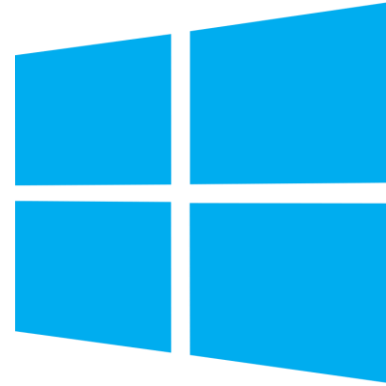


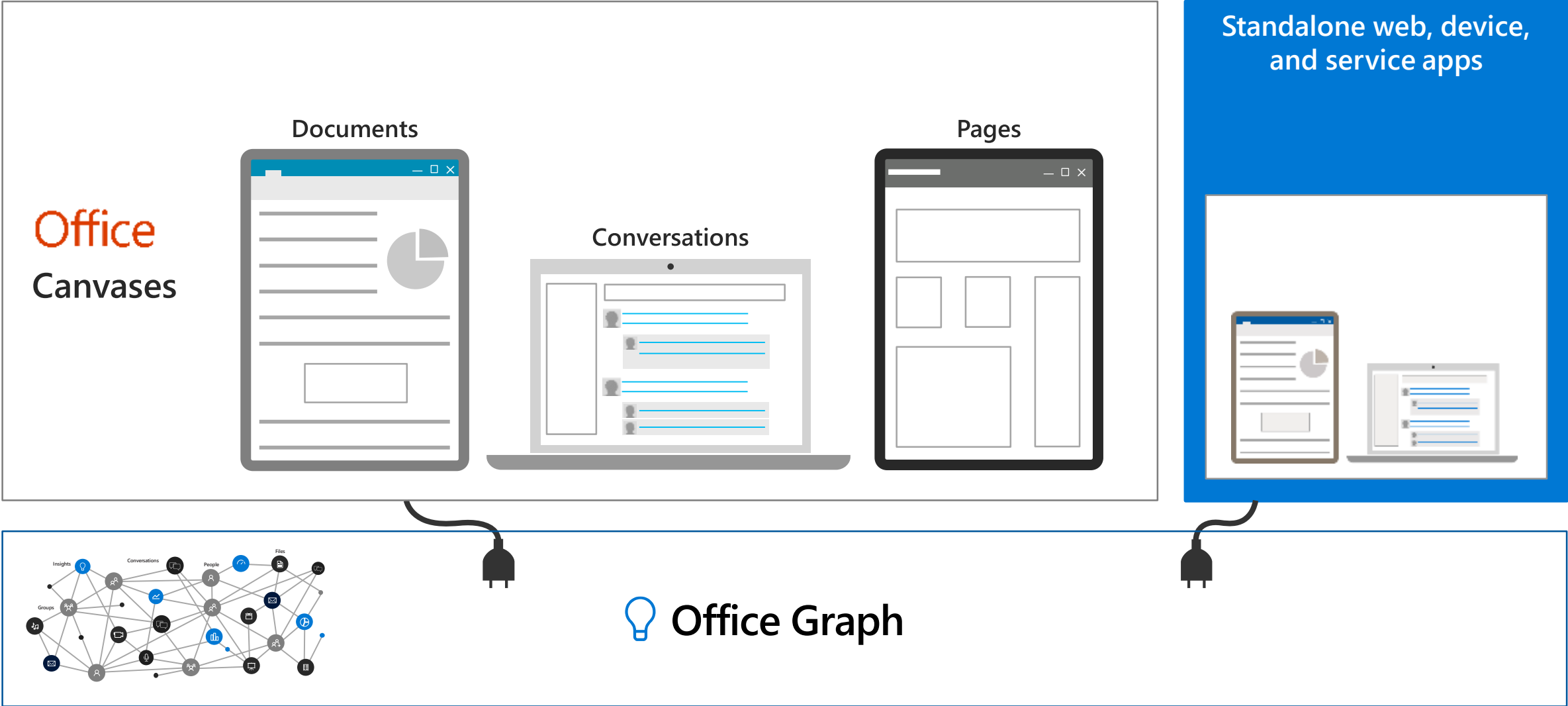
# The data from within: Understand your organization with Microsoft Graph

