

Molndrift av tjänster och applikationer

DEVOPS22

Del 3; introduktion Azure

Kort summering av föregående lektion/ev. lektioner

Föregående lektion:

- Frågor kring förra lektionen?
 - Vad är molnet
 - Förkortningar (IaaS, PaaS, SaaS)
 - Private Cloud
 - Iordningställande av era egna on-prem servrar

Lektionstillfällets mål och metod

Mål med lektionen:

- Introduktion till Azure
- Få ordning på vår On-prem / local cloud (om det inte redan är klart)

Lektionens arbetsmetod/er:

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

Kursens syfte och mål

- Syftet med kursen är att ge de studerande de kunskaper och färdigheter som krävs för att drifta egenutvecklade applikationer och IT- tjänster i publika moln.
- Målet för kursen är att de studerande ska kunna uppvisa självständiga färdigheter och kunskap i tillämpningsområden, kravställning av system, kunskap om moderna verktyg samt förmåga till implementering av molnssystem.

Kursen går igenom följande moment

- Utveckla och driftsätta applikationer med hjälp av Platform as a Service (PaaS)
- Tjänster inom molnbaserade infrastruktur.
- Uppsättning av säker åtkomstkontroll av molnbaserade tjänster.
- Virtual Infrastructure Management.
- Infrastructure as a Service (IaaS) med t.ex. Microsoft Windows Azure, Googles Cloud-plattform, Amazon AWS eller en annan publik molntjänst.
- Användningsfall Molnimplementationer, t.ex. containers, serverless, auto-scaling.
- Monitorering och metrics.

De studerande ska ha kunskaper i/om

- Drift av tjänster i publika moln samt där tillhörande ekonomiska och säkerhetsmässiga aspekter
- Skillnader mellan lokala och publika moln samt skillnad och fördel mellan infrastructure as a service (IaaS), platform as a service (PaaS) och software as a service (SaaS)
- Containerhantering

De studerande ska ha färdigheter i att

- Installera servertjänster i publika moln.
- Drifta och flytta virtuella maskiner mellan privata och publika moln.
- Utföra monitorering av miljöerna och insamling av metrics

De studerande ska ha kompetens för att

- Hantera drift av applikationer och tjänster i privata så väl som publika moln.
- Hantera användarsäkerhet vid drift av tjänster i publika moln.

För Godkänd (G) krävs

- Ha kännedom om skillnader mellan lokala och publika moln samt skillnad och fördel mellan Infrastructure as a Service (IaaS), Platform as a service (PaaS) och Software as a Service (SaaS)
- Ha kunskaper om containerhantering i molnet
- Utföra monitorering av miljöerna och insamling av metrics
- Kan hantera drift av applikationer och tjänster i privata så väl som publika moln samt där tillhörande ekonomiska och säkerhetsmässiga aspekter och kontohantering
- Kunna drifta och flytta virtuella maskiner mellan privata och publika moln
- Kunna installera tjänster till publika moln och hantera tillhörande användarsäkerhetsaspekter

För Väl Godkänd (VG) krävs

- Studenten kan med säkerhet hantera drift av applikationer i tjänster i privata så väl som publika moln
- Studenten kan kommunicera kring val och tillvägagångssätt för molnimplementationer

Examinationsform

4 individuella inlämningsuppgifter.

Några utmaningar med on-prem...

- High Availability, HA
- Fault Tolerance
- Disaster Recovery
- Scalability
- Elasticity

High Availability HA

- Maintain acceptable continued performance despite temperature, load fluctuations or failures in service or hardware
- Azure Data center
 - Power
 - Cooling
 - Network
- Availability Zone Redundancies
 - 1 or more Datacenter
- Region
 - 1 or more availability zones

Fault Tolerance

- A systems ability to continue operating properly when one or more of its components fail
- Proactive
 - Backup data/apps/resources
 - Deploy to multiple availability zones or regions
 - Load balance across multiple availability zones or regions
 - Monitor health
- Reactive
 - Restore data/apps to different availability zones or regions
 - Deploy to different availability zones or regions

Disaster Recovery

- A systems ability to back up and restore data/apps/resources when needed
- Azure site recovery
 - On-premise to on-premise
 - On-premises to Azure
 - Other cloud to Azure
 - Azure to Azure



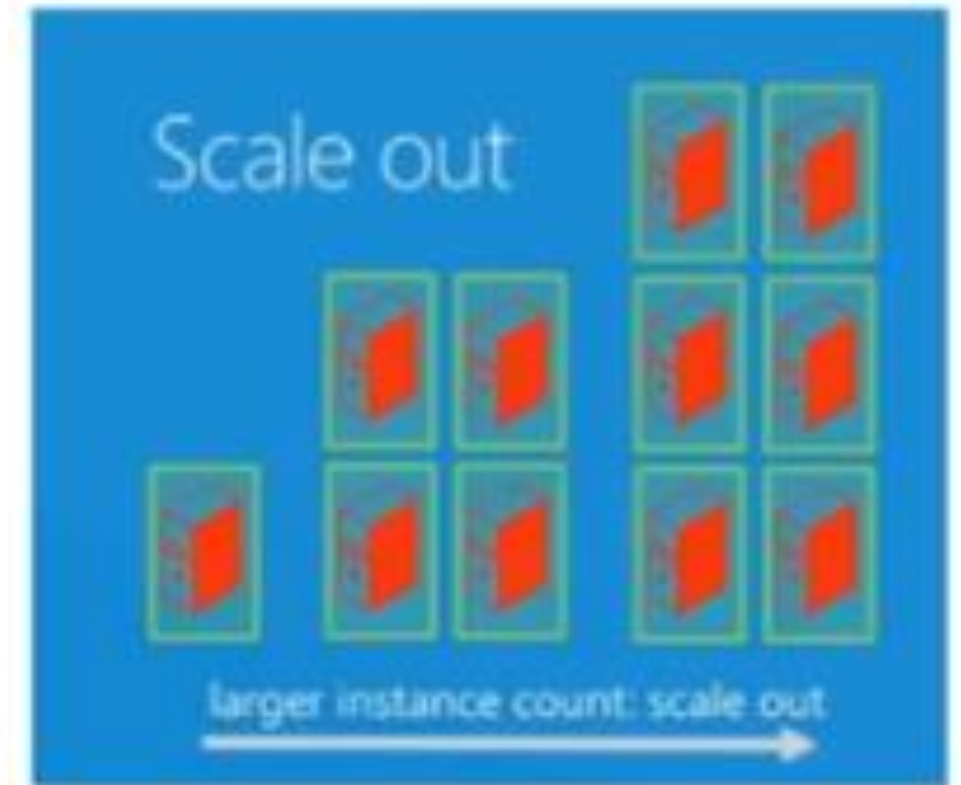
Scalability – Scaling Up

- *The ability to increase the instance count or size of existing resources*
- Scalability – Scale Up
- Increase instance **size** existing resources
- Disruptive



Scalability – Scaling Out

- *The ability to increase the instance count or size of existing resources*
- Scalability – Scale Out
- Increase instance **count** existing resources
- Non-disruptive



Elasticity

- *The ability to increase or decrease the instance count or size of existing resources on fluctuations in traffic or load, or in the resource workload*
- Ability to scale in both directions (in + out, up + down)
- Manual or automatic
- Based on changes in load or workload
- Pay only for what you use

Real-time elasticity



Grupparbete

- High Availability, HA
 - Fault Tolerance
 - Disaster Recovery
 - Scalability
 - Elasticity
-
- Vilka teknologier kan man använda för att lösa ovanstående utmaningar i en "vanlig" on-premise-miljö?

