



1ST EDITION

Azure Security

Cookbook

Practical recipes for securing Azure resources and operations

A decorative graphic element in the bottom left corner, consisting of several orange lines forming a stylized, nested geometric shape that resembles a series of connected chevrons or a stylized letter 'S'.

STEVE MILES

Azure Security Cookbook

Practical recipes for securing Azure resources and operations

Steve Miles



BIRMINGHAM—MUMBAI

Azure Security Cookbook

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Proofreader: Safis Editing

Indexer: Rekha Nair

Production Designer: Joshua Misquitta

Marketing Coordinator: Marylou De Mello

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Securing Azure AD Identities

Azure Active Directory (Azure AD) is a multi-tenant cloud-based identity and access management solution that is part of Microsoft's **Entra Identity platform** product family.

You can read more about *Entra* and its integrated *hybrid* and *multi-cloud identity and access solutions* family at the following Microsoft site: <https://www.microsoft.com/en-us/security/business/microsoft-entra>.

In this chapter, you will learn how to *secure* and *protect* Azure AD identities.

We will break down this chapter into sections that cover how you can review your environments, including security posture, tenant-level identity and access management, password management and protection, security defaults, multi-factor authentication, and Conditional Access. We will then look at implementing Identity Protection and *Identity Management* services.

By the end of this chapter, you will have covered the following recipes to create secure Azure AD identities:

- Reviewing Azure AD Identity Secure Score
- Implementing Azure AD tenant Identity and Access Management
- Implementing Azure AD Password Protection
- Implementing Self-Service Password Reset
- Implementing Azure AD security defaults
- Implementing Azure AD multi-factor authentication
- Implementing Conditional Access policies
- Implementing Azure AD Identity Protection
- Implementing Azure AD Privileged Identity Management

Introduction to Azure Identity Services

Before we look at any recipes, we will first introduce some concepts surrounding *Microsoft Identity services*. This will assist us in establishing a foundation of knowledge to build upon. We will start by looking at **Active Directory (AD)**.

What is AD?

AD provides **Identity and Access Management (IAM)** and **Information Protection** services for traditional Windows Server environments. It was first included with *Windows Server 2000* as an installable service.

AD provides different services in its portfolio and is used as a generic and *umbrella term* in many cases.

These individual services in Azure AD include the following:

- **AD Domain Services (AD DS)**
- **AD Federation Services (AD FS)**
- **AD Certificate Services**
- **AD Rights Management Services**

In this next section, we will introduce Azure AD and look at its relationship with AD, a similar name but with different functions, capabilities, and use cases.

When is AD not AD? When it is Azure AD!

Before we go any further, we should clear one thing up: there is a common misconception that **Azure AD** must just be a cloud-based **Software-as-a-Service (SaaS)** *version*, but it is **not!**

It is easy enough why people (*wrongly*) think this may be the case; after all, **Exchange Online** and **SharePoint Online** are indeed exactly that, *SaaS versions* of their traditional infrastructure deployed platforms; if only it were that simple, though.

In many ways, **Azure AD** is like **AD** on the surface; they are both **Identity Providers (IDPs)** and provide **IAM** controls. Still, at the same time, they function differently and don't yet provide a complete parity of capabilities, although quite close.

It is worth noting that Azure AD is constantly evolving to meet the requirements and demands of authentication and authorization of workloads and services to bring capabilities in line with those available in AD, such as **Kerberos realms** within Azure AD.

At the time of publishing this book, you *cannot use* Azure AD to 100% replace the provided capabilities of AD.

Depending on the scenario, it may be the case that your environments will never be 100% cloud-based for identity services. You may remain with *Hybrid identity services* – that is, both AD and Azure AD coexist in a connected and synchronized state.

What is Azure AD?

Azure AD is a *SaaS identity management solution* that is *fully managed* and provides functions such as an *IDP* and *IAM* for managing and securing access to resources based on **Role-Based Access Control (RBAC)**.

As Azure AD is provided as a *fully managed service*, there is no installable component such as **Windows Servers and Domain Controllers (DC)**; *zero infrastructure* needs to be deployed by you.

The primary cloud authentication protocol used by Azure AD is based around using **OpenID, OAuth, and Graph**, whereas AD uses **Kerberos** and **NTLM**.

What is Hybrid Identity?

The hybrid identity approach allows you to *synchronize objects*, such as *user objects* and their *passwords*, between AD and Azure AD *directories*.

The main driver for hybrid identity within an organization is legacy AD-integrated applications that do not support cloud identity authentication protocols.

This capability provides users access to *AD authenticated*, and *Azure AD authenticated* using a single **Common Identity** and password.

The password synced to Azure AD is a *hash* of the stored *hashed password*; passwords are never stored in Azure AD, only the password hash. This capability is referred to as **same sign-on**, meaning you will be prompted each time to enter the *same* credentials when you wish to authenticate to resources.

This capability should not be confused with **single sign-on (SSO)**, which *does not* prompt you again when accessing resources. The following diagram shows the relationship between AD and Azure AD:

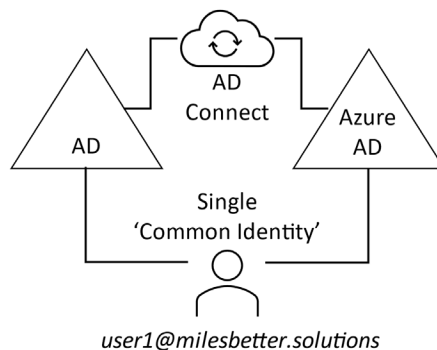


Figure 1.1 – AD and Azure as a relationship

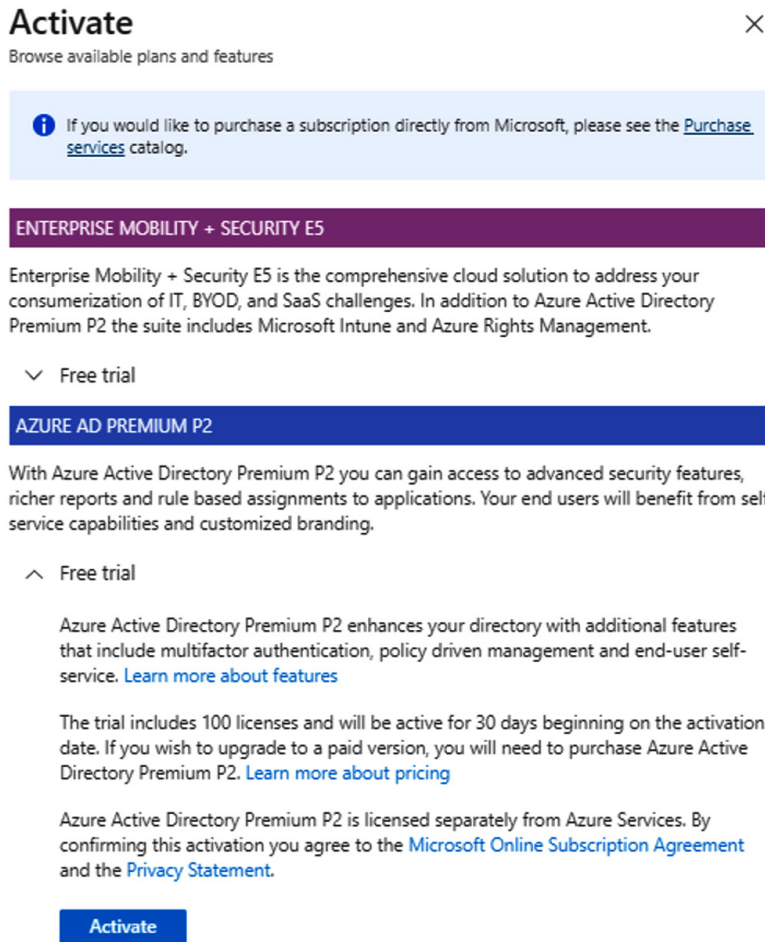
Azure AD Connect is a free downloadable tool that *synchronizes* objects between AD and Azure AD's IDP directories; this establishes *hybrid identities*. Azure AD Connect provides additional functionality and capabilities and allows for **Self-Service Password Reset (SSPR)** through additional configuration.

You can continue learning more, should you wish, about hybrid identities and Azure AD Connect, by going to <https://learn.microsoft.com/en-us/azure/active-directory/hybrid/what-is-azure-ad-connect>.

Technical requirements

For this chapter, the following are required for the recipes:

- A machine with a modern browser such as Edge or Chrome and internet access; this machine can be a client or server operating system. We will use a Windows 10 Microsoft Surface laptop with a Chrome browser for the recipe examples.
- An Azure AD tenancy; you may use an existing one or sign up for free: <https://azure.microsoft.com/en-us/free>.
- Access to the *Global Administrator* role for the tenancy.
- Some cloud-only test user created accounts as part of the Azure AD tenancy.
- You will require Azure AD Premium licenses or trial licenses. The following steps will guide you on activating a free trial if you do not already have a license:
 - I. From the Azure portal, go to **Azure AD | Licenses | All products**, then click **Try/Buy** from the *top toolbar*.
 - II. Select the **AZURE AD PREMIUM P2** free trial and click **Activate**:



Activate ×

Browse available plans and features

i If you would like to purchase a subscription directly from Microsoft, please see the [Purchase services](#) catalog.

ENTERPRISE MOBILITY + SECURITY E5

Enterprise Mobility + Security E5 is the comprehensive cloud solution to address your consumerization of IT, BYOD, and SaaS challenges. In addition to Azure Active Directory Premium P2 the suite includes Microsoft Intune and Azure Rights Management.

∨ Free trial

AZURE AD PREMIUM P2

With Azure Active Directory Premium P2 you can gain access to advanced security features, richer reports and rule based assignments to applications. Your end users will benefit from self-service capabilities and customized branding.

∧ Free trial

Azure Active Directory Premium P2 enhances your directory with additional features that include multifactor authentication, policy driven management and end-user self-service. [Learn more about features](#)

The trial includes 100 licenses and will be active for 30 days beginning on the activation date. If you wish to upgrade to a paid version, you will need to purchase Azure Active Directory Premium P2. [Learn more about pricing](#)

Azure Active Directory Premium P2 is licensed separately from Azure Services. By confirming this activation you agree to the [Microsoft Online Subscription Agreement](#) and the [Privacy Statement](#).

Activate

Figure 1.2 – Azure AD Premium P2 free trial activation

Reviewing Azure AD Identity Secure Score

Azure AD Identity Secure Score enables you to make informed decision-making to protect your Azure AD tenancy.

This recipe will teach you how to monitor and *improve* your Azure AD Identity Secure Score.

We will take you through reviewing the Azure AD Identity Secure Score dashboard for your Azure AD tenancy environments and look at the actionable insights available to improve your secure score and security posture.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: <https://portal.azure.com>
- You should sign into the Azure portal with an account with the **Global Administrator** role

How to do it...

