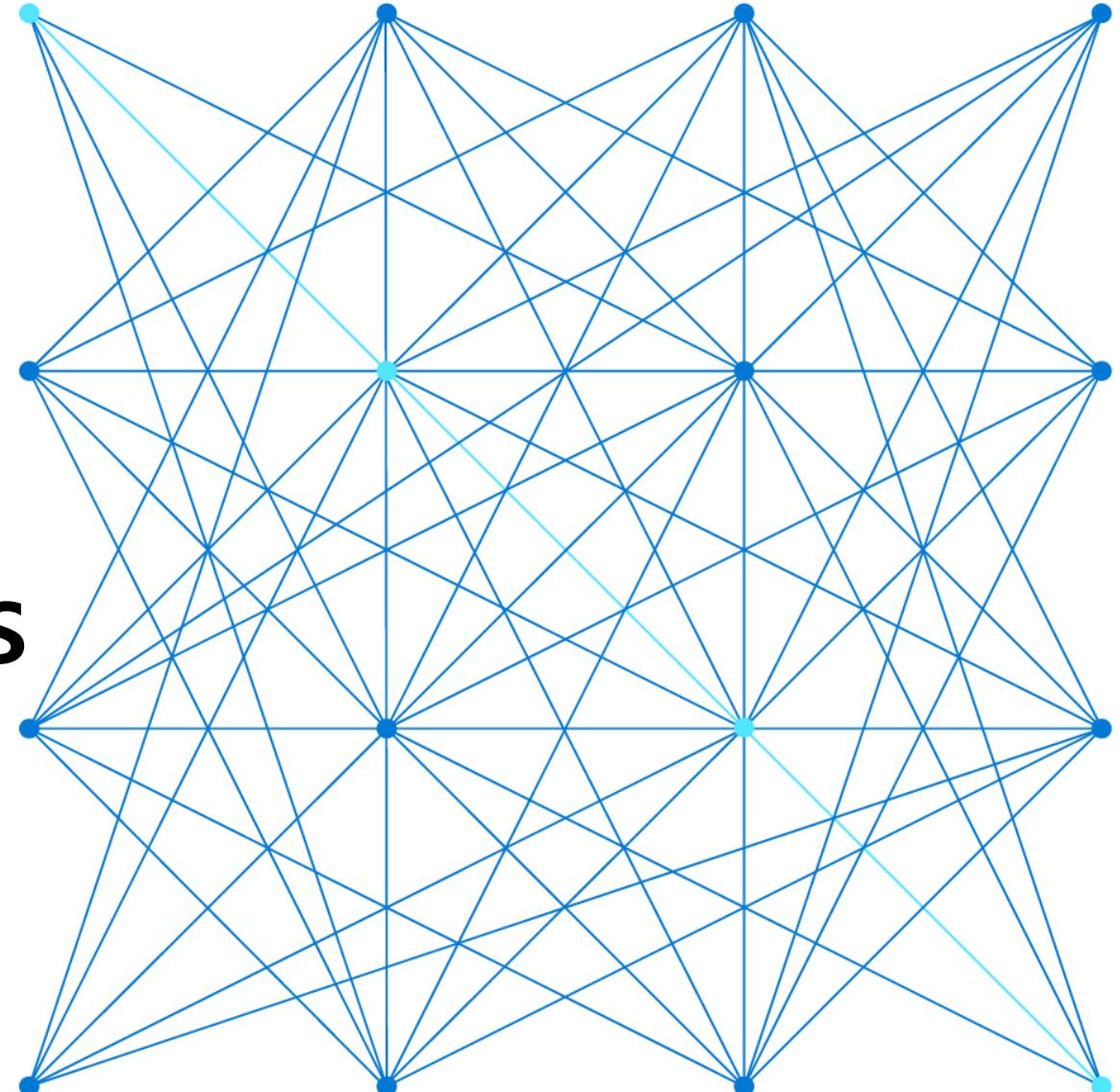


AZ-500

Tag 2

Microsoft Azure Security Technologies

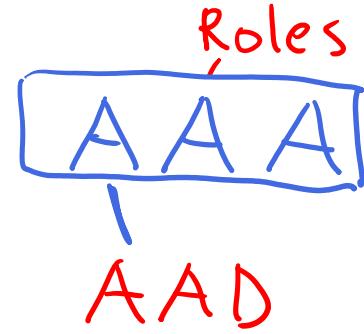
Guten Morgen!



AZ-500 Agenda



Learning Path 1 **Identity and Access**



Learning Path 2 **Implement Platform Protection**

Docker

VM NSG
App App Gw
FW Kubernetes AKS

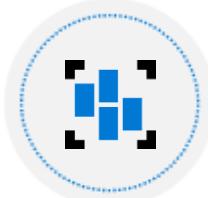
CLI

Tool az

Tool kubectl

Vi :g!

Code



Learning Path 3 **Data and Application Security**



Learning Path 4 **Security Operations**

Learning Path: Identity and Access



Azure Active Directory

ID Provider

MS Account
Facebook
Google
Okta



Hybrid Identity

AD
on-prem → AAD

SAML



Azure AD Identity Protection

ID Protection



Azure AD Privileged Identity Management

CA

MFA

PIM



Enterprise Governance



Application Security



Module Labs

Azure Active Directory



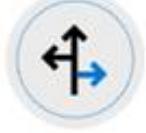
Azure Active Directory (Azure AD)



Azure AD features



Azure AD versus Active Directory Domain Services (AD DS)



Roles for Azure AD



Azure AD Domain Services



Azure AD Users



Azure AD Groups

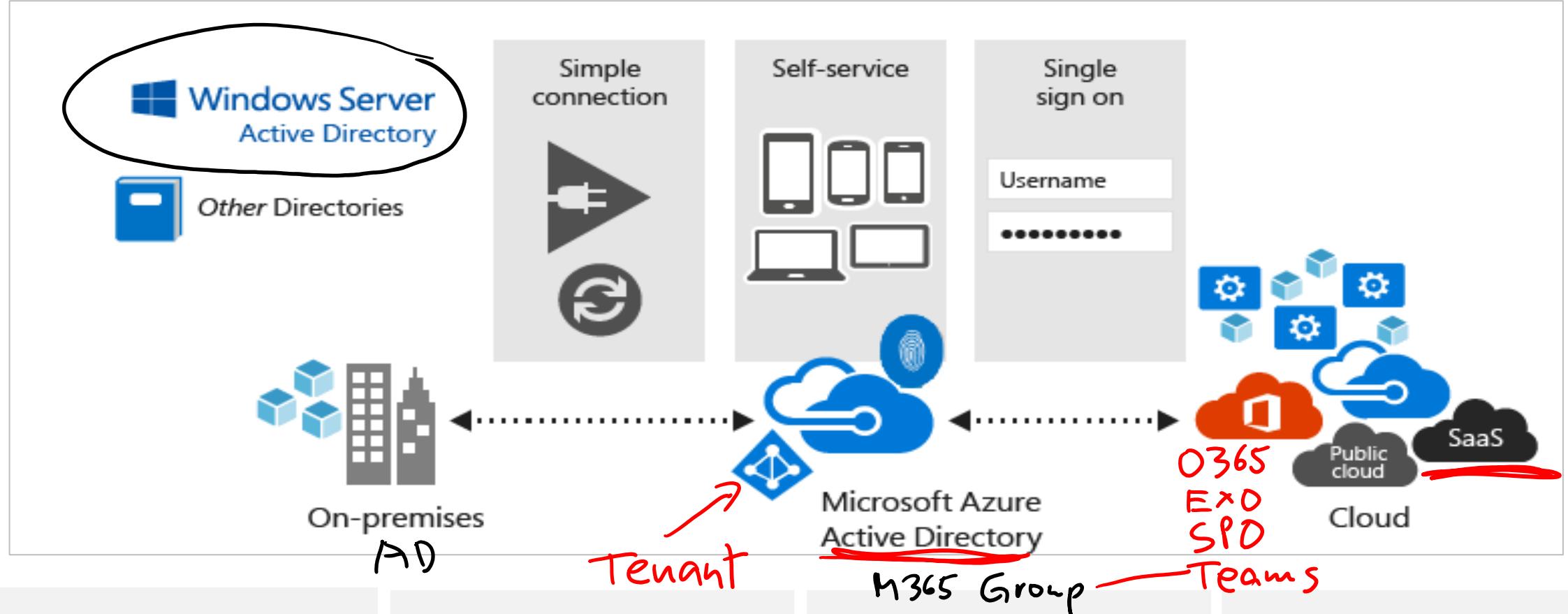


Administrative Units



Passwordless

Azure Active Directory Features



Microsoft's multi-tenant cloud-based directory and identity management service

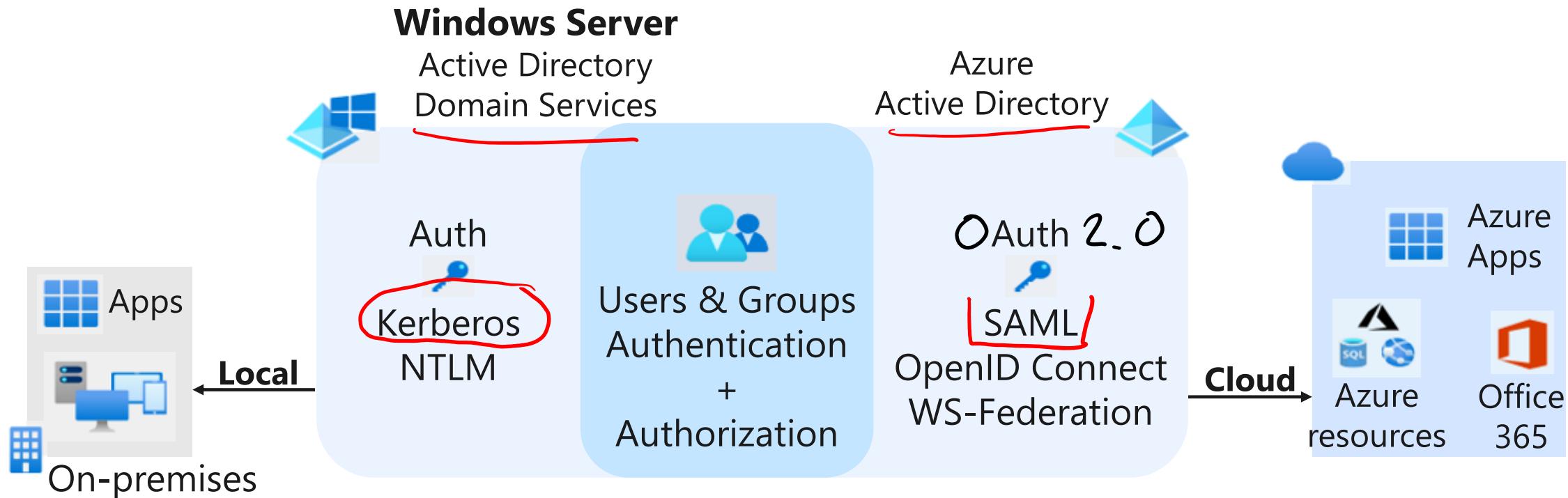
Identity management capabilities and integration

Integrates with Windows Server Active Directory

Provides SSO access

Sovereign Cloud
Delos ?

Azure AD versus Active Directory Domain Services (AD DS)



Service	Authentication	Structure	What it's used for
Azure Active Directory	Includes SAML, OpenID Connect (based on OAuth), WS-Federation	Tenants	Internet-based services and applications like Office 365, Azure services, and third-party SaaS applications
Active Directory Domain Services	Kerberos, NTLM	Forests, domains, organizational units	Authentication and authorization for on-premises printers, applications, file services, and more

Roles for Azure AD (sample)

Tenant

Admin Unit AU

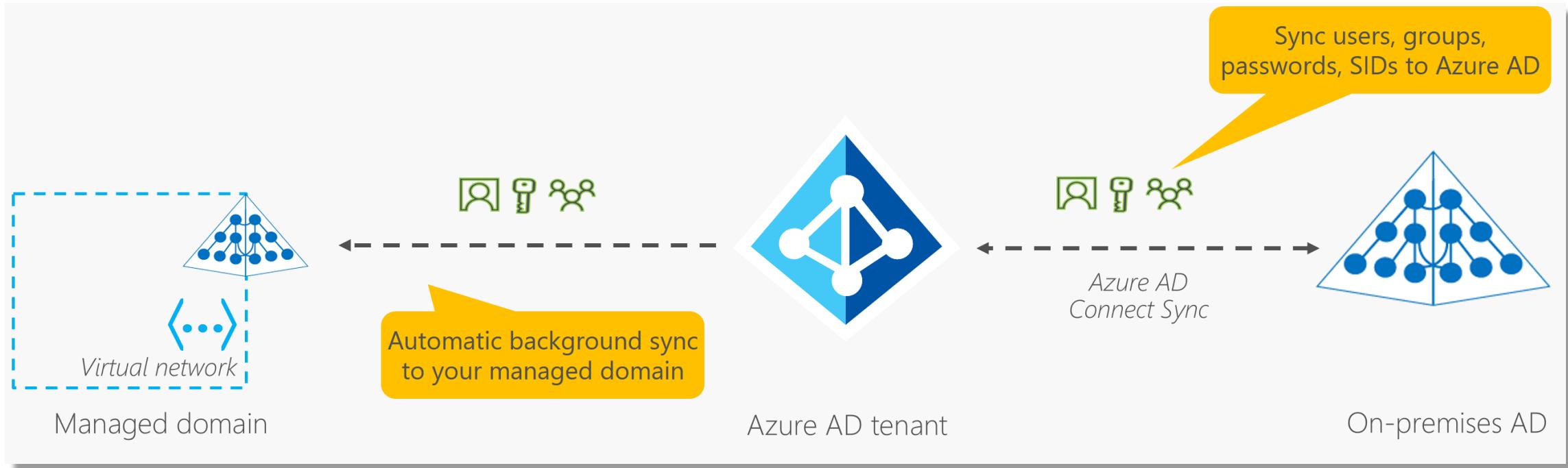
Azure
Built-in
Custom

Owner
Contributor
Reader

Built-in Role	Description
Global Administrator	Users with this role have access to all administrative features in Azure Active Directory
Security Administrator	Users with this role have permissions to manage security-related features in the Microsoft 365 Security Center, Security Center, Azure Active Directory Identity Protection, Azure Information Protection, and Office 365 Security & Compliance Center
Billing Administrator	Makes purchases, manages subscriptions, manages support tickets, and monitors service health
Global Reader	Users in this role can read settings and administrative information across Microsoft 365 services but can't take management actions.

User Administrator
User Admin

Azure Active Directory Domain Services



- Azure Active Directory Domain Services (Azure AD DS) provides managed domain services such as domain join, group policy, lightweight directory access protocol (LDAP), and Kerberos/New Technology LAN Manager (NTLM) authentication.



You use these domain services without the need to deploy, manage, and patch domain controllers (DCs) in the cloud.

Azure AD Users

- Add new users or delete existing users from your Azure Active Directory (Azure AD) tenant.
 - To add or delete users, you must be a User Administrator or Global Administrator.

The screenshot shows the Microsoft Azure portal interface for managing users. The top navigation bar includes the Microsoft Azure logo, a search bar, and user account information (chrisgreen@contoso.com, CONTOSO). The main page title is 'Contoso | Users'. On the left, there's a sidebar with links for 'All users (preview)', 'Audit logs', 'Sign-in logs', 'Diagnose and solve problems', 'Manage', 'Deleted users (preview)', 'Password reset', 'User settings', and 'Bulk operation results'. The main content area has a search bar and a toolbar with buttons for 'New user', 'Download users', 'Bulk operations', 'Refresh', and 'Manage view'. A dropdown menu from the 'New user' button is open, showing 'Create new user' (Create a new internal user in your organization) and 'Invite external user' (Invite an external user to collaborate with your organization). Below this, a table lists users:

User principal name	User type	Identities
aincharon@contoso.com	Guest	ExternalAzureAD
mycolannino_microsoft.c...	Guest	ExternalAzureAD
AzureAdmin@identityit.o...	Member	IdentityIT.onmicrosoft.com

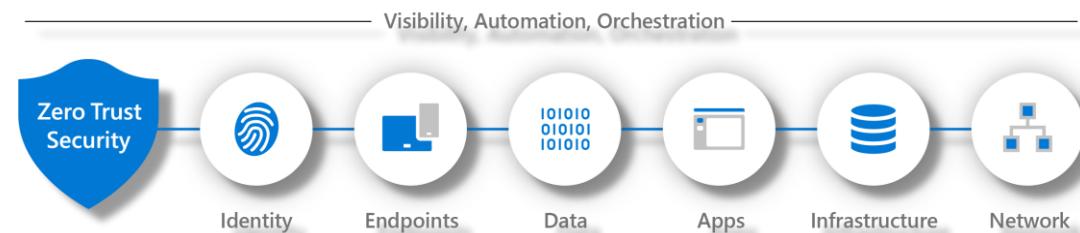
Azure AD Groups

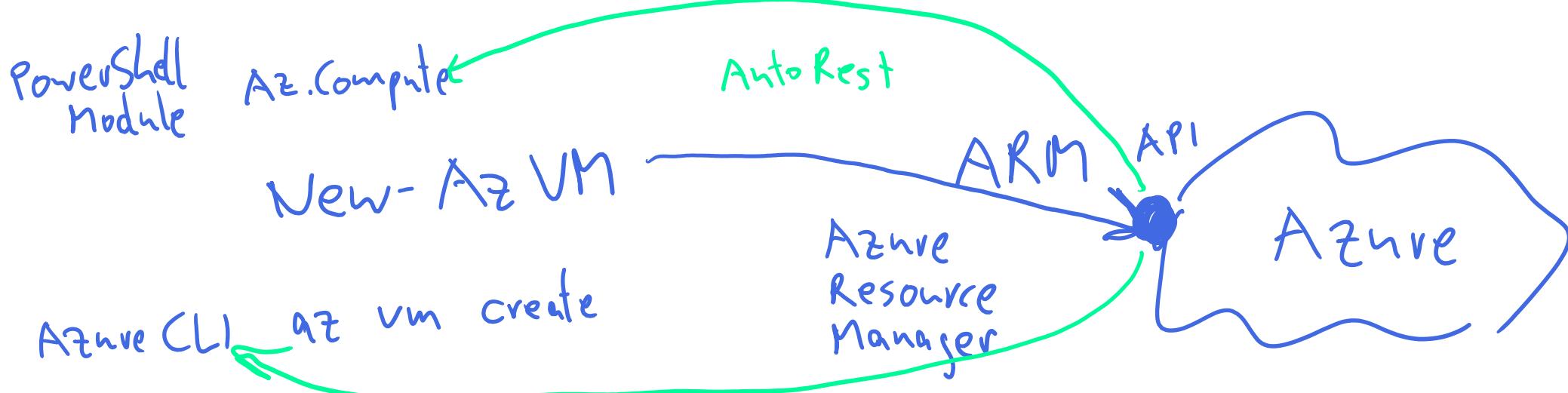
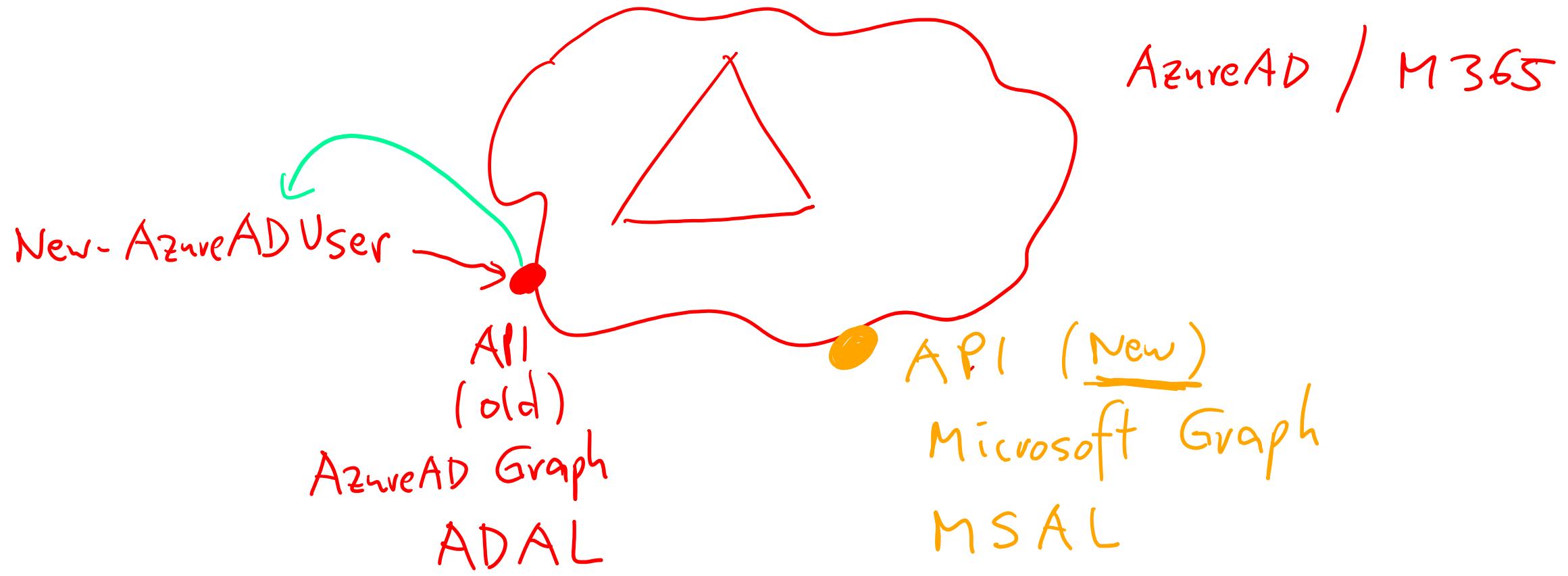
- Azure Active Directory (Azure AD) provides several ways to manage access to resources, applications, and tasks.

- With Azure AD groups, you can grant access and permissions to a group of users instead of each individual user.

- Limiting access to Azure AD resources to only those users who need access is one of the core security principles of Zero Trust.

Name	Object Id	Group type
MDM- policy - All org	b4550b3e-45ae-4f46-ba85-19c5c4412d71	Security
MDM - policy - East	2b8b023a-17b6-410b-84d9-daf447c70f08	Security
MDM policy - North	35d3ba26-23f7-4689-afea-a803586f077c	Security
MDM policy - South	4ef1fe76-3a35-4847-a46f-81369c95bb34	Security
MDM policy - West	8a0cd375-c701-42f4-b074-c54f70a32da0	Security





Administrative Units in Azure AD

The screenshot shows the Azure Active Directory portal interface. At the top, the navigation bar includes 'Home > Default Directory > School of Engineering'. The main title is 'School of Engineering | Users (Preview)'. Below the title, there's a sub-header 'Default Directory - Azure Active Directory'. A search bar labeled 'Search (Ctrl+ /)' is on the left. To its right are buttons for 'Add member', 'Remove member', 'Bulk operations', 'Refresh', and 'Columns'. A message box says 'This page includes previews available for your evaluation. View previews →'. On the left, a sidebar under 'Manage' lists 'Properties', 'Users (Preview)' (which is selected), 'Groups', and 'Roles and administrators'. Below the sidebar is an 'Activity' section with 'Bulk operation results'. In the center, there's a search bar for 'Search users' and a button 'Add filters'. It displays a message '0 users found' and 'Unable to complete due to service connection error. Please try again later.' There are also columns for 'Name', 'User principal name', and 'User type'.

