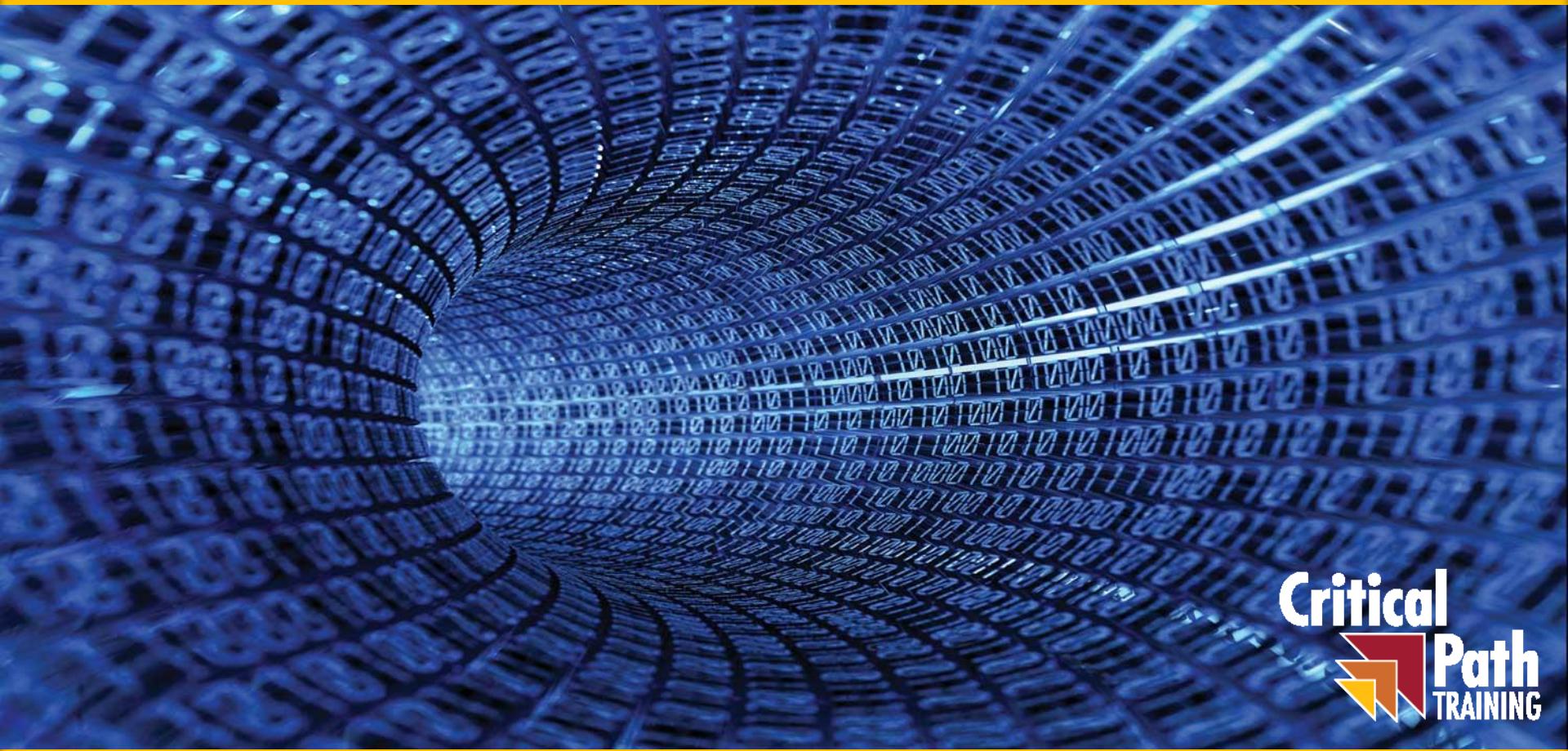


Building Custom Solutions using PowerApps



**Critical
Path
TRAINING**

Agenda

- Getting Started with PowerApps Studio
- Connecting to Data
- Integrating PowerApps with SharePoint Online



Creating PowerApps from a Template

- Create app based on a template for a specific scenario
 - Pre-built layouts and colour schemes for different app screens
 - Templates have predefined screens, features, and sample data
- Customize app made from template
 - Change layout, screens, features, and delete sample data



Learning from Template Apps

- Learn how controls are being configured for common actions such as:
 - Submit data from a form by clicking on a button
 - Transition from one app screen to the other
 - Show a list of items from my data, etc.
 - Data flows in and out of your app
 - Wire up your data source to your app
 - Camera or GPS are being integrated into your app



PowerApps Studio Interface

The screenshot illustrates the PowerApps Studio interface with several numbered callouts highlighting specific features:

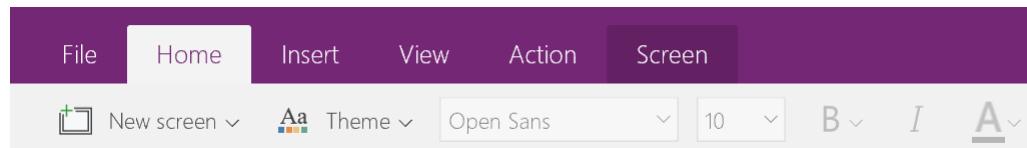
- 1** **Properties Panel**: Located on the left side, this panel displays a tree view of the screen's components and their properties. It includes sections for Properties, Data, and Advanced.
- 2** **Screen Preview**: The main workspace shows a "Budget Tracker" screen. It features a header bar with the title "Budget Tracker". Below the header, there are three main sections: "All budgets", "Total spent", and "Attached receipts". The "All budgets" section lists four budget items: "Team events at Contoso", "Spring customer visits", "Meta Conference XVI", and "Litware team event". The "Total spent" section contains a pie chart showing the distribution of spending across categories like Interior design, Food, Entertainment, and Miscellaneous. The "Attached receipts" section indicates "No receipts".
- 3** **Advanced Properties**: A detailed view of the "BudgetScreen" properties. It includes sections for ACTION (OnVisible, OnHidden, OnStart), DATA (BackgroundImage), DESIGN (Fill, ImagePosition), and a search bar.
- 4** **Color Picker**: A color picker tool used to set the fill color for a control. The current value is set to "Fill" with the color "#FF0000" (red).
- 5** **Color Hex Input**: An input field where the color "#FF0000" is being typed in.
- 6** **Toolbars**: A horizontal toolbar at the top with icons for New screen, Label, Button, Text, Controls, Gallery, Data table, Forms, Media, Charts, and Icons.
- 7** **Menu Bar**: The menu bar includes File, Home, Insert, View, Action, and Screen. The "Insert" tab is currently selected.



Ribbon

- Set of context-sensitive tabs which will display controls you can use to build your app:

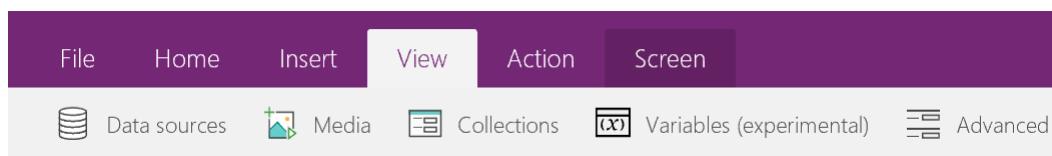
- Home tab



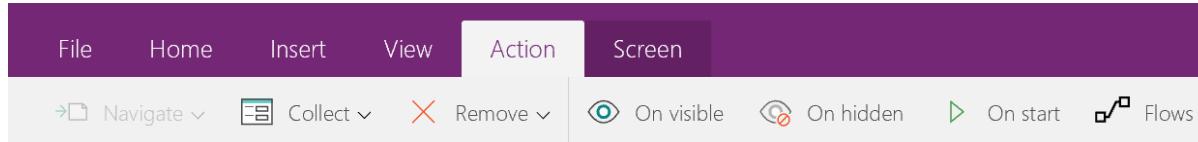
- Insert tab



- View tab



- Action tab



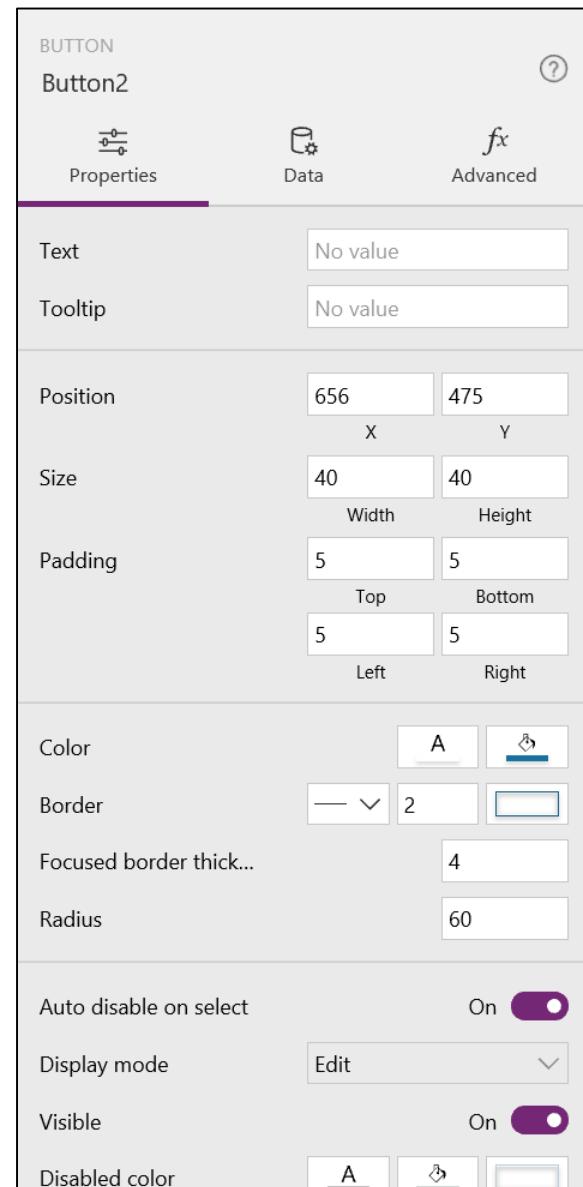
Panels

- **Properties Panel**
 - Will expose most common properties of any control you can configure visually without writing an expression
- **Data Panel**
 - Will surface configuring data sources and binding fields to Gallery and Form controls
- **Advanced Panel**
 - Used for more advanced customizations for controls



Properties Panel

- Configure controls without using a formula
 - Varies based on control
- Configure properties such as:
 - Text
 - Tooltip text
 - Position
 - Look & Feel
 - Size
 - Padding
 - Colors
 - Borders



Data Panel

- Will list existing data sources
- Also provides ability to add new data sources

The screenshot shows the Data Panel interface. At the top, there are three tabs: Properties, Data (which is selected), and Advanced. Below the tabs, the title "Data sources" is followed by a help icon and a "Add data source" button with a plus sign. A list of five data sources is displayed, each with a blue cloud icon, the source name, the owner's email, the provider, and a three-dot ellipsis menu icon.

Source	Owner	Provider	Actions
Budgets	zoe@ck2017.onmicrosoft.com	OneDrive for Business	...
Expenses	zoe@ck2017.onmicrosoft.com	OneDrive for Business	...
Categories	zoe@ck2017.onmicrosoft.com	OneDrive for Business	...
ExpenseByCategory	zoe@ck2017.onmicrosoft.com	OneDrive for Business	...
Receipts	zoe@ck2017.onmicrosoft.com	OneDrive for Business	...

Advanced Panel

- Configure more advanced customizations for controls

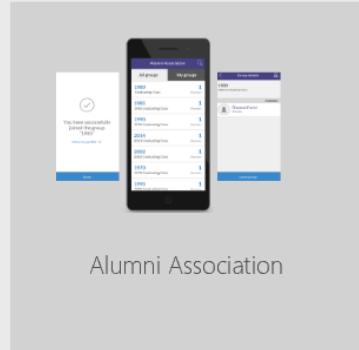
The screenshot shows the 'Advanced' tab selected in the top navigation bar of a configuration interface. The interface is divided into three main sections: ACTION, DATA, and DESIGN.

- ACTION:** Contains the code:

```
OnSelect
Navigate
(AddExpenseScreen, ScreenTransition.Fade,
{SpendRecord:SpendRecord, Record:Defaults(Expenses)});ResetForm
(FormNewExpense);NewForm
(FormNewExpense);Clear
(ReceiptsCollect)
```
- DATA:** Contains the field "Tooltip" with the value "...".
- DESIGN:** Contains the fields "AutoDisableOnSelect" set to "true" and "Color" set to "RGBA(255, 255, 255, 1)".

Phone Layout Templates

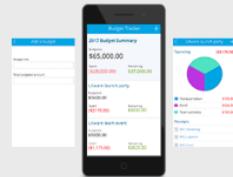
Templates



Alumni Association



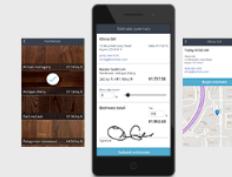
Asset Checkout



Budget Tracker



Case Management



Cost Estimator



Employee Engagement Survey



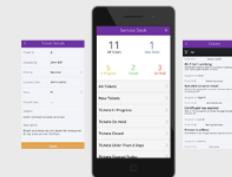
Health Plan Selector



Invoice Management



Quick Tips



Service Desk

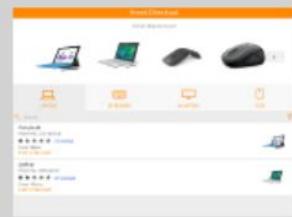


Site Inspection

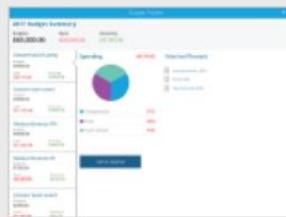


Tablet Layout Templates

Templates



Asset Checkout



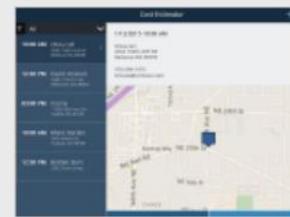
Budget Tracker



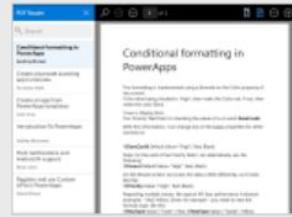
Case Management



Contest Registration



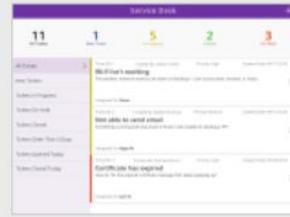
Cost Estimator



PDF Reader



Product Showcase



Service Desk

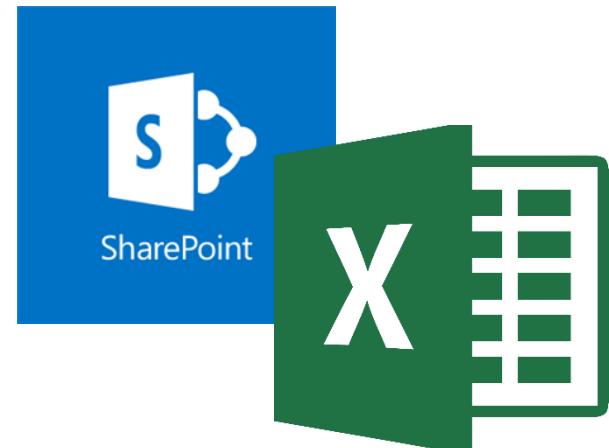


Site Inspection



Create App from Data Source

- In PowerApps, you can automatically generate an app based on a data source which includes:
 - SharePoint List
 - Create directly from SharePoint list
 - Or create a connection to the SharePoint list
 - Entity (entities will be discussed further in Module 4)
 - Excel data



SharePoint List

- Generate an app automatically based on data in a SharePoint list
 - Users can manage items in app for SharePoint list
 - Libraries are NOT supported
- By default, the app will have 3 screens:
 - **BrowseScreen1** - browse through all records in the list
 - **DetailsScreen1** - view all fields for a specific record
 - **EditScreen1** - create or edit a record
- Customize these screens based on your needs
- Not all columns are supported



Supported/Unsupported Columns

Column type	Support	Default cards
Single line of text	Yes	View text
Multiple lines of text	Yes	View text
Choice	Yes (single values only)	View lookup
Number	Yes	View percentage View rating View text
Currency	Yes	View percentage View rating View text
Date and Time	Yes	View text
Lookup	Yes (single values only)	View lookup Edit lookup
Boolean (Yes/No)	Yes	View text View toggle



Supported/Unsupported Columns

Column type	Support	Default cards
Person or Group	Yes (single values only)	View lookup Edit lookup
Hyperlink	Yes	View URL View text
Picture	Yes (read-only)	View image View text
Calculated	Yes (read-only)	
Task Outcome	No	
External data	No	
Managed Metadata	Yes (read-only)	
Rating	No	



Excel Data

- You can use an Excel file that has table data.
- Excel files must be uploaded to a cloud service before you can create the PowerApp:
 - Box
 - Dropbox
 - FTP
 - Google Drive
 - OneDrive
 - OneDrive for Business



Creating Custom PowerApps

- You can create your own app from scratch using the Blank app template:
 - Using any one of a variety of data sources and then adding more sources later.
 - This approach is much more time-intensive than generating an app automatically.
 - Experienced app makers can build the best app for their needs.
 - Specify the appearance and behavior of each UI element so that you can optimize the result for your exact goals and workflow.



Key Points

- PowerApps can be created in PowerApps Studio
- You can create apps automatically from:
 - Existing templates
 - Data sources such as a SharePoint custom list or Excel file
- Microsoft does continue to add more templates which they announce on their blog site.
- Not all SharePoint columns are supported in PowerApps



App Name & Icon

- Name, icon, and description settings your app
- **File tab > App Settings (PowerApps Studio)**

The screenshot displays the 'App settings' interface in PowerApps Studio, divided into two main sections: 'PowerApps Studio for web' and 'PowerApps Studio for Windows'.

PowerApps Studio for web:

- App name:** IT Service Desk Demo - Tablet
- Icon:** Preview shows a blue square with a white gear icon.
- Background color:** A 4x4 grid of color swatches.
- Icons:** A grid of icons including a checkmark, star, magnifying glass, arrows, and other symbols.
- App name:** Service Desk - Tablet
- Description:** A text input field asking to describe what people can do with the app.

PowerApps Studio for Windows:

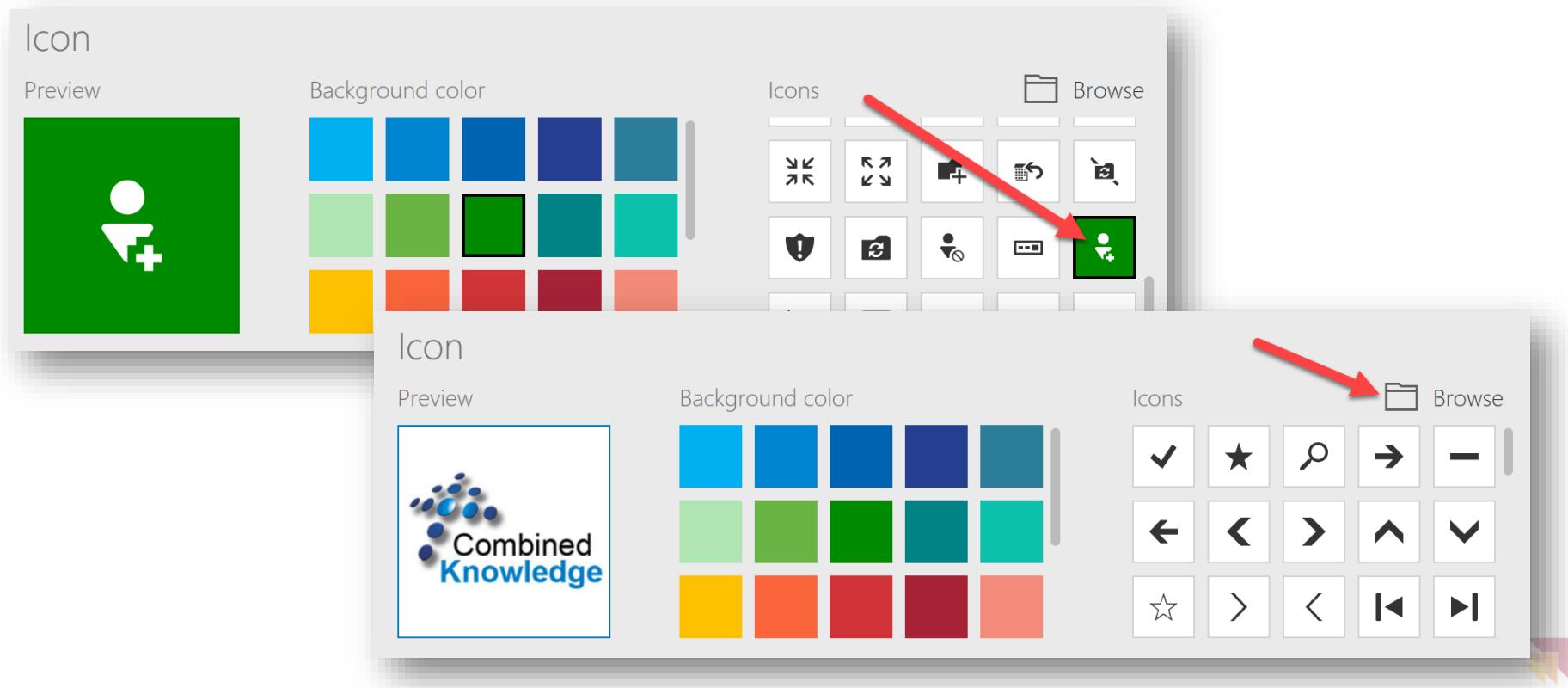
- Icon:** Preview shows a purple square with a white circular arrow icon.
- Background color:** A 4x4 grid of color swatches.
- Icons:** A grid of icons including a checkmark, star, magnifying glass, arrows, and other symbols.
- Description:** A text input field asking to describe what people can do with the app.

App settings sidebar:

- App name + icon:** Change the name or icon for the app
- Screen size + orientation:** Change the aspect ratio for your app

App Background & Icon

- Use pre-defined icons & change background color or use your own image
 - For best results, use square icon (i.e. 300x300)



Screen Size & Orientation

Phone layout

App settings

- App name + icon
Change the name or icon for the app
- Screen size + orientation
Change the aspect ratio for your app



Orientation

- Landscape
- Portrait

Advanced settings

Lock aspect ratio

Locking this automatically maintains the ratio between height and width to prevent distortion.

- On

Lock orientation

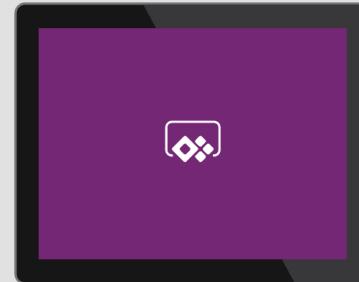
Locking orientation keeps the screen in its current orientation, even when the device is rotated.

- On

Tablet layout

Screen size + orientation

Choose the screen size and orientation that your users will most likely be using.



1024 x 768

Orientation

- Landscape
- Portrait

Size

- 16:9 (Default)
- 3:2 (Surface Pro 3)
- 16:10 (Widescreen)
- 4:3 (iPad)

Advanced settings

Lock aspect ratio

Locking this automatically maintains the ratio between height and width to prevent distortion.