This recipe consists of the following tasks:

- Reviewing Identity Secure Score
- Updating the improvement actions status

Task – Reviewing Identity Secure Score

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory | Security | Identity Secure Score**.
Alternatively, in the search bar, type `azure ad identity secure score`; click on **Azure AD Identity Secure Score** from the list of services shown.
2. You will now see the **Identity Secure Score** blade.
3. The top section of the **Identity Secure Score** screen represents your *identity security posture*:

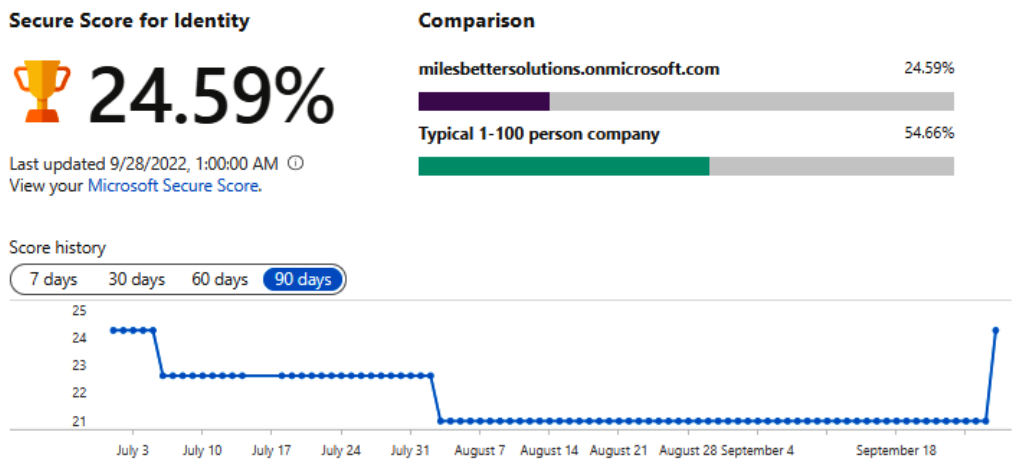


Figure 1.3 – Secure Score screen

This area of the screen shows three aspects to review:

- **Secure Score for Identity** is a percentage of your alignment with Microsoft’s best practice security recommendations
- **Comparison** is your security posture management compared to other tenants of a similar size
- **Score history** is a trend graph over time

4. The lower section of the **Identity Secure Score** screen provides a list of recommended and possible security **Improvement actions**.

Each recommended improvement action has a **Score Impact**, **User Impact**, **Implementation Cost**, **Max Score** possible, and **Current Score**:

Improvement actions

Download Columns

Name ↑↓	Score Impact ↑↓	Current Score ↑↓	Max Score ↑↓	User Impact ↑↓	Implementation C... ↑↓	Status ↑↓
Require multifactor authentication for administrative roles	16.39%	0	10	Low	Low	To address
Ensure all users can complete multifactor authentication	14.75%	0	9	High	High	To address
Enable policy to block legacy authentication	13.11%	0	8	Moderate	Moderate	To address
Do not expire passwords	13.11%	8	8	Moderate	Low	Completed
Protect all users with a user risk policy	11.48%	0	7	Moderate	Moderate	To address
Protect all users with a sign-in risk policy	11.48%	0	7	Moderate	Moderate	To address
Enable password hash sync if hybrid	8.20%	5	5	Low	Low	Completed
Do not allow users to grant consent to unreliable applications	6.56%	0	4	Moderate	Low	To address
Use least privileged administrative roles	1.64%	1	1	Low	Low	Completed
Designate more than one global admin	1.64%	1	1	Low	Low	Completed
Enable self-service password reset	1.64%	0	1	Moderate	Moderate	To address

Figure 1.4 – The Improvement actions screen

5. Click **Download**; you can access the improvement actions in a CSV file:

Improvement actions

Download Columns

	A	B	C	D	E	F	G
	Name	Score Impact	Current Score	Max Score	User Impact	Implementation Cost	Status
1	Require multifactor authentication for administrative roles	16.39	0	10	Low	Low	To address
2	Ensure all users can complete multifactor authentication	14.75	0	9	High	High	To address
3	Enable policy to block legacy authentication	13.11	0	8	Moderate	Moderate	To address
4	Do not expire passwords	13.11	8	8	Moderate	Low	Completed
5	Protect all users with a user risk policy	11.48	0	7	Moderate	Moderate	To address

Figure 1.5 – Improvement actions download

6. By clicking on an **Improvement action**, you can see further information:

Improvement action ✕

Enable self-service password reset

SCORE IMPACT ⓘ
+1.64%

CURRENT SCORE ⓘ
0

MAX SCORE ⓘ
1

STATUS ⓘ
To address ▾

DESCRIPTION ⓘ
With self-service password reset in Azure Active Directory, users no longer need to engage help desk to reset passwords. This feature

A measure of how much impact the action will have on users' passwords, which are being used.

A measure of how difficult is to implement the improvement action

IMPLEMENTATION COST ⓘ
Moderate

WHAT AM I ABOUT TO CHANGE? ⓘ

1. [Follow our step-by-step guidance to enable self-service password reset](#)
2. If you have users that are synced from on-premises Active Directory using Azure AD Connect, you may also need to enable the password writeback feature. [For more information, enable the password writeback feature. For more information, see this article](#)

HOW WILL IT AFFECT MY USERS? ⓘ
Users will be able to self-service password reset in Azure AD and no longer need to engage help desk.

[Get Started](#)

Secure score updates can take up to 48 hours.

Save

Figure 1.6 – Improvement actions information

With that, you have reviewed Identity Secure Score. In the next task, we will update the status of improvement actions.

Task – Updating the improvement actions status

Perform the following steps:

1. Select an **Improvement action** and click to open it.
2. From the **Improvement action** screen, on the **STATUS** section, select the status you wish to update the action to and then click **Save**:

Improvement action ×

Enable policy to block legacy authentication

SCORE IMPACT ⓘ
+13.11%

CURRENT SCORE ⓘ
0

MAX SCORE ⓘ
8

STATUS ⓘ

Risk accepted ✓

To address

Risk accepted

Planned

Resolved through third party

Resolved through alternate mitigation

USER IMPACT ⓘ
Moderate

IMPLEMENTATION COST ⓘ
Moderate

WHAT AM I ABOUT TO CHANGE? ⓘ

1. We provide step-by-step guidance to select and enable the right method to block legacy authentication for your organization in the Microsoft 365 admin center (part of the MFA wizard). [Go to the Microsoft 365 MFA wizard](#)
2. If you would like to perform the implementation yourself, first check what Azure Active Directory license you have under "Prerequisites" in Microsoft Secure Score or [see your license type under "Basic information" in the Azure](#)

Secure score updates can take up to 48 hours.

Save

Figure 1.7 – Improvement actions status options

With that, you have updated the status of improvement actions. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we reviewed the information presented in the Azure AD identities Secure Score and took action from available insights.

- The Azure ID Identity Secure Score overlaps with the identity score used for the *Microsoft secure score*, which means the recommendations will be the same.
- The Azure AD Identity Secure Score provides a value of between **1%** and **100%**, representing how well your Azure AD tenancy is secured based on Microsoft's best practices and *recommendations*.

You can also see actionable improvement insights on how your score can be improved and each improvement's impact on the secure score.

The dashboard and a score history timeline show a comparison of your environment's Azure AD tenancy to a tenancy of the same size and industry average.

Your environment's Azure AD tenancy identity settings are compared with best practice recommendations once a day (approx 1:00 A.M. PST); changes made to an improvement action *may not* be reflected in the score for up to **48 hours**.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- What is the identity secure score in Azure Active Directory?: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals/identity-secure-score>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Azure AD tenant Identity and Access Management

Account compromise is one of the biggest threat vectors to protect against, and those with privileged access roles will be the focus of attacks. There are often too many users assigned privileged accounts, with more access than is required for a user to carry out their role. There is often insufficient RBAC in place, and the principle of least privilege should be adopted for these privileged administrator roles.

While we need to limit the number of user accounts that have the Global Administrator role, there should also not be a single point of compromise for the Global Administrator role. Having more than one account with the Global Administrator role is important. It is crucial to have an emergency account in case of a breach or conditional access lockout of a Global Administrator role assigned. Global Administrator role accounts can use a buddy system to monitor each other's accounts for signs of a breach.

This recipe will teach you to ensure you only have the users assigned with the least privileges required for their role and ensure you have a minimum of two accounts assigned the Global Administrator role.

We will take you through the steps to implement these tasks.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: <https://portal.azure.com>
- You should sign in with an account that has the **Global Administrator** role

How to do it...

This recipe consists of the following tasks:

- Implementing least privileged administrative roles
- Designating more than one Global Administrator

Task – implementing least privileged administrative roles

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory | Roles and administrators**.
2. From the **All roles** section, select the **Global administrator** role:

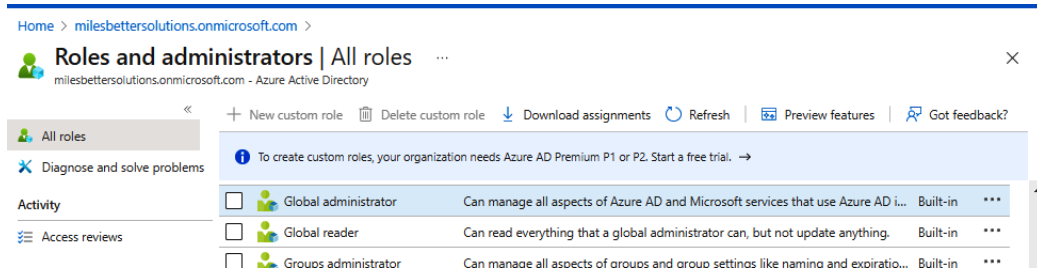


Figure 1.8 – Azure AD Roles and Administrators screen

3. From the **Assignments** section, identify only the accounts required to have the **Global Administrators** role; ensure you have at *least two* or no more than *five* accounts with the **Global Administrator** role.

Select a user for users who no longer require the **Global Administrator** role and then click **Remove assignments** from the top toolbar:

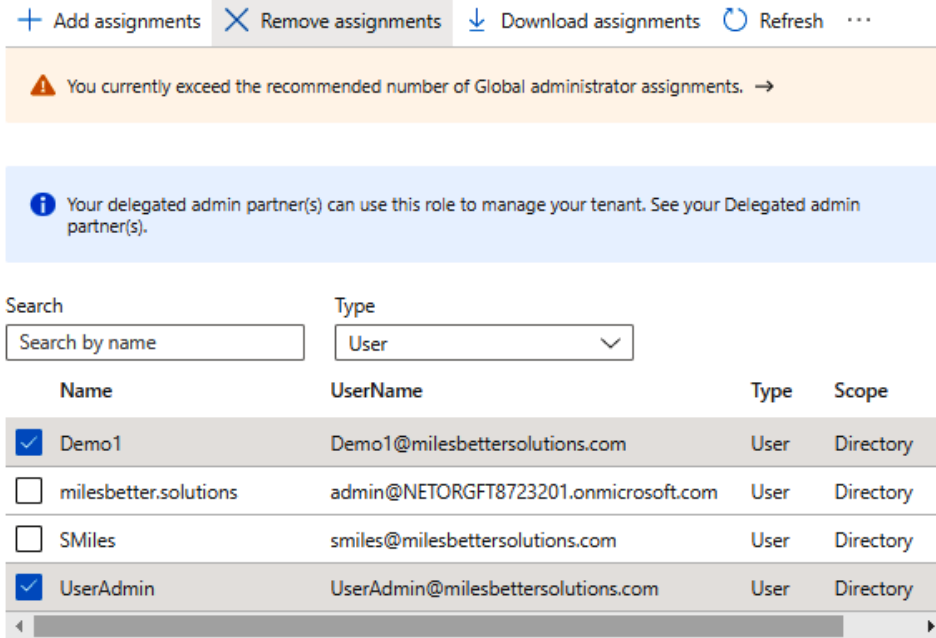


Figure 1.9 – The Remove assignments screen

- From **Azure Active Directory | Roles and administrators | All roles | Global administrator**, we can now see that the user has been removed from the **Global Administrator** role:

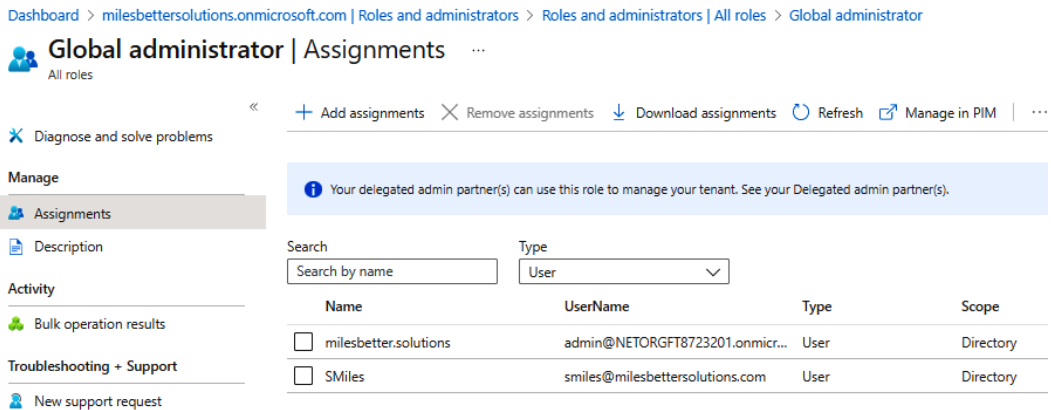


Figure 1.10 – Global Administrator Assignments screen

- To reassign least privileged admin users to roles required to complete their tasks, navigate to **Azure Active Directory | Users**. Select and click the *users* to assign *roles*.

- From the **User** blade for the user selected to assign a directory role, go to **Assigned roles** from the **Manage** section and click **Add assignments**:

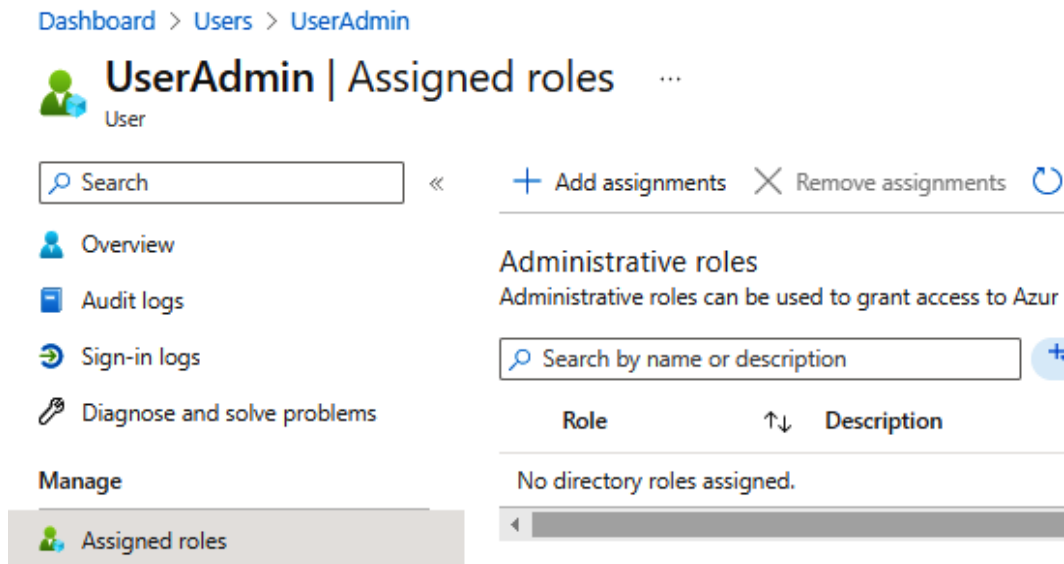


Figure 1.11 – The Assigned roles screen

- From the **Directory roles** pop-up screen, locate the *directory role* you wish to assign from the list of all available roles; select the *directory role* to assign and click **Add**:

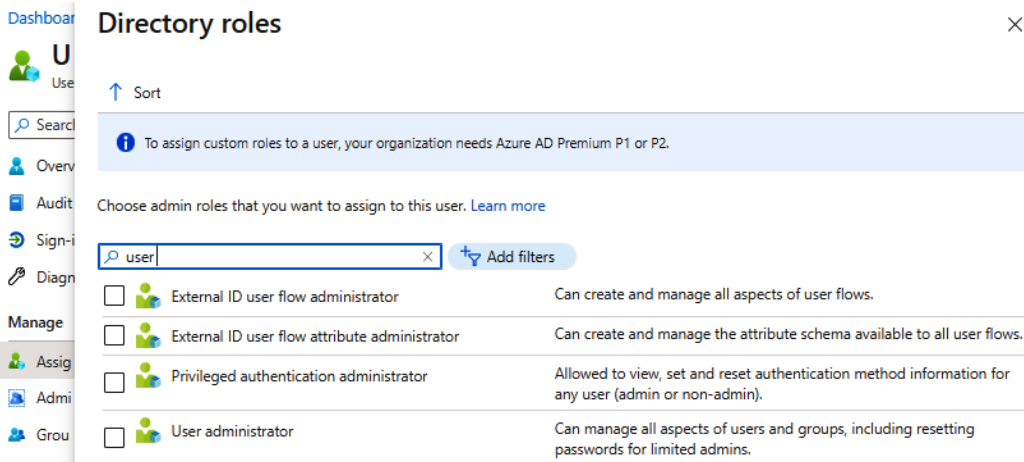


Figure 1.12 – The Directory roles assignment screen

8. Your user will now have the required *least privileged admin* role assigned and no longer have the highly privileged **Global Administrator** role:

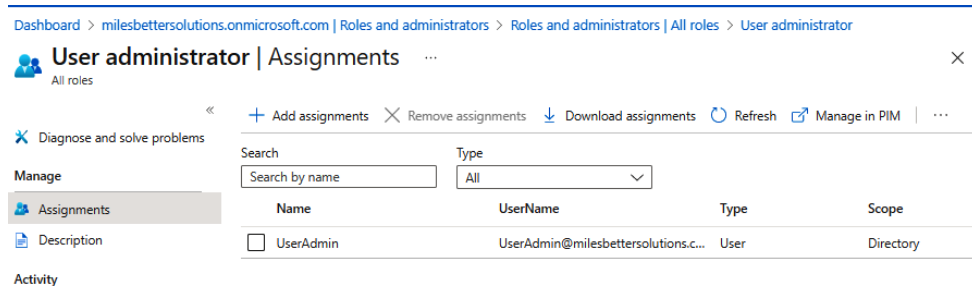


Figure 1.13 – User administrator | Assignments

With that, you have learned how to use least privileged roles. In the next task, we will designate more than one Global Administrator for the tenancy.

Task – designating more than one Global Administrator

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory | Roles and administrators | All roles | Global Administrator**.
2. From the **Assignments** blade, click **Add assignments** and locate the user(s) to add to the **Global Administrators** role:

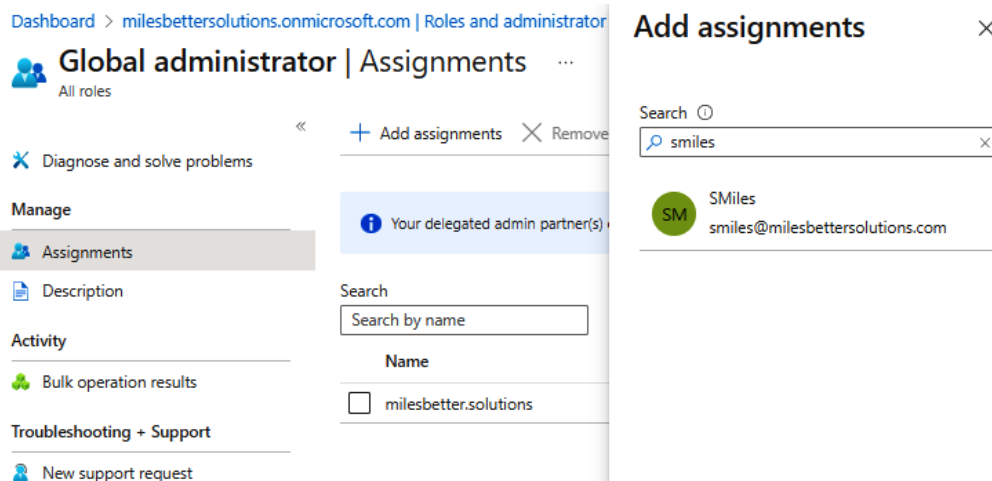


Figure 1.14 – Global administrator – the Add assignments screen

3. Select the user, and then click **Add**:

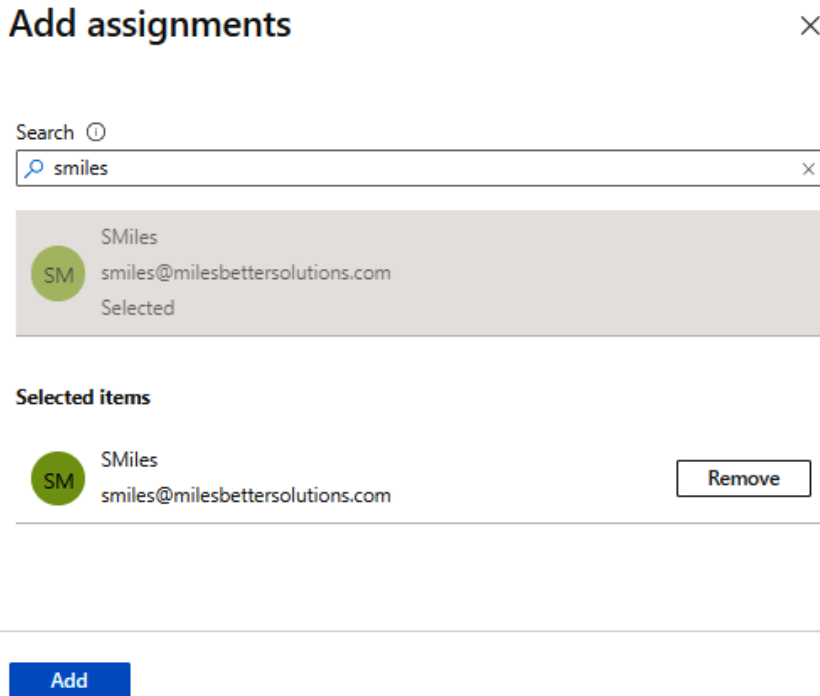


Figure 1.15 – Global administrator – The Add assignments screen

4. You will now see that the user(s) have been assigned the **Global Administrator** role:

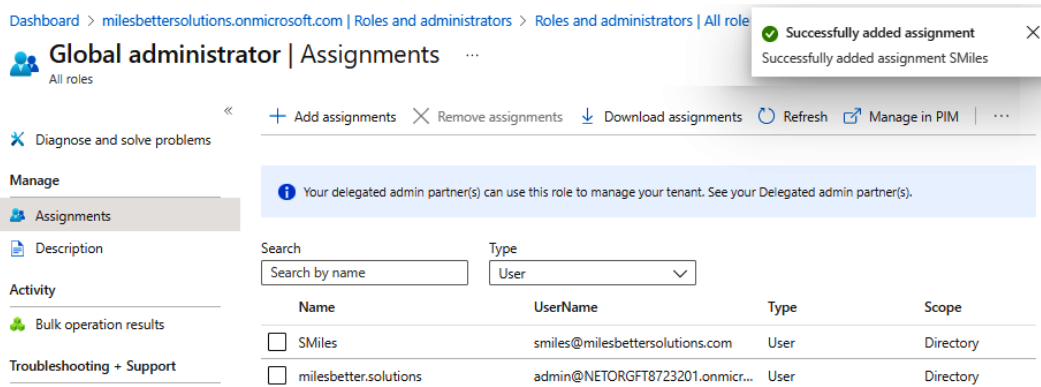


Figure 1.16 – Global administrator | Assignments

With that, you have created more than one Global Administrator role. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at limiting the number of users with the Global Administrator role and ensuring you only had the users assigned with the least required privileges for their role. In our example, we removed the Global Administrator role from a user and reassigned them to the User Administrator role, which was the least privileges required for their tasks.