Tobias Urban

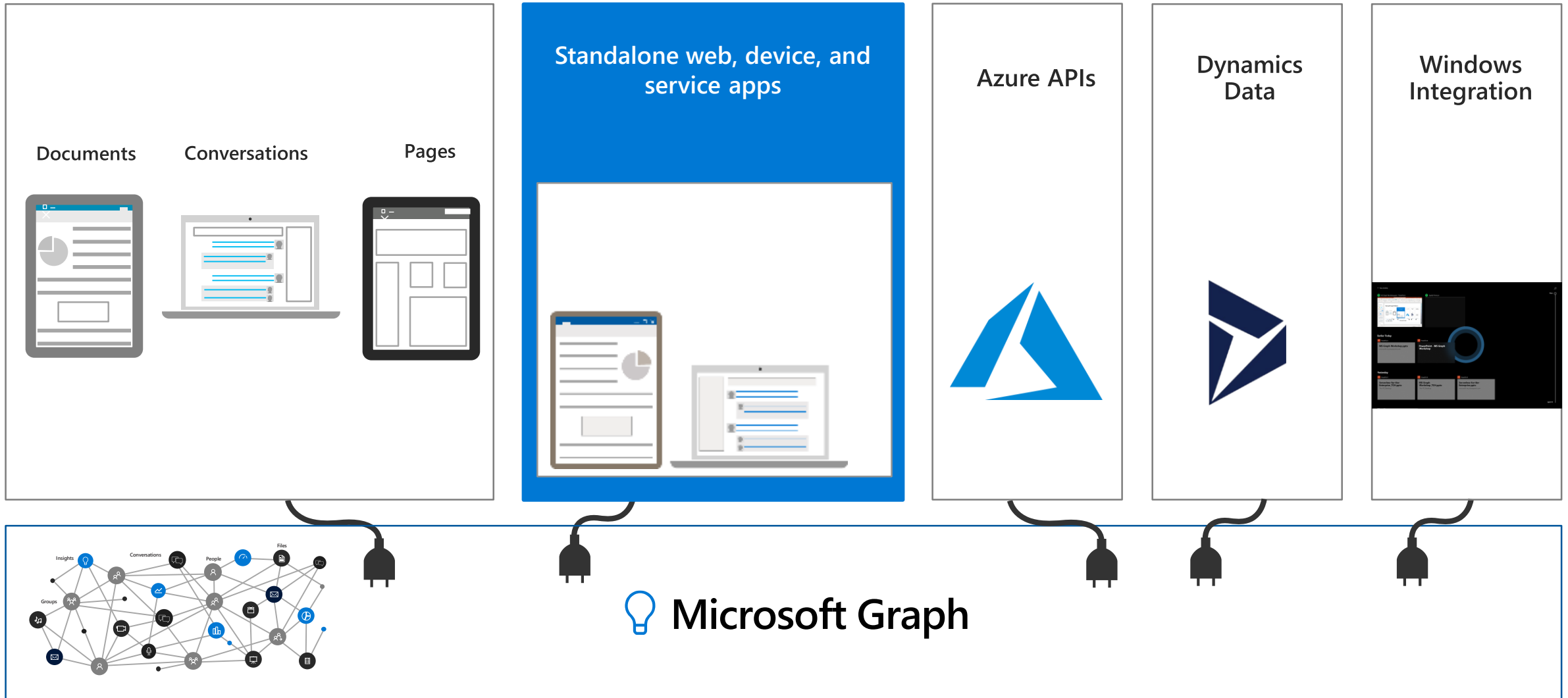
# The world of Microsoft



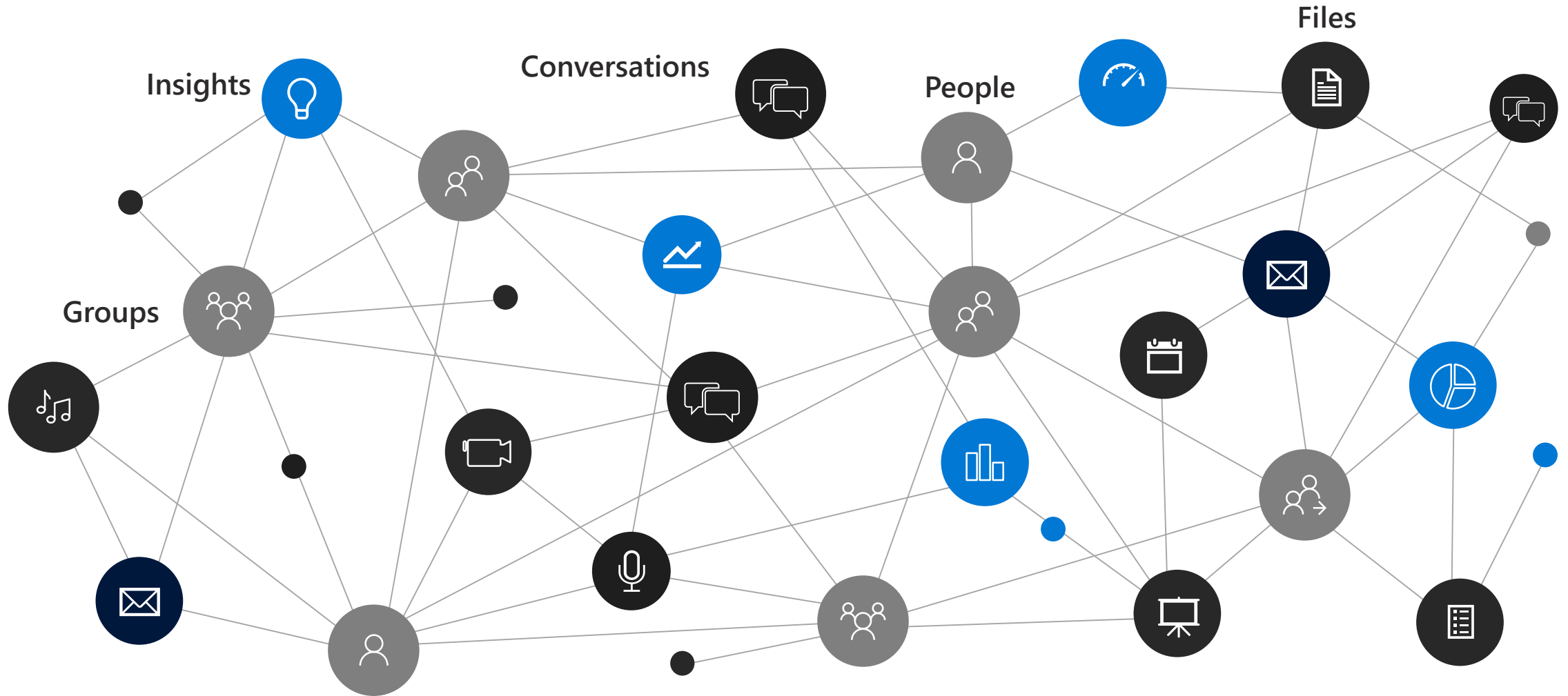
# Office 365 Platform



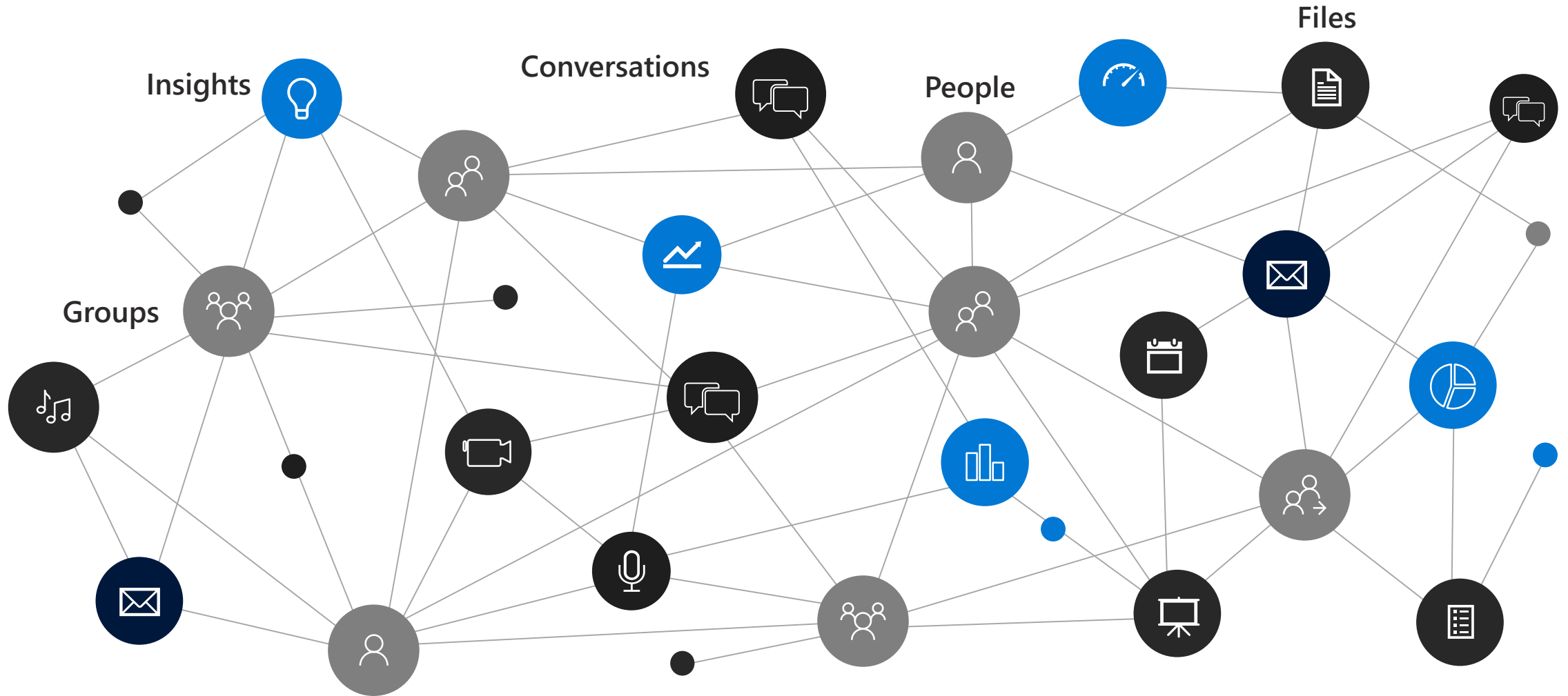
# Microsoft Graph Platform



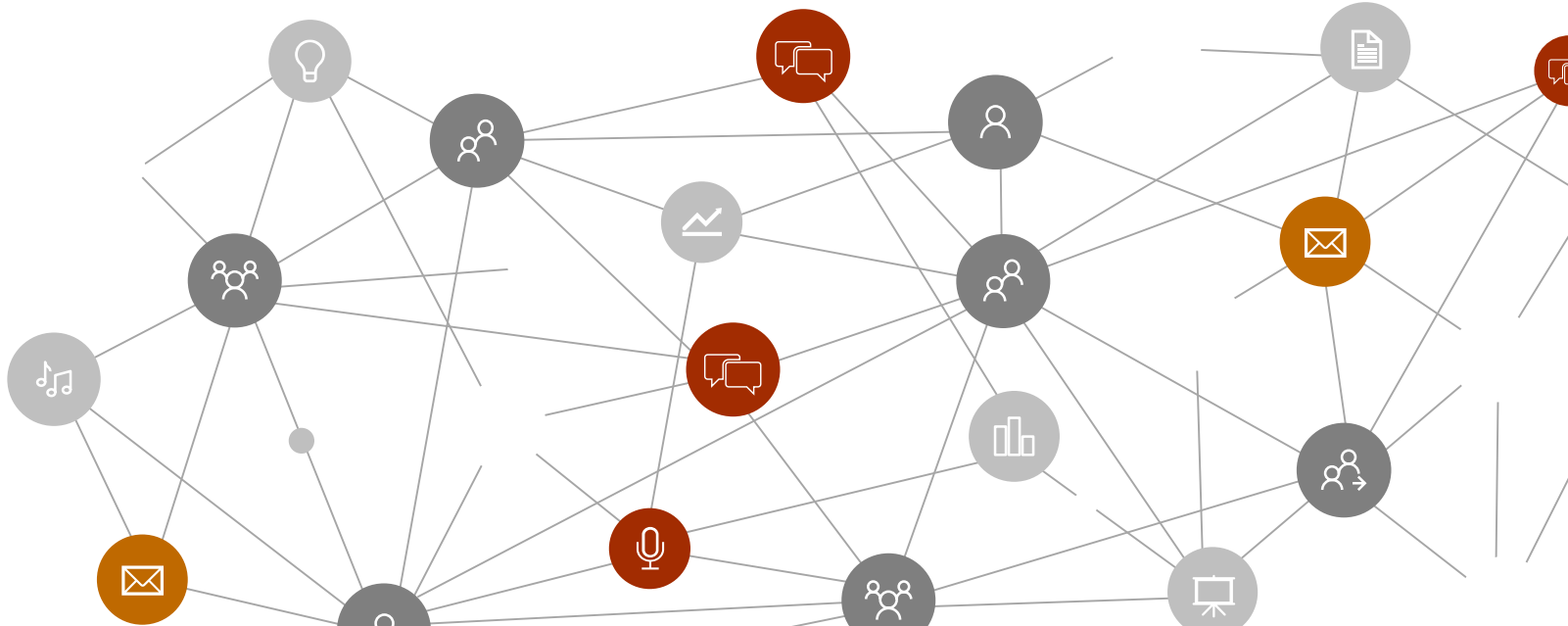
# Microsoft Graph



# Microsoft Graph



# Microsoft Graph



# Emerging Patterns with MS Graph



Smart Pickers



Graph-Connected Devices



Graph-Powered Bots



Intelligent Business Process

## Rich context

Is this person out of the office?  
Who is their manager?  
Where do they need to be next?  
What documents have they been working on recently?

## Deep insights

What documents are most interesting to this person?  
What's the best time for this group of people to meet?  
Who should this person contact for info on this topic?

## Real-time updates

Reschedule meeting when a conflict appears  
Notify owner when a file is modified  
Continue a process immediately after approval mail is received