Resultat av grupparbete

- RAID är en uppenbar teknologi, kommer ni på några fler?
- Kolumn 2

Grundläggande begrepp

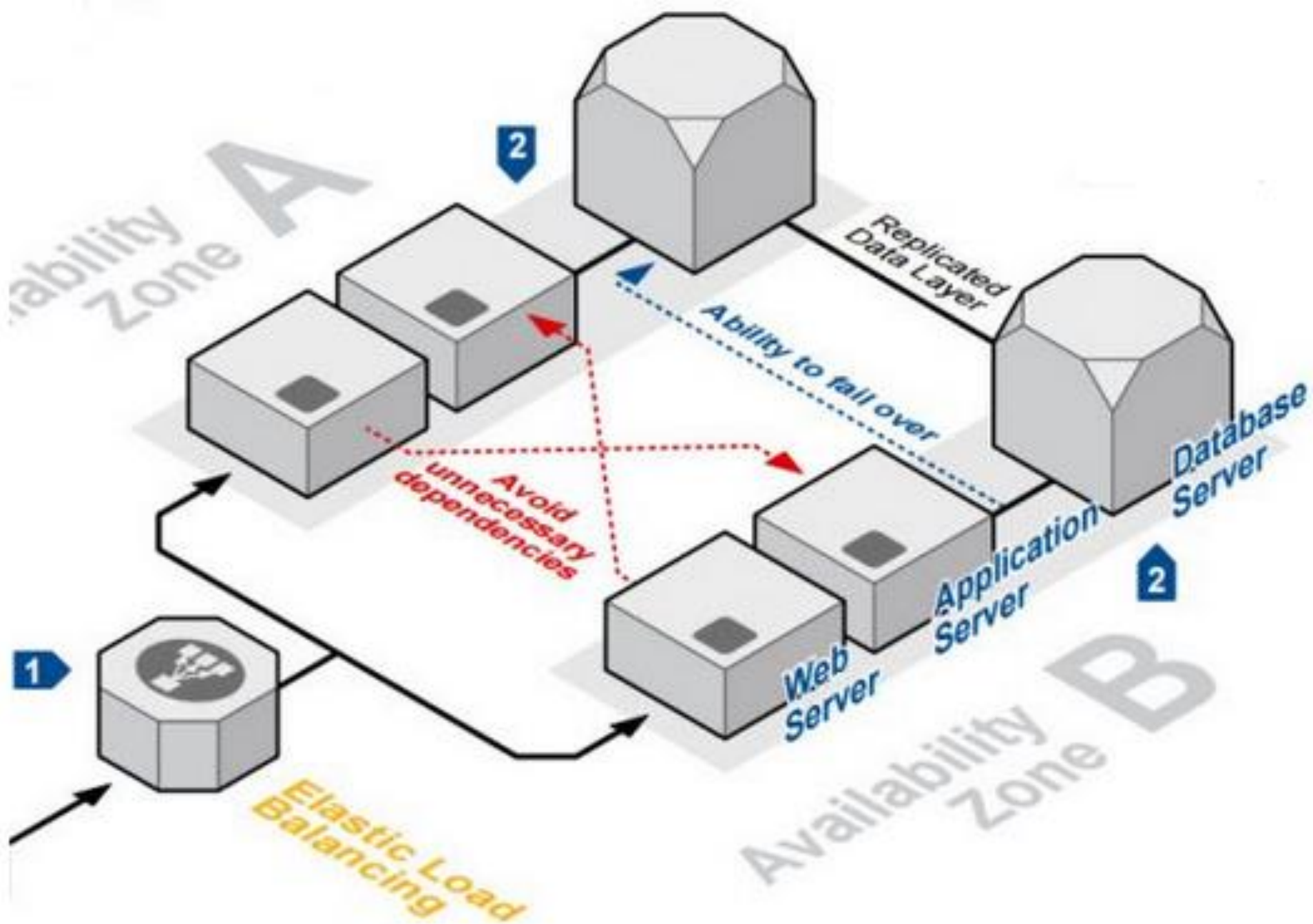
- Region
- Availability Zones

Region

- An area within a geo that does not cross national borders and contains one or more datacenters.
- Pricing, regional services, and offer types are exposed at the region level.
- A region is typically paired with another region, which can be up to several hundred miles away.
- Regional pairs can be used as a mechanism for disaster recovery and high availability scenarios. Also referred to as *location*.

