



Let systems  
communicate  
using Azure  
Integration  
Services

@SteefJan



# Me



**codit** | Azure Technology Consultant



Microsoft MVP – Azure

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Azure Lowlands Organizer

**SERVERLESS** NOTES | Writer

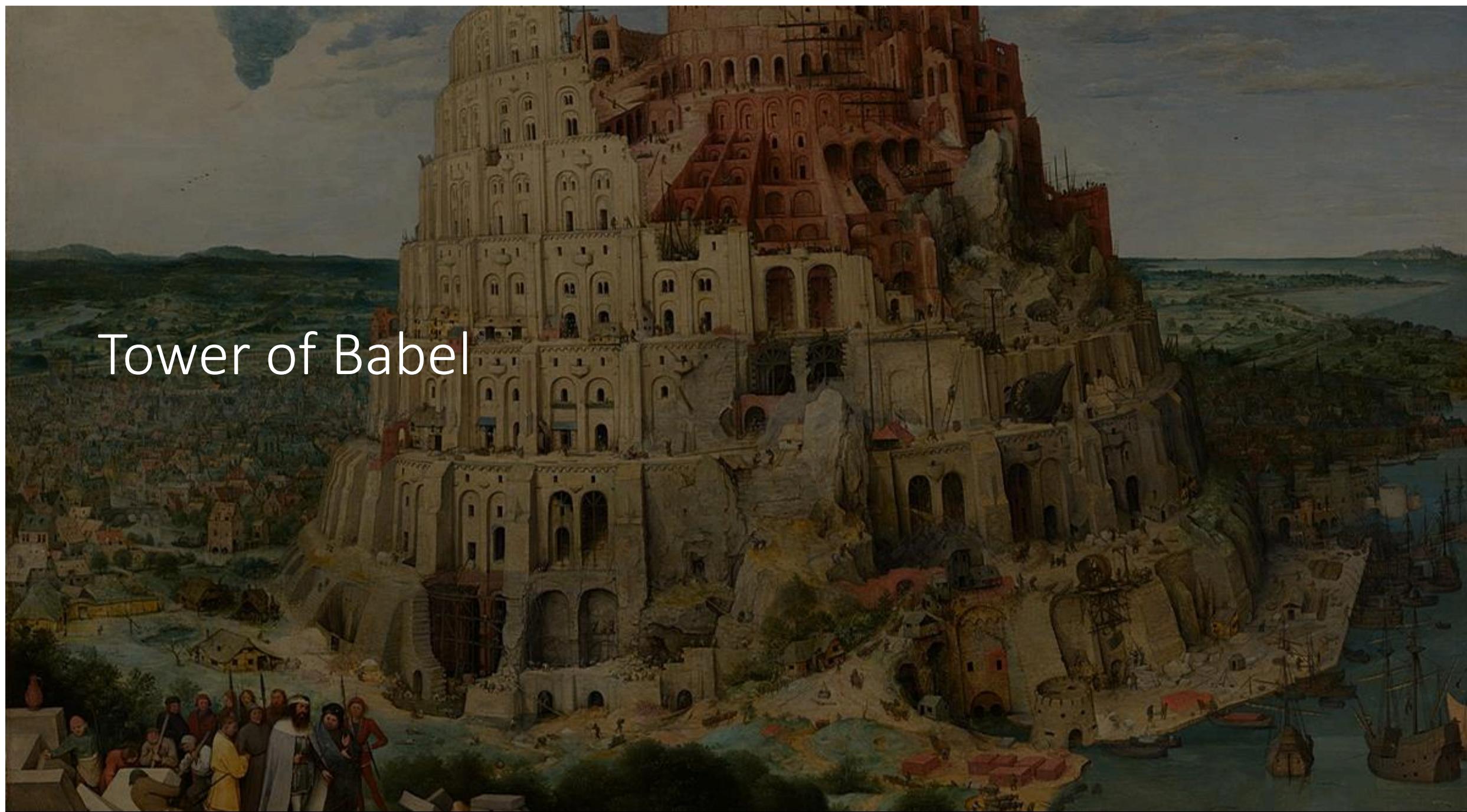


## The Story Outline

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- Integration
- Architecture
- Technology
- Real-world cases
- Best practices
- Power Automate
- Market
- Take-aways