Admin Unit Members

- Users
- Groups

Usage

Delegate administration of AD resources to specific person or role

Configure using

- PowerShell / MS Graph
- Azure AD portal
- M365 Admin Center

Passwordless

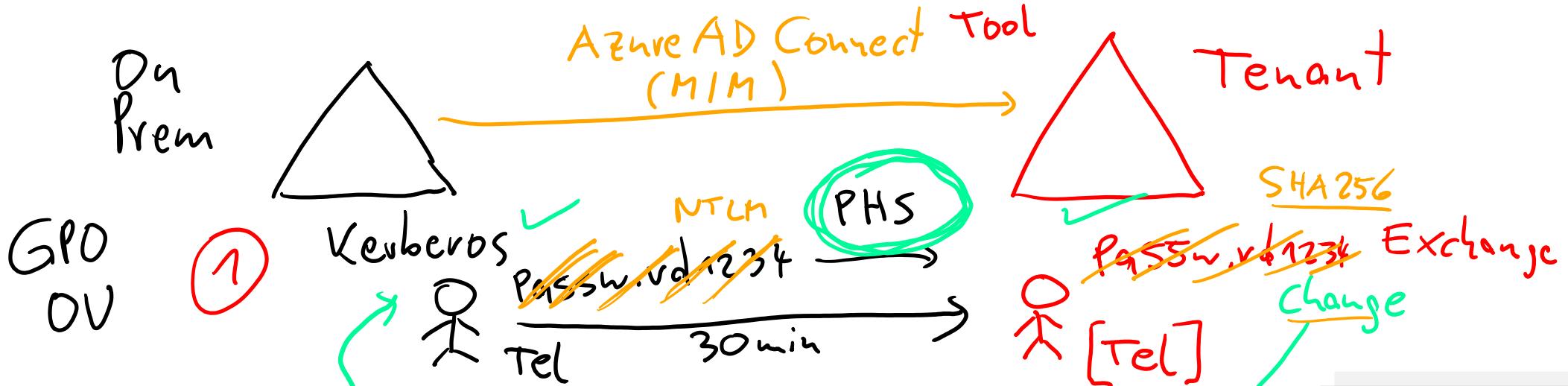
Home > Default Directory > Security >

The screenshot shows the 'Authentication methods | Policies' page in the Azure AD Security section. The left sidebar includes 'Search (Ctrl+ /)', 'Manage' (selected), 'Policies' (highlighted), 'Password protection', 'Monitoring', 'Activity', 'User registration details', and 'Registration and reset events'. The main content area has a 'Got feedback?' button and a note about enabling combined security info registration. It also contains a table of authentication methods:

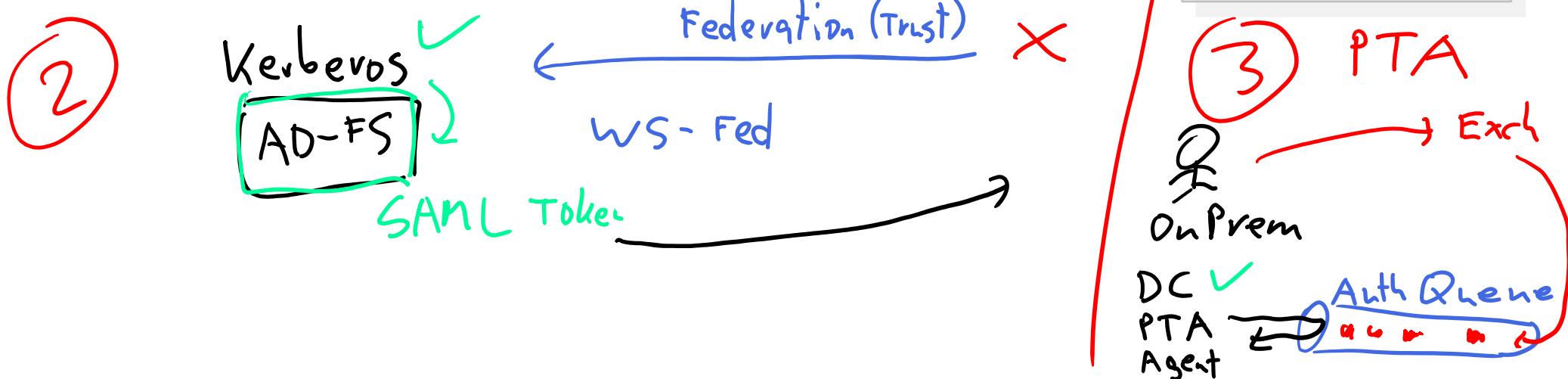
Method	Target	Enabled
FIDO2 Security Key		No
Microsoft Authenticator		No
Text message (preview)		No
Temporary Access Pass (preview)		No

Log in without using a password, ever.

- Increased security
- Better user experience
- More insights with logs and audits



Hybrid Identity



Hybrid Identity

-  Azure AD Connect
-  Azure AD Connect cloud sync
-  Authentication Options
-  Password Hash Synchronization (PHS)
-  Pass-through Authentication (PTA)
-  Federation with Azure AD
-  Authentication Decision Tree
-  Password Writeback

Azure AD Connect

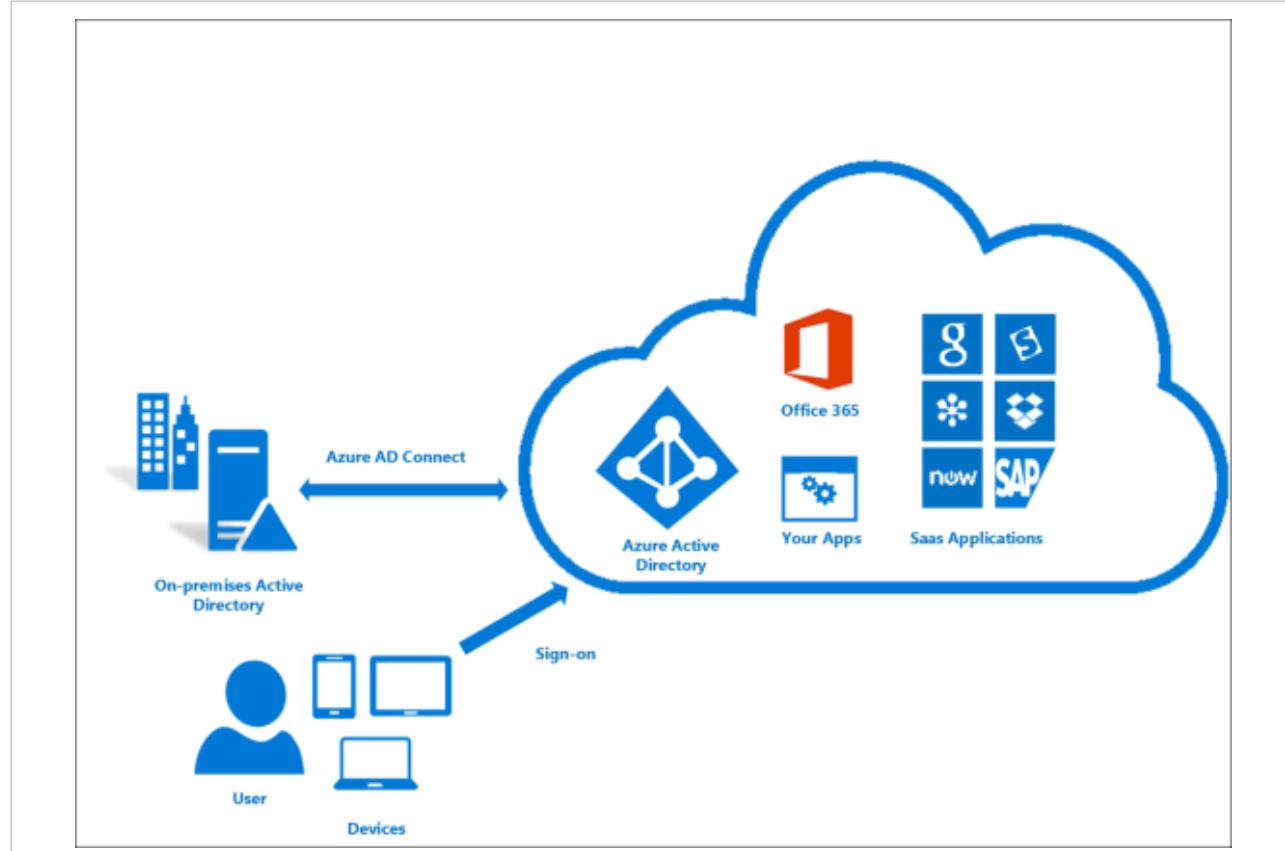
Cloud Sync

SaaS

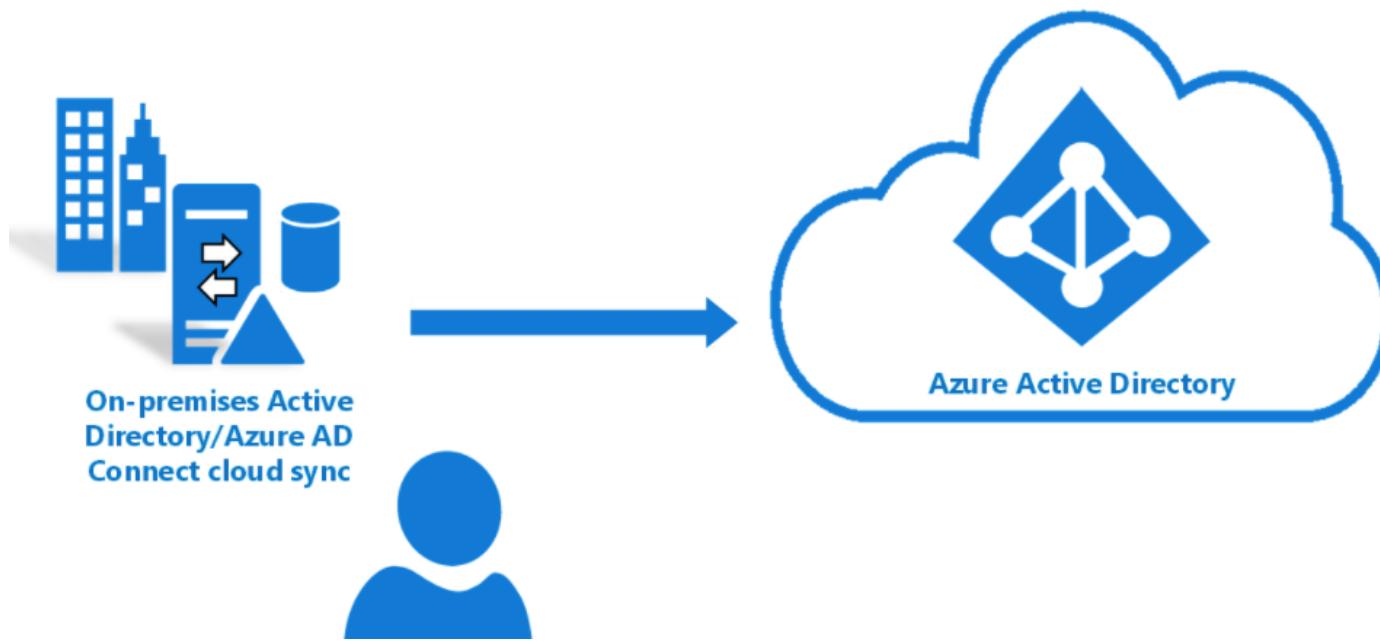
Integrate your on-premises directories with Azure Active Directory

Provides a common identity for your users for Office 365, Azure, and SaaS applications integrated with Azure AD

There are several authentication options to enable hybrid identity



Azure AD Connect Cloud Sync



Alternate method to integrate your on-premises directories with Azure Active Directory

Uses the Azure AD cloud provisioning agent

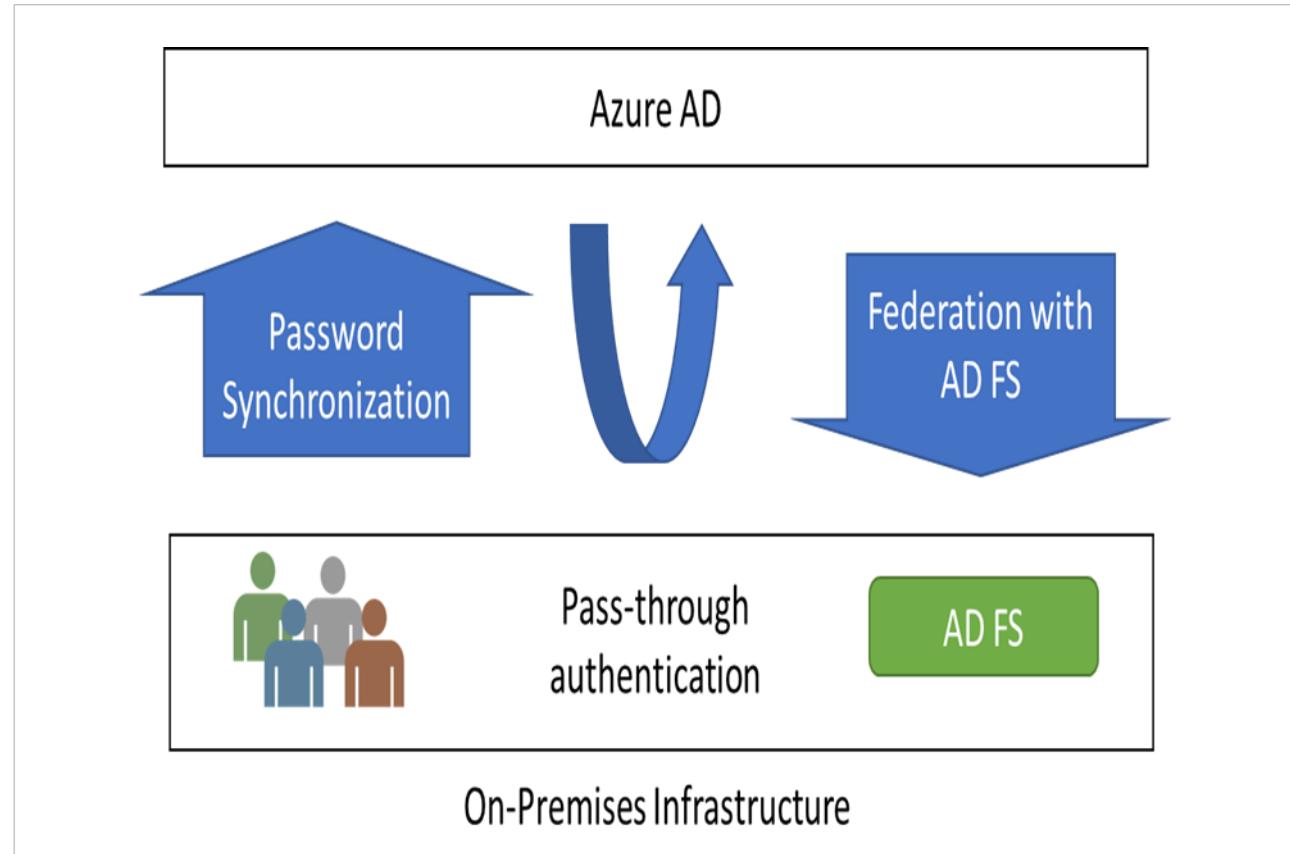
Runs stand-alone or along-side Azure AD Connect

Authentication Options

Password Hash Synchronization (PHS) can synchronize an encrypted version of the password hash for user accounts

Pass-through authentication (PTA) authenticates the username and password with the on-premises domain controllers

AD FS is the Microsoft implementation of an identity federation solution that uses claims-based authentication

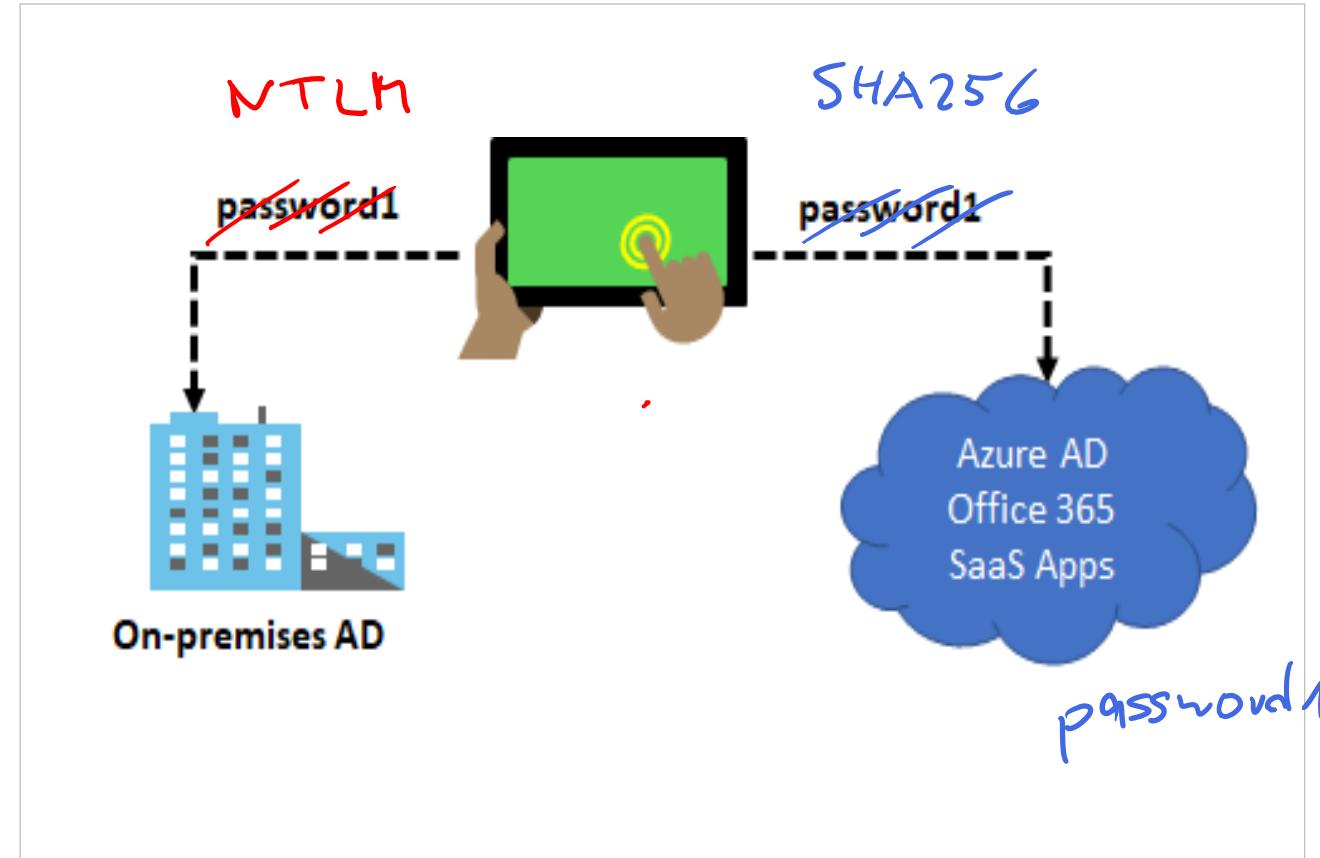


Password Hash Synchronization *

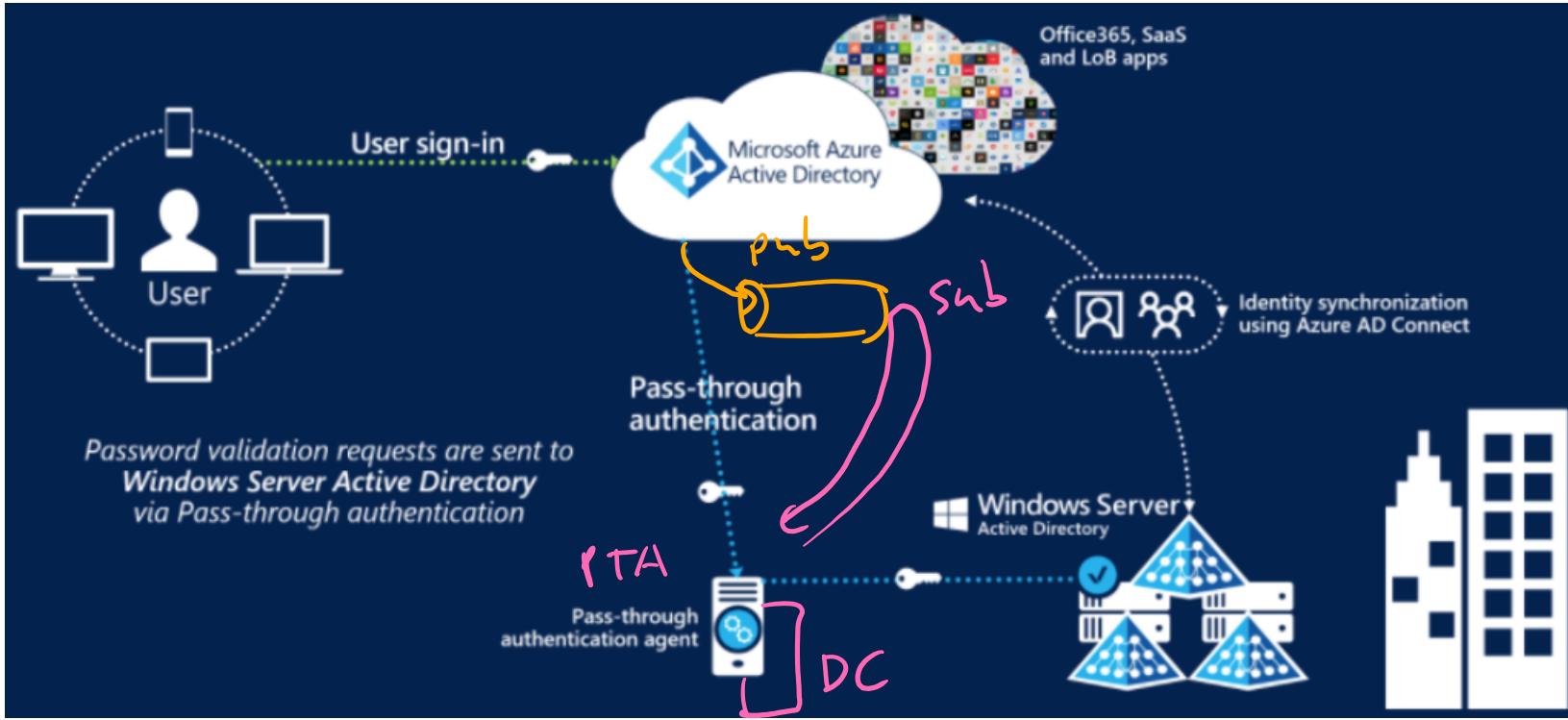
Password hash synchronizes user passwords from on-premises Active Directory to cloud-based Azure AD

Sign into Azure AD services using the on-premises password

Improve the productivity of your users and reduce your helpdesk costs



Pass-through Authentication



Supports user sign-in into all web browser-based applications and into Microsoft Office client applications

Is a free feature and can be enabled via Azure AD Connect

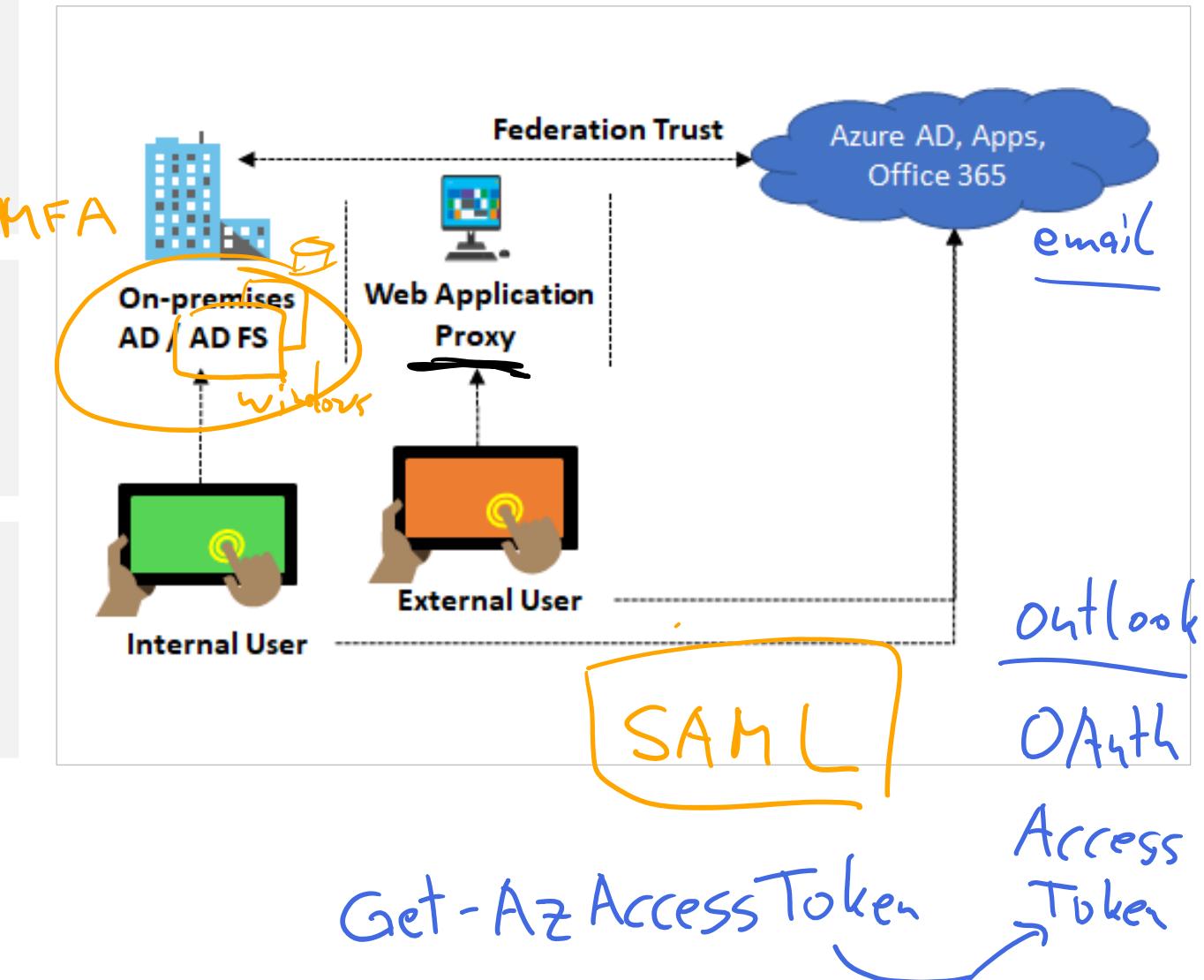
Is not only for user sign-in but allows an organization to use other Azure AD features – MFA and Self-Service Password Reset

