

# **Extend PowerApps and Flow using Custom Connectors**



# GitHub Repo

- All slides and demo files available for download
  - <https://github.com/CriticalPathTraining/CustomConnectors>



# Deep Dive into PowerApps and Flow

- Two action-packed days of building PowerApps and Flows
  1. Getting Started with PowerApps Studio
  2. Designing PowerApps using Advanced Techniques
  3. Building PowerApps for SharePoint Online
  4. Introduction to Microsoft Flow
  5. Designing Flows to Automate an Approval Process
  6. Building PowerApps and Flows for Power BI
  7. Working with the Common Data Service for Apps
  8. Managing Application Lifecycle with PowerApps and Flow
- More info
  - <https://www.criticalpathtraining.com>
  - [info@criticalpathtraining.com](mailto:info@criticalpathtraining.com)

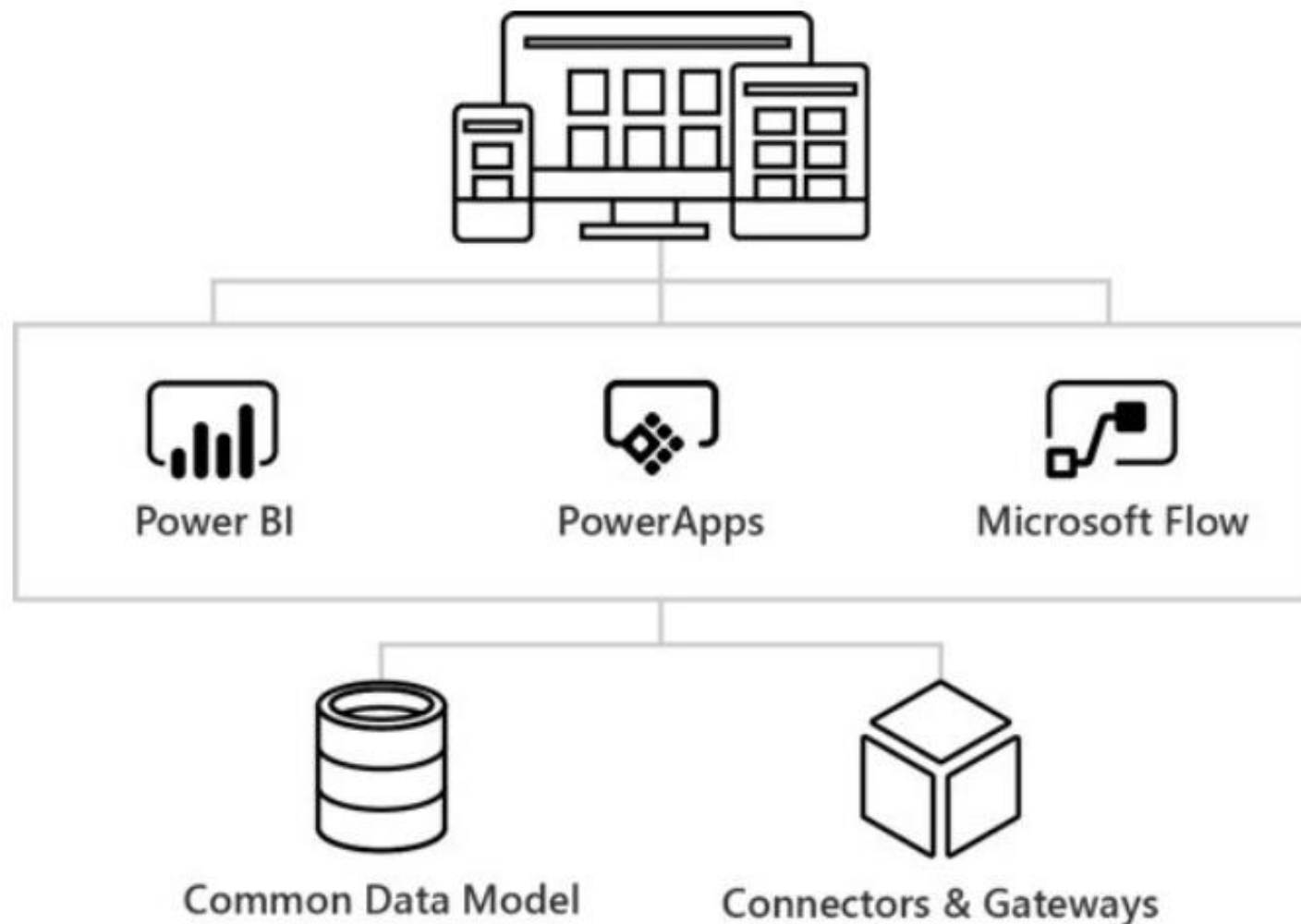


# Agenda

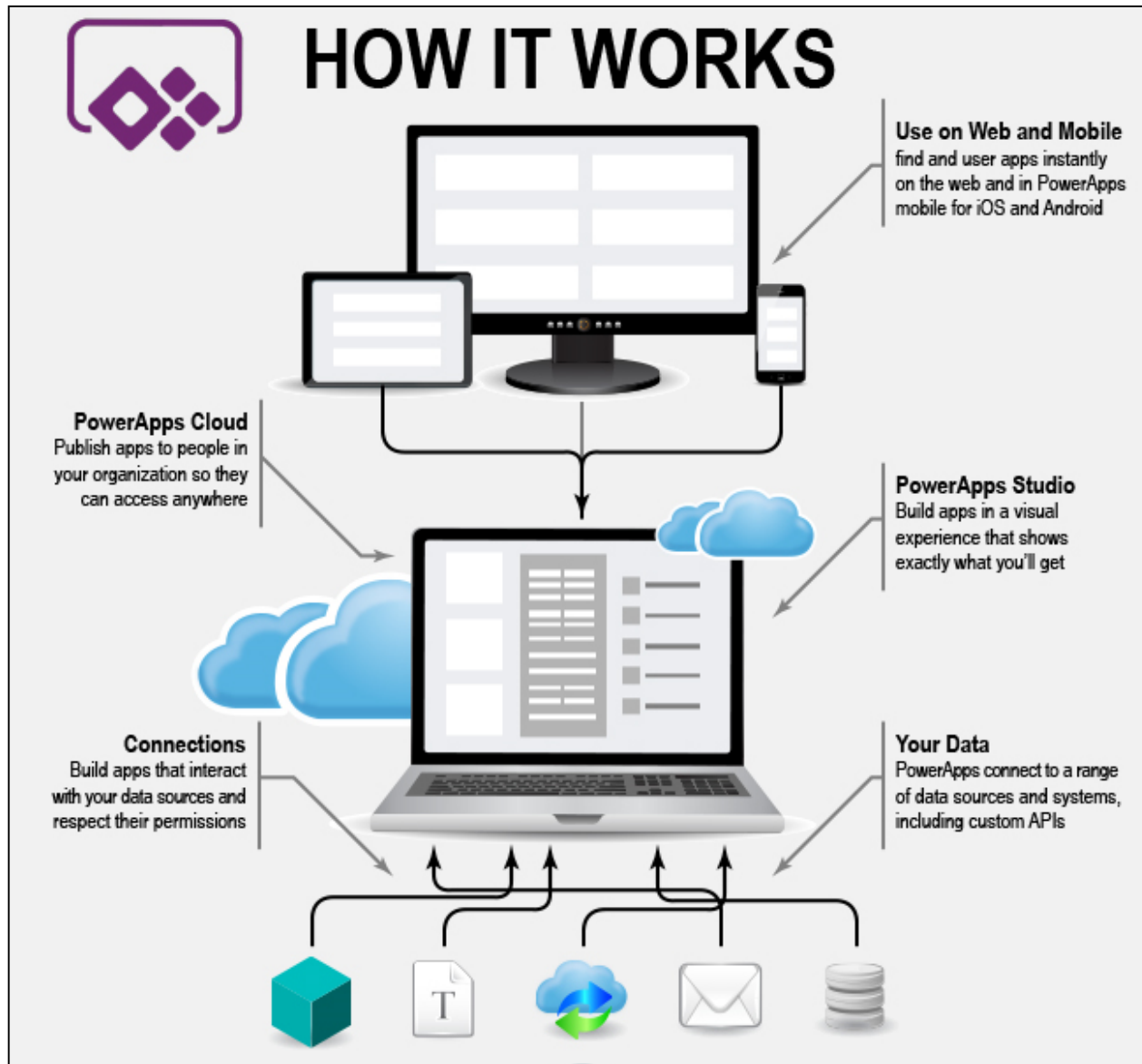
- Introduction to Custom Connectors
- Creating a Simple Custom Connector
- Authentication with Custom Connectors



# What is the Business Application Platform?



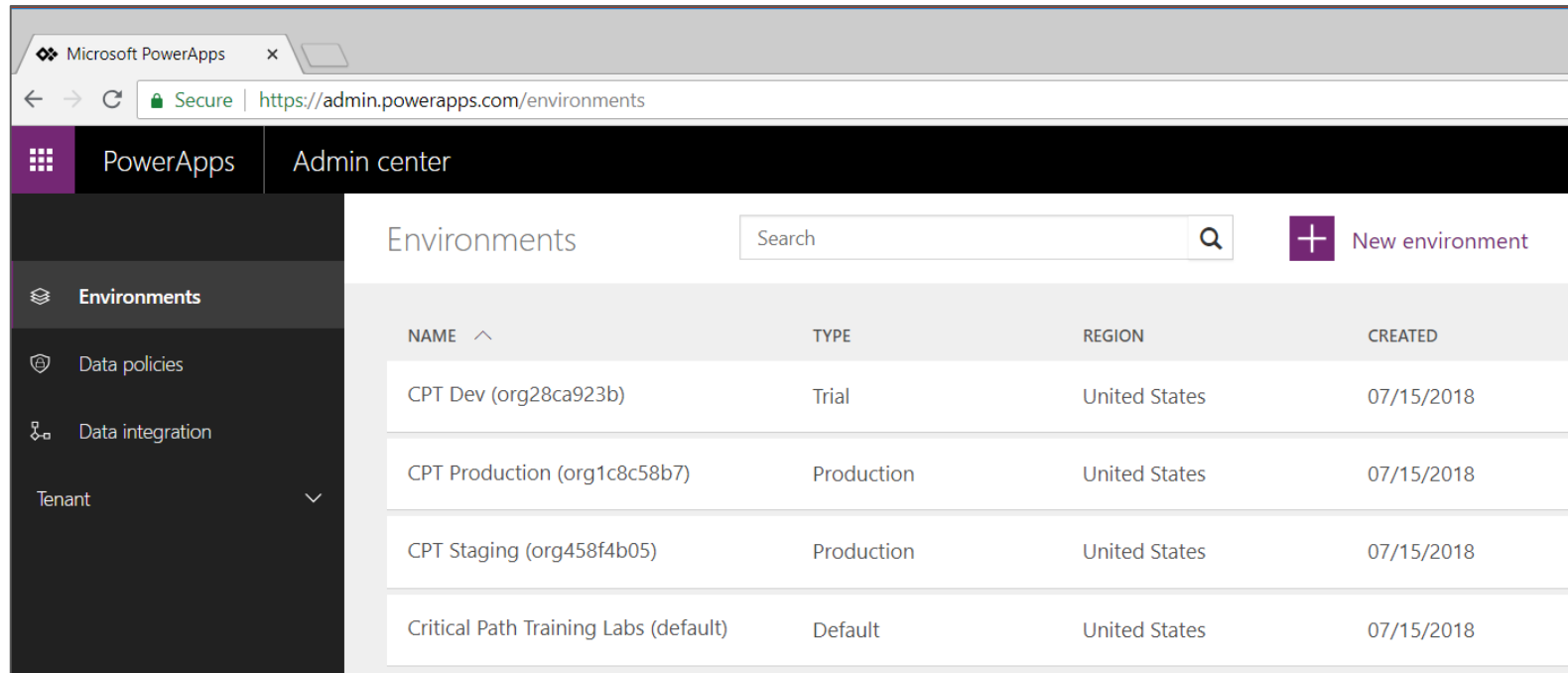
# What is PowerApps?





