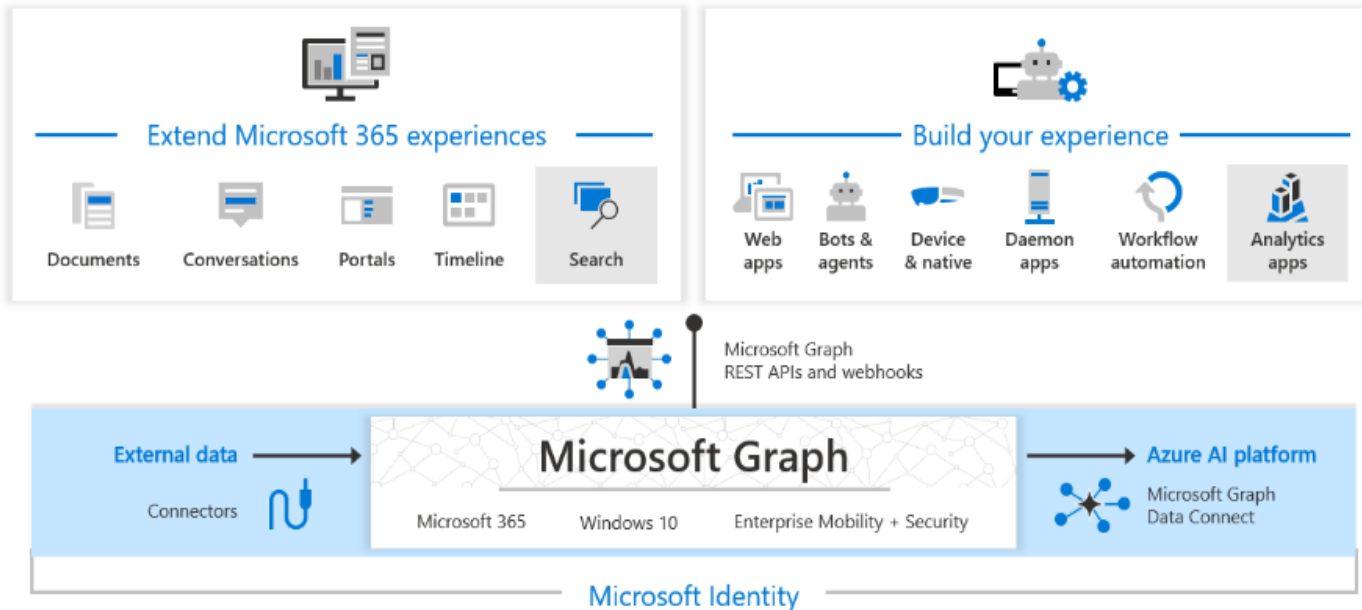# Overview of Microsoft Graph

Microsoft Graph is a gateway to DATA and intelligence in Microsoft 365

Microsoft Graph is a Restful API to expose Data over https

Microsoft Graph offers Graph Explorer to query all the protected DATA

Three main components that facilitates the access and flow of data
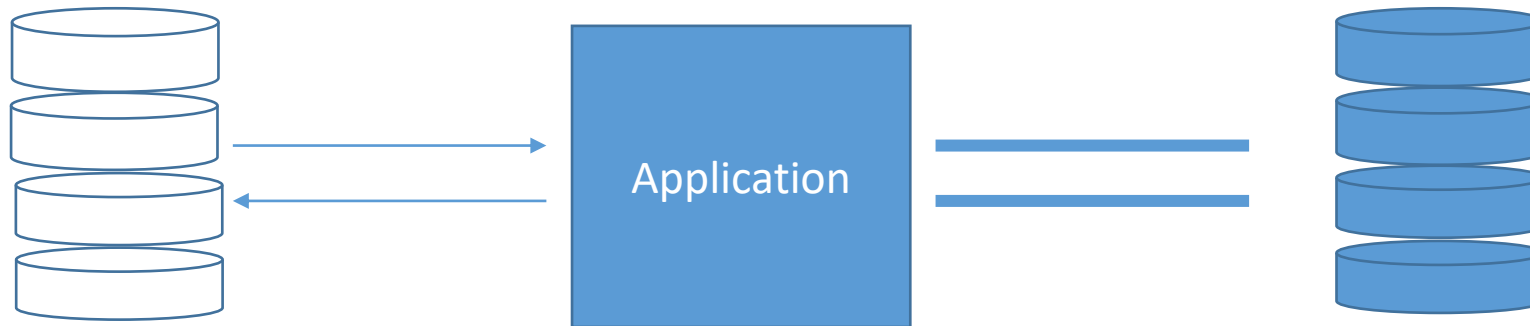
- Microsoft Graph API