Federation with Azure AD

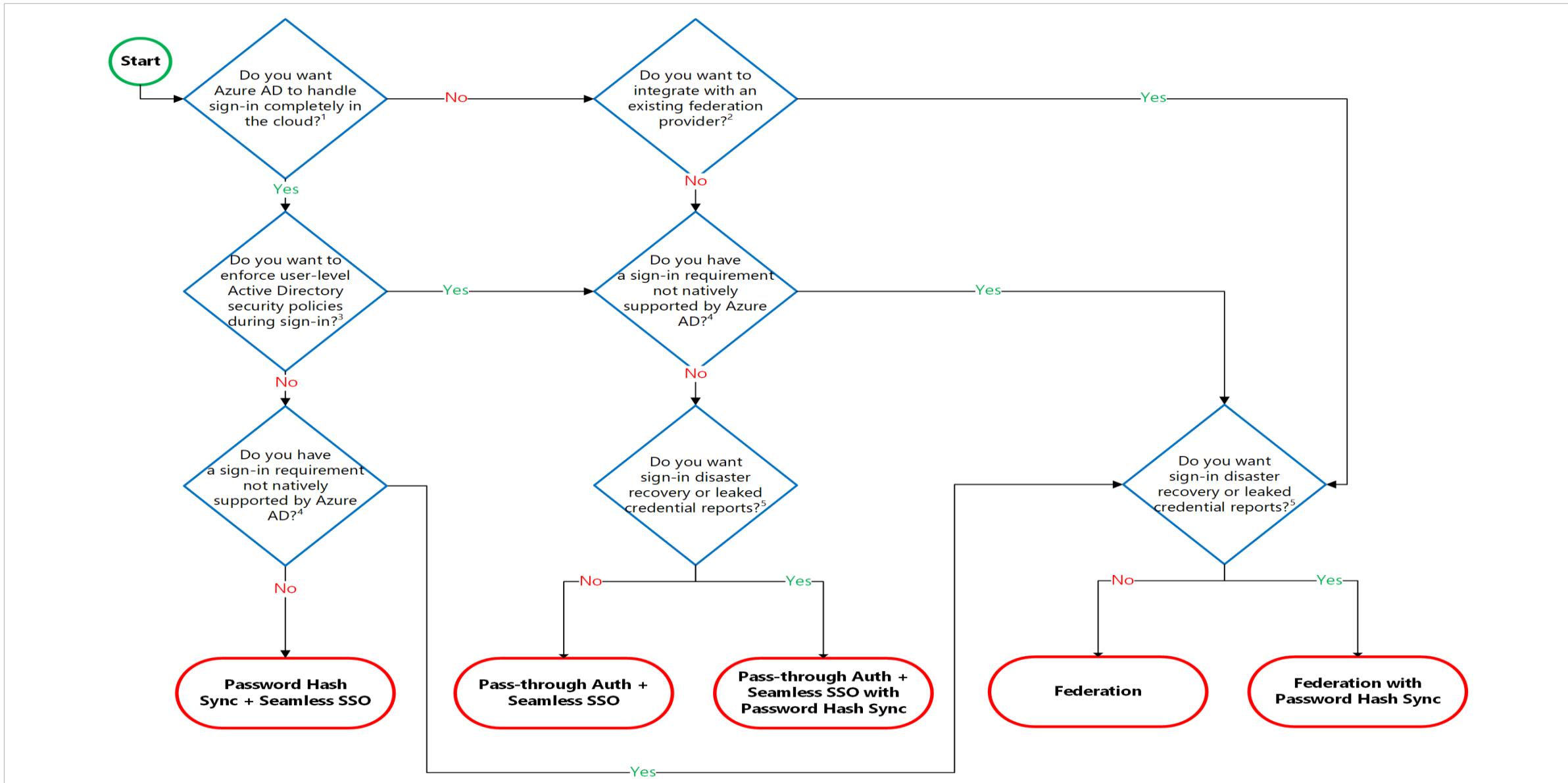
Federation is a collection of domains that have established trust

You can federate your on-premises environment with Azure AD and use this federation for authentication and authorization

This sign-in method ensures that all user authentication occurs on-premises



Authentication Decision Tree



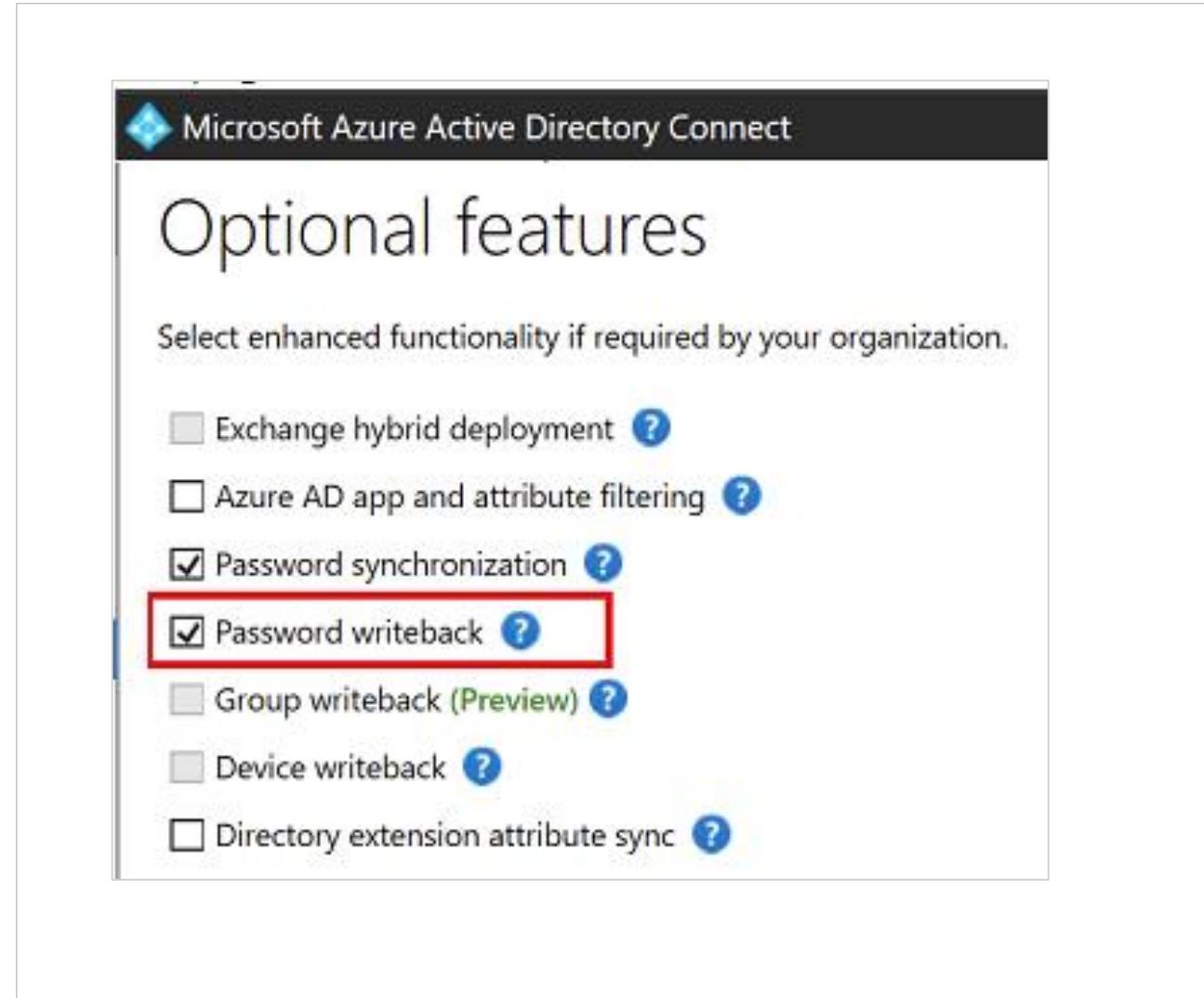
Password Writeback

Use Password Writeback to configure Azure AD to write passwords back to your on-premises Active Directory

A component of Azure AD Connect

Available to subscribers of Premium Azure Active Directory editions

Removes the need to set up and manage an on-premises SSPR solution



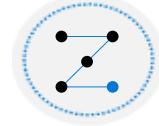
Azure AD Identity Protection



Azure AD Identity Protection



Azure AD Identity Protection



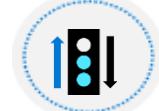
Risk Events



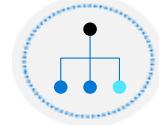
User Risk Policy



Sign-in Risk Policy



Azure MFA concepts



Azure AD Conditional Access Policies
CA



Conditions



Access Reviews

SMS

Tel
Auth App
FIDO Token
123456

passwordless
Hello Biometric

Azure AD Identity Protection Features

CA Policies
Templates

The screenshot shows three separate policy configuration pages side-by-side, each representing a template for identity protection:

- Multifactor authentication registration policy:** This policy applies to all users and requires Azure MFA registration. It includes a note that the policy only affects cloud-based Azure MFA and not MFA Server. The "Enforce Policy" switch is set to "On".
- User risk remediation policy:** This policy applies to all users and requires password change based on user risk conditions. It includes a "Review" section showing estimated impact and number of users impacted. The "Enforce Policy" switch is set to "Off".
- Sign-in risk remediation policy:** This policy applies to all users and requires multi-factor authentication based on sign-in risk conditions. It includes a "Review" section showing estimated impact and number of sign-ins impacted. The "Enforce Policy" switch is set to "Off".

Automate the detection and remediation of identity-based risks

Investigate risks using data in the portal

Export risk detection data to third-party utilities for further analysis

Azure Identity Protection Risk Events

Each detected suspicious action is stored in a record called a risk event

Leaked credentials

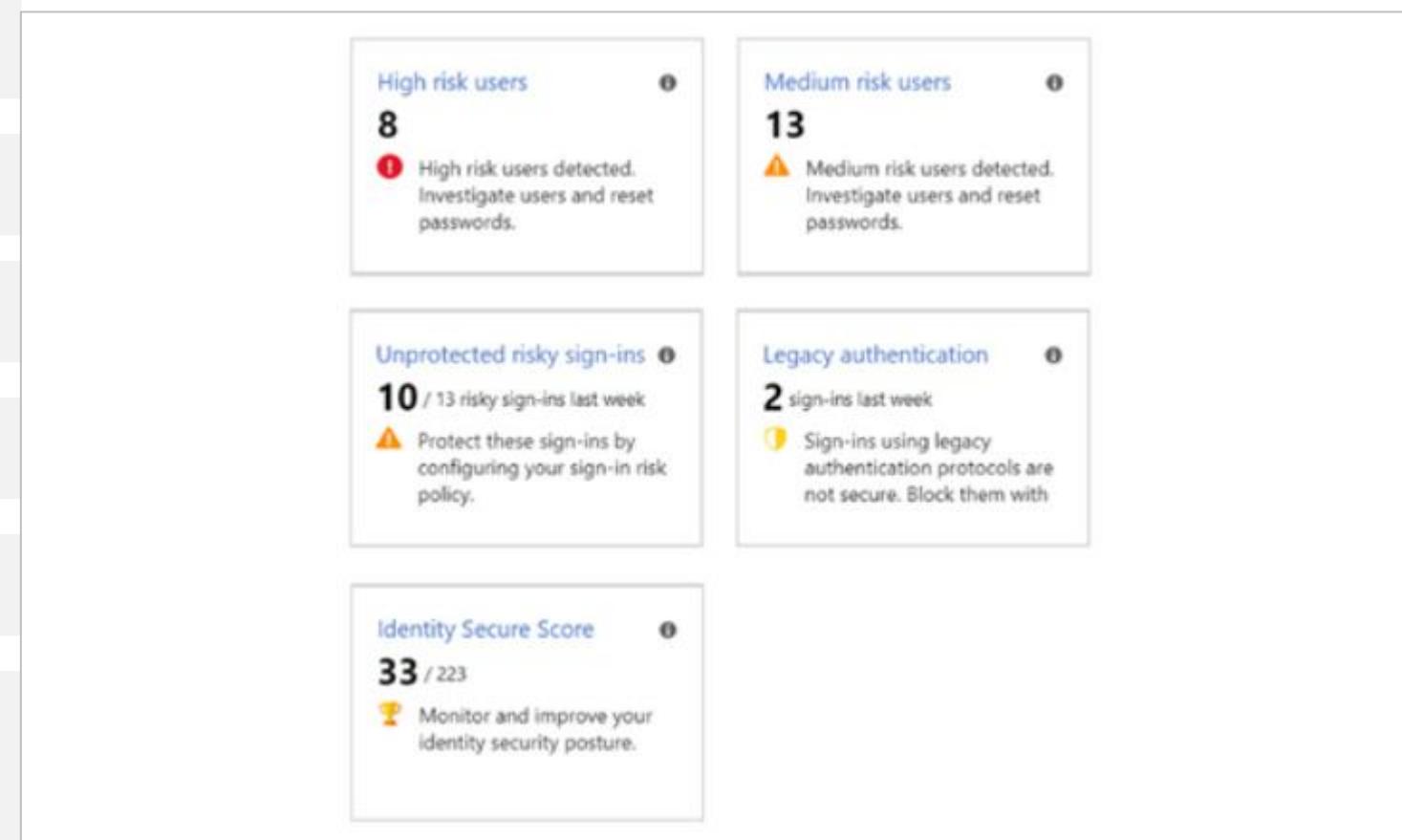
Sign in from anonymous IP addresses

Impossible travel to atypical locations

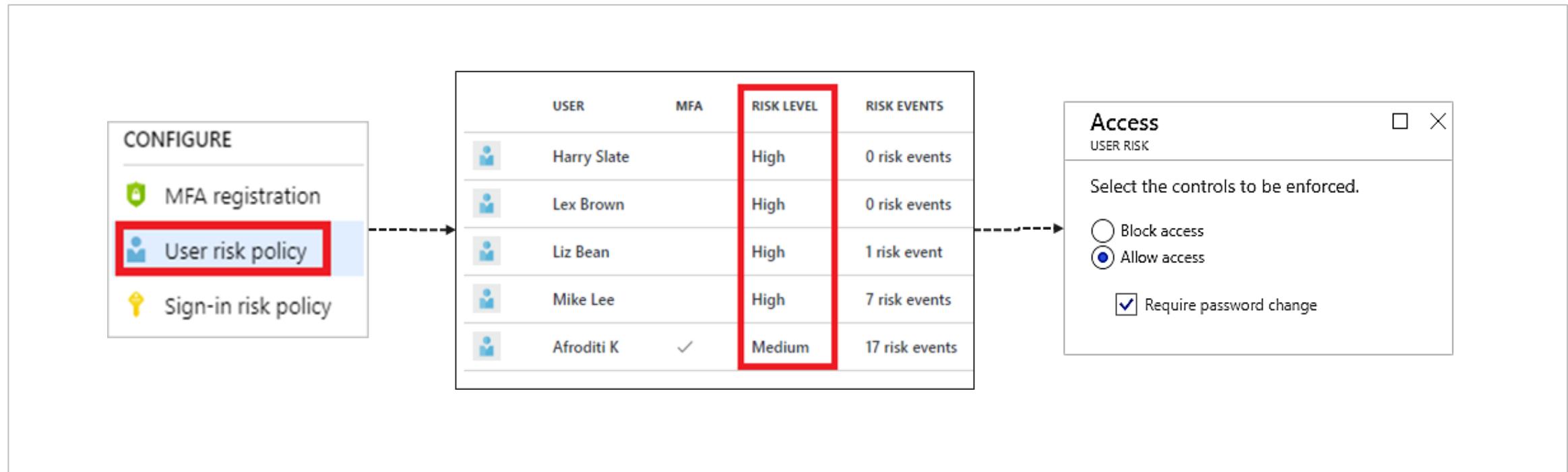
Sign in from unfamiliar locations

Sign in from infected devices

Sign in from IP addresses with
suspicious activity



User Risk Policy



Applied to user sign-ins

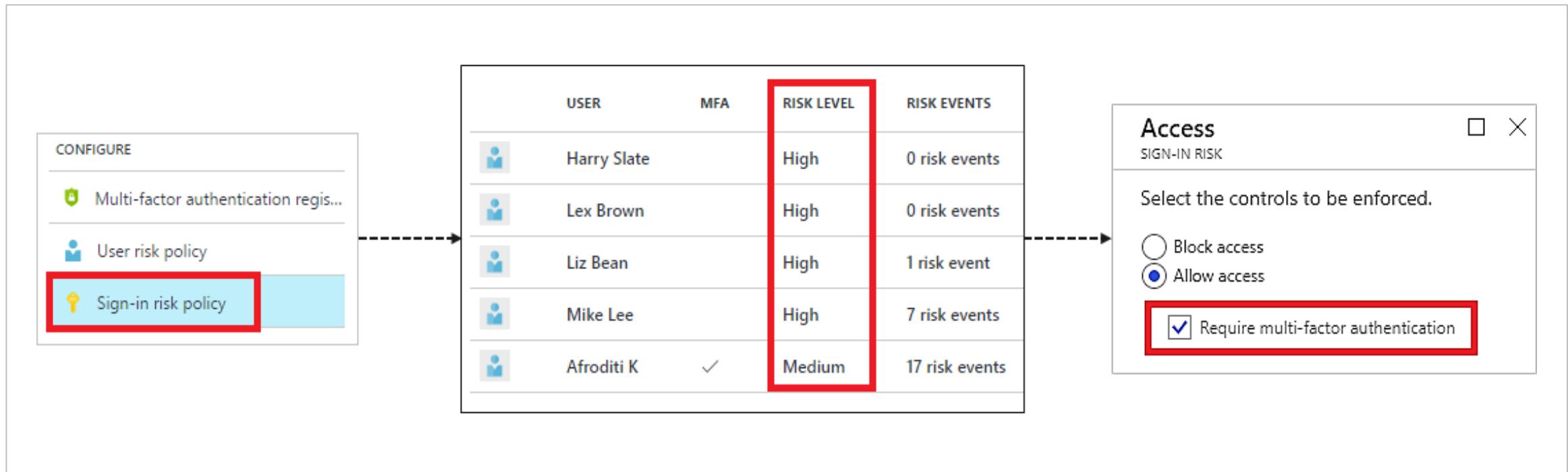
Automatically respond
based on a specific user's
risk level

Provide the condition (risk
level) and action (block or
allow)

Use a high threshold during
policy roll out

Use a low threshold for
greater security

Sign-in Risk Policy



Applied to all browser traffic and sign-ins using modern authentication

Provide the condition (risk level) and action (block or allow)

Automatically respond to a specific risk level

Target all policies to specific users – omit certain types of users

Azure MFA Concepts

The security of MFA two-step verification lies in its layered approach

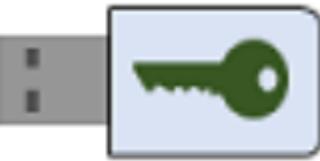
Authentication methods include:

- Something you know (typically a password)
- Something you have (a trusted device that is not easily duplicated, like a phone)
- Something you are (biometrics)

Username

test@xxx.com

Password



Enabling MFA

per user MFA

Select the users that you want to modify and enable for MFA

User states can be Enabled, Enforced, or Disabled

On first-time sign-in, after MFA has been enabled, users are prompted to configure their MFA settings

Azure MFA is included free of charge for global administrator security

The screenshot shows the 'multi-factor authentication' service settings page for 'users'. At the top, there's a note about licensing and a deployment guide. Below that, there are search and filter options ('View: Sign-in allowed users', 'Multi-Factor Auth status: Any') and a 'bulk update' button. A table lists five users:

DISPLAY NAME	USER NAME	MULTI-FACTOR AUTH STATUS
Adam Barr	AdamB@contoso.com	Disabled
Alice Ciccu	AliceC@contoso.com	Disabled
Amy Rusko	AmyR@contoso.com	Disabled
Ann Beebe	AnnB@contoso.com	Disabled
Ben Smith	BenS@contoso.com	Disabled

Annotations on the right side of the table include '3 selected' above the first two rows, 'quick steps' above the 'Enable' link, and a red circle and arrow pointing to the 'Disabled' status of the last row, with a 'Manage user settings' link below it.

MFA Settings

Account Lockout – temporarily lock accounts if too many denied authentication attempts occur.

Block/Unblock Users – block specific users from being able to receive MFA requests.

Fraud Alerts - Users can report fraudulent attempts to access their resources

The screenshot shows the Microsoft Azure portal interface. At the top, there's a blue header bar with the Microsoft Azure logo, a search bar containing 'Search resources, services, and docs (G+)', and three icons: a square, a document, and a bell. Below the header, the breadcrumb navigation shows 'Home > Contoso > Security > Multi-Factor Authentication | Getting started'. The main title is 'Multi-Factor Authentication | Getting started' with a rocket icon. On the left, a sidebar menu has 'Getting started' (with a rocket icon) highlighted in grey, while 'Diagnose and solve problems' (with a cross icon) is unselected. A red rectangular box highlights the 'Settings' section, which contains the following items: 'Account lockout', 'Block/unblock users', 'Fraud alert', 'Notifications', 'OATH tokens', 'Phone call settings', and 'Providers'. To the right of the sidebar, there's a 'Got feedback?' button with a heart icon. The main content area on the right includes a section titled 'Azure Multi-Factor Authentication' with the sub-instruction 'Use MFA to protect your users and data.', a 'Configure' section with 'Additional cloud-based MFA settings', and a 'Learn more' section with links to 'Deploy cloud-based Azure Multi-Factor Authentication', 'Configure Azure Multi-Factor Authentication', 'What is conditional access in Azure Active Directory?', and 'Best practices for conditional access in Azure Active Directory'.

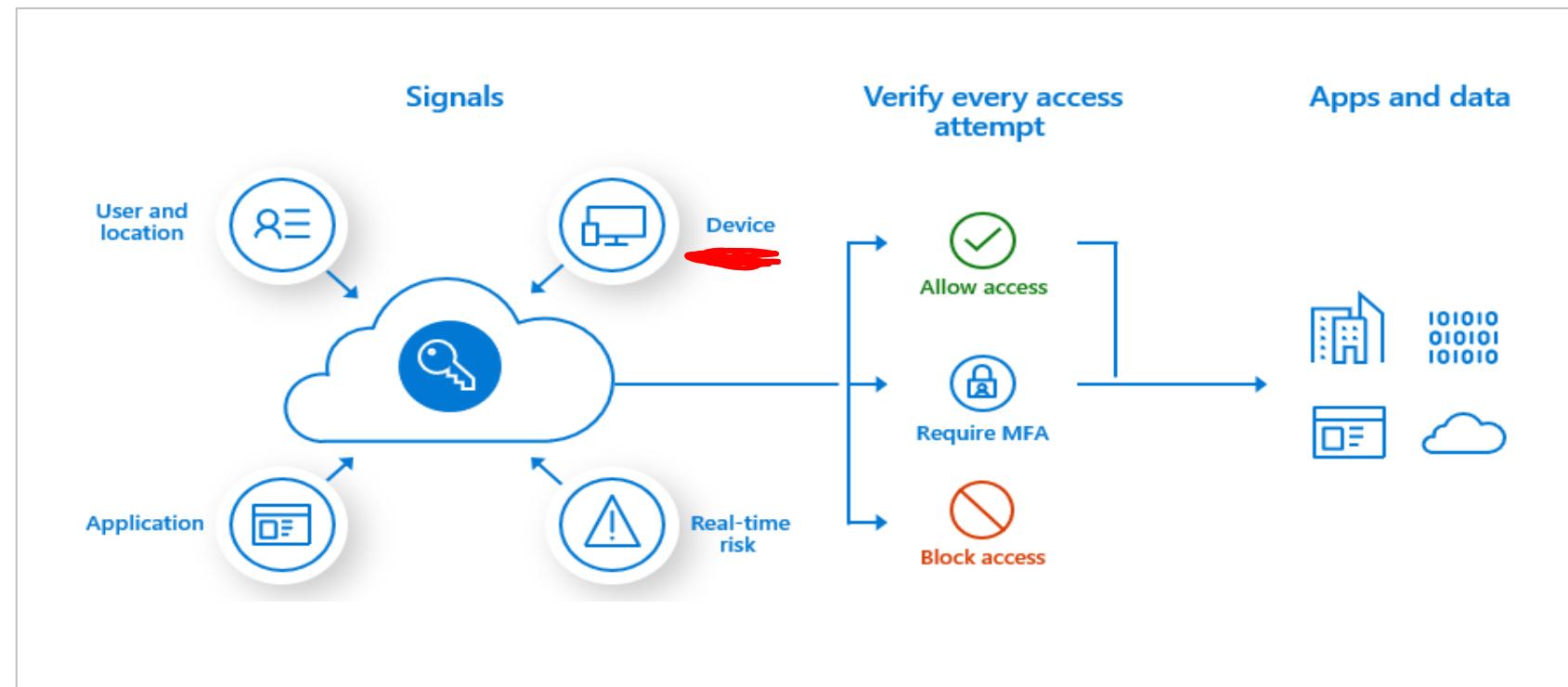
Azure AD Conditional Access

Identity management is the new control plane

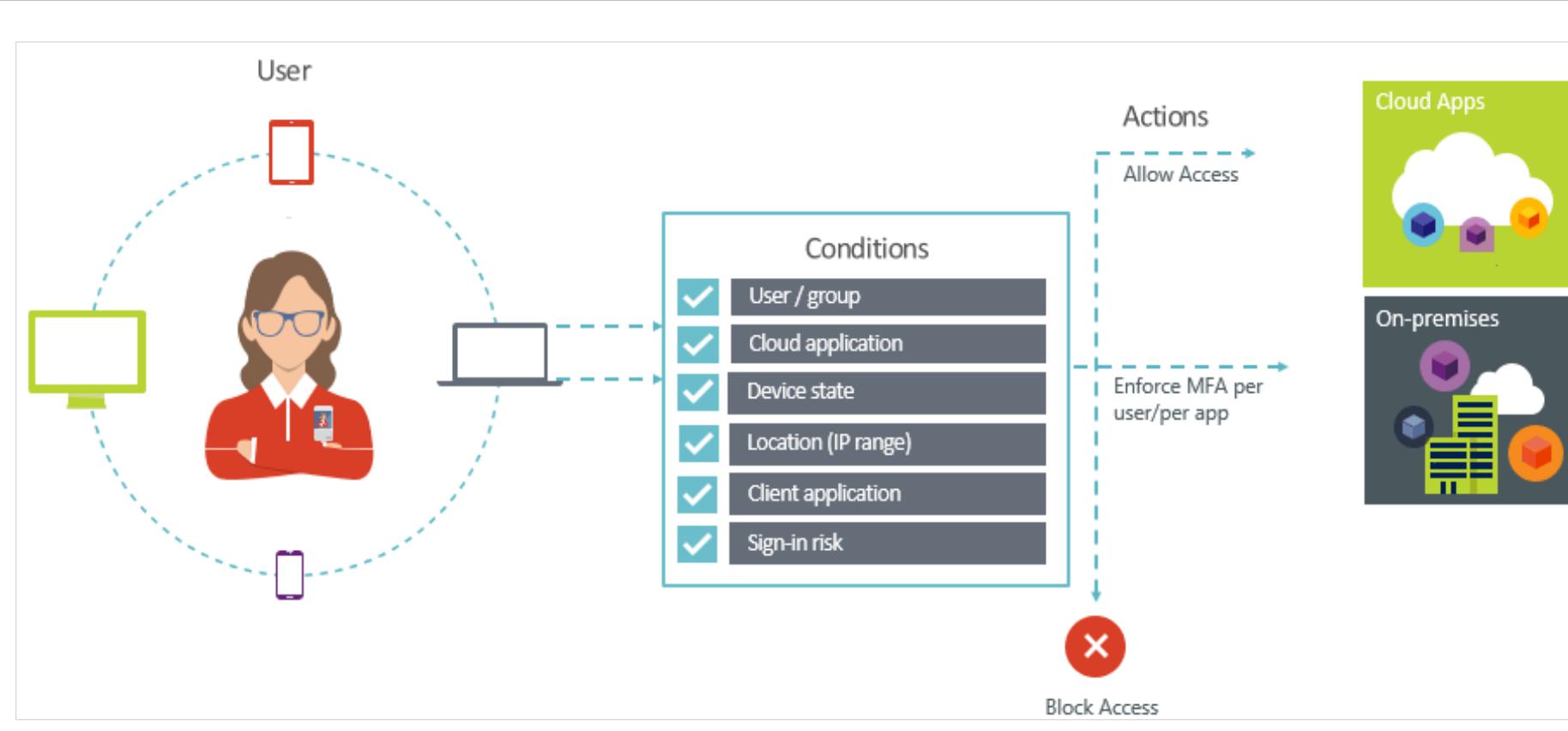
Use signals to make an informed decision