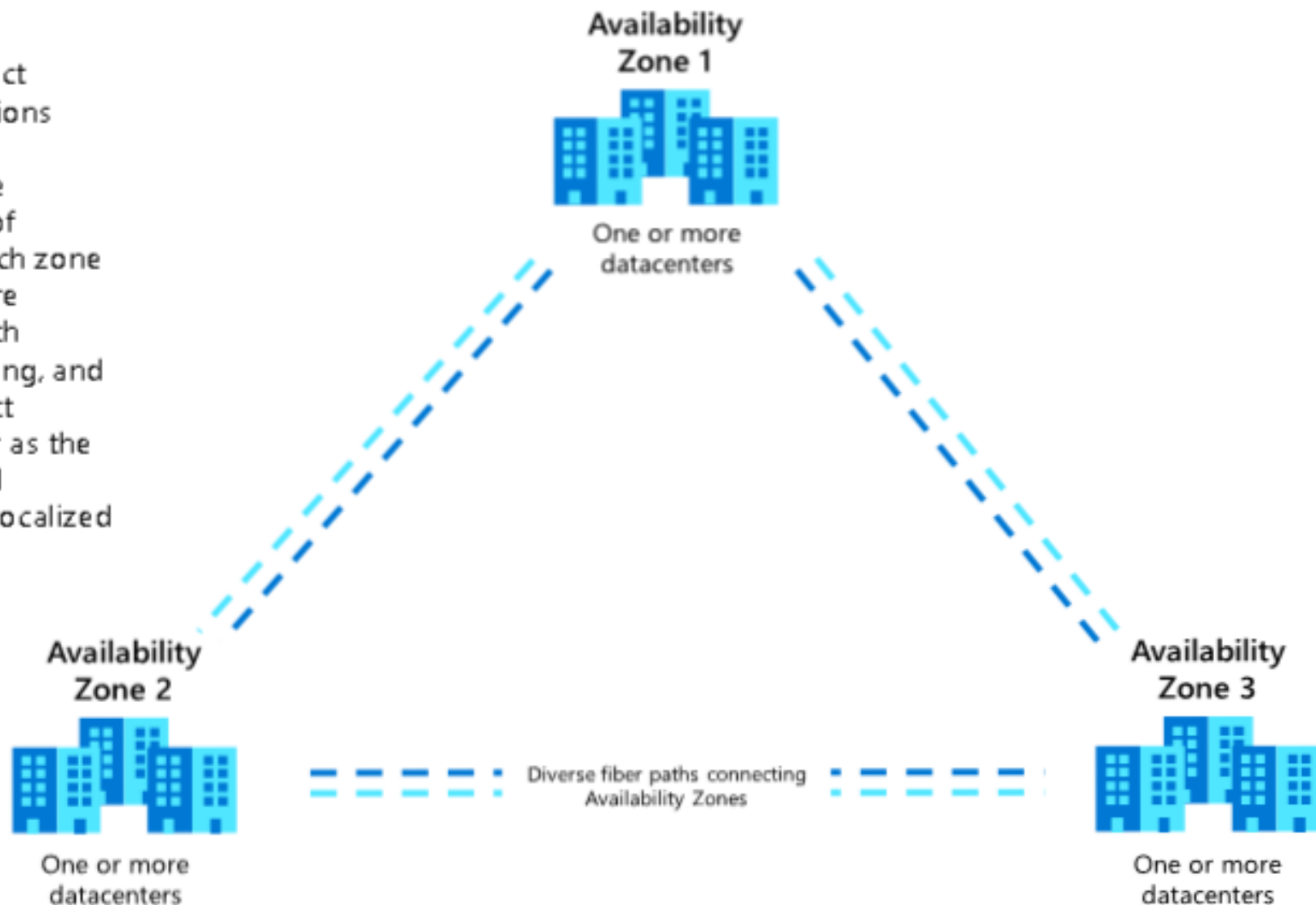
Availability Zones

- Availability Zones are physically separate locations within an Azure region.
- Each Availability Zone consists of one or more datacenters equipped with independent power, cooling, and networking.
- By running services on multiple availability zones, you can make your applications resilient to failure or disruption in your primary data center.
- Lower latency within Availability Zone.



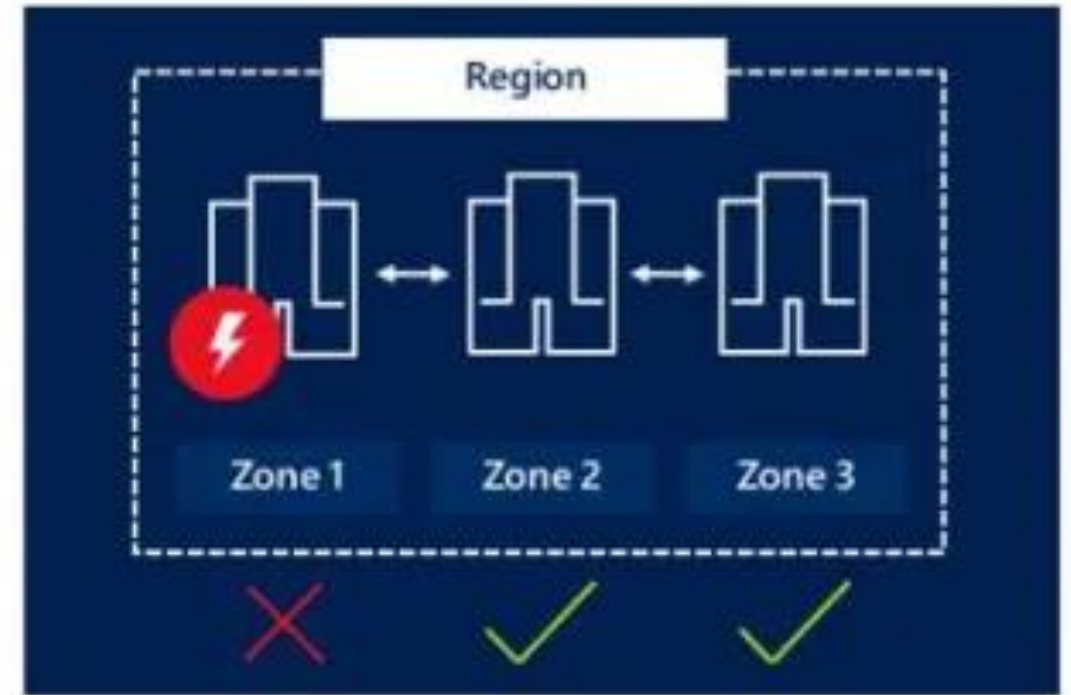
Azure Region

Composed of three distinct physical and logical locations within an Azure Region, Availability Zones provide synchronous replication of applications and data. Each zone is made up of one or more datacenters equipped with independent power, cooling, and networking. This construct eliminates the datacenter as the single point of failure and reduces the exposure to localized failure events.



Availability Zones

- Linux Virtual Machines
- Windows Virtual Machines
- Virtual Machine Scale Sets
- Managed Disks
- Load Balancer
- Public IP address
- Zone-redundant storage
- SQL Database
- Event Hubs
- Service Bus (Premium Tier Only)



Picture courtesy – Microsoft

- VPN Gateway
- ExpressRoute
- Application Gateway (preview)

Single VM

Easier lift
and shift

Availability Sets

Protecting against failures
within datacenters

Availability Zones

Protecting from entire
datacenter failures

Region Pairs

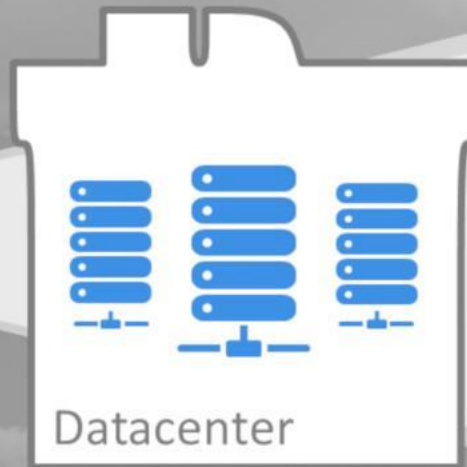
Regional protection within
data residency boundaries