# Tower of Babel



# Systems instead of people



**servicenow®**



**ORACLE®**



**SAP Business One®**

**SAP HANA**

**MathWorks®**

**splunk®**

**AFAS software**

**zendesk**

**Dropbox**

**paycom**

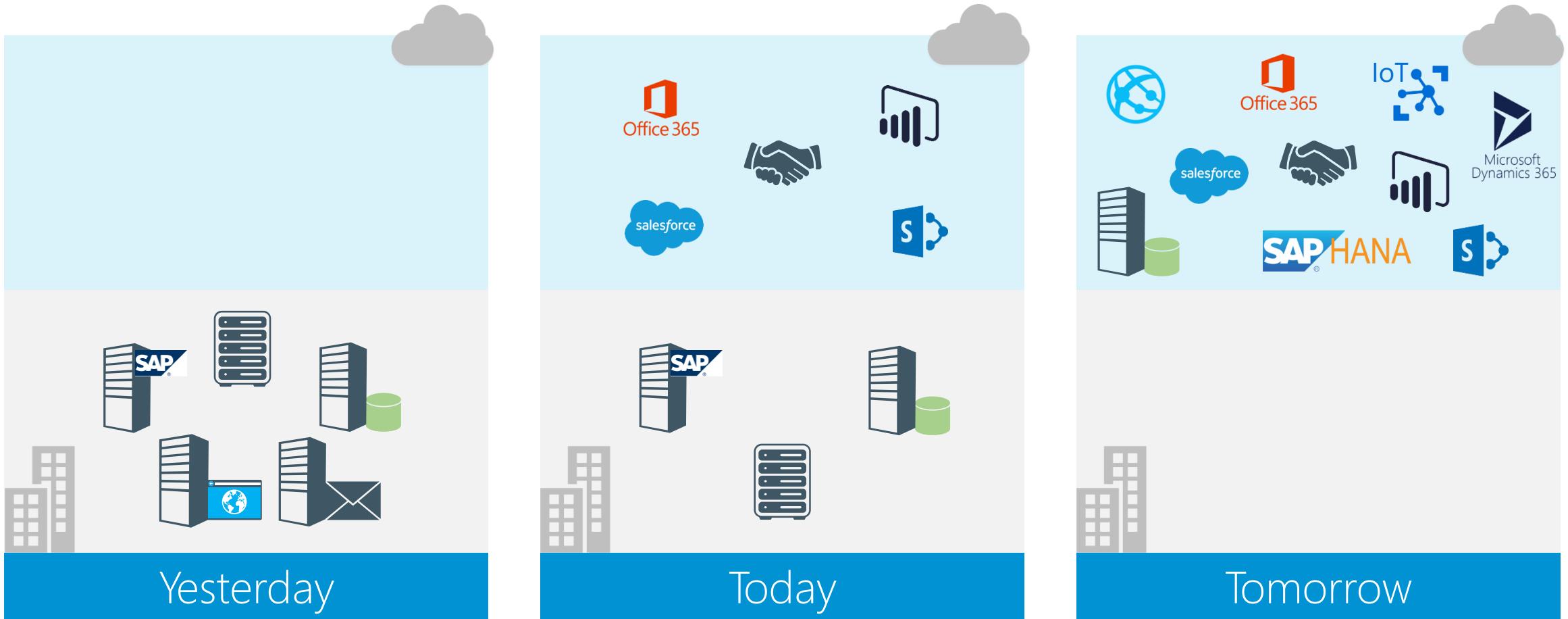
**twilio**

**Microsoft Dynamics 365**

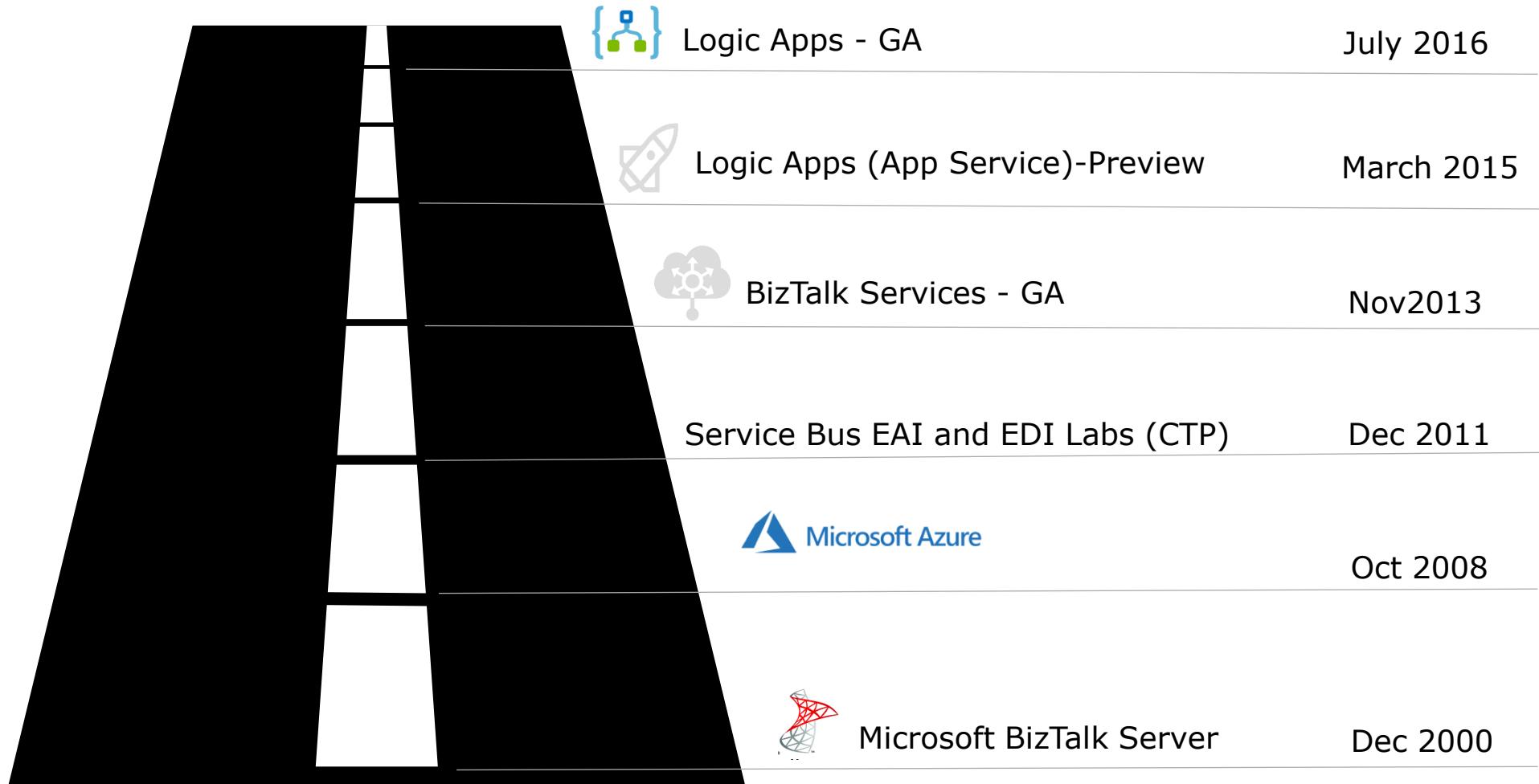
**workday**

**zoom**

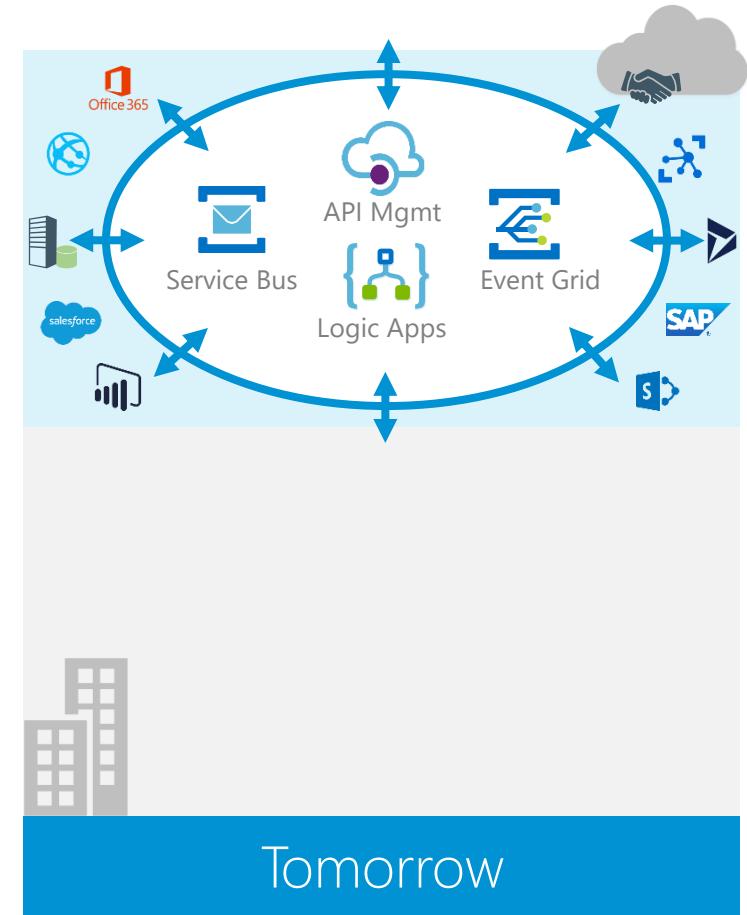
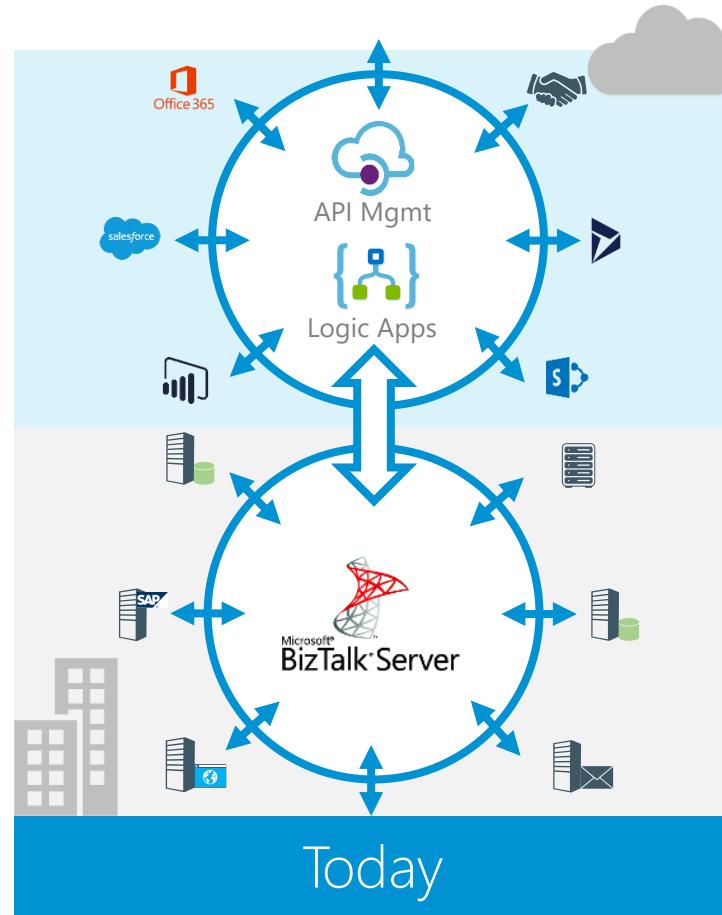
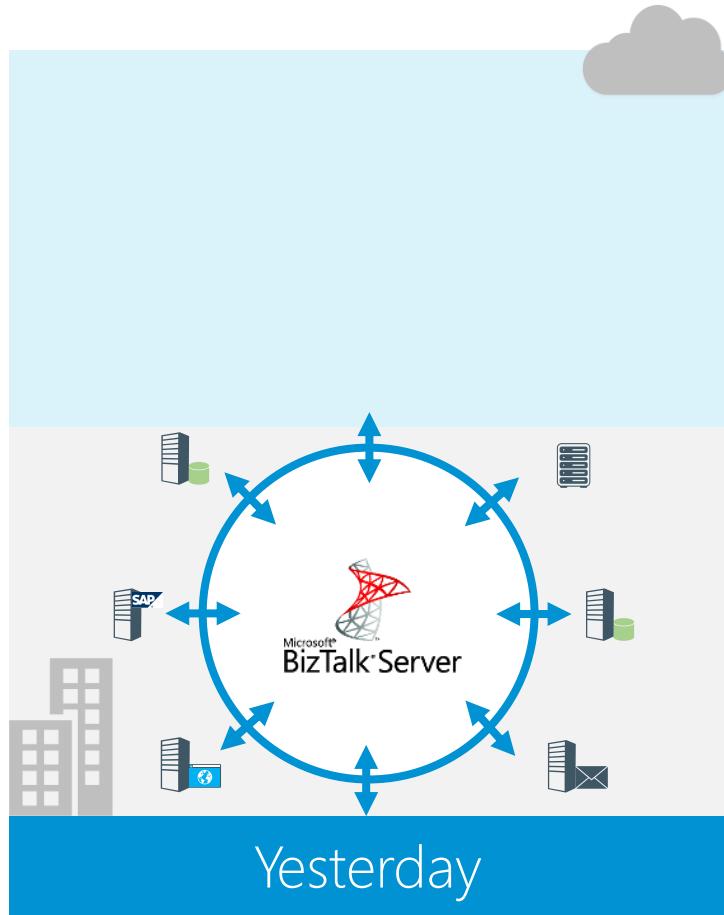
# Application Landscape



# The Journey



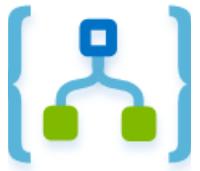
# Integration Landscape



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# Integration Tech

# Azure Integration Services



**Logic Apps:** create workflows and orchestrate business processes to connect hundreds of services in the cloud and on-premises.



**Service Bus:** connect on-premises and cloud-based applications and services to implement highly secure messaging workflows.



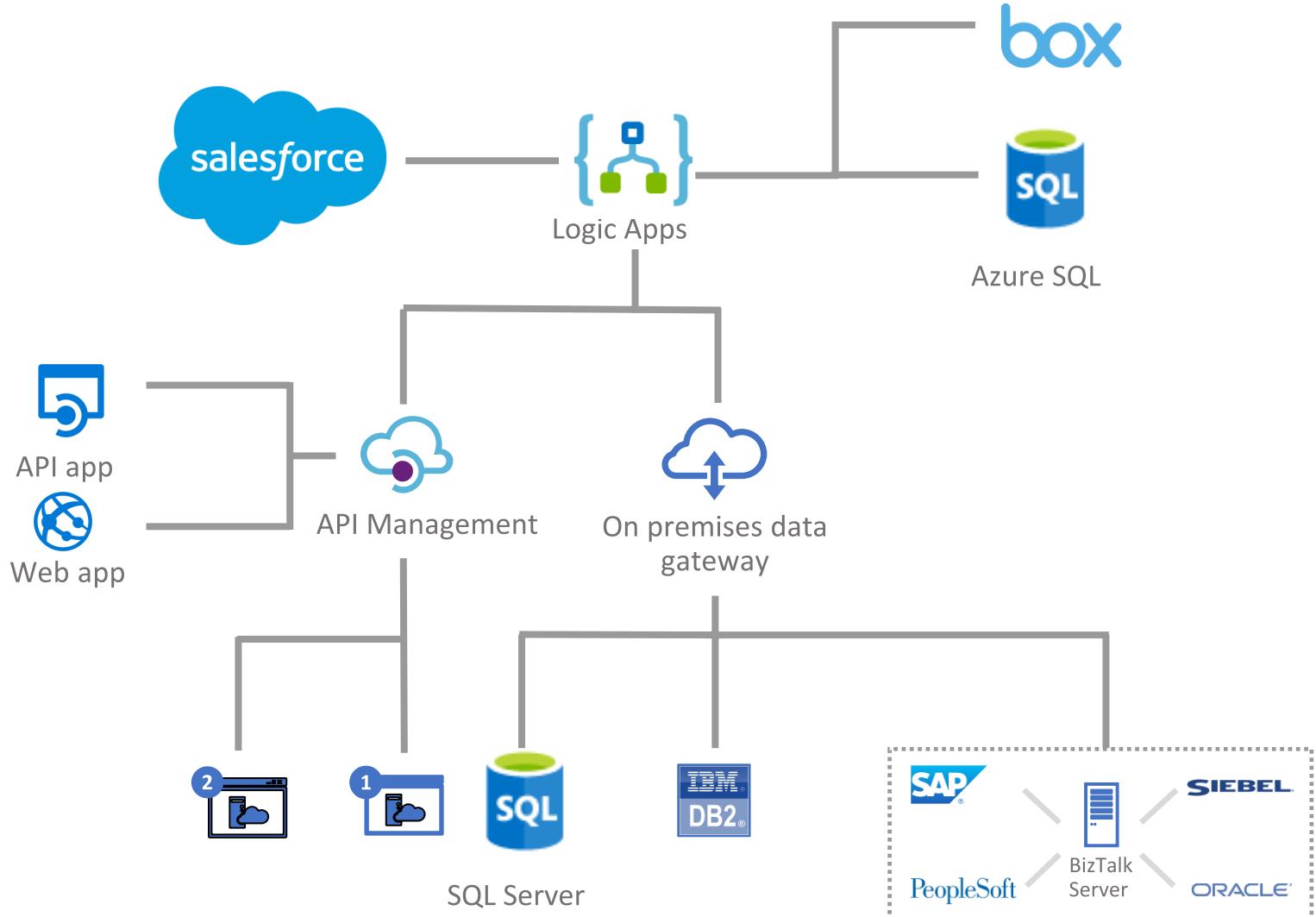
**API Management:** publish your APIs securely for internal and external developers to use when connecting to backend systems hosted anywhere.



**Event Grid:** connect supported Azure and third-party services using a fully managed event-routing service with a publish-subscribe model that simplifies event-based app development

# What can Logic Apps do?

- Connect to on-premises, hybrid, and cloud applications
- Run mission critical, complex integration scenarios with ease
- Build smart integrations leveraging machine learning, cognitive services



# Connectors

## Cloud APIs and platform functionality

- | Hundreds of out of box connectors
  - | SaaS, on-prem, protocols, B2B and message manipulation
- | Hybrid connectivity
- | Hosted and managed within the platform
- | Scales to meet your needs
- | First class designer experience



## Custom Connectors

- | Access any REST/SOAP API
- | Cloud or on-premises
- | Simple creation wizard
- | Connections and managed secrets
- | First class designer experience

## API connections

- | Authenticate once and reuse
- | Differentiate connection configuration
- | Simple to deploy
- | Portal experience for managing API Connections

# Component Architecture

- **Logic Apps RP**  
*Reads the workflow definition and breaks down into a composition of tasks with dependencies*
- **Logic Apps Runtime**  
*Distributed compute/workers are coordinated to complete tasks on-demand*
- **Connection Manager**  
*Manages connection configuration, credentials and token refreshment*
- **Connector Runtime**  
*API abstraction via Open API descriptions*