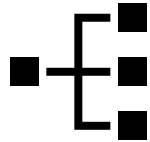


# What is Microsoft Graph?

Data



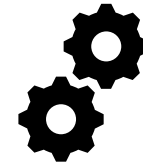
RESTful API



Azure Active  
Directory



Your custom  
applications



# What is Microsoft Graph?

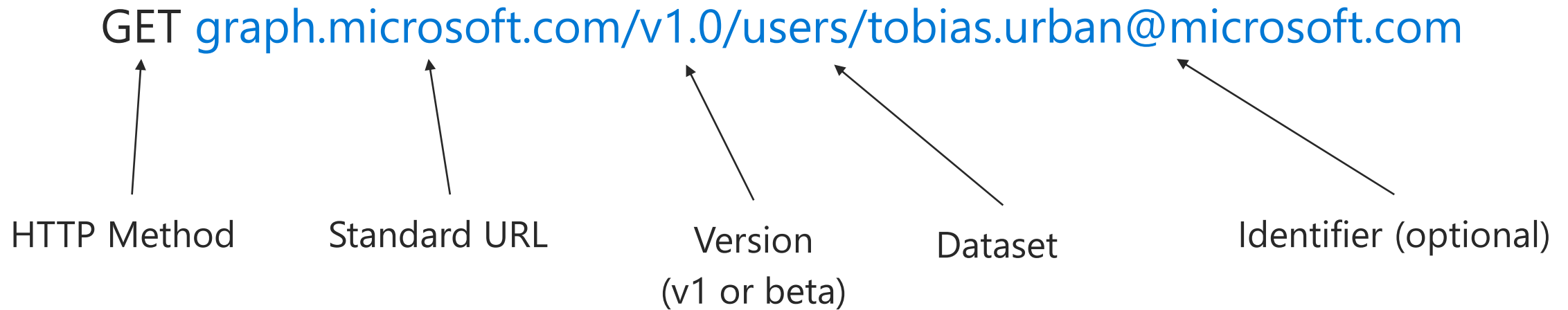
GET [graph.microsoft.com/v1.0/users/tobias.urban@microsoft.com](https://graph.microsoft.com/v1.0/users/tobias.urban@microsoft.com)

HTTP/1.1 200 OK

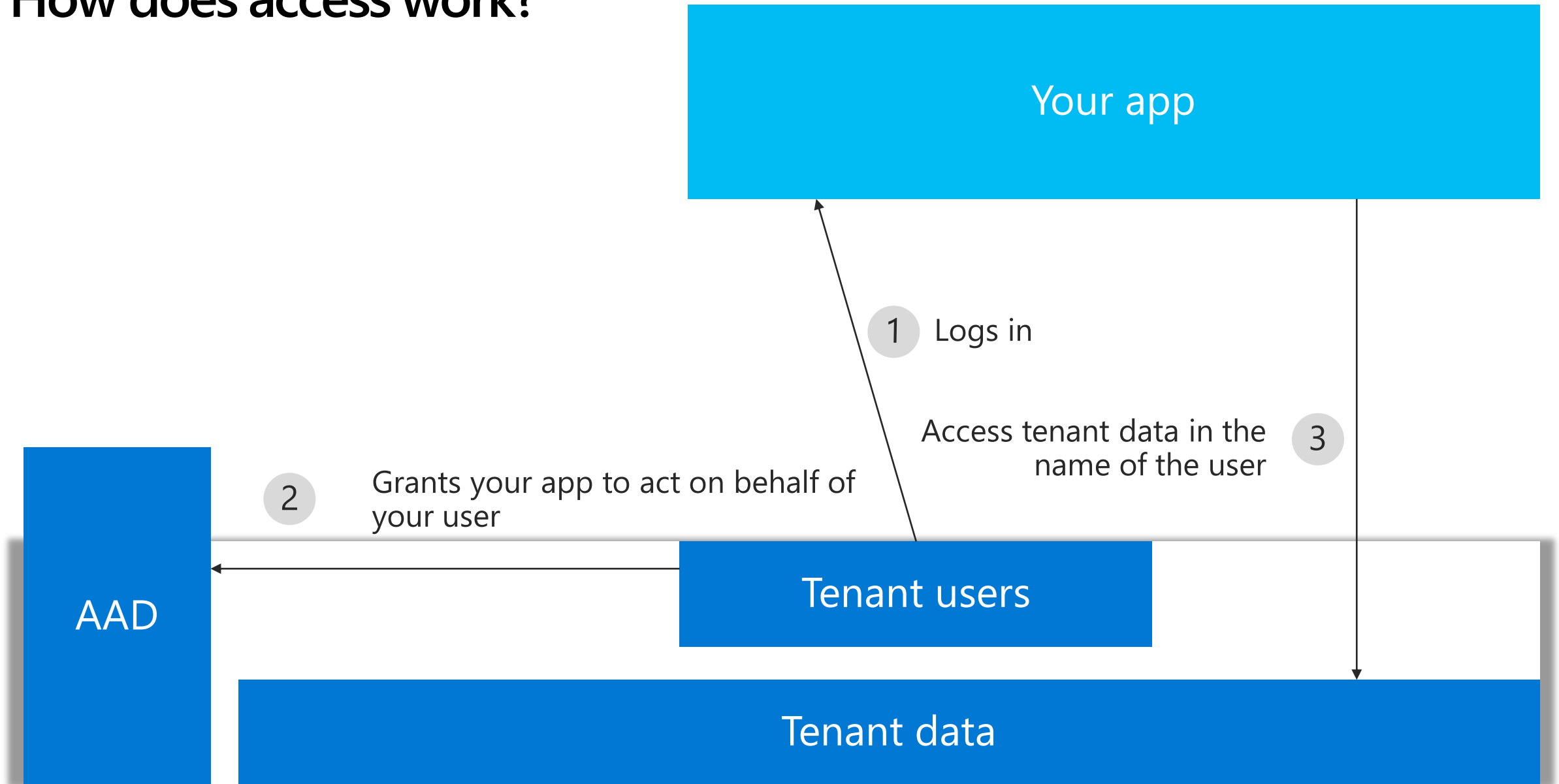
Content-type: application/json

```
Content-length: 491 {  
  "businessPhones": [ "businessPhones-value" ],  
  "displayName": "displayName-value",  
  "givenName": "givenName-value",  
  "jobTitle": "jobTitle-value",  
  "mail": "mail-value",  
  "mobilePhone": "mobilePhone-value",  
  "officeLocation": "officeLocation-value",  
  "preferredLanguage": "preferredLanguage-value",  
  "surname": "surname-value",  
  "userPrincipalName": "userPrincipalName-value",  
  "id": "id-value"  
}
```