We then ensured you had a minimum of two accounts assigned the Global Administrator role by adding a user to this role. The Microsoft recommendation is for a minimum of two users and no more than five for this role.

There's more...

Azure AD user accounts with the *highest privileged* role of **Global Administrator** will be the primary goal for compromise by bad actors. This is because this role has access to every administrative setting in your environment's Azure AD tenancy at the **read** and **modify** permission level.

Microsoft recommends that you assign user accounts with *less privileged* roles. This limits the user's scope of permissions through **RBAC** to only be able to do what a user needs to do for their job function.

The following are some of the many roles that can be considered to reduce the use of the *Global Administrator* role but still have enough access for a user to be able to perform their duties:

- Application Administrator
- Authentication Administrator
- Azure DevOps Administrator
- Azure Information Protection Administrator
- Billing Administrator
- Compliance Administrator
- Conditional Access Administrator
- Directory Readers
- Exchange Administrator
- SharePoint Administrator
- Privileged Role Administrator
- Security Administrator
- User Administrator

Should you require further information on least privileged roles, you can refer to the following Microsoft Learn articles:

- Assigning Azure roles using the Azure portal: <https://learn.microsoft.com/en-us/azure/role-based-access-control/role-assignments-portal>
- Azure AD built-in roles: <https://learn.microsoft.com/en-us/azure/active-directory/roles/permissions-reference>
- What are the default user permissions in Azure Active Directory?: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals/users-default-permissions>
- Least privileged roles by task in Azure Active Directory: <https://learn.microsoft.com/en-us/azure/active-directory/roles/delegate-by-task>

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Best practices for Azure AD roles: <https://learn.microsoft.com/en-gb/azure/active-directory/roles/best-practices>
- Restrict member users' default permissions: <https://learn.microsoft.com/en-gb/azure/active-directory/fundamentals/users-default-permissions#restrict-member-users-default-permissions>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Azure AD Password Protection

Users often make poor choices when creating passwords, making them easy targets and victims of dictionary-based attacks.

This recipe will teach you how to implement Azure AD password protection in your environment's AD tenancy. We will take you through customizing your smart lockout threshold and creating a global and custom banned password list.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: <https://portal.azure.com>
- You should sign in with an account that has the **Global Administrator** role
- We will use Azure AD Premium licenses for this and future recipes

How to do it...

This recipe consists of the following task:

- Configuring password protection

Task – configuring password protection

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory** and then click **Security** under the **Manage** section from the *side menu*.
2. Select **Authentication Methods** under the **Manage** section from the *side menu*.
3. Select **Password protection** under the **Manage** section from the *side menu*.
4. From the **Custom smart lockout** section, set the **Lockout threshold** and **Lockout duration in seconds** properties as required; review the information in the tooltips by clicking on the **i** symbol:

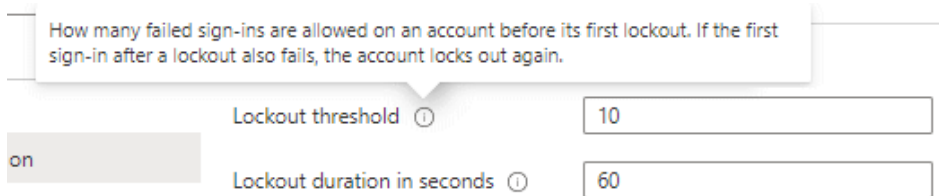


Figure 1.17 – Azure AD Premium P2 free trial activation

5. From the **Custom banned password** section, select **Yes**, enter strings that are to be banned, and click **Save**; review the information in the tooltips by clicking on the **i** symbol. It can take several hours to apply the banned password list:

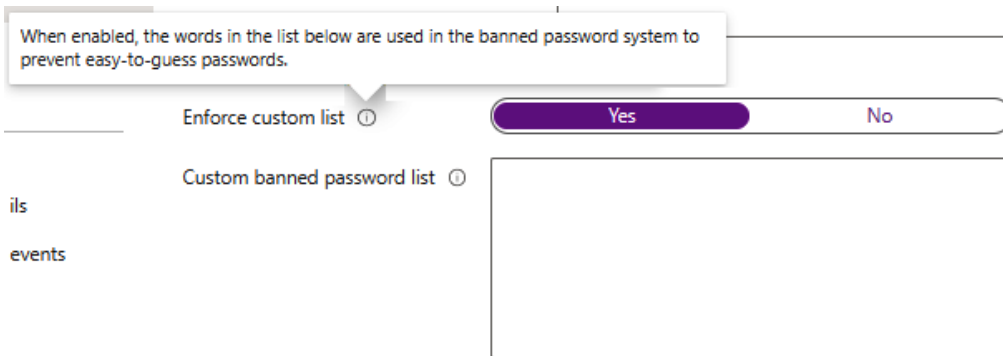


Figure 1.18 – Azure AD Premium P2 free trial activation

With that, you have configured password protection. This concludes the hands-on tasks for this recipe.

How it works...

You only need to add key terms such as **password** or **contoso** and the algorithm will automatically consider and block all variants of common character substitutions, such as **Pa\$\$w0rd1!** or **C@ntos0!**.

The banned password list may have a maximum of 1,000 key terms. The minimum length of a term string is 4 characters, where 16 characters is the maximum and are case-sensitive.

This recipe looked at customizing your smart lockout threshold to protect against brute-force attack methods. We also looked at creating a global and custom banned password list to protect against dictionary and password spray attacks and enforce the use of strong passwords.

Both of these measures, when implemented, can offer significant protection for your environment's Azure AD tenancy.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Eliminate bad passwords using Azure Active Directory Password Protection: <https://learn.microsoft.com/en-us/azure/active-directory/authentication/concept-password-ban-bad>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing a Self-Service Password Reset

Users will sometimes forget their passwords; to prevent intervention by an Azure AD administrator, a **self-service password reset (SSPR)** can be implemented. This allows users to click on the **Can't access your account?** link on the sign-in page for the portal or Microsoft Cloud service they are trying to access.

This recipe will teach you how to implement SSPR in your environment's AD tenancy. We will take you through enabling SSPR for a selected scope and review the available settings, then carry out a user registration for SSPR and test its operation to confirm the function is working.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: `https://portal.azure.com`
- You should sign in with an account that has the **Global Administrator** role
- Optionally, pre-create an **Azure AD Security group** called **SSPR-Test-Group** and add members to test with

How to do it...

This recipe consists of the following task:

- Configuring Self-Service Password Reset

Task – configuring Self-Service Password Reset

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory** and then click **Password** under the **Manage** section from the *side menu*.
2. From **Properties**, under the **Manage** section from the *side menu*, choose **Selected** under **Self-service password reset enabled**; review the information in the tooltips on this page by clicking on the **i** symbol:

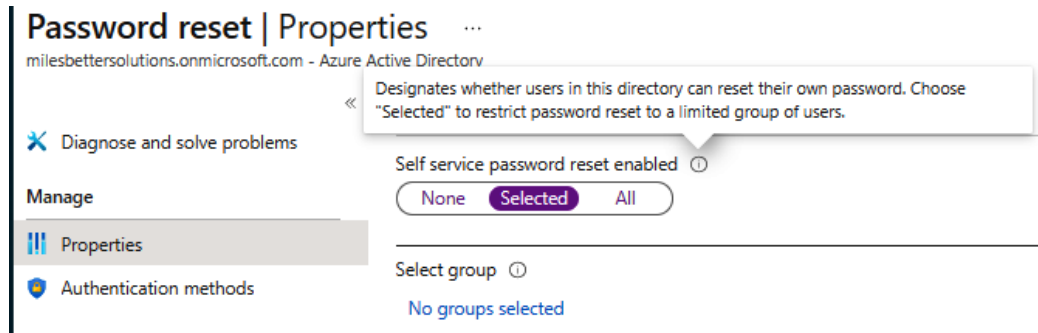


Figure 1.19 – Password reset | Properties

3. Click on the **No groups Selected** hyperlink and then browse and select the group to enable SSPR. Then, click **Save**:

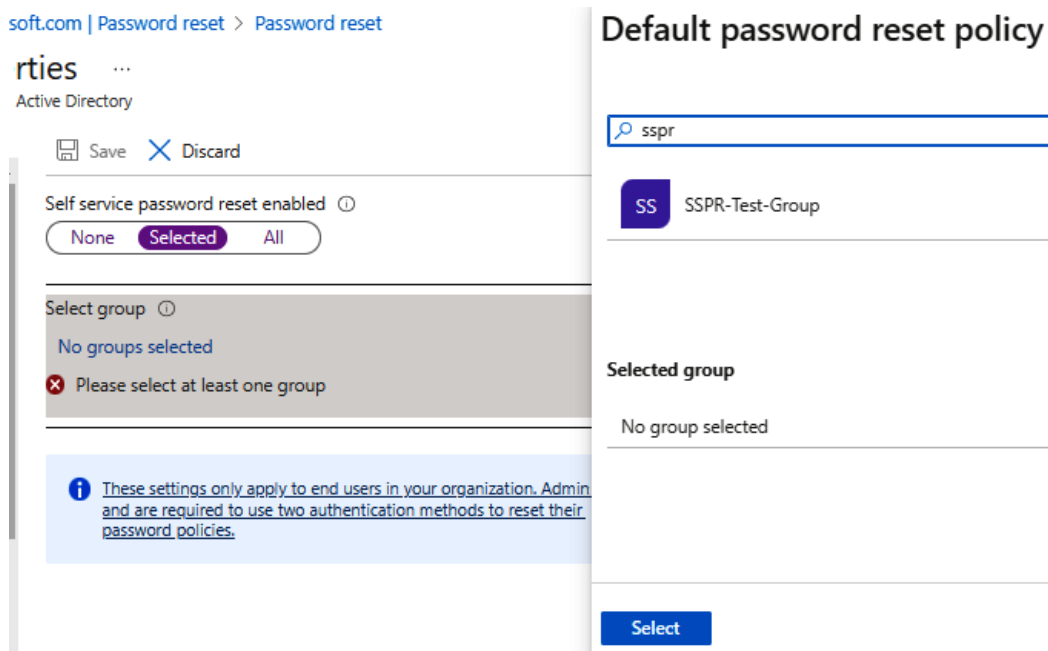


Figure 1.20 – Password reset selected groups

4. From **Authentication methods**, under the **Manage** section from the *side menu*, select as required the **Number of methods required to reset** setting.
5. Then, select as required the **Methods available to users** setting:

Save Discard

Number of methods required to reset ①

1 2

Methods available to users

Mobile app notification

Mobile app code

i Users can register their mobile app at aka.ms/mfasetup or in the new security info registration experience at aka.ms/setupsecurityinfo. You can enable security info registration for your organization by following steps at aka.ms/securityinfodocs. For additional help on using Authenticator app methods visit aka.ms/authappsspr

Email

Mobile phone

Office phone

Security questions

i These settings only apply to end users in your organization. Admins are always enabled for self-service password reset and are required to use two authentication methods to reset their password. [Click here to learn more about administrator password policies.](#)

Figure 1.21 – Authentication methods

6. From **Registration**, under the **Manage** section from the *side menu*, select **Yes** for **Require users to register when signing in?**
7. Select the **Number of days before users are asked to re-confirm their authentication information** setting as required.
8. From **Notifications**, under the **Manage** section from the *side menu*, select **Notify users on password resets?** as required.
9. From **Notifications**, under the **Manage** section from the *side menu*, select the **Notify users on password resets?** and **Notify all admins when other admins reset their password?** settings as required.
10. From **Customization**, under the **Manage** section from the *side menu*, select the **Customize helpdesk link?** and **Custom helpdesk email or URL** settings as required.
11. Review the *settings configured* from **Administrator Policy** in the **Manage** section from the *side menu*.

With that, you have configured SSPR. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at how we can implement SSPR when users forget their password for a portal or Microsoft Cloud service they are trying to access.

This prevents intervention from an Azure AD administrator, which reduces the burden on these roles and also protects against loss of productivity.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Tutorial: Enable users to unlock their accounts or reset passwords using Azure Active Directory SSPR: <https://learn.microsoft.com/en-us/azure/active-directory/authentication/tutorial-enable-sspr>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Azure AD security defaults

The perimeter vanishes with the rise in hybrid working and a remote workforce on unsecured devices outside of secure corporate networks. Now, it is commonplace to be targeted by identity-related attacks such as password spray and phishing. However, with basic security adoption, such as blocking legacy authentication and **multi-factor authentication (MFA)**, 99.9% of these identity-related attacks can be stopped. However, we must balance security with productivity.

Because security can require skills and money, Microsoft is providing no-cost preconfigured secure settings by default to provide a basic level of security for everybody.

This recipe will teach you how to implement the Azure AD security defaults in your environment's AD tenancy.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: <https://portal.azure.com>
- You should sign into the Azure portal with an account with the **Global Administrator, Security Administrator, or Conditional Access Administrator** role

How to do it....

This recipe consists of the following task:

- Enabling security defaults

Task – enabling security defaults

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory** and click **Properties** in the **Manage** section from the *side menu*.
2. Then, click the **Manage Security Defaults** hyperlink, select **Yes** under **Enable security defaults**, and click **Save**:

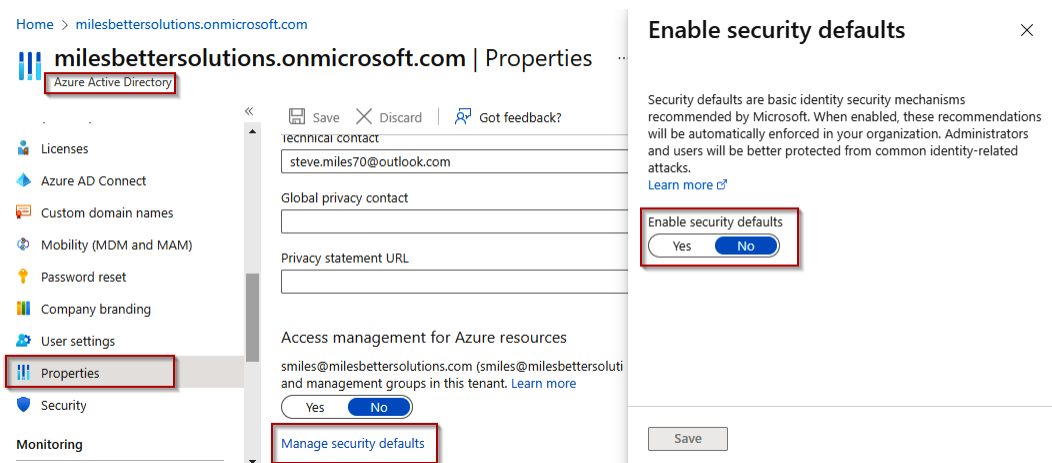


Figure 1.22 – The Enable security defaults screen

With that, you have enabled security defaults. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at enabling security defaults in your environment's Azure AD tenancy.

The security defaults are Microsoft-recommended security mechanisms with preconfigured security settings that, once enabled, are automatically enforced in your tenant to protect against the most common identity-based attacks.

The following are the enforced settings:

- Azure MFA for all users and administrators
- Blocking of legacy authentication protocols
- Protection of privileged access activities, such as Azure portal access

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Security defaults in Azure AD: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals/concept-fundamentals-security-defaults>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Azure AD multi-factor authentication

We must adopt a **zero-trust** strategy in the perimeter-less world of cloud services and hybrid working more than ever. This means that we must **assume breach** and **never trust, always verify**.

Azure AD MFA provides an additional layer of defense; we never trust a single authentication method and must assume that the traditional password method has been compromised. Microsoft studies show that when you implement MFA, your accounts are more than 99.9% less likely to be compromised.

This recipe will teach you how to implement Azure AD MFA in your environment's AD tenancy.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: <https://portal.azure.com>.
- You should sign into the Azure portal with an account with the **Global Administrator** role.

- You will require Azure AD Premium licenses or trial licenses.
- If you have Security Defaults enabled, you will automatically have MFA enabled for all users and administrators using the free benefits of Azure AD. Using one of the paid Azure AD Premium licenses provides additional capabilities, such as the additional authentication methods of verification codes, text messages, or phone calls, as well as the following:
 - **Azure AD Premium P1:** This license includes **Azure Conditional Access** for MFA
 - **Azure AD Premium P2:** This license adds **risk-based Conditional access** to MFA through **Information Protection**

How to do it...

This recipe consists of the following task:

- Configuring MFA

Task – configuring MFA

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory**, click **Security** in the **Manage** section from the *side menu*, and then click **Multifactor authentication**.
2. From the **Multifactor authentication | Getting started** blade, click the **Additional cloud-based multifactor authentication settings** hyperlink under the **Configure** section heading:

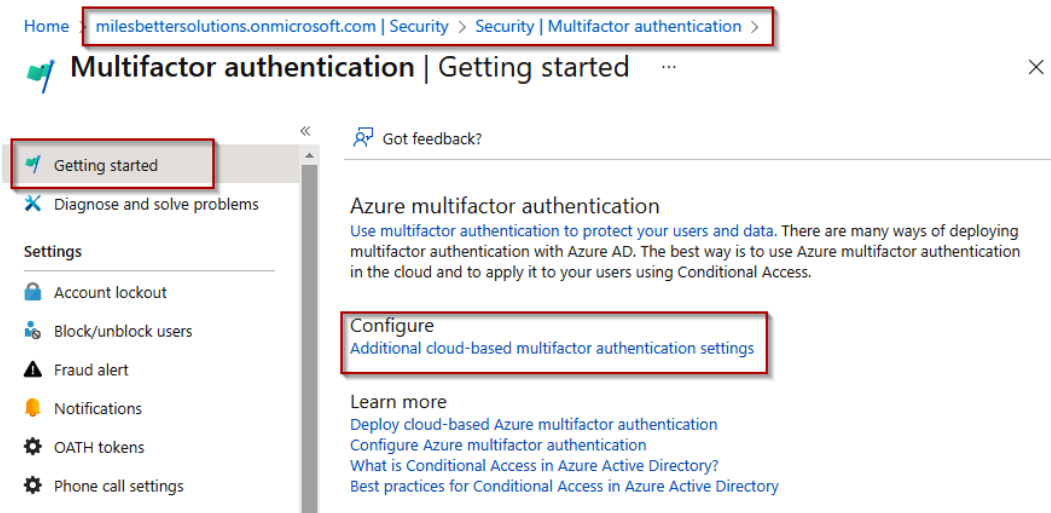


Figure 1.23 – Multifactor authentication | Getting started

- Two tabs are available from the new **multi-factor authentication** page that opens; select the user's tab and then **users** to enable MFA:

multi-factor authentication

users service settings

Before you begin, take a look at the [multi-factor auth deployment guide](#).

View:

<input type="checkbox"/>	DISPLAY NAME ^	USER NAME	MULTI-FACTOR AUTH STATUS
<input type="checkbox"/>	Demo1	Demo1@milesbettersolutions.com	Disabled
<input type="checkbox"/>	[Redacted]	[Redacted]	[Redacted]
<input type="checkbox"/>	[Redacted]	[Redacted]	[Redacted]
<input type="checkbox"/>	[Redacted]	[Redacted]	[Redacted]
<input type="checkbox"/>	SMiles	smiles@milesbettersolutions.com	Disabled
<input type="checkbox"/>	Steve Miles	steve.miles70@outlook.com	Disabled
<input type="checkbox"/>	UserAdmin	UserAdmin@milesbettersolutions.com	Disabled

Select a user

Figure 1.24 – MFA configuration screen

- From the **user** pane on the right, click on the **Manage user settings** hyperlink in the **quick steps** section:

Demo1

Demo1@milesbettersolutions.com

quick steps

Enable

Manage user settings

Figure 1.25 – MFA selected user pane

- On the **Manage user settings** pop-up screen, select any of the three options as required and then select **save**:

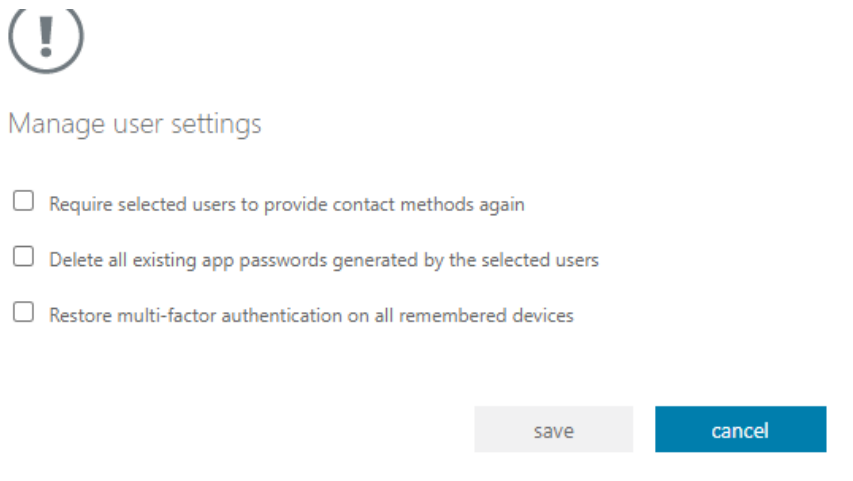


Figure 1.26 – Manage user settings pop-up screen

6. Click **Enable** on the user pane screen from *Step 4* of this recipe. From the **About enabling multi-factor auth** pop-up screen that appears, read the provided links, click **enable multi-factor auth**, and click **close** on the **Updates successful** screen.
7. To disable a user for MFA, select the user from the **user** pane, click **Disable** in the **quick steps** section, select **Yes** on the pop-up screen, and click **Close**:

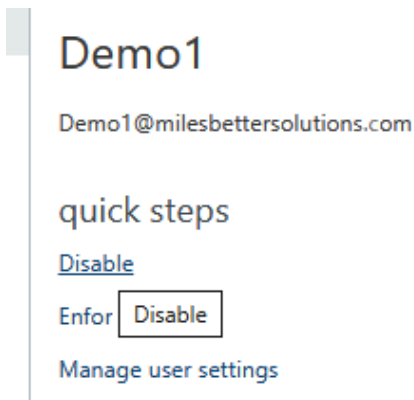


Figure 1.27 – Disabling MFA for a user

8. You may bulk update enabling users for MFA by selecting the **bulk update** button and uploading a CSV file; a template file will be provided that you can download.
9. Once the **user** tab configuration is complete, select the **service settings** tab in the **multi-factor authentication** browser window:

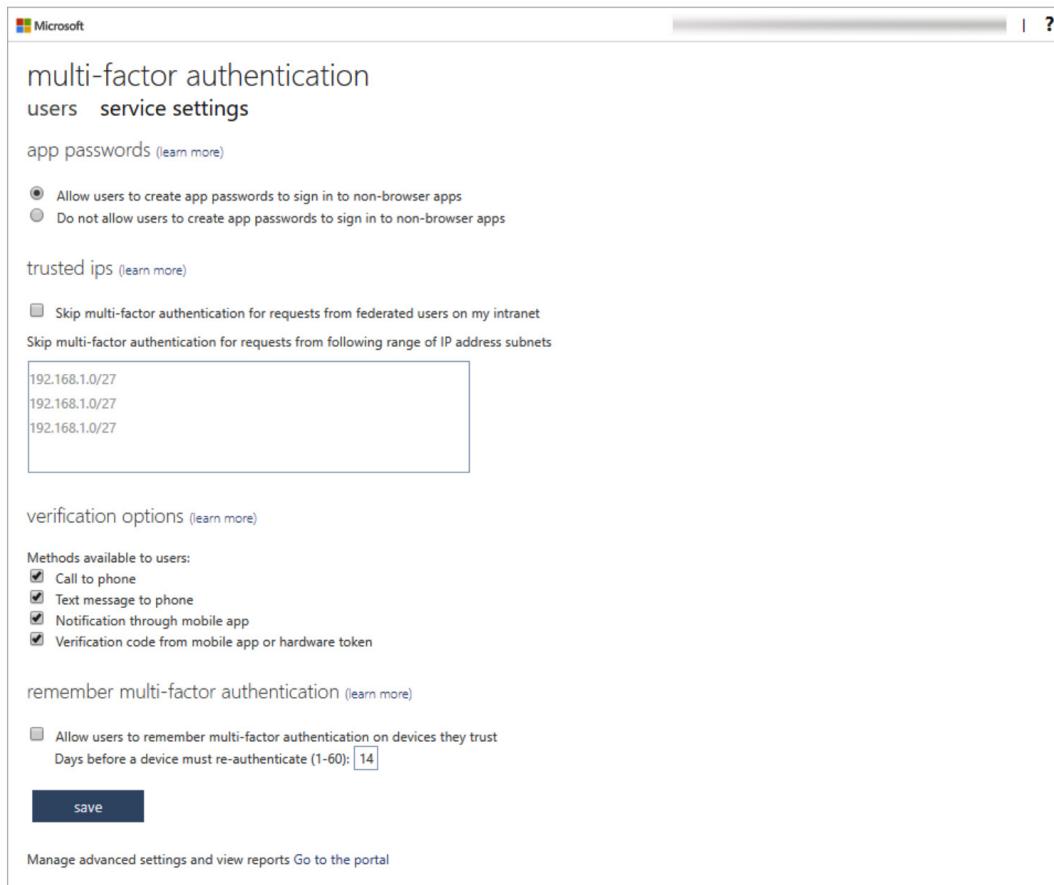


Figure 1.28 – The service settings tab's settings

10. From the **service settings** screen, set the required options and click **save**. Note the **verification options** section.

With that, you have configured MFA. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at how to enable Azure AD MFA in our environment's Azure AD tenancy to provide an additional layer of security for users to sign to protect their identity from compromise.

Azure AD MFA requires us to provide one or more additional factors as a method to authenticate in addition to the password factor.

We can use the following authentication factors:

- Something we know (*password*)
- Something we own (*device*)
- Something we are (*biometrics*)

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Secure Azure Active Directory users with Multi-Factor Authentication: <https://learn.microsoft.com/en-us/training/modules/secure-aad-users-with-mfa/>
- Features and licenses for Azure AD Multi-Factor Authentication: <https://learn.microsoft.com/en-us/azure/active-directory/authentication/concept-mfa-licensing>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Conditional Access policies

There must be a balance of protecting an organization's resources while ensuring every user, wherever they are, is empowered to be productive whenever.

To further strengthen our Azure AD identities, we can use insights from identity-driven signal data to make informed access control decisions and then use those decisions to enforce access policies.

MFA works alongside Conditional Access to provide further granular control of access.

Conditional Access is based on an IF/THEN approach. This approach means that IF signal information collected from the sign-in process matches certain criteria, THEN decisions are made based on the information as to whether access will be *allowed* or *blocked*.

Conditional Access will also determine whether the user will be required to perform additional authentication methods or take other actions, such as resetting their password. This is represented in the following diagram:

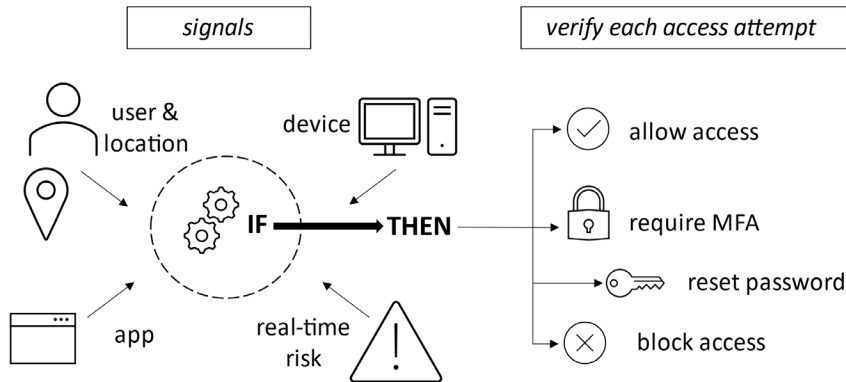


Figure 1.29 – Conditional Access concept

The following are some common Conditional Access policies:

- Require MFA for all users
- Require MFA for Microsoft portals/services access
- Require password reset for risky users
- Block the use of legacy authentication protocols
- Require hybrid-joined or compliant devices
- Allow or deny from specific locations

This recipe will teach you how to implement Conditional Access policies in your environment's AD tenancy. We will take you through enabling conditional access policies and configuring them to restrict user access to apps based on if a set of conditions have been met.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: `https://portal.azure.com`.
- You should sign into the Azure portal with an account with the **Global Administrator** role.
- You will require Azure AD Premium licenses or trial licenses.

- If you have Security Defaults enabled, you will automatically have MFA enabled for all users and administrators using the free benefits of Azure AD. Using one of the paid Azure AD Premium licenses provides additional capabilities such as the additional authentication methods of verification codes, text messages, or phone calls, as well as the following:
 - **Azure AD Premium P1:** This license includes Azure Conditional Access for MFA
 - **Azure AD Premium P2:** This license adds risk-based Conditional access to MFA

How to do it...

This recipe consists of the following task:

- Configuring Conditional Access

Task – configuring Conditional Access

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory**, click **Security** in the **Manage** section from the *side menu*, and then click **Conditional Access** in the **Protect** section.
2. Click **+ New Policy** from the *top toolbar* in the **Conditional Access Policies** blade:

Home > Security | Conditional Access > Conditional Access

Conditional Access | Policies

Azure Active Directory

« + New policy + New policy from template (Preview) What If | ...

Overview (Preview)

Policies

Insights and reporting

Diagnose and solve problems

Manage

Named locations

Custom controls (Preview)

Terms of use

VPN connectivity

Authentication context (Preview)

Classic policies

What is Conditional Access?

Conditional Access gives you the ability to enforce access requirements when specific conditions occur. Let's take a few examples

Conditions	Controls
When any user is outside the company network	They're required to sign in with multifactor authentication
When users in the 'Managers' group sign-in	They are required be on an Intune compliant or domain-joined device

[Want to learn more about Conditional Access?](#)

Get started

- Create your first policy by clicking "+ New policy"
- Specify policy Conditions and Controls
- When you are done, don't forget to Enable policy and Create

[Interested in common scenarios?](#)

Figure 1.30 – Conditional Access | Policies

3. Select a **Name** for your policy from the **New conditional access policy** blade.
4. From the **Assignments** section, select which *users and groups* this policy will apply to:

The screenshot shows the 'New Conditional Access Policy' configuration page. The title is 'New ... Conditional Access policy'. There are two columns of text: 'Control access based on Conditional Access policy to bring signals together, to make decisions, and enforce organizational policies. Learn more' and 'Control access based on who the policy will apply to, such as users and groups, workload identities, directory roles, or external guests. Learn more'. Below the text are two main sections. The left section is 'Assignments' with a sub-section 'Users or workload identities' showing '0 users or workload identities selected'. The right section is 'What does this policy apply to?' with a dropdown menu set to 'Users and groups'. Below this are radio buttons for 'Include' and 'Exclude'. Under 'Include', there are three options: 'None' (selected), 'All users', and 'Select users and groups'.

Figure 1.31 – User settings

5. From the **Cloud apps or actions** section, select whether this policy will apply to **Cloud apps** or **Actions**; we will select **Cloud apps**:

The screenshot shows the 'New Conditional Access Policy' configuration page. The title is 'New ... Conditional Access policy'. There are two columns of text: 'Control access based on Conditional Access policy to bring signals together, to make decisions, and enforce organizational policies. Learn more' and 'Control access based on all or specific cloud apps or actions. Learn more'. Below the text are two main sections. The left section is 'Assignments' with a sub-section 'Users or workload identities' showing '0 users or workload identities selected' and a sub-section 'Cloud apps or actions' showing 'No cloud apps, actions, or authentication contexts selected'. The right section is 'Select what this policy applies to' with a dropdown menu set to 'Cloud apps'. Below this are radio buttons for 'Include' and 'Exclude'. Under 'Include', there are three options: 'None' (selected), 'All cloud apps', and 'Select apps'.