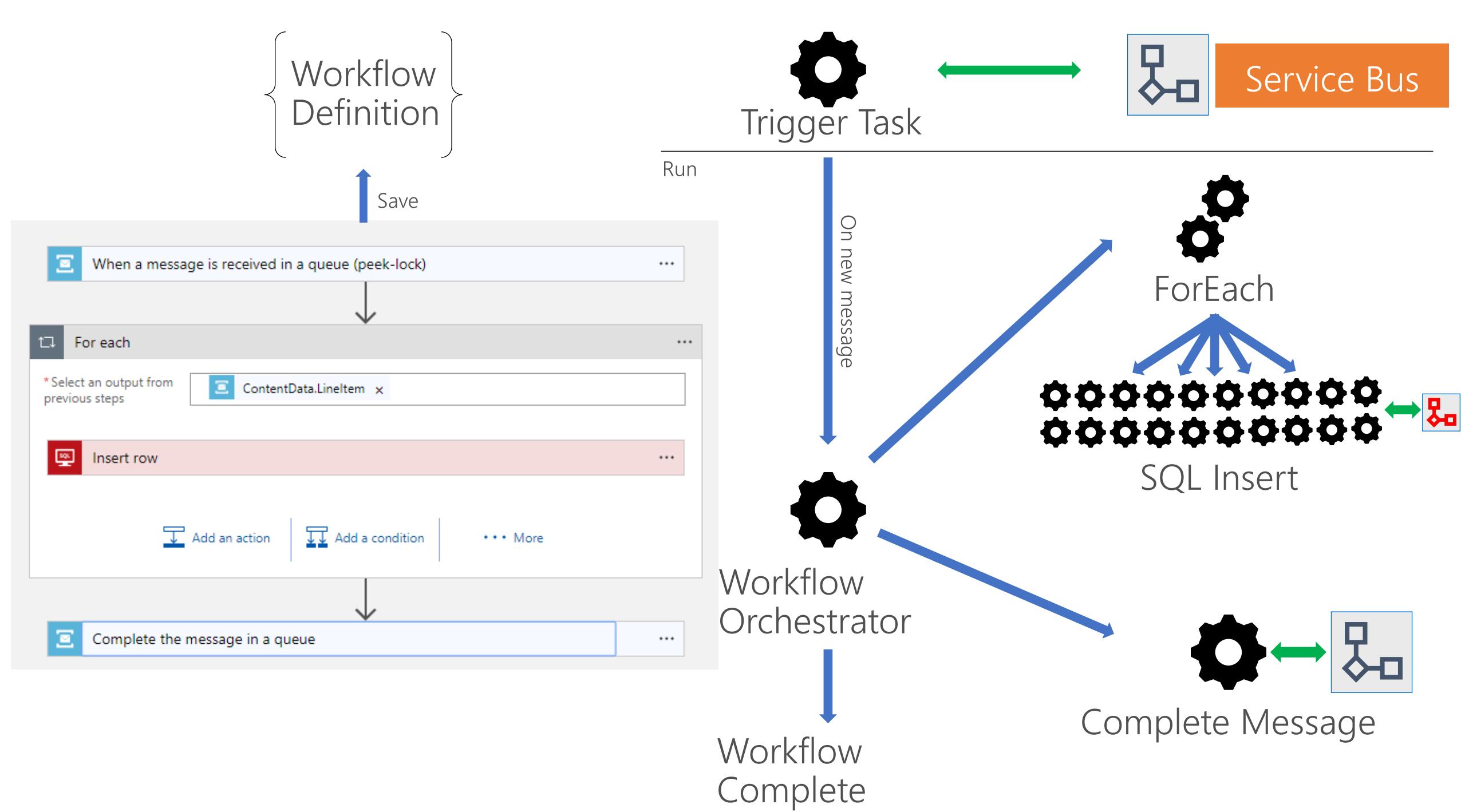
## Logic Apps Service

Logic  
Apps RP

Connection  
Manager

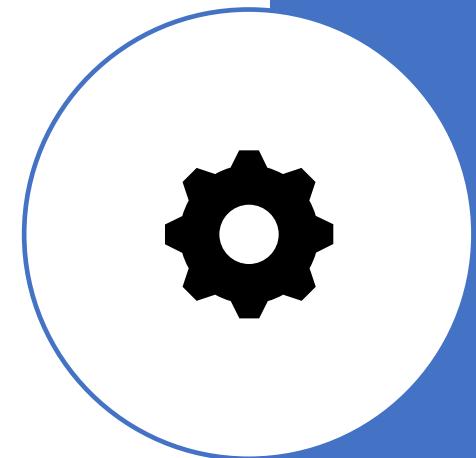
Logic  
Apps  
Runtime

Connector  
Runtime

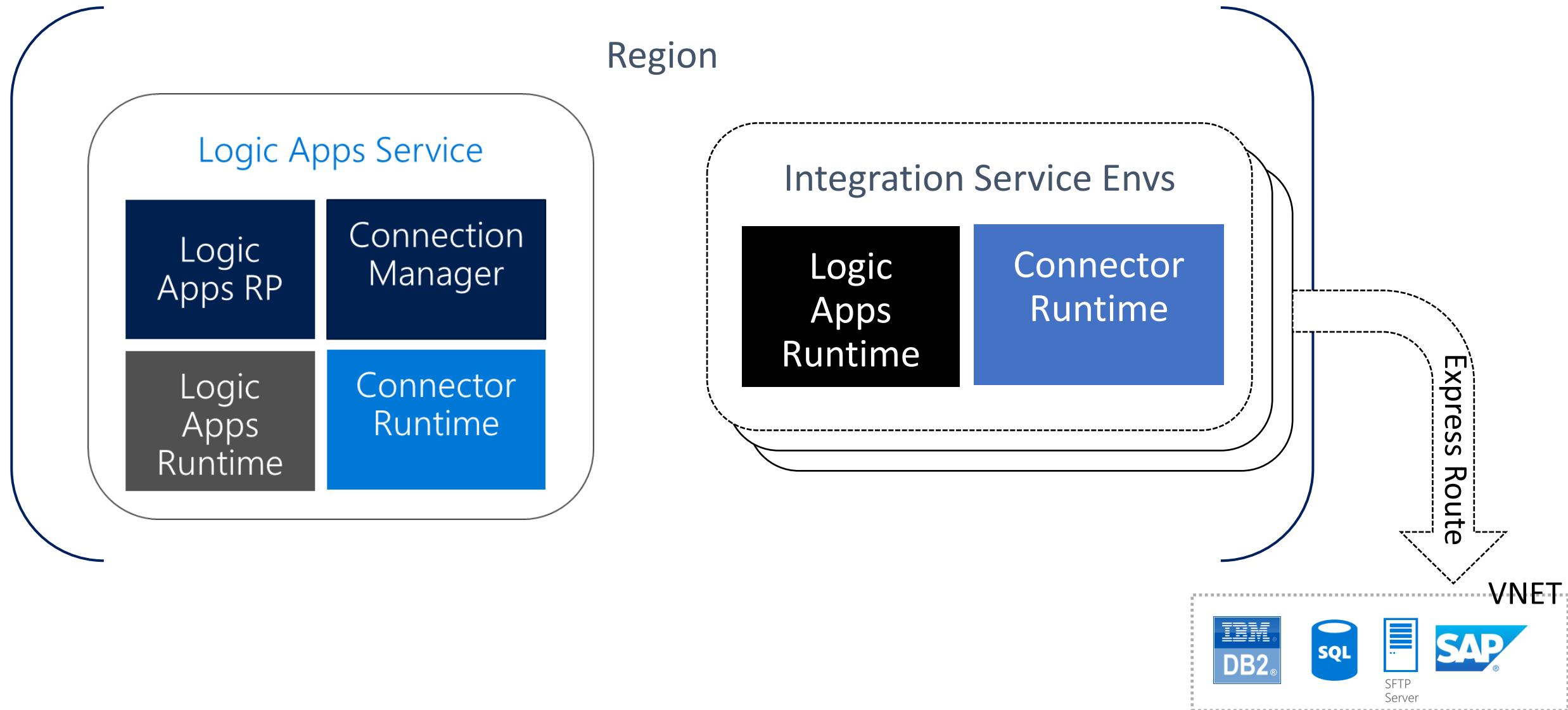


# Task Resiliency

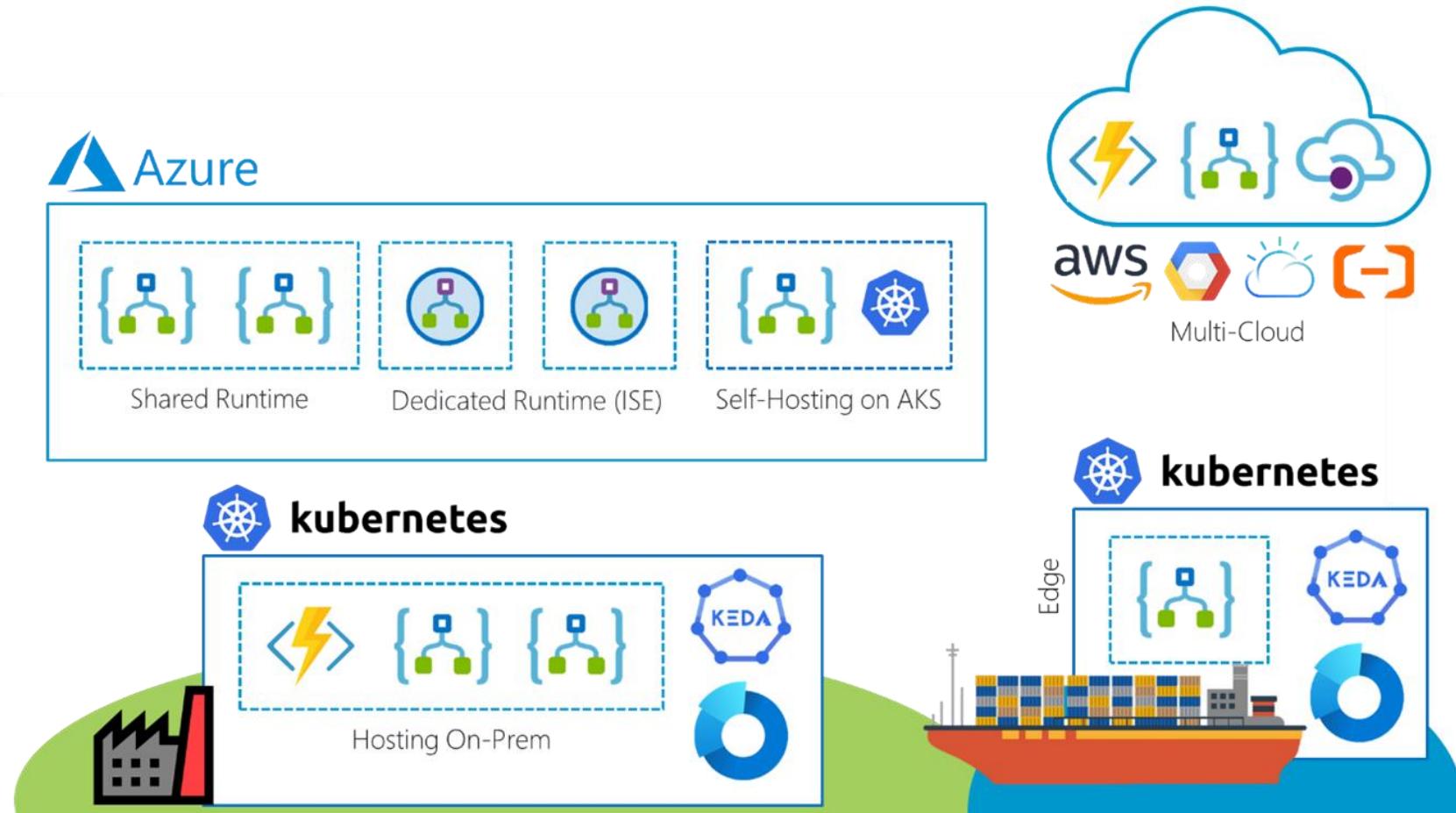
- No active thread management – tasks and runs can exist in parallel and at massive scale
- At least once guaranteed execution
- Transient failures invoke retry-policies (DNS issues, throttles, or 5xx responses)
- If the task doesn't respond, workflow orchestrator will assign a new task (at least once guarantee)



# Integrated Service Environment (ISE)



# Latest developments – Ignite 2020



<https://www.codit.eu/blog/why-running-azure-logic-apps-anywhere-is-a-game-changer/>

# What does service bus deliver?

Fully **managed** service in Azure offering a **reliable** and **secure** platform for asynchronous transfer of data and state

- Communication backbone for many sophisticated cloud solutions
- Entities like relay, queues, topics and subscriptions
- Enables hybrid cloud solutions
- Compliance with AMQP
- Richer application semantics like
  - FIFO
  - Deduplication
  - Transactional behavior and atomicity



# Azure Service Bus

## Service Bus Relay:

**Scenario:** You have on-premise systems that you need to communicate with directly from outside your organization...

**Solution:** Internal Web Services are exposed securely via the Relay which passes calls into the on-premise service and back to the calling clients

## Service Bus Queues:

**Scenario:** Multiple systems and remote clients need to send business events to head office which processes these messages under varying load.

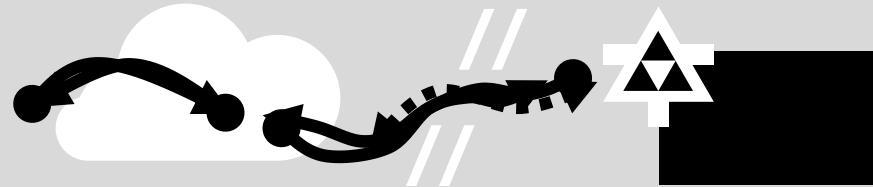
**Solution:** Queues decouple senders from receivers, multiple receivers can handle varying load, simple to add new senders without impact.

## Service Bus Topics:

**Scenario:** Multiple actions must be taken as a result of incoming messages from external systems, but these actions frequently change.

**Solution:** Topics are special queues that have subscriptions which contain rules to determine which messages a subscription will contain.