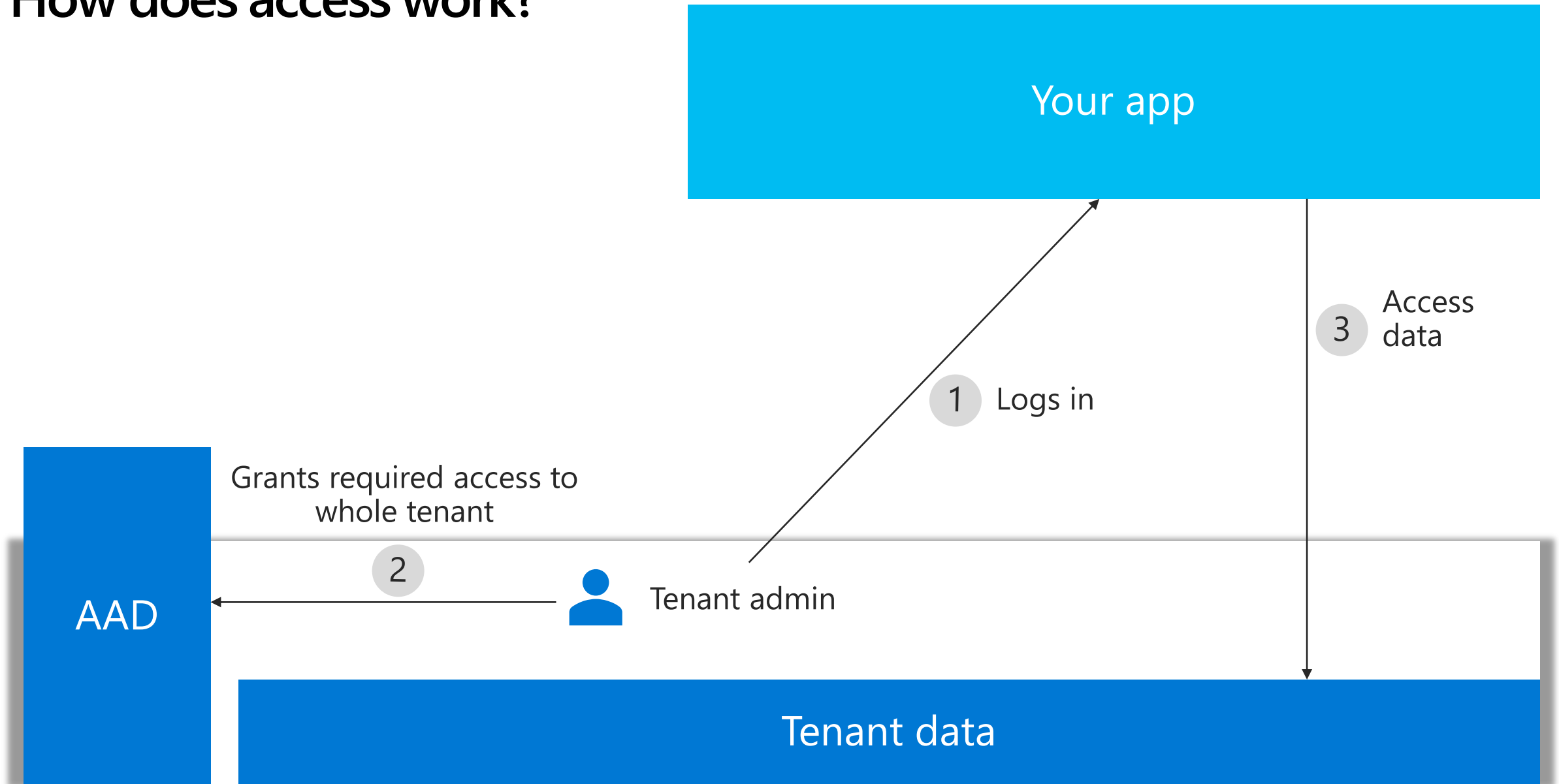
# What is Microsoft Graph?



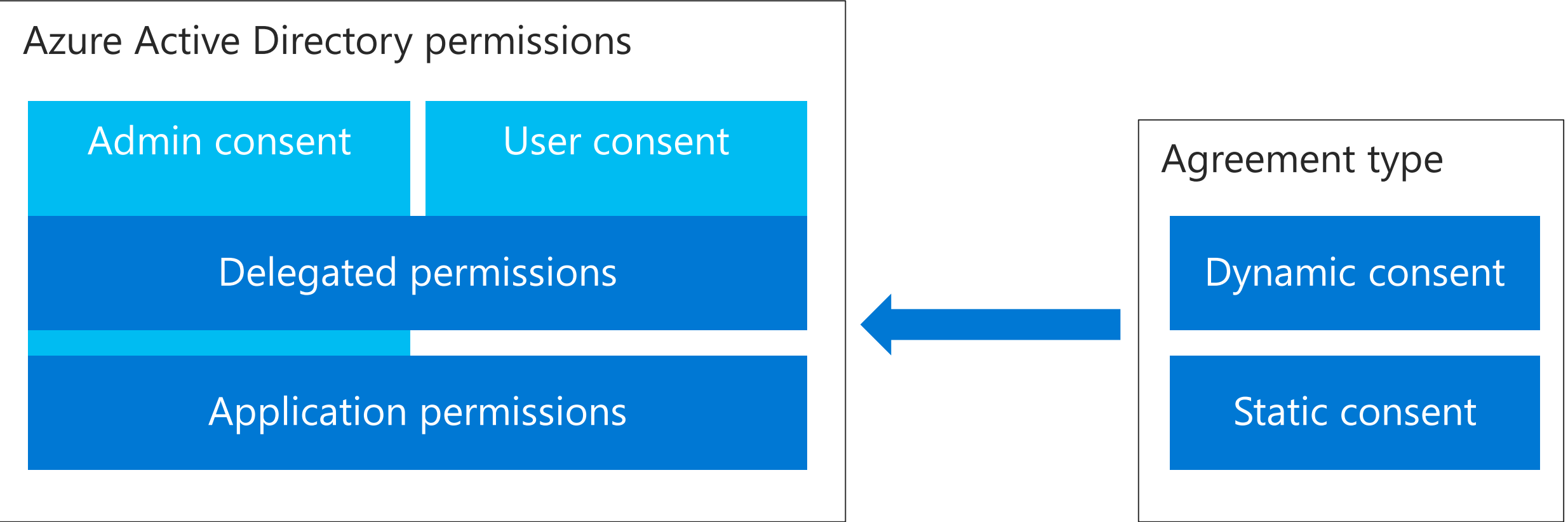
# How does access work?