# PowerApps Admin Center & Environments

- PowerApps architecture based on environments
  - Environment provides context for creating apps and flows
  - Every tenant is automatically created with default environment
  - Organization can create multiple environments for dev & staging
  - PowerApps Plan 2 license required to manage environments



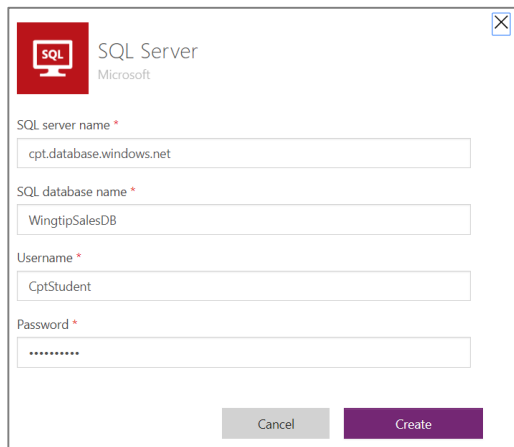
The screenshot displays the Microsoft PowerApps Admin Center interface. The browser address bar shows the URL <https://admin.powerapps.com/environments>. The left sidebar contains navigation options: Environments (selected), Data policies, Data integration, and Tenant. The main content area is titled 'Environments' and includes a search bar and a '+ New environment' button. Below this is a table listing the environments for the tenant.

NAME ^	TYPE	REGION	CREATED
CPT Dev (org28ca923b)	Trial	United States	07/15/2018
CPT Production (org1c8c58b7)	Production	United States	07/15/2018
CPT Staging (org458f4b05)	Production	United States	07/15/2018
Critical Path Training Labs (default)	Default	United States	07/15/2018

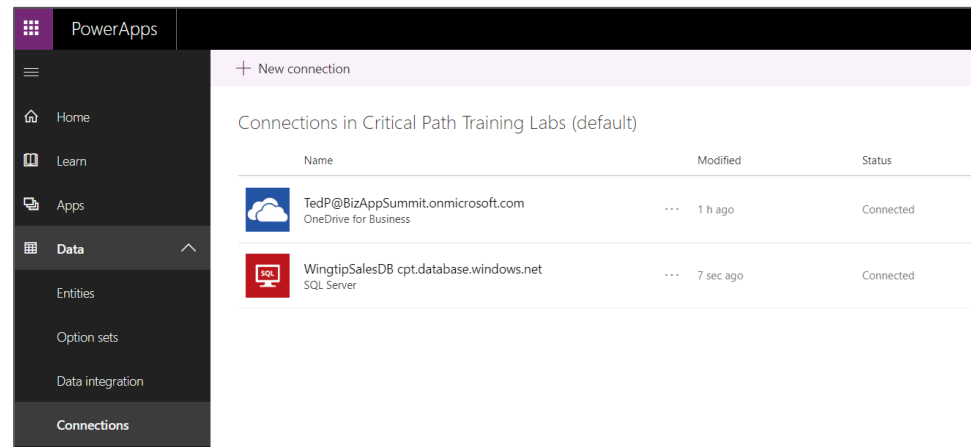


# Understanding Connectors & Connections

- What is a Connector?
  - API wrapper that PowerApps uses to interact with datasource
- What is a Connection?
  - Configuration created to connect to a specific datasource
  - Each connection is created using a specific connector
  - Connection also caches login credentials and granted permissions
  - Connections can be shared across users



The screenshot shows the 'SQL Server' connector configuration window. It has a title bar with the SQL Server icon and 'SQL Server Microsoft'. The form contains four input fields: 'SQL server name \*' with the value 'cpt.database.windows.net', 'SQL database name \*' with the value 'WingtipSalesDB', 'Username \*' with the value 'CptStudent', and 'Password \*' with masked characters. At the bottom are 'Cancel' and 'Create' buttons.



The screenshot shows the 'PowerApps' interface with the 'Connections' tab selected. It displays a table of connections for 'Critical Path Training Labs (default)'. The table has columns for Name, Modified, and Status. Two connections are listed: 'TedP@BizAppSummit.onmicrosoft.com OneDrive for Business' (modified 1 h ago, Connected) and 'WingtipSalesDB cpt.database.windows.net SQL Server' (modified 7 sec ago, Connected).

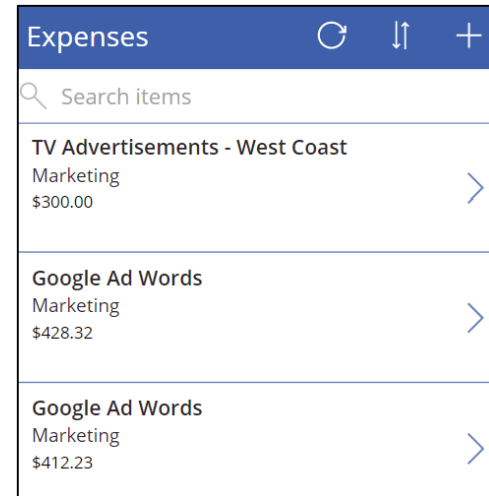
Name	Modified	Status
TedP@BizAppSummit.onmicrosoft.com OneDrive for Business	... 1 h ago	Connected
WingtipSalesDB cpt.database.windows.net SQL Server	... 7 sec ago	Connected