VM SLA

99.9%

with Premium Storage



Datacenter

Protection from...
Hardware failure and
Software update cycles

VM SLA

99.95%



Region 1

Availability
Zone 1

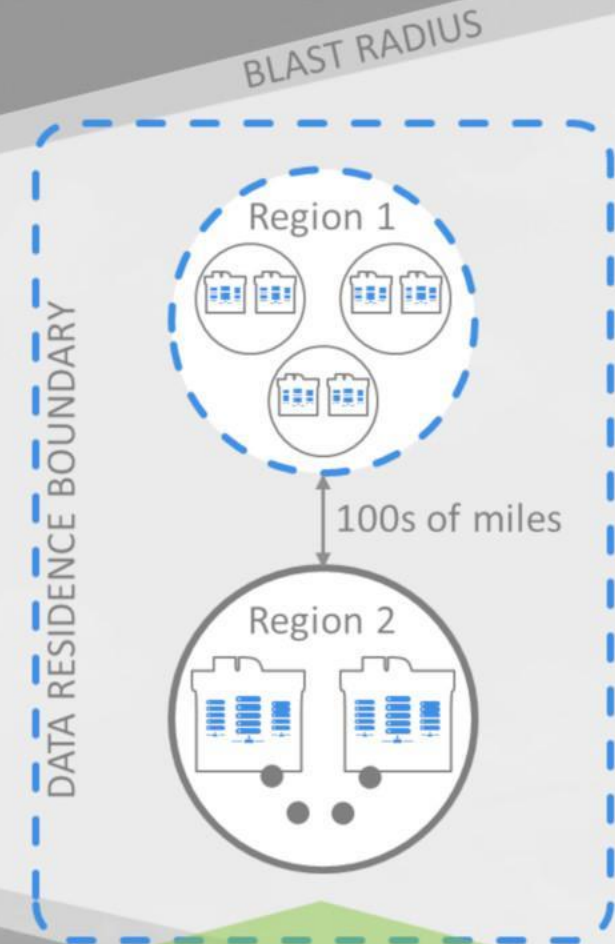
Availability
Zone 2

Availability
Zone 3

Protection from...
Fire, power + cooling
disruption, and flood

VM SLA

99.99%



Region 1

Region 2

100s of miles

DATA RESIDENCE BOUNDARY

BLAST RADIUS

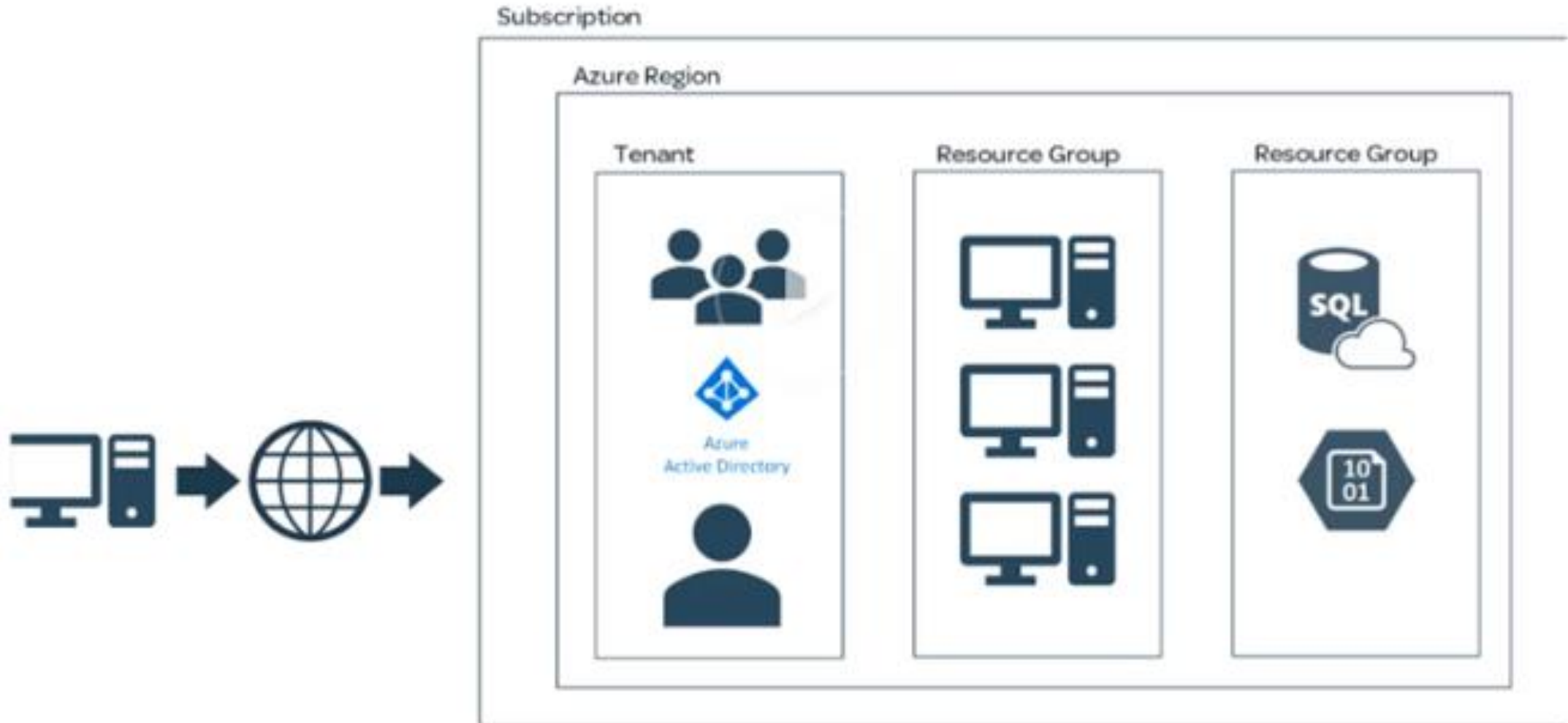
Protection from...
Tornado, earthquake and
other large scale disasters



Region och Availability Zones

- <https://azure.microsoft.com/en-us/global-infrastructure/geographies/>

Azure Concepts



Technical documentation, API, X

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🔒 https://docs.microsoft.com/en-us/

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Kom igång med Azure

- Man kan komma in i Azure via många länkar, jag brukar använda:
- <https://portal.azure.com>

Welcome to Azure!

Don't have a subscription? Check out the following options.



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Azure services



Create a
resource



All resources



Virtual
machines



App Services



Storage
accounts



SQL databases



Azure
Database fo...



Azure Cosmos
DB



Kubernetes
services



More services

Navigate



Subscriptions



Resource groups



All resources



Dashboard

Kom igång med Azure

- Visades inte bilden där ni har möjlighet att registrera er som student, så använd denna länk istället:
- <https://azure.microsoft.com/sv-se/free/students/>
- Fungerar inte det heller, så logga ut ur allt som har med Microsoft att göra, radera alla cookies ur er webbläsare och prova igen.



Skapa kostnadsfritt i molnet med Azure for Students

Använd din e-postadress för universitet eller skola för att registrera dig
och förnya varje år som du är student

Börja kostnadsfritt

[Läs mer om berättigande >](#)

Börja med
\$100 Azure-
kredit

Inget
kreditkort
krävs

+

Kostnadsfria tjänster

Få populära tjänster kostnadsfritt medan du har din kredit.