# How does access work?



# Consent Framework



# Steps in developing a Graph-empowered application

1

Register a new application in Azure Active Directory

2

Implement authorization in your new application

3

Access the Microsoft Graph

# Register a new application in Azure Active Directory

Go to [portal.azure.com](https://portal.azure.com)

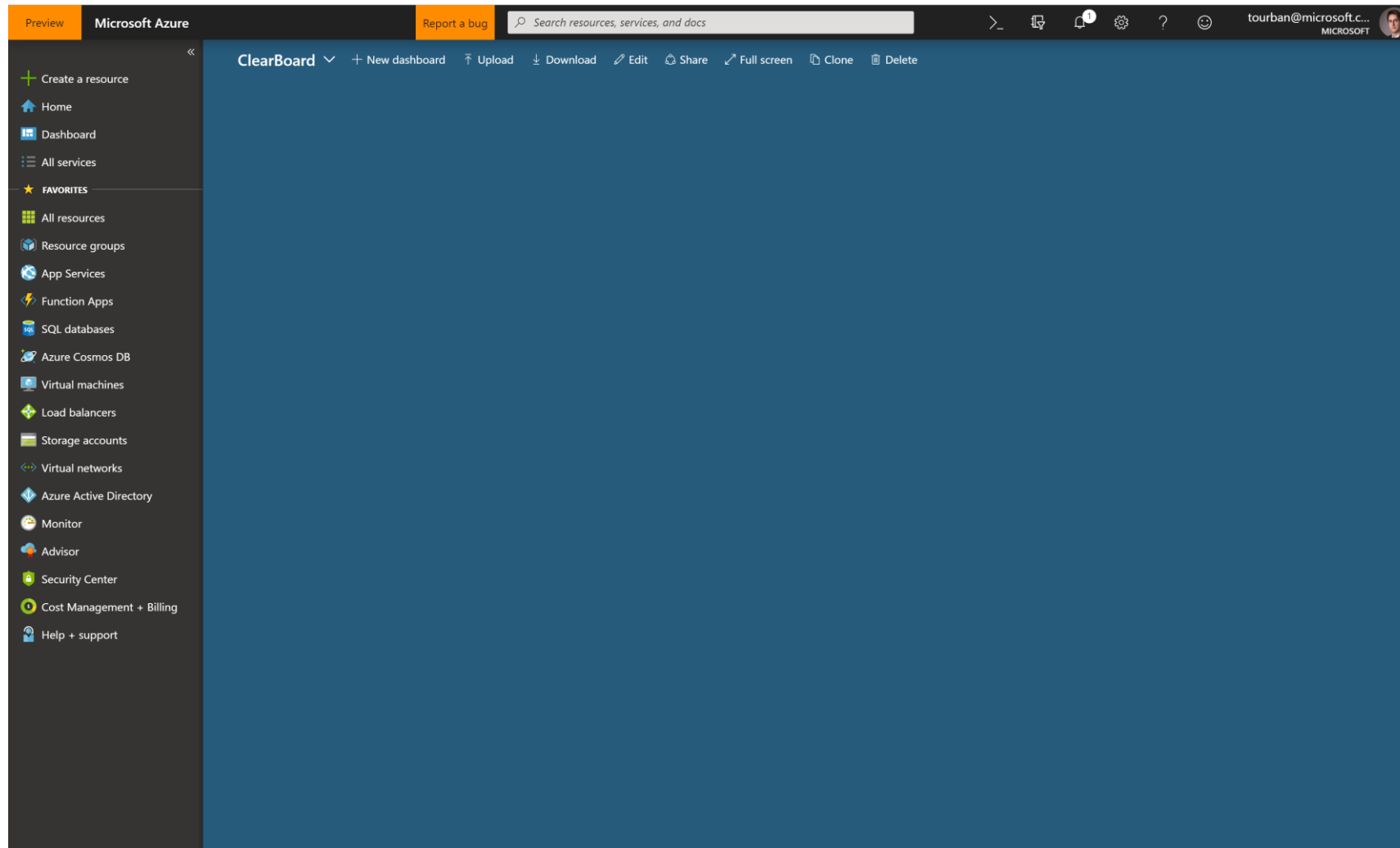
Find "Azure Active Directory" on the left side or search for it

Click on "App registrations (preview)" in the navigation

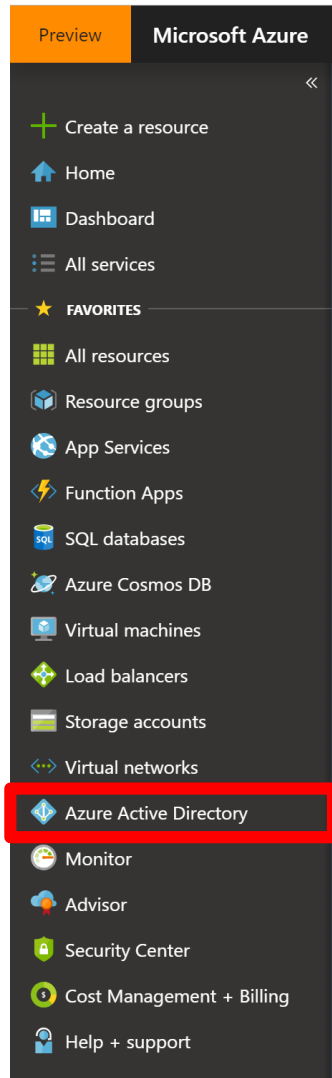
Click "New Registration



# Register a new application in Azure Active Directory



# Register a new application in Azure Active Directory



# Register a new application in Azure Active Directory

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes 'Preview', 'Microsoft Azure', 'Report a bug', and a search bar. The left sidebar contains navigation links for 'Create a resource', 'Home', 'Dashboard', 'All services', 'FAVORITES', and various Azure services like 'Resource groups', 'App Services', 'Function Apps', 'SQL databases', 'Azure Cosmos DB', 'Virtual machines', 'Load balancers', 'Storage accounts', 'Virtual networks', 'Azure Active Directory', 'Monitor', 'Advisor', 'Security Center', 'Cost Management + Billing', and 'Help + support'.

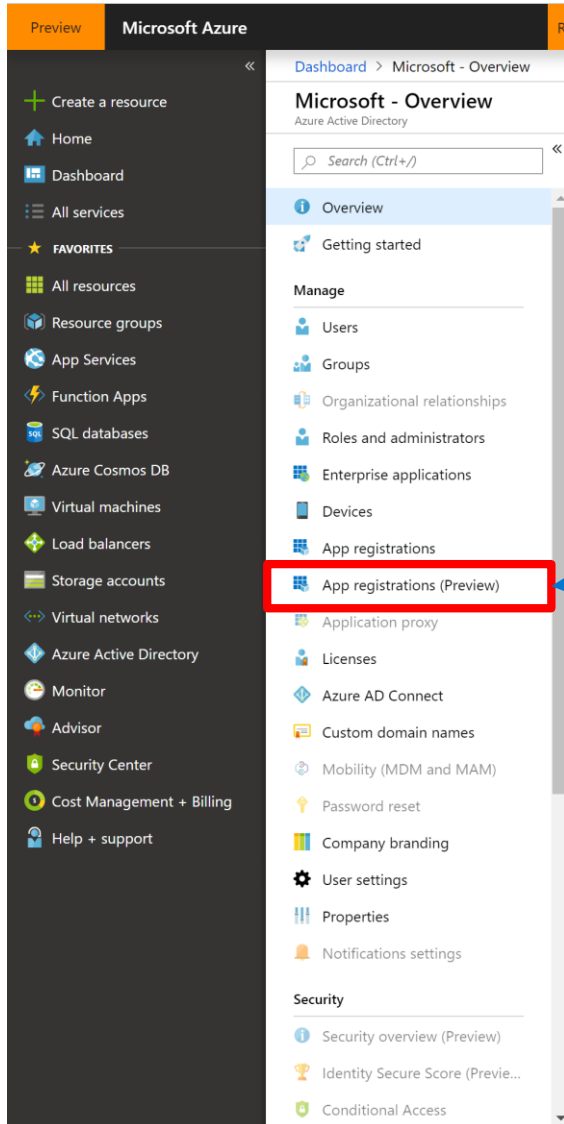
The main content area is titled 'Microsoft - Overview' under 'Azure Active Directory'. It includes a search bar, 'Switch directory', and 'Delete directory' options. The 'Overview' section shows the directory name 'microsoft.onmicrosoft.com' and the application type 'Azure AD Premium P2'. Below this, the 'Sign-ins' section indicates that only global administrators, security administrators, security readers, and report readers can view sign-ins. The 'Your role' is listed as 'User'.

