Molndrift av tjänster och applikationer
DEVOPS22
Del 7; Azure Docker, PowerShell, SQL

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Kort summering av föregående lektion/ev. lektioner

Föregående lektion:

- Frågor kring förra lektionen?
  - Azure AD Connect
  - Azure AD Domain Services, AADDS
  - Azure Storage account

Lektionstillfällets mål och metod

Mål med lektionen:

- Intro till Azure Docker
- Lite PowerShell
- SQL migrering

Lektionens arbetsmetod/er:

- Beskriv kortfattat hur vi kommer att arbeta under dagens lektion.

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Vad är Container?

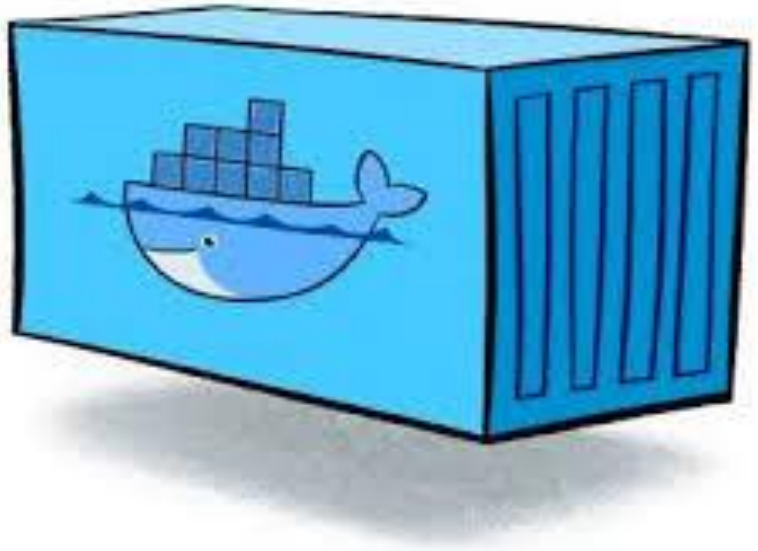
- Containrar uppenbarade sig i England redan i mitten av 1700-talet i form av stora trälådor för koltransport. Sedan fortsatte det med speciallösningar för olika transportbehov. För att lasta om lådorna behövs kraftiga kranar, vilket i första hand kom under 1900-talet.

Vad är Container?

- I mitten av 1900-talet ökade användningen markant i samband med att olika standarder infördes, till exempel ISO-containern, sopcontainrar och flygcontainrar. Containersystemet revolutionerade godshanteringen i världen. Det berodde på att en infrastruktur byggts med anpassade transportmedel, hanteringsutrustningar och med förflyttning av arbetskraft (från hamnstuverierna till inlandets kundlager). Detta var en av orsakerna till att globaliseringen tog fart.

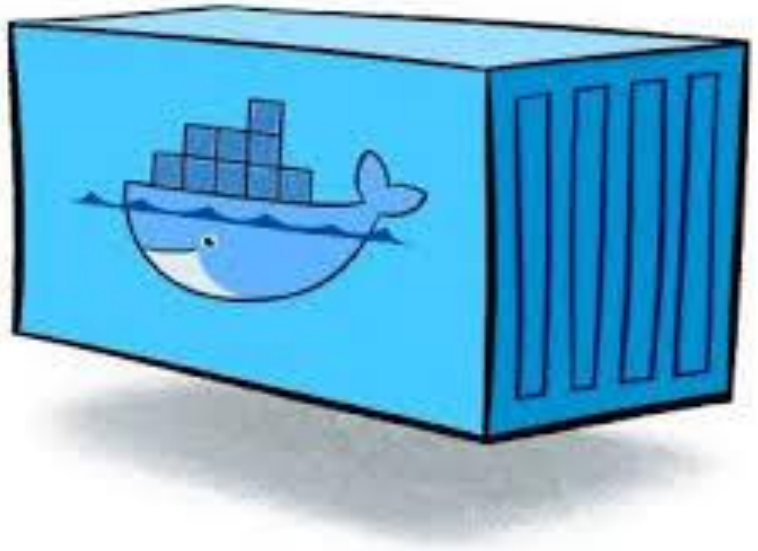
What is Cointaners?

- Standardized packaging for software and dependencies
- A way to isolate apps from each other
- Works with Linux and Windows Servers
- Allows separate apps to share the same OS kernel

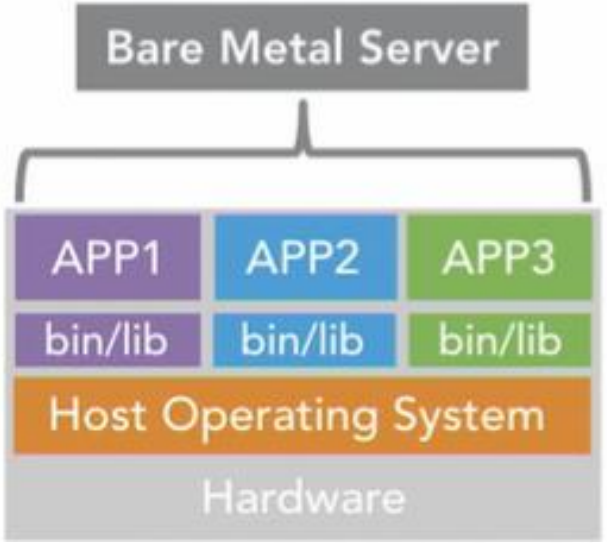


What is Cointaners?

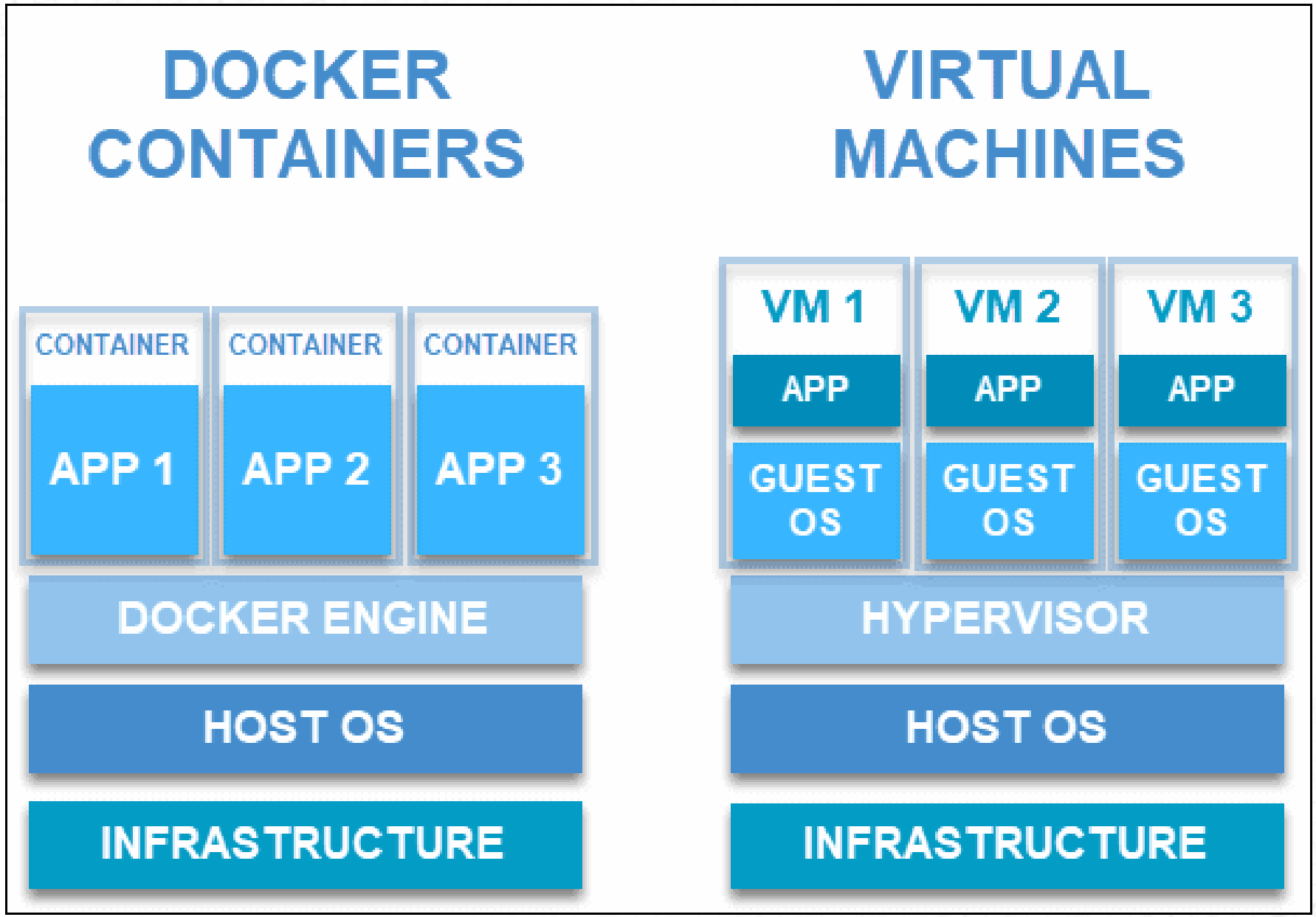
- A self-contained sealed unit of software
- Contains everything required to run the code
- A container includes
  - Code
  - Config
  - Processes
  - Networking
  - Dependencies
  - Operating system