- Microsoft Graph Connectors

- Microsoft Graph Data Connect

Its all about Data

Every application or service that we use/build is either generating data or consuming data

Any information that exists, which is accessed by any medium is called "Data"

Application

What can be done using MS Graph

Unified programming model and a single endpoint https://graph.microsoft.com/

Accessing Data	• /me,/users,/groups, /messages etc…..
Traversing Data	• /users/{id}/photo/$value
Accessing Insights	• /insights/trending
Work/School and Personal Accounts	• Authenticate API using Microsoft Account

Permissions

Delegated permissions

These are used by apps that have a signed-in user present.
Either the user or an administrator consents to the permissions that the app requests and the app can act as the signed-in user when making calls to Microsoft Graph.
Some delegated permissions can be consented by non-administrative users, but some higher-privileged permissions require administrator consent.

Application permissions

These are used by apps that run without a signed-in user present. For example, apps that run as background services or daemons.
Application permissions can only be consented by an administrator

Services for MS Graph

At the core of Microsoft Graph are the concepts of the user and group.
The user's data is what drives businesses. A Microsoft 365 *group* is the fundamental entity that lets users collaborate

Microsoft 365 core services: Bookings, Calendar, Delve, Excel, Microsoft 365 compliance eDiscovery, Microsoft Search, OneDrive, OneNote, Outlook/Exchange, People (Outlook contacts), Planner, SharePoint, Teams, To Do, Viva Insights

Enterprise Mobility + Security services: Advanced Threat Analytics, Advanced Threat Protection, Azure Active Directory, Identity Manager, and Intune

Windows services: activities, devices, notifications, Universal Print

Dynamics 365 Business Central services

OAuth 2.0 authorization code grant flow to get access token from Microsoft Identity platform

Basic steps to use the OAuth 2.0 authorization code grant flow to get an access token from the Microsoft identity platform endpoint:

1. Register your app with Azure AD.
2. Get authorization.
3. Get an access token.
4. Call Microsoft Graph with the access token.
5. Use a refresh token to get a new access token.

Home > sahcl | App registrations >

Register an application ...

* Name

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

GraphSDK

Supported account types

Who can use this application or access this API?

(•) Accounts in this organizational directory only (sahcl 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

By proceeding, you agree to the Microsoft Platform Policies ⤴

Register

Different endpoints (Without MS Graph)

Its basically an application

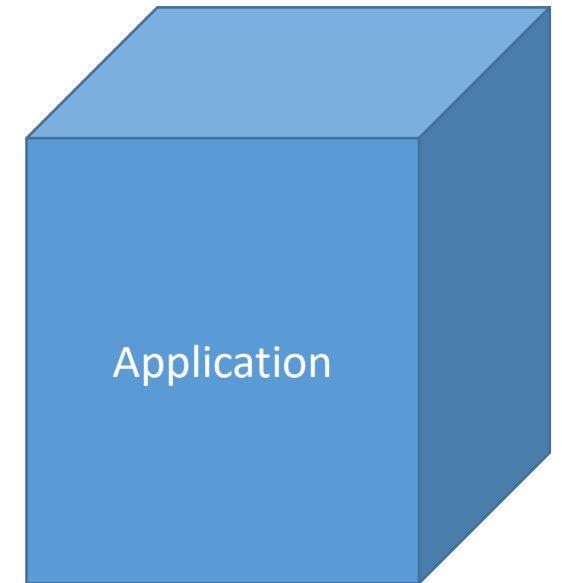| Users, Groups, Policies, Applications	Azure Active Directory	https://portal.azure.com
Mailboxes, Mails, Calendars	Exchange Online	https://portal.office.com https://outlook.office365.com/ecp/
Documents, Sites, Folders	SharePoint Online	https://<tenantName>.admin.sharepoint.com
Channels, Applications	Microsoft Teams	https://admin.teams.microsoft.com