Base the decision on organizational policy

Enforce the decision across resources



Conditions



Conditions –
“When this happens”

Access controls –
“Then do this”

Provides two step authentication verification

Lets you enforce controls on access to apps based on specific conditions

Access Reviews

Enable organizations to recertify group memberships, application access, and privileged role assignments

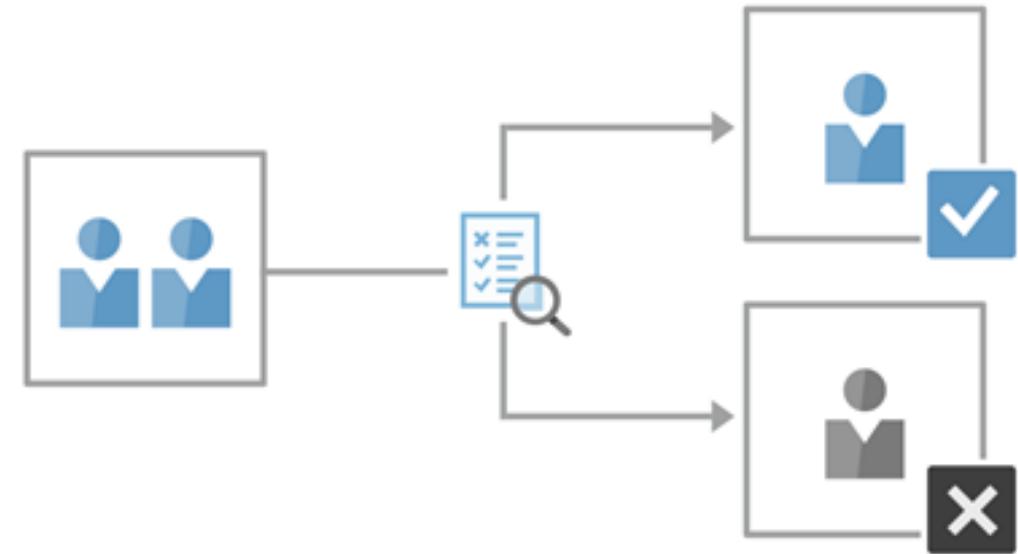
Evaluate guest user access

Evaluate employee access to applications and group membership

Track reviews for compliance or risk-sensitive applications

Evaluate the role assignment of administrative users (PIM)

Premium P2 license – Global admins or User Admins membership



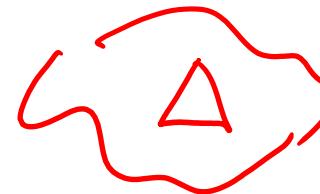
Workflow

Request

Approve Approver
 奔驰奔驰

Global Admin

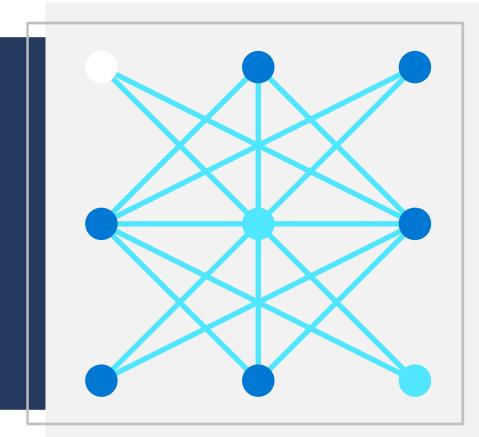
:



M365
EXO
SP
Teams

PIM DIT 6h

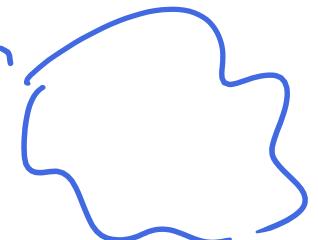
Privileged Identity Management



6h

Owner

Subscription



Azure

OVH

Privileged Identity Management (PIM)



Microsoft's Zero Trust Model



Microsoft Identity Management Evolution



PIM Features



PIM Scope



PIM Onboarding

Eligible



PIM Configuration Settings

Roles



PIM Workflow

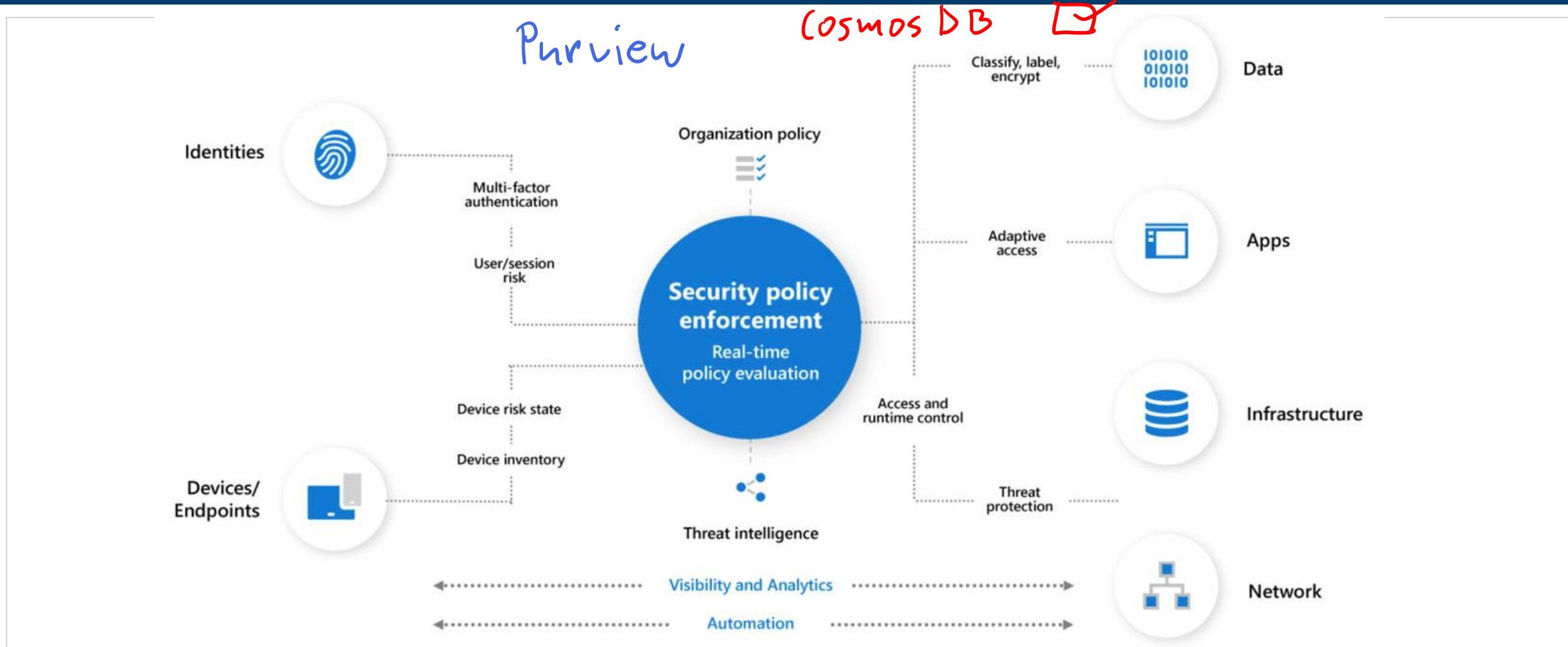


Microsoft's Zero Trust Model

Always authenticate
Assume breach



Assume breach and verify each request as though it originates from an open network



Microsoft Identity Management Evolution

\$ 10^9

We recommend Azure AD Privileged Identity Management as the service to help protect your privileged accounts

Traditional

- On-premises identity provider is in use
- No SSO is present between cloud and on-premises apps
- Visibility into identity risk is very limited

Advanced

- Cloud identity federates with on-premises system
- Conditional access policies gate access and provide remediation actions
- Analytics improve visibility

Optimal

- Password less authentication is enabled
- User, device, location and behavior is analyzed in real time to determine risk and deliver ongoing protection
- MFA is enforced

Azure AD Privileged Identity Management (PIM)

Access Package Groups

Time-based and approval-based role activation for privileged users

Just-in-time privileged access
to Azure

4h

1 Jahr



Time-bound access to
resources

Approval to activate privileged
roles



Multi-factor authentication to
activate any role

→

Justification to understand why
users activate

Notifications when privileged
roles are activated

Access reviews to ensure users
still need roles

Audit history for internal or
external audit

PIM Scope

Azure AD Roles

Assign users to a role – users must elevate to use the privileges granted by the role

Prioritize protecting Azure AD roles that have the greatest number of permissions

Azure resources

Identify the management groups and subscriptions

Resources most vital for your organization or host the most sensitive data

Resources that core, customer-facing applications depend on - PIM will help you discover these resources

Privileged Identity Management

Privileged Identity Management

Manage

Azure AD roles

Azure resources

Tenant

Azure Owner
Contributor

Which Azure AD roles and resources should be protected with PIM?

PIM Onboarding

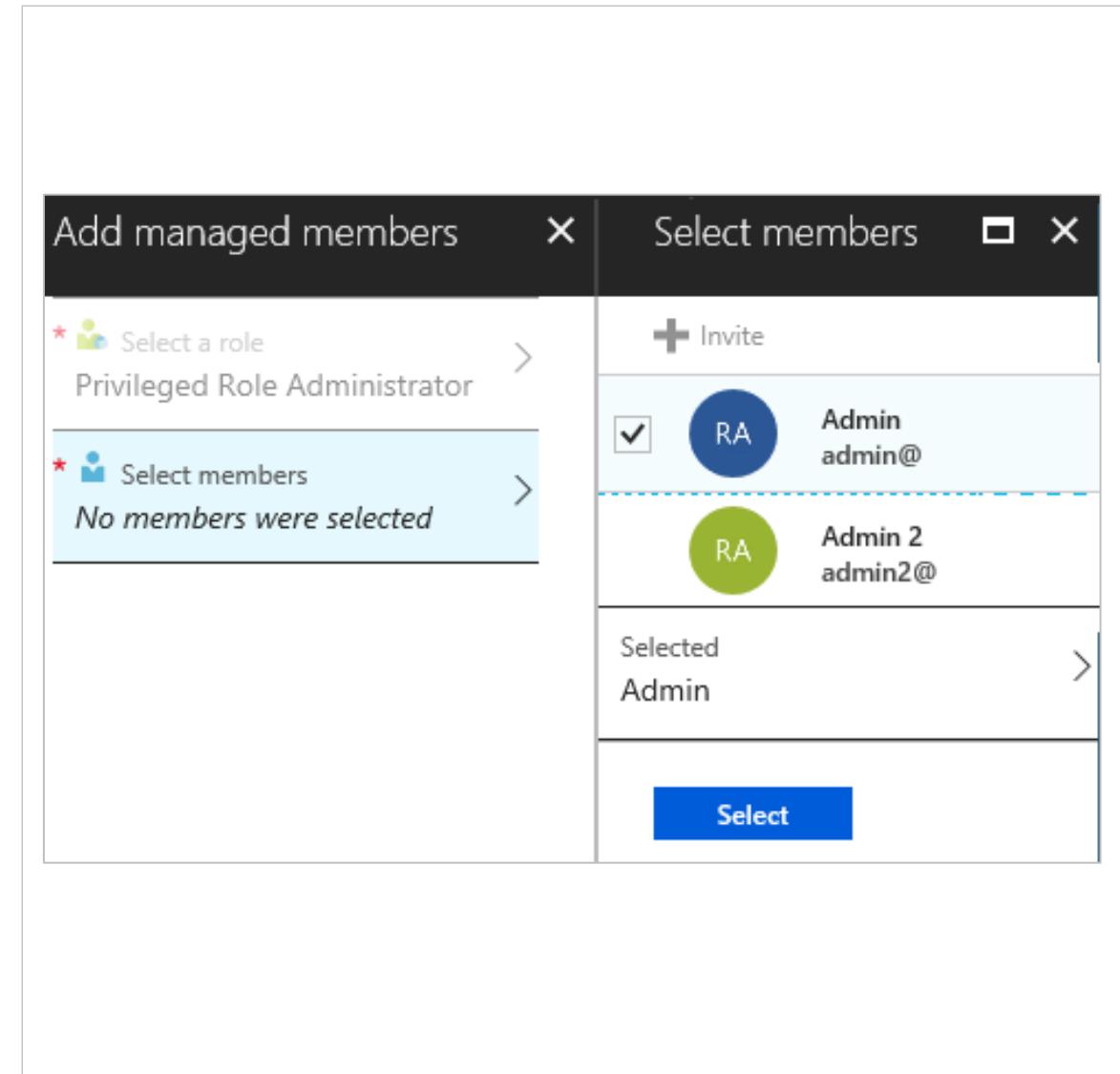
PIM automatically enable when a privileged role goes into **PIM** or **Roles and Administrators**

The Global administrator (first user) who enables PIM gets write access

The first user can assign others to the Privileged Role Administrator

Global administrators (not first user), Security administrators, and Security readers have read-only access

Ensure there are always at least two Privileged Role Administrators



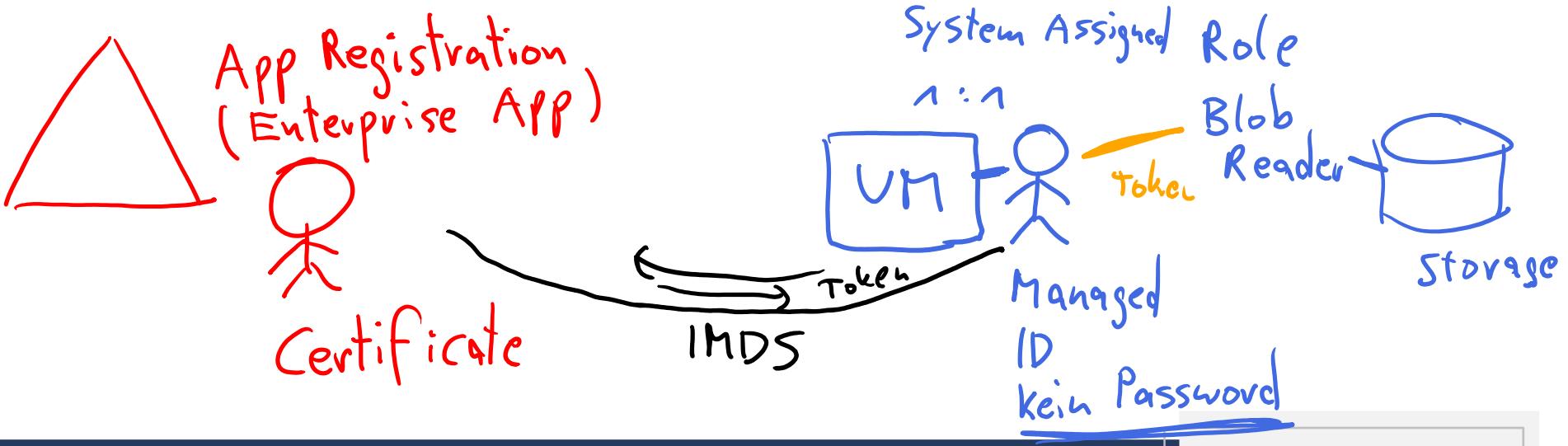
PIM Configuration Settings

Settings can be different for Azure AD roles and Azure resources

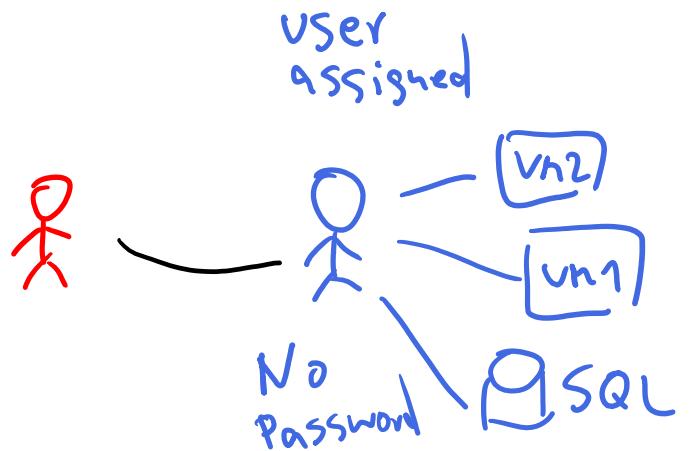
Activation	Assignment	Notifications
<p>Activation maximum duration (hours)</p> <p>0 <input type="text" value="1"/> 1</p> <p>On activation, require <input checked="" type="radio"/> Azure MFA <input type="radio"/> None</p> <p><input checked="" type="checkbox"/> Require justification on activation <input type="checkbox"/> Require ticket information on activation <input type="checkbox"/> Require approval to activate</p> <p>Select approver(s) <input type="button" value=">"/> No approver selected</p>	<p><input checked="" type="checkbox"/> Allow permanent eligible assignment Expire eligible assignments after <input type="text" value="1 Year"/> ▾</p> <p><input checked="" type="checkbox"/> Allow permanent active assignment Expire active assignments after <input type="text" value="6 Months"/> ▾</p> <p><input type="checkbox"/> Require Azure Multi-Factor Authentication <input checked="" type="checkbox"/> Require justification on active assignment</p>	<p>Send notifications when members are assigned as eligible to this role:</p> <p>Role assignment alert <input checked="" type="checkbox"/> Admin Notification to the assigned user (assignee) <input checked="" type="checkbox"/> Assignee Request to approve a role assignment renewal/... <input checked="" type="checkbox"/> Approver</p> <p>Send notifications when members are assigned as active to this role:</p> <p>Role assignment alert <input checked="" type="checkbox"/> Admin Notification to the assigned user (assignee) <input checked="" type="checkbox"/> Assignee Request to approve a role assignment renewal/... <input checked="" type="checkbox"/> Approver</p> <p>Send notifications when eligible members activate this role:</p> <p>Role activation alert <input checked="" type="checkbox"/> Admin Notification to activated user (requestor) <input checked="" type="checkbox"/> Requestor Request to approve an activation <input checked="" type="checkbox"/> Approver</p>

PIM Workflow

PIM Administrator		PIM User	PIM Approver	PIM Administrator
Plan	Assign	Activate	Approve	Audit
Determine users and roles that will be managed by PIM.	Assign users or current admins as eligible admins for specific Azure AD roles, so they only have access when necessary.	Activate your eligible admin roles so they can get limited access to the privileged identity.	View and approve all activation requests for specific Azure AD roles that you are configured to approve.	View and export a history of all privileged identity assignments and activations so you can identify attacks and stay compliant.



Application Security



(E2) Instance Meta Data Service
AWS

Application Security



Microsoft Identity Platform



Azure AD Application Scenarios



App Registration



Microsoft Graph Permissions



Managed Identities



Web App Certificates

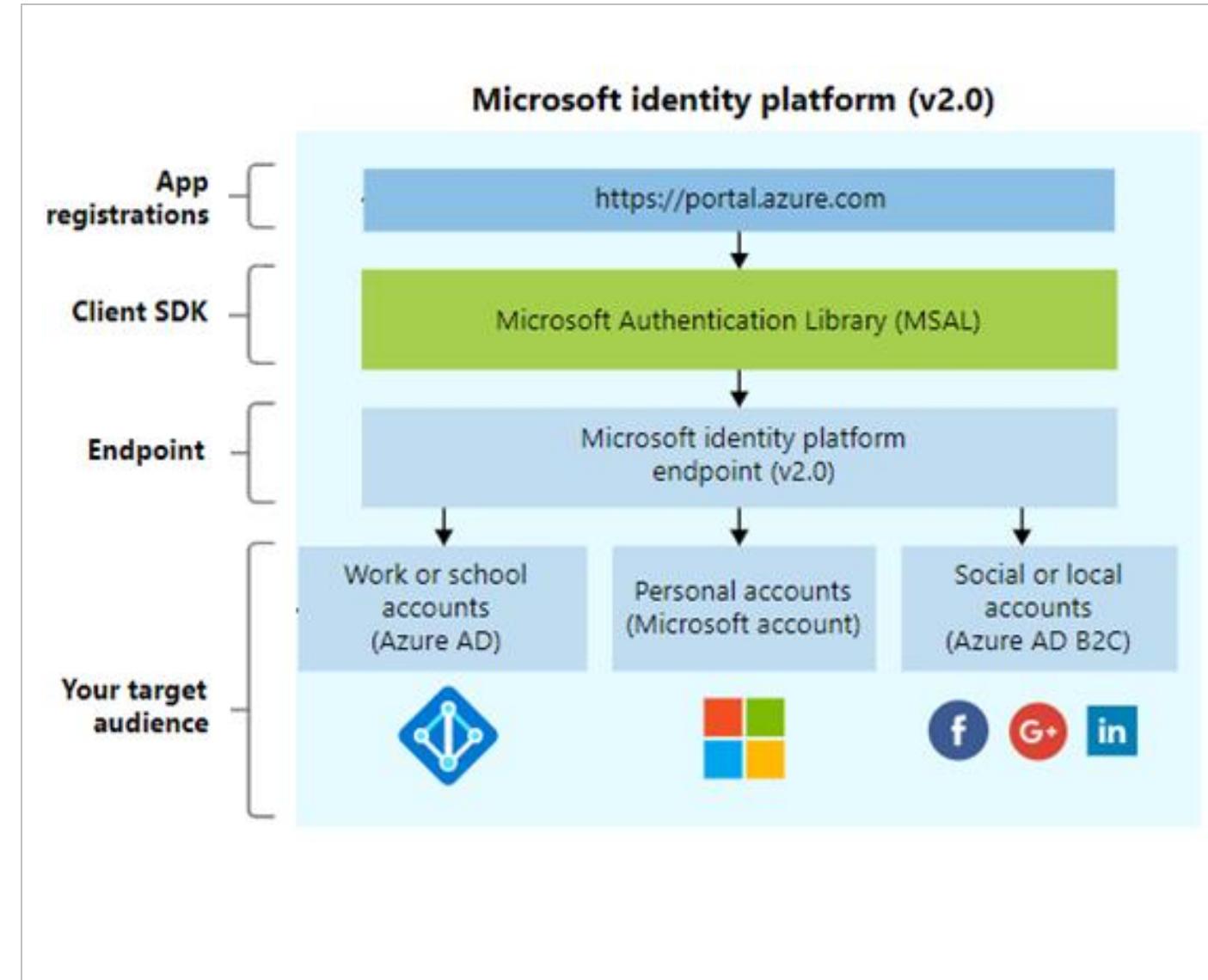
Microsoft Identity Platform

Write code once and authenticate any Microsoft identity into your application

Simple to use, provides a single sign-on experience

Use the portal to register and configure your application

Use the Microsoft Graph API for programmatic application configuration



Azure AD Application Scenarios

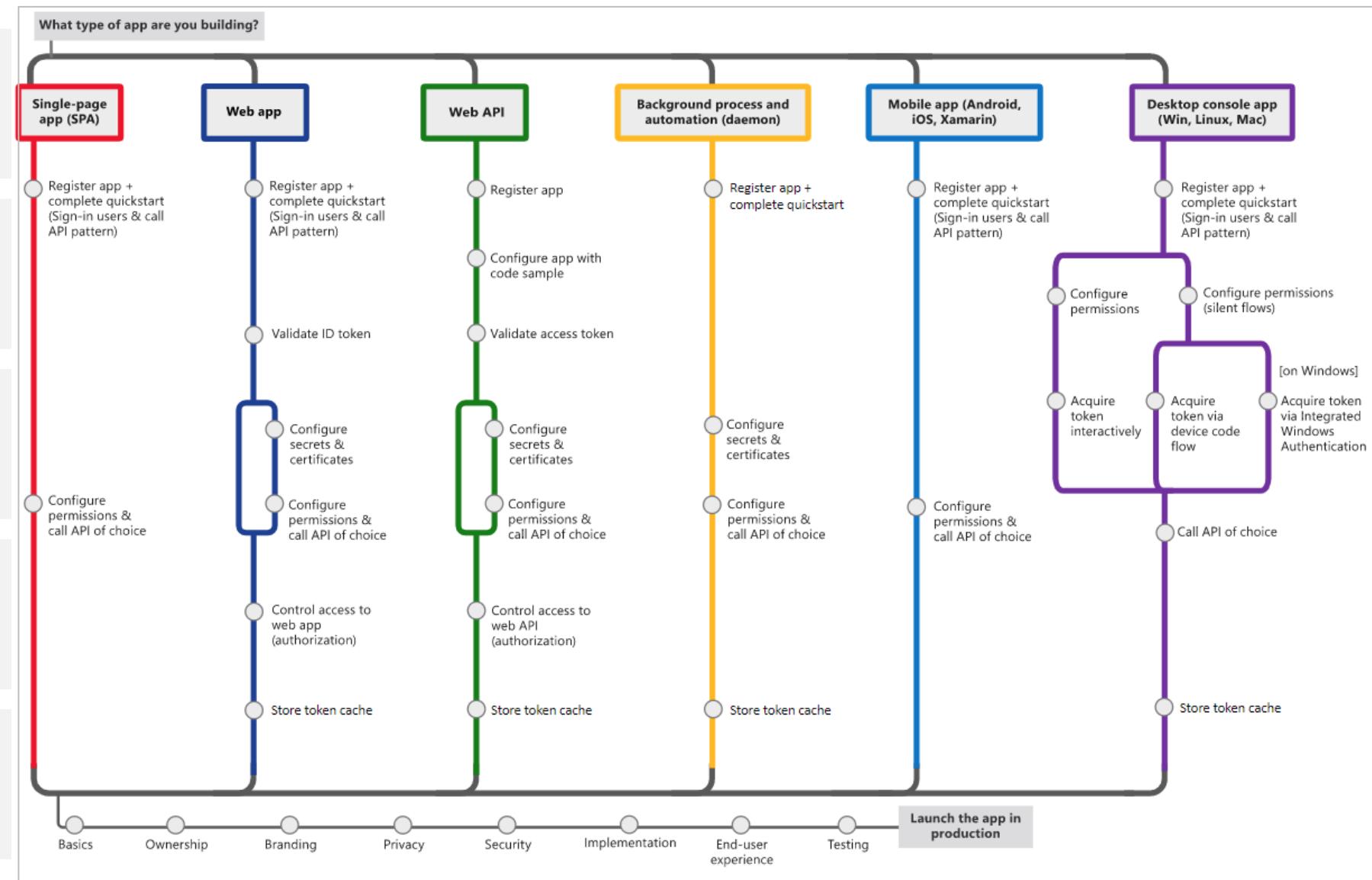
Single page frontends
that run in a browser

Web browser to a web
application

Web API on behalf of a
user

Web applications that
need resources from a
web API

Daemon or server
application that needs
resources from a web API



App Registration

Any application that outsources authentication to Azure AD must be registered in a directory

Registration creates token information including a unique application id.