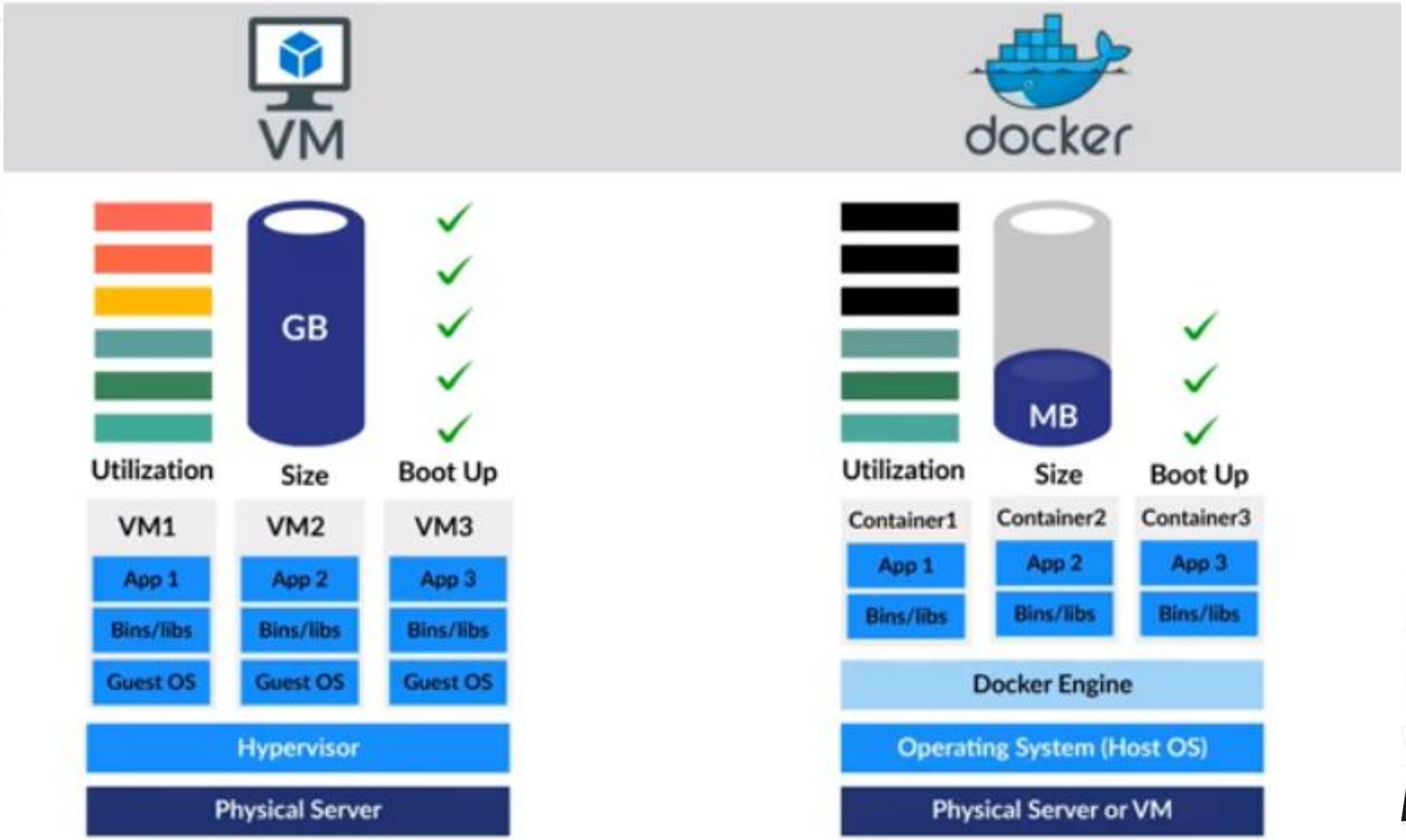


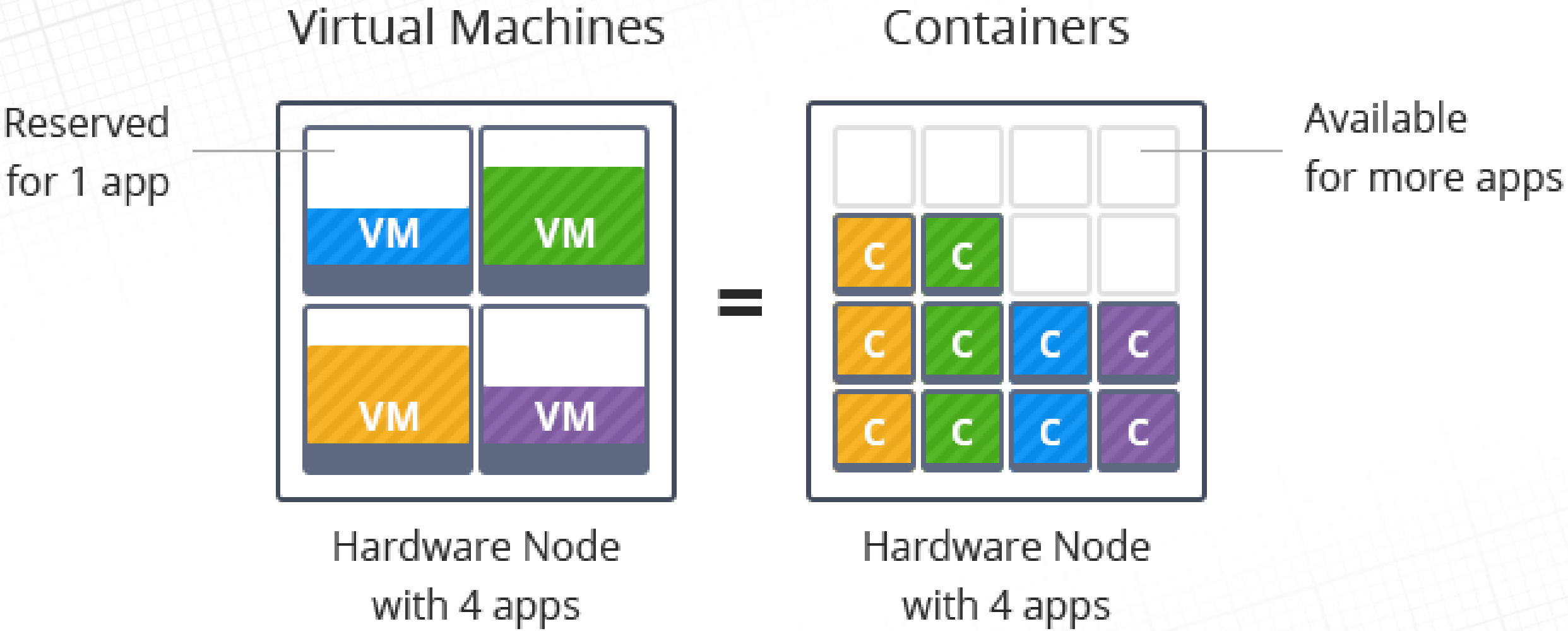
Bare Metal, Virtual Server or Container



EMIN

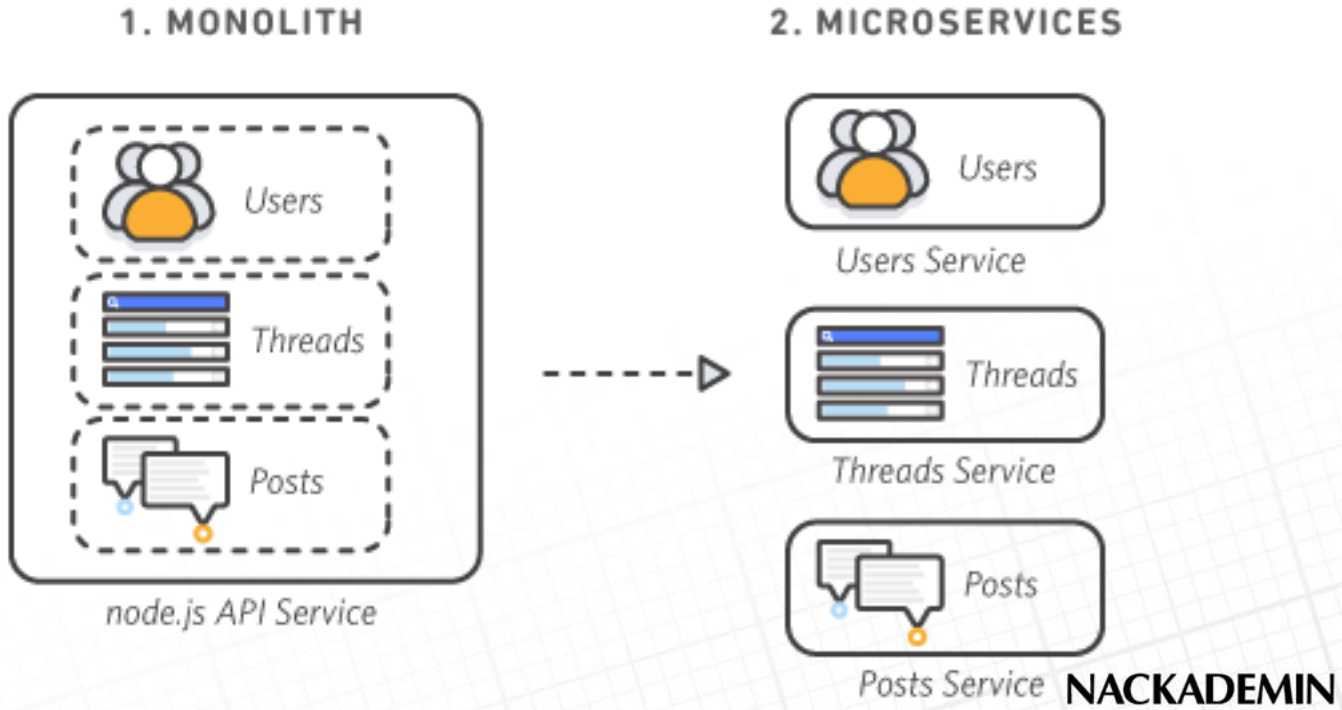

DOCKER CONTAINERS
CONTAINER
APP 1
CONTAINER
APP 2
CONTAINER
APP 3
DOCKER ENGINE
HOST OS
INFRASTRUCTURE
VIRTUAL MACHINES
VM 1
APP
GUEST OS
VM 2
APP
GUEST OS
VM 3
APP
GUEST OS
HYPERVISOR
HOST OS
INFRASTRUCTURE





Break Monolithic App into Microservices

- Monolithic App
  - Minor code changes required full recompile and testing
  - Application becomes a single point of failure
  - Application is difficult and often expensive to scale



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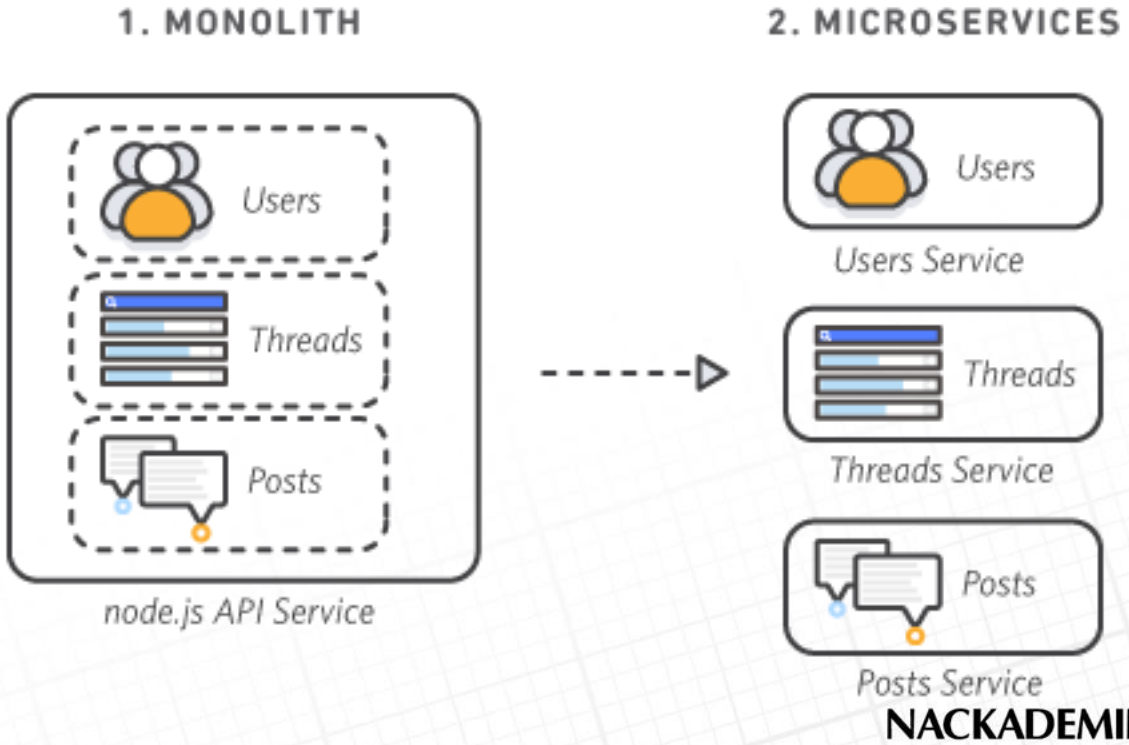
Break Monolithic App into Microservices