Graph Explorer

Application

Single endpoint to access Applications – MS Graph

Azure Active Directory

Exchange Online

SharePoint Online
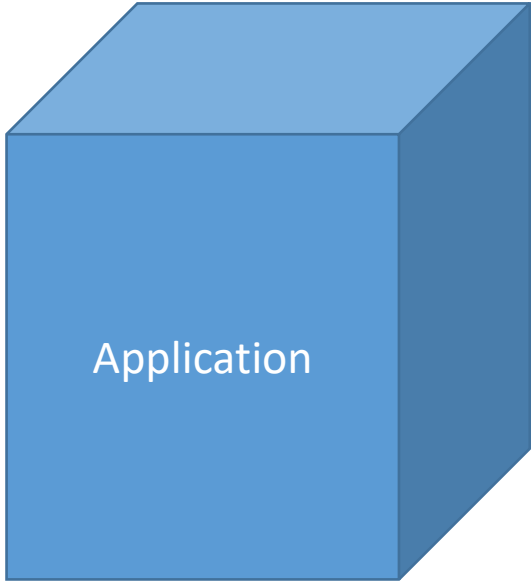
Microsoft Teams

https://graph.microsoft.com/V1.0

Graph Explorer

Application

Advantages

- Ease of development
  - Unified API endpoint – No more calling different endpoint for each service.
  - No requirement to get separate token for each service
- Platform Flexibility - .NET MVC, PHP, Python, AngularJS, IOS, Android etc.
- Logical Navigation across item relationship
- Use MS Graph Explorer to try all the scenarios using the API
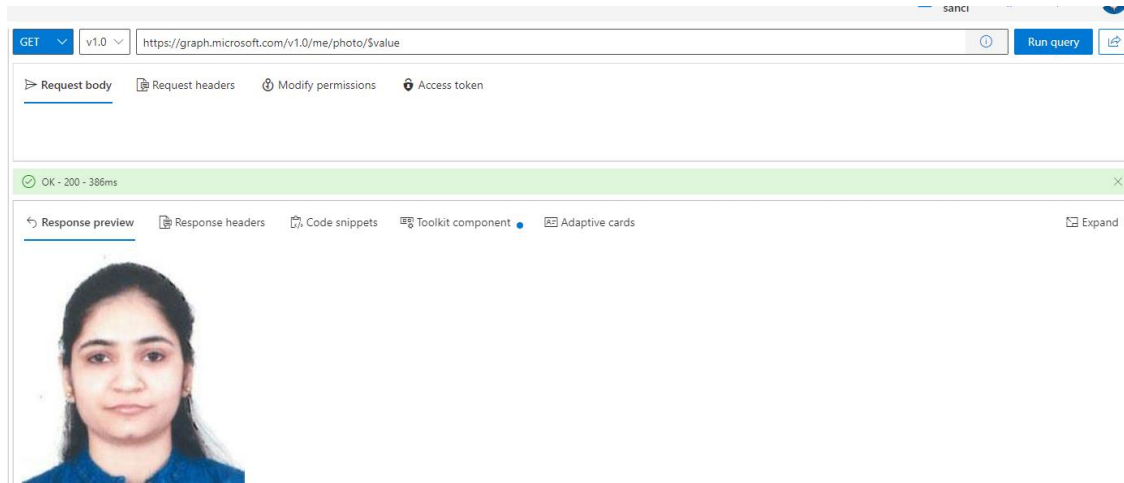
Demo MS Graph Explorer

1. Navigate to https://developer.microsoft.com/en-us/graph/graph-explorer

2. Login with Azure Account (here signed-in with soni.a@sahcl.onmicrosoft.com)

3. Query the respective API (https://graph.microsoft.com/v1.0/me)

Modify Permission in Graph Explorer as per the queries API

| GET | v1.0 | https://graph.microsoft.com/v1.0/me | ⓘ | **Run query** | ⬆ |

▷ Request body   📋 Request headers   🔱 **Modify permissions**   🛡 Access token

Permissions (7)
One of the following permissions is required to run the query. Select a permission and click Consent.