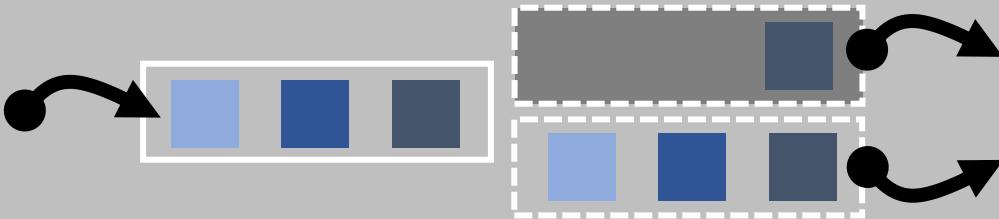
### Relay: Two Way Call into On-Premise Service



### Message Queue: FIFO Resilient Queue



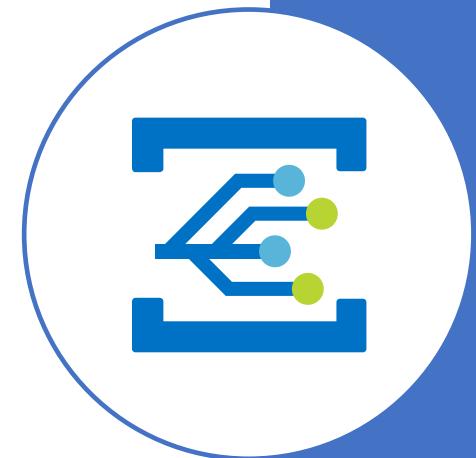
### Topic: Queue with 1:n rule-based subscriptions



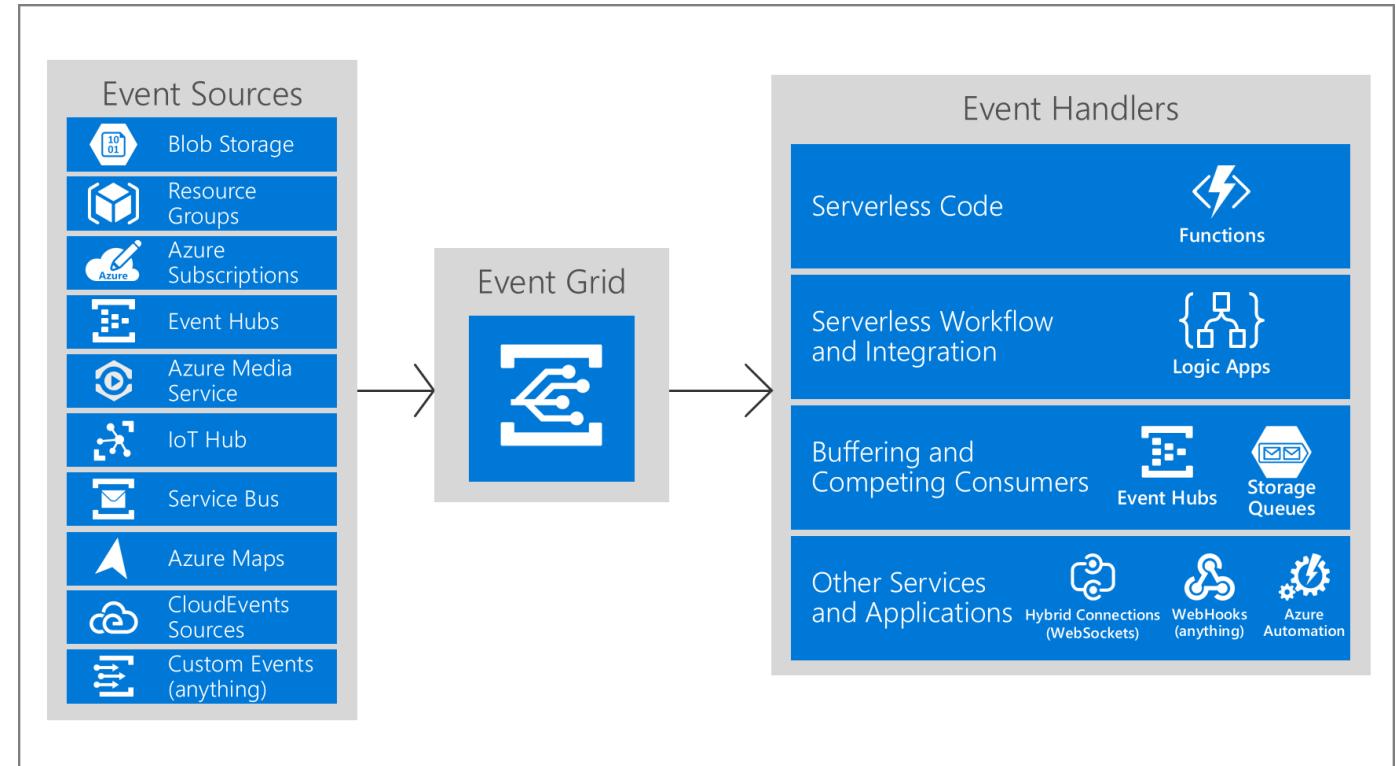
# What is Azure Event Grid?

Eventing **backplane** that enables event-driven reactive programming

- Event consumption of Azure and Non-azure resources
- Allows reactive programming, and events are discrete facts
- The event message has the information you need to react to changes in services and applications
- Light weight
- Low cost

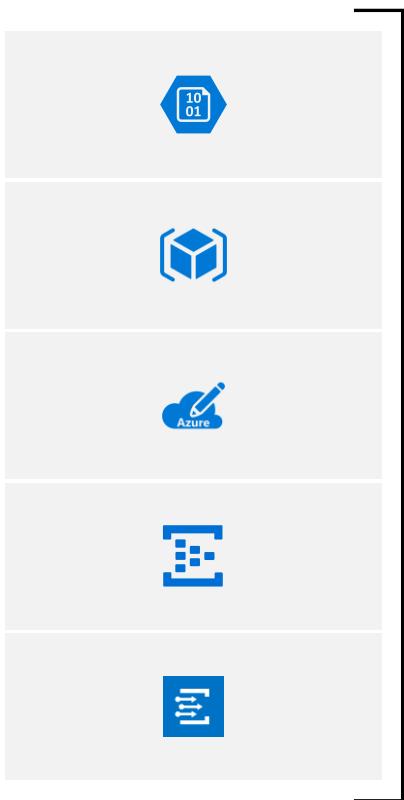


# Azure Event Grid



# Manage all events in one place

## Event publishers



Subscribe to pre-defined system events in Azure or create your own custom topics

Route events to any end-points, Azure or even beyond

Enable filtering and efficient routing of events

Create Event Subscription  
Event Grid - PREVIEW

Name:

Subscription:  Azure Event Grid - Test

Resource group:  Use existing

Topic Type:  Storage Accounts

Event Types:  Raised when a blob is created.

Subscriber Type:  Web Hook

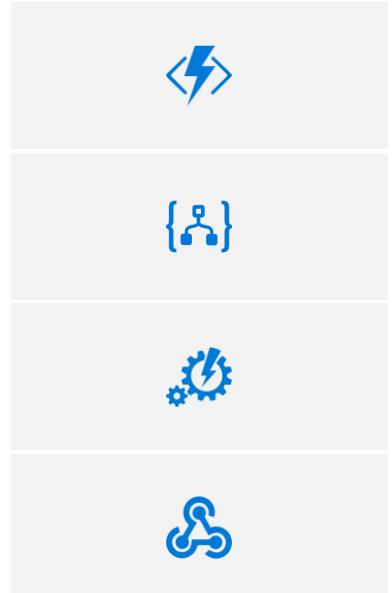
Prefix Filter:  Sample-workitems/{name}

Suffix Filter:  .jpg

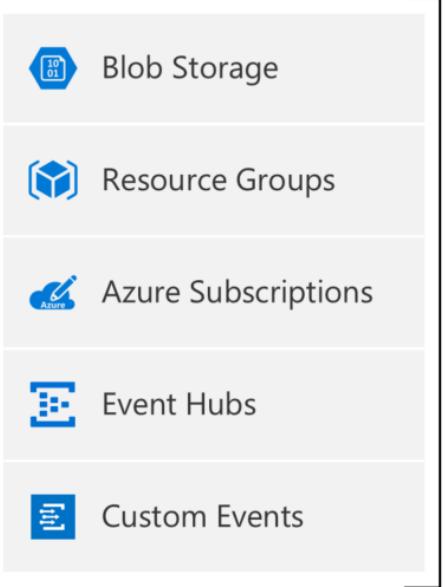
Filter Case Sensitive

**Create**

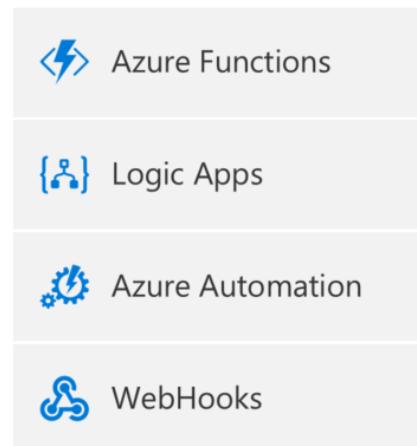
## Event handlers



## Event publishers



## Event handlers



# Concepts

- Events: what happened
- Event Publishers: where it took place
- Topics: where publishers send events
- Event Subscriptions: how you receive events
- Event Handlers: the app or service reacting to the event

# Event Grid Schema

## Proprietary Schema:

```
[  
 {  
   "topic": string,  
   "subject": string,  
   "id": string,  
   "eventType": string,  
   "eventTime": string,  
   "data":{  
     object-unique-to-each-publisher  
   },  
   "dataVersion": string,  
   "metadataVersion": string  
 }  
 ]
```

## CloudEvent Schema:

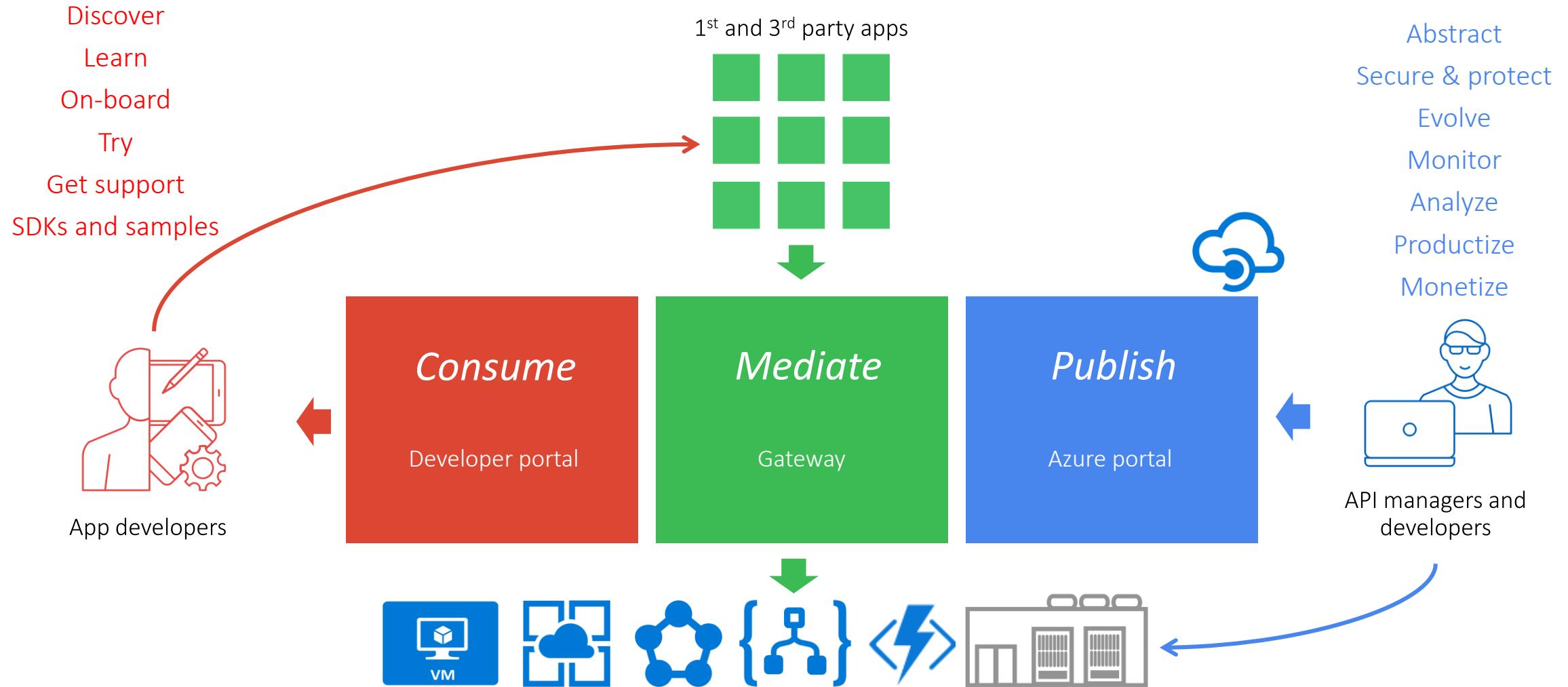
```
[  
 {  
   "specversion": string,  
   "type": string,  
   "source": string,  
   "id": string,  
   "time": string,  
   "subject": string,  
   "dataschema": string  
   "data":{  
     object-unique-to-each-publisher  
   },  
 }  
 ]
```

# What value does API Management bring?

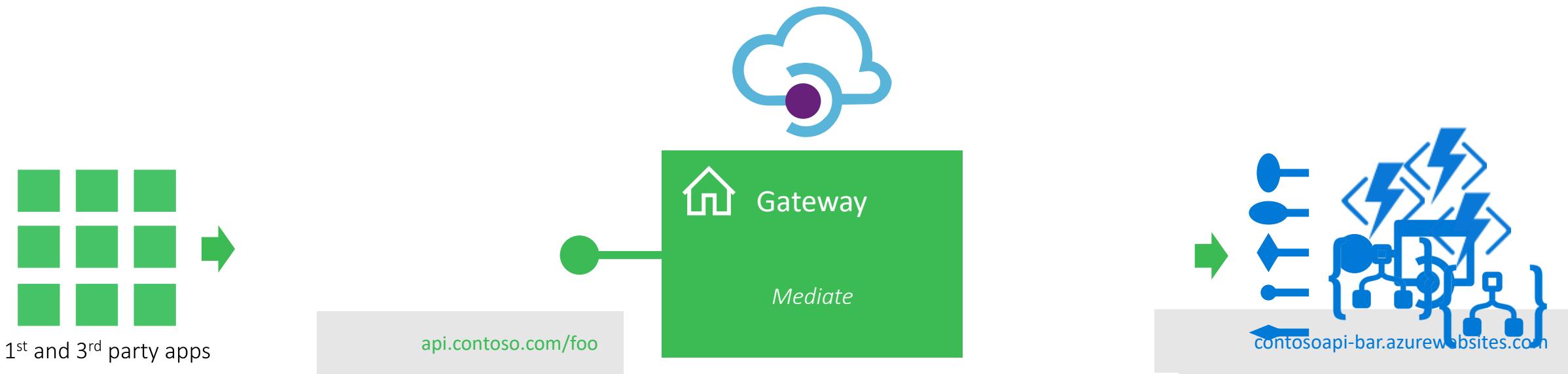
- A fully **managed** service that enables customers to publish, secure, transform, maintain, and monitor APIs.
- **API gateway** providing a simplified and secure façade for serverless Azure resources such as Logic Apps, APIs, and Functions.