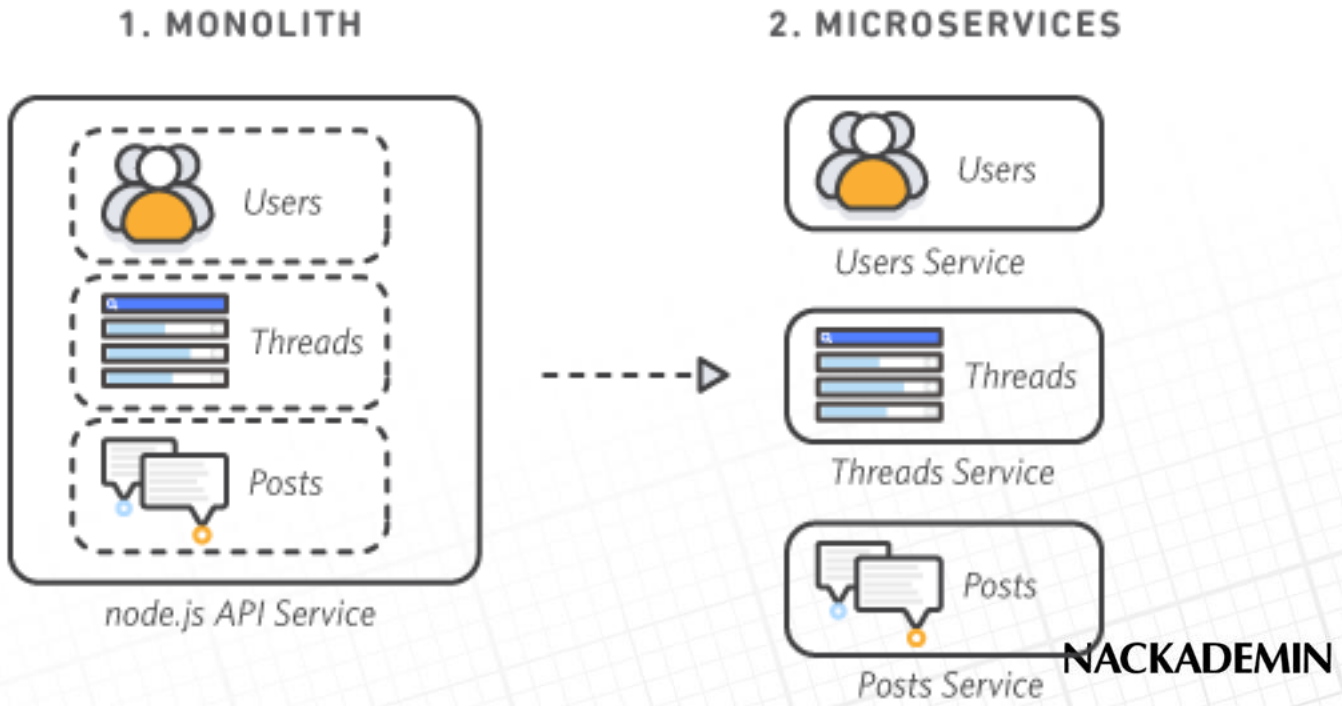
- Microservices architecture (MSA)
  - MSA decomposes applications into sets of manageable services, which are much faster to develop, and much easier to understand and maintain.
  - MSA enables each service to be developed independently by a team that is focused on that service.
  - MSA facilitates adoption of new technologies via application pace layering strategies.
  - MSA loosely couples services.
  - MSA strives for data isolation that facilitates loose coupling and horizontal scalability.



Break Monolithic App into Microservices

- The Twelve-Factor App methodology is used to produce software-as-a-service (SaaS), the development approach used in most modern applications. It was designed by Adam Wiggins and the development team at Heroku.

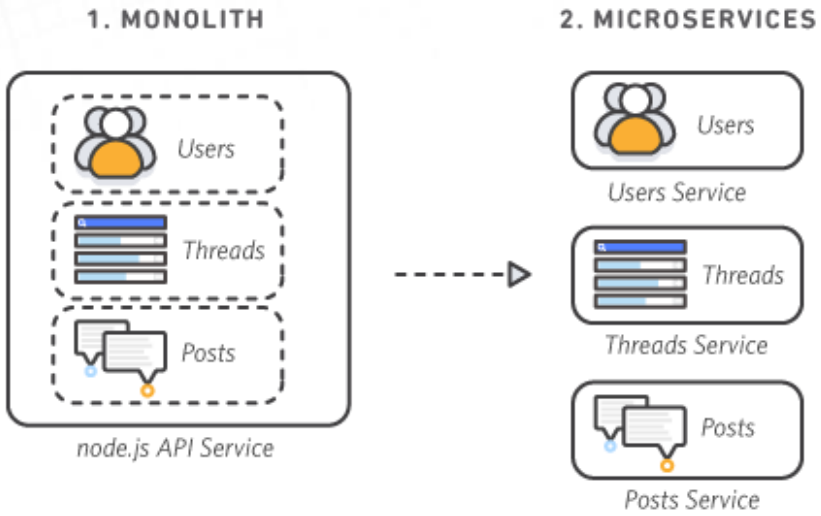
- https://12factor.net/



Break Monolithic App into Microservices

- The important characteristics of Twelve-Factor App are:
  - Use of declarative formats for setup automation, to minimize time and cost for new developers joining the project.
  - Clean contracts with the underlying operating system, offering maximum portability between execution environments.
  - Suitable for deployment on modern cloud platforms, obviating the need for servers and systems administration.
  - Minimized divergence between development and production, enabling continuous deployment for maximum agility.
  - Ability to scale up without significant changes to tooling, architecture, or development practices.

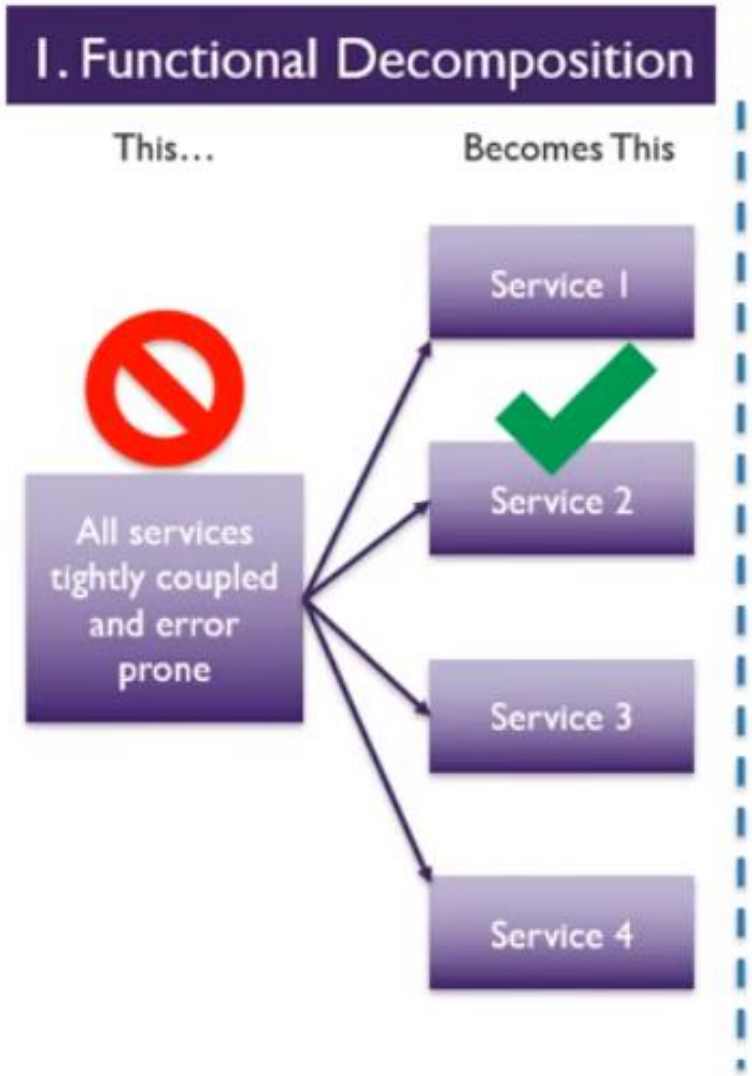
Compare Monolithic vs Microservices

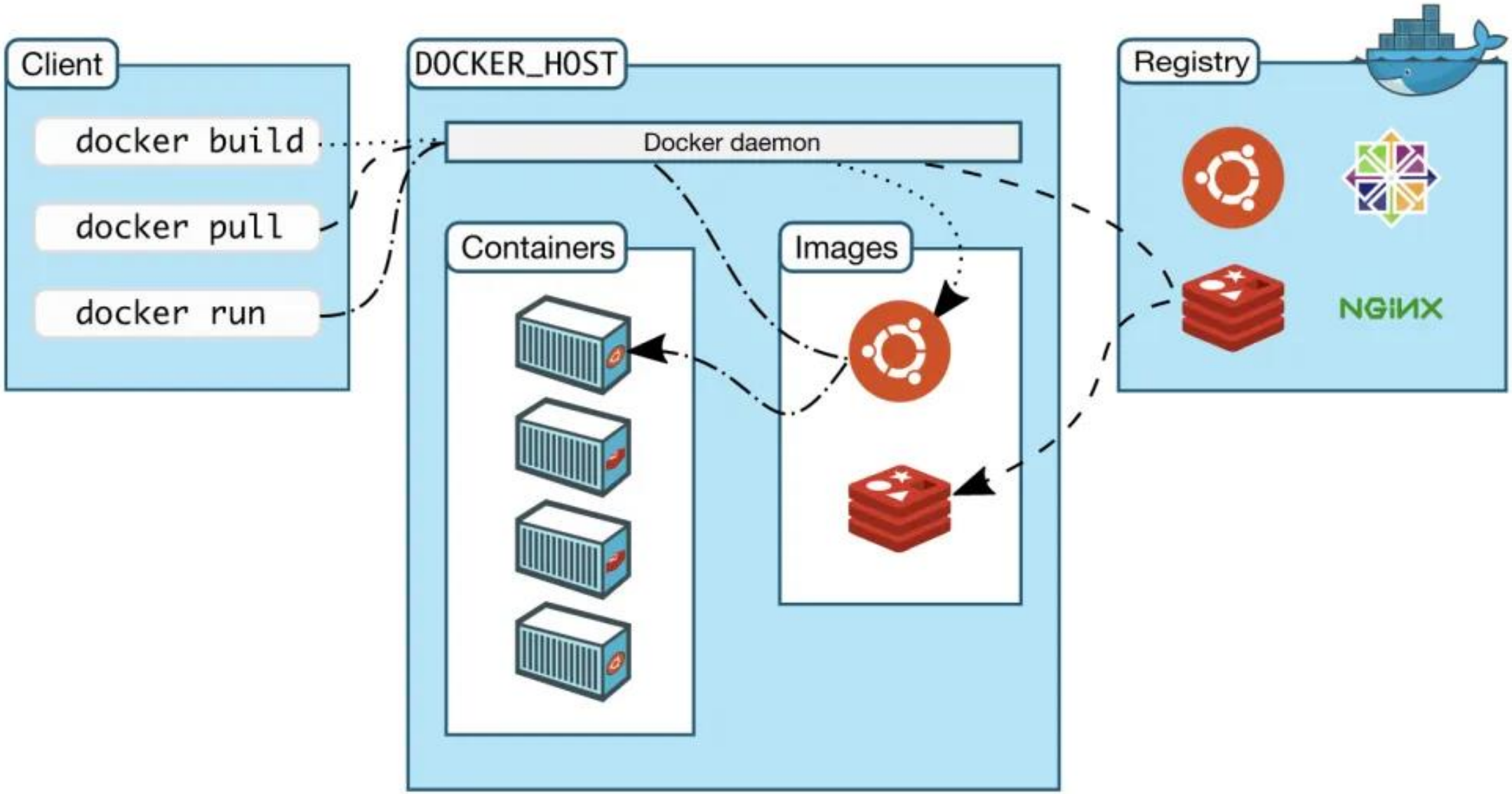


- Simple deployments
- Inter-module refactoring
- Vertical scaling
- Technology monoculture

- Partial deployments
- Strong module boundaries
- Horizontal scaling
- Technology diversity

Three way to Microservices




Client
docker build
docker pull
docker run
DOCKER_HOST
Docker daemon
Containers
Images
Registry
NGINX

Docker installation på klient

- Att installera docker på Windows-klient
- https://docs.docker.com/desktop/install/windows-install/

- Kommandon:
- https://docs.docker.com/engine/reference/commandline/docker/

Docker

```
docker -v
docker kommando --help

docker images

docker run hello-world

docker run -d -p 80:80 --name test hello-world

docker images
```