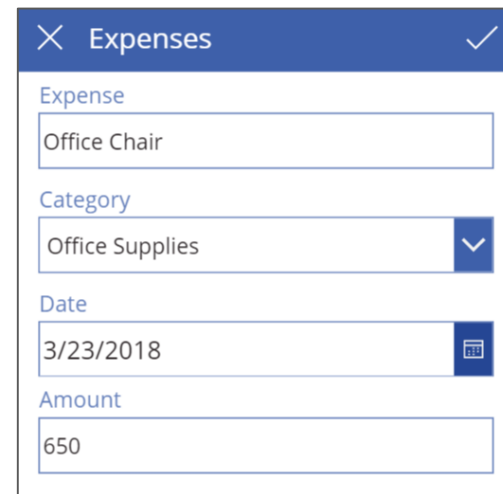


# Data Binding with Galleries and Forms

- Table binding
  - Gallery control
  - DataTable control
- Single-record binding
  - Display form control
  - Edit form control



Expenses		↺ ↻ ↻
Search items		
TV Advertisements - West Coast	Marketing	\$300.00
Google Ad Words	Marketing	\$428.32
Google Ad Words	Marketing	\$412.23



Expenses		✕ ✓
Expense	Office Chair	
Category	Office Supplies	
Date	3/23/2018	
Amount	650	



# Working with the Data Pane

- You use the Data pane to configure data binding
  - Select a data-bound control and then display Data pane
  - Data pane allows you to change layout for data binding
  - Once you select layout, you can then map fields below

The screenshot displays the PowerApps interface with the Data pane open. The interface is divided into three main sections: a left pane for controls, a central canvas, and a right pane for data configuration.

- Data-bound control:** An arrow points to the 'BrowseGallery1' control in the left pane.
- Data-bound connection:** An arrow points to the 'Expenses' data source in the 'Data source' section of the Data pane.
- Data-binding layout:** An arrow points to the 'Layout' section, which shows 'Title, subtitle, and body' as the selected layout.
- Field mappings:** An arrow points to the 'Body1' section, which shows the following field mappings:
  - Amount
  - Category
  - Expense

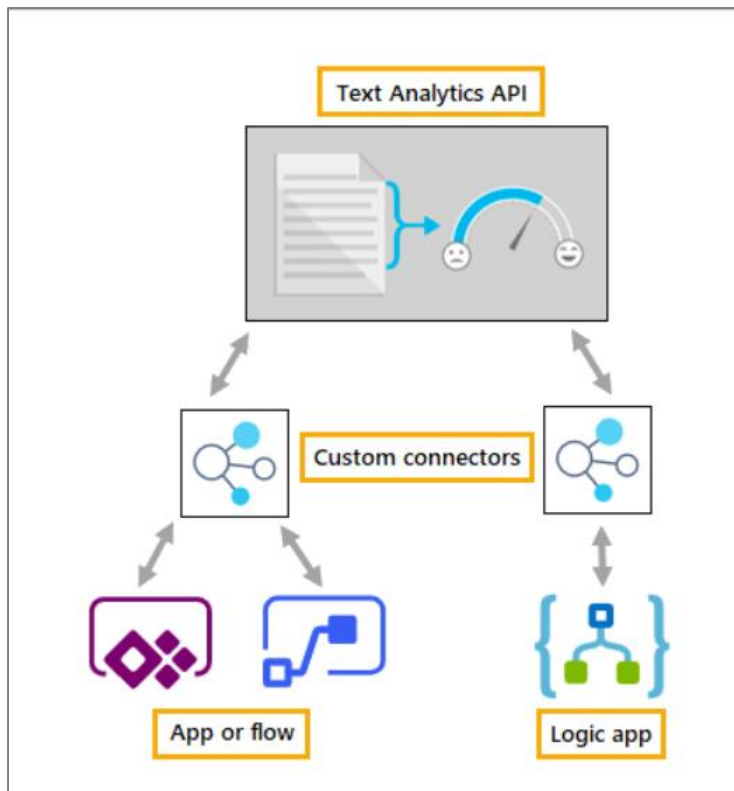
The central canvas displays a gallery titled 'Expenses' with the following data:

Item	Category	Amount
TV Advertisements - West Coast	Marketing	300
Google Ad Words	Marketing	428.32
Google Ad Words	Marketing	412.23
Coffee Supplies	Office Supplies	840.25
Printer Paper	Office Supplies	480
Cleaning Supplies	Office Supplies	268.45
Toner Cartridges for Printer	Office Supplies	3200



# Standard Connectors vs Custom Connectors

- PowerApps Supports two types of connectors
  - Standard connectors supplied out-of-box and vetted by Microsoft
  - Custom connectors created by organizations for their own use