- On

Lock orientation

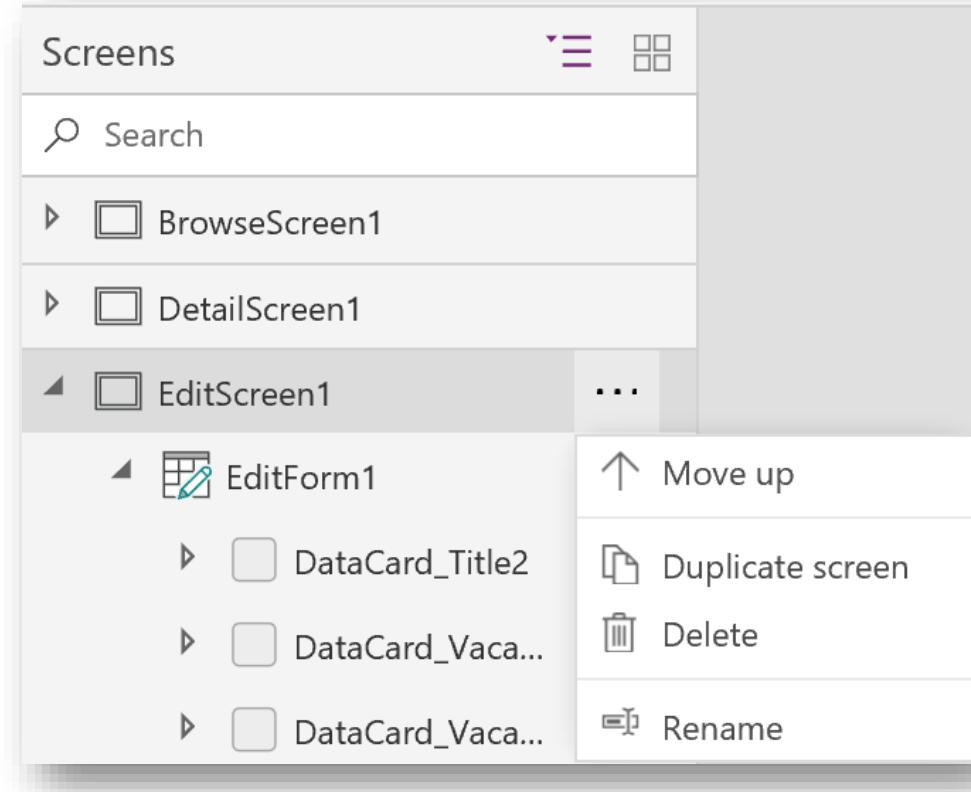
Locking orientation keeps the screen in its current orientation, even when the device is rotated.

- On



Customizing Screens

- Move (reorder)
- Duplicate
- Add screens
- Delete screens
- Rename screens



Screen Layout Settings

The screenshot shows the Power BI desktop application interface with the ribbon menu at the top. The 'Action' tab is selected, and the 'Fill' button in the 'Format' ribbon is also selected. A color palette dialog is open, showing a grid of colors. Below the ribbon, the 'Image position' dropdown is open, displaying five options: 'Fill', 'Fit', 'Stretch', 'Tile', and 'Center'. The 'Fit' option is currently selected. On the left side of the screen, there is a list of screens, and the 'ImagePosition' setting for the 'Vacation Status' screen is set to 'Fit'.

File Home Insert View Action Screen

Background image Image position Fill

Add an image file = fx

Basel_Add

Basel_ArrowsUpDown

Basel_Cancel

File Home Insert View Action Screen

Background image Image position Fill

ImagePosition

- Fill
- Fit
- Stretch
- Tile
- Center

Vacation Status

* Vacation Status

colors

No fill



Form Layouts

Vacation Request

* Vacation Start Date
12/31/2001

* Vacation End Date
12/31/2001

* Time Off Type

Comments

Card : PTO

PTO

CARD

DataCard_PTO2

Properties Data Advanced

Form customization

Vacation Request
zoe@ck2017.onmicrosoft.com
SharePoint

Refresh

Snap to columns 1

Layout Vertical

Form layout

Vertical

Horizontal



Controls

- You can add a variety of UI elements to your app which are called controls.
 - Controls have properties that can be configured to change the appearance and behavior of each control
- Properties can be configured:
 - Directly from the toolbar
 - In the **Properties** tab
 - Or in the formula bar



Adding Controls

- **Text:** Label, Text input, HTML Text, Pen input
- **Controls:** Button, Dropdown, Date picker, List box, Checkbox, Radio, Toggle, Slider, Rating, Timer
- **Gallery:** Vertical, Horizontal, Flexible height, Blank vertical, Blank horizontal, Blank flexible height
- **Data table**
- **Forms:** Edit, Display, Entity form
- **Media:** Image, Camera, Barcode, Video, Audio, Microphone, Add picture
- **Charts:** Column chart, Line chart, Pie chart
- **Icons**



Modifying Control Properties

The screenshot shows a "Vacation Request" form with the following fields:

- Title
- Vacation Start Date
- Vacation End Date
- Time Off Type
 - PTO (selected, indicated by a checked toggle switch)
 - Request Status
- Modified

The "Time Off Type" section has a tooltip: "Card : PTO".

The right side of the interface displays the properties of the current control, "DataCard_PTO1", which is a CARD type.

Property	Value	Unit
Position	0	X
	320	Y
Size	640	Width
	103	Height
Color	[Color swatch]	
Border	—	0
Display mode	View	
Visible	On	<input checked="" type="checkbox"/>
Width fit	Off	<input type="checkbox"/>



Card Controls and Data Cards

- **Card controls**
 - Building blocks of the **Edit** and **Display** form controls
 - Form represents entire record
 - **Card** represents a single field of the record
- Interact with **cards** in right-hand pane after you select a form control in design workspace
 - In the pane:
 - Choose which fields to show
 - Change order of fields
 - Change how to show each field



Data Cards

The screenshot shows the Microsoft Power Apps interface for customizing a Data Card. On the left, a preview of the Data Card is displayed with a red border around the main content area. The card has a blue header bar with the title "Vacation Request". Below the header are several input fields:

- * Title: "Time off Request"
- * Vacation Start Date: "9/4/2017"
- * Vacation End Date: "9/10/2017"
- * Time Off Type: A dropdown menu (empty)
- Comments: "SharePoint conference in Stockholm"
- PTO: A toggle switch (on)
- Request Status: A dropdown menu (empty)

On the right, the "Data" tab of the Data Card properties pane is selected. It shows the card's title as "DataCard_Title2" and its connection to "Vacation Request" in SharePoint. The "Fields" section lists the fields from the card, each with a dropdown menu and a red arrow pointing to it. The dropdown for "Title" shows options like "abc" and "...". The dropdown for "Request Status" shows options like "Edit text", "Edit multi-", and "Allowed".



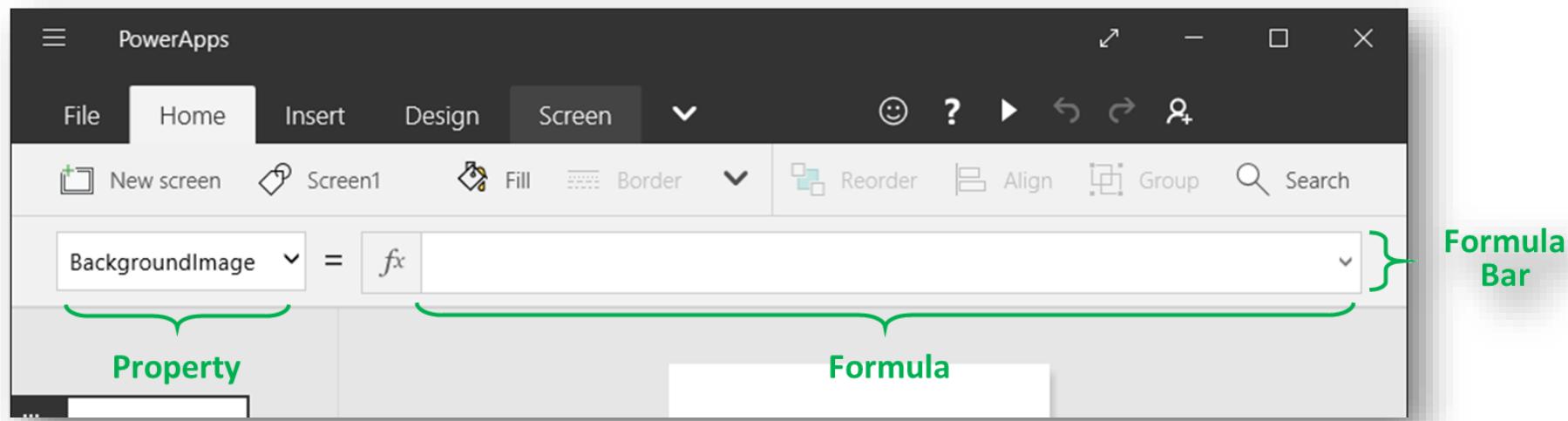
Working with the Formula Bar

- **Excel Formulas**
 - Build formulas that populate cells
 - Create tables and charts
- **PowerApps Formulas**
 - Build formulas similar to Excel as you configure controls instead of cells
 - Build formulas that apply specifically to apps instead of spreadsheets



Working with the Formula Bar

- Formula sits on top of the screen and has two parts:
 - **Property list:** Each control and screen has a set of properties. Use this list to select a specific property.
 - **Formula:** The formula to be calculated for this property, made up of values, operators, and functions.



Working with the Formula Bar

- Formula **Text** of a **Label** control
 - All strings must be in double quotes “**string text**”

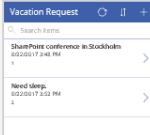
The screenshot shows the PowerApps formula bar interface. The top navigation bar includes File, Home, Insert, View, Action, and a Label tab. Below the bar are various styling options like Overflow, Auto height, Line height, Padding, Vertical align, Visible, and Border. The main area displays a formula bar with a dropdown for 'Text' containing the formula '= "Vacation Request"'. A red bracket highlights the 'Text' dropdown with the label 'Property "Text"', and another red bracket highlights the formula with the label 'Formula: string "Vacation Request"'. In the center, there's a preview of a 'Vacation Request' screen with fields for Title, Vacation Start Date (9/4/2017), and Vacation End Date (9/10/2017). On the right, the Properties panel shows the label control is named 'LblAppName3' with its Text property set to 'Vacation Request'. The bottom right corner features a small decorative graphic.

Formula Examples (Label Text)

Sum of numbers

Text = $f\chi \backslash$ Sum(10,15)

Screens



25

Return now (date and time)

$f\chi \backslash$ Now()

8/24/2017 1:15 AM

Add 5 days to today's date

$f\chi \backslash$ DateAdd(Today(), 5, Days)

≡



8/29/2017

Return today's date

$f\chi \backslash$ Today()



8/24/2017

<https://powerapps.microsoft.com/en-us/tutorials/formula-reference/>



Formula Errors

A screenshot of the Microsoft PowerApps formula editor. The formula bar shows the text `Sum(1,2,3|`. A yellow exclamation point icon is positioned above the cursor. To the left of the formula bar, there is a small preview area containing a yellow warning icon. The formula dropdown menu for `Sum` is open, showing the syntax `Sum(number, number, number, ...)` and the description `number: A numeric value for this sum operation.`. A green callout box with an arrow points from the text "Yellow exclamation points indicate a problem until the formula is complete (closing parenthesis added)." to the yellow exclamation point icon. Another green callout box with a brace on the right side points from the formula bar to the text "Formula: Partial, missing an ending paren".

PowerApps

File Home Insert

TextBox1 Text

Text = f_x Sum(1,2,3|

... Screen1

Sum(number, number, number, ...)
number: A numeric value for this sum operation.

Yellow exclamation points indicate a problem until the formula is complete (closing parenthesis added).

Formula: Partial, missing an ending paren



Change Value Based on Input

Book1 - Excel		
	$f\!x$	= A1 + A2
	A	B
1	49	
2	64	
3	113	
4		

A3's formula depends on the values of cells A1 and A2

Text = $f\!x$ TextInput1 + TextInput2

Screen1

49 ← TextInput1

65 ← TextInput2

114 ← TextBox1



Form Interactivity & Navigation

- Create buttons and set the navigation to go back and forth between screens

The screenshot shows a development environment for creating mobile forms. At the top, there's a toolbar with various icons and a status bar indicating '27'. Below the toolbar, a configuration panel is open for an 'OnSelect' event. The configuration panel has two main sections: a dropdown menu and a formula editor. The formula editor contains the expression: `ResetForm(EditForm1);Back()`. To the right of the configuration panel, a preview window displays a 'Vacation Request' screen. This screen has two fields: 'Vacation Start Date' (set to 12/31/2001) and 'Vacation End Date' (also set to 12/31/2001). On the left side of the interface, there's a sidebar titled 'Screens' with a search bar and a list of screens: 'BrowseScreen1', 'DetailScreen1', and 'EditScreen1'. The 'EditScreen1' item is currently selected. At the bottom of the interface, another configuration panel is shown for the 'OnSelect' event of 'EditScreen1'. Its formula is: `Navigate(BrowseScreen1, None)`. A preview window below this panel shows the 'Vacation Request' screen again, but with a back arrow icon on the left.



Data Sources & Connectors

- **Data Sources**
 - External information stored in cloud services
 - Examples: Excel workbooks, SharePoint lists, SQL tables
- **Connectors**
 - A proxy or wrapper around an API which allows the underlying service to talk to PowerApps and Flow



SharePoint



Office 365 Users



Salesforce
PREMIUM



Dropbox



Excel



SQL Server



Twitter



OneDrive for Business



Dynamics 365



OneDrive



SQL Database

- **Two connection options for SQL:**
 - Cloud (Azure SQL Database)
 - On-premises SQL Server
- **Generate app automatically**
 - From SQL Database connection
- **Build app from scratch**
 - Add new connection to new app
- **Update an existing app**
 - Add new connection to existing app

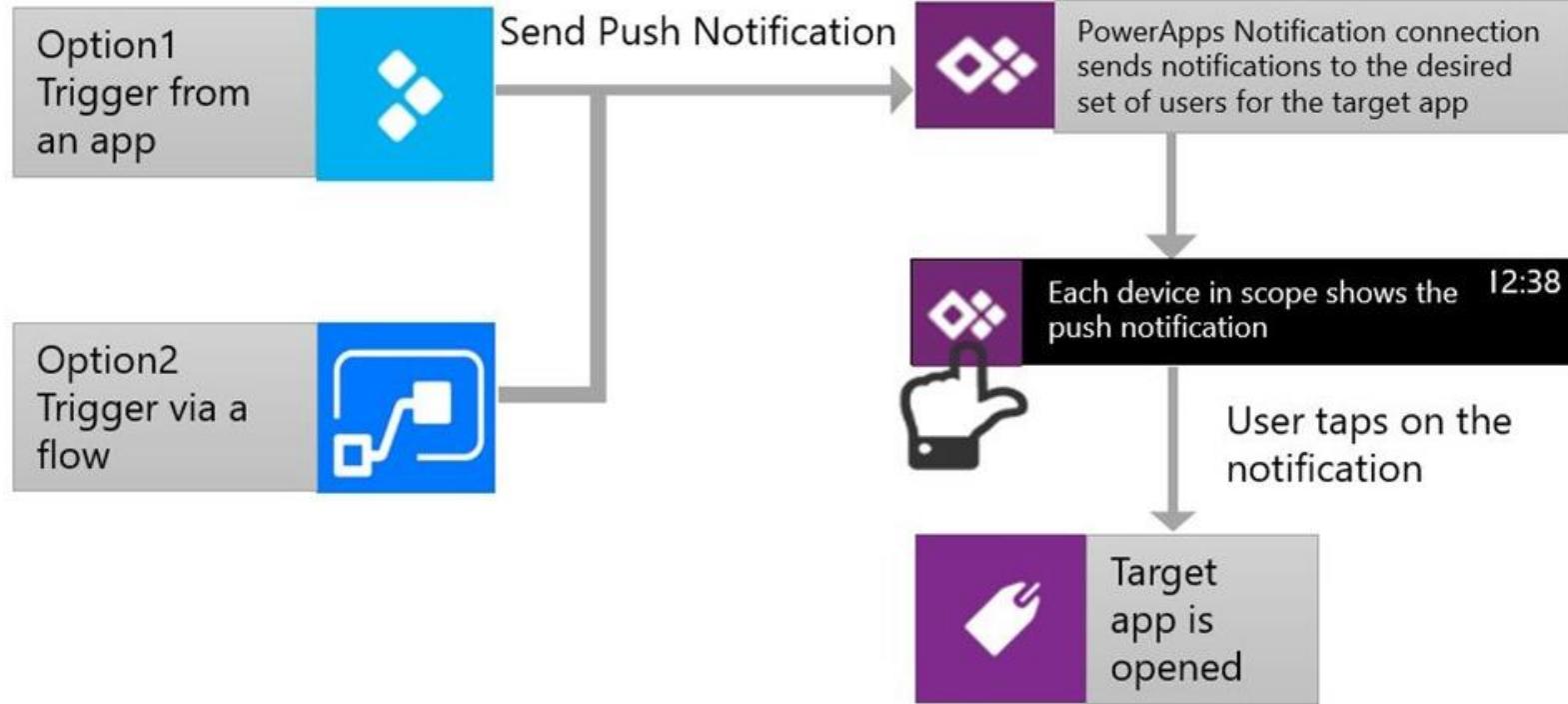


Components of a Connector

- Components offers a set of operations:
 - **Actions**
 - Changed directed by a user such as an action to lookup, write, or delete data
 - **Triggers**
 - Can notify your app when a specific event occurs
 - Two types of triggers:
 - **Polling triggers** – These triggers call your service at a specified frequency to check for new data.
 - **Push triggers** – Provides ability to send various notifications that directly targets your Apps. Trigger push notification directly from an App or from a Flow.



Push Notification Examples

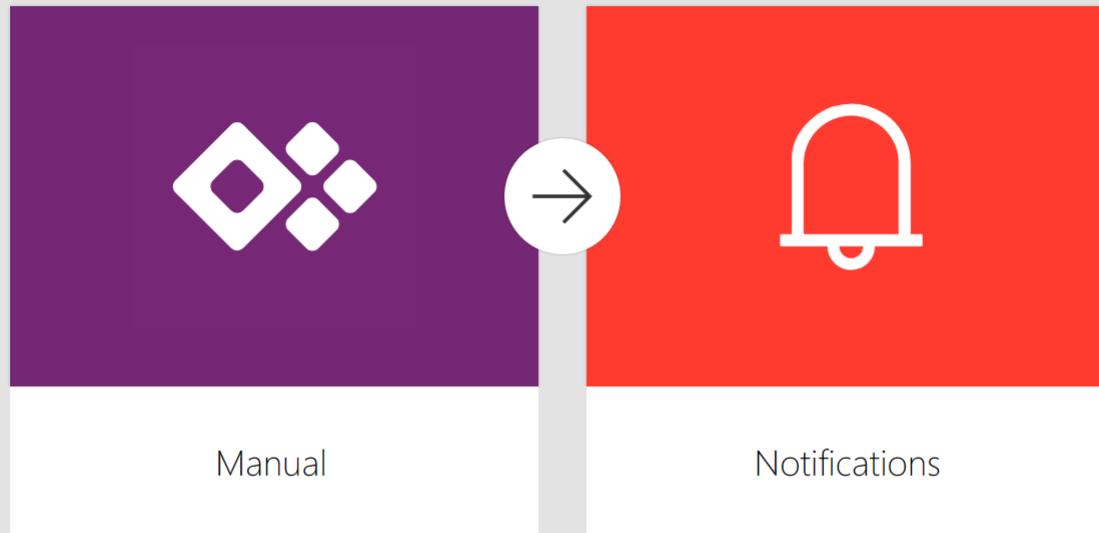


Triggering and opening Push notifications with PowerApps.



Push Notification Examples

Send a push notification triggered by PowerApps



This flow sends a push notification to your Flow App through PowerApps, when triggered with a button tap. You will need an installation of the Flow App for this template.

[Use this template](#)



Understanding Delegation

- **Delegation** is where you can delegate the processing of data to a data source before the data is pulled in an app
 - Key to building efficient apps
 - Minimizes the amount of data that needs to be brought into the app
- PowerApps includes a powerful set of functions to filter, sort, and shape tables of data
 - Equivalent to writing database queries



Types of Delegate Functions

- **Filter functions**
 - *Filter*, *Search*, and *LookUp* can be delegated
- **Sorting functions**
 - *Sort* and *SortByColumns* can be delegated
- **Aggregate functions**
 - *Sum*, *Average*, *Min*, and *Max* can be delegated
 - Not all data sources support this delegation

<https://powerapps.microsoft.com/en-us/tutorials/delegation-list/>



Small and Large Data Sets

- **Large data sets (over 500 records)**
 - Requires using data sources and formulas that can be delegated
 - Only way to keep your app performing well and ensures users can access all the information they need
- **Small data sets (less than 500 records)**
 - Can use any data source and formula
 - Processing can be done locally if the formula cannot be delegated



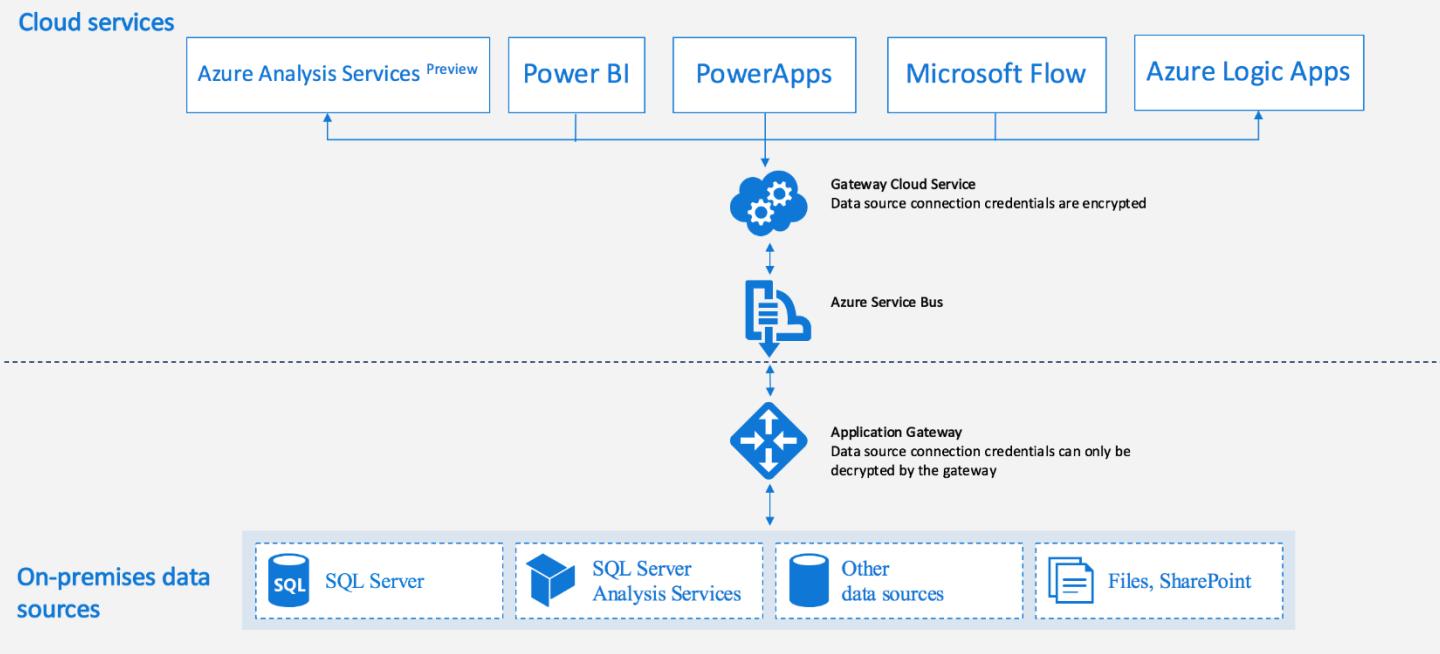
On-premises Gateways

- Install an on-premises data gateway to transfer data quickly and securely between PowerApps and a data source that's not in the cloud
- With a gateway, you can connect to on-premises data over these connections:
 - SharePoint
 - SQL Server
 - Oracle
 - Informix
 - Filesystem
 - DB2



On-premises data gateway

One gateway for multiple cloud services and experiences



Install a Gateway

The screenshot shows the Microsoft PowerApps portal interface. On the left, there's a navigation sidebar with the following items:

- Home
- Apps
- Connections
- Flows
- Gateways** (this item is highlighted with a yellow oval)
- Notifications
- Common Data Service

The main content area has a title "Gateways" with a help icon. It displays the message: "You don't have a gateway installed. To connect to your on-premises data, you can install one now." Below this message is a purple button labeled "Install a gateway". To the right of the message is a large purple cloud icon with a double-headed arrow inside, representing data connectivity.

On-Premises Data Gateway

Mobilize legacy on-premises systems into great apps that work across devices – without having to migrate any data. [Learn more](#)

Download



Install a Gateway

On-premises data gateway installation

Reminder before you install.

⚠ The gateway works best when it is installed on a computer that is always on and not asleep.

The gateway will perform more slowly on a wireless network.

Next

Cancel

On-premises data gateway installation

Getting ready to install the on-premises data gateway.

Install to

C:\Program Files\On-premises data gateway

I accept the [terms of use](#) and [privacy statement](#)

Install

Close



Install a Gateway



Almost done.

Installation was successful!

Enter email to identify the account to use with this gateway.

Next, you need to sign in to register your gateway.



Sign in to your account X

Microsoft Azure

Work or school account

[Can't access your account?](#)

© 2017 Microsoft
[Terms of use](#) [Privacy & Cookies](#)



Install a Gateway

On-premises data gateway

You are signed in as zoe@ck2017.onmicrosoft.com and are ready to register the gateway.