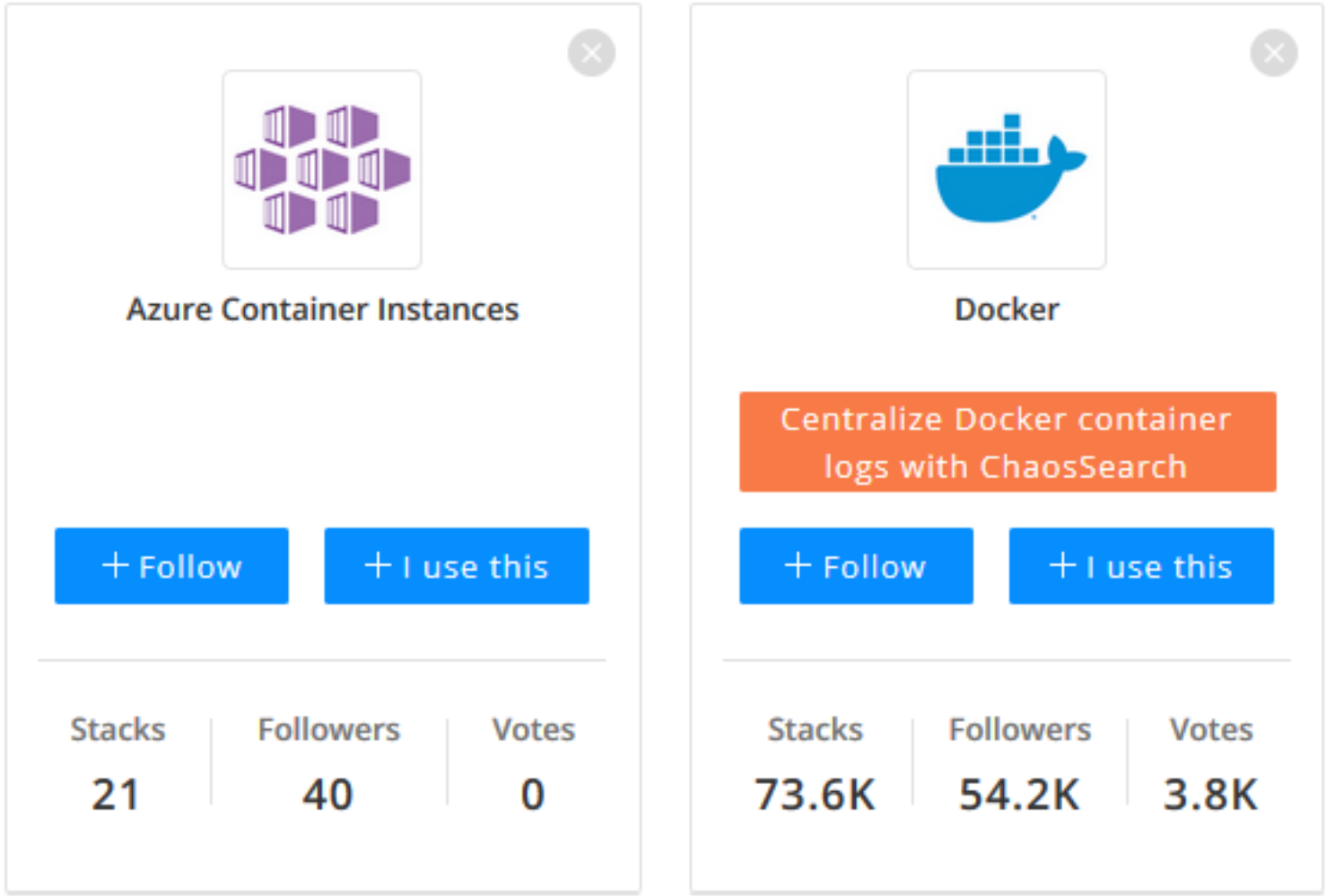
Docker

```
docker run --rm -p 80:80 --name milo nginx:latest
docker run --rm -d -p 80:80 --name milo nginx:latest

docker ps

docker restart milo

docker stop milo

docker run -ti --rm --name myOwn ubuntu bash
```

Docker

```
docker run --rm -d -p 80:80 --name milo nginx:latest

docker ps

docker stop milo
docker ps -a   eller   docker ps -l

docker commit 28d68455e92a

docker commit relaxed_hodgkin my-image2

docker image rm my-image2
```

Container Instances vs Docker



Container Instances vs Docker

- Developers describe Azure Container Instances as "Easily run containers on Azure with a single command". Containerize your application using Docker technology and execute immediately with one click.
- On the other hand, Docker is detailed as "Enterprise Container Platform for High-Velocity Innovation". The Docker Platform is the industry-leading container platform for continuous, high-velocity innovation, enabling organizations to seamlessly build and share any application — from legacy to what comes next — and securely run them anywhere.

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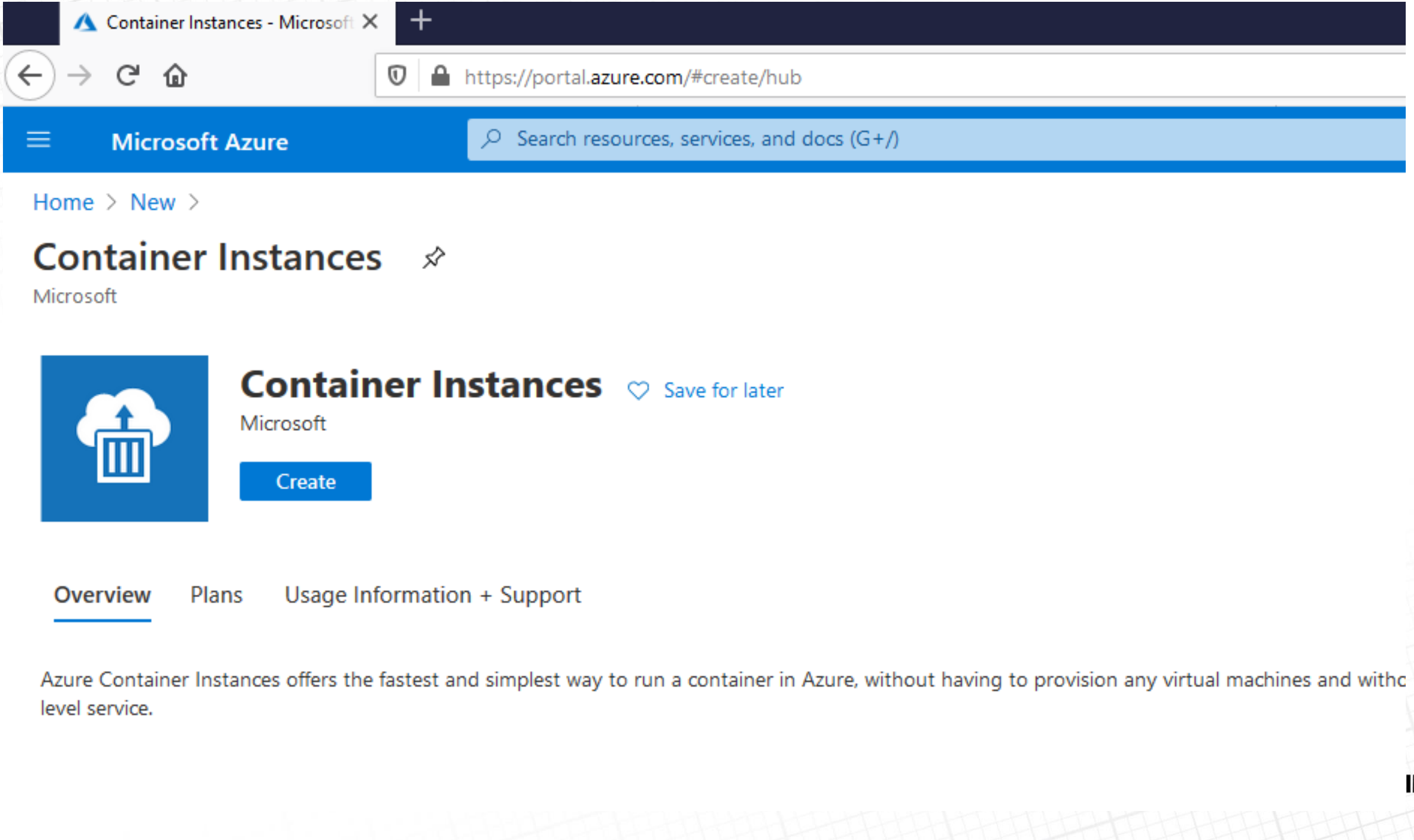
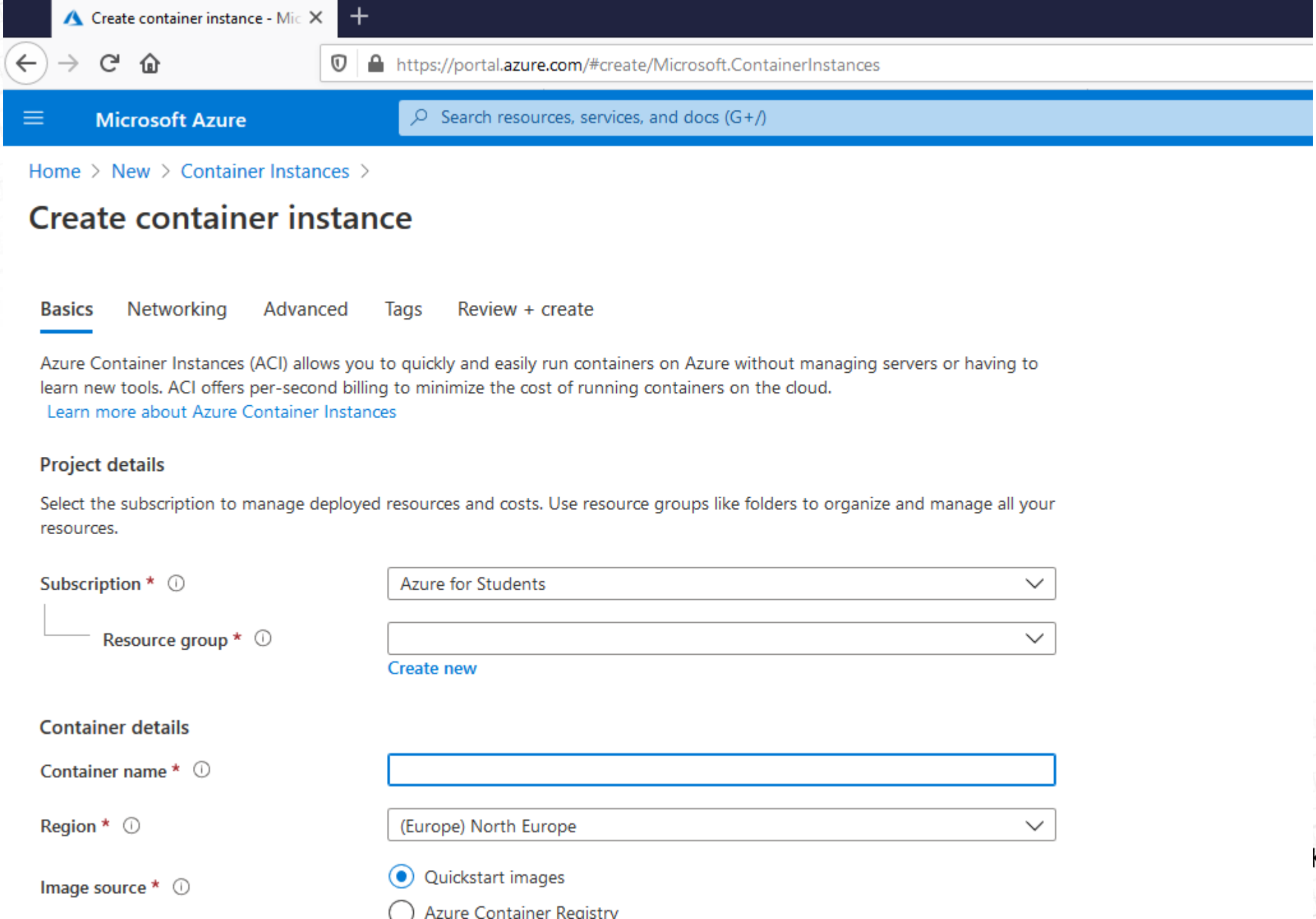
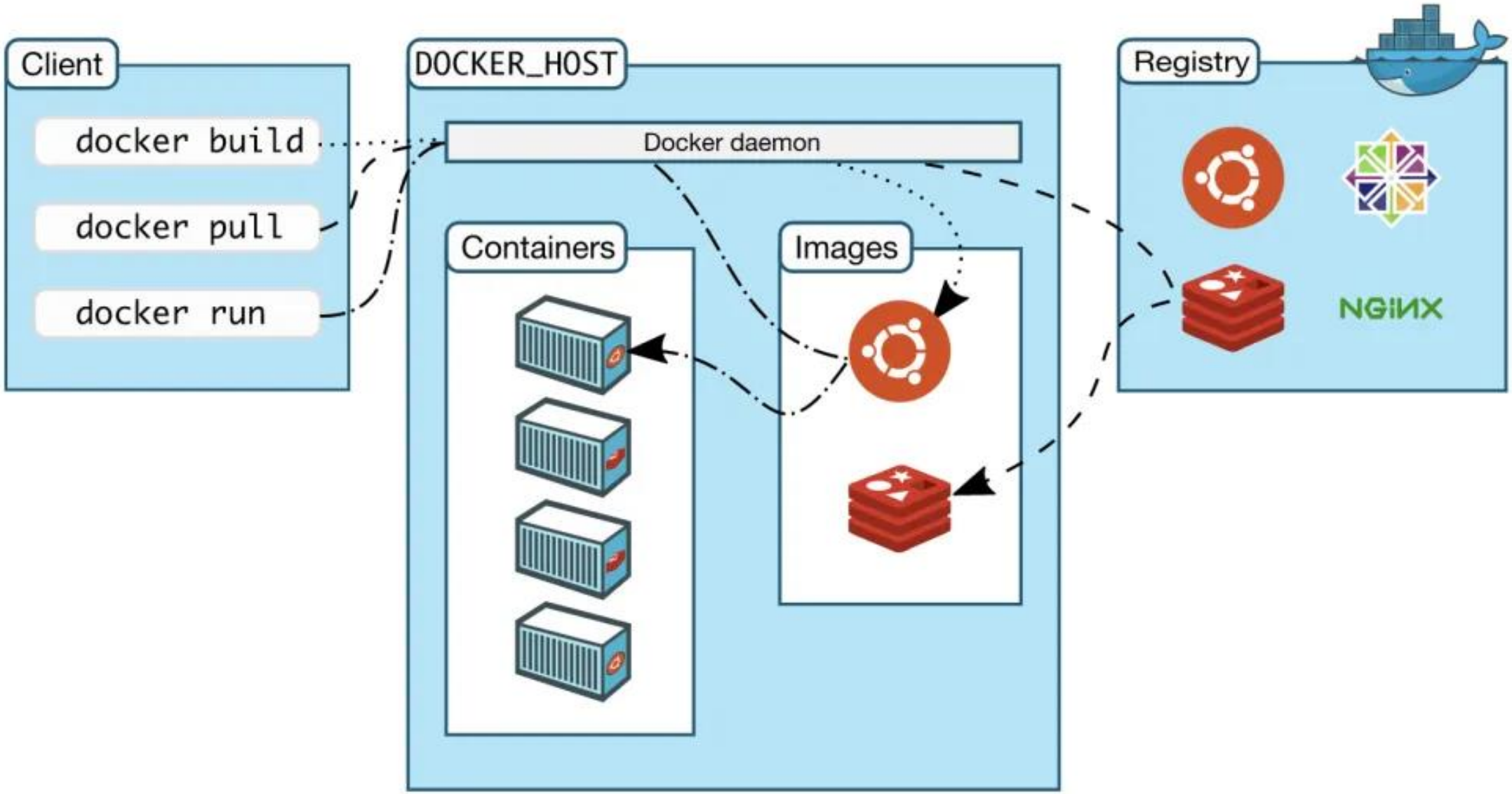
Azure Cloud Deployment Models