Kom igång med Azure

- \$100 är ungefär 1000 kr om man räknar lite slarvigt
- Det kanske känns som mycket pengar, men i Azure försvinner allt ganska fort om ni överdriver prestanda på exempelvis servrar.
- Ni ska alltså hushålla med pengarna, i alla fall tills alla inlämningar är klara. Jag vet inte vad som händer om ni går över gränsen, troligen får ni betala resten själva (det blir väl något ni får ta upp med Martin i så fall)
- Stäng av så mycket ni kan när det inte används

Övning

- Skapa ett eget konto på Azure

Navigera i Azure

- Navigering och förklaring av vissa knappar / länkar

Home - Microsoft Azure

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 Create a resource

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 Resource groups

🌐

 App Services

🗄

 SQL databases

🌐

 Azure Cosmos DB

💻

 Virtual machines

⚖

 Load balancers

📁

 Storage accounts

🔗

 Virtual networks

👤

 Azure Active Directory

🕒

 Monitor

🔧

 Advisor

🛡

 Security Center

👤

 Help + support

💰

 Cost Management + Billing

Services

🔑

 Subscriptions

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 Virtual machines

🔗

 Route tables

🔥

 Firewalls

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 Virtual networks

📊

 All resources

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 Storage accounts

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Subscriptions

🗂

 Resource groups

📊

 All resources

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 Dashboard

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 Azure Monitor

Monitor your apps and infrastructure

🛡

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Secure your apps and infrastructure

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Dashboard

Private dashboard

[+ New dashboard](#) [Refresh](#) [Full screen](#) [Edit](#) [Share](#) [Download](#) [Clone](#) [Assign tags](#) [Delete](#) [Feedback](#)

Auto refresh : Off

Last updated: 33 minutes ago

All resources

All subscriptions



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Azure getting started made easy!



Launch an app of your choice on Azure in a few quick steps

[Create DevOps Starter](#)

Quickstarts + tutorials



Windows Virtual Machines

Provision Windows Server, SQL Server, SharePoint VMs



Linux Virtual Machines

Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs



App Service

Create Web Apps using .NET, Java, Nodejs, Python, PHP



Functions

Process events with a serverless code architecture

Azure services



Create a resource



Subscriptions



Virtual machines



Route tables



Firewalls



Virtual networks



All resources



App Services



Storage accounts



More services

Navigate



Subscriptions



Resource groups



All resources



Dashboard

Tools



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Azure Monitor

Monitor your apps and infrastructure



Security Center

Secure your apps and infrastructure



Cost Management

Analyze and optimize your cloud spend for free

Useful links

Technical Documentation
Azure Migration Tools

Azure Services
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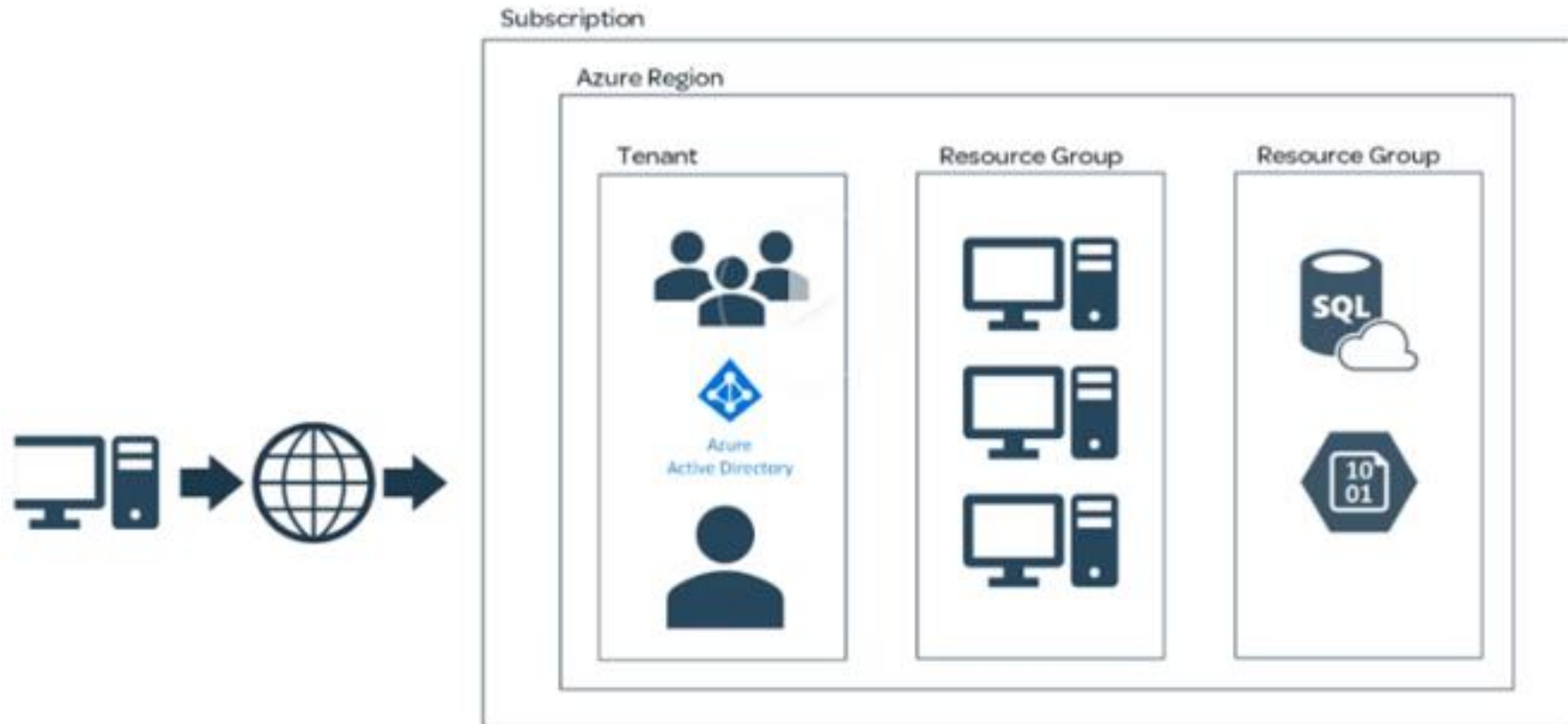


Skapa lite saker på Azure

- Resource group
- Virtual Network
- Virtual Server

Resource group

- Man måste ha minst en Resource group



Home - Microsoft Azure

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 Virtual machines

⚖️

 Load balancers

📁

 Storage accounts

🔗

 Virtual networks

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 Azure Active Directory

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 Monitor

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Home > New >

Resource group

Microsoft



Resource group

Microsoft

Save for later

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Overview

Plans

Usage Information + Support

Resource groups enable you to manage all your resources in an application together. Resource groups are enabled by Azure Resource Manager. Resource Manager allows you to group multiple resources as a logical group which serves as the lifecycle boundary for every resource contained within it. Typically a group will contain resources related to a specific application. For example, a group may contain a Website resource that hosts your public website, a SQL Database that stores relational data used by the site, and a Storage Account that stores non-relational assets.

[Home](#) > [New](#) > [Resource group](#) >

Create a resource group

[Basics](#) [Tags](#) [Review + create](#)

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * ⓘ

Azure for Students



Resource group * ⓘ

Resource details

Region * ⓘ

(US) East US

[Review + create](#)[< Previous](#)[Next : Tags >](#)

MILO-ResourceGroup - Microsoft Azure

Control and organize Azure resources

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Dashboard >

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MILO-ResourceGroup

🔗

Resource group

🔍 Search (Ctrl+ /)

⏪

+

 Add

≡

 Edit columns

🗑

 Delete resource group

🔄

 Refresh

⬇

 Export to CSV

🔗

 Open query

🏷

 Assign tags

→

 Move

🗑

 Delete

...