# API Management - a hub for enterprise APIs



# Façade and front door



# Policies

 Expand  Form view

- Encapsulate common API management functions
  - Access control, Protection, Transformation, Caching, ...
- Chained together into a pipeline
- Mutate request context or change API behavior
- Set in the inbound and outbound directions
- Can be triggered on error
- Applied at a variety of scopes

## Access restriction policies

- + Check HTTP header
- + Limit call rate per key
- + Limit call rate per subscription
- + Restrict caller IPs
- + Set usage quota per key
- + Set usage quota per subscription
- + Validate JWT

## Advanced policies

- + Control flow
- + Forward request to backend service
- + Log to EventHub
- + Output trace information
- + Retry
- + Return response
- + Send one way request

Calculate effective policy



**apimsjw | APIs** API Management service

Search (Ctrl+ /) <> [Developer portal](#) [Developer portal \(legacy\)](#)

REVISION 1 CREATED Oct 31, 2018, 1:42:39 PM

Design Settings Test Revisions Change log

Search APIs Filter by tags Group by tag Add API

All APIs Basic Calculator ... Echo API ... ErrorQueue ... EventHandler ... FeedbackLogicApp2 ... myfunctionsdemo1.azurewebsites.net ... RobustLogicApp ... SoapTest ... Star Wars API ... WS\_Integration [SOAP] ... insurance/policy

Frontend GET /people/

Inbound processing Modify the request before it is sent to the backend service.

Policies </>

base ... + Add policy

Backend HTTP(s) endpoint http://swapi.co/api Policies </>

base ... + Add policy

Outbound processing Modify the response before it is sent to the client.

Policies </>

base ... + Add policy

Search operations Filter by tags Group by tag Add operation

All operations GET GetPeople ... GET GetPeopleByID ...

Inbound processing Modify the request before it is sent to the backend service.

Policies </>

base ... + Add policy

Backend HTTP(s) endpoint http://swapi.co/api Policies </>

base ... + Add policy

Outbound processing Modify the response before it is sent to the client.

Policies </>

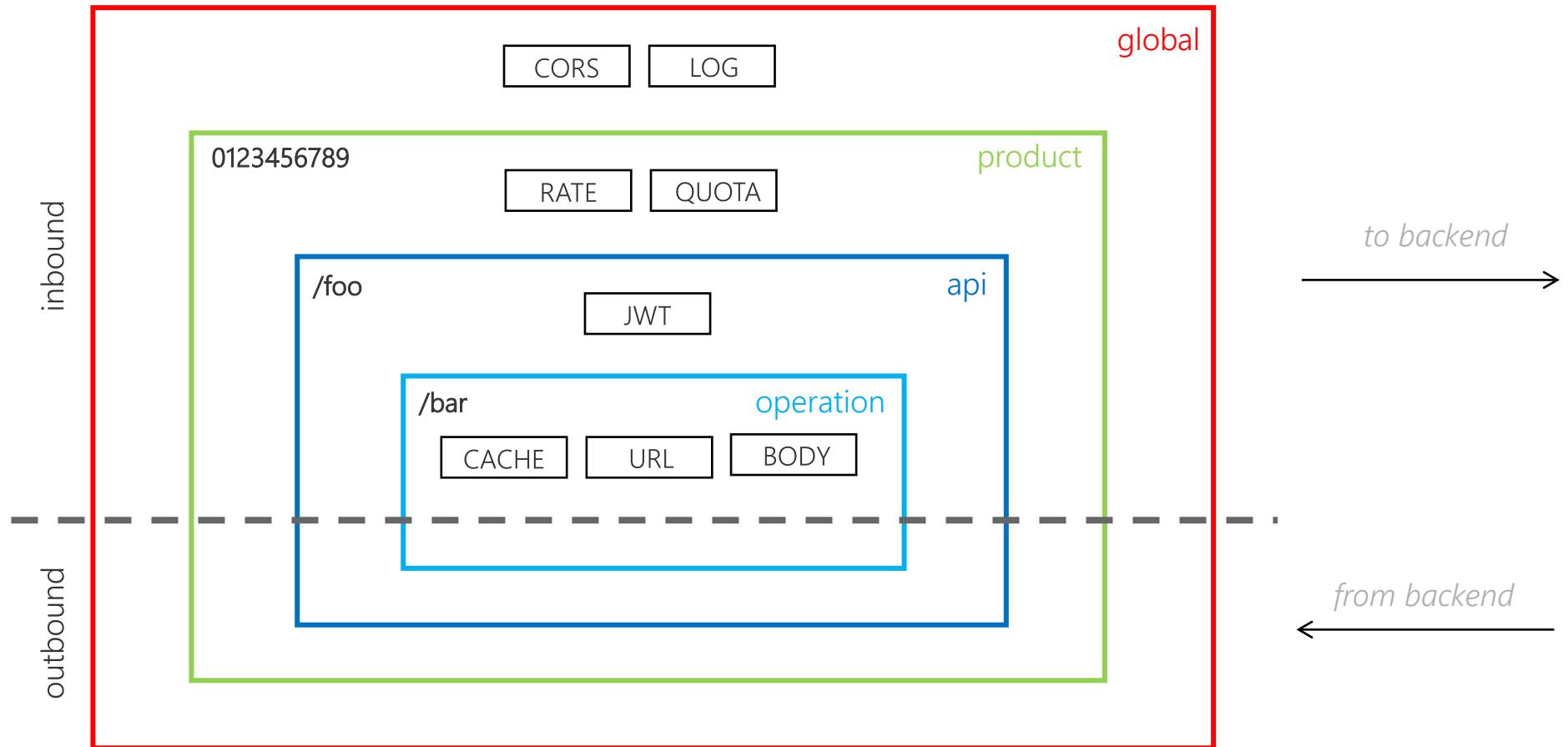
base ... + Add policy

```
1  <!--
2      IMPORTANT:
3          - Policy elements can appear only within the <inbound>, <outbound>, <backend> section elements.
4          - To apply a policy to the incoming request (before it is forwarded to the backend service), place a correspon
5          - To apply a policy to the outgoing response (before it is sent back to the caller), place a corresponding p
6          - To add a policy, place the cursor at the desired insertion point and select a policy from the sidebar.
7          - To remove a policy, delete the corresponding policy statement from the policy document.
8          - Position the <base> element within a section element to inherit all policies from the corresponding sectio
9          - Remove the <base> element to prevent inheriting policies from the corresponding section element in the end
10         - Policies are applied in the order of their appearance, from the top down.
11         - Comments within policy elements are not supported and may disappear. Place your comments between policy el
12     -->
13 <policies>
14     <inbound>
15         |     <base />
16     </inbound>
17     <backend>
18         |     <base />
19     </backend>
20     <outbound>
21         |     <base />
22     </outbound>
23     <on-error>
24         |     <base />
25     </on-error>
26 </policies>
```