Home > App registrations >

Register an application

⚠️ If you are building an application for external users that will be distributed by Microsoft, you must register as a first party application to meet all security, privacy, and compliance policies. [Read our decision guide ↗](#)

* Name

The user-facing display name for this application (this can be changed later).

Supported account types

Who can use this application or access this API?

Accounts in this organizational directory only (Microsoft only - Single tenant)
 Accounts in any organizational directory (Any Azure AD directory - Multitenant)
 Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
 Personal Microsoft accounts only

[Help me choose...](#)

Redirect URI (optional)

We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.

Web e.g. <https://example.com/auth>

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

By proceeding, you agree to the Microsoft Platform Policies [↗](#)

Register

Microsoft Graph Permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process

Delegated permissions are used by apps that have a signed-in user present

Application permissions are used by apps that run without a signed-in user present

Request API permissions

Select an API

[Microsoft APIs](#) [APIs my organization uses](#) [My APIs](#)

Commonly used Microsoft APIs

Microsoft Graph



Take advantage of the tremendous amount of data in Office 365, Enterprise Mobility + Security, and Windows 10. Access Azure AD, Excel, Intune, Outlook/Exchange, OneDrive, OneNote, SharePoint, Planner, and more through a single endpoint.

Azure Batch



Schedule large-scale parallel and HPC applications in the cloud

Azure Data Catalog



Programmatic access to Data Catalog resources to register, annotate and search data assets

Azure Data Explorer



Perform ad-hoc queries on terabytes of data to build near real-time and complex analytics solutions

Azure Data Explorer (with Multifactor Authentication)



Perform ad-hoc queries on terabytes of data to build near real-time and complex analytics solutions

Azure Key Vault



Manage your key vaults as well as the keys, secrets, and certificates within your Key Vaults

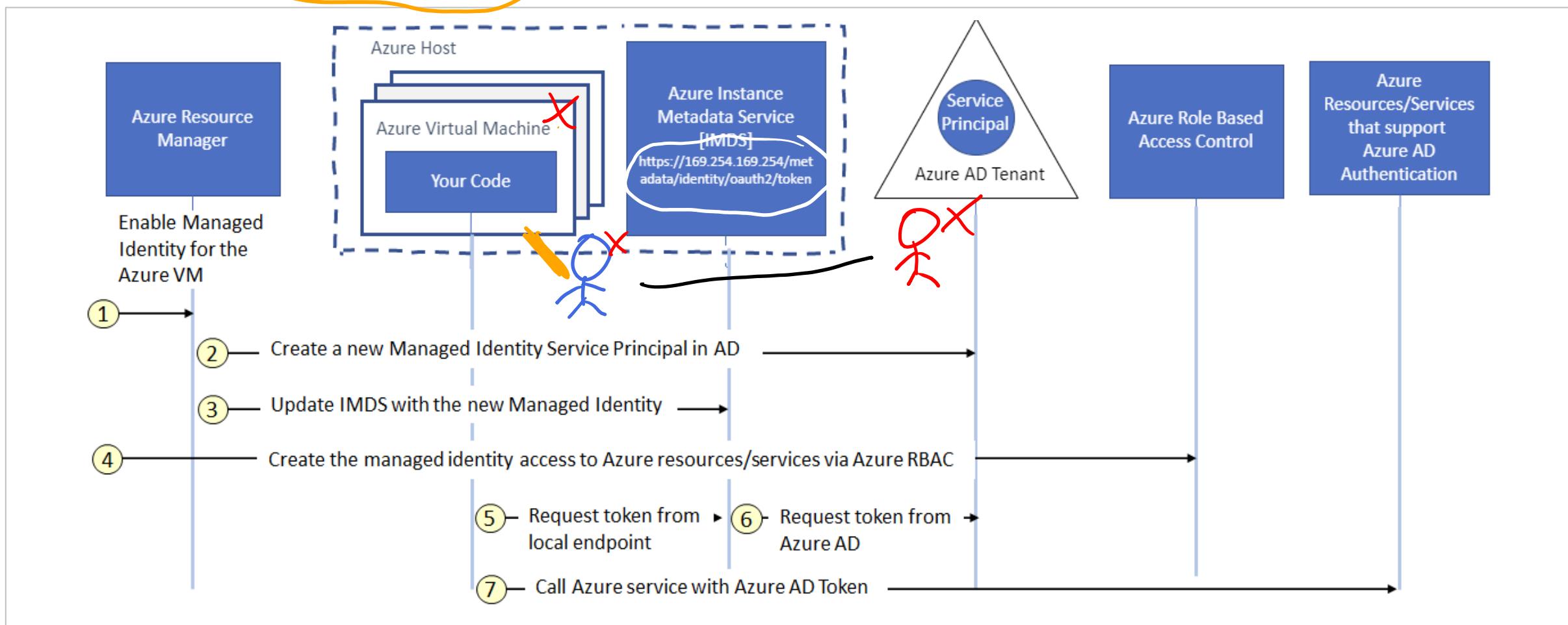
Azure Storage



Secure, massively scalable object and data lake storage for unstructured and semi-structured data

Managed Identities

Managed identities use Azure AD authentication to authenticate services – no code in the application.
Identities can be system-assigned or user-assigned.



IaaS
VM

www

API

Azure App Services Overview



(Managed)
Identity

PaaS

App Services

~~Fortran~~

~~Rust~~

Go

Ruby



Microsoft
.NET



python™

App Service Environments

The ASE is a single tenant deployment of the Azure App Service that runs in your virtual network.

Internal line-of-business applications

Applications that need more than 30 App Service plan instances

Single tenant system to satisfy internal compliance or security requirements

Network isolated application housing

Multi-tier applications



App Service
Environments

App Service Plans

F1

S1

5 Deployment Slots

An App Service plan defines a set of compute resources for a web app to run.

Operating System (Windows, Linux)

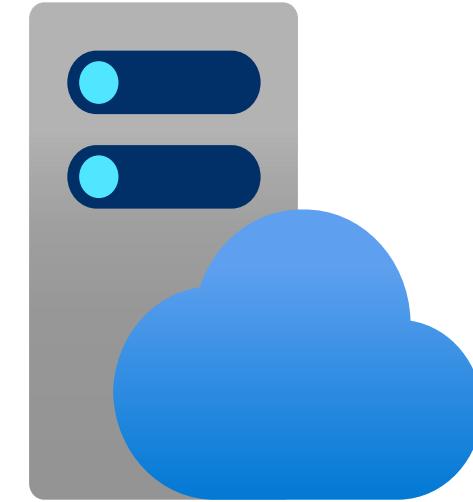
Region (West US, East US, etc.)

Number of VM instances

ACU

Size of VM instances (Small, Medium, Large)

Pricing tier (Free, Shared Basic, Standard, Premium, PremiumV2, V3, Isolated, Isolated V2)



App Service Plans

App Service Environment Networking

An App Service Environment has the following network information at creation:

App Service Environment Subnet

Domain Suffix

Virtual IP (VIP)

Inbound Address

Default Outbound Address

The screenshot shows the Azure portal interface with the following details:

- IP Addresses**: Lists networking configuration for the App Service Environment.
 - ASE virtual network: azurewebappsvc
 - ASE subnet: azurewebappsvc_1a
 - Domain suffix: azurewebappsvc.appserviceenvironment.net
- Inbound**:
 - Virtual IP: Internal
 - Inbound address: 192.168.250.4
- Outbound**: Default outbound addresses: 20.102.34.209, 20.102.34.146

The left sidebar shows the navigation menu for the 'IP addresses' section of the 'azurewebappsvc' App Service Environment.

Availability Zone Support for App Service Environments

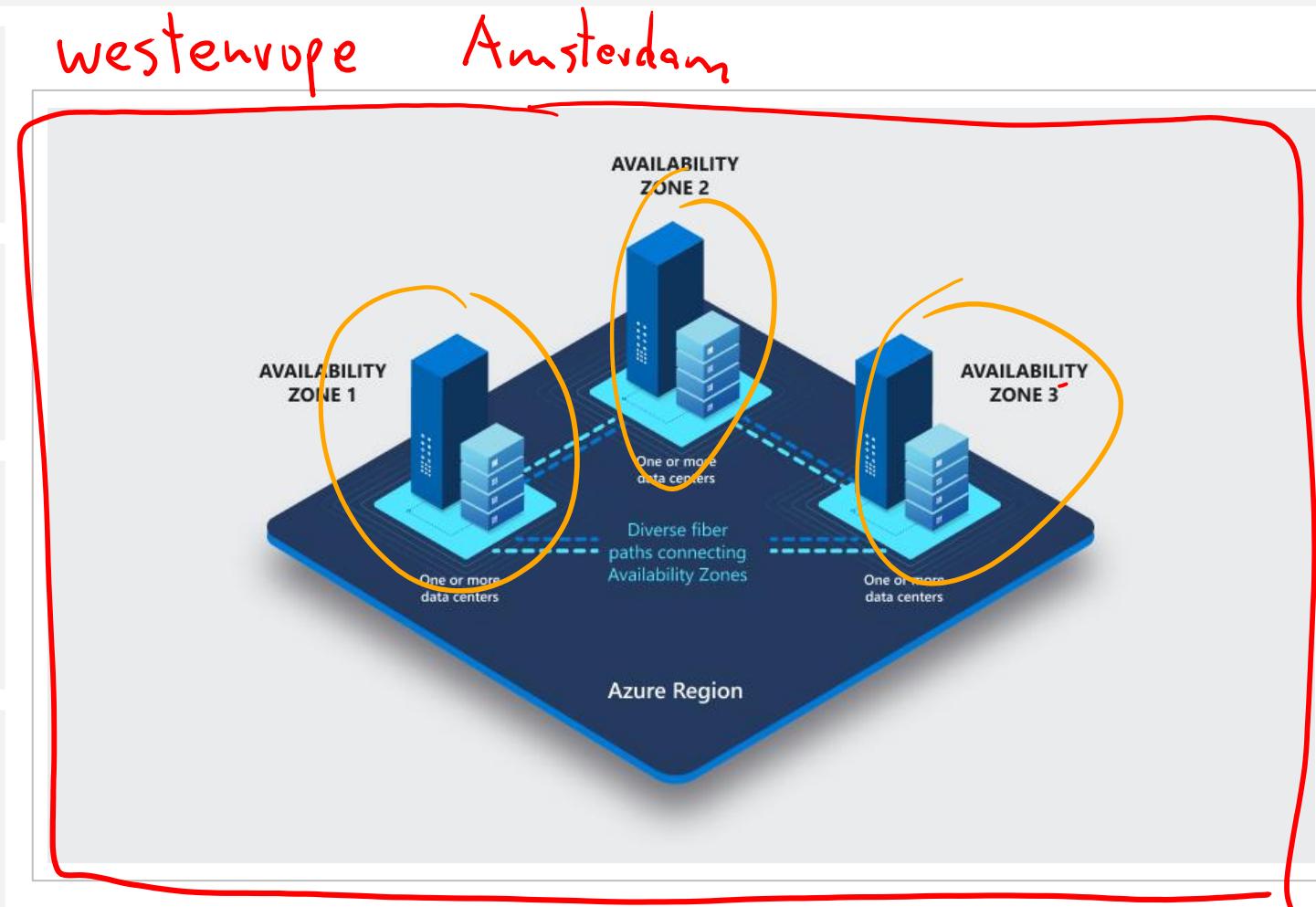
App services can be deployed across availability zones. The architecture is known as zone redundancy.

Azure regions feature datacenters deployed within a latency-defined perimeter.

Availability Zones are connected through a dedicated regional low-latency network.

Tolerance to failures is achieved because of redundancy and logical isolation of Azure services.

To ensure resiliency, a minimum of three separate availability zones are present in all availability zone-enabled regions.



IaaS

VM

CaaS

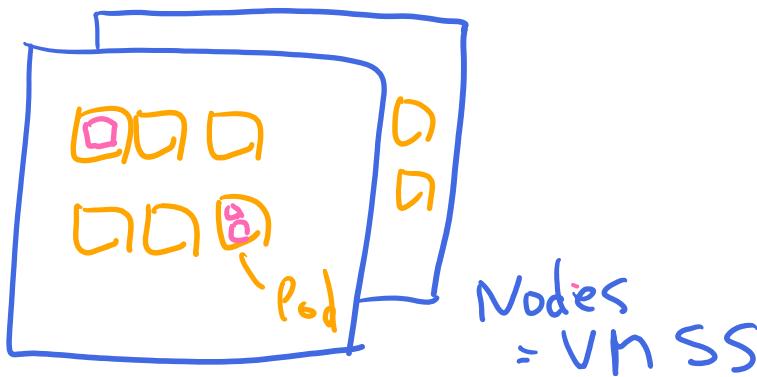
ACI

Container
Instance

PaaS

App Service

AKS
Kubernetes Cluster

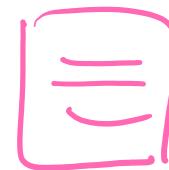


Container Image

Registry

App
Run
OS

Super Mario
Java
Linux



shared Kernel

→ Azure Container Reg ACR

→ Docker Hub

App Service Environment Certificates

The following options are available to enable certificates in App Service.

Create a free App Service managed certificate

Purchase an App Service certificate

Import a certificate from Key Vault

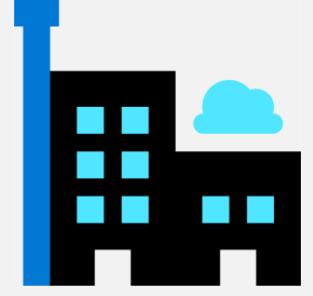
Upload a private certificate

Upload a public certificate



App Service
Certificates

Enterprise Governance



Enterprise Governance



Shared Responsibility Model



Azure Cloud Security Advantages



Azure Hierarchy



Azure Policy



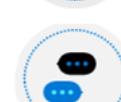
Azure Role Based Access Control (RBAC)



Azure RBAC vs Azure Policies



Built-in Roles



Resource Locks



Azure Blueprints



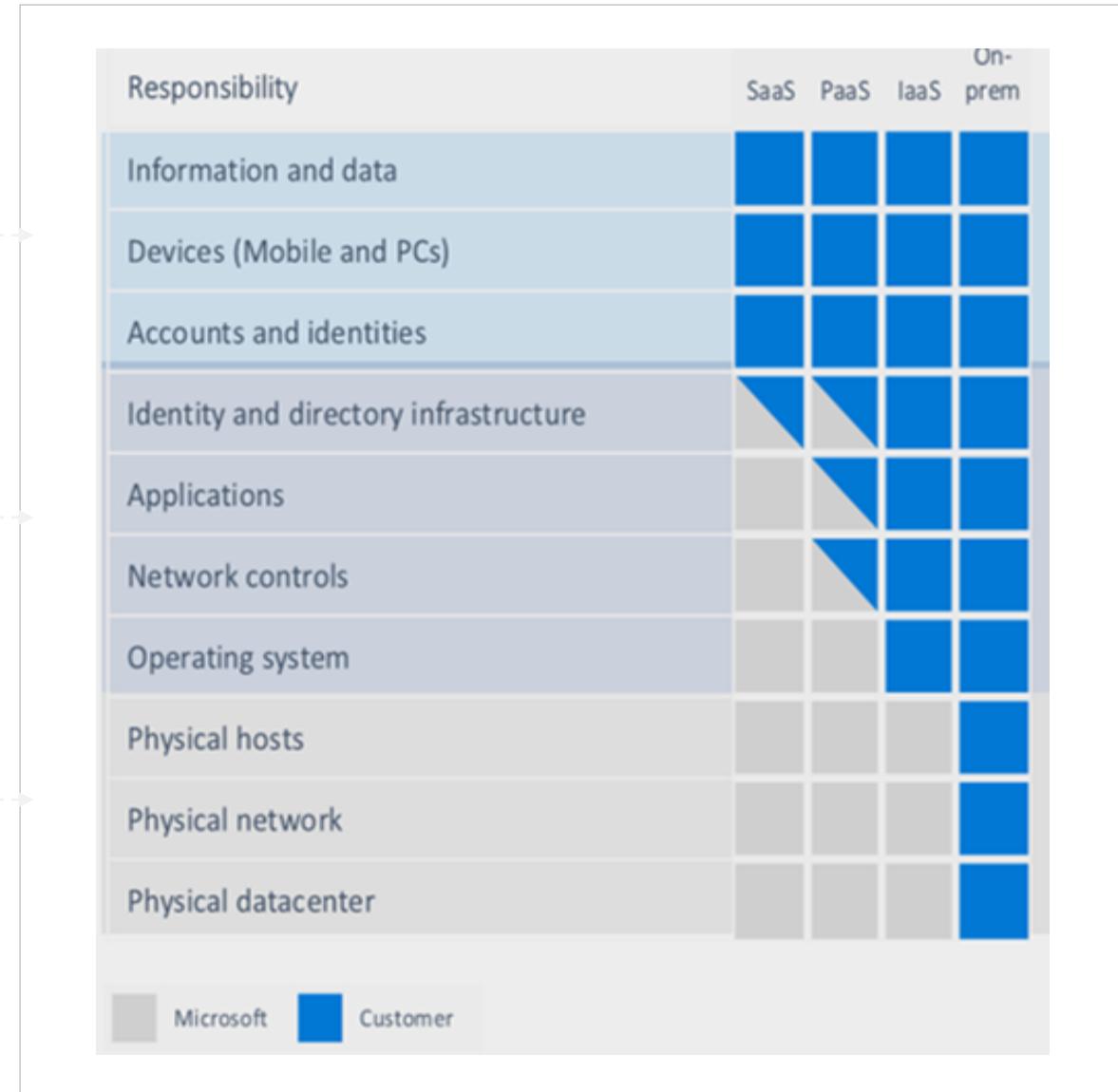
Azure Subscription Management

Shared Responsibility Model

Responsibility always retained by the customer

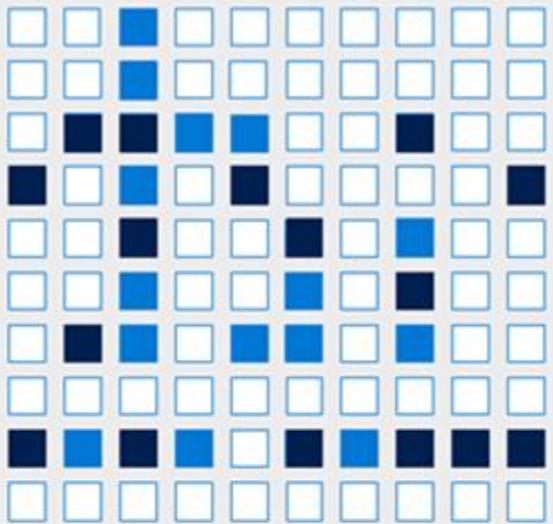
Responsibility varies by service type

Responsibility transfers to cloud provider

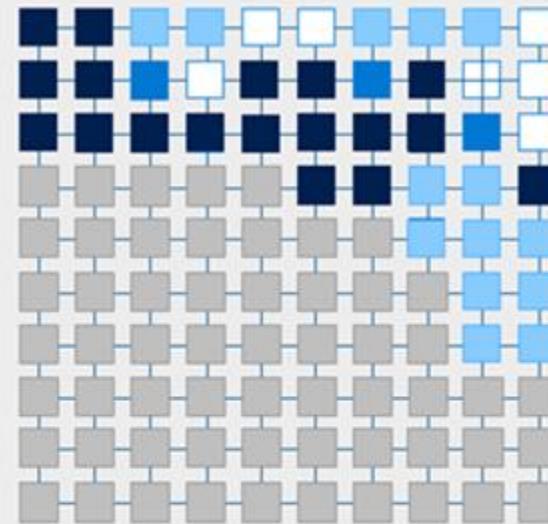


Azure Cloud Security Advantages

Traditional Approach



Cloud-Enabled Approach



Security is a challenging and under-resourced function

- Satisfied responsibility
- Unmet responsibility
- Partially met responsibility
- Cloud provider responsibility

Cloud Technology enables security to:

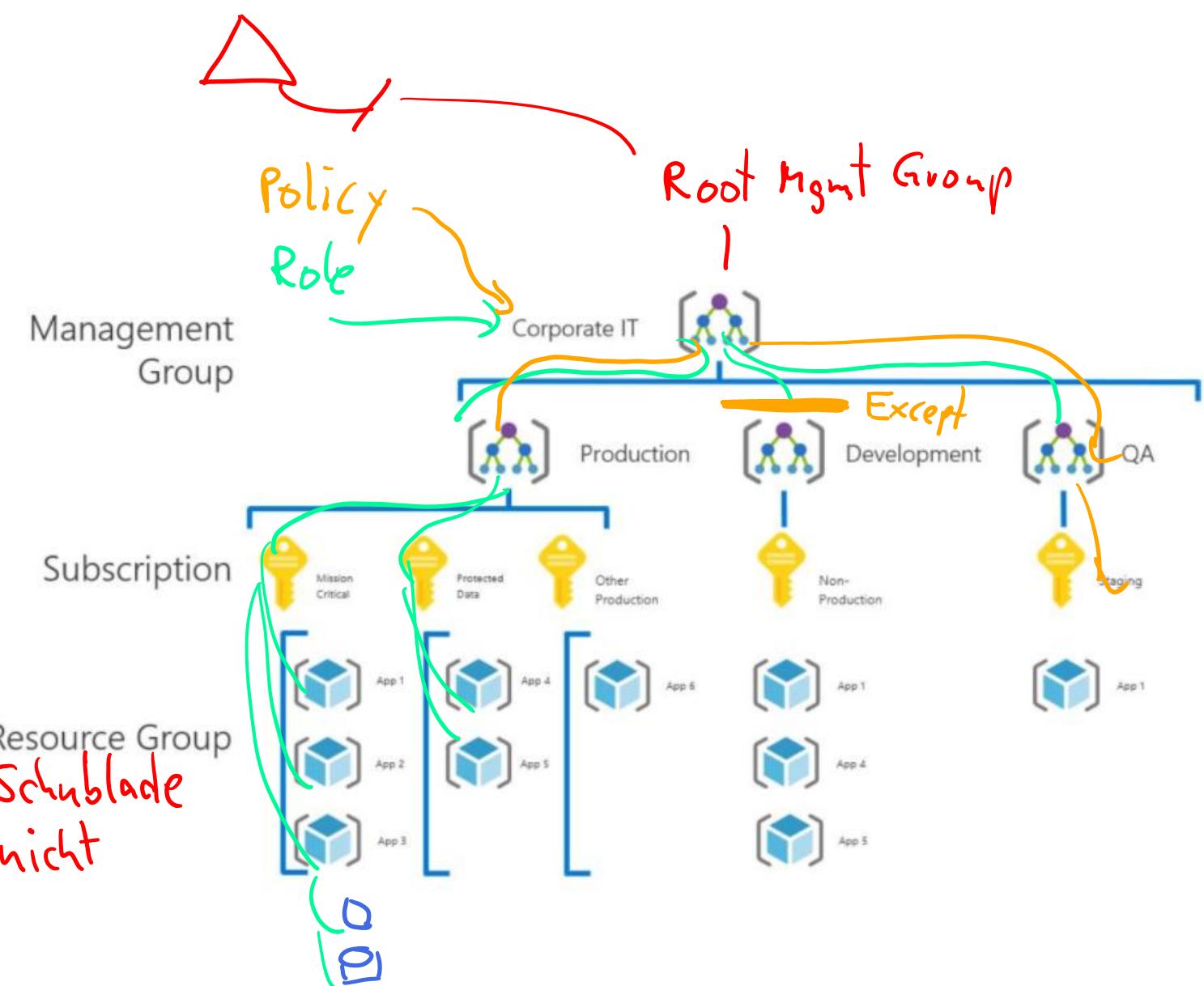
- Shift commodity responsibilities to provider and re-allocate your resources
- Leverage cloud-based security capabilities for more effectiveness
- Use cloud intelligence to improve detection/response time

Azure Hierarchy

Management groups provides a level to manage multiple subscriptions

Subscriptions provision products and services for an account

Resource groups are containers for resources that share the same life cycle



Azure Policy

Azure Policy is a service in Azure that you use to create, assign and, manage policies

Azure Policy runs evaluations and scans for non-compliant resources

Advantages:

- Enforcement and compliance
- Apply policies at scale
- Remediation

Effect
Allow
Deny
Add If Missing

Usage Cases
Allowed resource types - Specify the resource types that your organization can deploy.
Allowed virtual machine SKUs – Specify a set of virtual machine SKUs that your organization can deploy.
Allowed locations – Restrict the locations your organization can specify when deploying resources.
Require tag and its value - Enforces a required tag and its value.
Azure Backup should be enabled for Virtual Machines – Audit if Azure Backup service is enabled for all Virtual machines.