Overview

Activity log

Access control (IAM)

Tags

Settings

Quickstart

Deployments

Policies

Properties

Locks

Cost Management

Cost analysis

Cost alerts (preview)

Budgets

Advisor recommendations

Monitoring

Insights (preview)

Alerts

...

^ Essentials

Subscription (change) : Azure for Students

Deployments : No deployments

Subscription ID : a5bf7118-6fc2-4729-b1cd-08fbb2a9edc9

Tags (change) : [Click here to add tags](#)

Filter by name...

Type == (all) X

Location == (all) X

+

 Add filter

Showing 0 to 0 of 0 records.

☐ Show hidden types ⓘ

No grouping

List view

Name ↑↓

Type ↑↓

Location ↑↓

🏠

No resources to display

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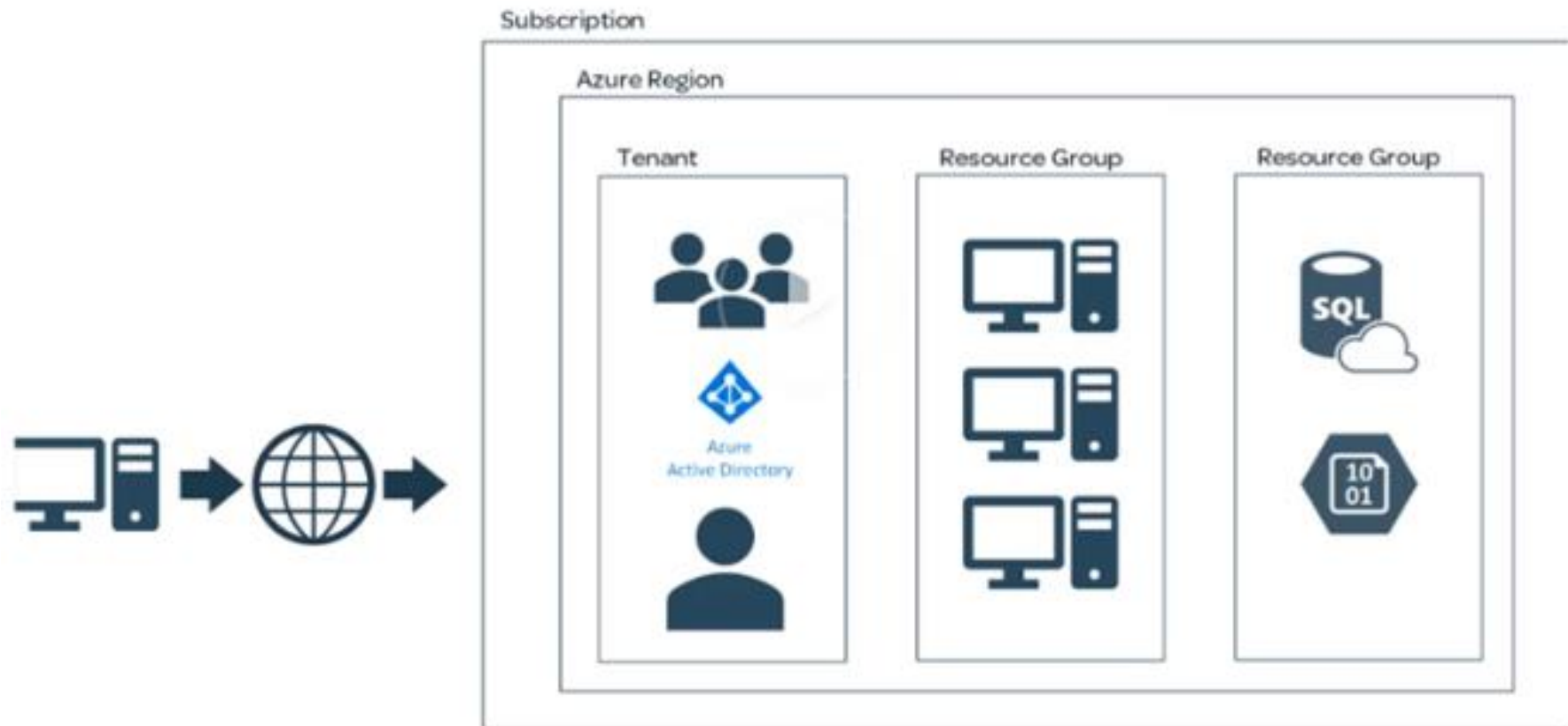
[Learn more](#) ⓘ

Create resources

Clear filters / Show hidden

Virtual Network (Vnet)

- Man måste ha minst ett Virtual Network



[Dashboard](#) > [MILO-ResourceGroup](#) > [New](#) >

Virtual Network

Microsoft



Virtual Network

Microsoft

[Save for later](#)[Create](#)[Overview](#)[Plans](#)[Usage Information + Support](#)

Create a logically isolated section in Microsoft Azure with this networking service. You can securely connect it to your on-premises datacenter or a single client machine using an IPsec connection. Virtual Networks make it easy for you to take advantage of the scalable, on-demand infrastructure of Azure while providing connectivity to data and applications on-premises, including systems running on Windows Server, mainframes, and UNIX.

Use Virtual Network to:

- Extend your datacenter
- Build distributed applications
- Remotely debug your applications

Dashboard > MILO-ResourceGroup > New > Virtual Network >

Create virtual network

Basics IP Addresses Security Tags Review + create

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks. VNet is similar to a traditional network that you'd operate in your own data center, but brings with it additional benefits of Azure's infrastructure such as scale, availability, and isolation. [Learn more about virtual network](#)

Project details

Subscription * ⓘ Azure for Students
Resource group * ⓘ MILO-ResourceGroup
[Create new](#)

Instance details

Name *
The name must be between 1 and 80 characters.
The name must begin with a letter or number, end with a letter, number or underscore, and may contain only letters, numbers, underscores, periods, or hyphens.
The value must not be empty.
Region * (Europe) North Europe

Review + create

< Previous

Next : IP Addresses >

[Download a template for automation](#)

Dashboard > MILO-ResourceGroup > New > Virtual Network >

Create virtual network

Basics IP Addresses Security Tags Review + create

The virtual network's address space, specified as one or more address prefixes in CIDR notation (e.g. 192.168.1.0/24).

IPv4 address space

10.0.0.0/16 10.0.0.0 - 10.0.255.255 (65536 addresses)



☐ Add IPv6 address space ⓘ

The subnet's address range in CIDR notation (e.g. 192.168.1.0/24). It must be contained by the address space of the virtual network.

+ Add subnet 🗑 Remove subnet

☐ Subnet name

Subnet address range

☐ default

10.0.0.0/24

Review + create

< Previous

Next : Security >

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Home > MILO-vnet

<.>MILO-vnet | Subnets

Virtual network

×

🔍Search (Ctrl+/)

⏪

+ Subnet

+ Gateway subnet

🔄 Refresh

🔍Search subnets

Name ↑↓	IPv4 ↑↓	IPv6 (many available) ↑↓	Delegated to ↑↓	Security group ↑↓	
default	10.0.0.0/24 (251 available)	-	-	-	...
GatewaySubnet	10.0.2.0/24 (251 available)	-	-	-	...
Servers	10.0.1.0/24 (251 available)	-	-	-	...