# Policy scopes

GET /foo/bar HTTP/1.1  
Host: api.constoso.com  
Key: 0123456789

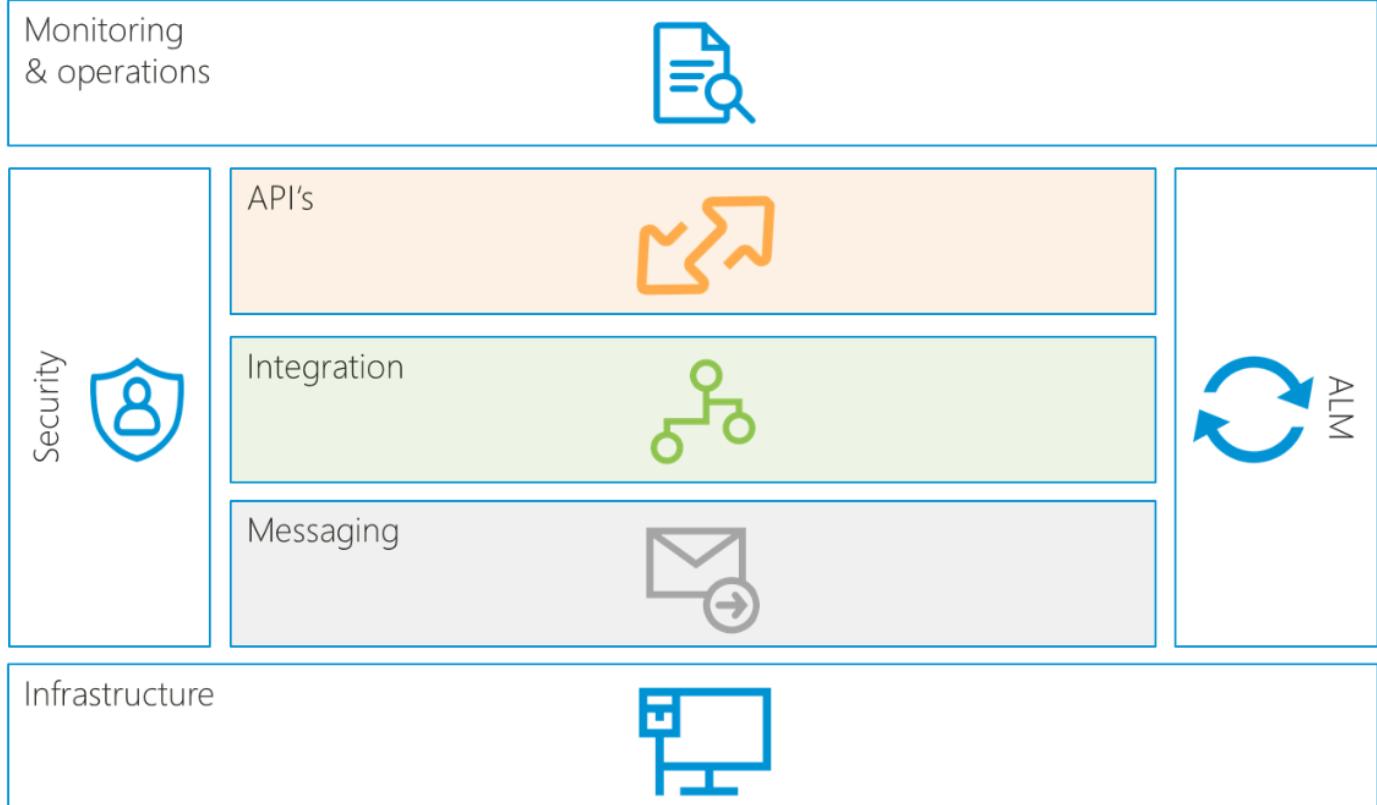
*from caller* →  
→ *to caller*

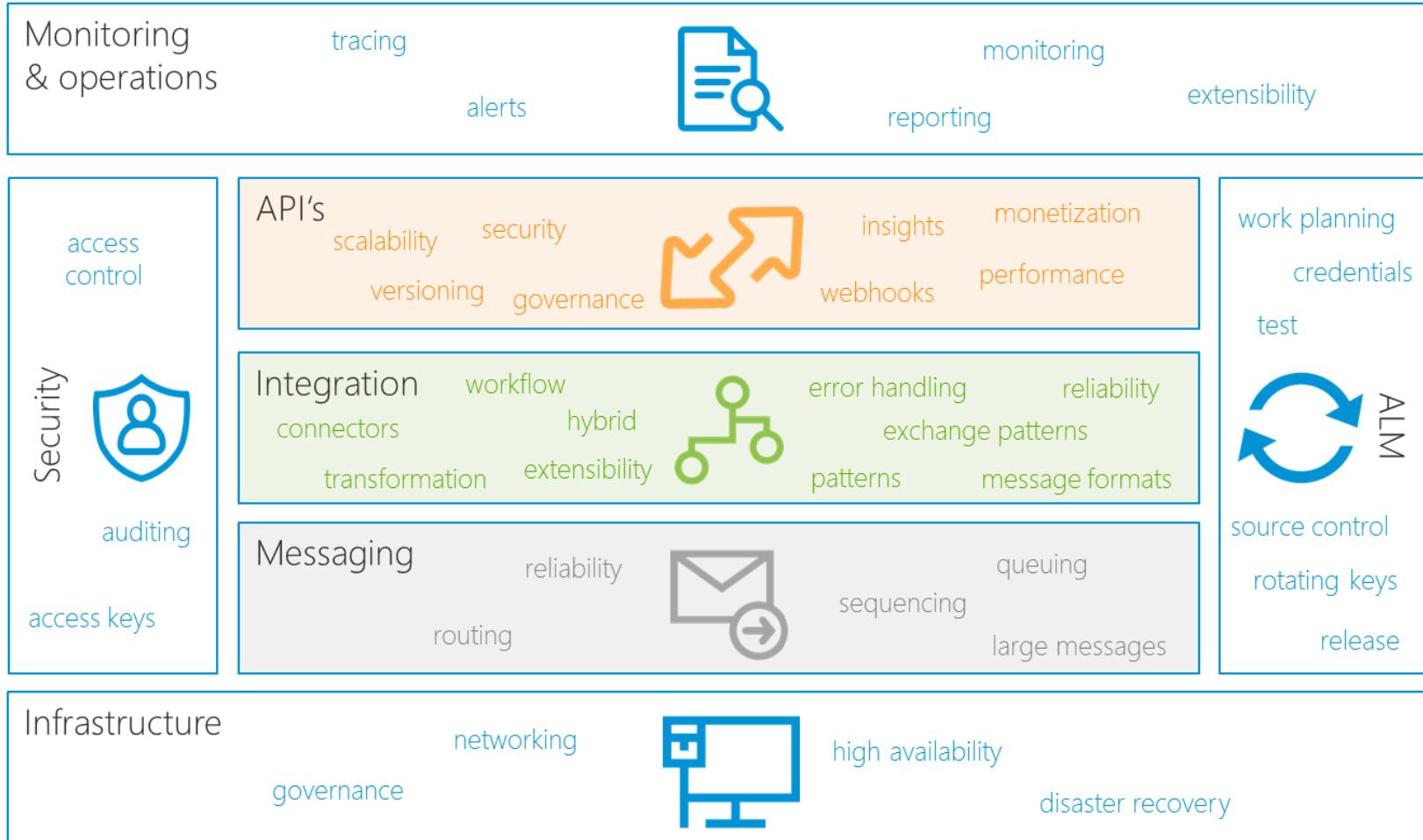




# Solution Architecture

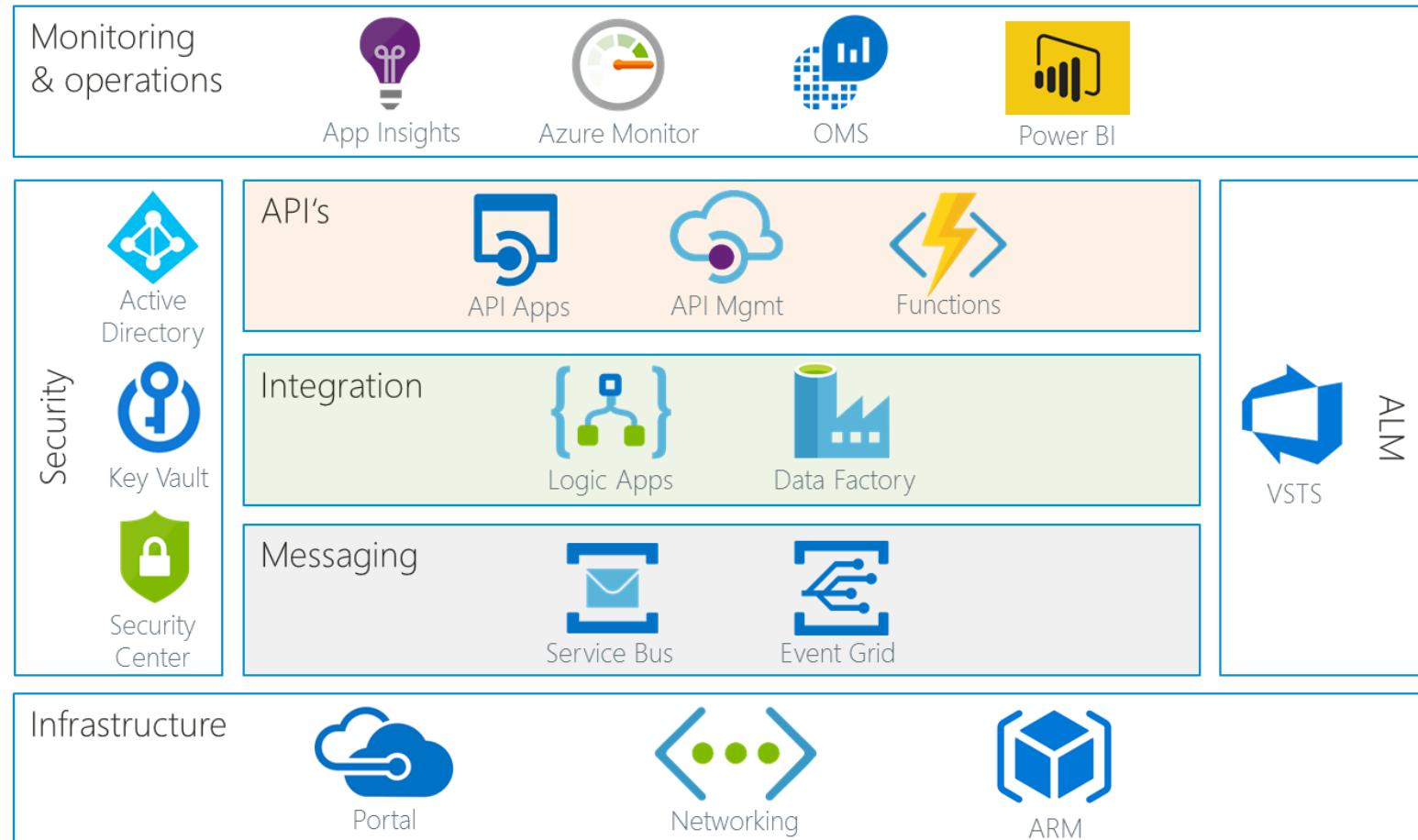
# Architectural Building Blocks





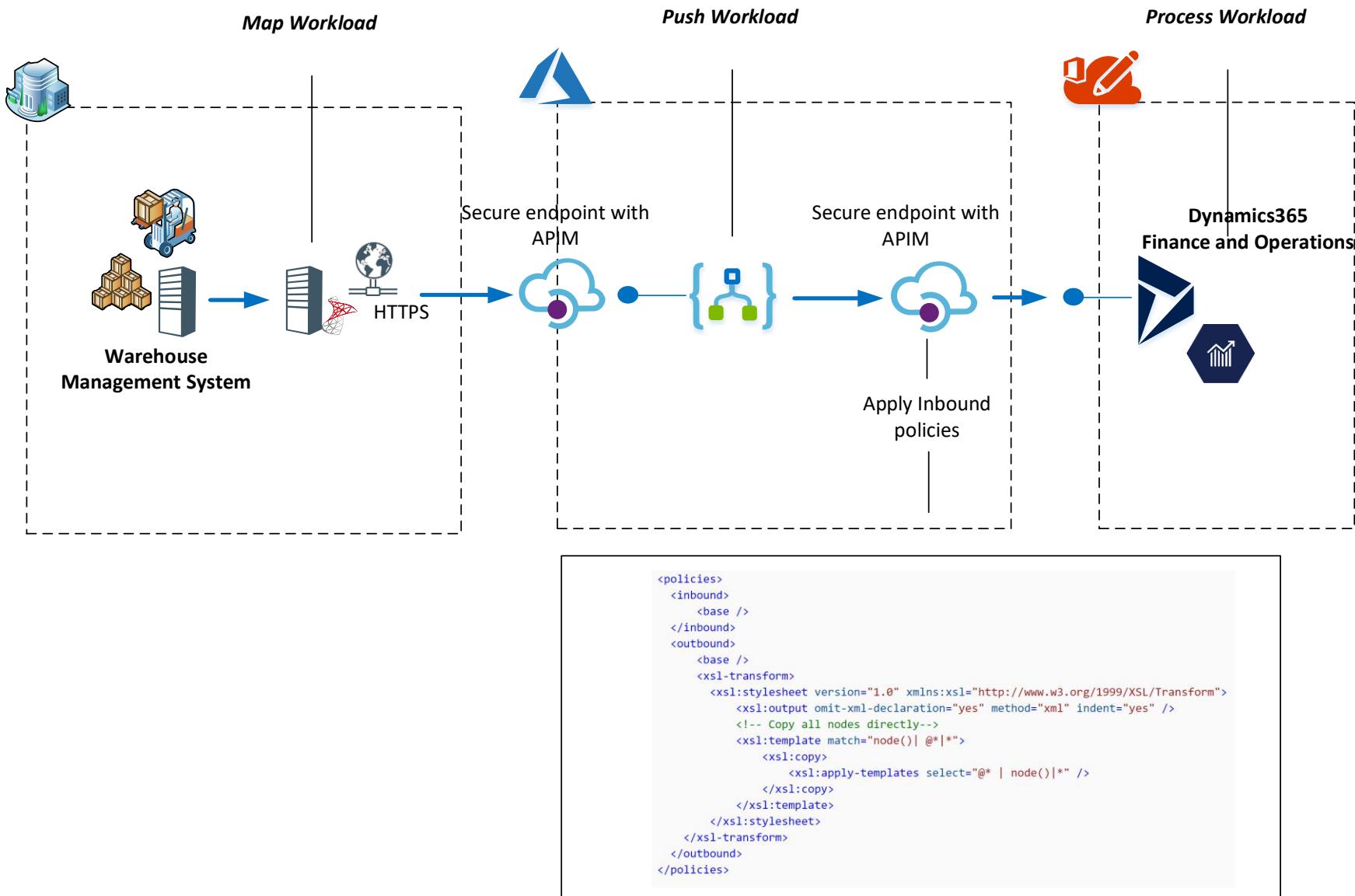
# Responsibilities

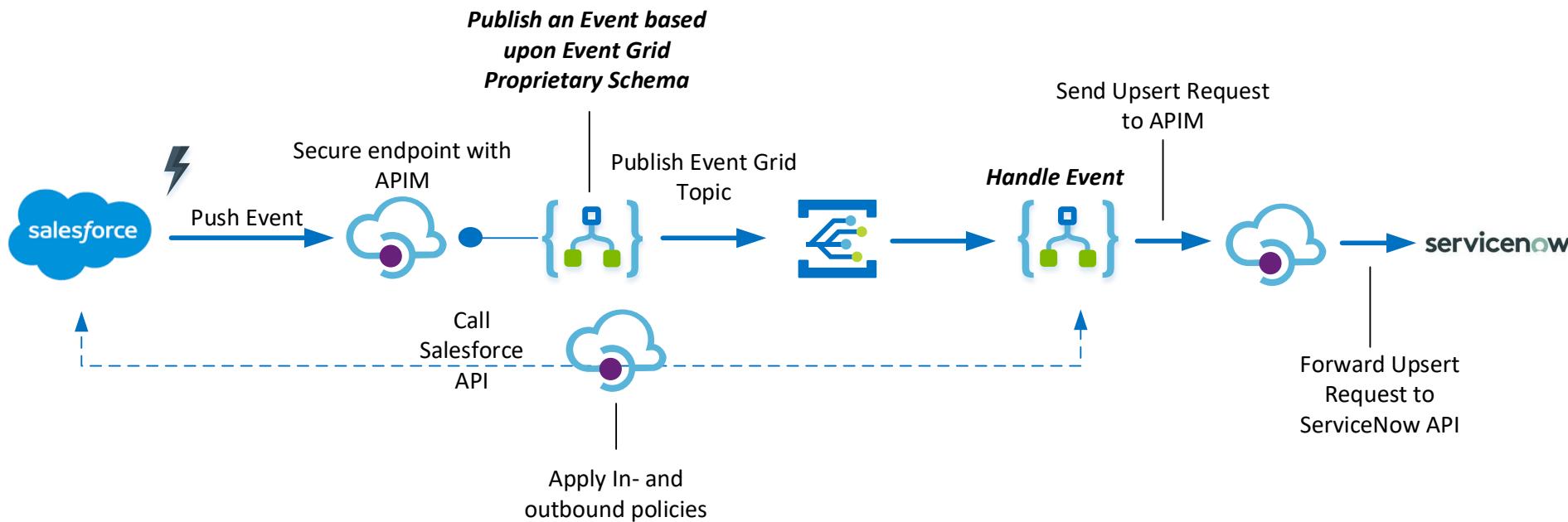
# Azure Integration Solution Building Blocks



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# Real World Integration Cases





```

<outbound>
  <base />
  <set-body template="liquid">{
    "Project": {
      "Description": "{{body.Description__c}}",
      "Account_ID": "{{body.Account__c}}",
      "Project_Placeholder_ID": "{{body.Id}}"
    }
  }</set-body>
</outbound>
  