Permission	Description	Admin consent requir...	Status
Directory.Read.All	Allows the app to read data in your organization's directory.	✓	Consented
Directory.ReadWrite.All	Allows the app to read and write data in your organization's directory, such as other users, groups. It does not allow the app to delete users or groups, or reset user passwords.	✓	**Consent**

Once logged in MS Graph Explorer with Microsoft Account Access Token will be provided to call several services

| GET | v1.0 | https://graph.microsoft.com/v1.0/me | ⓘ | **Run query** | ⬆ |

▷ Request body   📋 Request headers   🔱 Modify permissions   🛡 **Access token**

Access token 📋 { }

eyJ0eXAiOiJKV1QiLCJub25jZSI6InBoVjRXYTQ2MXZTZUJXXzFRWHBwV1pUUDE0ZTFiMjdjZV82UVAwVWdoSW8iLCJhbGciOiJSUzI1NiIsIng1dCI6IjJaUXBKM1VwYmpBWVhZR2FYRUpsOGxWMFRPSSIsImtpZCI6IjJaUXBKM1VwYmpBWVhZR2FYRUpsOGxWMFRPSSJ9.
eyJhdWQiOiIwMDAwMDAwMy0wMDAwLTAwMDAtYzAwMC0wMDAwMDAwMDAwMDAiLCJpc3MiOiJodHRwczovL3N0cy53aW5kb3dzLm51dC9kY2E0MGI2My02OTZhLTQxMzYtjdjMC1kNjEyOTUzZjQ1N2IvIiwiaWF0IjoxNjY4MTkyOTUzLCJuYmYiOjE2Njgx0TI5NTMsImV4cCI6MTY2ODE5Nzg3MSwiYnNidCI6McwiYwNyIjoiMSIsImFpbyI6IkFiWUUFxLzhUQUFBQUt5ZkfpMXNFT2paT0JtalVMVmVqYU5Ma31nMFVoZXN2VEk3Y3RWTzQyVW9TNytIDwRvQUk3aTdtTXRTR3dDU01hK09iS2t1ME8zQUZDWUdWN1VnS1FaR1JxbjBhaVN5bW5LcEtYN3BzCTJzPSIsImFtciI6WyJwd2QiLCJtZmEiXSwiYXBwX2Rpc3BsYX1uYW11IjoiR3JhcGggRXhwbG9yZXIiLCJhcHBpZCI6ImR1OGJjOGI1LWQ5ZjktNDhiMS1hOGFkLWI3NDhkYTcyNTA2NCIsImFwcG1kYWNyIjoiMCIsImZhbW1seV9uYW11IjoiQXJvcmEiLCJnaXZlb19uYW11IjoiU29uaSIsIm1kdH1pb3JoiZXN1ciIsIm1wYWRkciI6IjE2OC4xNDkuMTg0LjYxIiwibmFtZSI6I1NvbmkgQXJvcmEiLCJvaWQiOiI1ZTcyYjQ2Ni0zNmJjLTQ2YjctYWI3Mi01NTFjODJmYTY1NDIiLCJwbGF0ZiI6IjMiLCJwdW1kIjoiMTAwMzIwMDFGRTgzQ0EwMSIsInJoIjoiMC5BWEVBWXd1azJ6Q0nVOa0czd05ZU2xUOUZ1d01BQUFBQUFBUF3QUFBQUFBQUFBQ0hBSUkuIiwic2NwIjoiQXBwbG1jYXRpb24uUmVhZC5BbGwgVWFpbC5SZWFkIG9wZW5pZCBwcm9maWx1IFVzZXIuUmVhZCBVc2VyLlJlYWRXcm10ZS5BbGwgZW1haWwiLCJzdWIiOiVZZn1ZFpzXkxPcmRvQURZWrm5FaR1cy5SZWFkV3JpdGUuQWxzIGVtYWlsIiwic3ViIjoiN2t3SkxNYUZXaVA2bnVPU211aXhHZ2pRS0JwTEJyUzJjOUZMdGQ0Q0aXdMXCIsInR1bmFudF9yZWdpb25fc2NvcGUiOiJOQSIsInRpZCI6ImRjYTQwYjYzLTY2OWEtNDEzNi1iN2M3LWQ2MTI5NTNmNDU3YiIsInVua1XF1Z9uYW11IIjoic29uaS5hQHNhaGNsm9ubW1jcm9zb2Z0Lm5Nb1SIsInVubiI6InNvbmkuYUBzc29tTlTxNzcxNDV1MTAiLCJiN21mYm9zbmV5N2CSZW5Y5LTQ20DktODE0My03NmIxOTR1ODU1MDkiXSwieG1zX3N0Ijp7InN1YiI6Ik8wVUFEMHZaZkJMamU3M1JBWF1tN0h4WNZsUEdPZTZwcERXMWh0RGZ5a2sifSwieG1zX3RjZHQiOjE2NTM1NjAyNzJ9.BZS7AErHkYG5CpdywEGimguqkmKq32FQ8IqaJ_DCfrvc7_T1TNsZ8r3HJ5eQNP-
KBQiAvG0GS94zZFPx53xitKYUsbZ81A1KsEOhZKT7UNWOIiStOA9c_fZXWQ1R71KP1bH8YrOWQXYoUGxaix560YzQ-q9871kLIHAm3RHOiJhg2-kw1WRIz7KZckwc7AccbpYP6Y7h5QAPE5PFXHHV-P4q4R9vPBjZGxldaY6EybTGFd99t--
ZIoIge435ga4pylGtDP7JGILtySJgsXbI7AUnwdR8I2xO5EfIm71W_Tc3FNSkeY-kHXOZ2EWIXfpfM9wbkplENsiUBTM4dDg37g