**DEMO**

# **Inspecting the Custom Connectors within a PowerApps Environment**

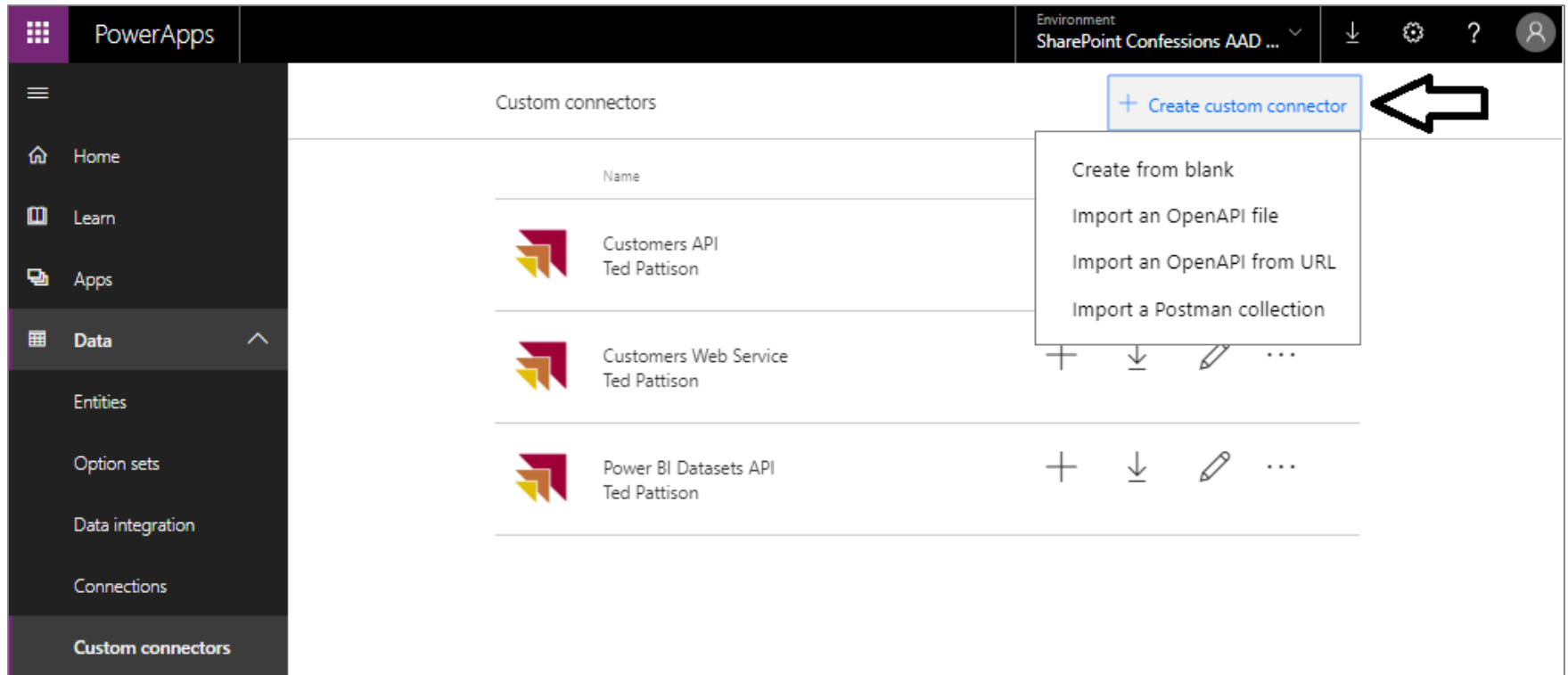


# Agenda

- ✓ Introduction to Custom Connectors
- Creating a Simple Custom Connector
- Authentication with Custom Connectors



# Creating a New Custom Connector



The screenshot shows the PowerApps interface. The top navigation bar includes the PowerApps logo, the environment name "SharePoint Confessions AAD ...", and icons for download, settings, help, and user profile. The left sidebar contains a menu with "Home", "Learn", "Apps", "Data", "Entities", "Option sets", "Data integration", "Connections", and "Custom connectors". The "Custom connectors" section is active, displaying a table of existing connectors. A button labeled "+ Create custom connector" is highlighted with a blue border and a large black arrow pointing to it. A dropdown menu is open below this button, showing four options: "Create from blank", "Import an OpenAPI file", "Import an OpenAPI from URL", and "Import a Postman collection".

Custom connectors	
Name	
Customers API Ted Pattison	
Customers Web Service Ted Pattison	
Power BI Datasets API Ted Pattison	



# Defining Requests

Request

+ Import from sample

\* Verb

The verb describes the operations available on a single path.

GET

\* URL

This is the request URL.

http://subliminalsystems.com/api/Customers/

Path

Path is used together with Path Templating, where the parameter value is actually part of the operation's URL.

Query

Query parameters are appended to the URL. For example, in /items?id=####, the query parameter is id.

Headers

These are custom headers that are part of the request.

Body

The body is the payload that's appended to the HTTP request. There can only be one body parameter.

Request

+ Import from sample

\* Verb

The verb describes the operations available on a single path.

GET

\* URL

This is the request URL.

http://subliminalsystems.com/api/Customers({CustomerId})

Path

Path is used together with Path Templating, where the parameter value is actually part of the operation's URL.

\* CustomerId

...

Query

Query parameters are appended to the URL. For example, in /items?id=####, the query parameter is id.

Headers

These are custom headers that are part of the request.

Body

The body is the payload that's appended to the HTTP request. There can only be one body parameter.





# Defining the Response

Connector Name: Customers Web Service

1. General > 2. Security > **3. Definition** > 4. Test

✓ Update connector ✕ Close

▼ Actions (2)

Actions determine the operations that users can perform. Actions can be used to read, create, update or delete resources in the underlying connector.

- 1 GetCustomers ...
- 2 **GetCustomer** ...
- + New action

▼ References (0)

References are reusable parameters used by both actions and triggers.

← Back

**Response** + Import from sample

\* Name

default

Headers

These are custom headers that are part of the response.

References Used

The following are the references used by this entity

Body

The payload that is available on the response. These are the tokens that will show up as the outputs in designer.

Address ... BirthDate ... City ... Company ... CustomerId ...

EmailAddress ... FirstName ... FirstPurchaseDate ... Gender ...

HomePhone ... LastName ... LastPurchaseDate ... State ... WorkPhone ...

Zipcode ... odata.metadata ...

Validation

This helps you identify potential issues with this response.

**Validation** ✓

Validation succeeded.