Azure Policy – Storage

Microsoft Azure Search resources, services, and docs (G+) Home > Secure transfer to storage accounts should be enabled ... X

Policy definition

Assign Edit definition Duplicate definition Delete definition Export definition

Essentials

Name	: Secure transfer to storage accounts should be enabled	Definition location	: --
Description	: Audit requirement of Secure transfer in your storage account. Secure transfer is an option tha...	Definition ID	: /providers/Microsoft.Authorization/policyDefinitions/404c3081-a854-4457-ae30-26a93ef6...
Available Effects	: Audit, Deny, Disabled	Type	: Built-in
Category	: Storage	Mode	: Indexed

Definition Assignments (0) Parameters

```
1 {  
2   "properties": {  
3     "displayName": "Secure transfer to storage accounts should be enabled",  
4     "policyType": "BuiltIn",  
5     "mode": "Indexed",  
6     "description": "Audit requirement of Secure transfer in your storage account. Secure transfer is an option that forces your storage account to accept requests only from s",  
7     "metadata": {  
8       "version": "2.0.0",  
9       "category": "Storage"  
10    },  
11    "parameters": {  
12      "effect": {  
13        "type": "String",  
14        "metadata": {  
15          "displayName": "Effect",  
16          "description": "The effect determines what happens when the policy rule is evaluated to match"  
17        },  
18        "allowedValues": [  
19          "Audit",  
20          "Deny",  
21        ]  
22      }  
23    }  
24  }  
25 }
```

Azure Policy – SQL

Microsoft Azure Search resources, services, and docs (G+) 1 ? ?

Home > Deploy Advanced Data Security on SQL servers X

Policy definition

Assign Edit definition Duplicate definition Delete definition Export definition

Essentials

Name : Deploy Advanced Data Security on SQL servers	Definition location : --
Description : This policy enables Advanced Data Security on SQL Servers. This includes turning on Threat D...	Definition ID : /providers/Microsoft.Authorization/policyDefinitions/6134c3db-786f-471e-87bc-8f479dc8...
Available Effects : DeployIfNotExists	Type : Built-in
Category : SQL	Mode : Indexed

Definition Assignments (0)

```
1  {
2    "properties": {
3      "displayName": "Deploy Advanced Data Security on SQL servers",
4      "policyType": "BuiltIn",
5      "mode": "Indexed",
6      "description": "This policy enables Advanced Data Security on SQL Servers. This includes turning on Threat Detection and Vulnerability Assessment. It will automatically c",
7      "metadata": {
8        "version": "1.2.0",
9        "category": "SQL"
10      },
11      "parameters": {},
12      "policyRule": {
13        "if": {
14          "field": "type",
15          "equals": "Microsoft.Sql/servers"
16        },
17        "then": {
18          "effect": "DeployIfNotExists",
19          "details": {
20            "type": "Microsoft.Sql/servers/securityAlertPolicies",
21            "name": "Deploy Advanced Data Security on SQL servers"
22          }
23        }
24      }
25    }
26  }
```

Azure Policy – Kubernetes

Microsoft Azure Search resources, services, and docs (G+) 1 ? Export

Home > Kubernetes clusters should not use specific security capabilities ...

Policy definition

Assign Edit definition Duplicate definition Delete definition Export definition

Essentials

Name	: Kubernetes clusters should not use specific security capabilities	Definition location	:	--
Description	: Prevent specific security capabilities in Kubernetes clusters to prevent ungranted privileges o...	Definition ID	:	/providers/Microsoft.Authorization/policyDefinitions/a27c700f-8a22-44ec-961c-41625264...
Available Effects	: audit, deny, disabled	Type	:	Built-in
Category	: Kubernetes	Mode	:	Microsoft.Kubernetes.Data

Definition Assignments (0) Parameters

```
1 {  
2   "properties": {  
3     "displayName": "Kubernetes clusters should not use specific security capabilities",  
4     "policyType": "BuiltIn",  
5     "mode": "Microsoft.Kubernetes.Data",  
6     "description": "Prevent specific security capabilities in Kubernetes clusters to prevent ungranted privileges on the Pod resource. For more information, see https://aka.ms",  
7     "metadata": {  
8       "version": "3.0.2",  
9       "category": "Kubernetes"  
10    },  
11    "parameters": {  
12      "effect": {  
13        "type": "String",  
14        "metadata": {  
15          "displayName": "Effect",  
16          "description": "'audit' allows a non-compliant resource to be created or updated, but flags it as non-compliant. 'deny' blocks the non-compliant resource creation o  
17        },  
18        "allowedValues": [  
19          "audit",  
20          "deny",  
21        ]  
22      }  
23    }  
24  }  
25}
```

Azure Policy – Key Vault

Microsoft Azure Search resources, services, and docs (G+/-) 1 ? Help Feedback

Home > Keys should be backed by a hardware security module (HSM) ...

Policy definition

Assign Edit definition Duplicate definition Delete definition Export definition

Essentials

Name : Keys should be backed by a hardware security module (HSM)	Definition location : --
Description : An HSM is a hardware security module that stores keys. An HSM provides a physical layer of ...	Definition ID : /providers/Microsoft.Authorization/policyDefinitions/587c79fe-dd04-4a5e-9d0b-f89598c7...
Available Effects : Audit, Deny, Disabled	Type : Built-in
Category : Key Vault	Mode : Microsoft.KeyVault.Data

Definition Assignments (0) Parameters

```
1 {  
2   "properties": {  
3     "displayName": "Keys should be backed by a hardware security module (HSM)",  
4     "policyType": "BuiltIn",  
5     "mode": "Microsoft.KeyVault.Data",  
6     "description": "An HSM is a hardware security module that stores keys. An HSM provides a physical layer of protection for cryptographic keys. The cryptographic key cannot",  
7     "metadata": {  
8       "version": "1.0.1",  
9       "category": "Key Vault"  
10    },  
11    "parameters": {  
12      "effect": {  
13        "type": "String",  
14        "metadata": {  
15          "displayName": "Effect",  
16          "description": "'Audit' allows a non-compliant resource to be created, but flags it as non-compliant. 'Deny' blocks the resource creation. 'Disable' turns off the p",  
17        },  
18        "allowedValues": [  
19          "Audit",  
20          "Deny",  
21        ]  
22      }  
23    }  
24  }  
25}
```

Azure Role-Based Access Control

	Role					
	Reader	Resource-specific	Custom	Contributor	Owner	
Scope	 Management group	Observers	Users managing resources			
 Subscription					Admins	
 Resource group						
 Resource	Automated processes					

Azure Role-Based Access Control – Security Principal

1

Security principal



User



Group

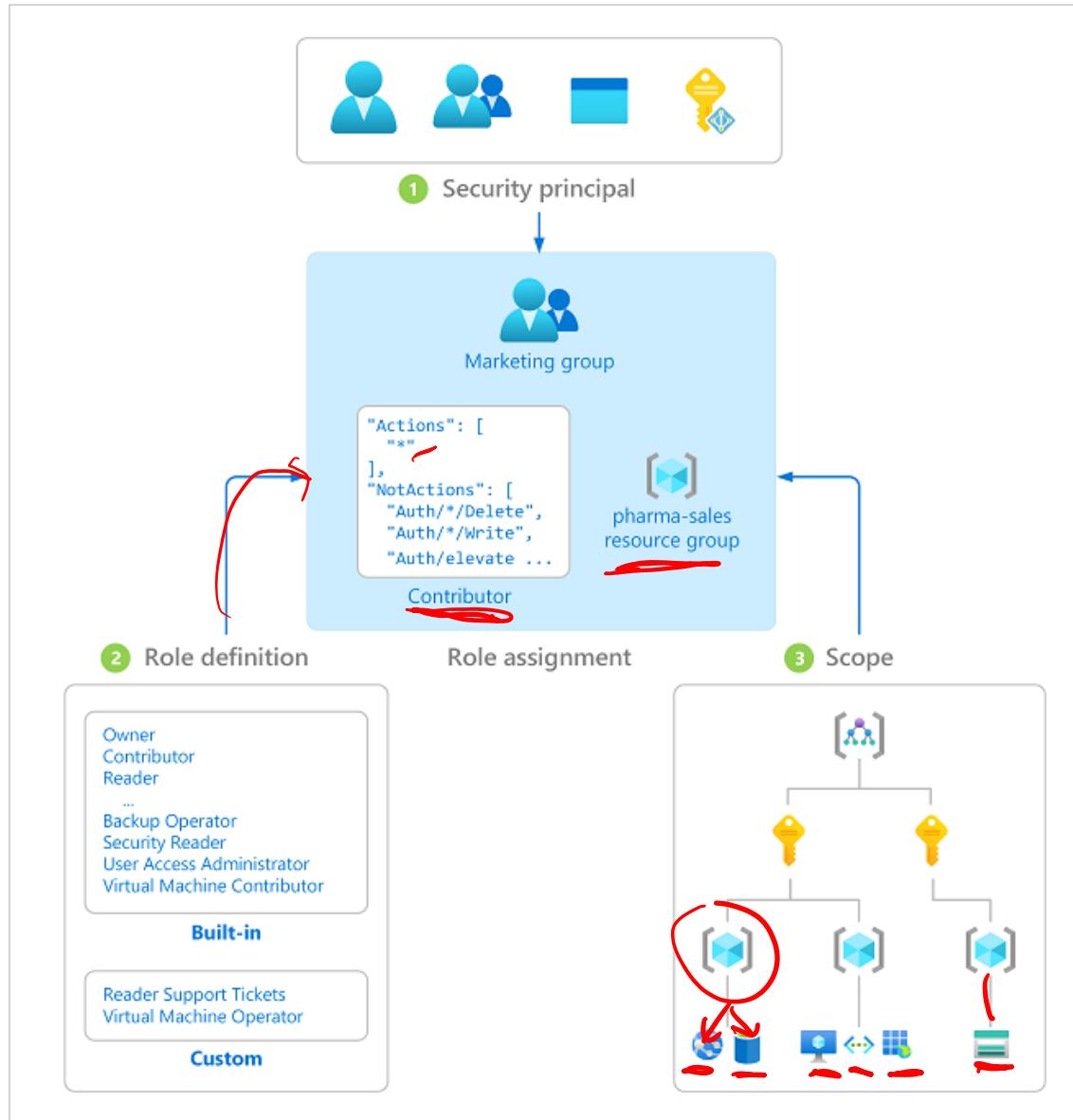


Service
principal



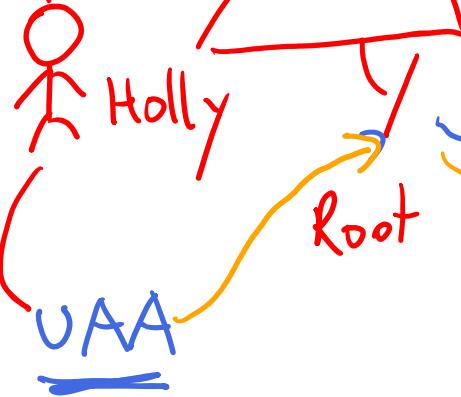
Managed
identity

Azure Role-Based Access Control – Role Assignments

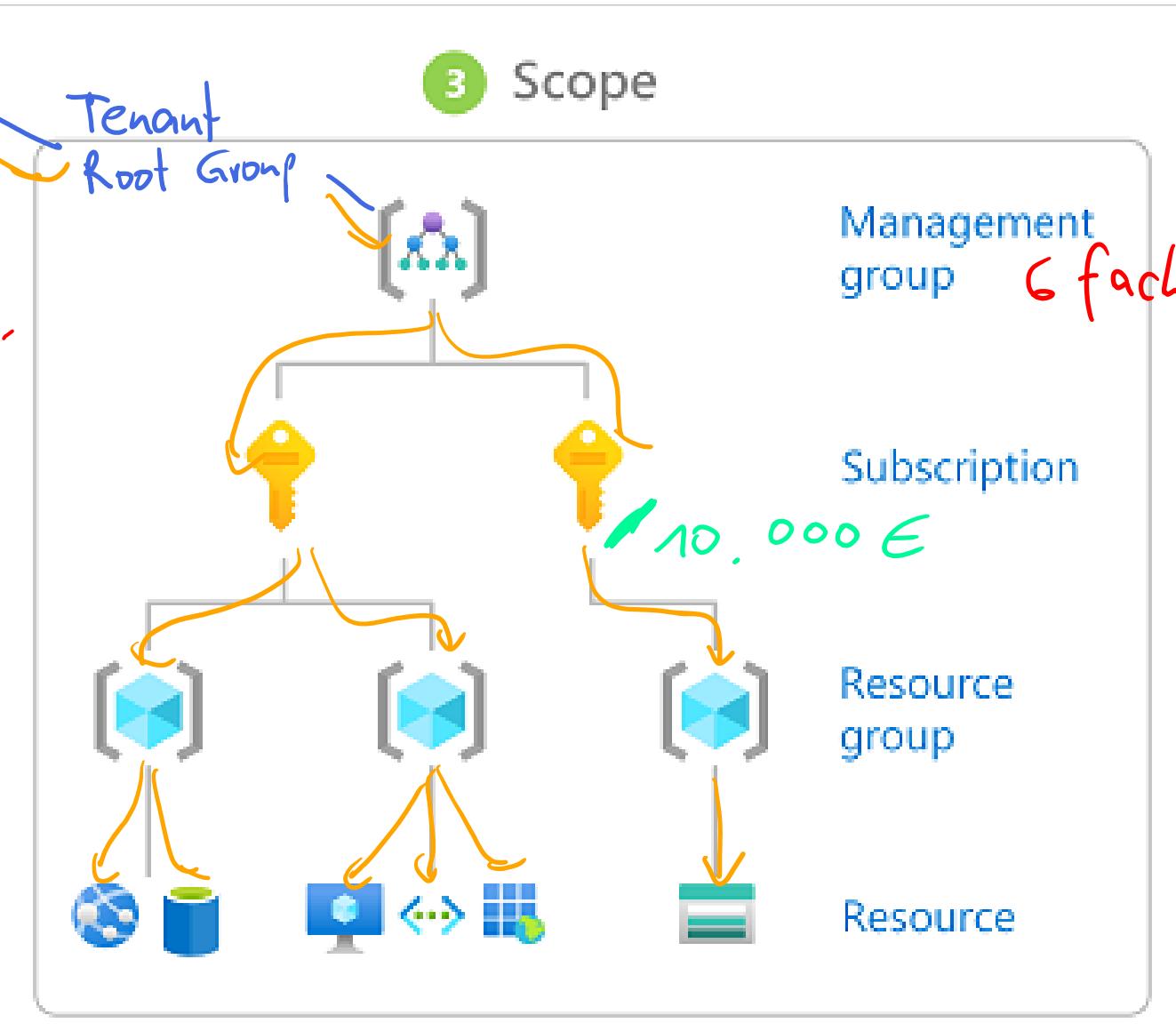


Global Admin + tenant

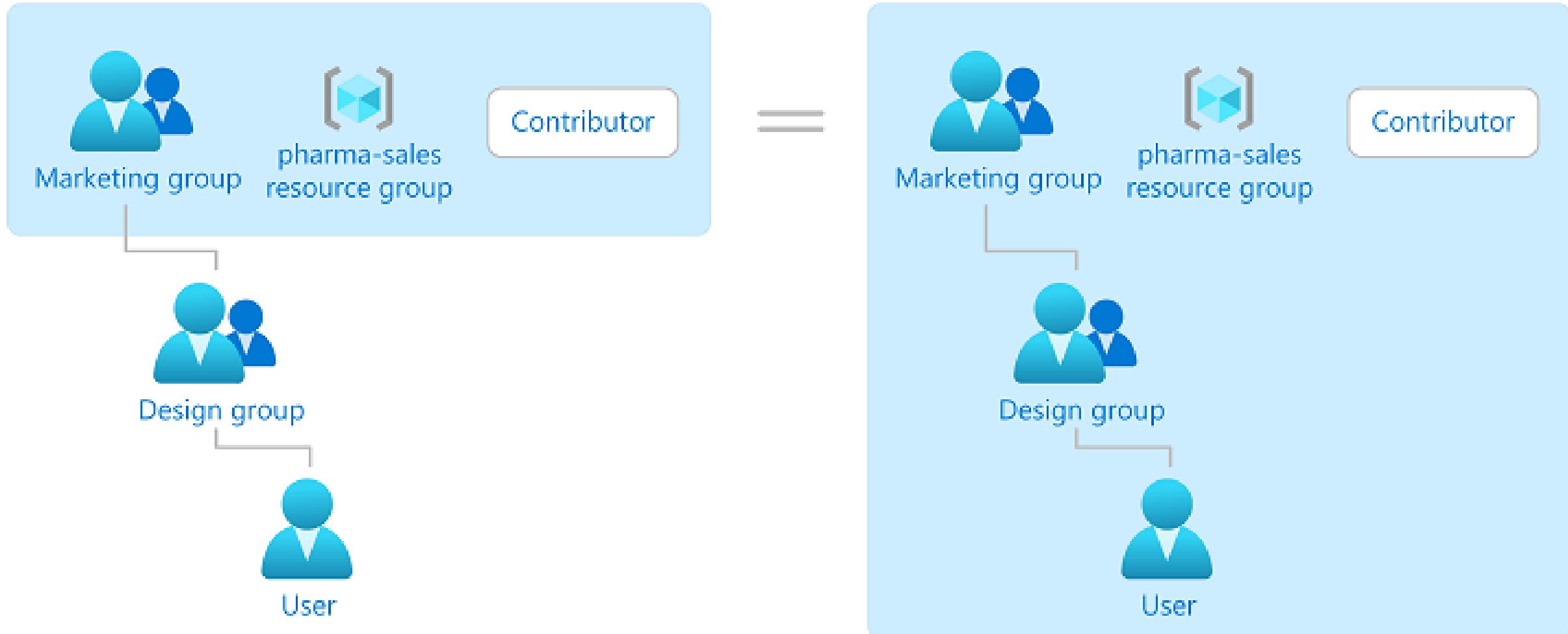
Azure Role-Based Access Control – Scope



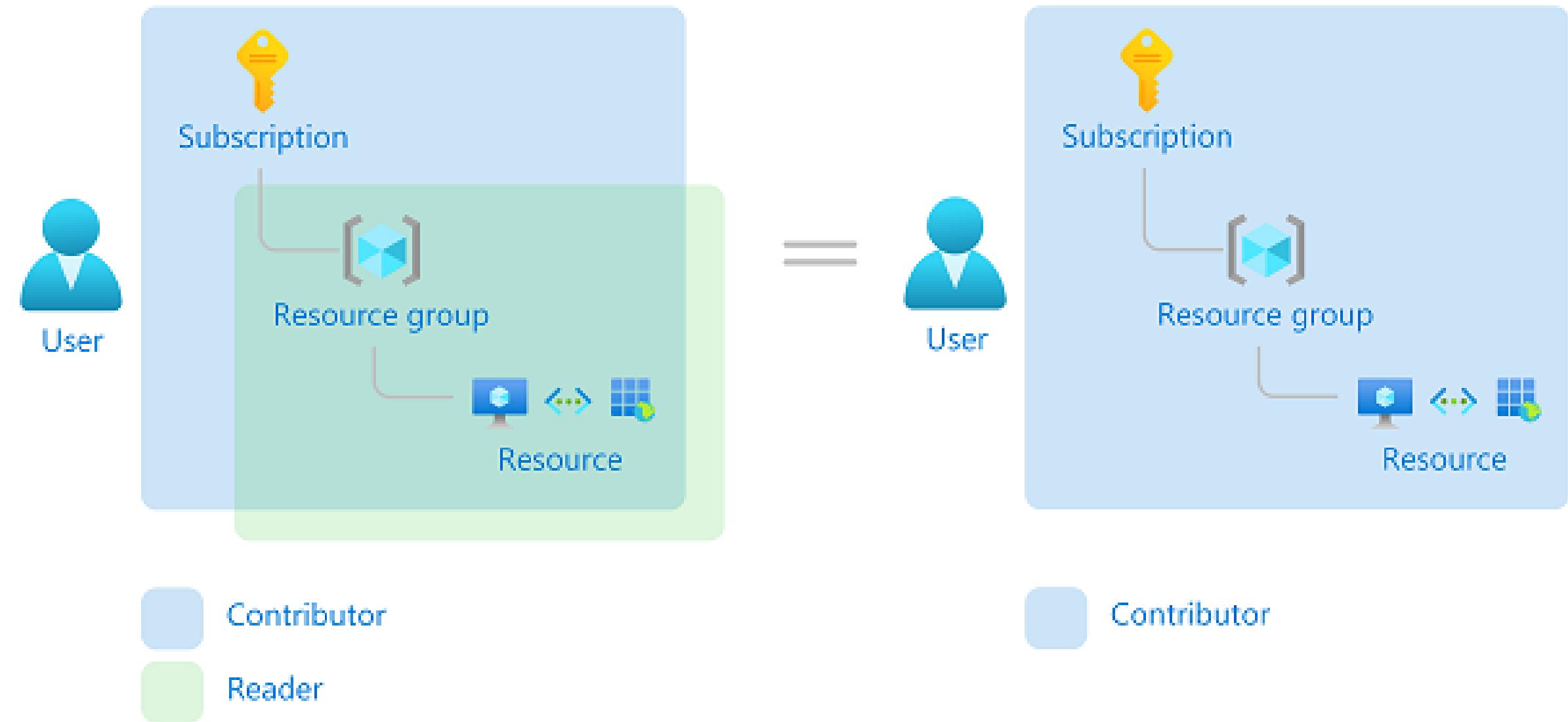
User Access Admin



Azure Role-Based Access Control – Groups



Azure Role-Based Access Control – Multiple role assignments



Azure Role-Based Access Control – Role Definition

2 Role definition

Owner
Contributor
Reader
...