- **Docker on VM**
- Billed as VM costs
- You manage the VMs
- Standard Docker management process

- **Azure Container Instances (ACIs)**
- CPU/memory/time-based billing
- No VM management
- Template and pipeline integration


Container Instances - Microsoft
https://portal.azure.com/#create/hub
Microsoft Azure
Search resources, services, and docs (G+/)
Home > New >
Container Instances
Microsoft
Container Instances
Save for later
Microsoft
Create
Overview
Plans
Usage Information + Support
Azure Container Instances offers the fastest and simplest way to run a container in Azure, without having to provision any virtual machines and withc
level service.
IN

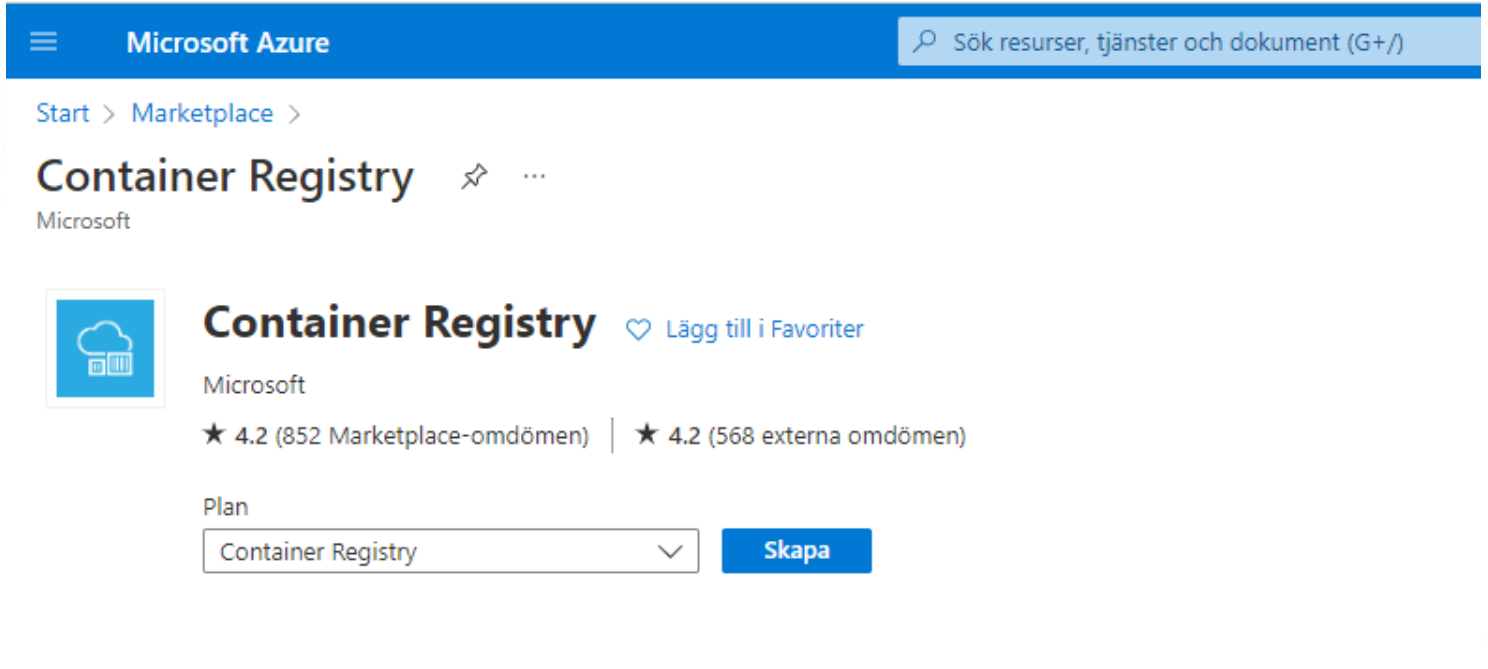

Create container instance - Mic
https://portal.azure.com/#create/Microsoft.ContainerInstances
Microsoft Azure
Search resources, services, and docs (G+/)
Home > New > Container Instances >
Create container instance
Basics
Networking
Advanced
Tags
Review + create
Azure Container Instances (ACI) allows you to quickly and easily run containers on Azure without managing servers or having to learn new tools. ACI offers per-second billing to minimize the cost of running containers on the cloud.
Learn more about Azure Container Instances
Project details
Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.
Subscription *
Azure for Students
Resource group *
Create new
Container details
Container name *
Region *
(Europe) North Europe
Image source *
Quickstart images
Azure Container Registry


Client
docker build
docker pull
docker run
DOCKER_HOST
Docker daemon
Containers
Images
Registry
NGINX

Registry

- Docker
  - https://hub.docker.com/search?q=&type=image
- Microsoft katalog
  - https://mcr.microsoft.com
  - https://azure.microsoft.com/en-us/blog/microsoft-syndicates-container-catalog/

Privat Container Registry?



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Nr 3 – Nginx via Azure Container Instance

- Skapa en egen Azure Container Instance, använd nginx som image/avbild
- Se att du kan skapa den, starta om och liknande
- När den är igång, surfa till den med http
- Om den inte fungerar – kontrollera att porten för http (tcp port 80) är öppen i NSG
- Ta en skärmdump av Welcome to nginx-webbsidan, se till att webbläsarens adress syns i bilden, ladda upp till Studentportalen
- Skriv en kort förklaring av varje steg du tog för att slutföra uppgiften, inklusive eventuella utmaningar du stötte på och hur du överkom dem

Extra läsning

- Extra läsning:
- https://docs.docker.com/cloud/aci-integration/

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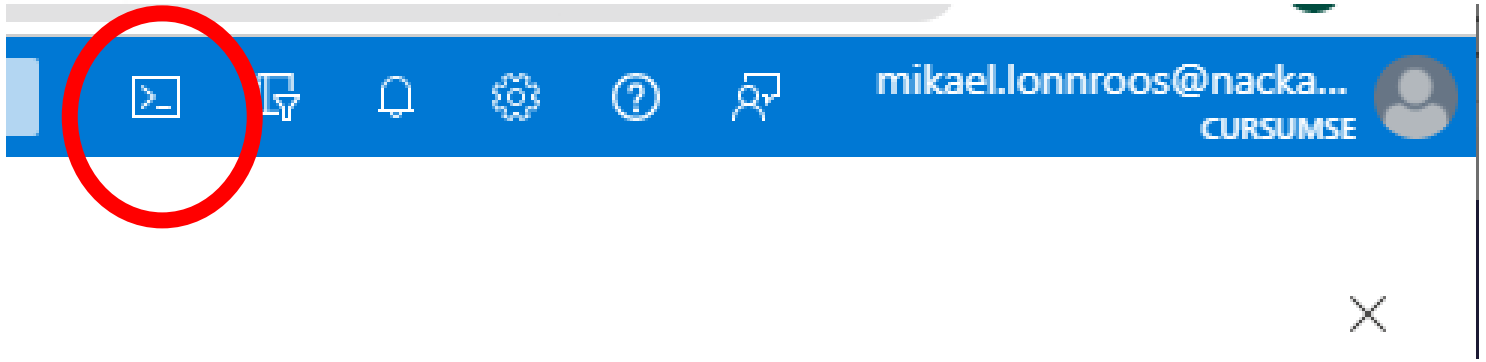
Powershell

- Via azure-portalen



- Eller surfa till shell.azure.com

- Eller på din egen dator (nästa slide)

Powershell

```
Install-Module -Name Az -Force

Connect-AzAccount
```

Powershell

```
Get-AzResourceGroup

Get-AzResourceGroup –Name ”rg-DevOps-WE”

New-AzResourceGroup –Name ”AzurePowerShell” –Location
”westeurope”
```

Powershell

```
$RG = New-AzResourceGroup –Name ”AzurePowerShell” –
Location ”westeurope”

$VM = New-AzVM -ResourceGroupName $RG.ResourceGroupName
-Location $RG.Location -Name "PowerShell"

$VM = New-AzVM -ResourceGroupName $RG.ResourceGroupName
-Location $RG.Location -Name "PowerShell" -Image
Win2019Datacenter
```

Powershell

```
$c=New-AzContainerInstanceObject -Name nginxobject -
Image nginx
New-AzContainerGroup -ResourceGroupName myResourceGroup
-Location westeurope -Name mycontainer -Container $c -
IPAddressType 'Public' -IPAddressDnsNameLabel
mycontainer

Get-AzContainerGroup -ResourceGroupName myResourceGroup
-Name mycontainer

Remove-AzContainerGroup -ResourceGroupName
myResourceGroup -Name mycontainer
```

Powershell

```
Remove-AzResourceGroup –Name ”AzurePowerShell” –Force

Remove-AzResourceGroup –Name ”AzurePowerShell” –Force -
AsJob
```

Azure CLI

```
az login

az group create --name myResourceGroup --location
northeurope
```

Azure CLI

```
az group create --name myResourceGroup --location
northeurope

az container create --resource-group myResourceGroup --
name mycontainer --image
mcr.microsoft.com/azuredocs/aci-helloworld --dns-name-
label milo-demo --ports 80

az container show --resource-group myResourceGroup --
name mycontainer --query
"{FQDN:ipAddress.fqdn,ProvisioningState:provisioningStat
e}" --out table
```