← Security Test →

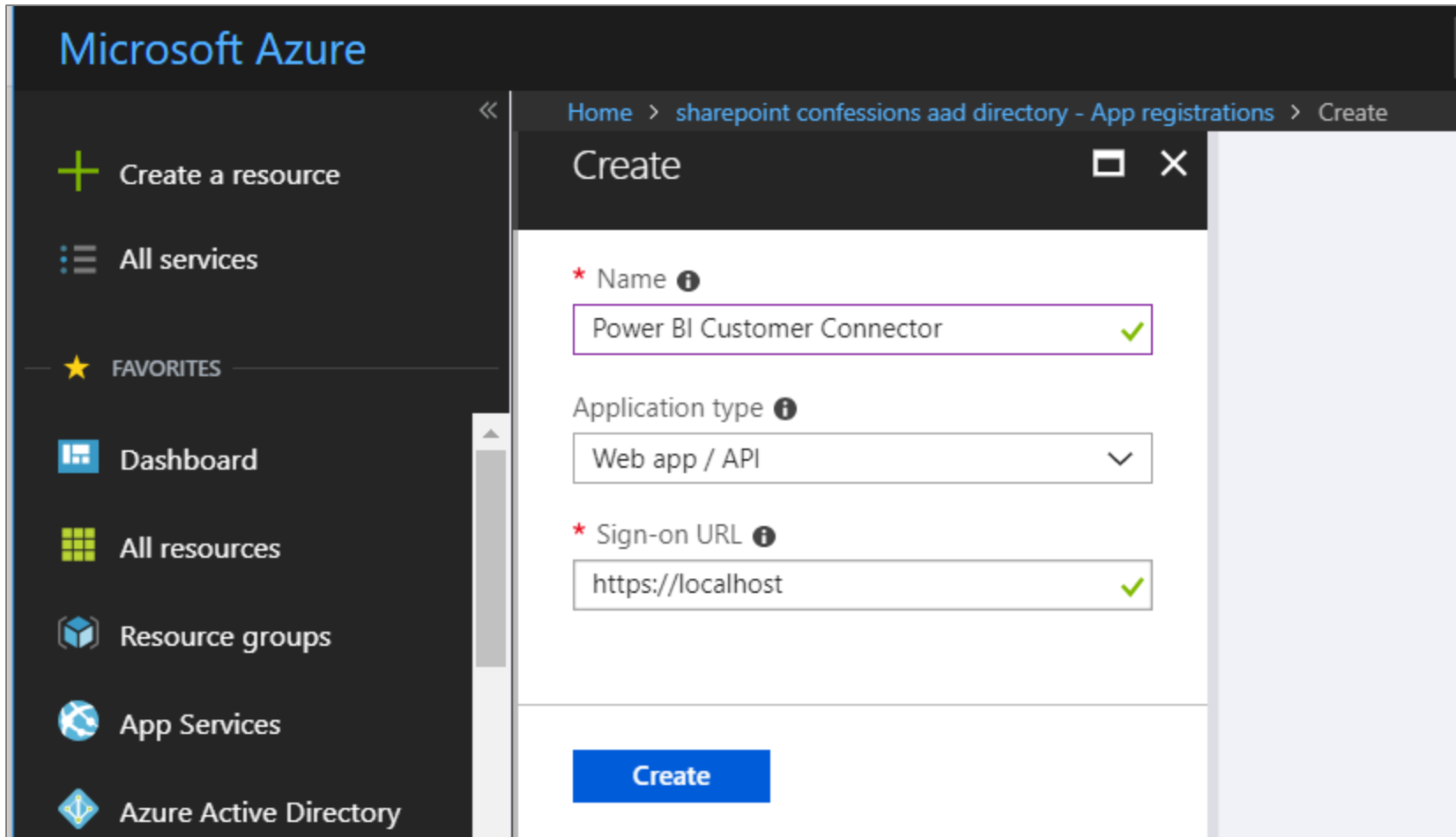


# Agenda

- ✓ Introduction to Custom Connectors
- ✓ Creating a Simple Custom Connector
- Authentication with Custom Connectors



# Creating an Azure AD Application



The screenshot shows the Microsoft Azure portal interface. On the left is a dark sidebar with navigation links: 'Create a resource', 'All services', 'FAVORITES', 'Dashboard', 'All resources', 'Resource groups', 'App Services', and 'Azure Active Directory'. The main content area has a breadcrumb trail: 'Home > sharepoint confessions aad directory - App registrations > Create'. Below the breadcrumb is a 'Create' dialog box with a title bar containing a maximize icon and a close 'X' icon. The dialog contains three required fields, each marked with a red asterisk and an information icon: 'Name' with the value 'Power BI Customer Connector' and a green checkmark; 'Application type' with a dropdown menu showing 'Web app / API'; and 'Sign-on URL' with the value 'https://localhost' and a green checkmark. At the bottom of the dialog is a blue 'Create' button.

Microsoft Azure

Home > sharepoint confessions aad directory - App registrations > Create

Create

\* Name ⓘ  
Power BI Customer Connector ✓

Application type ⓘ  
Web app / API ▼

\* Sign-on URL ⓘ  
https://localhost ✓

Create



# Application ID (aka Client ID)

Home > sharepoint confessions aad directory - App registrations > Power BI Customer Connector

## Power BI Customer Connector

Registered app

Settings Manifest Delete

Display name	Application ID
Power BI Customer Connector	0d956d63-2b3a-4a6b-8b21-5b43db48cc77
Application type	Object ID
Web app / API	07aee325-93c9-44bb-a770-71773f948223
Home page	Managed application in local directory
<a href="https://localhost">https://localhost</a>	<a href="#">Power BI Customer Connector</a>

⌵

Click to copy



# Configuring Permissions

Home > sharepoint confessions aad directory - App registrations > Power BI Customer Connector > Settings

## Power BI Customer Connector

Registered app

⚙ Settings ✎ Manifest 🗑 Delete

Display name	Application ID
Power BI Customer Connector	0d956d63-2b3a-4a6b-8b21-5b43db48cc77
Application type	Object ID
Web app / API	07aee325-93c9-44bb-a770-71773f948223
Home page	Managed application in local directory
<a href="https://localhost">https://localhost</a>	<a href="#">Power BI Customer Connector</a>