New on-premises data gateway name
MyOnPremGateway

Recovery key (8 character minimum)
••••••••

(i) This key is needed to restore the gateway and can't be changed. Record it in a safe place.

Confirm recovery key
••••••••|

We'll use this region to connect the gateway to cloud services: West US [Change Region](#)

<< Back Configure Cancel

On-premises data gateway

Status

Service Settings

Diagnostics

Network

Logic Apps
West US [Create a gateway resource in Azure](#)

PowerApps and Flow
Default environment (✓) Ready

Power BI
Default environment (✓) Ready

Close



Install a Gateway

More information about on-premises gateways and installation can be found at:

<https://powerapps.microsoft.com/en-us/tutorials/gateway-reference/>



Common Data Service

- **Common Data Service (CDS) is:**
 - A Microsoft Azure–based business application platform
 - Enables you to easily build and extend applications with their business data
 - Includes a Data Model
- **One of the biggest benefits is:**
 - It does all the heavy lifting of bringing your data together in one place for your users and applications



3 Pillars of Common Data Service

- **Be the focal point for your data**
 - Bring your data together into one place
- **Be a great place to build and manage apps**
 - Help app creators and developers of all skill levels to easily create apps with the data in the Common Data Service
- **It works with the rest of Microsoft**
 - Provide out-of-the-box integrations with technologies across Microsoft including Flow, Power BI, and Office



Common Data Model Entities

- **Entities**
 - Standard set of entities comes with a common data model in the Common Data Service
 - Covers a range of common business needs
 - Grouped into categories



Standard Entities

Functional group	Description
Customer Service	The Customer Service entities manage issues from your customers, including tracking, escalation, and documentation.
Foundation	The Foundation entities contain information that is relevant to nearly every other entity group. This group contains entities such as Address and Currency.
People, Organizations, and Groups	These entities encompass a rich set of people and organizations that you might interact with, including employees, contractors, donors, volunteers, fans, alumni, and families.
Purchasing	The Purchasing entities let you create purchasing solutions.
Sales	The Sales entities let you create end-to-end sales solutions, from tracking leads and opportunities, to following through with contacts, accepting and delivering orders, and sending invoices.



Fields and Data Types

- **Default Fields**
 - Each entity contains a set of default fields
 - These fields cannot be changed or deleted
 - Some fields like *ContactID* are specific to an entity and files like *Created on date time* are common to all entities
- You can extend standard entities by adding fields:
 - Click **Add field** and specify the new field's properties



Custom Entity

- **Create a Custom Entity**
 - When extending a standard entity is not enough
- **Data Types**
 - Fields in an entity have a data type
 - More than a dozen data types are available
- **Some representative types:**
 - *Basic types*: Text and Number
 - *More complex types*: Email and Phone
 - *Special types*: Lookup (for creating relationships) and Picklist (to hold a fixed set of values for a field)



Working with Entities

Fields • Key • Relationships • Field groups • Data

- **Fields:** see fields and data types and add fields
- **Key:** the field that identifies each row in an entity (i.e. Contact ID for the Contact entity)
- **Relationships:** connections between related entities (i.e. Product and Product category)
- **Field groups:** used to control various behaviors (i.e. which fields to automatically show when you create an app screen in PowerApps)
- **Data:** browse sample data and your own data after it's imported



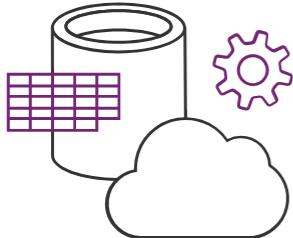
Working with Entities

- **Open in Excel:** With the [PowerApps Office Add-in](#) installed you can explore and edit your data in Excel
- **Import data:** bring in data from Excel and CSV files
- **Export data:** export data to an Excel file
- **Export template:** export the structure of an entity to an Excel file so you can populate the file and import it back into the entity
- **Settings and Delete:** are not available for standard entities



CDS Entities

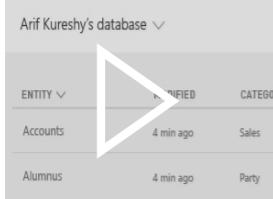
Entities 



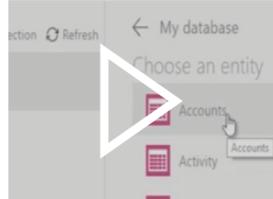
Create your own environment and database where you can build apps using the Common Data Service.

 Create database

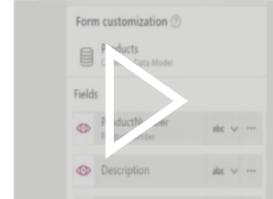
See how the Common Data Service works.



Working with entities



Creating an app



Create an app from scratch



Building Flows

- **Use Microsoft Flow to create logic that performs one or more tasks when an event occurs in an app**
 - For example, configure a button:
 - *Creates an item in a SharePoint list*
 - *Sends an email*
 - *Meeting request is sent*
 - *A file is added to the cloud*
- **You can configure any control in an app to start the flow**
 - Continues to run even if you close PowerApps
- **Create Flows from scratch or from a template**

My flows

Team flows



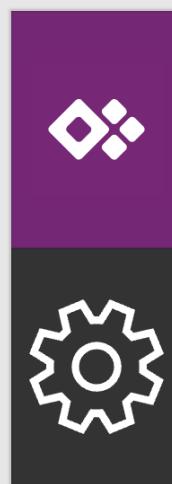
Create from blank



Create from template



PowerApps Flow Templates



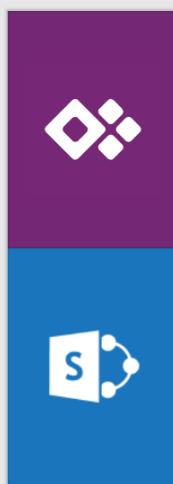
PowerApps button

By Microsoft
Used 14425 times



Send approval
email and follow up
via email

By Microsoft
Used 3240 times



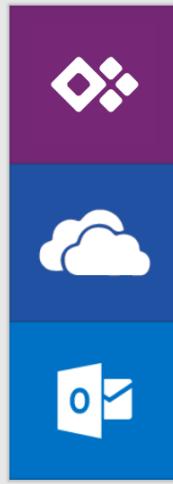
Upload a file to
SharePoint from
PowerApps

By Microsoft
Used 1189 times



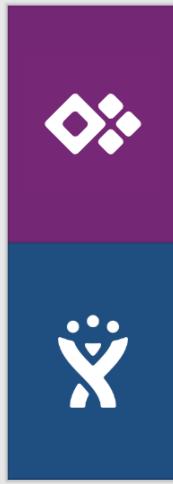
Add an item to
SharePoint and
send an email

By Microsoft
Used 362 times



Request approval
for new files in
OneDrive for
Business

By Microsoft
Used 261 times



Create a new issue
in JIRA from a
PowerApp

By Carlos Javier Puerta
Sanchez
Used 72 times



PowerApps and Flow

The screenshot shows the PowerApps interface. The left sidebar has icons for Home, Apps, Connections, Flows (which is selected), and Gateways. The main area has tabs for 'My flows' (selected) and 'Team flows'. A button to 'Create from blank' and another to 'Create from template' are at the top right. Below, it says 'The flows listed here start from an App. Click here to see all of your flows.' A table lists one flow:

Name	Last modified	Status	Actions
Upload a file to SharePoint from PowerApps	1 day ago	On	

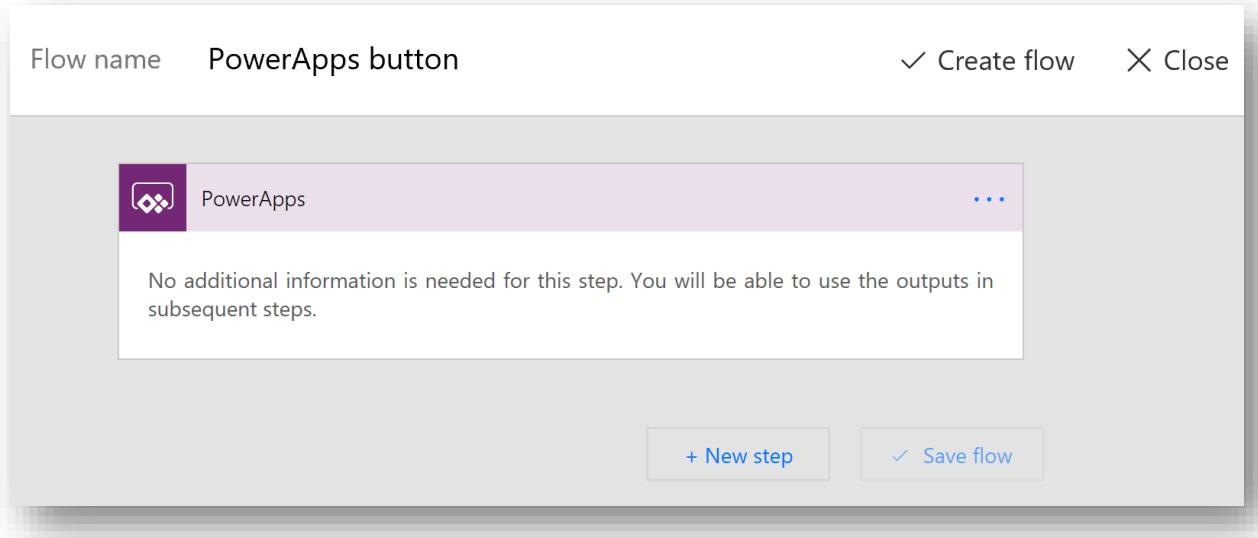
The screenshot shows the Flow interface. The left sidebar has icons for Flow (selected), My flows, Approvals, Templates, Connectors, and Learn. The main area has tabs for 'My flows' (selected) and 'Team flows'. A button to 'Create from blank' and another to 'Import' are at the top right. Below, it says 'The flows listed here start from an App. Click here to see all of your flows.' A table lists two flows:

Name	Last modified	Status	Actions
Start approval when a new item is added	1 day ago	On	
Upload a file to SharePoint from PowerApps	1 day ago	On	

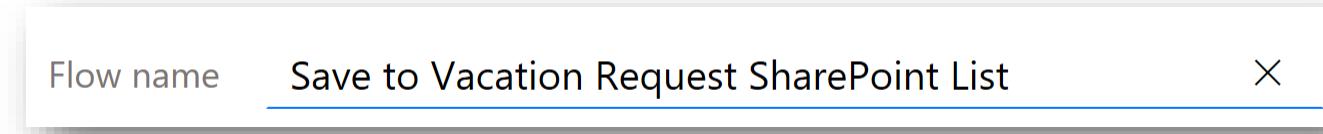


PowerApps Portal

Create from blank <https://web.powerapps.com>



Rename Flow by clicking on Flow name text



Flows Portal

Create from blank <https://flows.powerapps.com>

Start with one of these popular triggers



When a new email arrives



When an item is created



When a feed item is published



When a file is created



When a new tweet is posted



When a file is created



When a file is created



When a record is created

Or



Search hundreds of connectors and triggers



Flow Visual Designer

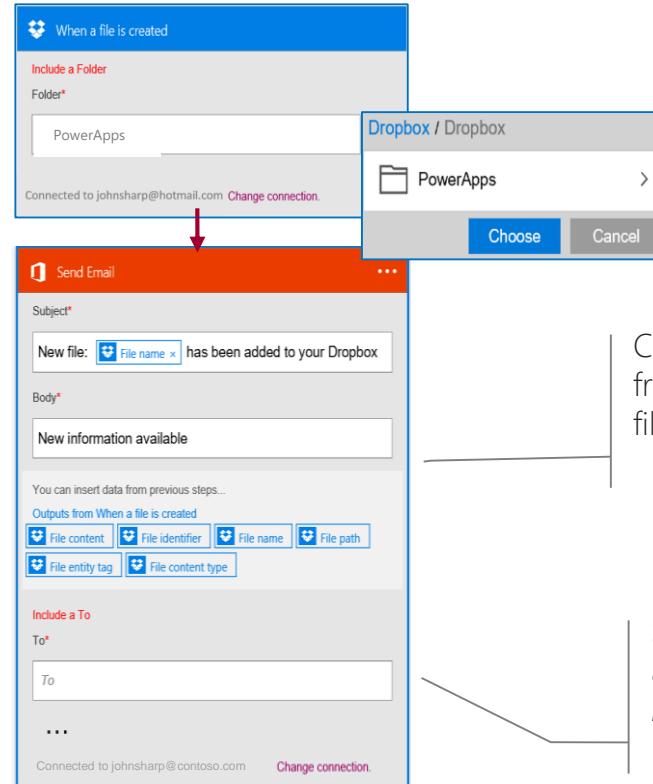
Sending an Exchange email when a new file is added in Dropbox

Authenticate to your Dropbox account.

Select folder to monitor

Authenticate to your O365 account.

Build email *Subject* and *Body*



Choose to include properties from previous step (Dropbox file) to improve relevance

Specify *Send To* email address and additional properties (optional): *From*, *CC*, *BCC* and *Importance*



Building Blocks of Flow

- Flows whether created from a template or from scratch:
 - Will contain **building blocks** that work together in certain ways (much like a flowchart)
- Building blocks of Flow:
 - **Services** - sources and destinations of data in a flow
 - **Triggers** - events that start a flow
 - **Actions** - tasks accomplished by the flow
 - **Conditions** - allow for branching if/then logic in a flow
 - **Loops** - for iterating over actions more than once



Triggers

- Triggers are events that initiate a Flow
- First entry in a Flow
- Linked to Connections
 - Services
 - Data sources

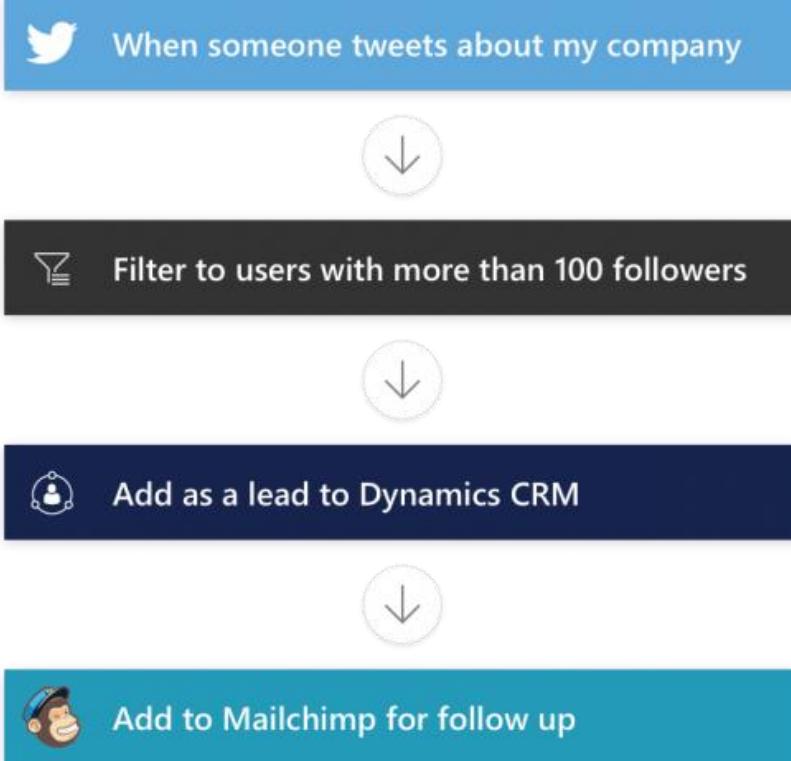


Conditions, Actions and Loops

- **Conditions**
 - A **condition** is essentially your “**If Statement**”.
 - If this happens do this or if that happens do something else.
 - Specify that a flow performs one or more tasks only if a particular condition is true.
- **Actions**
 - An **action** is something that occurs as a result of the workflow.
 - Add multiple actions and advanced options to a flow.
- **Loops**
 - Add sequences or instances where actions need to be repeated based on a condition

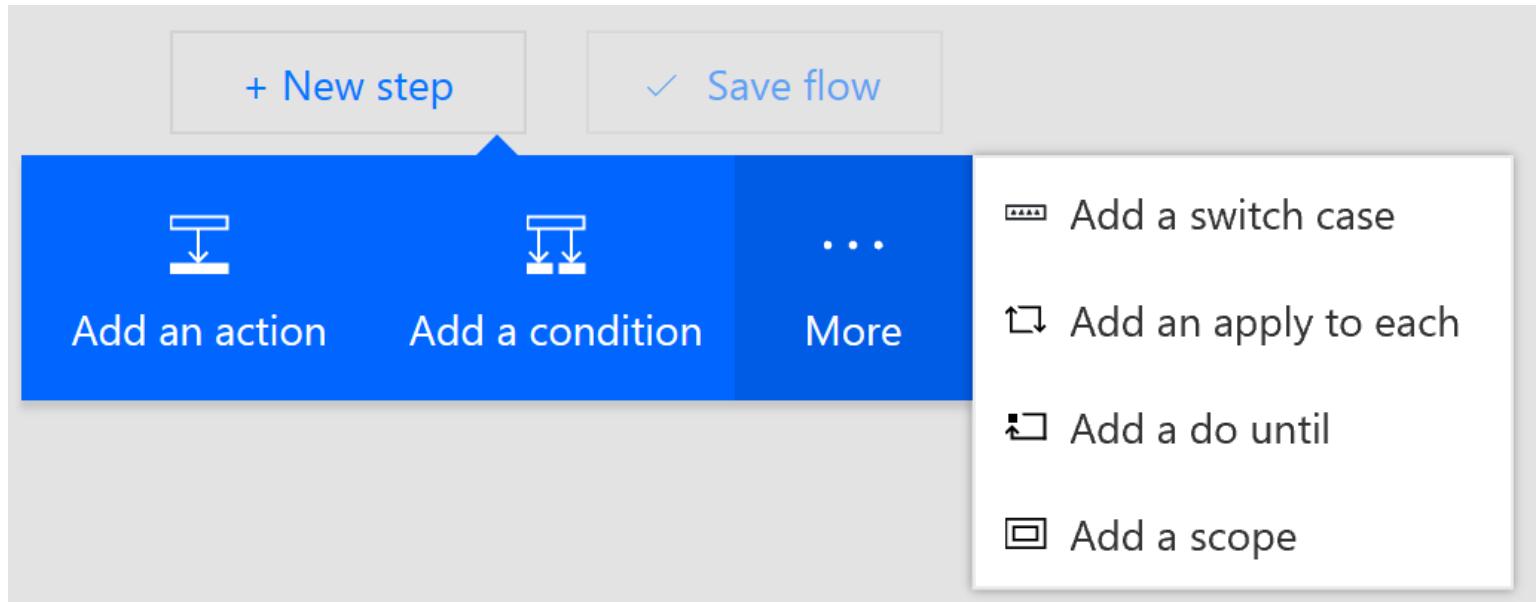


Looping Flow Example



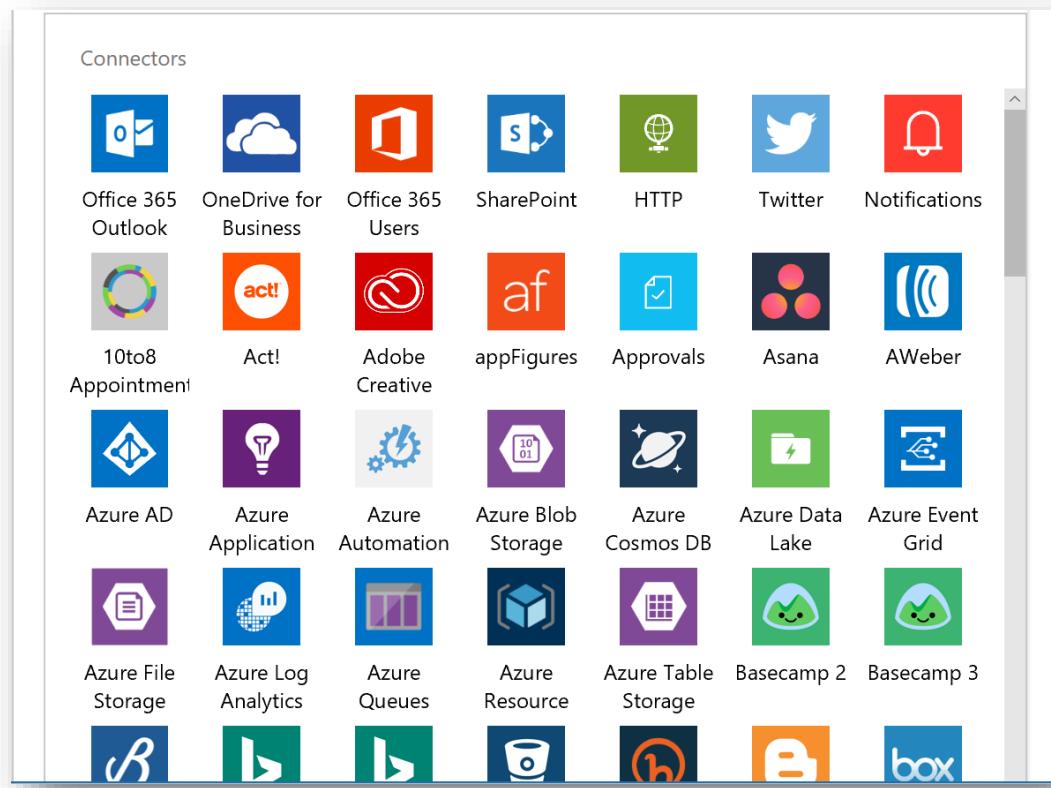
Creating New Steps

- Action, Condition, More...



Connectors

- Connect to services
- Surfaces Actions, Triggers
- Can manage ahead of time or when adding an action



Actions

PowerApps

Choose an action

Search all connectors and actions

Connectors

- Office 365 Outlook
- OneDrive for Business
- Office 365 Users
- SharePoint
- HTTP
- Twitter
- Notifications

Actions (264)

- Office 365 Outlook Create contact
- Office 365 Outlook Create event (V1)
- Office 365 Outlook Create event (V2)
- Office 365 Outlook Send an email
- Office 365 Outlook Send approval email
- OneDrive for Business Create file

SharePoint

← Search all actions

Triggers (6) Actions (21)

- SharePoint Create file
- SharePoint Create item
- SharePoint Get entity values
- SharePoint Get file properties
- SharePoint Get files (properties only)
- SharePoint Get items
- SharePoint List folder
- SharePoint Copy file
- SharePoint Delete file

Advanced Options

- Customize a flow by adding one or more advanced options and multiple actions for the same trigger.
 - For example, add an advanced option that sends an email message as high priority.
 - In addition to sending mail when an item is added to a SharePoint list, create a file in Dropbox that contains the same information.



Recurring Flows

The screenshot shows the Microsoft Flow interface. A search bar at the top contains the text "recurrence". Below the search bar, there are sections for "Connectors", "Triggers (1)", and "Actions (2)".

Connectors: Office 365, Schedule, Outlook.co... (with a "See more" link)

Triggers (1): Schedule - Recurrence

Actions (2): (Listed under "See more")

A detailed view of the "Schedule - Recurrence" trigger is shown in a modal window:

Recurrence

- * Frequency: Day
- * Interval: 1
- Time zone: (dropdown menu)
- Start time: Example: 2017-03-24T15:00:00Z

[Hide advanced options ^](#)



Delayed Flows

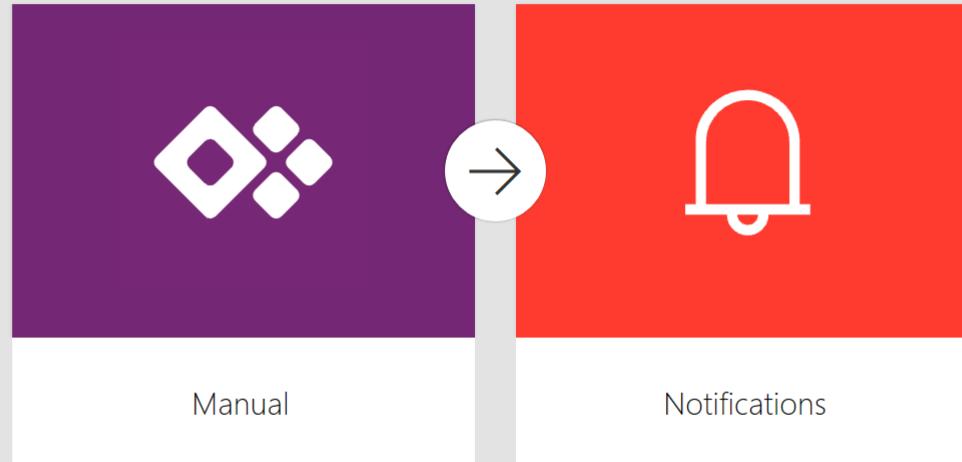
The screenshot shows a flow editor interface with three main components:

- Triggers (1) Actions (2)**: A sidebar showing two actions:
 - Schedule - Delay** (Icon: blue square with white clock)
 - Schedule - Delay until** (Icon: blue square with white circular arrow)
- Delay**: A detailed configuration dialog for the "Schedule - Delay" action.
 - * Count**: Input field for specifying the count of units to delay.
 - * Unit**: A dropdown menu currently set to "Minute". Other options include Day, Hour, Minute, Second, and an "Enter custom value" input field.
- Delay until**: A configuration dialog for the "Schedule - Delay until" action.
 - * Timestamp**: Input field showing an example value: 2016-07-11T14:45Z.