```

```

<inbound>
<base />

<send-request ignore-error="true" timeout="20" response-variable-name="bearerToken">
  <set-url>{{salesForceAuthorizationServer}}</set-url>
  <set-method>POST</set-method>
  <set-header name="Content-Type" exists-action="override">
    <value>application/x-www-form-urlencoded</value>
  </set-header>
  <set-body>@{
    | return "grant_type=password&client_id={{salesForceClientId}}&client_secret={{salesForceClientSecret}}";
  }</set-body>
</send-request>
<set-header name="Authorization" exists-action="override">
  <value>@("Bearer " + (String)((IResponse)context.Variables["bearerToken"]).Body)</value>
</set-header>

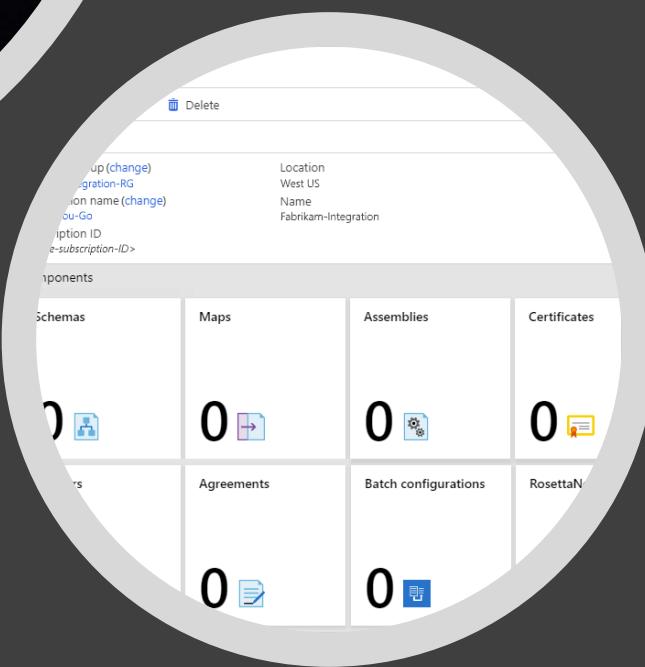
<set-header name="Ocp-Apim-Subscription-Key" exists-action="delete" />
</inbound>
  
```



# The Magic - Transformation

## Tech:

- Integration Account
- API (Function)
- API Management Policy



XML (Input):

```
<ns>
  <customer>
    <first-name>Micheal</first-name>
    <surname>Moore</surname>
  </customer>
<booking-data>
  <hh:airline>Airline
  <dom</hh:airline>
  <hh:connection>AK087</hh:connection>
  <hh:date>2001-11-22</hh:date>
  <hh:class>business</hh:class>
</booking-data>
<book-flight>
```

XSLT Mapping (Output):

```
...
<xsl:variable name="class" select="//hh:class"/>
...
<xsl:template match="//hh:class">
  ...
  <xsl:choose>
    <xsl:when test="$class='first'">1</xsl:when>
    <xsl:when test="$class='business'">2</xsl:when>
    <xsl:when test="$class='economy'">3</xsl:when>
    <xsl:otherwise>0</xsl:otherwise>
  </xsl:choose>
  ...
</xsl:template>
...
```

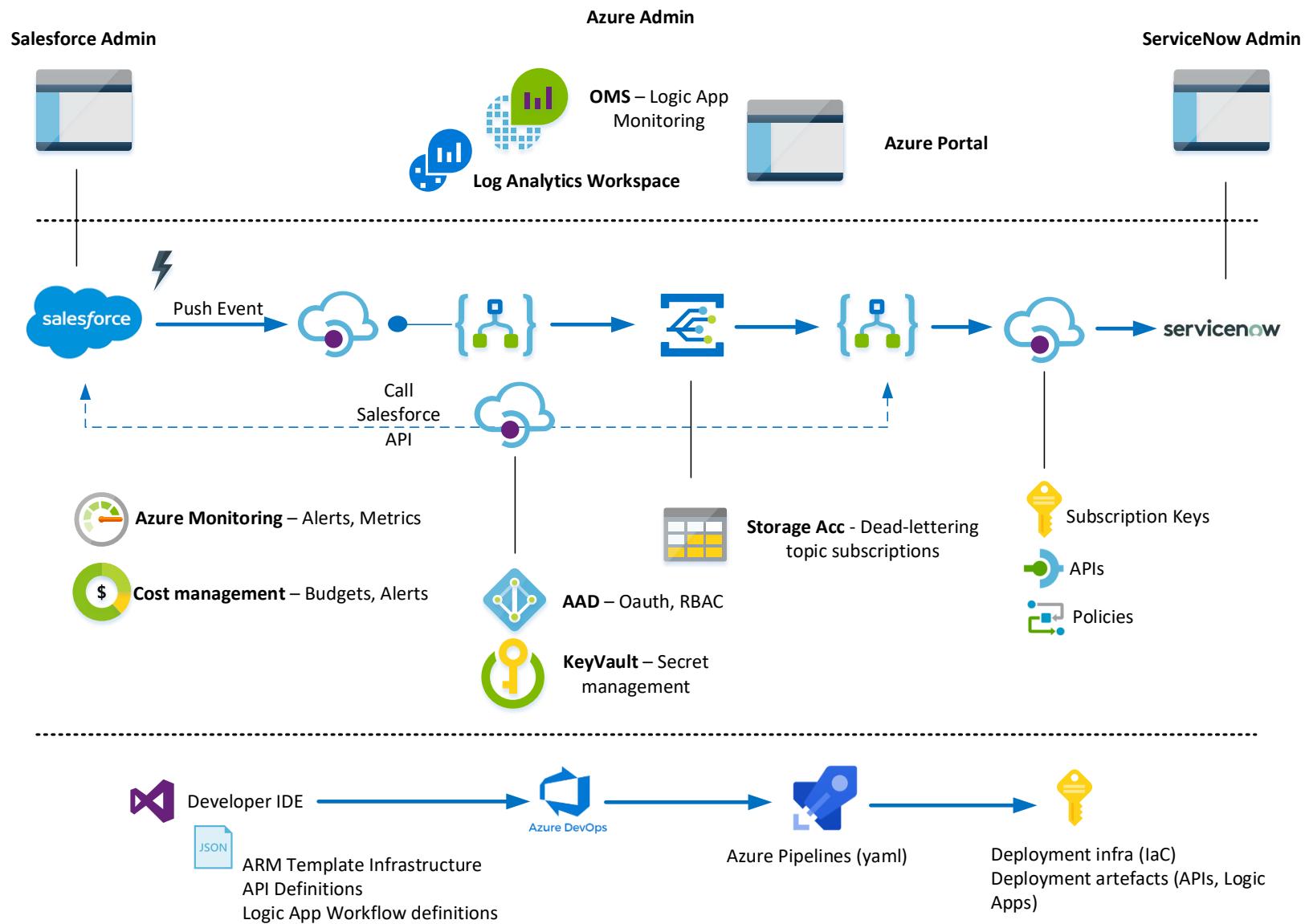
A red oval highlights the `<xsl:choose>` block in the XSLT mapping code.

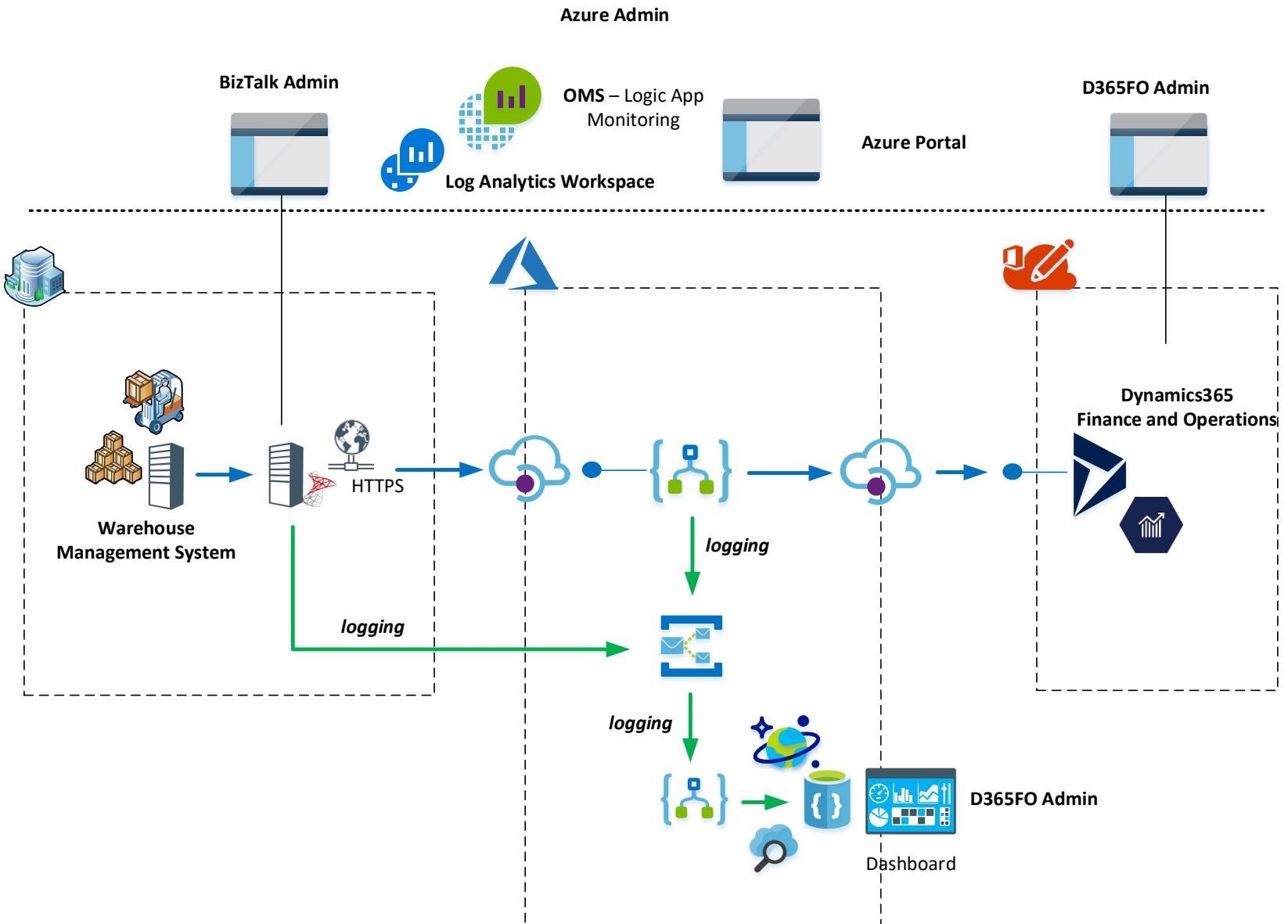
## Format:

- XML (XSLT)
- JSON (Liquid)
- Custom (.NET)