⌵

### Settings


🔍 Filter settings

#### GENERAL

- 📄 Properties >
- 🔗 Reply URLs >
- 👤 Owners >

#### API ACCESS

- 🔑 Required permissions >
- 🔑 Keys >



# Select the Power BI Service for the API

BI Customer Connector > Settings > Required permissions > Add API access > Select an API

Add API access

1 Select an API  
Power BI Service

2 Select permissions

Done

Select an API

Windows Azure Active Directory

Office 365 Exchange Online

Microsoft Graph

Office 365 SharePoint Online

Skype for Business Online

Office 365 Yammer

Dynamics CRM Online

**Power BI Service**

Microsoft Rights Management Services

Microsoft Intune API

Windows Azure Service Management API

Select



# Select the Required Permissions

Enable Access

☐ DELEGATED PERMISSIONS

↑↓

REQUIRES ADMIN




<input type="checkbox"/>	Read and write all dataflows	No
<input type="checkbox"/>	View all dataflows	No
<input type="checkbox"/>	Read and write all content in tenant	Yes
<input checked="" type="checkbox"/>	Read and Write all Reports	No
<input type="checkbox"/>	View users Groups	No
<input type="checkbox"/>	View all Groups	No
<input type="checkbox"/>	View all Reports (preview)	No
<input type="checkbox"/>	Create content (preview)	No
<input type="checkbox"/>	View content properties (preview)	No
<input checked="" type="checkbox"/>	Read and Write all Datasets	No
<input type="checkbox"/>	View all Datasets	No

Select





# Granting Permissions in Azure AD Portal

Required permissions		
<div> Add  Grant permissions </div>		
API	APPLICATION PERMI...	DELEGATED PE
Windows Azure Active Directory	0	1
Power BI Service	0	3



# Generating a Key Secret

onfessions aad directory - App registrations > Power BI Customer Connector > Settings > Keys

### Settings

Filter settings

GENERAL

- Properties >
- Reply URLs >
- Owners >

API ACCESS

- Required permissions >
- Keys >**

### Keys

Save Discard Upload Public Key

⚠ Copy the key value. You won't be able to retrieve after you leave this blade.

#### Passwords

DESCRIPTION	EXPIRES	VALUE
Key1	8/14/2019	ejVnaC0zTLRcc3ErbAhgchilb3CTC5SVyKgbvS9HLPk=

#### Public Keys



# Data Required to Create Custom Connector

CustomConnectorAzureAD.txt - Notepad

File Edit Format View Help

Application ID (aka Client ID)

0d956d63-2b3a-4a6b-8b21-5b43db48cc77

Secret Key

ejVnaC0zTLRcc3ErbAhgchi1b3CTC5SVyKgbvS9HLPk=




# Creating the New Custom Connector

1. General > 2. Security > 3. Definition > 4. Test

✓ Update connector ✕ Close

### General information

Add an icon and short description to your custom connector. Your host and base URL will be automatically generated from the swagger file.



Upload connector icon  
Supported file formats are PNG and JPG. (< 1MB)

↑ Upload

Icon background color

Description

☐ Connect via on-premises data gateway [Learn more](#)

Scheme  
☒ HTTPS ☐ HTTP

\* Host

Base URL

Security →



# Configuring the Client Id and Client Secret

←

Connector Name

Power BI Datasets API

1. General > 2. Security > 3. Definition > 4. Test

✓ Create connector ✕ Cancel


## Security

Choose the authentication type and fill in the required fields to set the security for your custom connector.  
[Learn more](#)

Authentication type

Choose what authentication is implemented by your API \*

OAuth 2.0

 Edit

OAuth 2.0

Identity Provider

Azure Active Directory

Client id \*

0d956d63-2b3a-4a6b-8b21-5b43db48cc77

Client secret \*

.....



# What About the Redirect URL?

The image displays two side-by-side screenshots of an OAuth 2.0 configuration interface, likely from the Azure portal. Both forms are titled 'OAuth 2.0' and have a purple header bar. The left form is in a 'Save' state, while the right form is in an 'Edit' state. A red arrow points from the 'Redirect URL' field in the left form to the 'Redirect URL' field in the right form, highlighting the difference in the URL values.

**Left Form (Save state):**

- Identity Provider: Azure Active Directory
- Client id \*: 0d956d63-2b3a-4a6b-8b21-5b43db48cc77
- Client secret \*: [Redacted]
- Login URL: https://login.windows.net
- Tenant ID: common
- Resource URL \*: https://analysis.windows.net/powerbi/api
- Scope: scope
- Redirect URL: Save the custom connector to generate the redirect URL
- Edit button: Edit

**Right Form (Edit state):**

- Identity Provider: Azure Active Directory
- Client id \*: 0d956d63-2b3a-4a6b-8b21-5b43db48cc77
- Client secret \*: [Redacted]
- Login URL: https://login.windows.net
- Tenant ID: common
- Resource URL \*: https://analysis.windows.net/powerbi/api
- Scope: Scope
- Redirect URL: https://msmanaged-na.consent.azure-apim.net/redirect
- Edit button: Edit



# Adding the Redirect URL back in Azure AD

Scope

Scope

Redirect URL

<https://msmanaged-na.consent.azure-apim.net/redirect>

Click to copy

Settings	×	Reply URLs
<p>Filter settings</p> <p>GENERAL</p> <p>Properties &gt;</p> <p><b>Reply URLs</b> &gt;</p> <p>Owners &gt;</p>		<p>Save Discard</p> <p><a href="https://msmanaged-na.consent.azure-apim.net/redirect">https://msmanaged-na.consent.azure-apim.net/redirect</a></p> <p></p>





# GetDatasets

## Request

It defines the pre-requirements needed in order to make a request. Describes a single operation parameter. A unique parameter is defined by a combination of a name and location.