Push Notifications

Send a push notification triggered by PowerApps



This flow sends a push notification to your Flow App through PowerApps, when triggered with a button tap. You will need an installation of the Flow App for this template.



Notifications Connectors

Connectors

See more

Notifications PowerApps Notification

Triggers (0) Actions (3)

Notifications Send me a mobile notification

Notifications Send me an email notification

PowerApps Notification SendPushNotification

Send me a mobile notification

* Text
Create a notification message

Link
Include a link in the notification

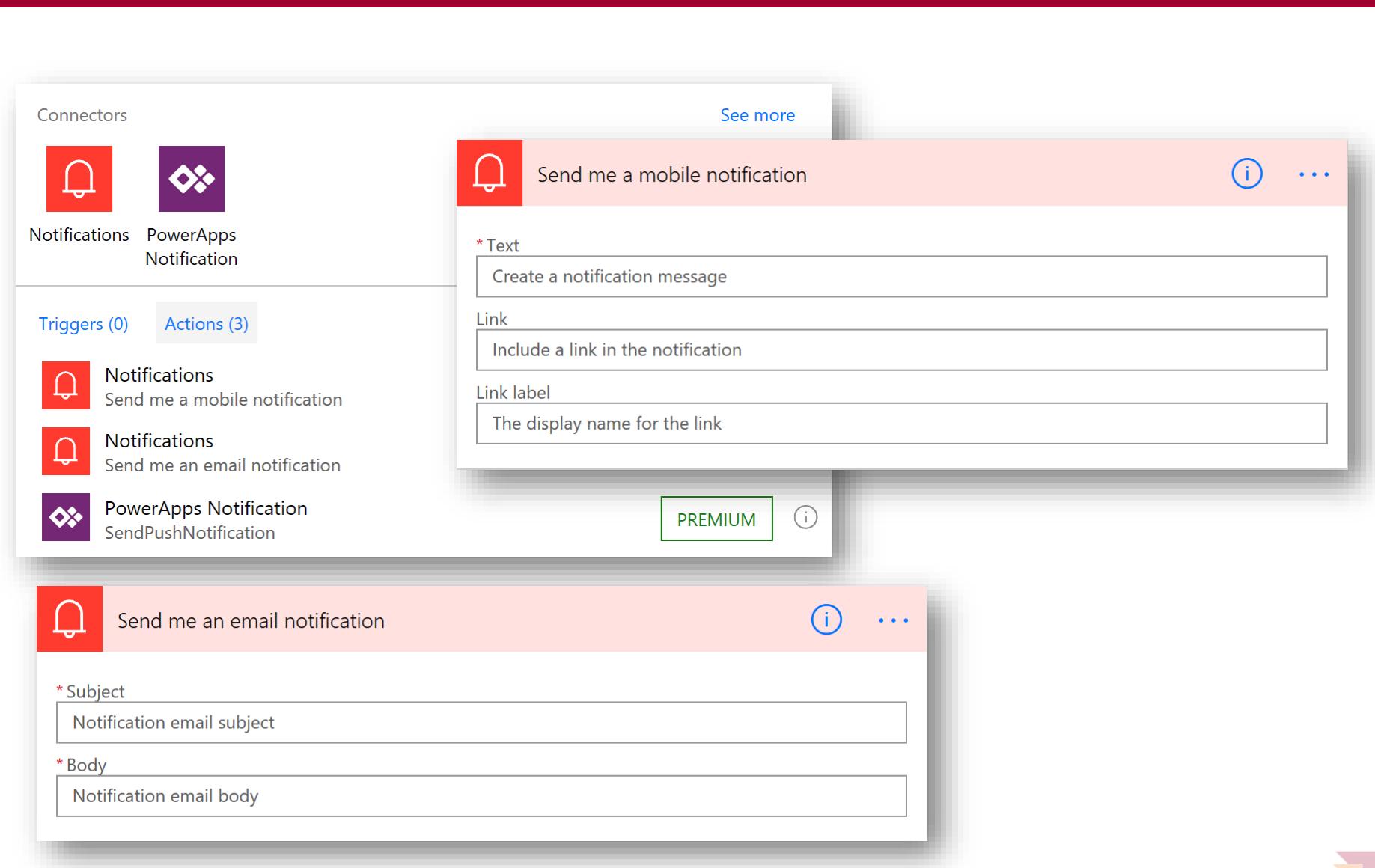
Link label
The display name for the link

PREMIUM

Send me an email notification

* Subject
Notification email subject

* Body
Notification email body



Flow Mobile App

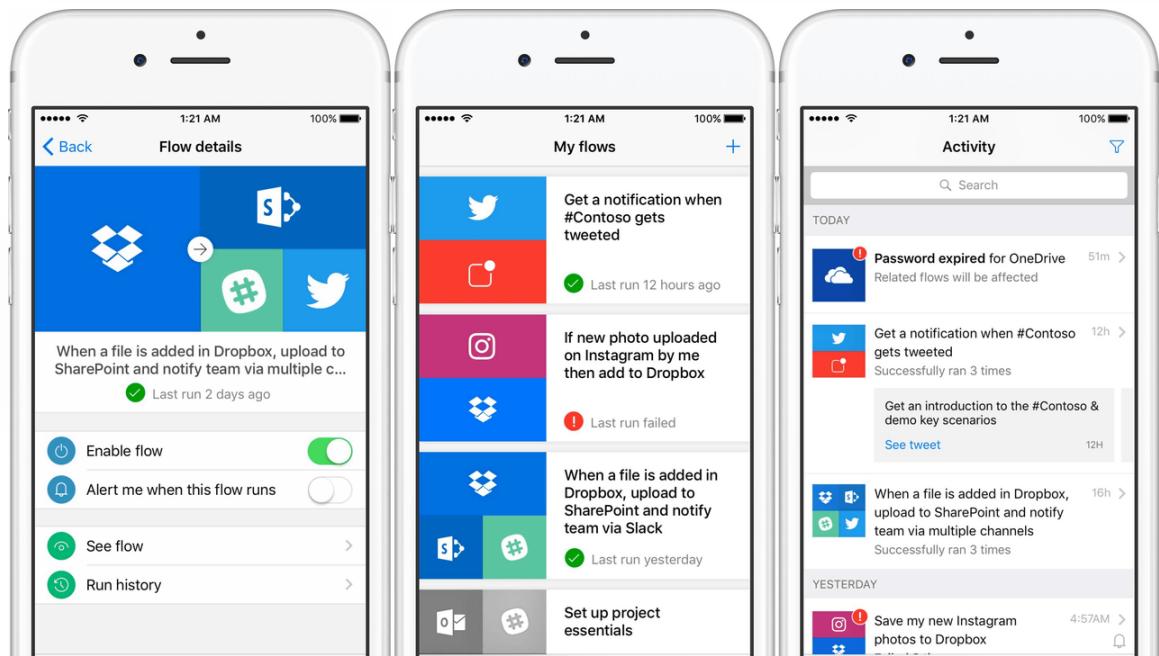
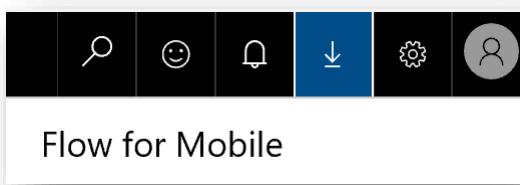
- Available for:
 - iOS
 - Android
 - Windows

Create automated workflows between your favorite apps and services to get notifications, synchronize files, collect data, and more — all from the palm of your hand

 Download from Apple Store

 Download from Google Store

 Download from Windows Store



Application Lifecycle Manage (ALM)

- **Managing Power Apps**
 - Sharing PowerApps
 - PowerApp Versioning
 - Microsoft AppSource
- **Running PowerApps**
 - PowerApps Mobile
 - Web Browser
 - SharePoint List
- **PowerApps Admin Center and Flow Admin Center**
 - Environments
 - Data Loss Prevention Policies



Sharing PowerApps

- **Apps can be shared with:**
 - Users or groups
 - Entire organization
- **There are 3 types of sharing options:**
 - Can Use
 - Users/groups can run the app but cannot share
 - Can Use and Share
 - Users/groups can run the app and share with others
 - Can Edit
 - Users/groups can run the app, customize it, and share the new version of the app



PowerApps Versioning

- For apps saved to the cloud, PowerApps keeps a history of changes:
 - Accessible via <https://web.powerapps.com>
 - Restore, delete, and publish versions

Details • Share • Versions • Settings

PowerApps keeps a version history of your apps.

VERSION	MODIFIED	MODIFIED BY	POWERAPPS RELEASE	PUBLISHED	COMMENT
3	8/11/2017 11:30:26 PM	MOD Administrator	2.0.676		Publish this version
2	8/11/2017 11:24:14 PM	MOD Administrator	2.0.676		Restore Delete
1	8/11/2017 1:04:45 AM	MOD Administrator	2.0.676	Live	Restore Delete



Microsoft AppSource

- **What is Microsoft AppSource?**
 - A destination to help business users find, try, and use line-of-business Software as a Service (SaaS) apps
<https://appsource.microsoft.com>
 - Find top business solutions for your industry from Microsoft and select partners—including exclusive apps



Get the right app, right now

Find top business solutions for your industry from Microsoft and select partners—including exclusive apps.



Build on what you have

Add new capabilities to your existing business applications. From Dynamics to Power BI, you'll find solutions to enhance what you already use.



Start with confidence

Try any app for free before you buy it, then work with a trusted Microsoft partner to implement your new solution.



Microsoft AppSource

- Get solutions tailored to your industry that work with the products you already use such as:
 - Dynamics 365, Office 365, Power BI, and various Cloud solutions

 Google Analytics By Microsoft Power BI Visualize data and gain insights from sites tracked by Google Analytics directly in Power BI	 Microsoft Dynamics NAV By Microsoft Power BI Immediately gain access to business performance insights	 Microsoft Azure Enterprise By Microsoft Power BI Analyze Azure consumption for your enterprise enrollment in Power BI	 Salesforce By Microsoft Power BI Explore and monitor sales metrics for yourself and your team	 Bing By Microsoft Power BI On-demand analytics of Internet search activity
Free	Free	Free	Free	Free
Get it now	Get it now	Get it now	Get it now	Get it now



Microsoft AppSource

- Easily search for apps and filter based on category, industry and product

The screenshot shows the Microsoft AppSource search interface. At the top is a search bar with the placeholder "Search Microsoft AppSource" and a magnifying glass icon. Below the search bar are three sections for refining results:

- Refine by category**: A list of 15 categories with checkboxes:
 - Analytics
 - Artificial intelligence
 - Collaboration
 - Customer service
 - Finance
 - Human resources
 - IT + administration
 - Marketing
 - Operations + supply chain
 - Productivity
 - Sales
- Refine by industry**: A list of 11 industries with checkboxes:
 - Agriculture
 - Distribution
 - Financial services
 - Government
 - Healthcare + life sciences
 - Manufacturing
 - Professional services
 - Retail + consumer goods
 - Education
- Refine by product**: A list of four products with checkboxes and icons:
 - Cloud solutions (blue square icon)
 - Dynamics 365 (blue square icon with white arrow)
 - Power BI (yellow square icon with chart)
 - Office 365 (red square icon with white 'O')



Microsoft AppSource

Products

Office 365 x

[Reset filters](#)

Apps

[Web apps](#)

[Cortana Intelligence](#)

Add-ins

[Dynamics 365](#)

[Power BI](#)

[Dynamics NAV](#)

Office 365 >

- Excel
- OneNote
- Outlook
- PowerPoint
- Project
- SharePoint
- Word



Boomerang

By Baydin Inc.
Outlook

The ultimate email productivity tool. Send later, track responses, schedule meetings, and more!

Free

[Get it now](#)



officeatwork Template Chooser

By officeatwork 365
Excel | PowerPoint | Project | Word

An easy way to manage, discover and use your templates in Office.

Additional purchase may be required

[Get it now](#)



Pickit Free Images

By Pickit
OneNote | PowerPoint | Word

Free HD images, icons & illustrations to bring your docs & presentations to life in a click.

Free

[Get it now](#)



Smartsheet for Outlook

By Smartsheet.com, Inc.
Outlook

Organize, track, and collaborate on projects or processes in real time right from your inbox.

Additional purchase may be required

[Get it now](#)

Categories

- Analytics
- Artificial intelligence
- Collaboration
- Customer service
- Finance
- Human resources
- IT + administration

Editor's Pick for Office 365



Yesware Email Tracking

By Yesware Inc.



Salesforce Lightning for Outlook



DocuSign for Word

By DocuSign, Inc.



iWRITER 365 - Templates for Word



PowerApps Admin Center

- **PowerApps using in an organization**
 - Need to have established boundaries and policies
- **PowerApps Admin Center provides admins (*global tenant admins & environment admins*) the ability to:**
 - Create and manage environments
 - Databases
 - Data policies



Flow Admin Center

- Place for global tenant & environment admins to manage:
 - **Data Loss Prevention (DLP) Policies**
 - **Data Integration**
 - Projects
 - Connection Sets
 - **Tenant**
 - User licenses
 - Quota

<https://admin.flow.microsoft.com>



Managing Environments

- An **Environment** is a space to store, manage, and share your organization's:
 - Business data, PowerApps, and Flows
- Also serve as **containers** to separate apps that have:
 - Different roles
 - Security requirements
 - Target audiences
- How you choose to leverage environments depends on your organization and apps you are trying to build



Environment Examples

- **Single environment:** Build apps in a single environment
- **Separate environments:** Create separate environments that group Test and Production versions of your apps
- **Separate environments by teams:** Create separate environments corresponding to specific teams or departments in your company.
 - Each containing the relevant data and apps for each audience
- **Separate environments by branches:** Create separate environments for different global branches of your organization



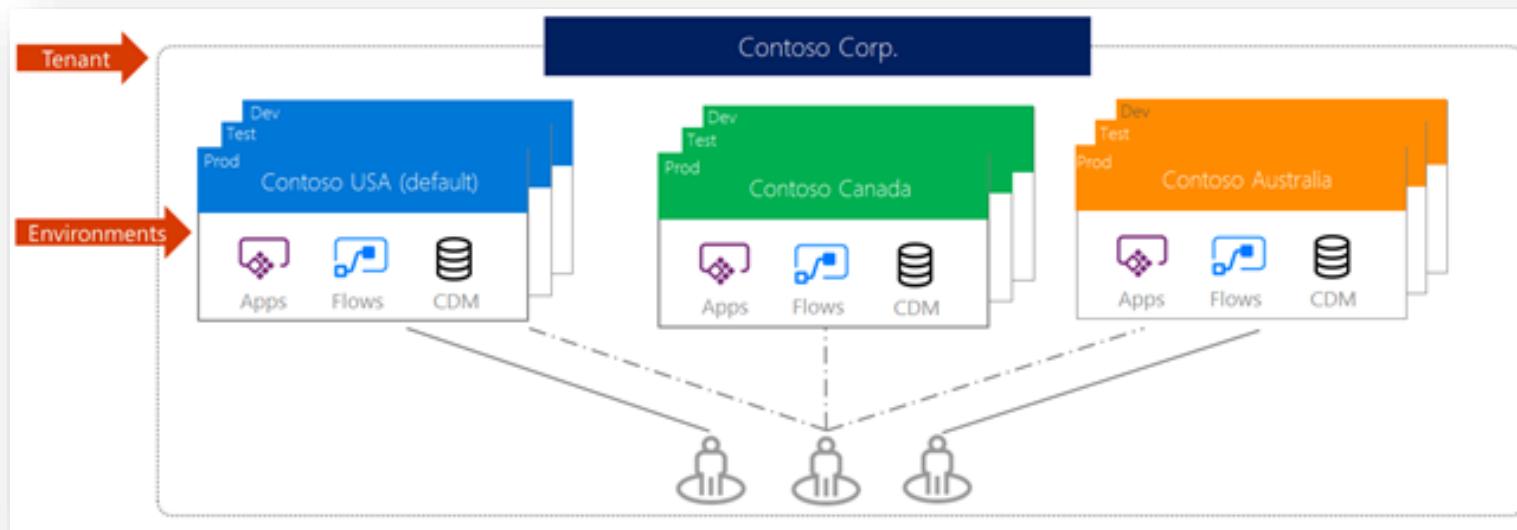
Apps in Environments

- App in an environment is permitted to connect to data sources deployed in same environment which includes:
 - Connections, Gateways, Flows, and Common Data Service databases
- For example, in a scenario with two environments for Test and Production (named *Test* and *Prod*):
 - You create a Common Data Service database in each of the environments
 - An app in the ‘Test’ environment will only be permitted to connect to the ‘Test’ database
 - It cannot connect to the ‘Prod’ database and vice-versa



CDS in Environments

- Every environment can have zero or one Common Data Service databases (provides storage for your apps)
 - The ability to create a CDS database for your environment depends on your purchased PowerApps license and your permission within the environment.



Environment Roles and Permissions

- **Environment Admin role** - can perform all administrative actions on an environment including the following:
 - Add or remove a user or group from either Environment Admin or Environment Maker role
 - Provision Common Data Service database for environment
 - View and manage all resources created in environment
 - Set Data Loss Prevention policies
- **Environment Maker role** - can create new resources within environment including apps, connections, custom APIs, gateways, and flows using Microsoft Flow



Data Loss Prevention Policies

- **Data is critical in an organization's success**
 - It needs to be readily available for decision-making
 - Needs to be protected so it's not shared with audiences that should not have access to the data
- **Data Loss Prevention (DLP) Policies**
 - PowerApps provides a way to protect your data by providing the ability to create and enforce policies
 - You can define which consumer services/connectors specific business data may be shared with



Data Loss Prevention Policies

- **Benefits of a DLP policy**
 - Ensures data is managed in a uniform manner across the organization.
 - Prevents important business data from being accidentally published to services such as social media sites.
- **Example:** Prevent business data stored in SharePoint from being automatically published to a Twitter feed.
 - Create a DLP policy that blocks SharePoint data from being used as the source for tweets.



Microsoft Flow roadmap - highlights



H2 Calendar 2017

- Export/import Flows across environments
- “In-the-box” review Flows for SharePoint Online
- Use Flow for Content Publishing approvals for SharePoint Online Publishing sites
- Utilize people, choice, attachment and multi-values in your Flows for SharePoint Online
- In-context Flow support in Dynamics 365, OneDrive and Teams
- Usage analytics for Flows
- Flow activity included in Office 365 audit logs
- UK deployment



Calendar 2018

- Use a HTML rich text editor to build emails
- Guides for debugging actions and conditions
- Government cloud deployment
- ALM – Sandbox environments
- ALM – Move or copy across environments
- Support for GDPR compliance
- Leverage device signals (e.g. Location) with Flows on mobile devices
- Include Flows in AppSource
- Azure functions integration

Roadmap is for general information purposes only and subject to change



PowerApps roadmap - highlights



H2 Calendar 2017

- Create and use embedded PowerApps as custom list forms in SharePoint Online
- Utilize attachments, multi-select fields, and images in your SharePoint Online driven PowerApps
- Easily embed PowerApps in SharePoint Online pages with web parts and within Power BI reports
- Use the Rules explorer for easier expression authoring
- Tenant-wide admin resource management, app usage analytics, and package export/import across environments
- Easily connect to Azure App Services & APIM



Calendar 2018

- Use server-side business logic for validation rules and easy defaulting
- Create model-driven apps
- Support for GDPR compliance
- Government cloud deployment
- SQL - Support for stored procs and views
- Enhanced application lifecycle management with sandbox environments



Control Input and Output Properties

No 2-way binding in PowerApps – one property to set and the other to fetch

Input and Output Properties

- Input only – Value based on a formula, can not use in other formulas
 - Does not show up in an IntelliSense
 - `TextInputBox.Default` (initial value)
- Input/Output – Value based on a formula, can use in other formulas
 - Shows up everywhere
 - `TextInputBox.BackgroundColor`
- Output only – No formula, can only use in other formulas
 - Does not show up in formula bar or advanced pane
 - `TextInputBox.Text` (value with user input)

Text input

Text input



Primitive Data Types

- Number – **123.456**
- Text – “**Hello World**”
- Boolean – **True** or **False**
- DateTime – **1/12/2017 12:00 PM**
- Date – **1/12/2017**
- All can hold Blank (Null) values
 - Test with **IsBlank** function
 - Create with **Blank** function



Compound Data Types

- Record – { FirstName: “Fred”, LastName: “Jones” }
- Table
 - Table({ FirstName: “Jane”, LastName: “Doe” },
{ FirstName: “John”, LastName: “Smith” })
 - [123, 456, 789] (one column named “Value”)
- Records and Tables can be nested
 - Table can contain records of tables of tables of records ...
 - Record can contain tables of records of tables of records ...
- There are no arrays, use a Table instead

Table Functions

- Tables are a value
 - Passed as arguments
 - Returned from functions
 - Just like a number or text string
- Each of the following functions returns a table
 - Filtering: **Filter, Search**
 - Sorting: **Sort, SortByColumns**
 - Shaping: **AddColumns, DropColumns, RenameColumns, ShowColumns**
 - Grouping: **GroupBy, Ungroup**



State Variables

- Collections
 - App scope
 - Tables
 - Primary functions: **Collect**, **Clear**, **ClearCollect**
 - Can be stored on the local device with **SaveData** & **LoadData**
 - Can be used as a global variable, but can be awkward to use as it is a table
- Context variables
 - Local screen scope
 - Primitive, record, or table
 - Primary functions: **UpdateContext**, **Navigate**
- All viewable from the File menu “Collections” and “Variables” tabs
- *hint*



Demo

- XX

```
ClearCollect( DataStructures, Table( { Name: { First: "John", Last: "Doe" }, Eyes: "Blue", Height: "5' 10\"", Addresses: Table( {  
    Type: "Home", Street: "1 Clover Ln", City: "Austin", State: "TX" }, { Type: "Work", Street: "2 Main St", City: "Dallas", State: "TX" } )^  
  ),  
  { Name: { First: "Jane", Last: "Doe" }, Eyes: "Hazel" } ) );  
UpdateContext( { VarText: "Hello World", VarNumber: 1234, VarRecord: { FirstName: "Sue", LastName: "Smith" }, VarTable: [ 1, 2, 3, 4 ] } )
```

I



Events and State Changes

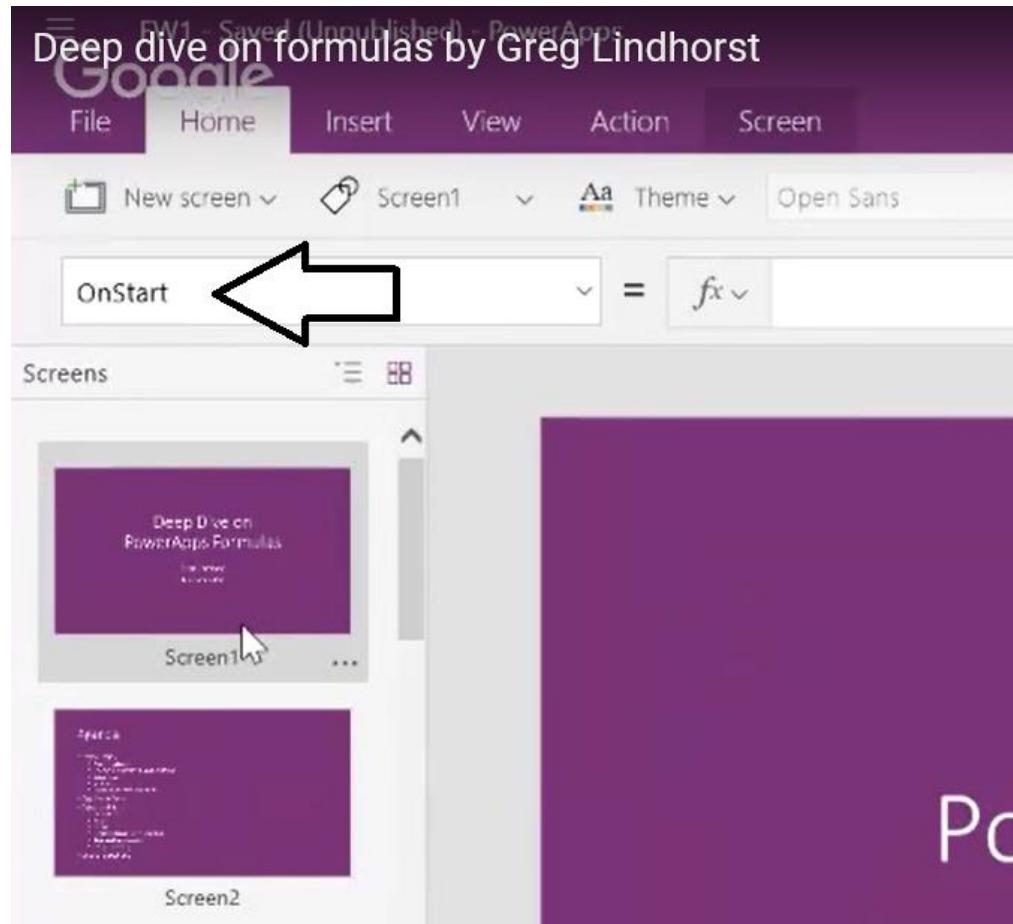
- Not Excel
 - Excel doesn't have Buttons, but apps do
 - Excel can't change state (the values of cells), but apps do
- Some formulas define imperative logic
 - OnSelect
 - OnVisible
 - OnStart
 - ...
- Can involve multiple steps with chaining operator ; (or :: depending on locale)
- Used to take actions
 - Set a context variable's value
 - Add to a collection
 - Change screens
 - Submit data to a server
 - Call a connector API
 - ...