Egen övning

- Skapa en resursgrupp via PowerShell
- Skapa en virtuell server via PowerShell
- Skapa en Container Instance, använd nginx som image/avbild via PowerShell

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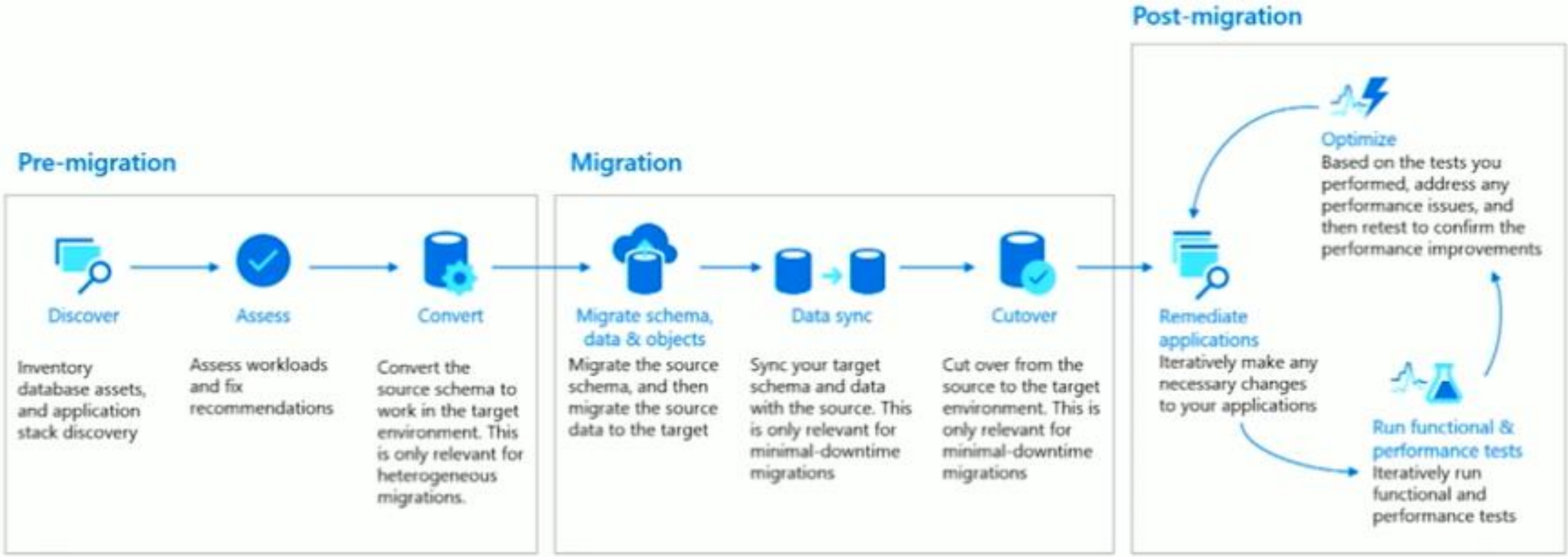
Flytta SQL till Azure

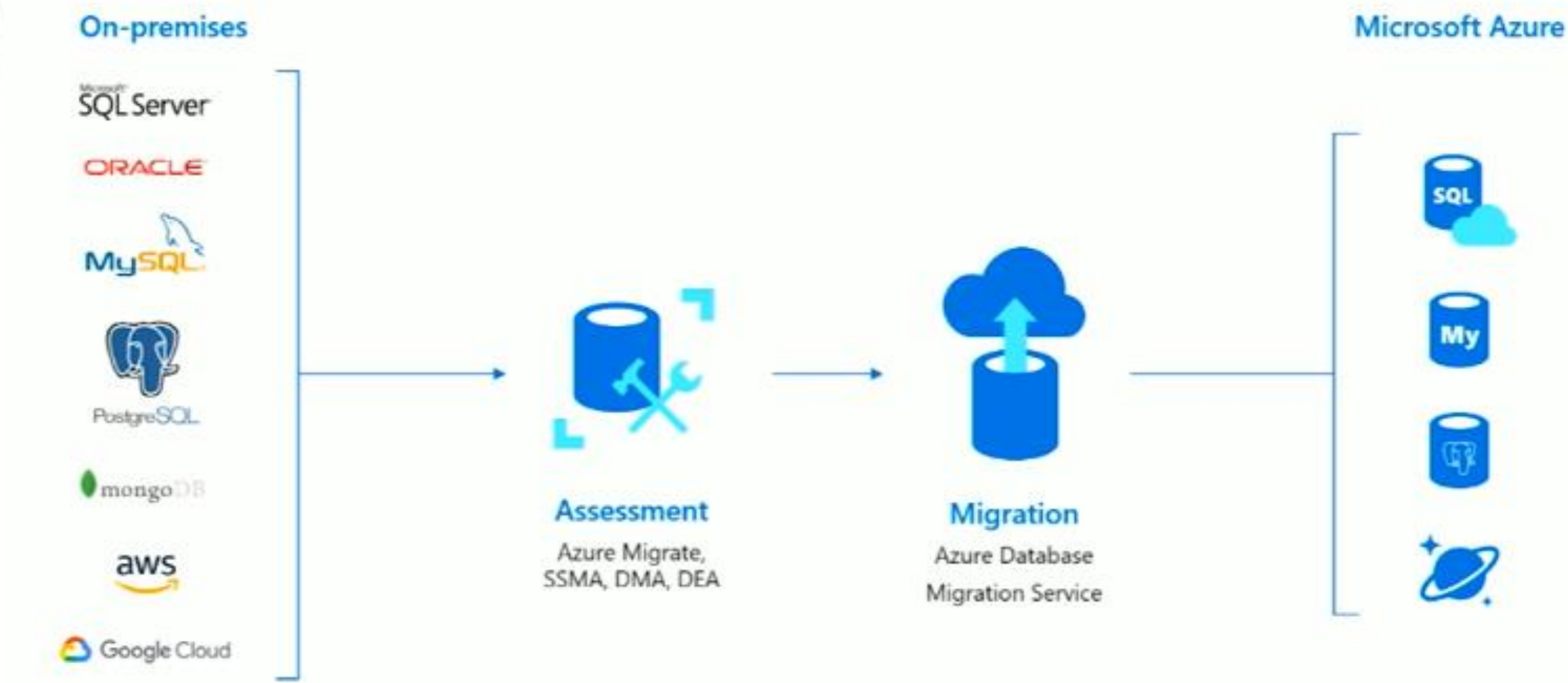
- Flytta hela servern till en IaaS
  - Om man har beroenden som typ använder DTC
  - Eller kör SQL på Linux
- Använd Azure SQL Managed Instance
  - Om man har databaser och instanser som kommunicerar med varandra
- Azure SQL database
  - Om man har en databas utan beroenden

Flytta SQL till Azure

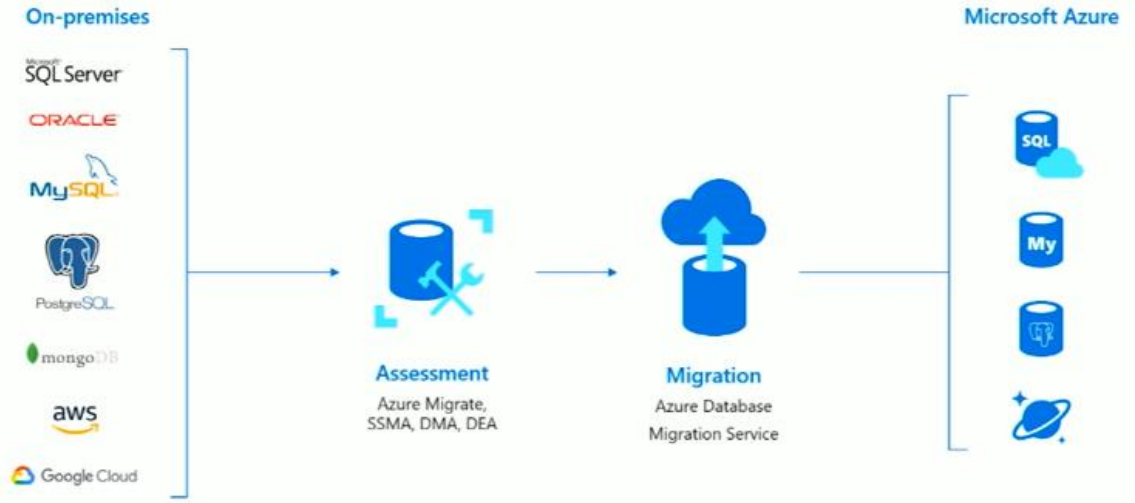
- On line eller ”one time”?
- Använda verktyg eller gör vi det för hand?
- Hur ska vi hantera?
  - Schema of databases
  - Data and Users
  - Server roles
  - SQL and Windows logins
  - Agent jobs
  - SSIS packages

Flöde


Pre-migration
Discover
Inventory database assets, and application stack discovery
Assess
Assess workloads and fix recommendations
Convert
Convert the source schema to work in the target environment. This is only relevant for heterogeneous migrations.
Migration
Migrate schema, data & objects
Migrate the source schema, and then migrate the source data to the target
Data sync
Sync your target schema and data with the source. This is only relevant for minimal-downtime migrations
Cutover
Cut over from the source to the target environment. This is only relevant for minimal-downtime migrations
Post-migration
Remediate applications
Iteratively make any necessary changes to your applications
Optimize
Based on the tests you performed, address any performance issues, and then retest to confirm the performance improvements
Run functional & performance tests
Iteratively run functional and performance tests

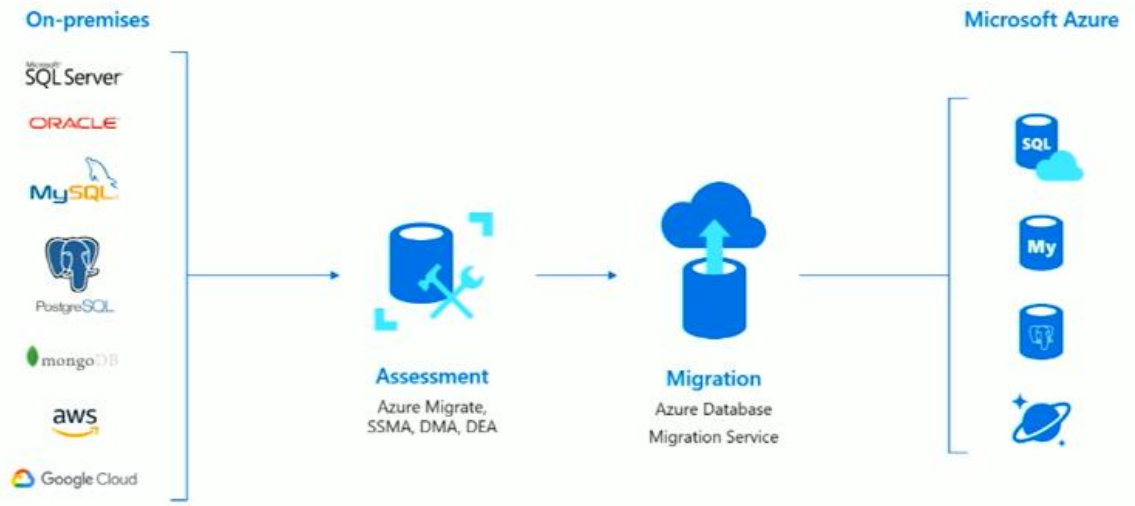

On-premises
Microsoft Azure
SQL Server
ORACLE
MySQL
PostgreSQL
mongoDB
aws
Google Cloud
Assessment
Azure Migrate,
SSMA, DMA, DEA
Migration
Azure Database
Migration Service
SQL
My