Tags

🔧Diagnose and solve problems

Settings

<.>Address space

🔗Connected devices

<.>Subnets

🛡️DDoS protection

🔥Firewall

🛡️Security

🌐DNS servers

<.>Peerings

🌐Service endpoints

<.>Private endpoints

📊Properties

🔒Locks

Monitoring

📄Diagnostic settings

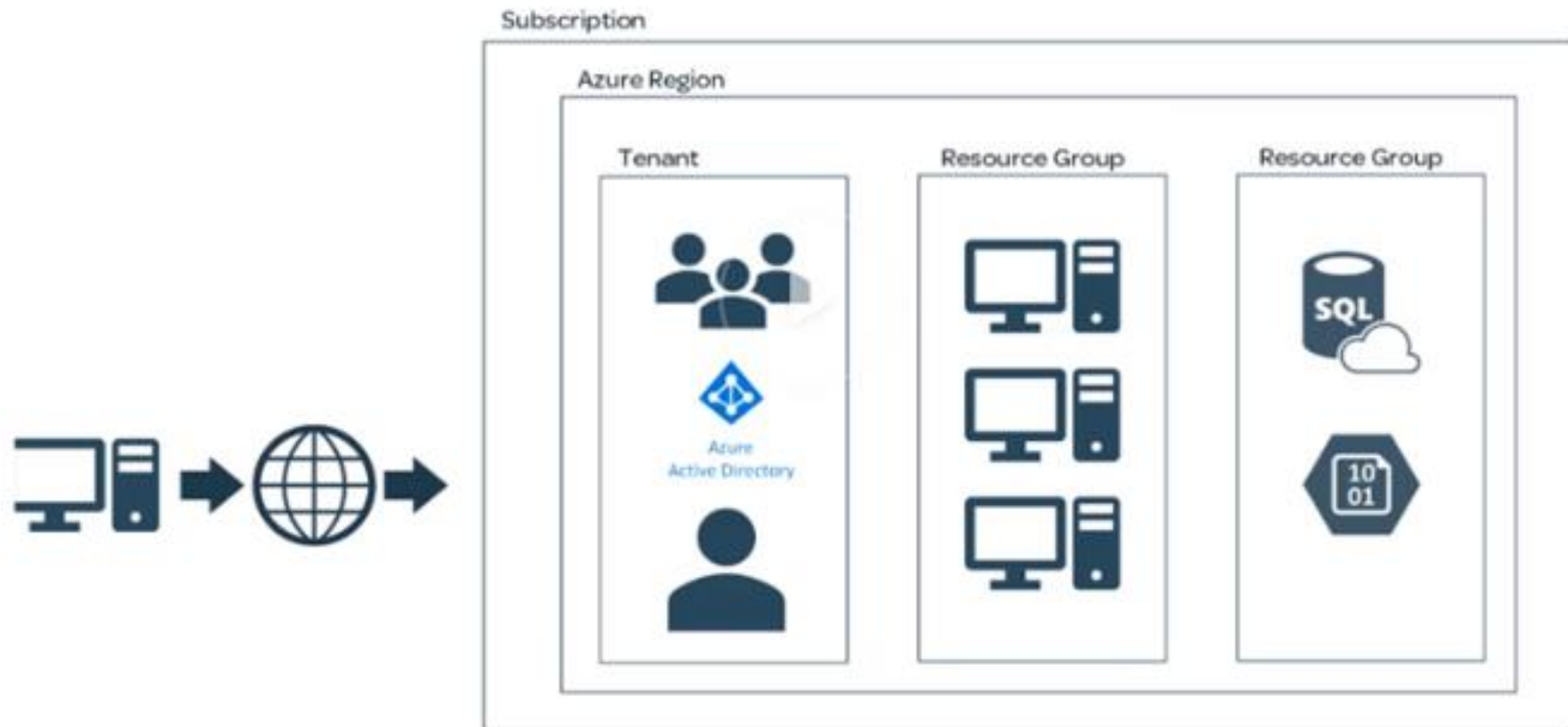
📄Logs

📄Connection monitor

EMIN

Windows Virtual Machines (VM)

- Skapa den billigaste VM för Windows vi hittar



Windows Server - Microsoft Az...Control and organize Azure res...+

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Home > New > Marketplace >

Windows Server🔗

Microsoft



Windows Server💙 Saved

Microsoft

Select a planWindows Server 2019 Datacenter▼

Create

OverviewPlansUsage Information + Support

Windows Server is the operating system that bridges on-premises environments with Azure services enabling hybrid scenarios and maximizing existing investments, including:

- Unique hybrid capabilities with Azure to extend your datacenter and maximize investments
- Advanced multi-layer security to help you elevate your security posture
- Faster innovation for applications enabling Developers and IT Pros to create new and modernize their apps, and
- Unprecedented Hyper-converged Infrastructure to evolve your datacenter infrastructure

Available Images

Windows Server 2019 is the latest Long-Term Servicing Channel (LTSC) release with five years of mainstream support + five years of extended support. Choose the image that is right for your application needs.

Latest: Windows Server 2019

- Server with Desktop Experience includes all roles including the graphical user interface(GUI)
- [Server Core](#) omits the GUI for a smaller OS footprint, or
- [Containers option](#) with both Nano and Server Core containers pre-installed on Server with Desktop Experience, or Server Core.

Windows Server Semi-Annual Channel releases deliver new operating system capabilities at a faster pace and are based on the Server Core installation option of the Datacenter edition. A new release comes out every six months and is supported for 18 months. Check the [Lifecycle Support Page](#) for support dates and always use the latest release if possible.

Terms of Use

Create a virtual machine - Micr...Control and organize Azure res...+https://portal.azure.com/?Microsoft_Azure_Education_correlationId=040B6DD28FE96690%...90%

Microsoft AzureSearch resources, services, and docs (G+/)mikael.lonnroos@nack...NACKADEMIN AB

Home > New > Marketplace > Windows Server >

Create a virtual machine

BasicsDisksNetworkingManagementAdvancedTagsReview + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [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 * ⓘ

(New) Resource group

[Create new](#)

Instance details

Virtual machine name * ⓘ

Region * ⓘ

(Europe) North Europe

Availability options ⓘ

No infrastructure redundancy required

Image * ⓘ

Windows Server 2019 Datacenter - Gen1

[Browse all public and private images](#)

Azure Spot instance ⓘ

☐ Yes ☒ No

Review + create

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Next : Disks >

EMIN

MILO-ResourceGroup - Microsoft Azure

Control and organize Azure resources

← → ↺ 🏠

🔒 https://portal.azure.com/?Microsoft_Azure_Education_correlationId=040B6DD28FE9660420AA604B8BE965A6&Micr...9edc9/resourceGroups/MILO-ResourceGroup/providers/Microsoft.Network/networkSecurityGroups/SRV-2019-nsg

90%

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⋮

Microsoft Azure

🔍 Search resources, services, and docs (G+/)

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Home >

📦 MILO-ResourceGroup

Resource group

✕

🔍 Search (Ctrl+ /)

⏪

+ Add

≡ Edit columns

🗑️ Delete resource group

🔄 Refresh

⬇️ Export to CSV

🔗 Open query

🏷️ Assign tags

➡️ Move ▾

🗑️ Delete

⋮

📊 Overview

📅 Activity log

👤 Access control (IAM)

🔖 Tags

Settings

🏠 Quickstart

📁 Deployments

📜 Policies

⚙️ Properties

🔒 Locks

Cost Management

💰 Cost analysis

💰 Cost alerts (preview)

💰 Budgets

🔍 Advisor recommendations

Monitoring

📍 Insights (preview)

📢 Alerts

⤴️ Essentials

Subscription (change) : Azure for Students

Deployments : 2 Succeeded

Subscription ID : a5bf7118-6fc2-4729-b1cd-08fbb2a9edc9

Tags (change) : [Click here to add tags](#)

Filter by name...