Demo MS Graph Explorer

The signed-in user's profile photo can be accessed using the https://graph.microsoft.com/v1.0/me/photo/$value endpoint

Another user's profile information or photo can be accessed using
https://graph.microsoft.com/v1.0/users/{user Id}
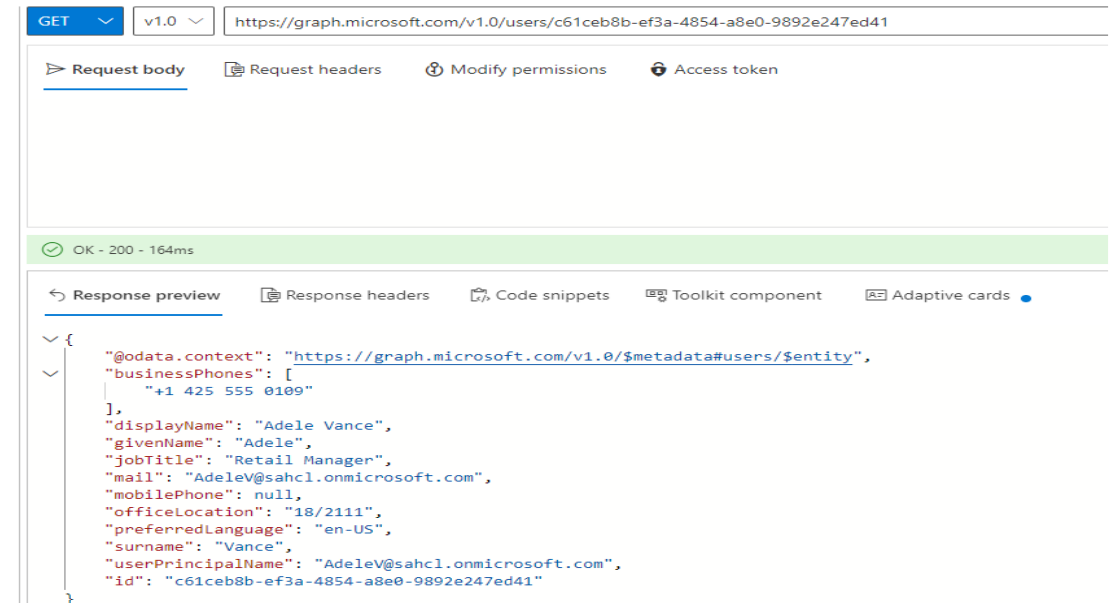
Demo MS Graph Explorer

Insufficient Access to user photo using
https://graph.microsoft.com/v1.0/users/{user Id}/photo/$value

Modify permission and consent for User.ReadBasic.All

Demo MS Graph Explorer

Consent granted for User.ReadBasic.All

User photo is now available

🔒 login.microsoftonline.com/common/reprocess?ctx=rQQIARAApZJNaB...