Flytta SQL till Azure



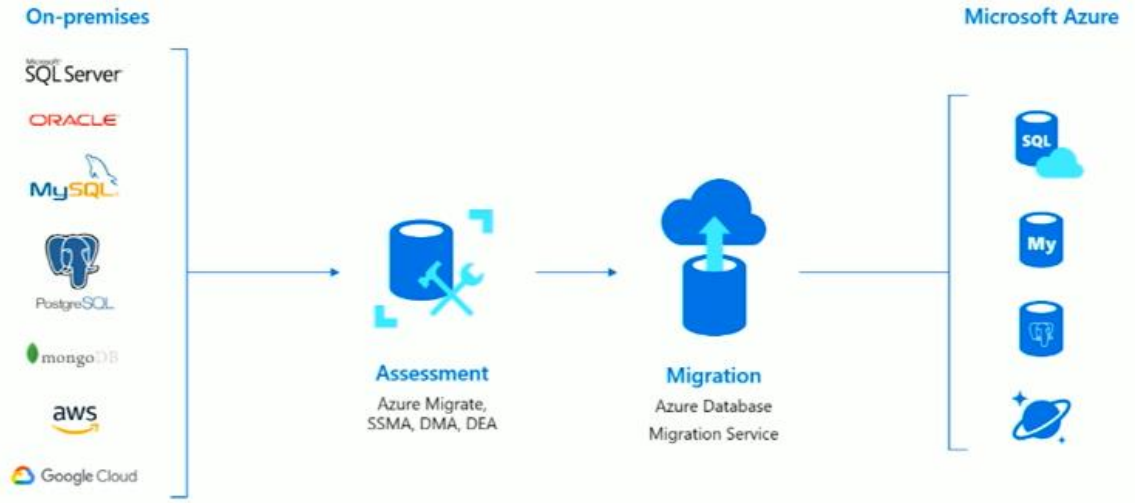
- Assessment
- Azure Migrate
  - Azure Migrate tillhandahåller en central hubb för att utvärdera och migrera till lokala Azure-servrar, infrastruktur, program och data.
  - https://docs.microsoft.com/sv-se/azure/migrate/migrate-services-overview

Flytta SQL till Azure



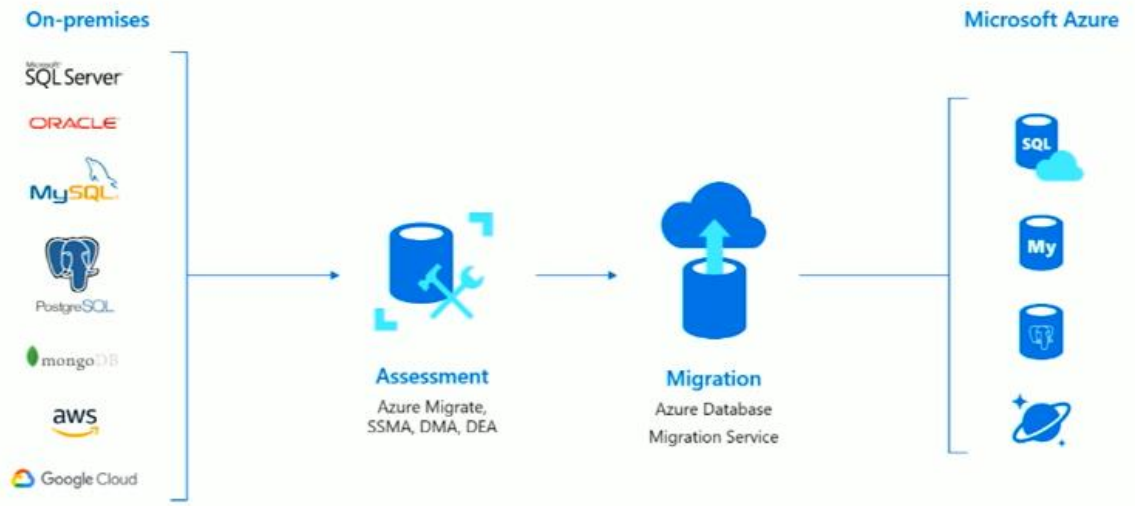
- Assessment
- SSMA, SQL Server Migration Assistant
  - SQL Server Migration Assistant (SSMA) is a free supported tool from Microsoft that simplifies database migration process from Access to SQL Server, Azure SQL Database and Azure SQL Database Managed Instance. SSMA for Access automates conversion of Microsoft Access database objects to SQL Server, Azure SQL Database or Azure SQL Database Managed Instance objects, loads the objects and migrates data to the target database.

Flytta SQL till Azure



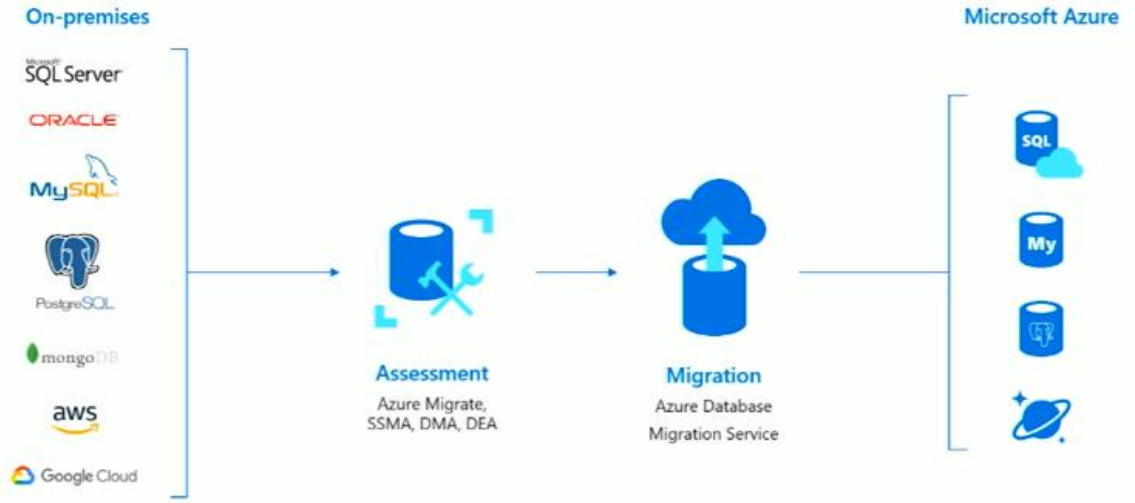
- Assessment
- DMA, Data Migration Assistant
  - Gör en assessment for Azure SQL
  - Data Migration Assistant (DMA) enables you to upgrade to a modern data platform by detecting compatibility issues that can impact database functionality on your new version of SQL Server. It recommends performance and reliability improvements for your target environment. It allows you to not only move your schema and data, but also uncontained objects from your source server to your target server
  - https://docs.microsoft.com/en-us/sql/dma/dma-overview?view=sql-server-ver15

Flytta SQL till Azure



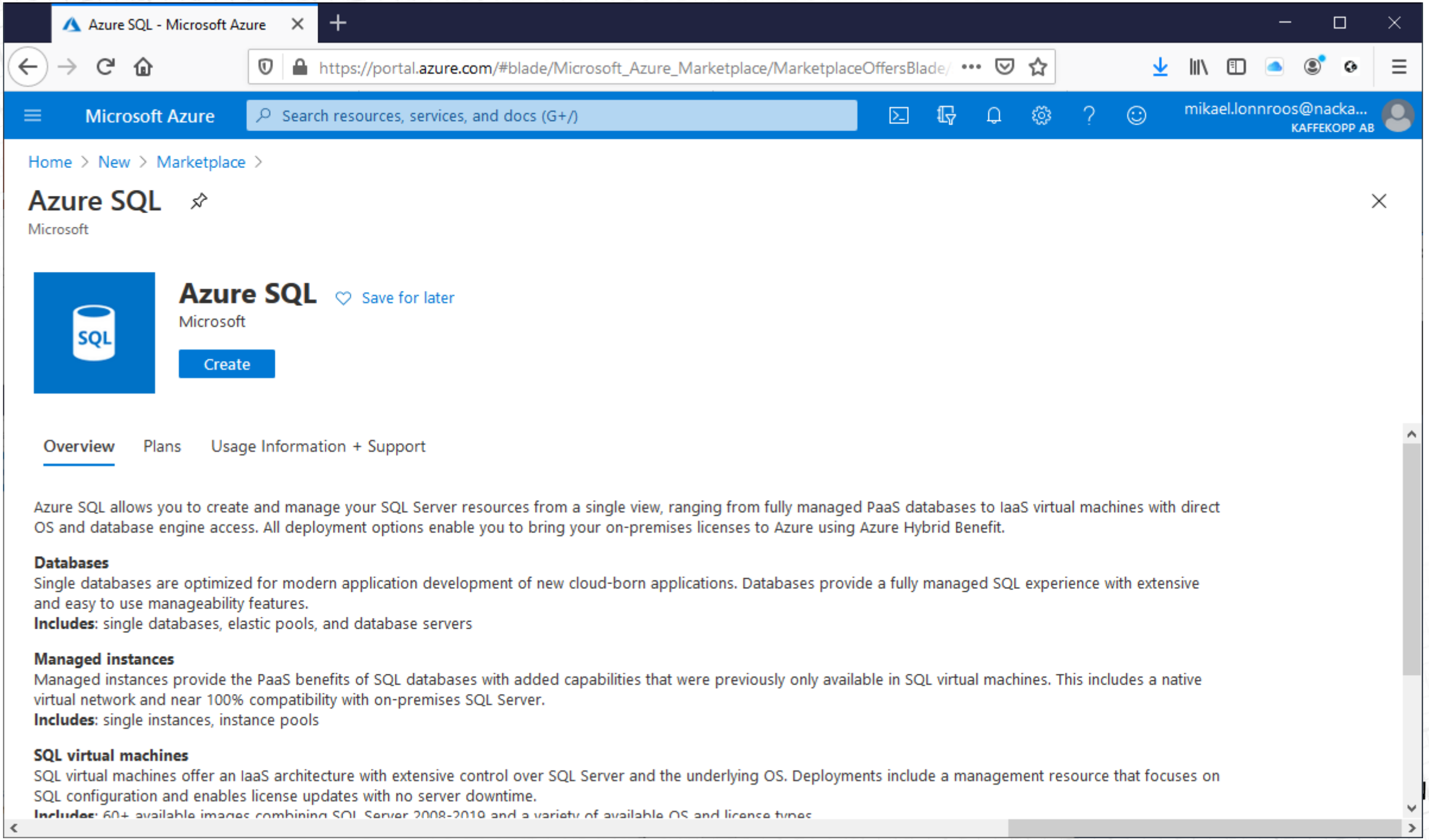
- Assessment
- DEA, Database Experimentation Assistant
  - Database Experimentation Assistant (DEA) is a new A/B testing solution for SQL Server upgrades. It will assist in evaluating a targeted version of SQL for a given workload. Customers who are upgrading from previous SQL Server versions (SQL Server 2005 and above) to any new version of the SQL Server will be able to use these analysis metrics
  - https://docs.microsoft.com/en-us/sql/dea/database-experimentation-assistant-overview?view=sql-server-ver15