The 'What's new in Azure AD' section provides updates, including a table of new features and updates:

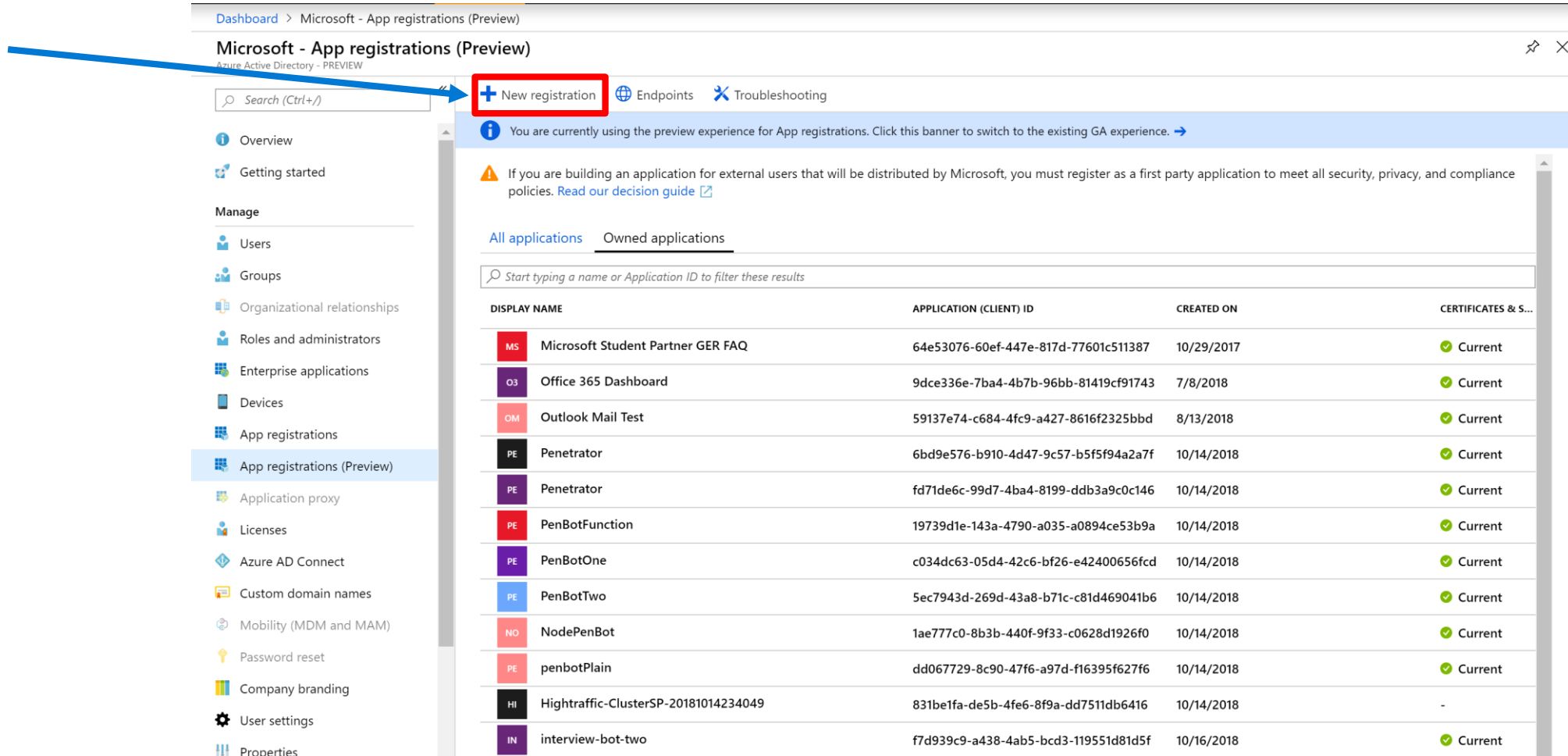
Feature	Count	Details
All services	(16)	New feature
Access Control	(2)	App Proxy - Access Control
3rd Party Integration	(2)	January 20, 2019
Identity Security & Protection	(2)	New Azure AD Application Proxy cookie settings
Privileged Identity Management	(2)	New feature
Enterprise Apps - 3rd Party Integration	(2)	January 20, 2019
Directory	(2)	New Federated Apps available in Azure AD app gallery - January 2019
Risk Scores	(1)	
User Authentication	(1)	
Device Lifecycle Management	(1)	

The right sidebar contains sections for 'Your role' (User), 'Find' (Users), 'Azure AD Connect sync' (Status: Enabled, Last sync: Less than 1 hour ago), 'Create' (User, Guest user, Group, Enterprise application, App registration), and 'Other capabilities' (Identity Protection, Privileged Identity Management, Tenant restrictions, Azure AD Domain Services, Access reviews). At the bottom, there are links for 'Getting started with Azure AD >', 'Create a directory >', and 'Discover Azure AD Capabilities >'.

# Register a new application in Azure Active Directory



# Register a new application in Azure Active Directory



Dashboard > Microsoft - App registrations (Preview)

## Microsoft - App registrations (Preview)

Search (Ctrl+/)
























[+ New registration](#) [Endpoints](#) [Troubleshooting](#)

You are currently using the preview experience for App registrations. Click this banner to switch to the existing GA experience. →

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](#)

[All applications](#) [Owned applications](#)

Start typing a name or Application ID to filter these results


DISPLAY NAME	APPLICATION (CLIENT) ID	CREATED ON	CERTIFICATES & S...
 Microsoft Student Partner GER FAQ	64e53076-60ef-447e-817d-77601c511387	10/29/2017	 Current
 Office 365 Dashboard	9dce336e-7ba4-4b7b-96bb-81419cf91743	7/8/2018	 Current
 Outlook Mail Test	59137e74-c684-4fc9-a427-8616f2325bbd	8/13/2018	 Current
 Penetrator	6bd9e576-b910-4d47-9c57-b5f5f94a2a7f	10/14/2018	 Current
 Penetrator	fd71de6c-99d7-4ba4-8199-ddb3a9c0c146	10/14/2018	 Current
 PenBotFunction	19739d1e-143a-4790-a035-a0894ce53b9a	10/14/2018	 Current
 PenBotOne	c034dc63-05d4-42c6-bf26-e42400656fcd	10/14/2018	 Current
 PenBotTwo	5ec7943d-269d-43a8-b71c-c81d469041b6	10/14/2018	 Current
 NodePenBot	1ae777c0-8b3b-440f-9f33-c0628d1926f0	10/14/2018	 Current
 penbotPlain	dd067729-8c90-47f6-a97d-f16395f627f6	10/14/2018	 Current
 Hightraffic-ClusterSP-20181014234049	831be1fa-de5b-4fe6-8f9a-dd7511db6416	10/14/2018	-
 interview-bot-two	f7d939c9-a438-4ab5-bcd3-119551d81d5f	10/16/2018	 Current

# Register a new application in Azure Active Directory

[Dashboard](#) > [Microsoft - App registrations \(Preview\)](#) > Register an application

## Register an application

PREVIEW

 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)
- ☐ Accounts in any organizational directory
- ☐ Accounts in any organizational directory and personal Microsoft accounts (e.g. Skype, Xbox, Outlook.com)

[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

Give it an intuitive name (The user will later see this)

Choose the third box

For the demo, insert  
`http://localhost:3500/api/callback`

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

Register

# Register a new application in Azure Active Directory

Home > urmade - App registrations (Preview) > ShowMe!

ShowMe!  
PREVIEW

Overview

Quickstart

Manage

- Branding
- Authentication
- Certificates & secrets
- API permissions
- Expose an API
- Owners
- Manifest

Support + Troubleshooting

- Troubleshooting
- New support request

Delete Endpoints

Display name : ShowMe!