■■ Microsoft
■■

soni.a@sahcl.onmicrosoft.com

Permissions requested

Graph Explorer
Microsoft ✔

This app would like to:

∨ Read all users' basic profiles

∨ View your basic profile

∨ Maintain access to data you have given it access to

☐ Consent on behalf of your organization

Accepting these permissions means that you allow this app to use your data as specified in their terms of service and privacy statement. You can change these permissions at https://myapps.microsoft.com. Show details

Does this app look suspicious? Report it here

[Cancel]   [Accept]

GET ∨   v1.0 ∨   https://graph.microsoft.com/v1.0/users/c61ceb8b-ef3a-4854-a8e0-9892e247ed41/photo/$value

▷ Request body   📄 Request headers   ⊙ Modify permissions   🛡 Access token

✓ OK - 200 - 39ms

↺ Response preview   📋 Response headers   Code snippets   Toolkit component   Adaptive cards

Similarly we can call different API to get the data like trending items around me

The same API that are called from Graph explorer can be consumed in custom application using SDKs and client libraries

Microsoft Graph SDK

SDKs are available in the following languages:

- .NET
- Go (preview)
- Java
- JavaScript
- PHP
- PowerShell
- Python (preview)

NuGet Packages for .NET SDK

- **Microsoft.Graph:** Contains models and request builders for accessing v1.0 endpoint with fluent API
- **Microsoft.Graph.Beta:** Contains models and request builders for accessing beta endpoint with fluent API
- **Microsoft.Graph.Core:** Core library for making calls to MS graph

Setup Project in Visual Studio

- Create Console App
- Run Install-Package Microsoft.Graph using Package Manager Console.

```
PM> Install-Package Microsoft.Graph
Restoring packages for C:\Users\adminuser\source\repos\MSGraphSample\MSGraphSample\MSGraphSample.csproj...
  GET https://api.nuget.org/v3-flatcontainer/microsoft.graph/index.json
  OK https://api.nuget.org/v3-flatcontainer/microsoft.graph/index.json 29ms
  GET https://api.nuget.org/v3-flatcontainer/microsoft.graph/4.47.0/microsoft.graph.4.47.0.nupkg
  OK https://api.nuget.org/v3-flatcontainer/microsoft.graph/4.47.0/microsoft.graph.4.47.0.nupkg 6ms
  GET https://api.nuget.org/v3-flatcontainer/microsoft.graph.core/index.json
```

- Create MS Graph Client with authentication provider. (Register the app in Azure AD for Authentication)

```
var client = GetAuthenticatedGraphClient();

var graphRequest = client.Users.Request();

var results = graphRequest.GetAsync().Result;
foreach (var user in results)
{
    Console.WriteLine(user.Id + ": " + user.DisplayName + " <" + user.Mail + ">");
}

Console.WriteLine("\nGraph Request:");
Console.WriteLine(graphRequest.GetHttpRequestMessage().RequestUri);
```

- The API to get all Azure Active Directory Users

Application Flow

Register the application.
Configure the project with ID and Key
Authenticate the user and get access token
Call Microsoft Graph API
Show the result

Querying Data (OData with MS Graph)

Microsoft Graph supports query parameters to control the amount of data returned in a response

Microsoft Graph combined with OData is a very powerful technology that grants access to all members within an organization, it also prevents duplication of an organization members data and offers an option to reference these members by their organization id

Name	Description	Example
$count	Retrieves the total count of matching resources.	/me/messages?$top=2&$count=true
$expand	Retrieves related resources.	/groups?$expand=members
$filter	Filters results (rows)	/users?$filter=startswith(givenName,'J')
$format	Returns the results in the specified media format	/users?$format=json
$orderby	Orders results	/users?$orderby=displayName desc
$search	Returns results based on search criteria	/me/messages?$search=pizza
$select	Filters properties (columns)	/users?$select=givenName,surname
$skip	Indexes into a result set.	/me/messages?$skip=11
$top	Sets the page size of results	/users?$top=2

OData Queries with MS Graph

- https://graph.microsoft.com/v1.0/me?$select=displayName

Response preview   Response headers   Code snippets   Toolkit component   Adaptive cards

```
{
    "@odata.context": "https://graph.microsoft.com/v1.0/$metadata#users(displayName)/$entity",
    "displayName": "Soni Arora"
}
```

- https://graph.microsoft.com/v1.0/users?$filter=jobTitle eq 'Developer'