Backup Operator
Security Reader
User Access Administrator
Virtual Machine Contributor

Built-in

Reader Support Tickets
Virtual Machine Operator

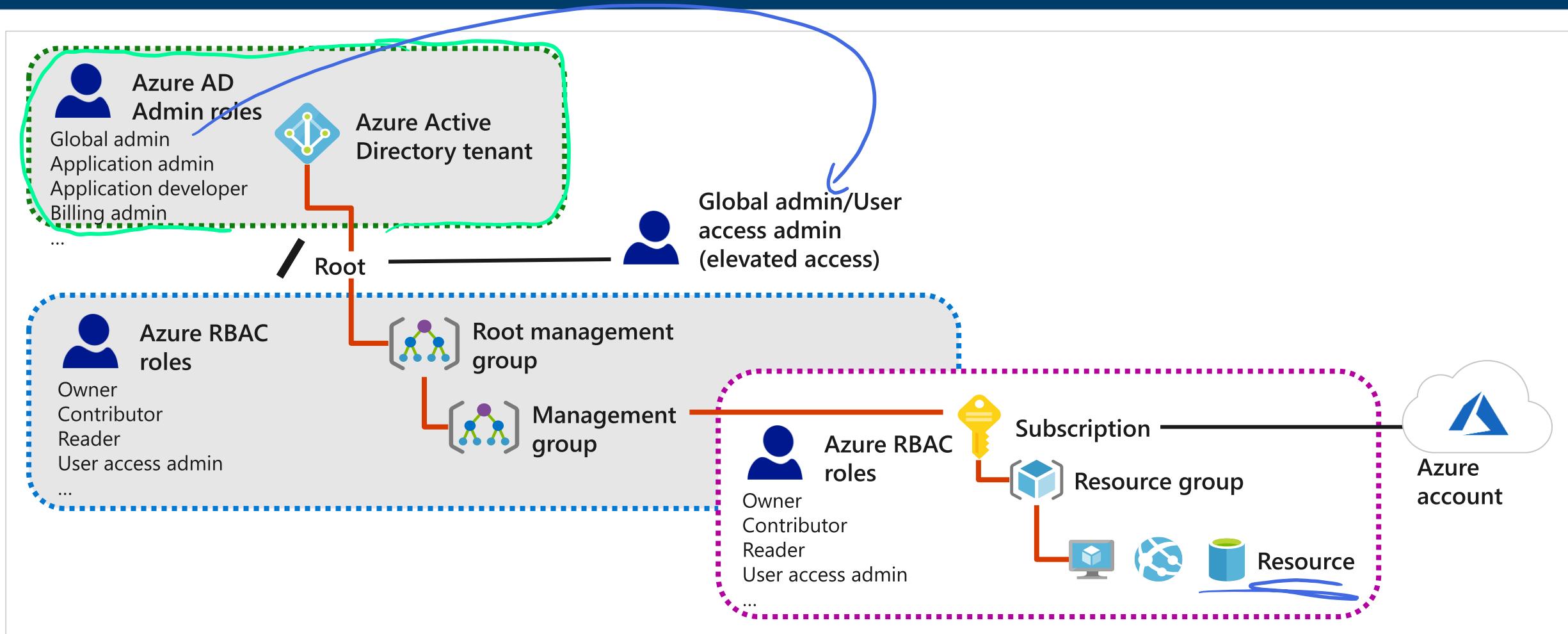
Custom

Contributor

```
"Actions": [  
    "*"  
],  
"NotActions": [  
    "Authorization/*/Delete",  
    "Authorization/*/Write",  
    "Authorization/elevateAccess/Action"  
],  
"DataActions": [],  
"NotDataActions": [],  
"AssignableScopes": [  
    "/"  
]
```

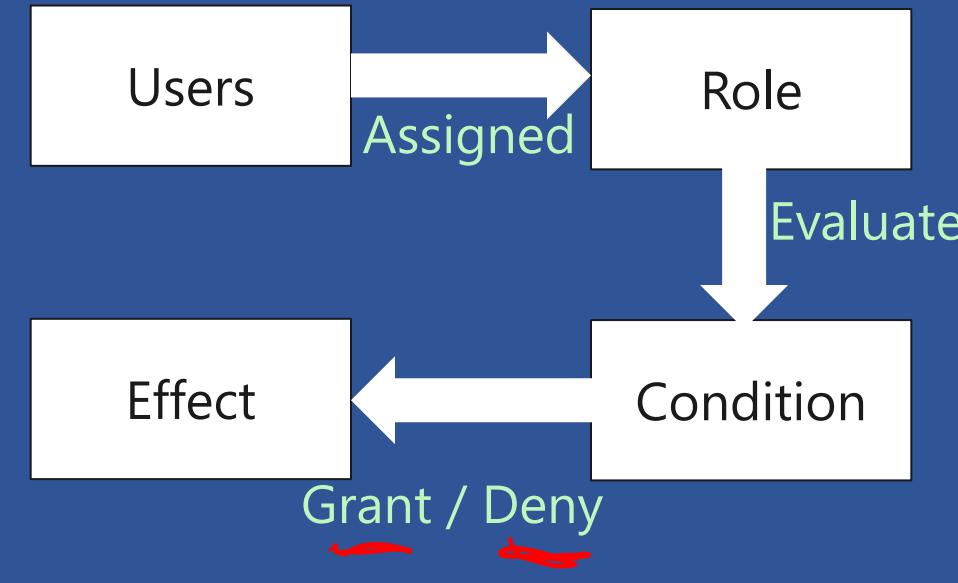
Azure Role-Based Access Control

Azure AD Admin roles and Azure RBAC roles work together to authenticate users.

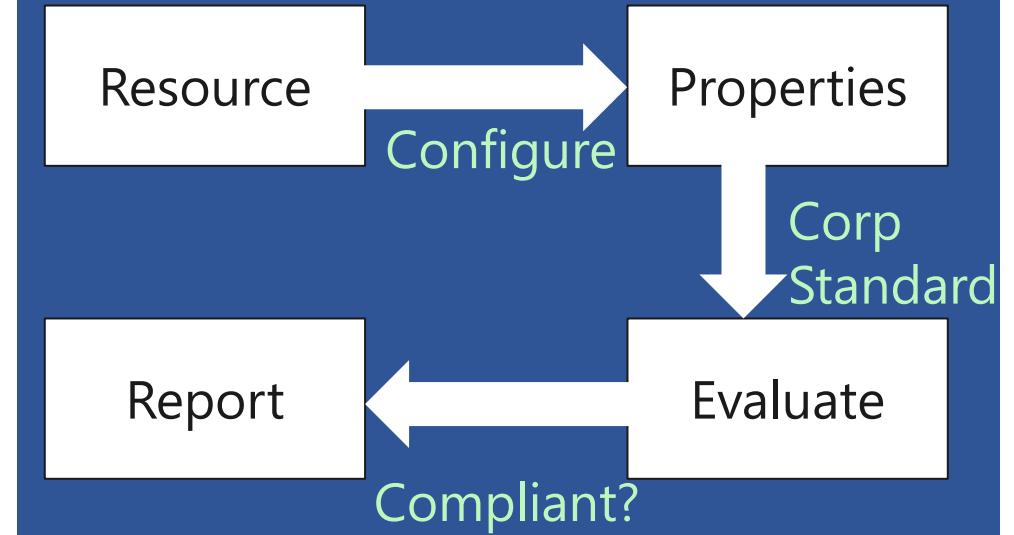


Azure RBAC vs Azure Policies

Role Based Access Control (RBAC)



Azure Policy



Azure RBAC manages who has access to Azure resources, what areas they have access to and what they can do with those resources.

Azure Policies focus on resource properties during deployment and for already existing resources.

Built-in Roles for Azure Resources

Built-in Role	Description
Owner	Allows you to manage everything including access to resources
Contributor	Allows you to manage everything except managing access to resources
Reader	Allows you to view everything but not make any changes
User Access Administrator	Allows you to manage user access to Azure resources

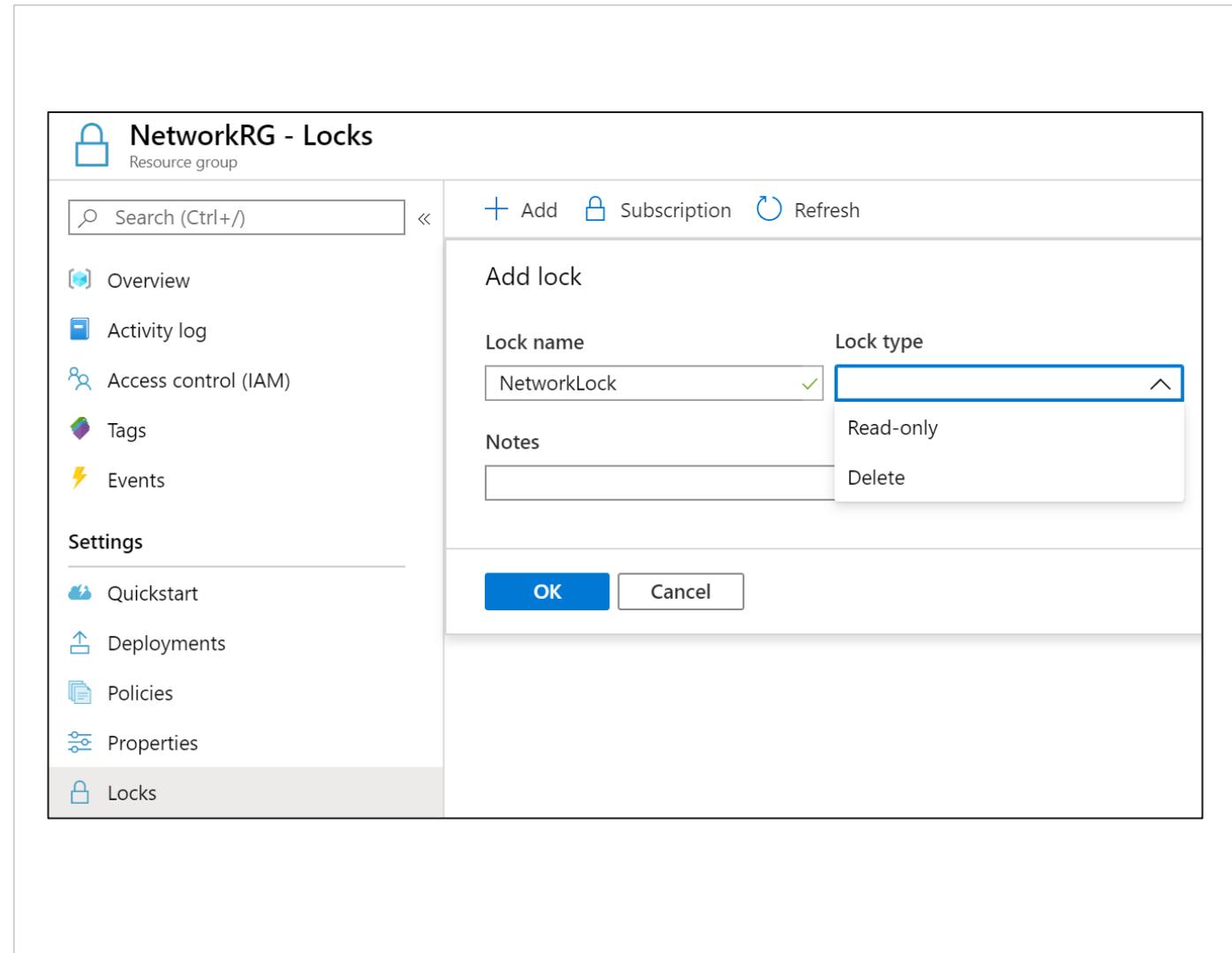
Resource Locks

Associate the lock with a subscription, resource group, or resource

Locks are inherited by child resources

Read-Only locks prevent any changes to the resource

Delete locks prevent deletion



Azure Blueprints (preview)

Designed to help with environment setup

Create reusable environment definitions that can recreate your Azure resources and apply your policies instantly

A package or container for composing focus-specific sets of standards, patterns, and requirements

RG

Policy

Role

Resource

json

json

json

(ARM Template)

Bicep Lang

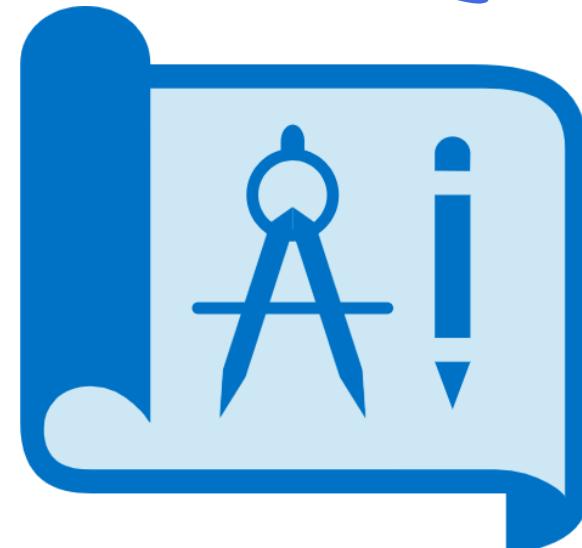
Terraform

IAC

1.0

1.1

1.2



Azure Subscription Management

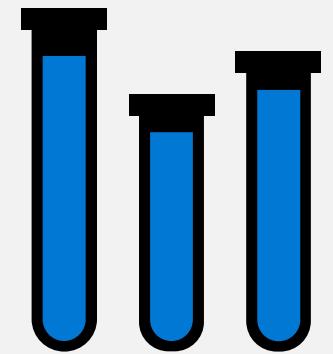
The Account Owner role can create Azure subscriptions.

Organizations assign Azure subscriptions to various business units.

If you're an Enterprise Agreement(EA) customer, your enterprise administrators can transfer billing ownership of your subscriptions between accounts.

The screenshot shows the 'Subscriptions' page in the Azure portal. At the top, there's a breadcrumb navigation from 'Home > Subscriptions'. Below it, the title 'Subscriptions' is followed by 'Microsoft'. A large blue 'Add' button with a plus sign is prominently displayed. A message below the button says 'Showing subscriptions in Microsoft. Don't see a subscription? [Switch directories](#)'. There are two dropdown menus: 'My role' which shows '0 selected' and has an 'Apply' button, and 'Status' which also shows '0 selected'. A checked checkbox says 'Show only subscriptions selected in the [global subscriptions filter](#)'. A search bar at the bottom is labeled 'Search to filter items...'. The overall interface is clean with a white background and light gray header elements.

Module - Labs



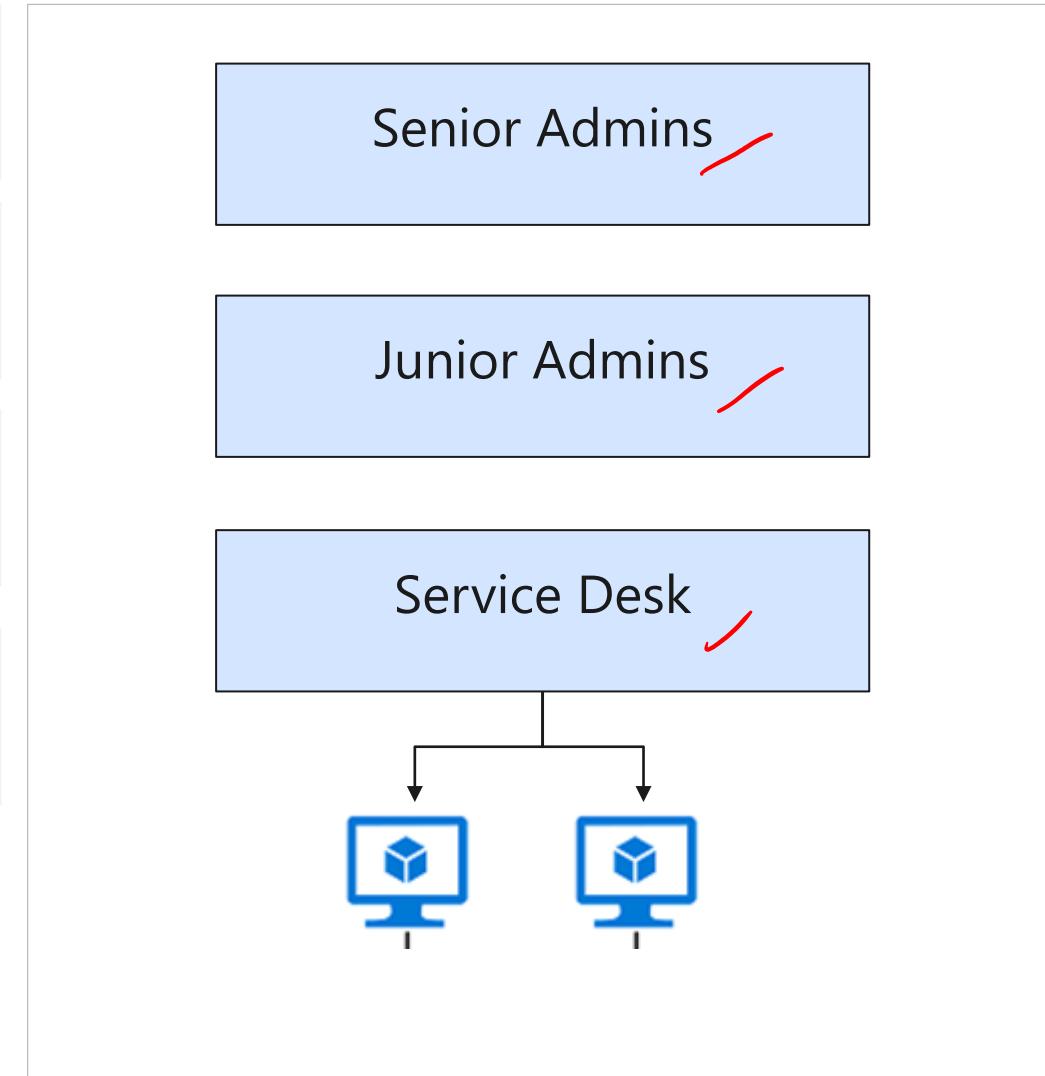
Lab 01 – Role-Based Access Control

Use the Portal to create a Senior Admins group with member Joseph Price.

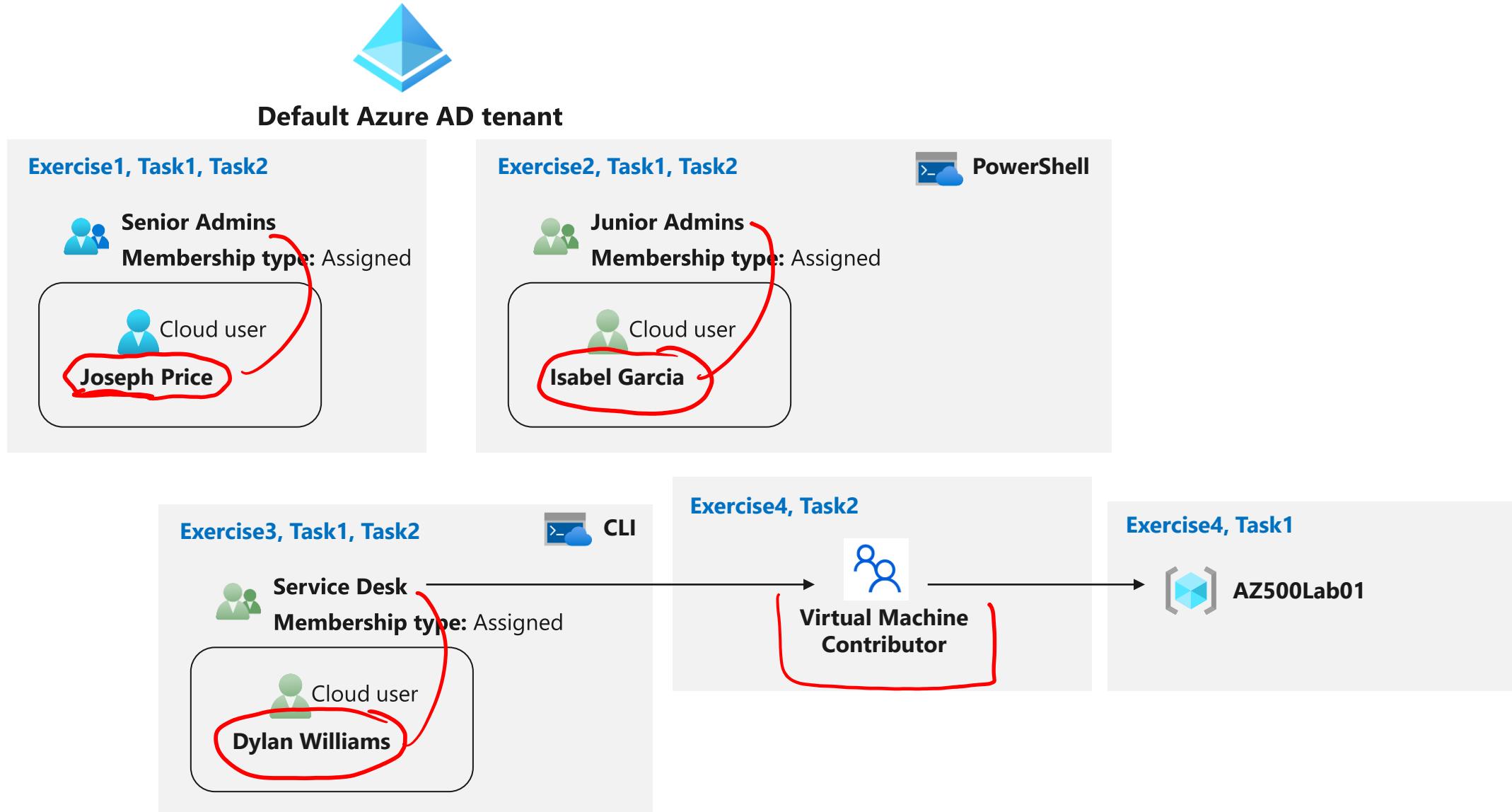
Use PowerShell to create a Junior Admins group with member Isabel Garcia.

Use the CLI to create a Service Desk group with member Dylan Williams.

Assign the Service Desk group Virtual Machine Contributor permissions.



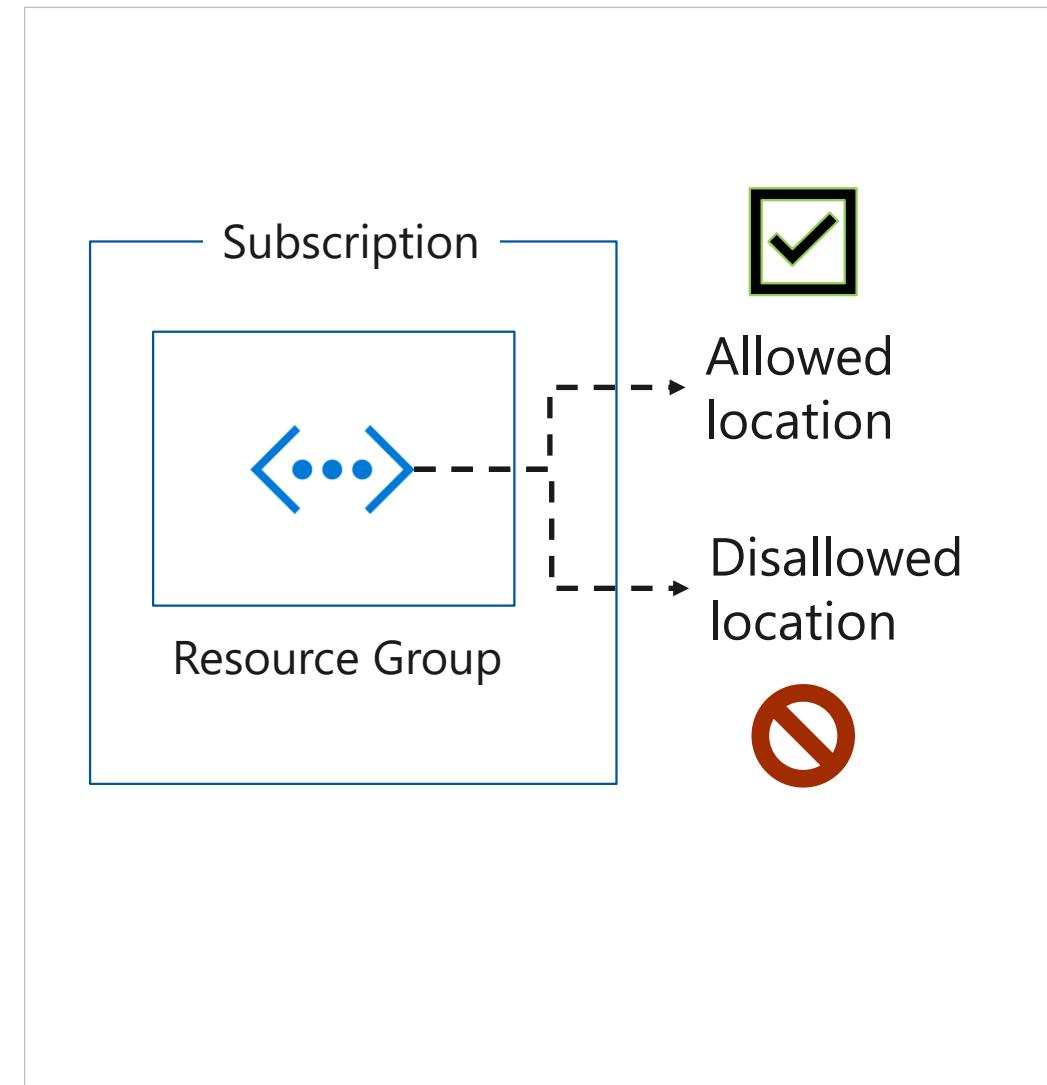
Lab 01 – Role-Based Access Control



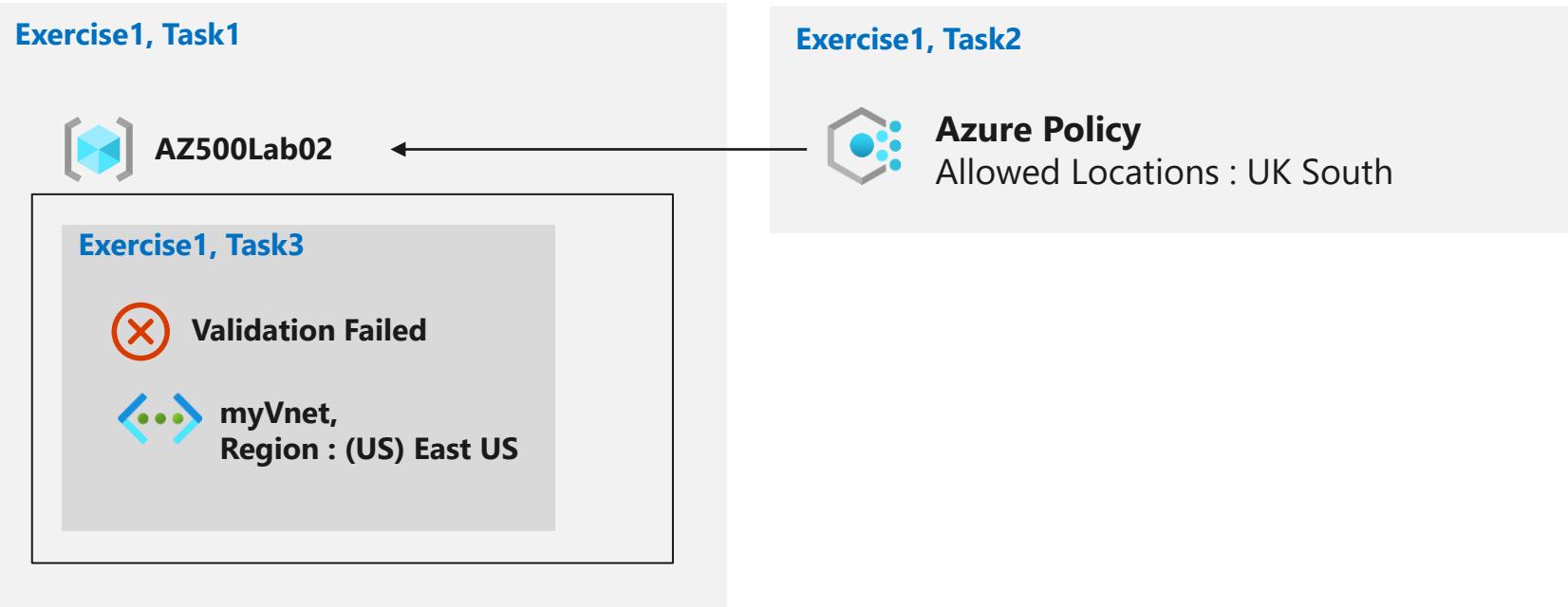
Lab 02 – Azure Policy

Create an Allowed Locations policy that ensures resources are only created in a specific region.