Figure 1.32 – Apps setting

- From the **Include** tab, we will click **Select apps**, search for **Azure Management**, tick the check box next to **Microsoft Azure Management app** in the list, and click **Select**. Note the warning dialog box about not locking yourself out:

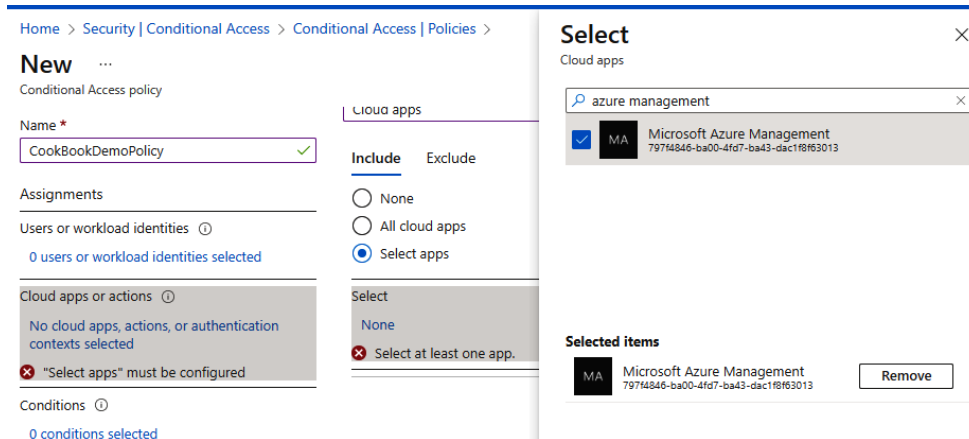


Figure 1.33 – App selection

- Click the **Conditions** settings, set any required conditions, or leave it unconfigured:

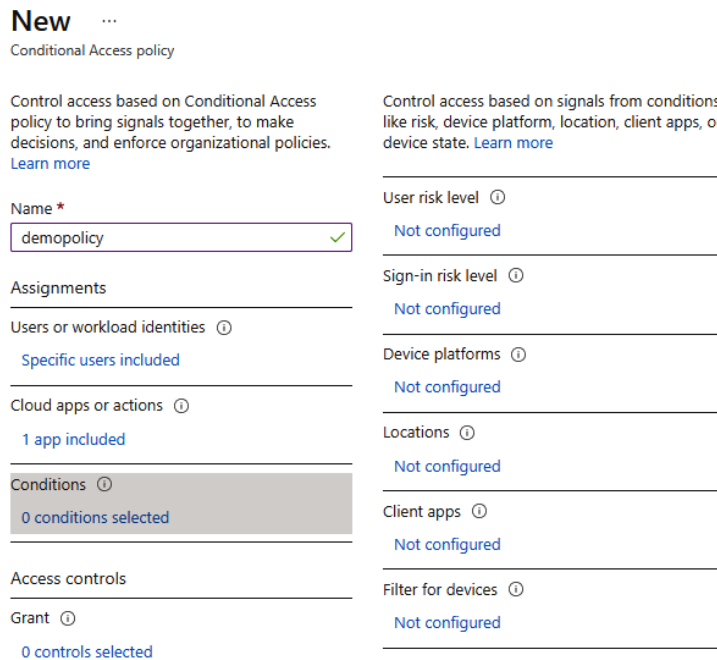


Figure 1.34 – Conditions settings

- From **Grant**, under the **Access controls** section, click on **0 controls selected**, set it to **Grant access**, tick **Require multifactor authentication**, and then click **Select**:

The screenshot displays the Azure AD Conditional Access policy configuration interface. On the left, the 'New' policy configuration pane shows the name 'demopolicy' and various assignment and condition settings. The 'Access controls' section is expanded to show the 'Grant' control, which is currently selected with '0 controls selected'. On the right, the 'Grant' configuration pane is open, showing options to 'Block access' or 'Grant access'. Under 'Grant access', several controls are listed: 'Require multifactor authentication' (checked), 'Require device to be marked as compliant', 'Require Hybrid Azure AD joined device', 'Require approved client app', 'Require app protection policy', and 'Require password change'. The 'For multiple controls' section is set to 'Require all the selected controls'. At the bottom, the 'Enable policy' section is set to 'Report-only', and the 'Create' button is visible.

Figure 1.35 – Access settings

- In the **Enable policy** section, leave it set to **Report-only**, then click **Create**.
- Your policy will now appear in the policies list:

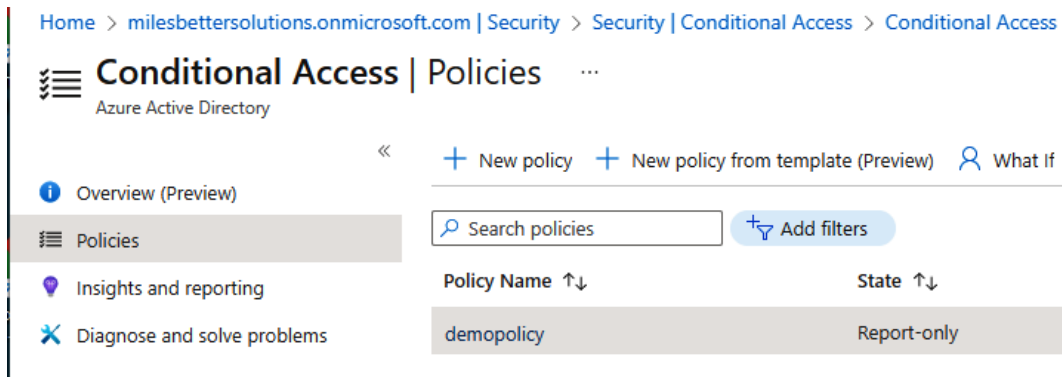


Figure 1.36 – Access policies list

With that, you have configured Conditional Access. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at how we can implement Conditional Access policies in addition to MFA to layer on an additional layer of defense while maintaining the users' productivity needs.

We configured a Conditional Access policy to a set of selected users (or groups) that required MFA when they accessed the Azure portal; this was enabled by selecting the Microsoft Azure Management app.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- What is Conditional Access?: <https://learn.microsoft.com/en-us/azure/active-directory/conditional-access/overview>
- Azure AD Conditional Access documentation: <https://learn.microsoft.com/en-us/azure/active-directory/conditional-access>
- Conditional Access: Cloud apps, actions, and authentication context: <https://learn.microsoft.com/en-us/azure/active-directory/conditional-access/concept-conditional-access-cloud-apps>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing the Azure AD Identity Protection service

We need solutions that provide remediation actions based on threat intelligence insights. Using policies, we can detect and respond to identity-based threats automatically; this allows us to react quicker and does not rely on human operator intervention.

This recipe will teach you how to implement Azure AD Identity Protection in your environment's AD tenancy.

We will take you through setting up risk policies, MFA registration policies, investigation, reports, and how to remediate identified risks.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: `https://portal.azure.com`
- You should sign in to the Azure portal with an account with the **Global Administrator** role
- You will require Azure AD Premium licenses or trial licenses

How to do it...

This recipe consists of the following task:

- Configuring Identity Protection

Task – configuring Identity Protection

Perform the following steps:

1. From the Azure portal, go to **Azure Active Directory**, click **Security** in the **Manage** section from the *side menu*, and then click **Identity Protection** in the **Protect** section.
2. From the **Identity Protection** blade, click **User risk policy**:

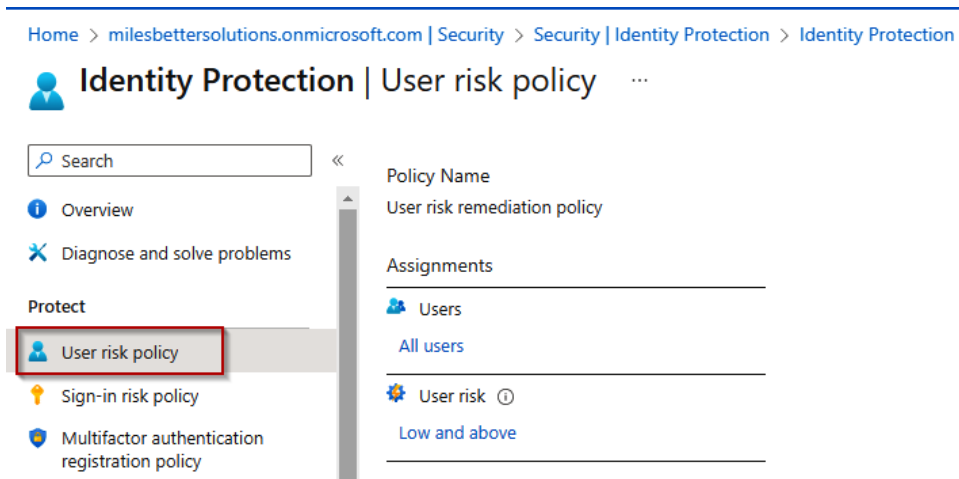


Figure 1.37 – User risk policy

3. From **Assignments**, click **All users**, review the available options, and select as required. You can set it to **include** or **exclude**.
4. From **User risk**, select the **risk level controls** options to be enforced: **High, Medium and above**, or **Low and above**. Then, click **Done**.
5. Click **Block access** from the **Access** section under **Controls** and select the controls to be enforced. You can set it to **Block** or **Allow** access and **Require password change**. Then, click **Done**:

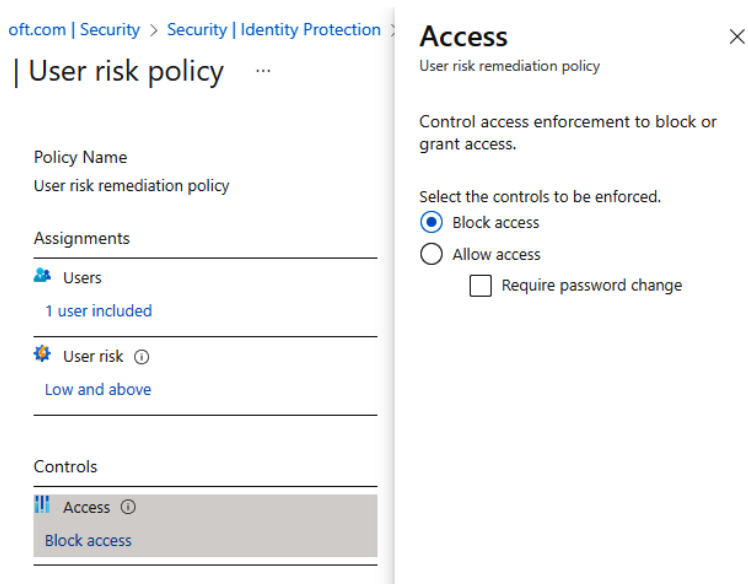


Figure 1.38 – User risk policy settings screen

6. Select **On** under **Enforce policy**, and then click **Save**.
7. Complete the same steps but this time for **Sign-in risk policy**:

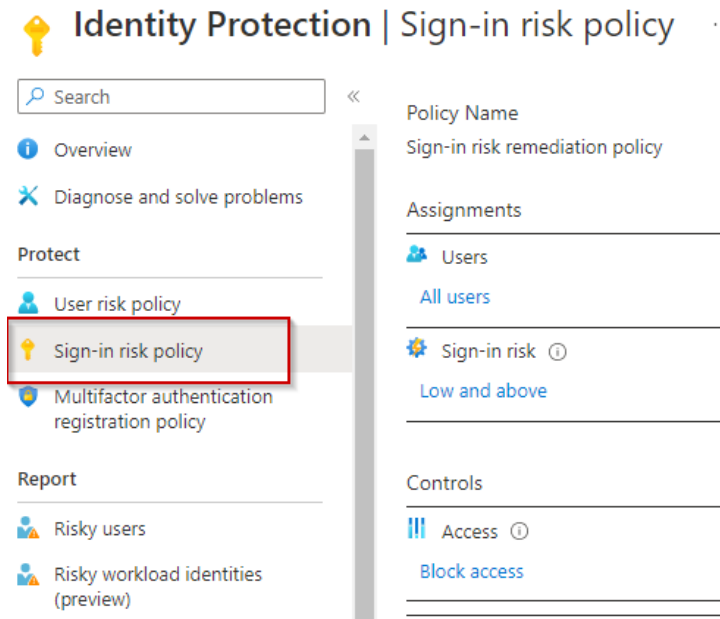


Figure 1.39 – Sign-in risk policy settings screen

With that, you have configured Identity Protection. This concludes the hands-on tasks for this recipe.