Demo



App OnStart – Only on First Form



Same in PowerApps as in Excel

Abs	Collect	DateValue	ForAll	LookUp	Proper	Set	TimeValue
Acceleration	Color	Day	GroupBy	Lower	Radians	ShowColumns	TimeZoneOffset
Acos	ColorFade	Defaults	HashTags	Max	Rand	Shuffle	Today
Acot	ColorValue	Degrees	Hour	Mid	Refresh	Sin	Trim
AddColumns	Compass	Disable	If	Min	Remove	Sort	TrimEnds
And	Concat	Distinct	IsBlank	Minute	Removelf	SortByColumns	Ungroup
App	Concatenate	Download	IsEmpty	Mod	RenameColumns	Split	Update
Asin	Connection	DropColumns	IsMatch	Month	Replace	Sqrt	UpdateContext
Atan	Count	EditForm	IsNumeric	Navigate	Reset	StartsWith	UpdateIf
Atan2	Cos	Enable	IsToday	NewForm	ResetForm	StdevP	Upper
Average	Cot	EndsWith	Language	Not	Revert	Substitute	User
Back	CountA	Errors	Last	Now	RGBA	SubmitForm	Validate
Blank	CountIf	EncodeUrl	LastN	Or	Right	Sum	Value
Calendar	CountRows	Exit	Launch	Param	Round	Switch	VarP
Char	DataSourcesInfo	Exp	Left	Parent	RoundDown	Table	ViewForm
Clear	Date	Filter	Len	Patch	RoundUp	Tan	Weekday
ClearCollect	DateAdd	Find	Ln	Pi	SaveData	Text	
Clock	DateDiff	First	LoadData	PlainText	Search	ThisItem	
Coalesce	DateTimeValue	FirstN	Location	Power	Second	Time	

Excel
Formula Language

DAX - Data Analysis
Expression Language

PowerApps
Formula Language



Imperative Functions

Abs	Collect	DateValue	ForAll	LookUp	Proper	Set	TimeValue
Acceleration	Color	Day	GroupBy	Lower	Radians	ShowColumns	TimeZoneOffset
Acos	ColorFade	Defaults	HashTags	Max	Rand	Shuffle	Today
Acot	ColorValue	Degrees	Hour	Mid	Refresh	Sin	Trim
AddColumns	Compass	Disable	If	Min	Remove	Sort	TrimEnds
And	Concat	Distinct	IsBlank	Minute	RemoveIf	SortByColumns	Ungroup
App	Concatenate	Download	IsEmpty	Mod	RenameColumns	Split	Update
Asin	Connection	DropColumns	IsMatch	Month	Replace	Sqrt	UpdateContext
Atan	Count	EditForm	IsNumeric	Navigate	Reset	StartsWith	UpdateIf
Atan2	Cos	Enable	IsToday	NewForm	ResetForm	StdevP	Upper
Average	Cot	EndsWith	Language	Not	Revert	Substitute	User
Back	CountA	Errors	Last	Now	RGBA	SubmitForm	Validate
Blank	Countif	EncodeUrl	LastN	Or	Right	Sum	Value
Calendar	CountRows	Exit	Launch	Param	Round	Switch	VarP
Char	DataSourceInfo	Exp	Left	Parent	RoundDown	Table	ViewForm
Clear	Date	Filter	Len	Patch	RoundUp	Tan	Weekday
ClearCollect	DateAdd	Find	Ln	Pi	SaveData	Text	
Clock	DateDiff	First	LoadData	PlainText	Search	ThisItem	
Coalesce	DateTimeValue	FirstN	Location	Power	Second	Time	



What is Flow?

- Service for automating workflows across other services
 - Designed by Microsoft for business users more than developers
- What can you do with Flow?
 - Get notifications
 - Copy files
 - Collect data
 - Automate approvals



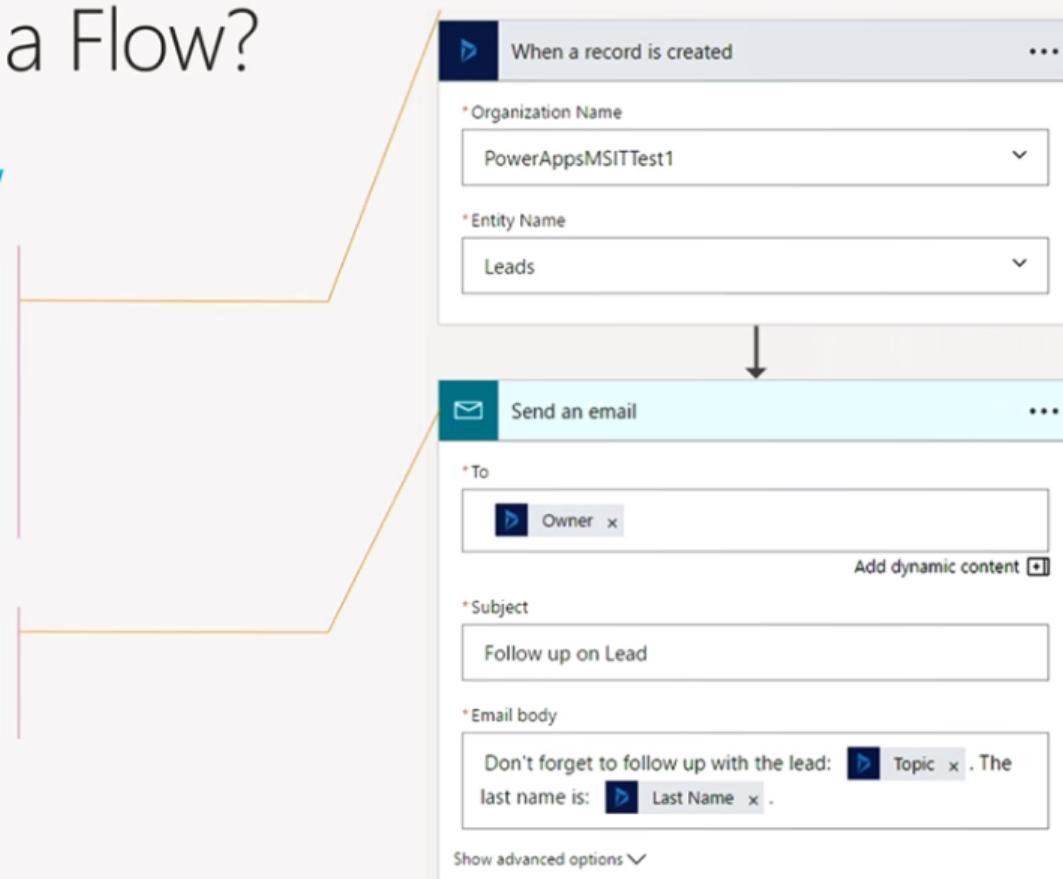
What makes up a Flow?

Example: Notification Flow

Trigger – the event that kicks off the flow:

- manually
- on a schedule
- on an event in the cloud

Actions – what the flow does
Can use data from the trigger



Connect to cloud and on premises data

Over 170 out of the box connectors with new connectors every week

Use Custom Connectors to connect to any custom REST endpoint

Connect to on-premises data using gateways



SharePoint Online



Salesforce



Dynamics CRM Online



Google Drive



Dropbox



Excel



OneDrive



Slack



Twitter



Office 365



Microsoft Azure



Custom APIs



Templates help users to get started

<p>Create a flow from blank</p> 	<p> Copy Dynamics CRM Accounts to Common Data Service customer organizations</p> <p>By Microsoft Used 227 times</p>	<p> Copy Dynamics CRM Accounts to customers in Dynamics 365 for Operations</p> <p>By Microsoft Used 187 times</p>	<p> When an object is created in Dynamics CRM, create a list item</p> <p>By Microsoft Used 184 times</p>	<p> Create Dynamics Leads based on Tweets with a button tap</p> <p>By Microsoft Used 31 times</p>	<p> Add a Dynamics Case after email approval</p> <p>By Microsoft Used 21 times</p>	<p> Copy new Dynamics CRM Cases to the Common Data Service</p> <p>By Microsoft Used 28 times</p>	<p> Create a Wunderlist Task for New CRM Leads</p> <p>By James Turner Used 25 times</p>
<p> When a new opportunity is created post to Yammer</p> <p>By Richard Bosse Used 122 times</p>	<p> Create Dynamics CRM Leads from an Excel table</p> <p>By Microsoft Used 121 times</p>	<p> Create Dynamics Leads based on Tweets</p> <p>By Microsoft Used 118 times</p>	<p> Create a new record in Dynamics CRM when a new list item is added</p> <p>By Microsoft Used 95 times</p>	<p> Send an mail from your SMTP server on new opportunities</p> <p>By Kerem Israr Used 28 times</p>	<p> Copy new Dynamics CRM Leads to the Common Data Service</p> <p>By Microsoft Used 25 times</p>	<p> Attach OneDrive files about Dynamics Contacts as notes</p> <p>By Microsoft</p>	<p> Create CRM Account for new Azure Queue Messages</p> <p>By Marius Pedersen</p>
<p> Copy new Dynamics CRM Contacts to the Common Data Service</p> <p>By Microsoft Used 31 times</p>	<p> Create a SharePoint item based on a Dynamics CRM record</p> <p>By Henry Schrein Used 79 times</p>	<p> Create Dynamics notes for Emails</p> <p>By Microsoft Used 81 times</p>	<p> Move rows from and Excel table to Dynamics AX Online Vendors</p> <p>By Microsoft Used 58 times</p>	<p> Send a Push Notification for new Sales Orders</p> <p>By Isaac Dongbatu</p>	<p> Copy Teams from the Common Data Service to Operations Customer Groups</p> <p>By Michael Barron</p>	<p> Copy Salesforce Accounts to Dynamics AX Online Customers</p> <p>By Microsoft</p>	<p> When a new lead is created in Dynamics CRM, add it to a Smartsheet</p> <p>By Microsoft</p>
<p> Copy from Dynamics CRM to the Common Data Service and Operations</p> <p>By Microsoft</p>	<p> CRM Opportunity Win to Create a New Project</p> <p>By Microsoft</p>	<p> Create Dynamics CRM Leads from a Google Sheet</p> <p>By Microsoft</p>	<p> On approval create a Dynamics CRM entity for items in a SharePoint list</p> <p>By Microsoft</p>	<p> Create a case in Dynamics from Freshdesk</p> <p>By Microsoft</p>	<p> Low stock warning</p> <p>By Microsoft</p>	<p> Social Media Promotions</p> <p>By Microsoft</p>	<p> Add notes to a Dynamics CRM contact</p> <p>By Microsoft</p>



Build flows from scratch

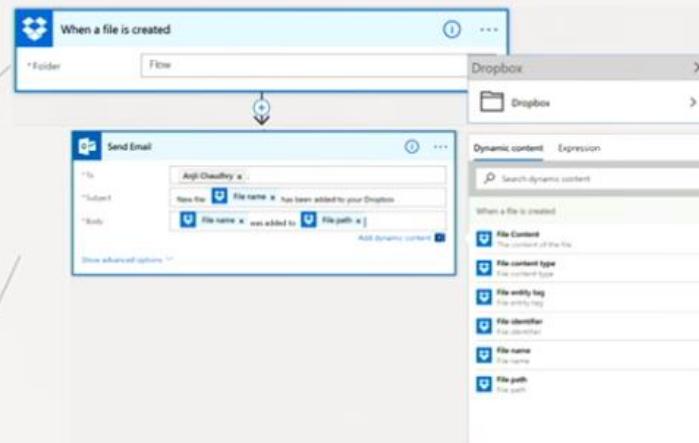
Sending an Exchange email when a new file is added in Dropbox

Authenticate to your Dropbox account.

Select folder to monitor

Authenticate to your O365 account.

Build email *Subject* and *Body*



Specify *Send To* email address and additional properties (optional): *From*, *CC*, *BCC* and *Importance*

Choose to include properties from previous step (Dropbox file) to improve relevance



Manage your flow

Flow Details

- View and edit title and description
- Turn flow on and off
- Clone it
- View run history

The screenshot shows the Microsoft Flow management interface. At the top, there's a navigation bar with links for Flows, Approvals, Templates, Connectors, Learn, and a search bar. Below the navigation bar, the main content area displays a flow titled "2 Run sentiment analysis on tweets and push results to a Power BI dataset". The flow consists of three steps: a Twitter connector, a Test Analysis connector, and a Power BI connector. There are buttons to "Edit flow", "More", and a toggle switch labeled "This flow is On". To the right of the flow details, there's a "CONNECTIONS" section listing "Test Analysis" (anjiic@microsoft.com), "anjiic@microsoft.com" (twice), and "anjili" (anjili@microsoft.com). Below the connections, the "RUN HISTORY" section shows ten recent runs, all of which have "Succeeded". The "OWNERS" section lists "Anjili Chaudhry" (anjili@microsoft.com) and a button to "Add another owner".

Run Status	Run Time	Action
Succeeded	37 seconds ago	See details
Succeeded	37 seconds ago	See details
Running	37 seconds ago	See details
Running	37 seconds ago	See details
Running	37 seconds ago	See details
Running	37 seconds ago	See details
Succeeded	37 seconds ago	See details
Succeeded	37 seconds ago	See details
Running	37 seconds ago	See details
Succeeded	37 seconds ago	See details

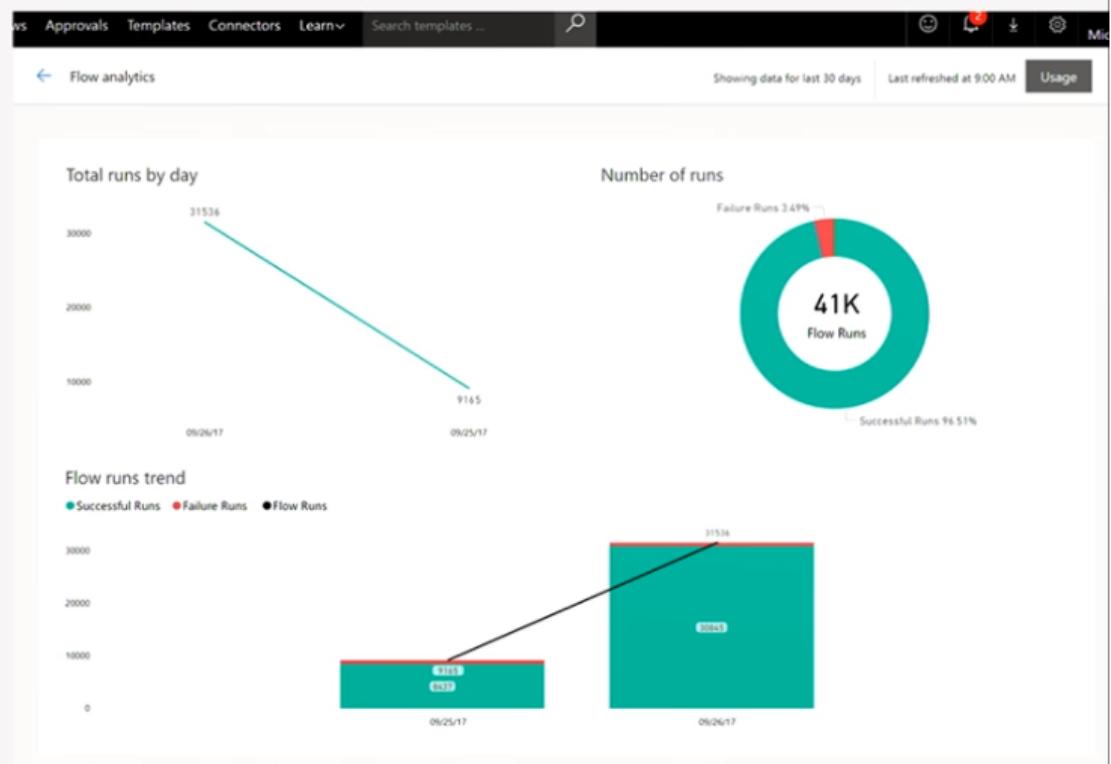
Manage your flow

Flow Details

- View and edit title and description
- Turn flow on and off
- Clone it
- View run history

Flow Analytics

- See number of runs and trends



Collaborate with your co-workers

Co-authoring

- Many authors can edit a flow, not just a single owner
- If the original author leaves the company the flow continues to function

The screenshot shows the 'Owners' section of a Microsoft Flow configuration page. At the top, there is a navigation bar with links for 'My flows', 'Approvals', 'Templates', 'Connectors', 'Learn', and a search bar. Below the navigation is a header with the text 'When an item is created -> Start an approval|Condition,Update item,Send em...'. On the right side of the header are several small icons: a smiley face, a gear, a red circle with a number '1', a downward arrow, and a gear.

Owners

Adding another owner allows others to edit, update and delete this flow. All owners can also access the run history and add or remove other owners.

[Learn more](#)

Add another owner

Sunay

Sunay Vaishnav
sunayv@microsoft.com

Anjali Chaudhry
anjlc@microsoft.com

Jon Levesque
jolevesq@microsoft.com

Embedded connections

Everyone listed as an owner will have access to all these connections and will only be able to use them in this flow.

[Learn more](#)

Embedded connections used in this flow:

Approvals	anjlc@microsoft.com	X
anjlc@microsoft.com	anjlc@microsoft.com	X
Mail	anjlc@microsoft.com	X
anjlc@microsoft.com	anjlc@microsoft.com	X

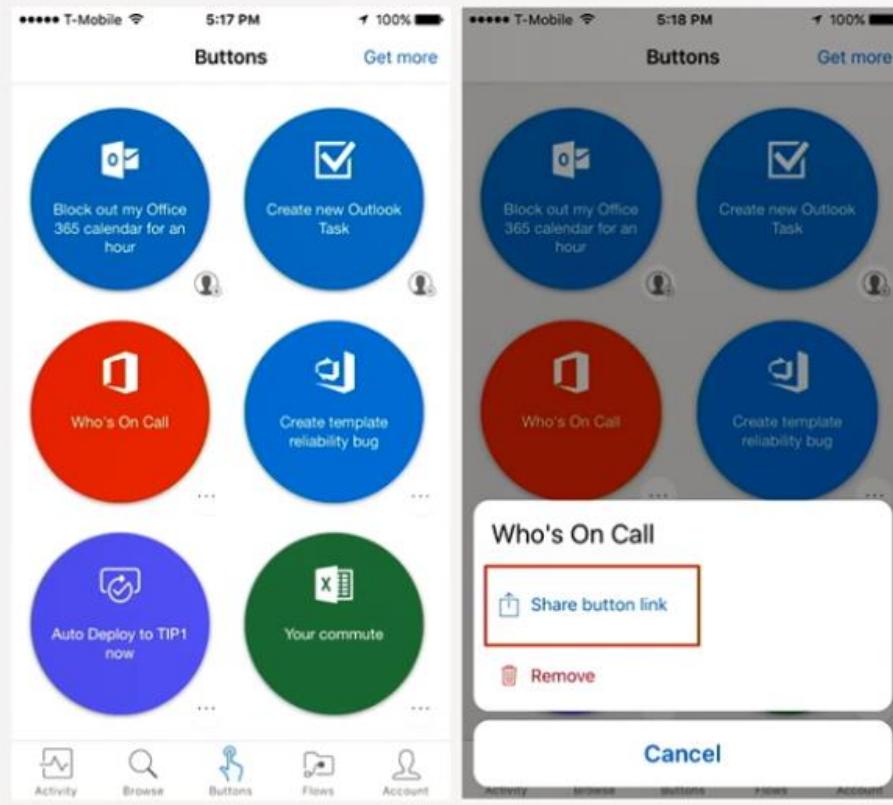
Create Buttons and share them

What are buttons?

- Easy way to trigger on demand flows with a push of a button!
- Buttons widget on phone and in the Flow app
- Physical buttons with Flic and Bttn

Sharing buttons

- Make buttons available to your co-workers to automate their tasks



Admin center

Environment administration

- Create and manage your organization's environments
- Lifecycle management of flows
- Manage roles and role membership
- View license and quota information

Data Loss Protection

- Control how data flows within your organization
- Set policies for classification of services

Local agility, central control

- Allow teams control over their environment and still have centralized control

Flows and apps that combine services from your business data and Non-business data groups will be automatically blocked. Services may only appear in one data group but can be moved at any time.

Business data only



Non-critical, mixed data (Default)



Non-business data



✓ Create data policy

Build a connector to feature on Flow OR custom to your company

Connect to your own services

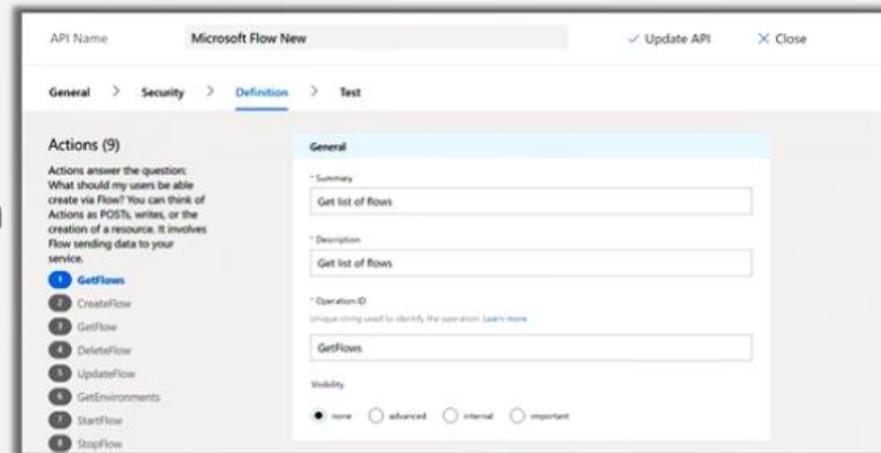
- Any REST end-point

Custom connectors within an organization

- Scoped to a company

Partner with Flow and PowerApps to build
first class connectors for your services

- Showcase your hero scenarios using
templates and explore co-marketing
opportunities with Microsoft



What's happened in the last six months?