### Request

+ Import from sample

#### \* Verb

The verb describes the operations available on a single path.

#### GET

#### \* URL

This is the request URL.

```
https://api.powerbi.com/v1.0/myorg/groups/{workspaceId}/datasets
```



# RefreshDataset

## Request

It defines the pre-requirements needed in order to make a request. Describes a single operation parameter. A unique parameter is defined by a combination of a name and location.

### Request

+ Import from sample

#### \* Verb

The verb describes the operations available on a single path.

#### POST

#### \* URL

This is the request URL.

```
https://api.powerbi.com/v1.0/myorg/groups/{workspaceId}/datasets/{datasetId}/refreshes
```

#### Path

Path is used together with Path Templating, where the parameter value is actually part of the operation's URL.

\* workspaceId ...

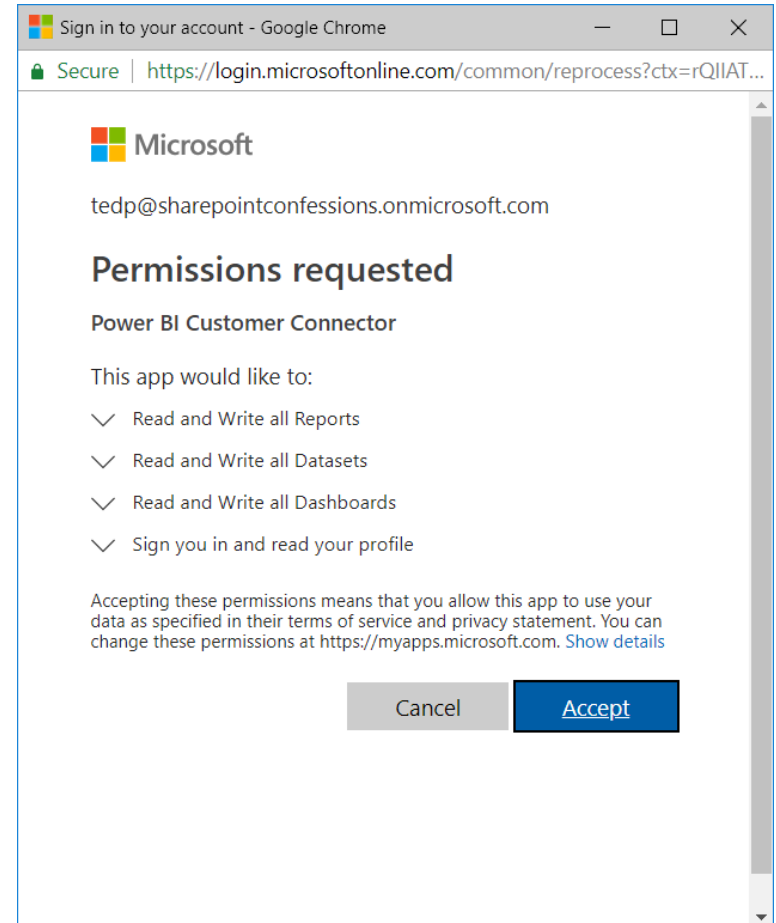
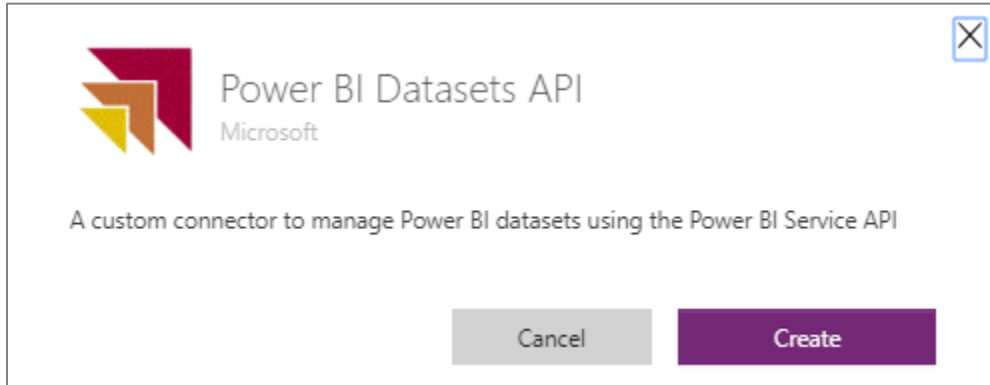
\* datasetId ...

#### Query

Query parameters are appended to the URL. For example, in /items?id=####, the query parameter is id.



# Creating a New Connection



# Importing Apps that use Custom Connections

### Import package

#### Package details

Created by Ted Pattison on 08/14/2018



**Name**  
Power BI Dataset Manager

**Environment**  
Critical Path Training Labs (default)



**Description**  
N/A

#### Review Package Content

Choose your import options.

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
 PBI Dataset Manger	App	<a href="#">Create as new</a> PBI Dataset Manger	

Related resources

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
 Power BI Service API	Connector	<a href="#">Select during import</a> Power BI Datasets API	

Import

Cancel



# Deep Dive into PowerApps and Flow

- Two action-packed days of building PowerApps and Flows
  1. Getting Started with PowerApps Studio
  2. Designing PowerApps using Advanced Techniques
  3. Building PowerApps for SharePoint Online
  4. Introduction to Microsoft Flow
  5. Designing Flows to Automate an Approval Process
  6. Building PowerApps and Flows for Power BI
  7. Working with the Common Data Service for Apps
  8. Managing Application Lifecycle with PowerApps and Flow
- More info
  - <https://www.criticalpathtraining.com>
  - [info@criticalpathtraining.com](mailto:info@criticalpathtraining.com)



# Summary

- ✓ Introduction to Custom Connectors
- ✓ Creating a Simple Custom Connector
- ✓ Authentication with Custom Connectors

