbed: https://blog.applus.com/better-engine-test-bed

Slide 11:

https://i.natgeofe.com/k/7530d2df-8919-4099-be7f-f5f787a60498/switzerland-matterhorn_4x3.jpg

Slide 12 & 19:

https://www.projekt-promotion.at/artikel/das-containerhaus-die-sparsame-und-nachhaltige-wohnalternative

Slide 13:

Windows: https://de.m.wikinews.org/wiki/Datei:Windows_logo_-_2012.png

Slide 15:

https://docs.microsoft.com/de-de/azure/architecture/solution-ideas/articles/migrate-existing-applications-with-aks

Slide 17:

Terraform: https://commons.wikimedia.org/wiki/File:Terraform_Logo.svg

Azure DevOps: https://visualstudio.microsoft.com/de/subscriptions/

Azure Pipeline: https://azure.microsoft.com/de-de/blog/topics/data-warehouse/

Azure Services: https://www.portal.azure.com

Azure: https://www.itprotoday.com/iaaspaas/microsoft-azure-cloud-platform-what-works-what-s-needed

Slide 20:

Linux: https://cdn.picpng.com/linux/linux-unix-tux-penguin-cute-43298.png

Windows: https://de.m.wikinews.org/wiki/Datei:Windows_logo_-_2012.png

Slide 21:

Azure: azure.microsoft.com

Prefect: docs.prefect.io

AKS: sharepointeurope.com

ACR: azure.microsoft.com

Linux: linuxfoundation.org

Python: python.org

Dask: docs.dask.org

Slide 23:

Docker: https://icon-icons.com/de/symbol/docker-logo/145331

Rancher: https://icon-icons.com/de/symbol/rancher-logo/169808

Azure Pipeline: https://icon-icons.com/de/symbol/azure-Rohrleitungen-logo/145465

Azure DevOps: https://icon-icons.com/de/symbol/microsoft-azure-devops/138386

Kubernetes: https://icon-icons.com/de/symbol/kubernetes/137461

Azure: https://icon-icons.com/de/symbol/microsoft-azure/135406

Microsoft: https://icon-icons.com/de/symbol/Microsoft/23401

Linux: https://icon-icons.com/de/symbol/code-linux-os/85584

Python: python.org

Prefect: docs.prefect.io