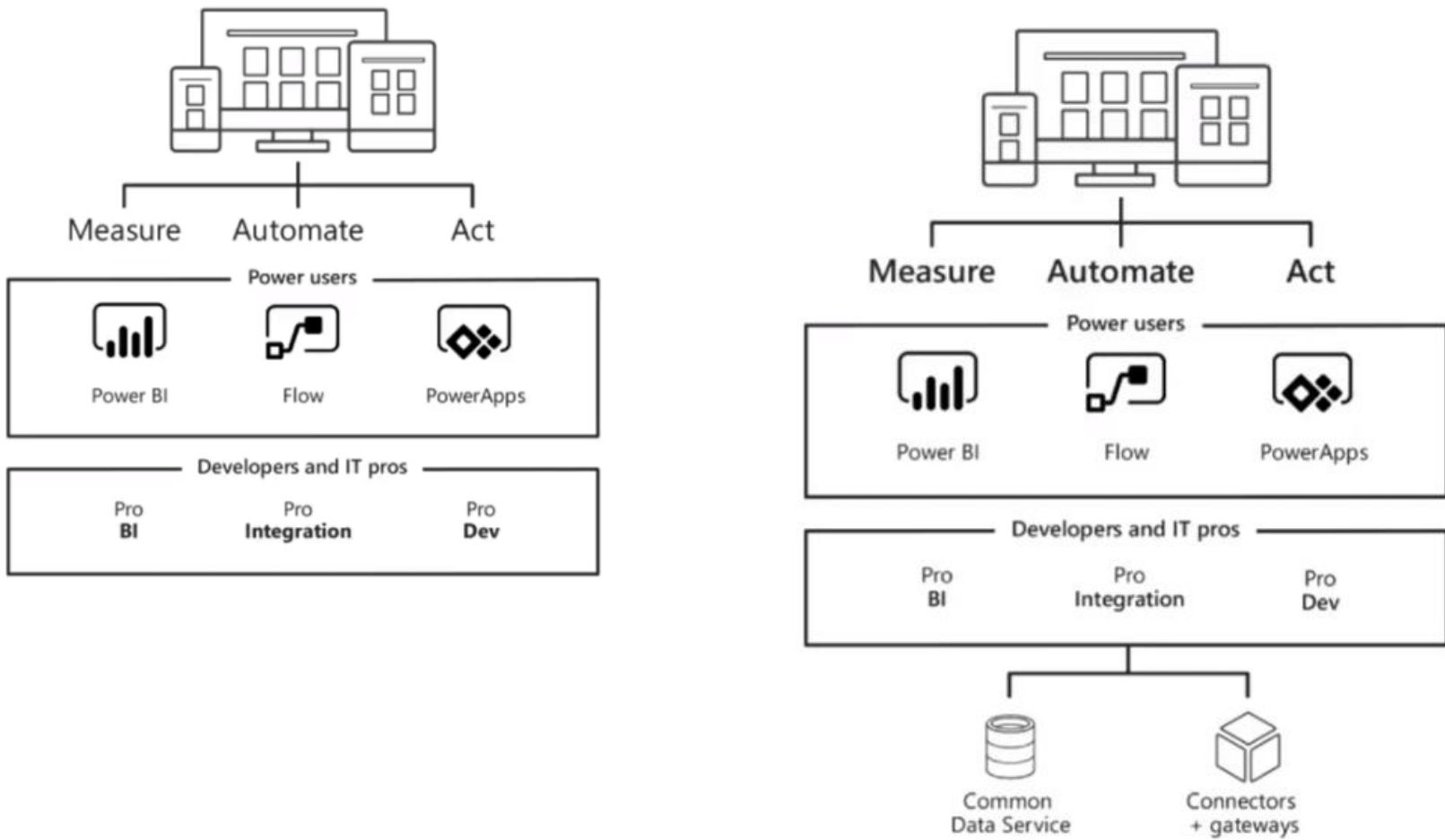
Flow Q2 2017 Updates

- New modernized approval experiences
- Trigger flows from physical buttons
- 'Diet' designer and new getting started experiences
- Team flows general availability
- Trigger buttons from widgets on iOS or Android
- Control-flow improvements like parallels and error handling
- Manage flows, licenses, quotas in the Admin center
- SharePoint Document library integration
- Windows Phone Support
- Convert the columns for tables or lists
- Build and submit your own connectors
- New Community Plan and Office 365 F1 Plan
- Dozens of new connectors

Flow Q3 2017 Updates

- Import and Export
- Use expressions in actions
- Grow up to Azure Logic apps
- OneDrive for Business integration
- More SharePoint column/file metadata support
- Reshare buttons and collect lists, emails or files
- Download full run history to Excel
- Compliance certifications (e.g. ISO, SOC, HIPAA etc...)
- Flow collections gallery
- Power BI analytics integration (First release only)
- Office 365 security & compliance center audit logs
- Custom connectors for on-premises APIs
- Dozens of new connectors





Triggers

Run manually based on user action

- From dedicated Flow button
- From other apps – PowerApps, SharePoint...

Run on a schedule

- From every minute to 4am on Saturdays

Run based on an event that happens
in a cloud or on-prem service

The screenshot shows the Microsoft Flow interface for selecting triggers. At the top, there is a search bar labeled "Search all services and triggers". Below the search bar, there are two main sections: "SERVICES" and "TRIGGERS (115)".

SERVICES:

- Flow button for mobile
- Office 365 Outlook
- SharePoint
- RSS
- Schedule
- Twitter
- Outlook.com
- Dropbox
- OneDrive for Business
- OneDrive

SEE MORE

TRIGGERS (115):

- appFigures - When there is a new review
- Asana - When a project is created
- Azure Queues - When there are messages

SEE MORE



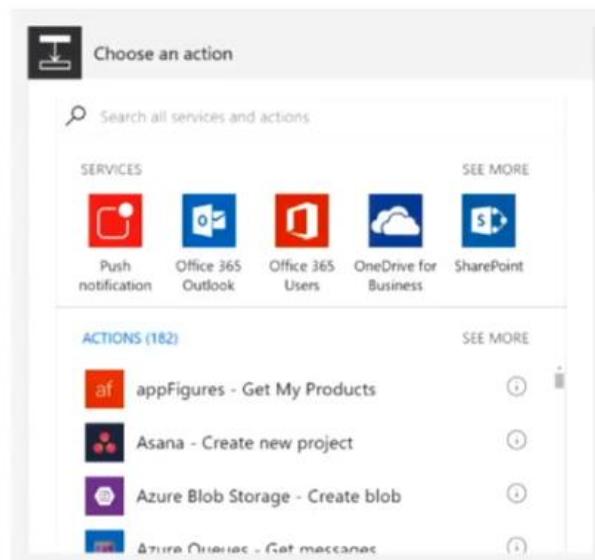
Actions

Any number of steps that run after the trigger

Connect to any cloud service or via the on-prem data gateway

Connect to any HTTP endpoints if there's no out-of-box connector

Some actions may not even use connections – just manipulate data locally

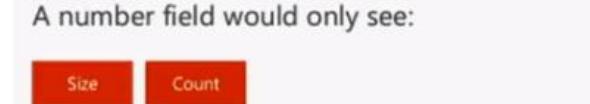
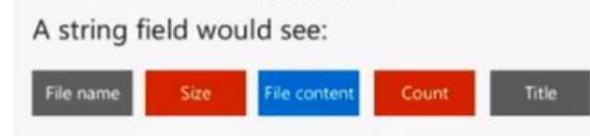
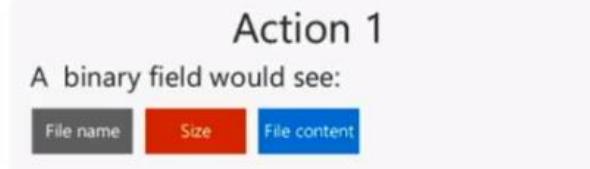
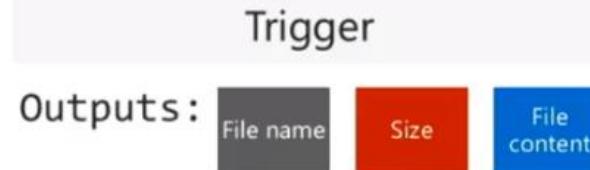


Flowing data

Data 'flows' from each step and is available for all later steps

Use  **Add Dynamic Content** to select outputs from previous steps

Certain outputs show up based on the types of the inputs and outputs



Using expressions

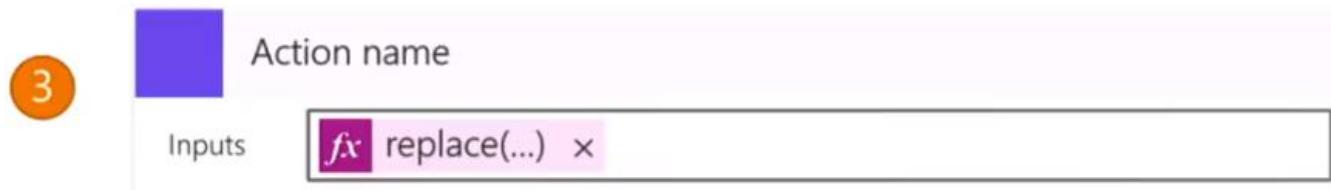
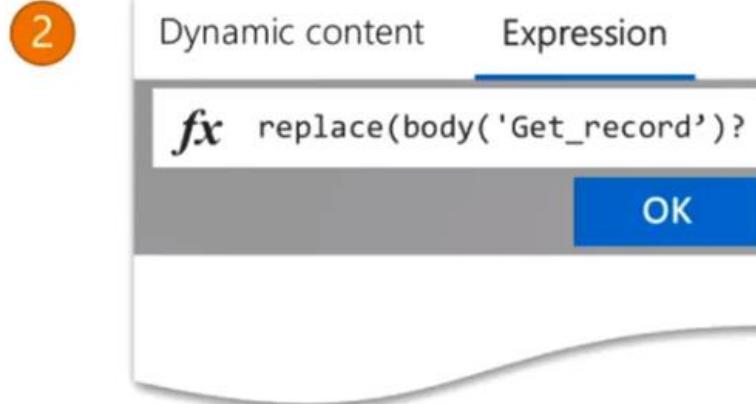
Many reasons to use expressions:

-  Convert types
-  Perform simple, inline calculations like string manipulation or arithmetic, or date/time manipulation
-  Generate data like the current time, a GUID or a random number
-  Handling optional values
-  "If" conditional statements
-  Working with lists



How to create expressions

- 1 Add Dynamic Content



Anatomy of an expression

myid: 123

mytitle: This item is due at <time>



This item is due at 2017-09-26T19:00:00Z

myname: Stephen

fx replace(body('Get_record')?['mytitle'], '<time>', utcnow())

1. Expression name: **replace**
2. One or more parameters, separated by commas
3. Use single quotes around static text
4. Include expressions in other expressions
5. Use square brackets to get properties from objects
6. Use the ? for optional properties



Data types and formats

Text – aka *Strings*

- Normal – 'Example string'
- Email, URL, phone number, etc...
- Base64
- Binary content
- Data URI
- URI component

For strings use single quotes

Non-text

- Floating-point number – 9.0
- Integer number – 137
- Boolean – true or false
- Array – a list of items
- Object – a record with key-value pairs
- XML content

Do *not* use single quotes for numbers, integers or booleans –

For example '`true`' does not equal `true`



Handling content conversion

- Some conversion is automatic
- In some cases, a conversion expression is automatically added by the UI
- Other conversions you'll need to author an expression for directly
 - The expression is named for the *destination* type
 - For example to convert to base 64, use the `base64()` expression

`fx string(value)`

Convert the parameter to a string

`fx float(value)`

Convert the parameter argument to a floating-point number

`fx bool(value)`

Convert the parameter to a Boolean

`fx base64(value)`

Returns the base 64 representation of the input string

`fx base64ToBinary(value)`

Returns a binary representation of a base 64 encoded string

`fx base64ToString(value)`

Returns a string representation of a base 64 encoded string

`fx binary(value)`

Returns a binary representation of a value

`fx dataUriToBinary(value)`

Returns a binary representation of a data URI

`fx dataUriToString(value)`

Returns a string representation of a data URI

`fx dataUri(value)`

Returns a data URI of a value

`fx uriComponent(value)`

Returns a URI encoded representation of a value

`fx uriComponentToBinary(value)`

Returns a binary representation of a URI encoded string

`fx uriComponentToString(value)`

Returns a string representation of a URI encoded string

`fx array(value)`

Convert the input to an array



		UI adds automatically										
To From		String	Base 64	Binary content	Data URI	URI comp.	Floating-point	Integer	Bool.	Array	JSON Object	XML content
String	Yes	base64()	binary()	dataUri()	uriComponent()	float()	int()	bool()	split() json()	json()	xml()	
Base 64	base64ToString()	Yes	base64ToBinary()	*	*	*	*	*	*	*	*	*
Binary content	string()	base64()	Yes	dataUri()	uriComponent()	*	*	*	*	*	*	*
Data URI	dataUriToString()	*	dataUriToBinary()	Yes	*	*	*	*	*	*	*	*
URI comp.	uriComponentToString()	*	uriComponentToBinary()	*	Yes	*	*	*	*	*	*	*
Floating-point	Yes	base64()	binary()	dataUri()	uriComponent()	Yes	No	No	No	No	No	No
Integer	Yes	base64()	binary()	dataUri()	uriComponent()	Yes	Yes	No	No	No	No	No
Bool.	Yes	base64()	binary()	dataUri()	uriComponent()	No	No	Yes	No	No	No	No
Array	join() string()	*	*	*	*	No	No	No	Select Action	Select or Compose	xml()	
JSON object	string()	*	*	*	*	No	No	No	Select or Compose	Compose Action	xml()	
XML content	string()	*	*	*	*	No	No	No	xpath()	xpath()	Logic apps only	

* First convert to/from a string and then use the expression required for normal strings



Working with strings

- Combine strings together with `concat()`
- Take a *substring* – like `LEFT()` in Excel
- Replace certain parts of a string
- Convert casing with `toLower()` or `toUpper()`
- Find the location of text, or if it starts with or ends with certain text

`concat(text_1, text_2?, ...)`

Combines any number of strings together

`substring(text, startIndex, length)`

Returns a subset of characters from a string

`replace(text, oldText, newText)`

Replaces a string with a given string

`guid()`

Generates a globally unique string (GUID)

`toLowerCase(text)`

Converts a string to lowercase using the casing rules of the i...

`toUpperCase(text)`

Converts a string to uppercase using the casing rules of the i...

`indexOf(text, searchText)`

Returns the first index of a value within a string (case-insensit...

`lastIndexOf(text, searchText)`

Returns the last index of a value within a string (case-insensit...

`startsWith(text, searchText)`

Checks if the string starts with a value (case-insensitive, invar...

`endsWith(text, searchText)`

Checks if the string ends with a value (case-insensitive, invari...



Arithmetic

Unlike Excel you cannot currently use the arithmetic operators you expect like +, -, *, /

Instead you'll use expressions

For example to say $X + Y * Z$

You would write `add(X,mul(Y,Z))`

`fx min(collection or item1, item2?, ...)`

Returns the minimum value in the input array of numbers

`fx max(collection or item1, item2?, ...)`

Returns the maximum value in the input array of numbers

`fx rand(minValue, maxValue)`

Generates a random integer within the specified range (inclu...

`fx add(summand_1, summand_2)`

Returns the result from adding the two numbers

`fx sub(minuend, subtrahend)`

Returns the result from subtracting two numbers

`fx mul(multiplicand_1, multiplicand_2)`

Returns the result from multiplying the two numbers

`fx div(dividend, divisor)`

Returns the result from dividing the two numbers

`fx mod(dividend, divisor)`

Returns the remainder after dividing the two numbers (mod...



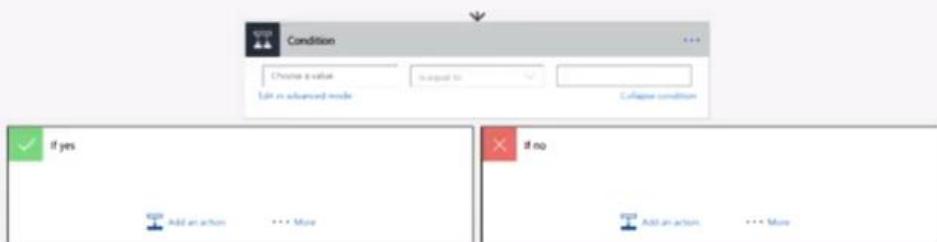
Date and time

- `addToTime()` to add times together
- `convertTimeZone()` to handle local times
- `formatDateTime()` for displaying in emails
- `dayOfWeek()` to extract specific date segments

<code>fx addMinutes(timestamp, minutes, format?)</code>	Adds an integer number of minutes to a string timestamp pa...
<code>fx addHours(timestamp, hours, format?)</code>	Adds an integer number of hours to a string timestamp pass...
<code>fx addDays(timestamp, days, format?)</code>	Adds an integer number of days to a string timestamp passe...
<code>fx convertTimeZone(timestamp, sourceTimeZone, destinationTimeZone, format?)</code>	Converts a string timestamp passed in from a source time zo...
<code>fx convertToUtc(timestamp, sourceTimeZone, format?)</code>	Converts a string timestamp passed in from a source time zo...
<code>fx convertFromUtc(timestamp, destinationTimeZone, format?)</code>	Converts a string timestamp passed in from a UTC to a target...
<code>fx formatDateTime(timestamp, format)</code>	Returns a string in date format
<code>fx startOfDay(timestamp, format)</code>	Returns the start of the day to a string timestamp passed in
<code>fx startOfMonth(timestamp, format)</code>	Returns the start of the month of a string timestamp
<code>fx startOfYear(timestamp, format)</code>	Returns the start of the year of a string timestamp
<code>fx dayOfWeek(timestamp)</code>	Returns the day of week component of a string timestamp
<code>fx dayOfMonth(timestamp)</code>	Returns the day of month component of a string timestamp
<code>fx dayOfYear(timestamp)</code>	Returns the day of year component of a string timestamp
<code>fx ticks(timestamp)</code>	Returns the number of ticks (100 nanoseconds interval) since...



Expressions in conditions



1. First, build what you can in the simple mode
2. Then select **Edit in advanced mode**
3. Finally, enter the expression – use any of the Boolean expressions

NOTE: Unlike in Add Dynamic Content, you must begin with the @ character

f_b equals(object1, object2)

Returns true if two values are equal

f_b and(expression1, expression2)

Returns true if both parameters are true

f_b or(expression1, expression2)

Returns true if either parameter is true

f_b not(expression)

Returns true if the parameters are false

f_b less(value, compareTo)

Returns true if the first argument is less than the second

f_b lessOrEquals(value, compareTo)

Returns true if the first argument is less than or equal to th...

f_b greater(value, compareTo)

Returns true if the first argument is greater than the second

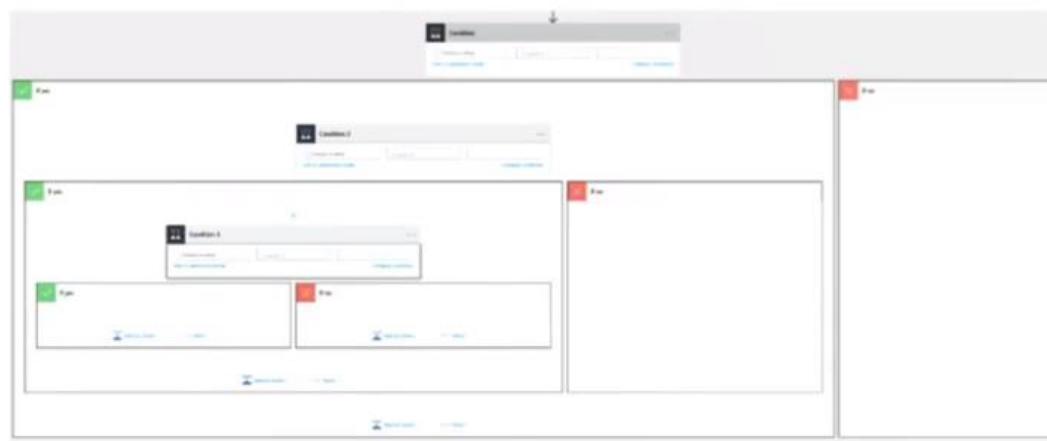
f_b greaterOrEquals(value, compareTo)

Returns true if the first argument is greater than or equal t...

The **if()** expression

Why use the **if()** expression if you can use a condition?

Avoid multiple nested conditions just to set a field



Caution: The if does not 'short circuit' which can result in errors if you try to reference a missing property in one branch



Handling optional values

Caution: trying to use a property that's not set – aka "null" -- will cause the flow to fail

Two steps to handle:

- 🚫 Use the "?" character after selecting the property (this happens automatically)
- ⚙️ Then, use the coalesce() function to provide a default value

```
coalesce(body('Get_record')?['content'], 'Default Value')
```



* Site Address
Process Simple Partners -
<https://microsoft.sharepoint.com/teams/prospart>

* List Name
Project List

* Id
 ID x

* Title
 Title x

* End Time
 End Time x

* Email aliases
 Email aliases x

Start Time

Num of Days
 Add dynamic content

Dynamic content Expression

c

- coalesce
- concat
- contains
- convertFromUtc
- convertTimeZone
- convertToUtc
- createArray
- decodeUriComponent
- encodeUriComponent
- listCallbackUrl
- uriComponent

What are Arrays?

Jane	8.29	ID: 123 Name: Jane Mail: J@a.c
Dan	4.89	ID: 888 Name: Bob Mail: B@a.c
Steve	0.28	ID: 456 Name: Dave Mail: D@a.c

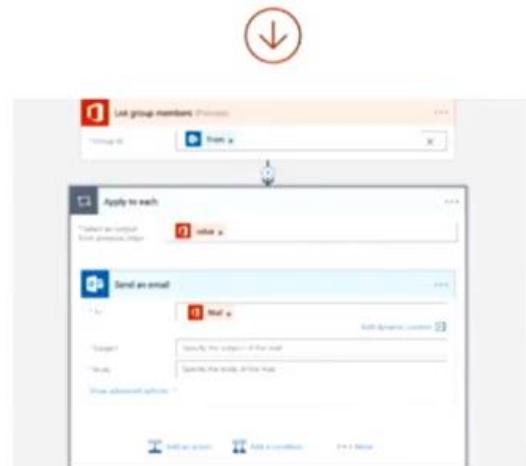
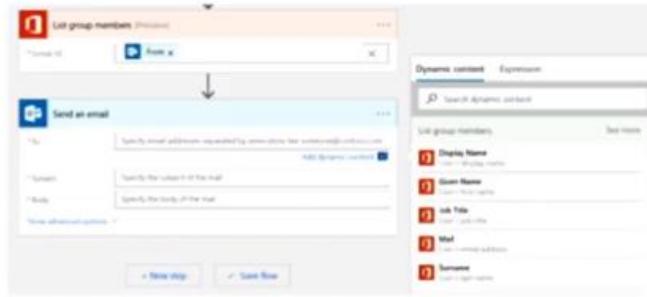
A few different classes of things you may need:

- ⚡ Repeat an action over each list item
- 📋 Get a single item from a list
- FilterWhere a list down
- ⟳ Make a list work with a different action



Apply to each

- Automatically added when you try to use an output that's *part of a list*
- Destination step to repeats over every list item
- If you do NOT want this you can:
 - Get only one list item using an expression, or,
 - Convert the whole list to a string in the form of a list or a table



Getting certain list items



0 ← Use the **first()** expression to get the first item from a list

1 ← Use square brackets and a number (starts at 0) to get a certain item, for example [2]

2 ← Use the **last()** expression to get the final item

Note: If the array is a list of Strings, Numbers, Booleans etc..., then the above expression can be used directly.

However, if it is an array of objects, you will need to **use square brackets** to select the specific property you need:

```
last(body('Get_rows')['value'])['mycolumn1']
body('Get_rows')['value'][2]['mycolumn1']
```



Convert the list to a string

Join – use join to get a simple list,
for example, if you have a list of
email addresses*

Create HTML/CSV Table – convert a
list of Objects to a tabular display
format, for example, for inclusion in
the body

* Note: You must have a list of strings, not a list of Objects

The image displays two separate Microsoft Power Automate flows. Both flows begin with a 'Join' action (indicated by a purple icon) which takes an input 'value x' and joins it with an empty string (''). This results in a single string value.

The first flow then uses a 'Send an email' action (blue icon) to send an email. The 'To' field is set to 'Output x'. The 'Subject' field is 'Specify the subject of the mail' and the 'Body' field is 'Specify the body of the mail'. There is also a 'Send advanced options' button.

The second flow begins with a 'Create HTML table' action (purple icon). It takes the same input 'value x' and includes headers ('Yes') and columns ('Automatic'). The resulting table is then used in a 'Send an email' action (blue icon) where the 'To' field is 'Specify email addresses separated by semicolons like someone@contoso.com', the 'Subject' field is 'Specify the subject of the mail', and the 'Body' field is 'Output x'. There is also a 'Show advanced options' button.



Filtering

Ideally – have the connector do the filtering for you

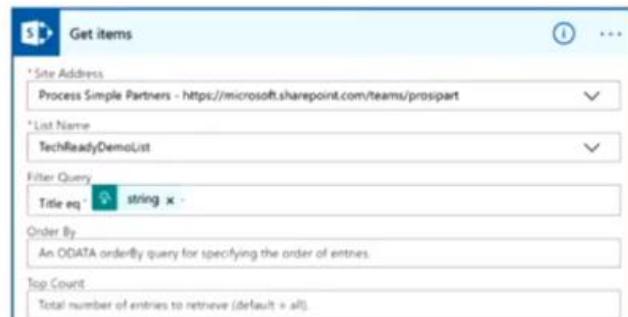
Requires use of Odata syntax and is limited. Read more [here](#).