Type == (all) ✕

Location == (all) ✕

+ Add filter

Showing 1 to 7 of 7 records.

☐ Show hidden types ⓘ

No grouping ▾

List view ▾

<input type="checkbox"/> Name ↑↓	Type ↑↓	Location ↑↓	
<input type="checkbox"/> 📦 MILO-AvailSet	Availability set	North Europe	...
<input type="checkbox"/> 🌐 MILO-vnet	Virtual network	North Europe	...
<input type="checkbox"/> 🖥️ SRV-2019	Virtual machine	North Europe	...
<input type="checkbox"/> 🌐 SRV-2019-ip	Public IP address	North Europe	...
<input type="checkbox"/> 🛡️ SRV-2019-nsg	Network security group	North Europe	...
<input type="checkbox"/> 🌐 srv-201940	Network interface	North Europe	...
<input type="checkbox"/> 🌐 SRV-2019_OsDisk_1_42a20d6a929b48a18128755416fe1176	Disk	North Europe	...

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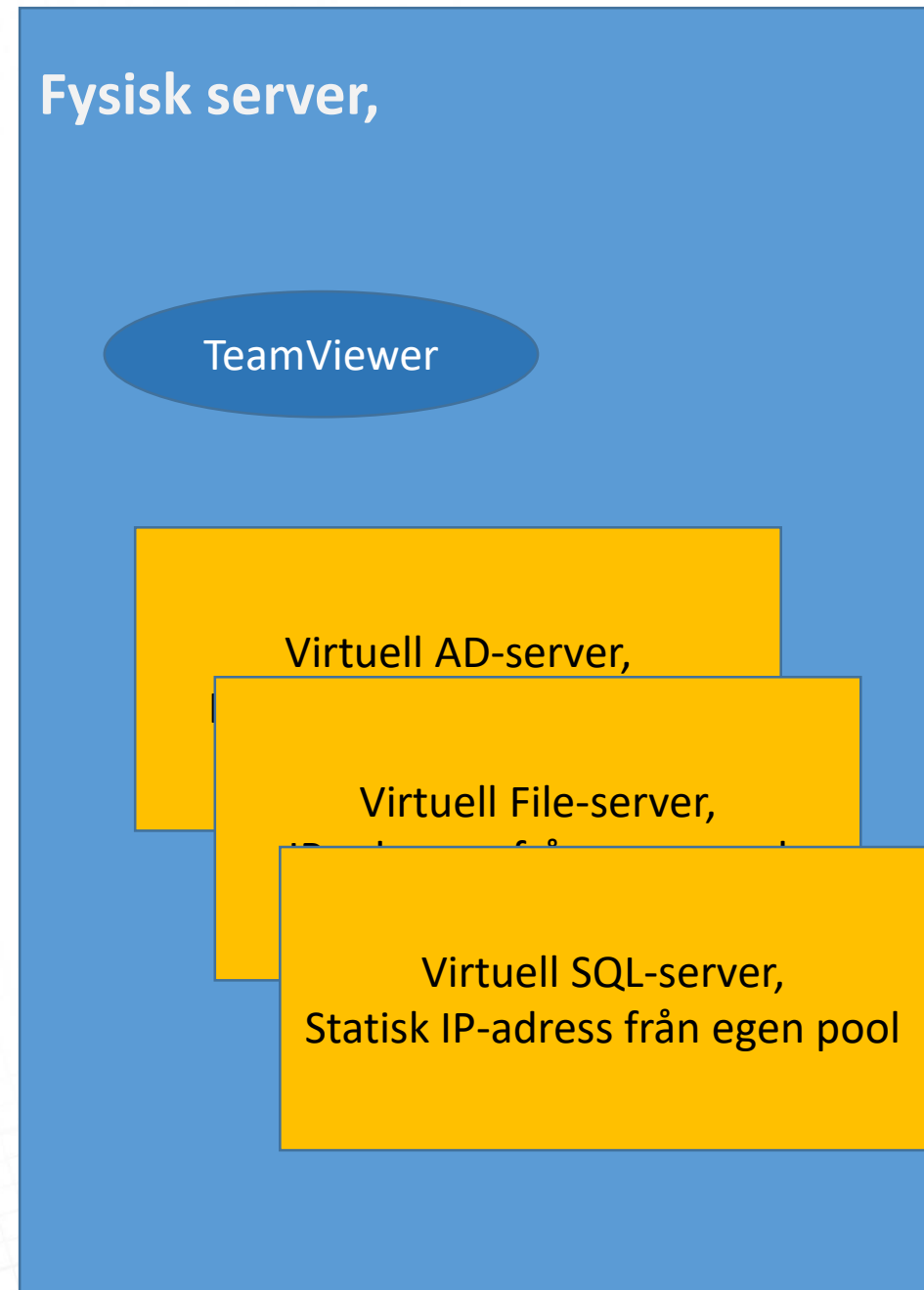
https://portal.azure.com/?Microsoft_Azure_Education_correlationId=040B6DD28FE9660420AA604B8BE965A6&Micr...9edc9/resourceGroups/MILO-ResourceGroup/providers/Microsoft.Network/networkSecurityGroups/SRV-2019-nsg

Övning: skapa lite resurser i Azure

- Skapa en Resource group
- Skapa ett Virtual Network
- Skapa en Virtual Machine med Windows Server, välj helst den billigaste servern.
- Anslut med Remote Desktop för att verifiera åtkomst till servern

Övning: Gör klart on-prem

- Fysisk server + TeamViewer
- En AD-server (och intern DNS), döp din domain till något lämpligt.
- En fil- och skrivarserver som är medlem i domainen. Denna ska, utöver OS, ha en liten disk som motsvarar Data-storage där användarna har sina filer.
- En server för SQL-server, även denna server ska vara med i domainen.



Summering av dagens lektion

- Kort summering kring vad vi har gått igenom under dagens lektionstillfälle.
 - Ev få ordning på vår On-prem / local cloud
 - Belysa redundans och HA på on-prem
 - Introduktion till Azure
 - Skapa eget studentkonto på Azure
 - Skapa en resource group, nätverk och installera en server på Azure
- 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.