How it works...

This recipe looked at how to implement Azure AD Identity Protection.

A risk policy will monitor for identity risks, which, when detected, enforce remediation measures, which are the controls that have been set, such as blocking or allowing access and requiring a password change by the user.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Manage Azure AD Identity Protection: <https://learn.microsoft.com/en-us/training/modules/manage-azure-active-directory-identity-protection>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>

Implementing Azure AD Privileged Identity Management

To protect your environment's Azure AD tenancy and improve your security posture, you should implement a robust privileged identity protection strategy for roles and resources.

This recipe will teach you to implement Azure AD **Privileged Identity Management (PIM)** in your environment's AD tenancy.

We will take you through configuring a user to be assigned a privileged access role in your Azure AD tenancy so that the user's activity may be controlled.

Getting ready

This recipe requires the following:

- A device with a browser, such as Edge or Chrome, to access the Azure portal: `https://portal.azure.com`
- You should sign into the Azure portal with an account with the **Global Administrator** role
- You will require Azure AD Premium licenses or trial licenses

How to do it...

This recipe consists of the following task:

- Configuring Privileged Identity Management

Task – configuring Privileged Identity Management

Perform the following steps:

1. From the Azure portal, search for **Azure AD Privileged Identity Management** and select **access**.
2. From **Azure AD Privileged Identity Management**, select **Azure Resources** and click **Discover resources**:

Home > Privileged Identity Management

Privileged Identity Management | Azure resources

Privileged Identity Management

Quick start

Tasks

- My roles
- My requests
- Approve requests
- Review access

Manage

- Azure AD roles
- Privileged access groups (Preview)
- Azure resources**

Refresh Discover resources Activate role

Resources are only visible when you have an active role assignment, resource access in PIM.

Search by resource name Resource type

Resource Parent resource

Discover resources or activate an eligible role assignment to continu

Figure 1.40 – The Privileged Identity Management screen

3. Select your **Subscription** from the **Azure resources** blade and click **Manage resource** from the *top toolbar*. Click **OK** on the pop-up screen, then *close* the **Discovery** page:

Refresh Manage resource

Discover Azure resources that you have write permission to.

Search by resource name Resource type

Resource	Resource type
<input type="checkbox"/> Azure subscription 1	Subscription
<input checked="" type="checkbox"/> Microsoft Azure Sponsorship	Subscription
<input type="checkbox"/> Microsoft Azure Sponsorship	Subscription

Figure 1.41 – The Azure resources blade

- Click the subscription listed on the **Azure resources** page; the **Overview** page will open. From the *left menu*, click **Roles** in the **Manage** section:



Figure 1.42 – Manage resources screen

- From the **Roles** blade, click + **Add assignments** from the *top toolbar*.
- From the **Select role** drop-down menu, select a *role* you want to be controlled via PIM. In our example, we will select the **Azure Arc Kubernetes Admin** role:

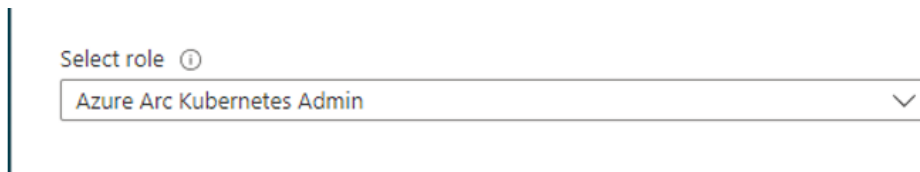


Figure 1.43 – Select role

- Click the **No member selected under Select member(s)** hyperlink and search and select a user from your *Azure AD tenant* to be assigned this role:

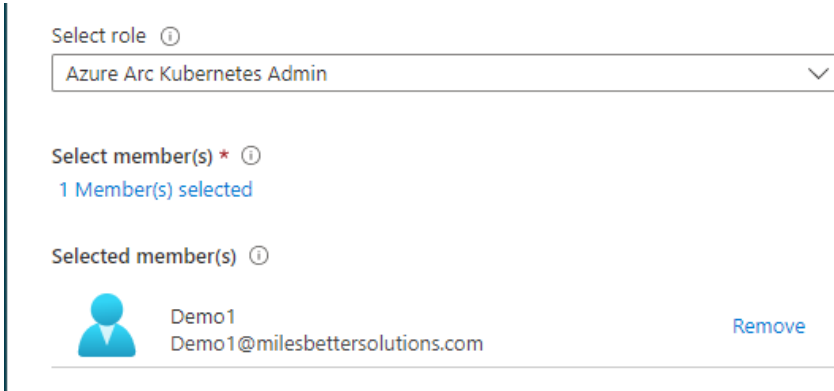


Figure 1.44 – Select member(s)*

8. Click **Next** >.
9. Select **eligible** under **assignment type** from the **setting** tab and set the **assignment start** and **end date/times** properties. Then, click **Assign**.
10. You will now see information from the **Overview** page regarding this new assignment:

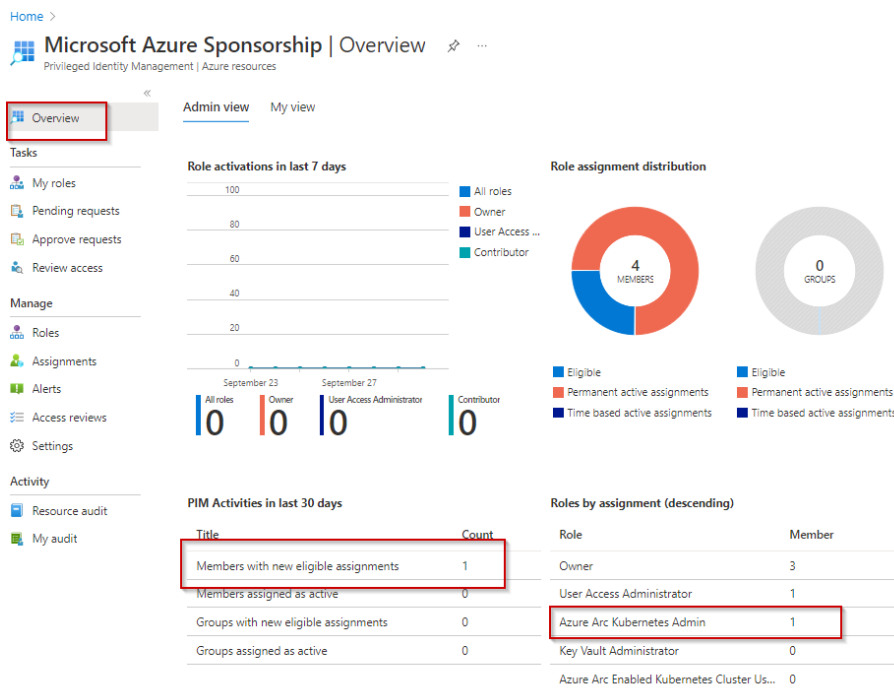
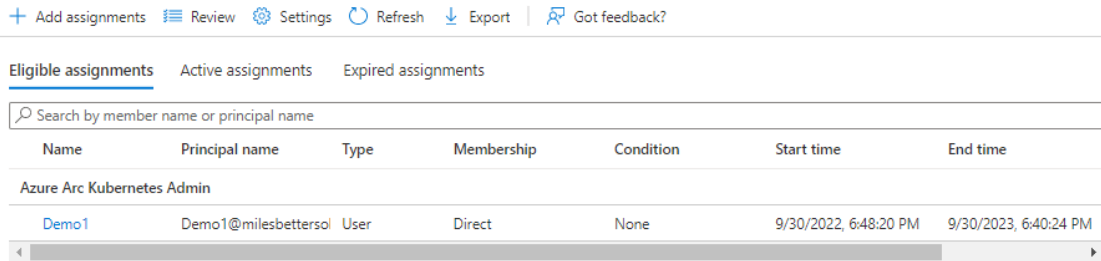


Figure 1.45 – Assignments on the Overview page

11. From **Assignments**, in the **Manage** section, you will see your assignment listed:



The screenshot shows the Azure AD Assignments interface. At the top, there are navigation links: '+ Add assignments', 'Review', 'Settings', 'Refresh', 'Export', and 'Got feedback?'. Below these are three tabs: 'Eligible assignments' (selected), 'Active assignments', and 'Expired assignments'. A search bar is present with the placeholder text 'Search by member name or principal name'. The main content is a table with the following columns: Name, Principal name, Type, Membership, Condition, Start time, and End time. The table contains one entry for 'Demo1' assigned to 'Demo1@milesbettersol' with a 'User' type, 'Direct' membership, and 'None' condition. The start time is '9/30/2022, 6:48:20 PM' and the end time is '9/30/2023, 6:40:24 PM'.

Name	Principal name	Type	Membership	Condition	Start time	End time
Azure Arc Kubernetes Admin						
Demo1	Demo1@milesbettersol	User	Direct	None	9/30/2022, 6:48:20 PM	9/30/2023, 6:40:24 PM

Figure 1.46 – Assignments

12. You should receive an email notification regarding this assignment; you can *update* or *remove* this assignment and create an *access review* for ongoing governance:

PIM: Demo1 has the Azure Arc Kubernetes Admin role

milesbettersolutions.onmicrosoft.com

Demo1 is assigned the Azure Arc Kubernetes Admin role for Microsoft Azure Sponsorship subscription

The details of this assignment appear below.

View the details of this assignment in the Privileged Identity Management (PIM) portal.

[View details >](#)

Settings	Value
User or Group	Demo1
Role	Azure Arc Kubernetes Admin
Resource name	Microsoft Azure Sponsorship
Resource type	subscription
Updated by	SMiles
Assignment type	Eligible
Assignment start	September 30, 2022 17:48 UTC
Assignment end	September 30, 2023 17:40 UTC
Justification	-

[Privileged Identity Management](#) protects your organization from accidental or malicious activity by reducing persistent access to Azure resources, providing just-in-time or time-limited access when needed.

Figure 1.47 – Assignment notification email

With that, you have configured Privileged Identity Management. This concludes the hands-on tasks for this recipe.

How it works...

In this recipe, we looked at how to configure Privileged Identity Management. We assigned a user the Azure Arc Kubernetes Admin role.

See also

Should you require further information, you can refer to the following Microsoft Learn articles:

- Plan and implement privileged access: <https://learn.microsoft.com/en-us/training/modules/plan-implement-privileged-access>
- Azure Active Directory fundamentals documentation: <https://learn.microsoft.com/en-us/azure/active-directory/fundamentals>