Built-in Flow action – Filter array

Select the Array in the From field

Can either use simple or advanced mode just like for Conditions

If you need the first N items you can use **take()** or **skip()**



Transforming Arrays

Two input modes: fill key-value pairs, or typing directly in

 Create an array of objects



Useful for passing this Array to another action

 Create an array strings, numbers, booleans etc...



Useful for getting a simple list, for example, of email addresses



Passing data into arrays

Can hardcode a list – or – have the list be dynamic at runtime

 Fill in each property of the object and get one item created

Send an email

* To	Specify email addresses separated by semicolons like someone@contoso.com
* Subject	Specify the subject of the mail
* Body	Specify the body of the mail
Attachments Name	Attachment name
Attachments Content	Attachment content
Importance	Importance

 Need to pass in an Array that exactly matches the fields

Send an email

* To	Specify email addresses separated by semicolons like someone@contoso.com
* Subject	Specify the subject of the mail
* Body	Specify the body of the mail
Attachments	Attachments
Importance	Importance



Checking list containment or duplicates

- You can use the `contains()` expression to see if something is in an array
- Use the `union()` function with the array twice to get a set of unique items



Building objects directly

You may need to use Compose to build an object or an Array

Use JSON syntax on the Compose action

```
{  
    "key" : "value"  
}  
  
[  
    "Bob",  
    "Jane"  
]
```



Escaping rules

When you directly are using the expression language you may need to *escape* certain characters

Using strings with a single quote character:

```
@substring('It''s A Great Day!',1,5)
```

Using spaces in action names:

```
@body('Name_with_spaces')
```

Building an object you need to escape '@':

```
{
    "@@odata.type" : ""
}
```



Normal action execution

Run in sequence

Flow terminates once an error (failure or timeout) is encountered

Skipped means the previous action didn't run

Summary: four possible states for an action:

- 👍 Succeeded
- 👎 Failed
- ✗ Timed out
- ↗ Skipped

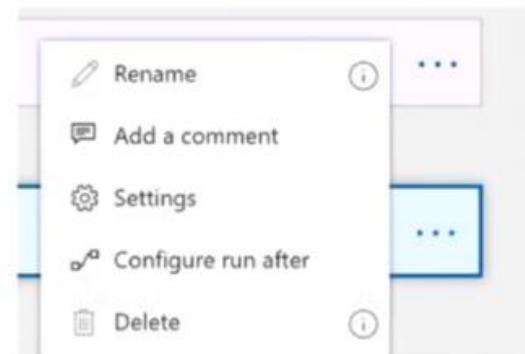


Action settings

The “...” menu contains entry points to **Settings** and **Configure run after**

Settings lets you configure:

- Async Actions
- Timeout
- Retry policy
- Sequential
- And more!



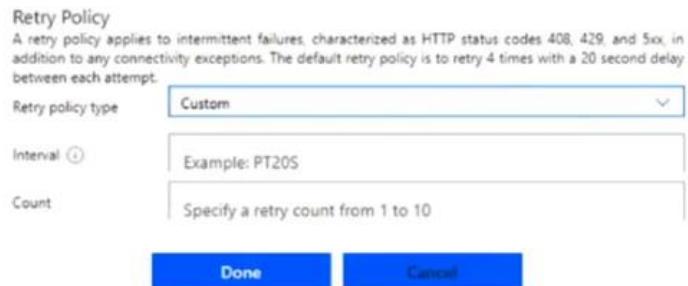
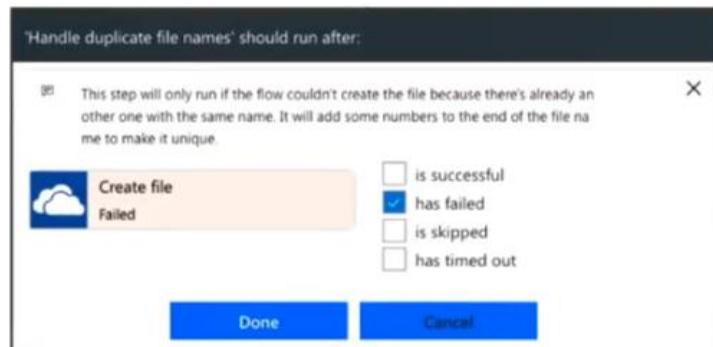
Error handling

Select the Run After option in the action menu

Choose which error conditions,
the arrow will turn dotted red

Use parallels for errors that
aren't at the end of the flow

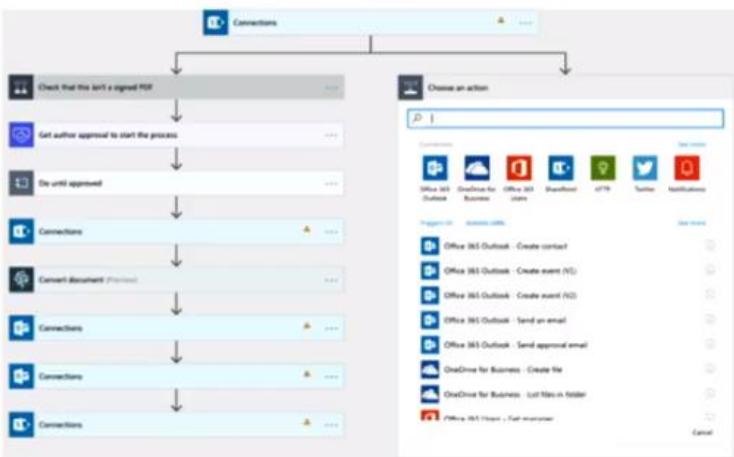
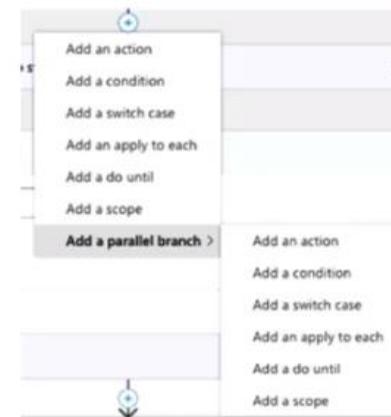
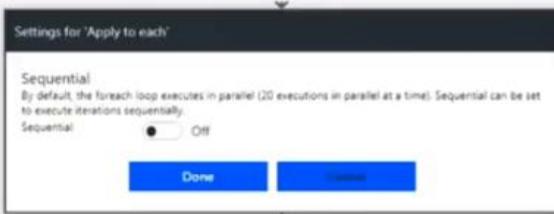
Retry policy by default handles
transient failures



Parallel execution

For actions select Add parallel branch from the  above the action

Inside of a foreach you can do up to 20 at a time

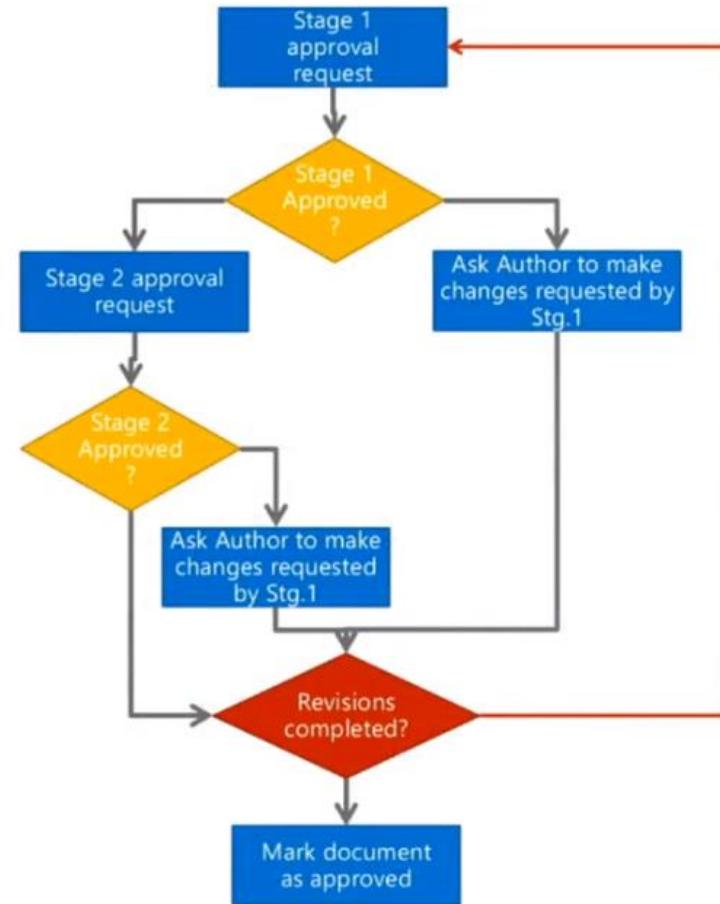


Looping

Do until - actions that you want to repeat until a condition is met

Wait for an approval to be completed

Check out a dedicated session on approvals Friday

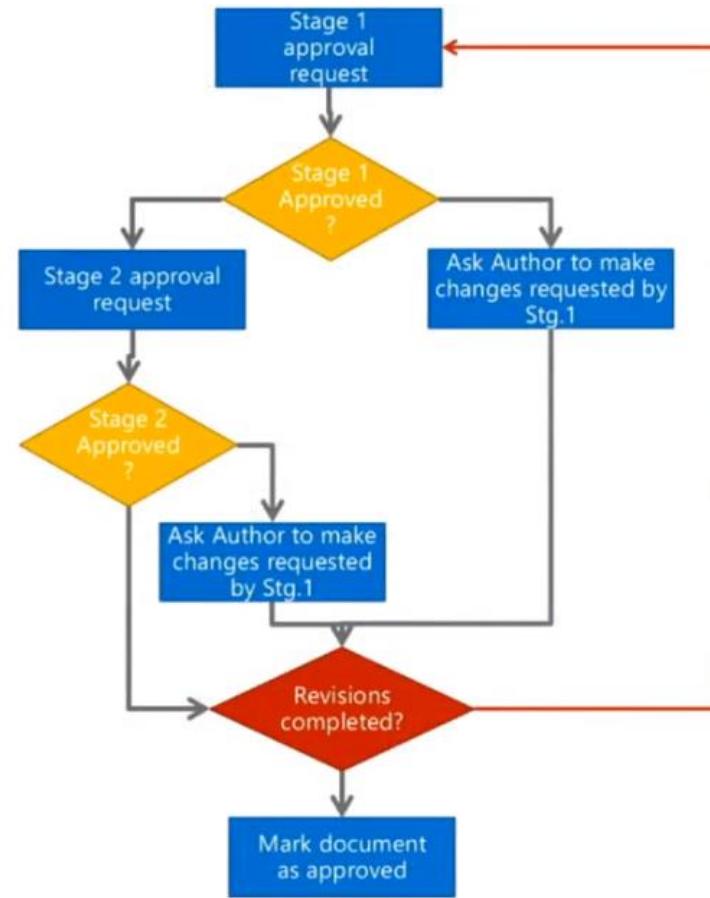


Looping

Do until - actions that you want to repeat until a condition is met

Wait for an approval to be completed

Check out a dedicated session on approvals Friday

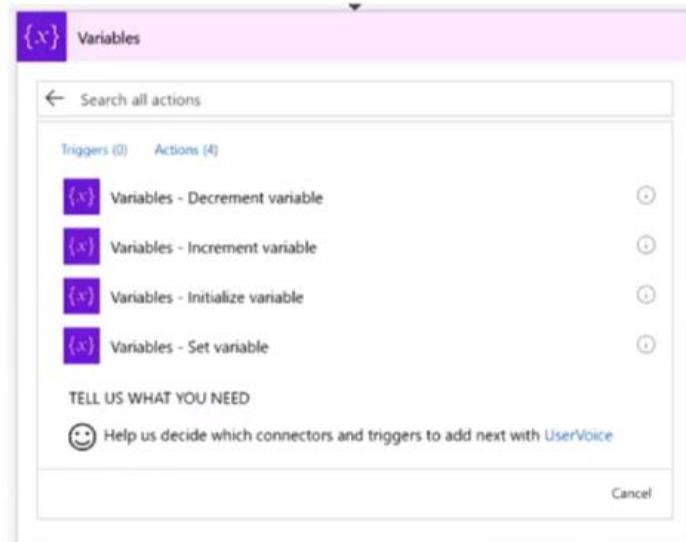


Variables

Always define the type and initialize the variable before you use it.

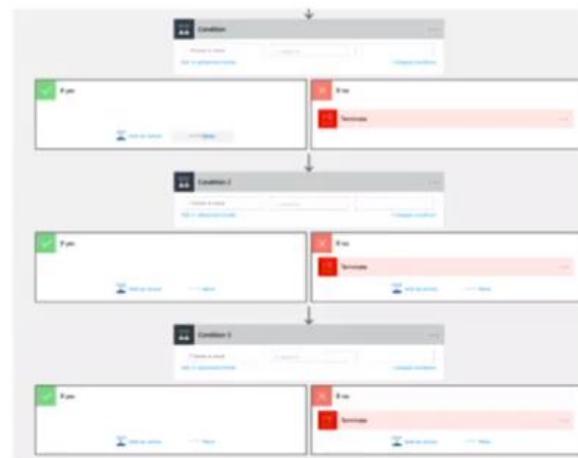
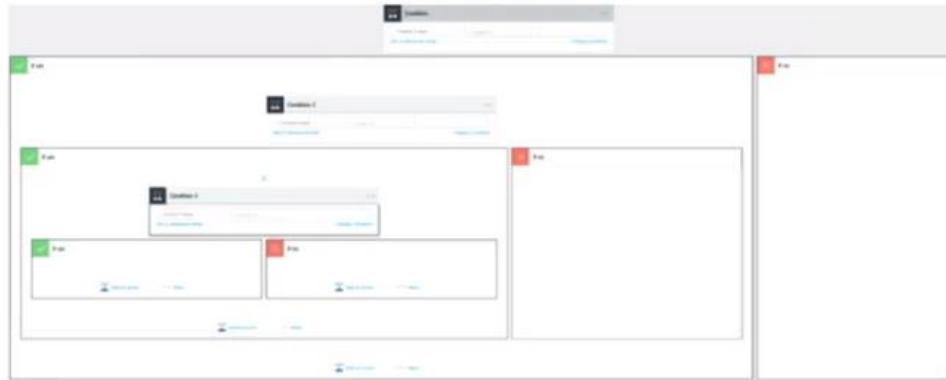
Useful for:

- Counters – you can increment or decrement variables
- Checking if something happened



Terminate flows

You can use this action to avoid nested conditions by ending in the middle



Asynchronous Actions

Any “trigger” can be in
the middle of a Flow as well

For example, create a flow
that waits for a reply to a
certain thread in the middle

You probably want to configure
a Time Out and handle that case



Calling nested workflows

In the child workflow:

Request

HTTP POST URL: `https://prod-56.westus.logic.azure.com:443/workflows/419593519f75...`

Request Body JSON Schema

```
Example:
{
    "type": "object",
    "properties": {
        "address": {
            "type": "string"
        }
    },
    "required": ["address"]
}
```

Use sample payload to generate schema

Show advanced options ▾

In the parent workflow:

HTTP

* Method: POST
URL: `https://prod-56.westus.logic.azure.com:443/workflows/419593519f754af7a37f07ab5736bb98/triggers/manual/paths/invoke?api-version=2016-06-01&sp=%2Ftriggers%2Fmanual%2Frun&sv=1.0&sig=vIgMxpt4ArzyNbXfnZMFeZegoGx2KqW-ttAKi>3IGQ`

Headers: Enter key Enter value

Body: `{ "message": "Success!" }`

Add dynamic content Show advanced options ▾

Response

* Status Code: 200

Headers: Enter key Enter value

Body: `{ "message": "Success!" }`

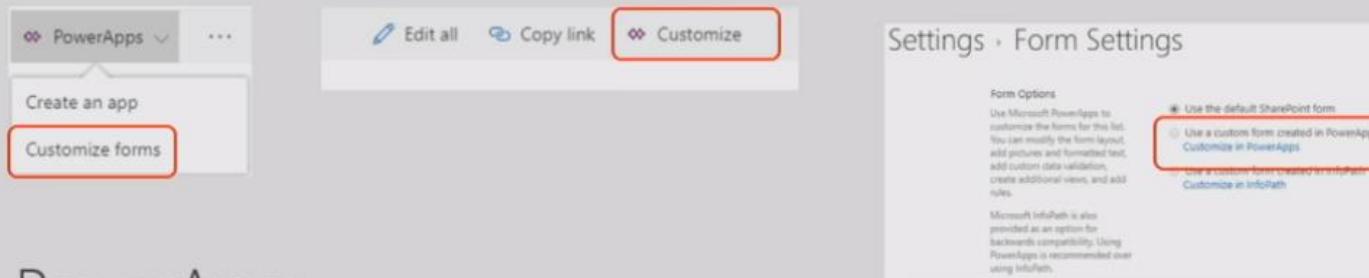
Add dynamic content



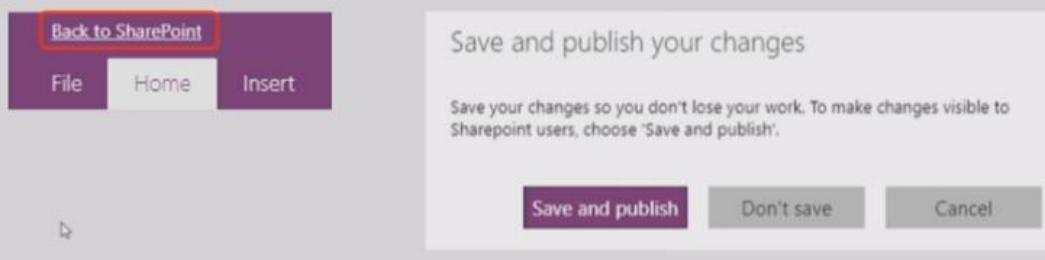
Embedded in SharePoint

Smooth transition between platforms

- In SharePoint



- In PowerApps





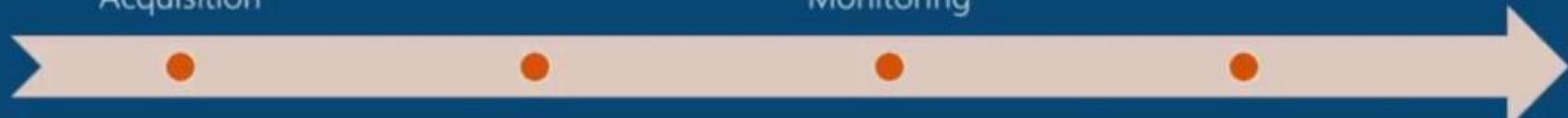
Let's take an journey today

*Who is using these services?
How do I manage licensing?*

*Where do I go to monitor
usage across my org?*

Acquisition

Monitoring



Security

Application Lifecycle
Management

*What data is accessible?
What are environments?
How do I control access?*

*How should I setup environments for my org?
How do I deploy a solution for my org?
How do I orchestrate updates?
How do I identify and fix bugs & issues?*

- Environments
- Data policies
- Data integration
- Tenant
- User licenses
- Quotas

Environments

Search



New environment

NAME	REGION	CREATED BY	CREATED
Fabrikam Inc. (default)	United States	SYSTEM	05/09/2017
Demo-Build	United States	Jane Doe	05/09/2017
Jane Doe's Environment	United States	SYSTEM	05/10/2017
Demo-Inspire	United States	James Oleinik	09/26/2017
Ignite Demo UAT	United States	James Oleinik	09/27/2017
Ignite Demo Production	United States	James Oleinik	09/27/2017

Environment Admin

Search



Details + Users

Enter names, email addresses, or user groups

+ Add everyone in my org



Name

Email



Frank Weigel

lwuser7@powerflowbuild.onmicrosoft.com



James Oleinik

admin@powerflowbuild.onmicrosoft.com



Jane Doe

build@powerflowbuild.onmicrosoft.com



Cancel

Save



[← Ignite Demo UAT](#)

Delete Import resources Export resources

Security • Details • Resources • Database

Environment roles

User roles

Permission sets

NAME	DESCRIPTION
Environment Admin	An environment admin has the ability to perform all administrative actions on an en...
Environment Maker	An environment maker has the ability to create new resources in an environment.



Security • Details • Resources • Database

Environment roles

User roles

Permission sets

User roles

Search   New role

NAME	DESCRIPTION	
Organization User	Default role that has access to public data.	 
Database Owner	Full access to all resources and database schema.	 



Ignite 2017

Created: 09/27/2017 Modified: 09/27/2017

Delete

Details + Share

Enter names, email addresses, or user groups

+ Add everyone in my org

Shared with

Name	Email	Permission
James Oleinik	admin@powerflowbuild.onmicrosoft.com	Owner
Charles Lamana	test2@powerflowbuild.onmicrosoft.com	Can use
Mark Overholt	IWUser4@powerflowbuild.onmicrosoft.com	Can use
Darshan Desai	IWUser0@powerflowbuild.onmicrosoft.com	Can edit



 Ignite 2017
Created: 09/27/2017 Modified: 09/27/2017

[Play](#) [Edit](#) [Delete](#) [Export \(preview\)](#)

[Details](#) • [Share](#) • [Versions](#) • [Settings](#) • [Analytics \(preview\)](#)

PowerApps keeps a version history of your apps.

VERSION	MODIFIED	MODIFIED BY	POWERAPPS RELEASE	PUBLISHED	COMMENT		
7	9/27/2017, 2:41:03 PM	Tenant Monkey Account	2.0.703	Live			
6	9/27/2017, 11:23:20 AM	Tenant Monkey Account	2.0.703				
5	9/27/2017, 11:08:06 AM	Tenant Monkey Account	2.0.703				
4	9/27/2017, 10:12:00 AM	Tenant Monkey Account	2.0.703				
3	9/27/2017, 8:40:38 AM	Tenant Monkey Account	2.0.703				



Application Lifecycle Management

When considering how to setup environments for your org, start simple!

1. Single environment model

Save+Publish allows testing & verifying new bits without impacting the users of your application

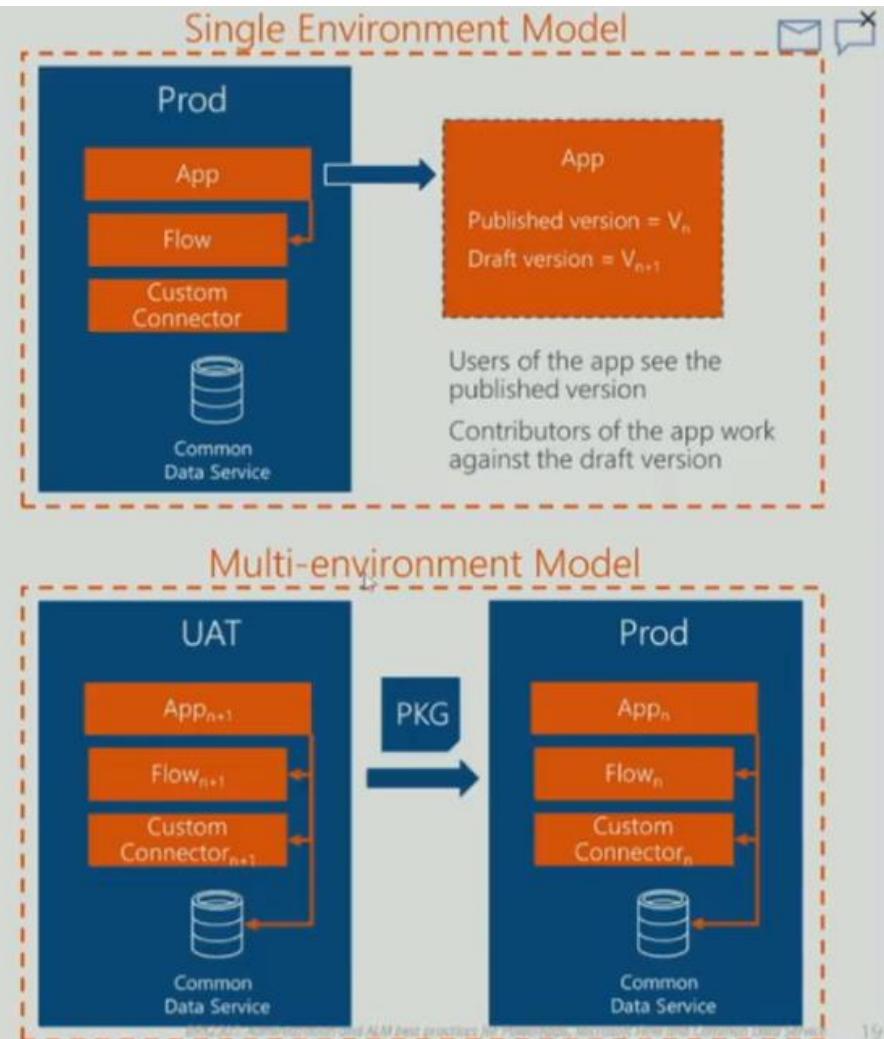
This model should work great for scenarios where you are not introducing breaking changes to your data model (either connectors or in your CDS schema)

2. Multi-environment model

Leverage packaging to move your solutions across environments (or tenants)

This model is required if your solution depends on custom connector or CDS where you need to introduce breaking change in the data model

Packaging requires a PowerApps Plan 2 or Microsoft Plan 2 license





PowerApps



Home



Apps



Learn



Connections



Flows



Gateways



Notifications

Export package

Package details

Created by James Oleinik on 09/27/2017

Name *

Environment

Description

Review Package Content

Choose your export options and add comments to provide instruction or add version notes.