Response preview   Response headers   Code snippets   Toolkit component   Adaptive cards

```
{
    "@odata.context": "https://graph.microsoft.com/v1.0/$metadata#users",
    "value": [
        {
            "businessPhones": [
                "+1 954 555 0118"
            ],
            "displayName": "Henrietta Mueller",
            "givenName": "Henrietta",
            "jobTitle": "Developer",
            "mail": "HenriettaM@sahcl.onmicrosoft.com",
            "mobilePhone": null,
            "officeLocation": "18/1106",
            "preferredLanguage": "en-US",
            "surname": "Mueller",
            "userPrincipalName": "HenriettaM@sahcl.onmicrosoft.com",
            "id": "923b9326-5c45-4cd6-8281-0eedeea71acd"
        }
    ]
}
```

MS Graph PowerShell SDK

Prerequisites
- Powershell 5.1 or later
- .Net Framework 4.7.2 or later
- Update PowerShellGet to the latest version using Install-Module PowerShellGet -force

Installation
Run the following command to install the SDK in PowerShell Core or Windows PowerShell
- Install-Module Microsoft.Graph -Scope CurrentUser

Authentication
The PowerShell SDK supports two types of authentication: delegated access, and app-only access

```
PS C:\Users\soni.a> Set-ExecutionPolicy -ExecutionPolicy RemoteSigned -Scope CurrentUser

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose
you to the security risks described in the about_Execution_Policies help topic at
https://go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "N"): A
PS C:\Users\soni.a> Install-Module Microsoft.Graph -Scope CurrentUser

NuGet provider is required to continue
PowerShellGet requires NuGet provider version '2.8.5.201' or newer to interact with NuGet-based repositories. The NuGet
 provider must be available in 'C:\Program Files\PackageManagement\ProviderAssemblies' or
'C:\Users\soni.a\AppData\Local\PackageManagement\ProviderAssemblies'. You can also install the NuGet provider by
running 'Install-PackageProvider -Name NuGet -MinimumVersion 2.8.5.201 -Force'. Do you want PowerShellGet to install
and import the NuGet provider now?
[Y] Yes  [N] No  [S] Suspend  [?] Help (default is "Y"):
```

MS Graph Use Cases

Corporate Calendar	Application used to aggregate and show events fectched from various Resource Mailboxes in Microsoft Exchange in a Calendar View in a SPFx webpart on SharePoint Page
Extranet	Sending Invitation to External users using Graph API to add them as guest Users in M365 Tenant to provide vendors/suppliers access to respective SharePoint Sites
Customs Authority	Sign Up User form (Azure webapp) which sends Invitation using Graph API to add the external users as Guest Users in M365 tenant to access the SharePoint Site
List down site collections associated to HUB	There is no UI for the site owners to list down all the site collection associated to the HUB. Using graph API we have listed all the associated site collection for a HUB.
People Search	Search functionality to get user contacts in his own network and to be able to search for employees in the Organization based on user's attributes in Azure AD
E-Greetings(Under Implementation)	Functionality to Import Contacts from User's Mailbox and show it on SharePoint Page so that the user can send greetings to anyone of those contacts.
Automated Teams channel	Automated the process to create teams channel when a new site collection gets attached to the HUB.
Email Classification	Read and store (classification) of emails into Mango db using Natural Processing Language through MS graph over O365
O365 service health	Updates the O365 service health status in Service Health Dashboard by querying the MS incidents and advisories using Graph API
Legal hold private channel discovery	A PowerAutomate workflow created using graph API to query all private channel associated with specific user on legal hold
Frequently connected colleagues	Used APIs to list down frequently connected colleagues
One note notebooks and sections	Used APIs to list down one note notebooks and sections
Followed yammer communities	Used APIs to list down followed yammer communities

References

- Microsoft Graph REST API v1.0 endpoint reference - Microsoft Graph v1.0 | Microsoft Learn
- https://learn.microsoft.com/en-us/azure/active-directory/develop/v2-oauth2-auth-code-flow
- https://learn.microsoft.com/en-us/graph/overview
- https://techgenix.com/microsoft-graph/
- https://learn.microsoft.com/en-us/shows/beginners-series-to-microsoft-graph/
- https://blog.mydock365.com/everything-you-want-to-know-about-the-power-of-microsoft-graph-api
- https://learn.microsoft.com/en-us/graph/auth/auth-concepts
- Oauth 2.0 Authorization Code Flow | Microsoft Graph – YouTube
- Microsoft Graph PowerShell SDK overview | Microsoft Learn
- https://devblogs.microsoft.com/odata/exploring-graph-native-support-for-odata/

Thank You