Application (client) ID : 28707f69-d156-4f54-8300-1cc1498a3cba

Directory (tenant) ID : a72be096-9a55-49f9-b4e3-5adc7696a39e

Object ID : b36d4c38-6314-40fa-8cb2-b13ce40ba575

Supported account types : All Microsoft account users

Redirect URIs : 1 web, 0 public client

Managed application in ... : ShowMe!

Call APIs

Build more powerful apps with rich user and business data from Microsoft services and your own company's data sources.

View API Permissions

Sign in users in 5 minutes

Use our SDKs to sign in users and call APIs in a few steps

View all quickstart guides

Documentation

- Microsoft identity platform
- Authentication scenarios
- Authentication libraries
- Code samples
- Microsoft Graph
- Glossary
- Help and Support

You can find your Client ID here (you will need it in your application)

Here is your Tenant ID (you need it for your application, but you could also insert <tenantname>.onmicrosoft.com instead of the Tenant ID

# Register a new application in Azure Active Directory

Home > [urmade - App registrations \(Preview\)](#) > ShowMe!

## ShowMe!

PREVIEW

«

- Overview
- Quickstart
- Manage
  - Branding
  - Authentication
  - Certificates & secrets
  - API permissions**
  - Expose an API
  - Owners
  - Manifest
- Support + Troubleshooting
  - Troubleshooting
  - New support request

Delete Endpoints

Display name : [ShowMe!](#)

Application (client) ID : 28707f69-d156-4f54-8300-1cc1498a3cba

Directory (tenant) ID : a72be096-9a55-49f9-b4e3-5adc7696a39e

Object ID : b36d4c38-6314-40fa-8cb2-b13ce40ba575

Supported account types : [All Microsoft account users](#)

Redirect URIs : [1 web, 0 public client](#)

Managed application in ... : [ShowMe!](#)

### Call APIs

Build more powerful apps with rich user and business data from Microsoft services and your own company's data sources.

[View API Permissions](#)

### Sign in users in 5 minutes

Use our SDKs to sign in users and call APIs in a few steps

[View all quickstart guides](#)

### Documentation

- [Microsoft identity platform](#)
- [Authentication scenarios](#)
- [Authentication libraries](#)
- [Code samples](#)
- [Microsoft Graph](#)
- [Glossary](#)
- [Help and Support](#)



# Register a new application in Azure Active Directory

Home > [urmade - App registrations \(Preview\)](#) > ShowMe! - API permissions

## ShowMe! - API permissions

PREVIEW

- Overview
- Quickstart
- Manage
  - Branding
  - Authentication
  - Certificates & secrets
  - API permissions**
  - Expose an API
  - Owners
  - Manifest
- Support + Troubleshooting
  - Troubleshooting
  - New support request

### API permissions

Applications are authorized to use APIs by requesting permissions. These permissions show up during the consent process where users are given the opportunity to grant/deny access.

[+ Add a permission](#)

API / PERMISSIONS NAME

TYPE

DESCRIPTION

ADMIN CONSENT REQUIRED

▶ [Microsoft Graph \(6\)](#)

These are the permissions that this application requests statically. You may also request user consent-able permissions dynamically through code. [See best practices for requesting permissions](#)

### Grant consent

As an administrator, you can grant consent on behalf of all users in this directory. Granting admin consent for all users means that end users will not be shown a consent screen when using the application.

[Grant admin consent for urmade](#)

You can set static (application) permissions here (We need that later)

If you are the admin of your tenant, you can grant your application all requested permissions here

# Register a new application in Azure Active Directory

[Home](#) > [urmade - App registrations \(Preview\)](#) > [ShowMe! - API permissions](#)

## ShowMe! - API permissions

PREVIEW



Overview

Quickstart

### Manage

Branding

Authentication

Certificates & secrets

API permissions

Expose an API

Owners

Manifest

### Support + Troubleshooting

Troubleshooting

New support request

## API permissions

Applications are authorized to use APIs by requesting permissions. These permissions show up during the consent process where users are given the opportunity to grant/deny access.

[+ Add a permission](#)

API / PERMISSIONS NAME

TYPE

DESCRIPTION

ADMIN CONSENT REQUIRED

▶ [Microsoft Graph \(6\)](#)

These are the permissions that this application requests statically. You may also request user consent-able permissions dynamically through code. [See best practices for requesting permissions](#)

## Grant consent

As an administrator, you can grant consent on behalf of all users in this directory. Granting admin consent for all users means that end users will not be shown a consent screen when using the application.

[Grant admin consent for urmade](#)

# Register a new application in Azure Active Directory

Home > urmade - App registrations (Preview) > ShowMe! - Certificates & secrets

## ShowMe! - Certificates & secrets

PREVIEW

Overview

Quickstart

### Manage

Branding

Authentication

Certificates & secrets

API permissions

Expose an API

Owners

Manifest

### Support + Troubleshooting

Troubleshooting

New support request

Credentials enable applications to identify themselves to the authentication service when receiving tokens at a web addressable location (using an HTTPS scheme). For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.

### Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

[Upload certificate](#)

THUMBPRINT

START DATE

EXPIRES

No certificates have been added for this application.

### Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

[+ New client secret](#)

DESCRIPTION

EXPIRES

VALUE

Linux

12/31/2299

Gs+ \*\*\*\*\*

test

3/21/2020

;+]\*\*\*\*\*

Click here to get a new client secret.  
Click on "Save" and then copy the  
secret as you will not be able to view it  
again!

# Register a new application in Azure Active Directory

Heads up with the secret! The preview version sometimes generates the # value in the secret which will break your .env. Just delete and recreate if that is the case!

You should by now have the following information:

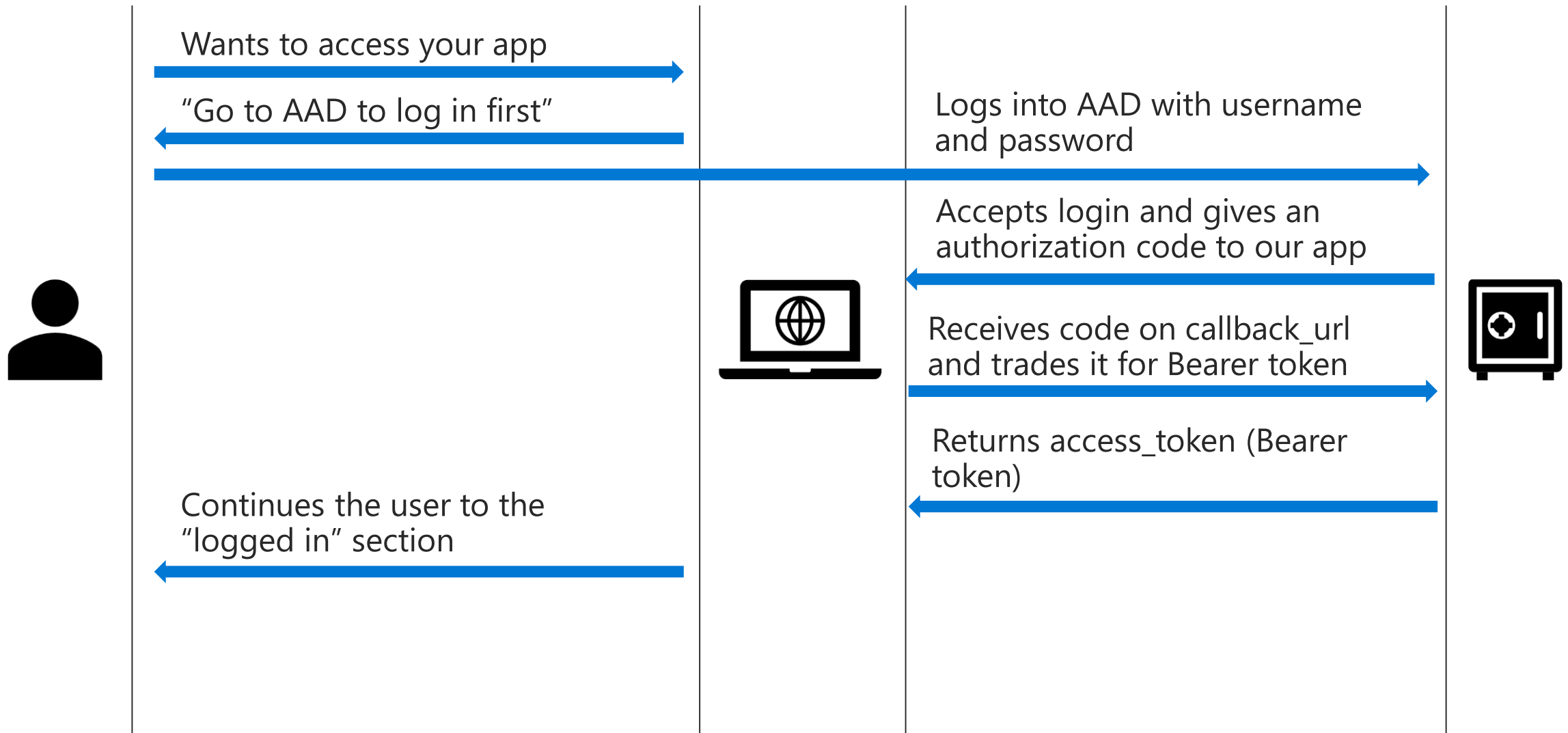
Client ID

Client Secret

Tenant ID

Callback URL for you App

# Implement authorization in your new application



# Implement authorization in your new application

## The easy way

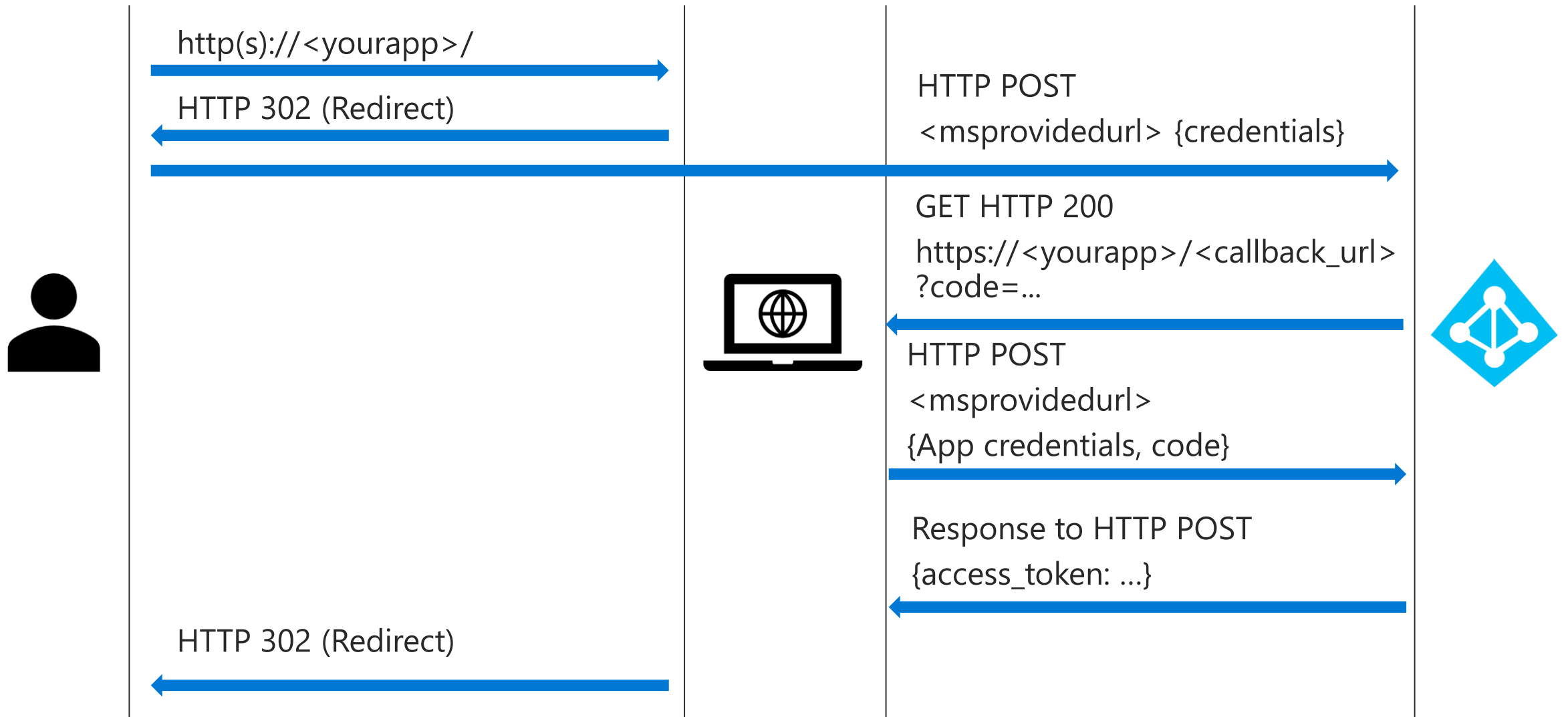
- Implement ADAL (optimized for AAD v1) or MSAL (optimized for AAD v2)
- Frameworks provided by Microsoft that provide easy authentication
- Maintained by Microsoft => Robust to change
- Provide less flexibility and harder to debug

# Implement authorization in your new application

## The Tech way

- Implement OAuth / OpenID Connect flows yourself
- Most flexibility in terms of implementation, chance to support multiple providers (OAuth is an industry-wide standard)
- Has to be maintained by yourself => You need to build competence there and have to stay up-to-date with the latest changes

# Implement authorization in your new application





# Access the Microsoft Graph

```
const call = {  
  method: "GET",  
  url:  
    "graph.microsoft.com/v1.0/me",  
  headers: {  
    Authorization: "bearer "  
      + access_token  
  }  
};
```

```
HTTP/1.1 200 OK  
Content-type: application/json  
Content-length: 491 {  
  "businessPhones": [ "businessPhones-value" ],  
  "displayName": "displayName-value",  
  "givenName": "givenName-value",  
  "jobTitle": "jobTitle-value",  
  "mail": "mail-value",  
  "mobilePhone": "mobilePhone-value",  
  "officeLocation": "officeLocation-value",  
  "preferredLanguage": "preferredLanguage-value",  
  "surname": "surname-value",  
  "userPrincipalName": "userPrincipalName-value",  
  "id": "id-value"  
}
```

## Access the Microsoft Graph

<https://docs.microsoft.com/en-us/graph/api/overview>

Independent from the REST Endpoint most of the Graph Endpoints support unified query properties. You can find these under the bullet point "Use the API".

# What is possible with the Graph?



Drone-enabled  
inventory  
management



Compliance  
recording & Call  
Centers through  
Teams



Organization  
sentiment  
barometers



Your next  
breakthrough?

A woman with long red hair in a braid is sitting in a black office chair, focused on writing on a tablet. She is wearing a white ribbed sweater. The background is a bright, out-of-focus office space with large windows.

# Let's get into it!!

<https://github.com/Urmade/MSGraph-Workshop>



<https://developer.microsoft.com/en-us/office/dev-program>

Among other perks a free O365 tenant for 3 months is included!

## Join the **Office 365** developer program today!

The developer program is designed to help you create intelligent, connected solutions that enable customers and organizations to do more.

JOIN NOW >



# Thank you!



linkedin.com/in/urban-tobias

<https://docs.microsoft.com/en-us/graph/api/overview>

<https://developer.microsoft.com/en-us/graph/graph-explorer>

<https://docs.microsoft.com/en-us/azure/active-directory/develop/authentication-scenarios>

<https://medium.com/@urmade/the-beginners-guide-to-azure-active-directory-438b9de85287>

<https://medium.com/@urmade/aad-b2b-2314d80fd3f8>

<https://docs.microsoft.com/en-us/graph/sdks/create-client?toc=.%2Fref%2Ftoc.json&view=graph-rest-1.0&tabs=Javascript>