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
ignite 2017	App	Update	 

Related resources

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
Send out my meeting notes	Flow	Update	 
jamesol@microsoft.com	Office 365 Outlook Connection	Select during import	 



Import package

Package details

Created by James Oleinik on 09/27/2017

Name

My pkg

Environment

Ignite Demo UAT

Description

N/A

Review Package Content

Choose your import options.

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
<input checked="" type="checkbox"/> Ignite 2017	App	Create as new	

Related resources

NAME	RESOURCE TYPE	IMPORT SETUP	ACTION
<input checked="" type="checkbox"/> Send out my meeting notes	Flow	Create as new	
<input checked="" type="checkbox"/> jamesol@microsoft.com	Office 365 Outlook Connection	Select during import	

Import

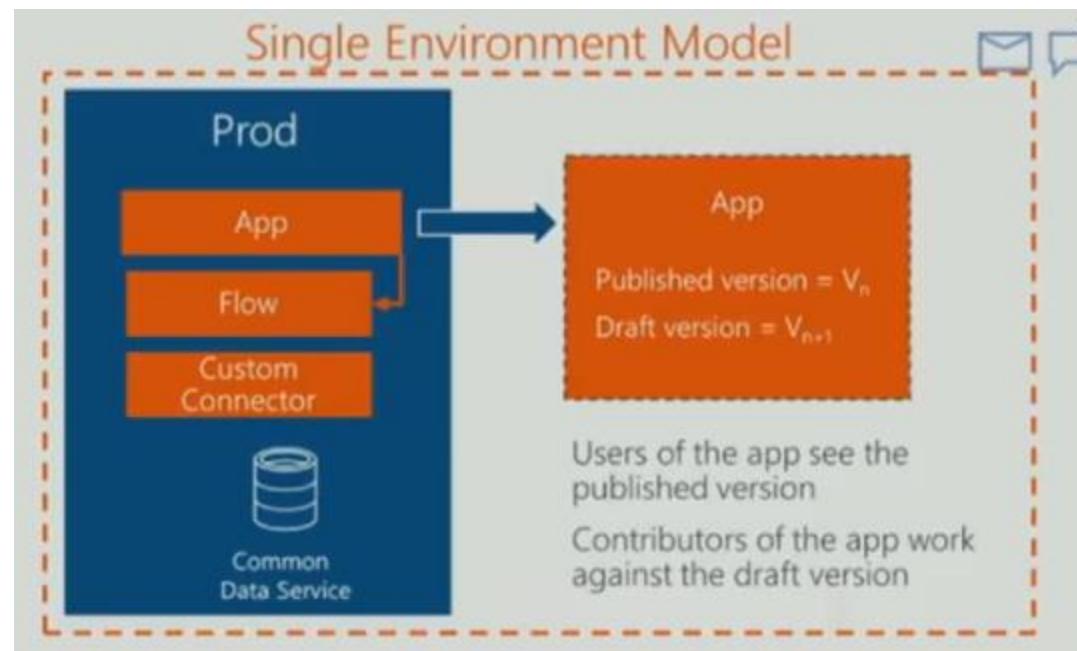
Cancel



1. Single environment model

Save+Publish allows testing & verifying new bits without impacting the users of your application

This model should work great for scenarios where you are not introducing breaking changes to your data model (either connectors or in your CDS schema)

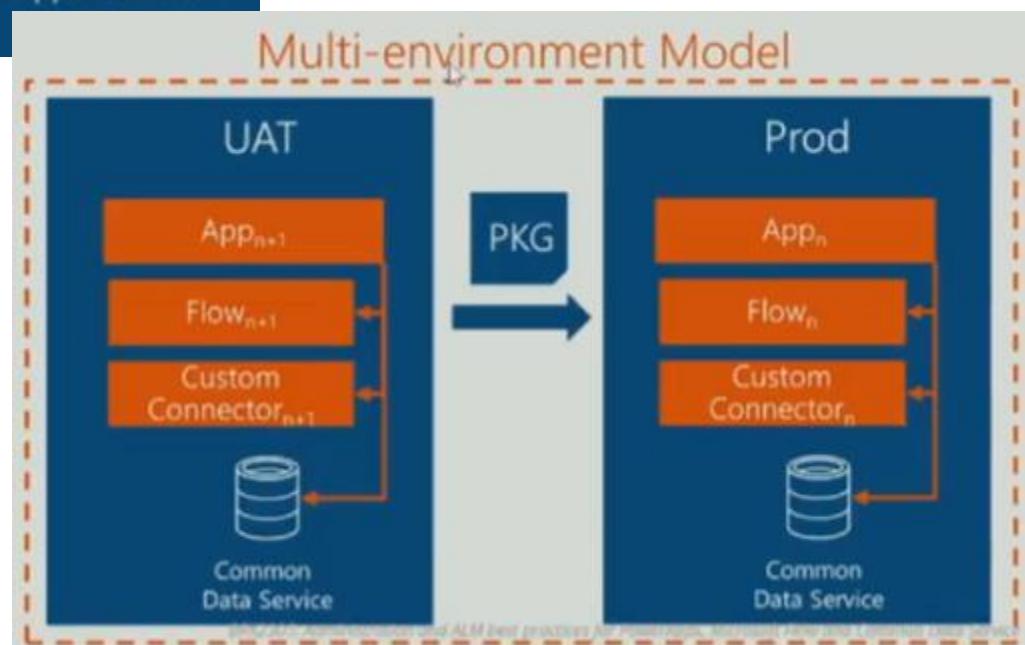


2. Multi-environment model

Leverage packaging to move your solutions across environments (or tenants)

This model is required if you solution depends on custom connector or CDS where you need to introduce breaking change in the data model

Packaging requires a PowerApps Plan 2 or Microsoft Plan 2 license



Environments

Security

PowerApps and Microsoft Flow are compliant with 13+ standards including HIPAA, EU Model Clauses, ISO & SOC

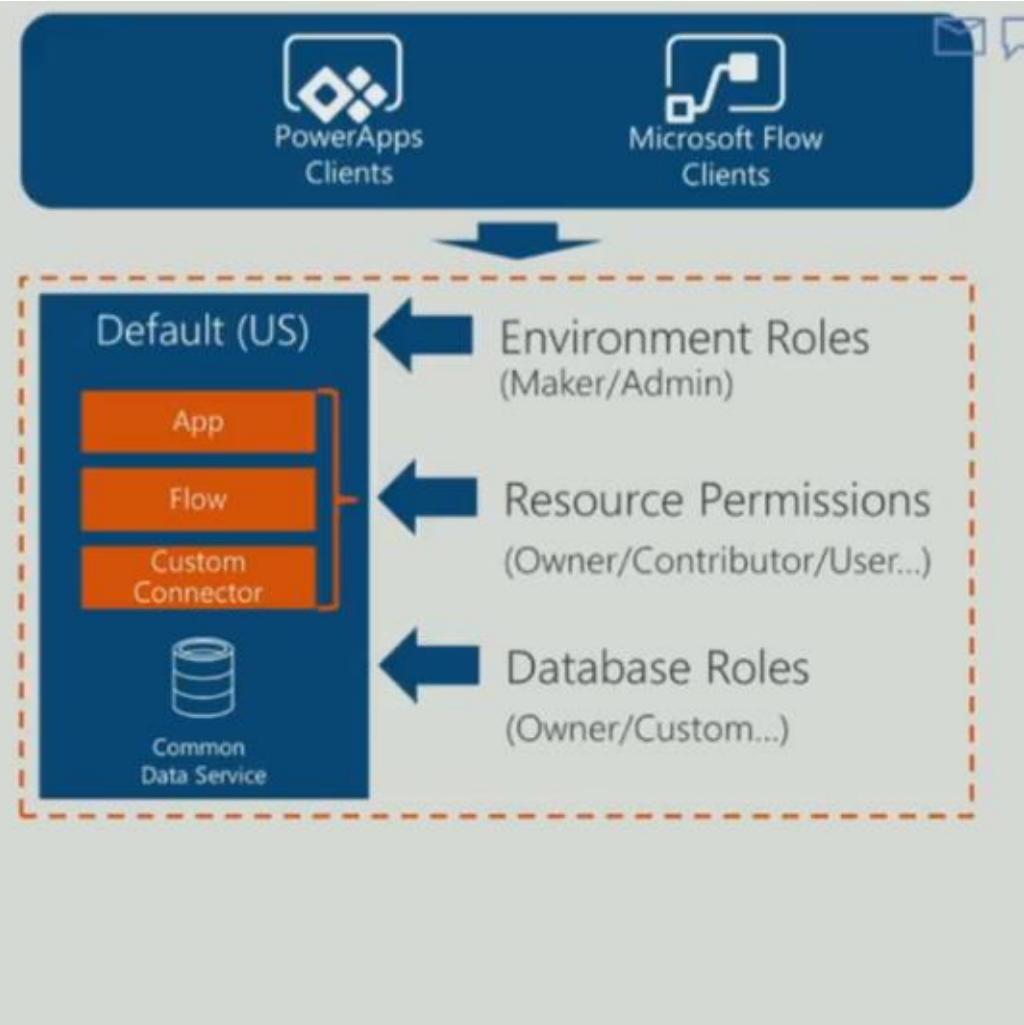
Environments serve two purposes in the business application platform:

1. Resource partitioning (by region)
2. Governance boundary

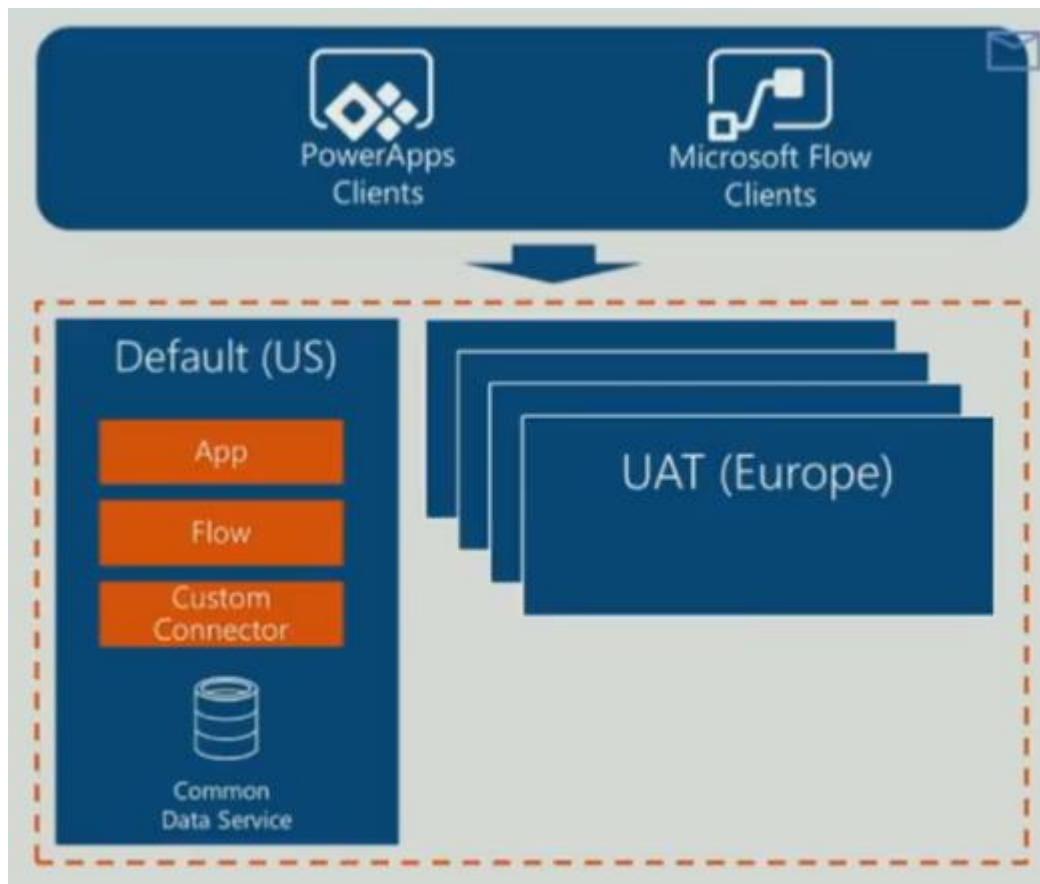
Every tenant is automatically provisioned a Default environment

Access is controlled at three levels:

1. Environment roles
2. Resource permissions for apps/flows/etc.
3. Database roles

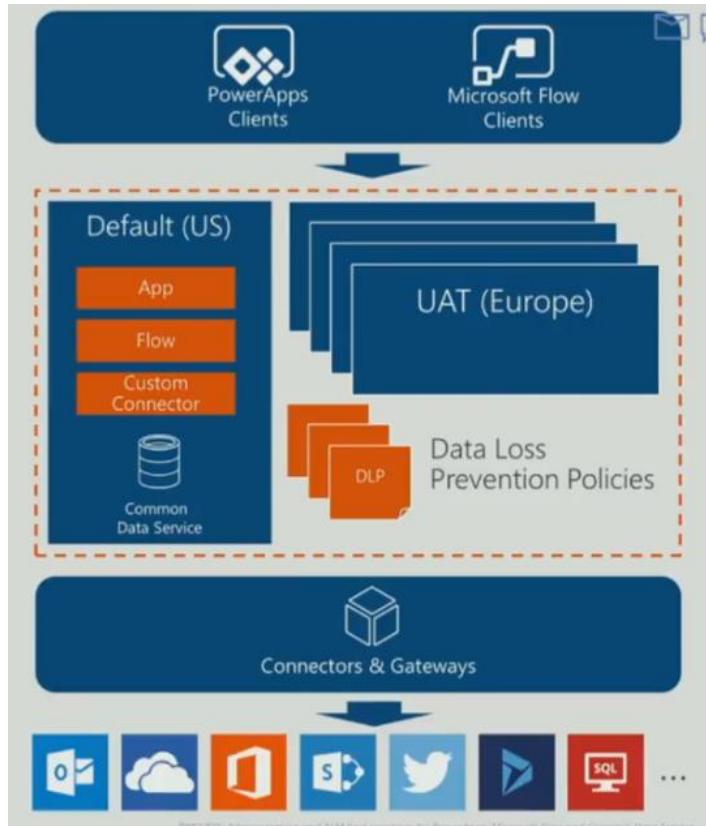


Additional environments can be provisioned by users with a PowerApps Plan 2 paid or trial license



Policies

Admins can set DLP policies to control access to data and connectors from apps and flows



Policy Violation

- Business Data vs Non-business Data

Error

Using these connections together conflicts with the company data loss prevention policies. Click [here](#) to learn more.

More

Ok



Monitoring

PowerApps Admin center allows you to centrally monitor and manage your org's resources:

1. View and manage environments
2. View and manage all apps and flows within an environment
3. View and manage your CDS database

View app usage analytics from web.powerapps.com
(app performance and error reporting reports are coming soon)

Flow usage analytics is also coming soon

These features require a PowerApps Plan 2 or Microsoft Plan 2 license

The image shows two screenshots of the PowerApps Admin center. The top screenshot is a desktop view of the 'Environments' page, listing three environments: 'Fabrikam Inc. (default)', 'Demo-Build', and 'Jane Doe's Environment'. The bottom screenshot is a tablet view of the 'Analytics (preview)' page for the 'Org Browser (Phone)' app, showing various charts and data tables related to app usage and performance.





Acquisition

PowerApps licenses always include an equivalent license for Flow

PowerApps and Flow plans are included within Office 365 and Dynamics 365 subscription

Individual users within an organization can directly sign-up for the following plans:

1. PowerApps Plan 2 90-day trial
2. PowerApps Community Plan
3. Flow Free

Admins can purchase and assign licenses for the stand-alone Plan 1 and Plan 2 offerings for PowerApps and Microsoft Flow

All licenses are per-user and can be managed in the Office 365 Admin Center or via PowerShell

The user licenses report for PowerApps and Microsoft Flow is available in the PowerApps Admin Center



Office 365 Business Essentials
Office 365 Business Premium
Office 365 Education
Office 365 Education Plus
Office 365 Enterprise E1
Office 365 Enterprise E3
Office 365 Enterprise E5
Office 365 Enterprise F1*



Dynamics 365 for Sales, Enterprise edition
Dynamics 365 for Customer Service, Enterprise edition
Dynamics 365 for Operations, Enterprise edition
Dynamics 365 for Field Service, Enterprise edition
Dynamics 365 for Project Service Automation, Enterprise edition
Dynamics 365 for Team Members, Enterprise edition
Dynamics 365 for Financials, Business edition
Dynamics 365 for Team Members, Business edition
Dynamics 365, Enterprise edition, Plan 1**
Dynamics 365, Enterprise edition, Plan 2 **



Flow Free
Flow Plan 1
Flow Plan 2



PowerApps Plan 1
PowerApps Plan 2 (+90d trial)
PowerApps Community Plan

Roadmap (highlights)



H2 Calendar 2017

- Export/import Flows across environments
- "In-the-box" review Flows for SharePoint Online
- Use Flow for Content Publishing approvals for SharePoint Online Publishing sites
- Utilize people, choice, attachment and multi-values in your Flows for SharePoint Online
- In-context Flow support in Dynamics 365, OneDrive and Teams
- Usage analytics for Flows
- Flow activity included in Office 365 audit logs
- UK deployment

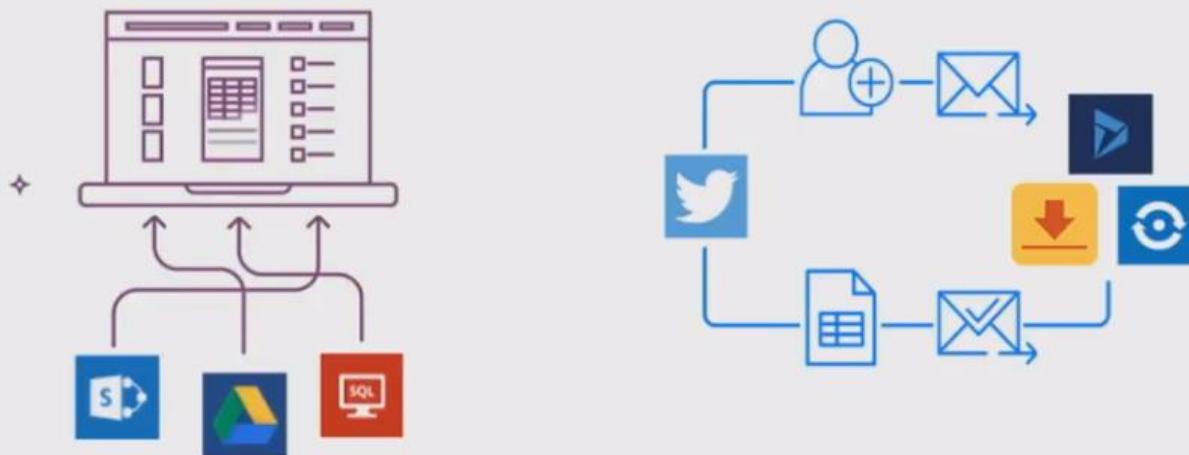


Calendar 2018

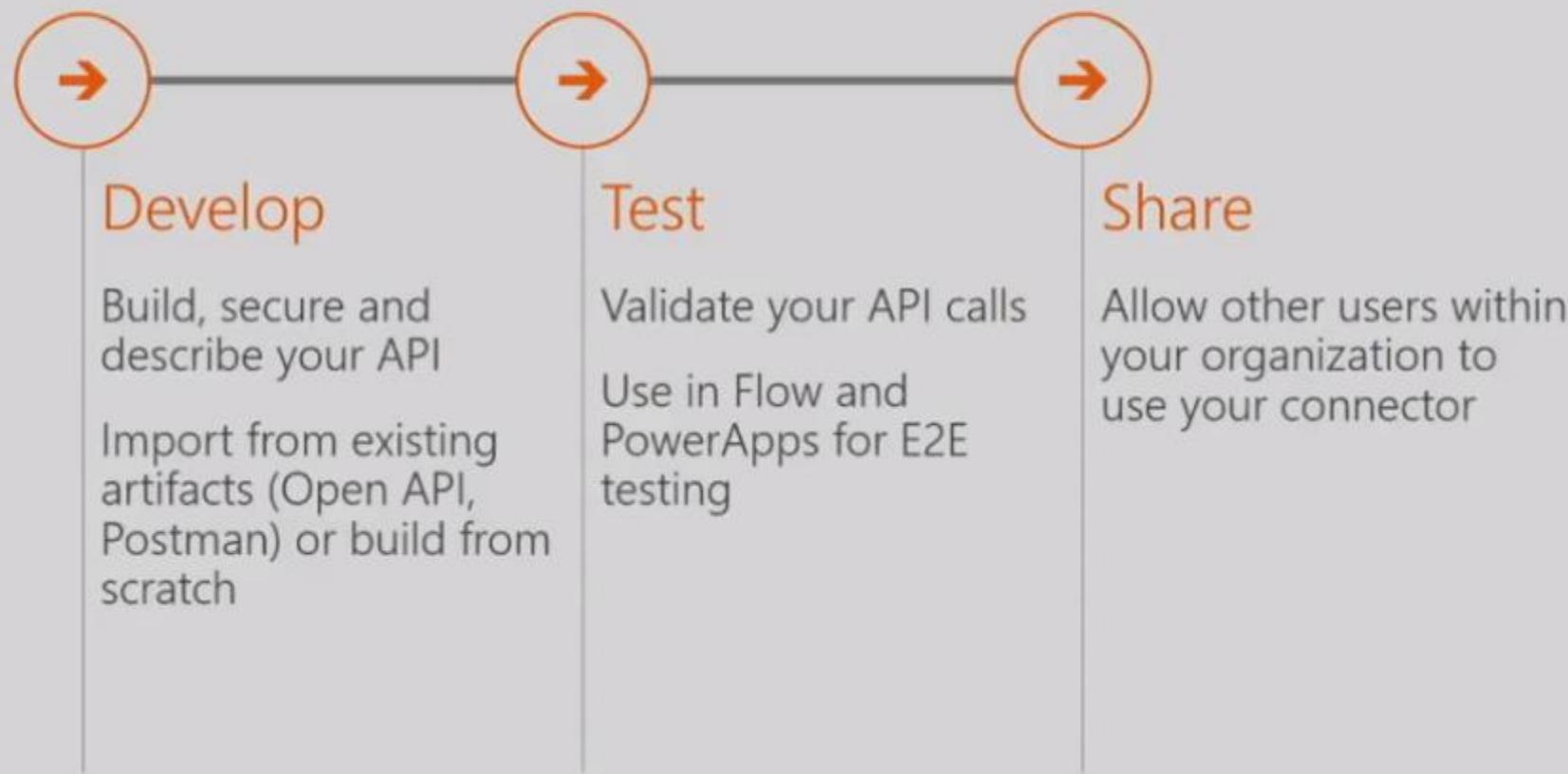
- Use a HTML rich text editor to build emails
- Guides for debugging actions and conditions
- Government cloud deployment
- ALM – Sandbox environments
- ALM – Move or copy across environments
- Support for GDPR compliance
- Leverage device signals (e.g. Location) with Flows on mobile devices
- Include Flows in AppSource
- Azure functions integration



A **connector** is a wrapper around an API that allows the underlying service to talk to **Microsoft Flow** and **PowerApps**



Building a Custom Connector



Why build a connector?



Enterprise developers

Looking for connectivity to a service we don't currently support
Need connectivity to a custom or internal service



Partners and ISVs

Expand the number of services you integrate with
Provide the extensibility your customers need
Increase exposure and adoption



Building a Custom Connector