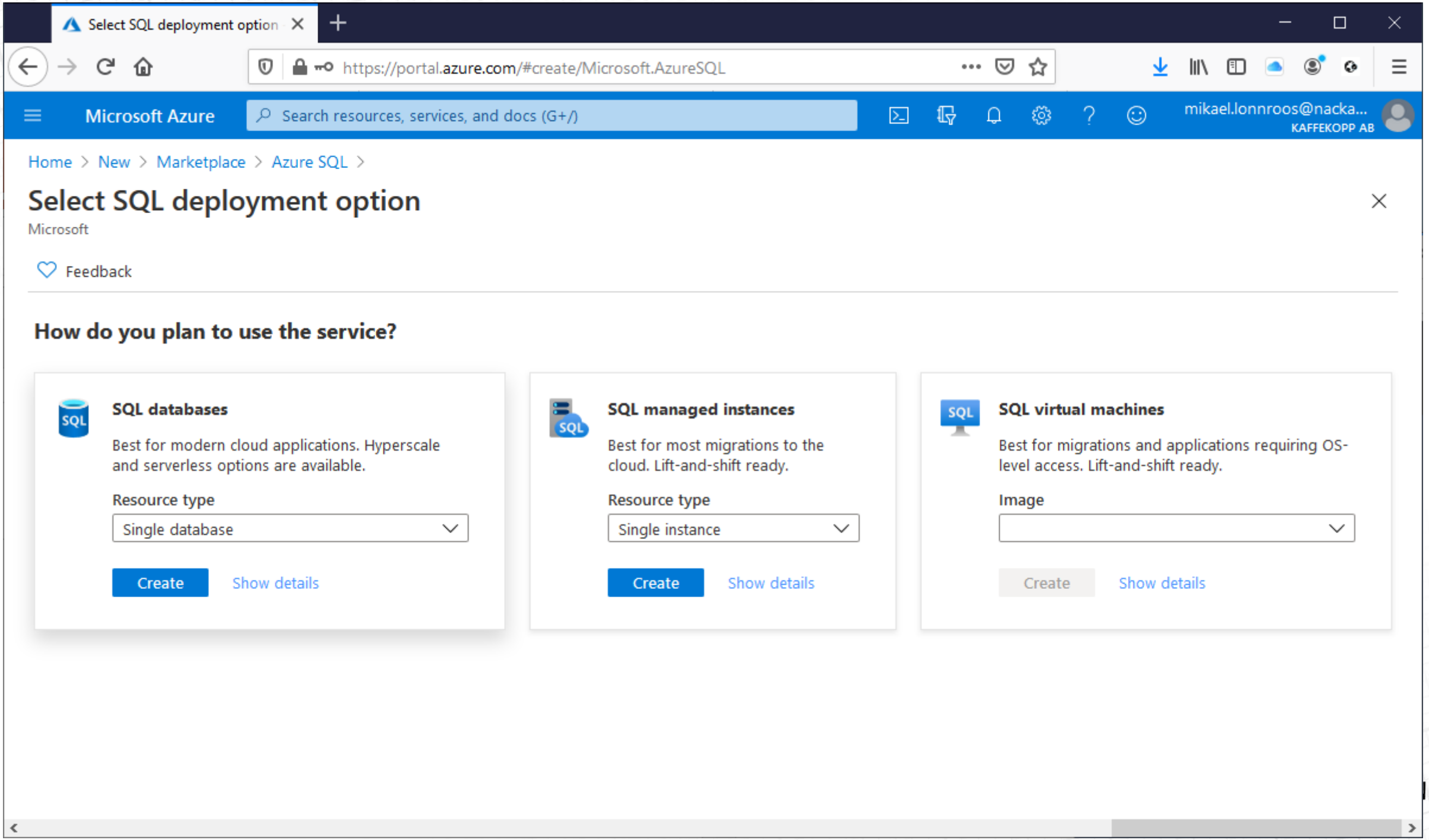
Flytta SQL till Azure

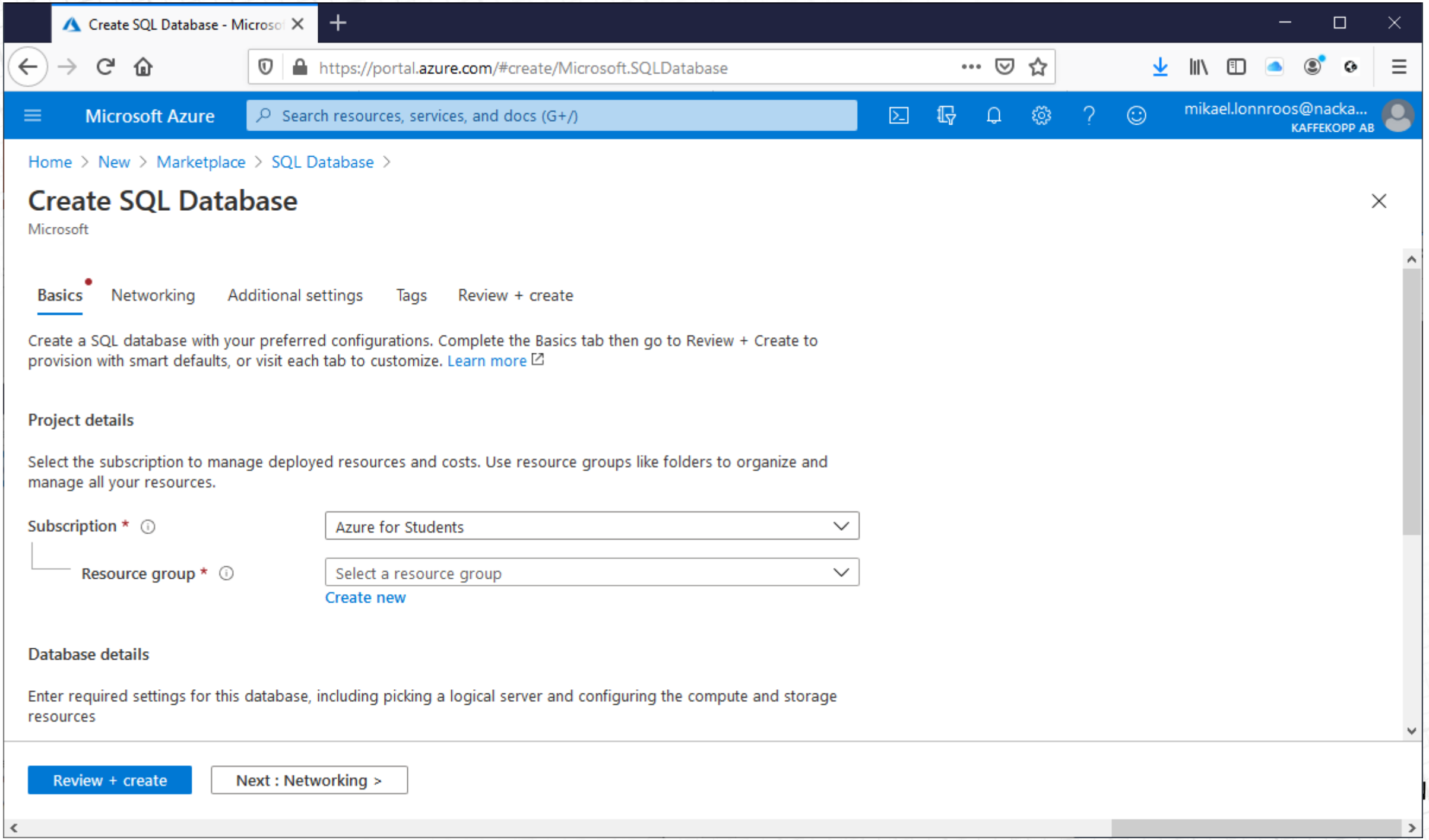


- Migration
- Azure Database Migration Service
  - Azure Database Migration Service is a tool that helps you simplify, guide, and automate your database migration to Azure. Easily migrate your data, schema, and objects from multiple sources to the cloud at scale.
  - https://azure.microsoft.com/sv-se/services/database-migration/

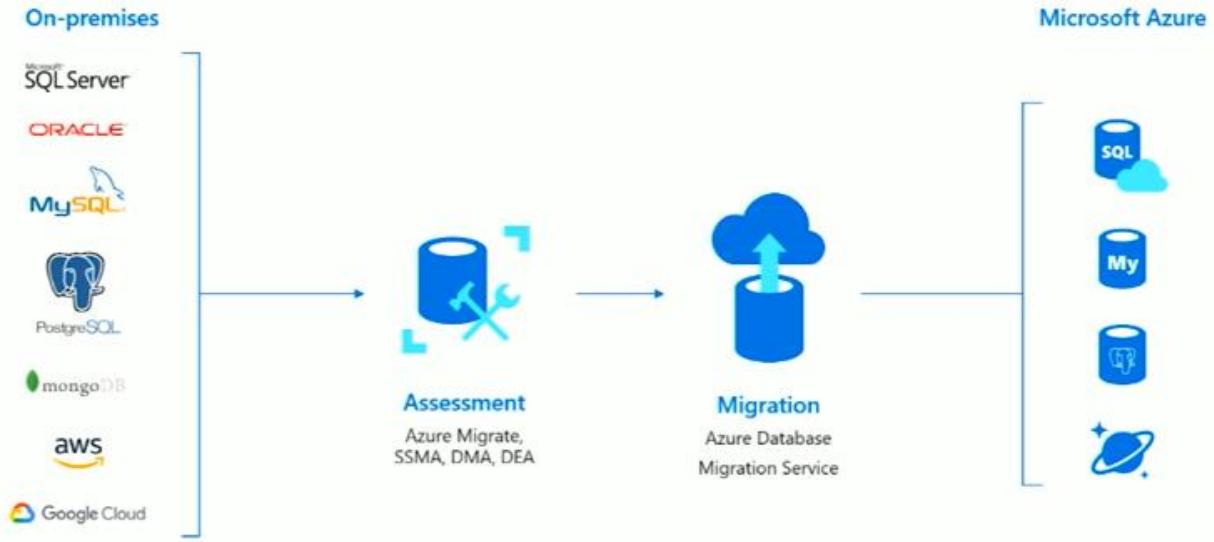
GÖR EN PLAN!


Azure SQL - Microsoft Azure
https://portal.azure.com/#blade/Microsoft_Azure_Marketplace/MarketplaceOffersBlade/
Microsoft Azure
Search resources, services, and docs (G+/)
mikael.lonnroos@nacka...
KAFFEKOPP AB
Home > New > Marketplace >
Azure SQL
Microsoft
Azure SQL
Save for later
Microsoft
Create
Overview
Plans
Usage Information + Support
Azure SQL allows you to create and manage your SQL Server resources from a single view, ranging from fully managed PaaS databases to IaaS virtual machines with direct OS and database engine access. All deployment options enable you to bring your on-premises licenses to Azure using Azure Hybrid Benefit.
Databases
Single databases are optimized for modern application development of new cloud-born applications. Databases provide a fully managed SQL experience with extensive and easy to use manageability features.
Includes: single databases, elastic pools, and database servers
Managed instances
Managed instances provide the PaaS benefits of SQL databases with added capabilities that were previously only available in SQL virtual machines. This includes a native virtual network and near 100% compatibility with on-premises SQL Server.
Includes: single instances, instance pools
SQL virtual machines
SQL virtual machines offer an IaaS architecture with extensive control over SQL Server and the underlying OS. Deployments include a management resource that focuses on SQL configuration and enables license updates with no server downtime.


Select SQL deployment option
https://portal.azure.com/#create/Microsoft.AzureSQL
Microsoft Azure
Search resources, services, and docs (G+/)
mikael.lonnroos@nacka...
KAFFEKOPP AB
Home > New > Marketplace > Azure SQL >
Select SQL deployment option
Microsoft
Feedback
How do you plan to use the service?
SQL databases
Best for modern cloud applications. Hyperscale and serverless options are available.
Resource type
Single database
Create
Show details
SQL managed instances
Best for most migrations to the cloud. Lift-and-shift ready.
Resource type
Single instance
Create
Show details
SQL virtual machines
Best for migrations and applications requiring OS-level access. Lift-and-shift ready.
Image
Create
Show details


Create SQL Database - Microso
https://portal.azure.com/#create/Microsoft.SQLDatabase
Microsoft Azure
Search resources, services, and docs (G+/)
mikael.lonnroos@nacka...
KAFFEKOPP AB
Home > New > Marketplace > SQL Database >
Create SQL Database
Microsoft
Basics
Networking
Additional settings
Tags
Review + create
Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to provision with smart defaults, or visit each tab to customize. Learn more
Project details
Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.
Subscription *
Azure for Students
Resource group *
Select a resource group
Create new
Database details
Enter required settings for this database, including picking a logical server and configuring the compute and storage resources
Review + create
Next : Networking >

Egen övning



- Ladda ner de olika verktygen
  - SSMA, SQL Server Migration Assistant
  - DMA, Database Migration Assistant
  - DEA, Database Experimentation Assistant
  - Azure Database Migration Service
- Skapa en (eller flera) egna databaser
- Prova

Summering av dagens lektion

- Kort summering kring vad vi har gått igenom under dagens lektionstillfälle.
  - Container
  - Lite powershell
  - SQL migrering

- Lyft gärna de studerande reflektioner kring dagens lektion.

  (Vad tar de med sig från dagens lektion? Finns det något som var extra svårt att förstå? Finns det något som vi behöver repetera? Hur upplevde de dagens arbetsmetoder?)

Framåtblick inför nästa lektion

- Berätta kort vad ni kommer att behandla vid nästa lektionstillfälle.
  - Nästa lektion kommer vi fortsätta med Azure.
- Finns det något som de studerande kan/måste förbereda sig inför nästa lektionstillfälle.