Test to ensure resources are only created in the Allowed Location.



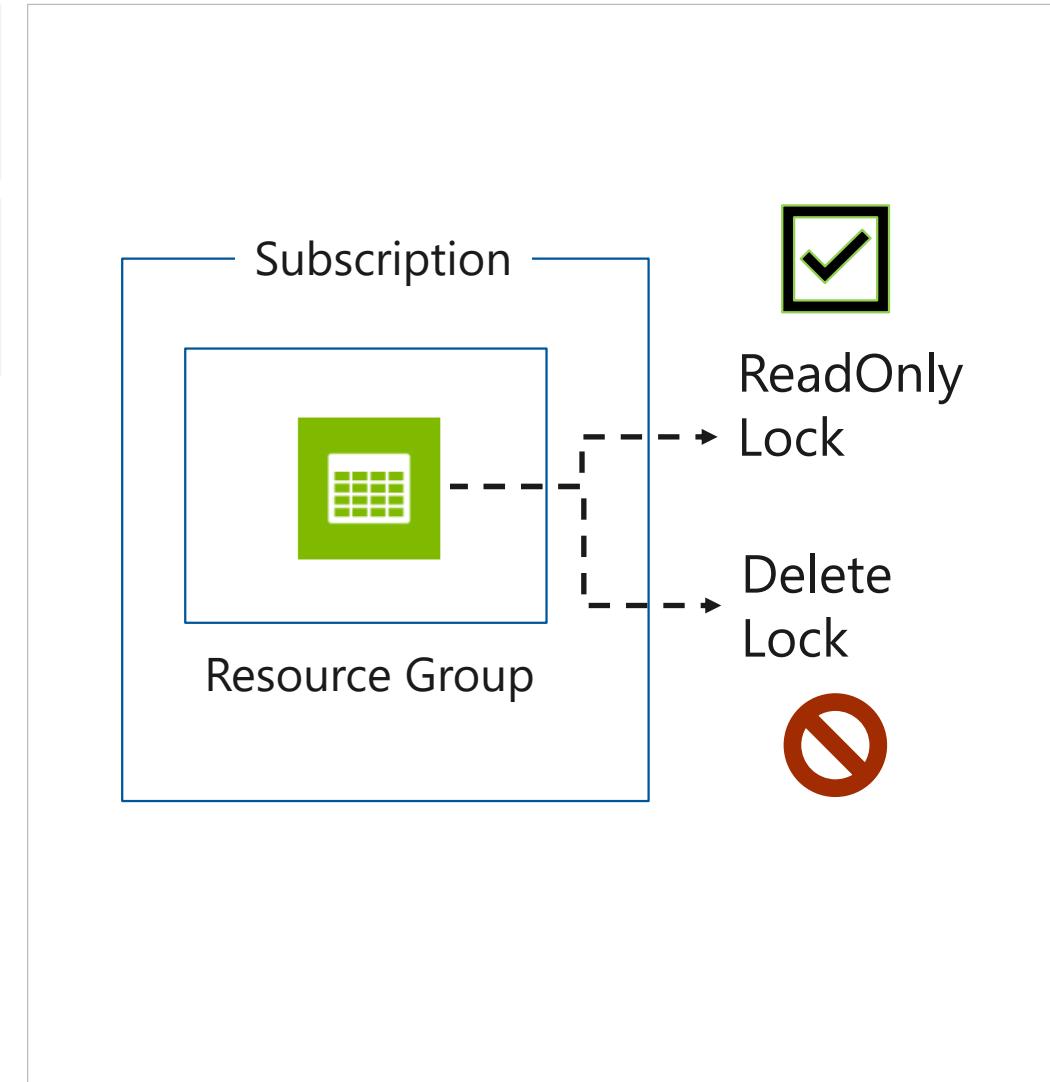
Lab 02 – Azure Policy



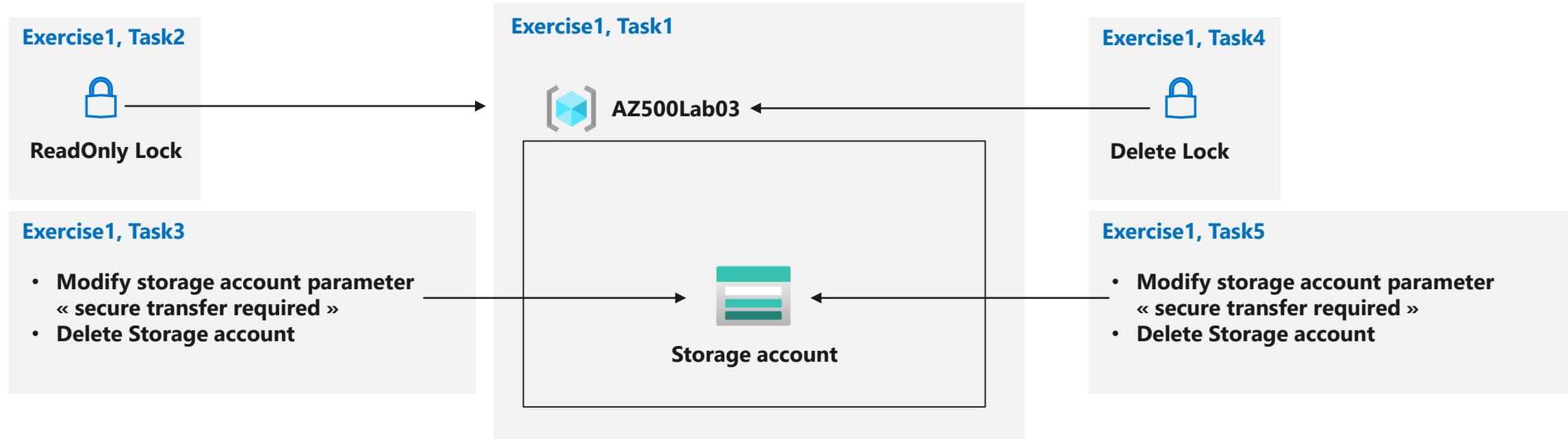
Lab 03 – Resource Manager Locks

Prevent a storage account configuration from being changed.

Prevent a storage account from being deleted.



Lab 03 – Resource Manager Locks

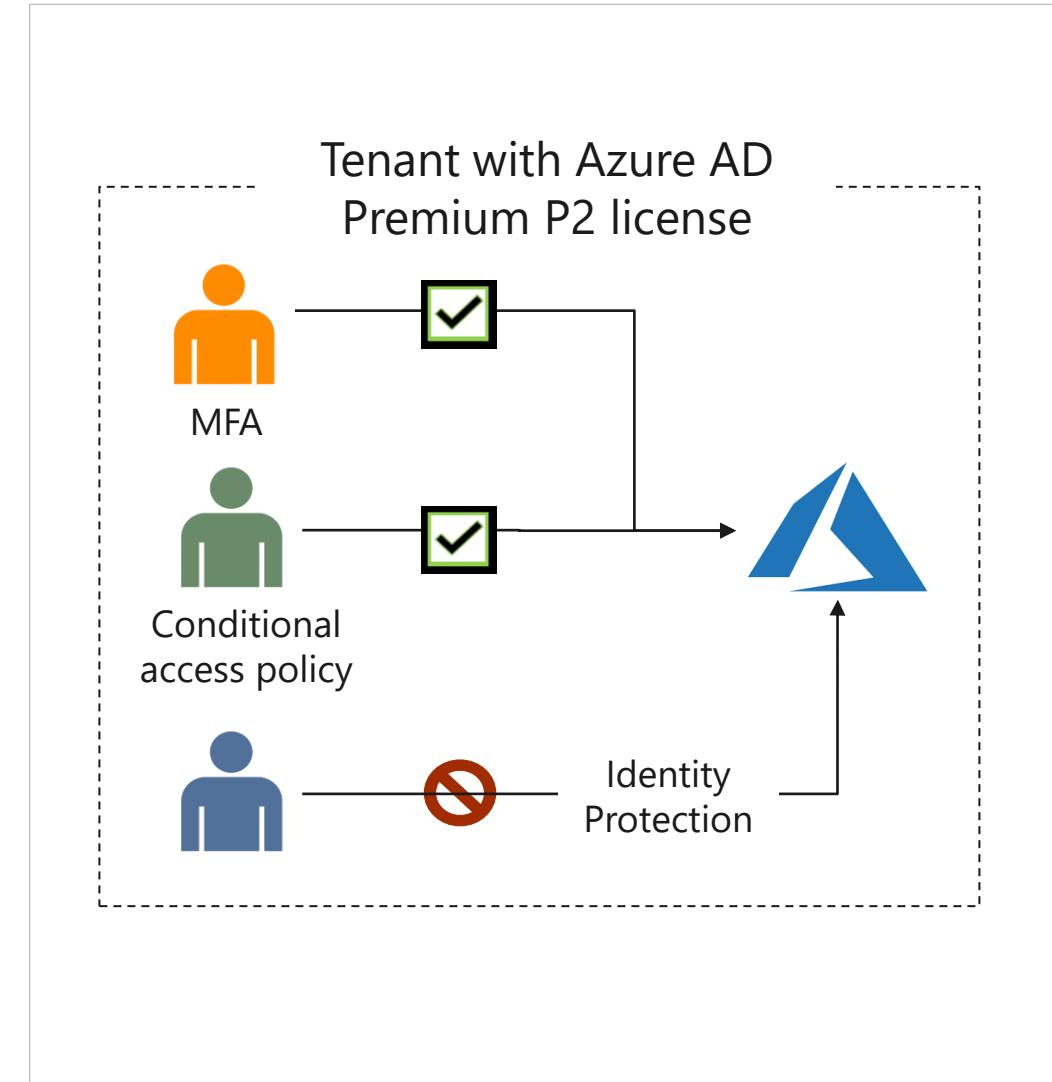


Lab 04 – MFA - Conditional Access - Identity Protection

Implement and test Azure MFA.

Implement and test Azure AD Conditional Access Policies.

Implement and test Azure AD Identity Protection.



Lab 04 – MFA - Conditional Access - Identity Protection

Exercise1, Task1



az500-04-vnet1 10.102.0.0/16

Subnet0 10.102.0.0/24



az104-07-vm0
10.102.0.4



Exercise2, Task2

Premium P2 free trial



Exercise2, Task1



AdatumLab500-04

Exercise2, Task3, Task4



aaduser1
Role: Global Administrator



Aaduser2
Role: user



aaduser3
Role: user

Your user account

Exercise2, Task5, Task6

MFA

static

Exercise3, Task1, Task2

Conditional Access → MFA

Exercise4, Task1, Task2,
Task3, Task4, Task5

Identity protection

Risk > Low → MFA

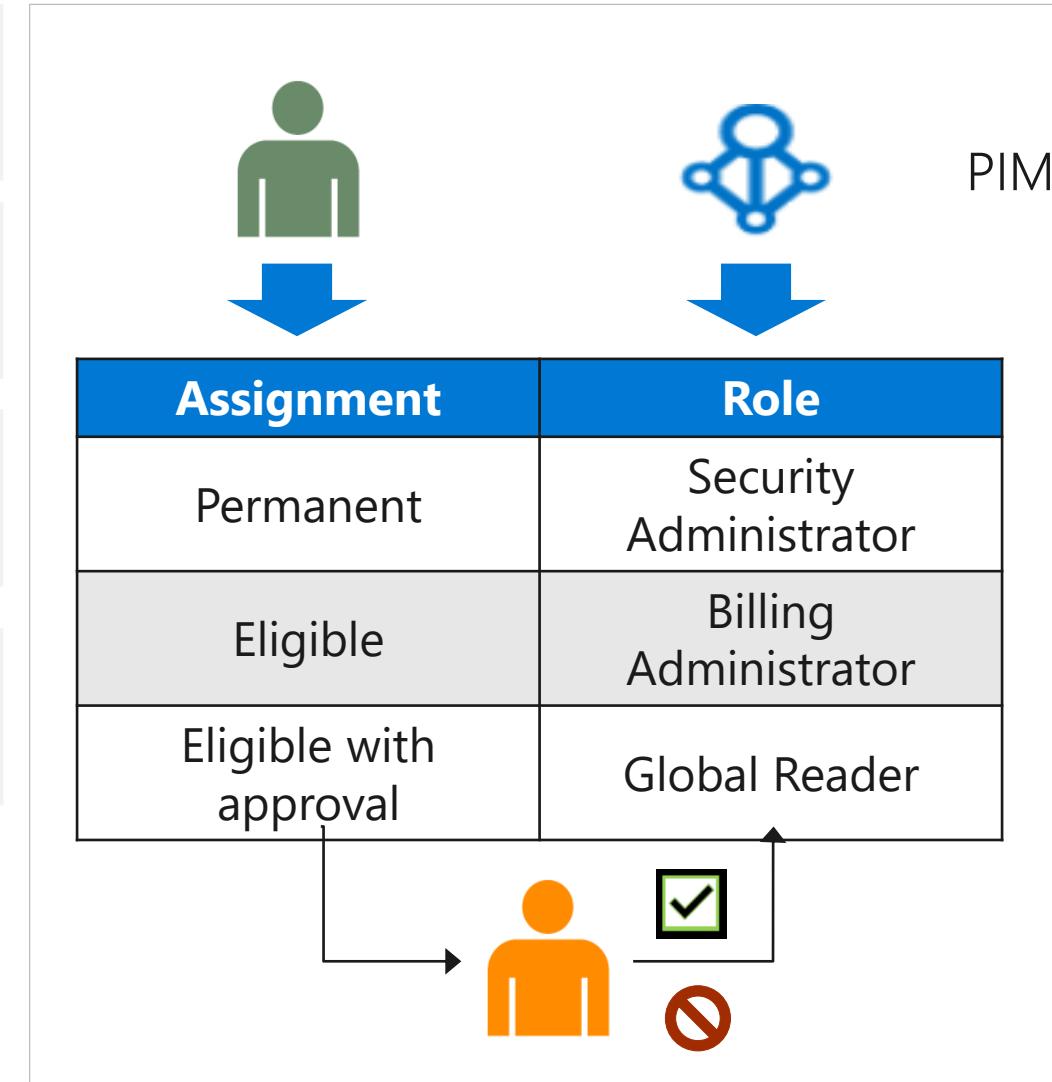
Lab 05 – Azure AD Privileged Identity Management

Onboard PIM.

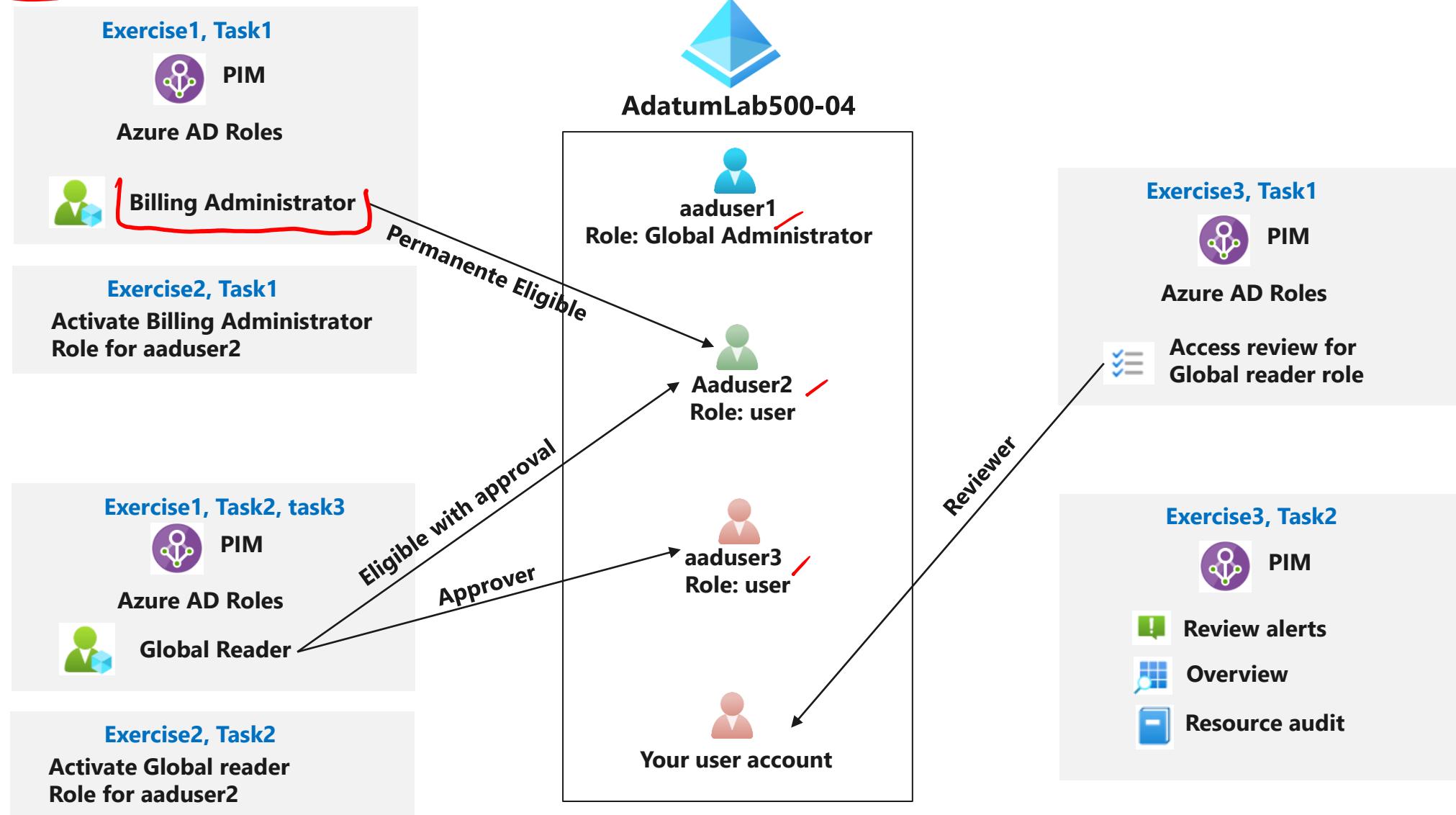
Configure PIM users and roles.

Activate PIM roles with and without approval.

Create an Access Review and review PIM auditing features.



Lab 05 – Azure AD Privileged Identity Management



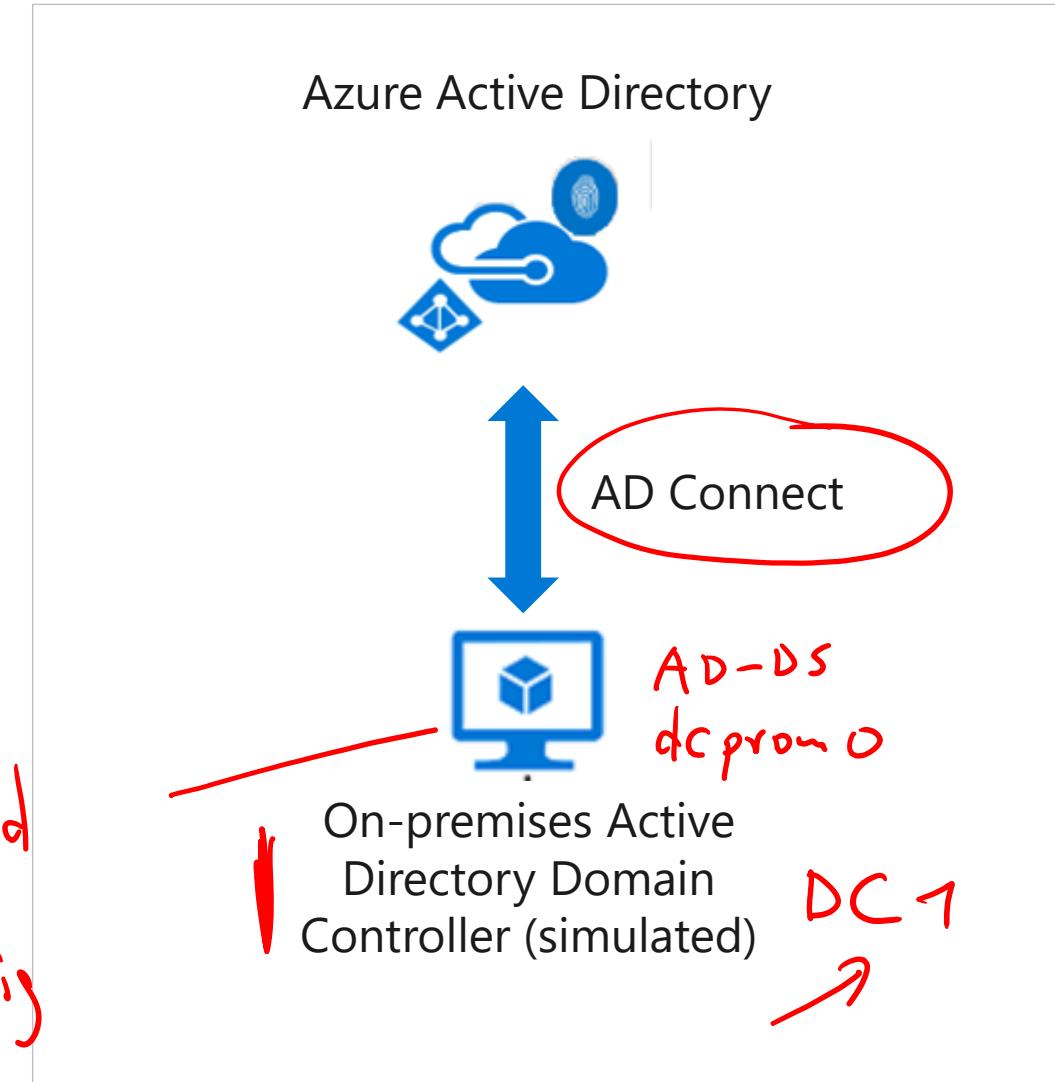
Lab 06 – Implement Directory Synchronization

Deploy an Azure VM hosting an Active Directory domain controller.

Create and configure an Azure Active Directory tenant.

Synchronize Active Directory forest with an Azure Active Directory tenant.

Desired
state
(config)

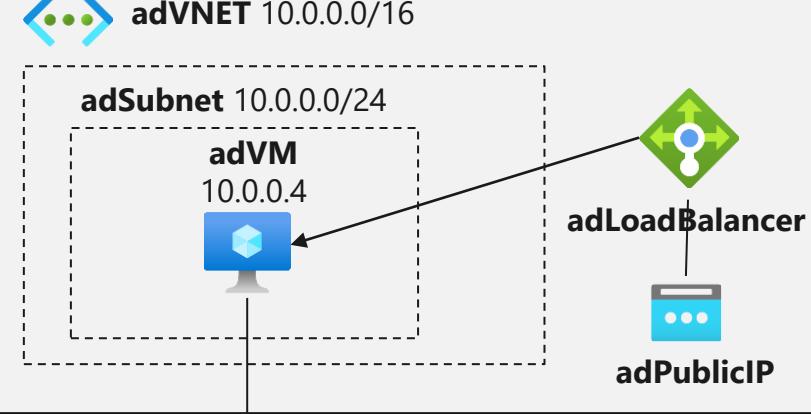


Lab 06 – Implement Directory Synchronization

Exercise1, Task1, Task2



adVNET 10.0.0.0/16



Exercise2, Task1, Task2



AdatumSync
Adatum.com

Adatum.com
Exercise3, Task1, Task2, Task3
OU: ToSync

Azure AD connect

aduser1

aduser1

Exercise2, Task3
Syncadmin
Role: Global Administrator

End of presentation