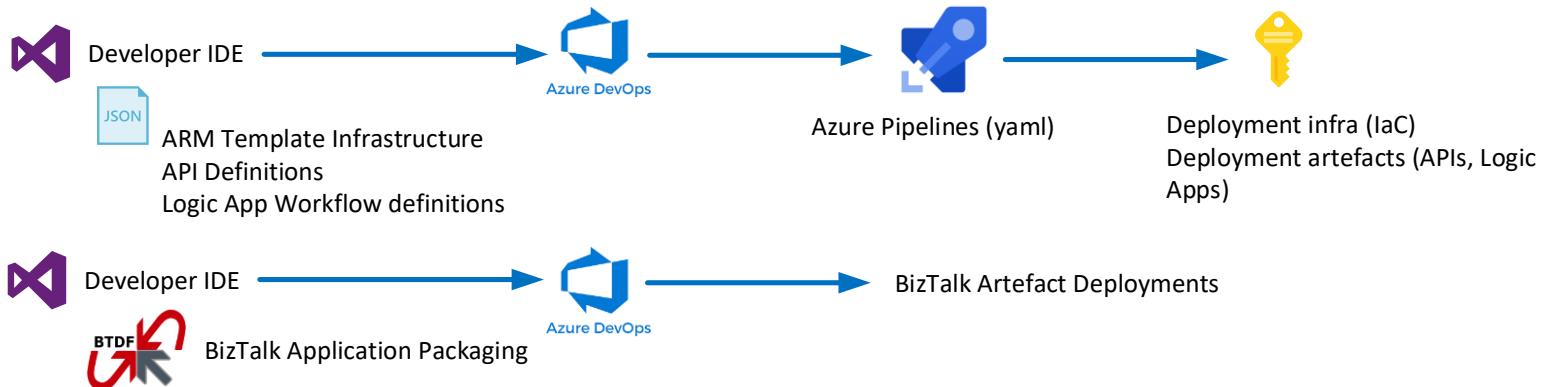
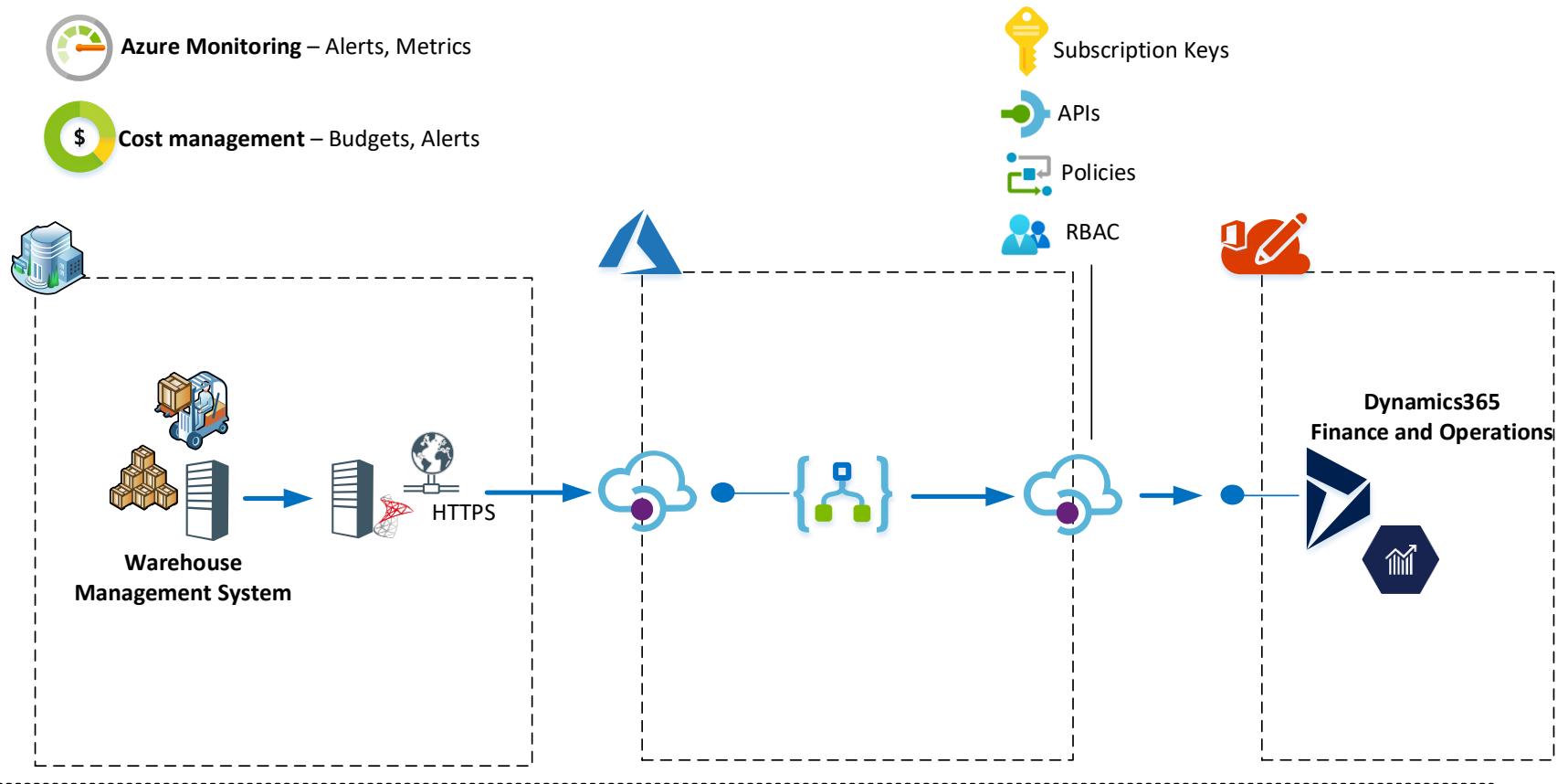
# Best Practices

- Loose coupling
- Monitoring
- Event driven
- Cost management
- Versioning
- Governance
- DevOps (automation)





## Other aspects



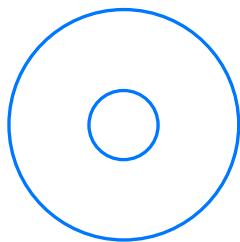
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Where does Power Automate fit in?

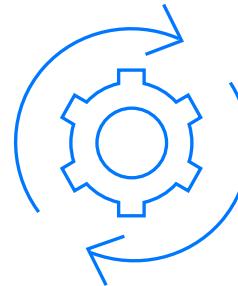
# Intelligent Automation

## Robotic Process Automation (RPA)

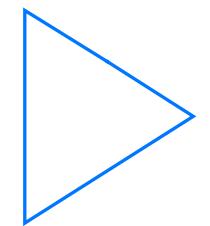
An RPA tool can learn to automate a task by watching the user perform that task in a graphical user interface (GUI), and then perform the automation by repeating those tasks directly in the GUI.



Record the Task

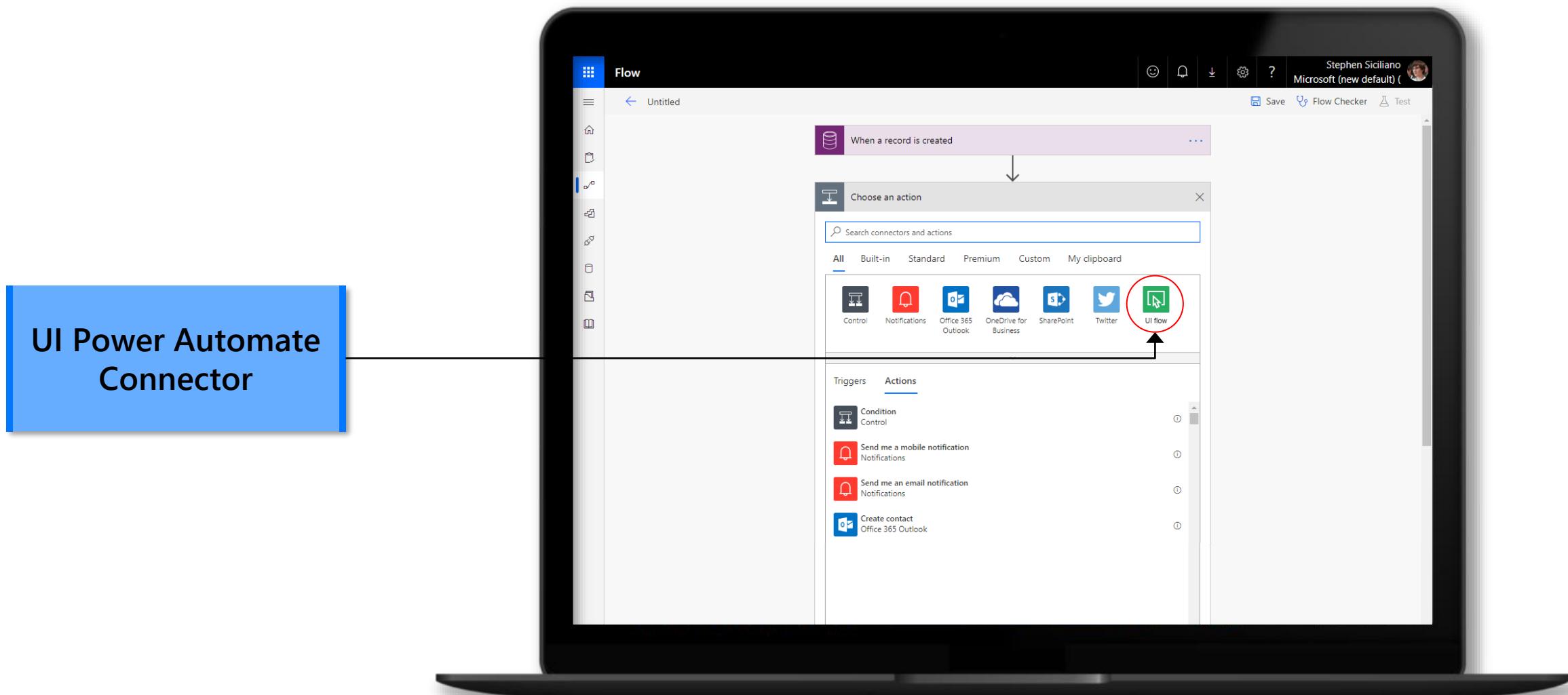


Automate the Task



Playback Task

# UI Flows Connector for RPA



# UI Flows Records User Actions of Legacy Apps



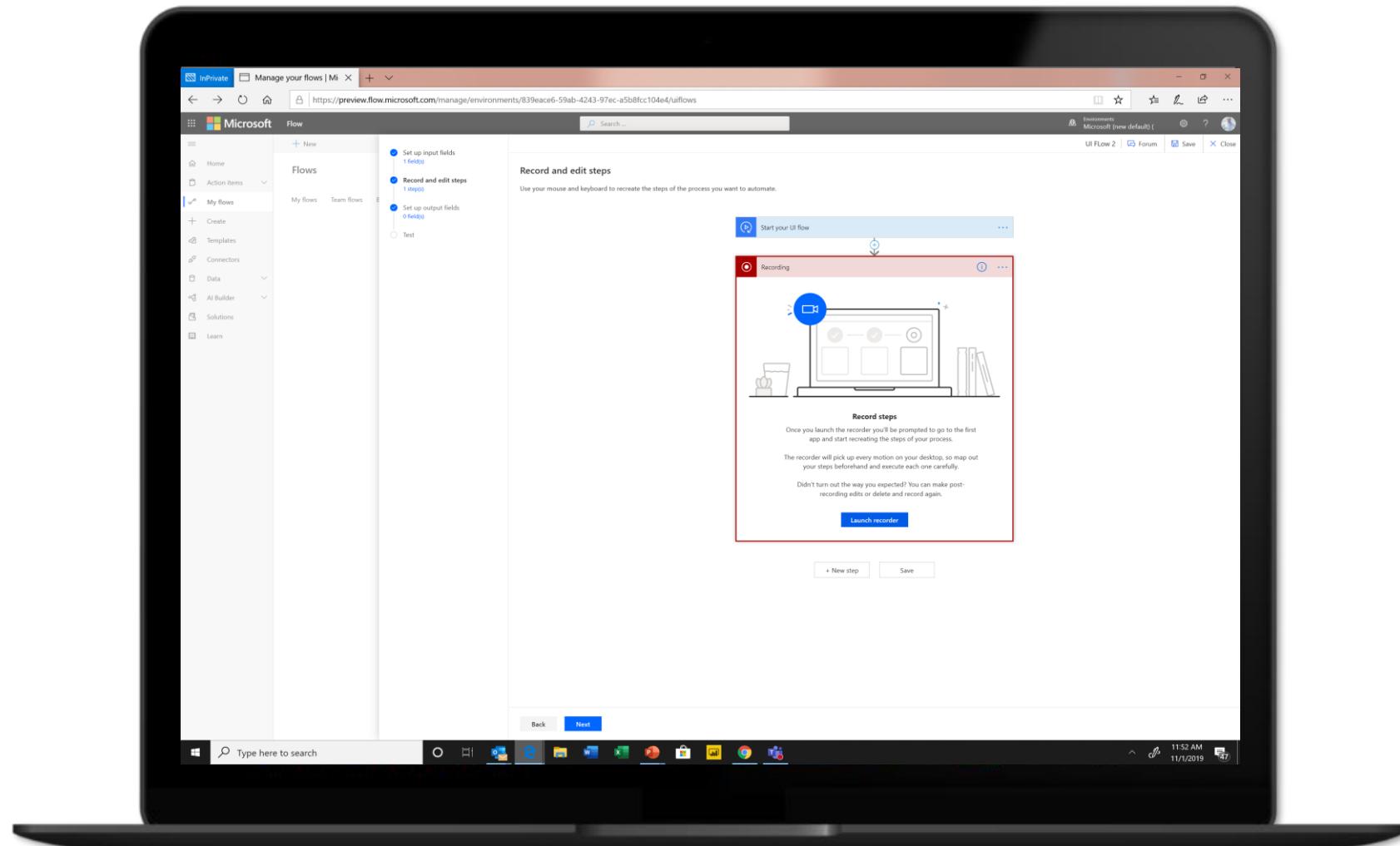
Launch the recorder



Record your click-steps



Build your flow



Scrape Energy Prices and Write to Excel - Process Designer

File Edit Debug Tools View Help

Main

1 Create Folder  
Create folder C:\Demo\2020-06\

2 Region of Autogenerated, Web Automation Actions for 'Daily Average'  
Launch New Internet Explorer  
Extract Data from Web Page  
End Region of Autogenerated, Web Automation Actions for 'Daily Average'

3 Close Web Browser  
Get First Free Row On Column from Excel Worksheet  
Select Cells in Excel Worksheet  
Send Keys  
Select Cells in Excel Worksheet  
Decrease Variable  
Send Keys  
Send Keys  
Send Keys  
Send Keys  
Send Keys  
GIF

Functions

AutoSave Off

File Home Insert Draw Page Layout Formulas Data Review View Help

Paste Calibri 11

Font Alignment Number Styles

Clipboard

General Conditional Formatting

Format as Table Cell Styles

UPDATES AVAILABLE Updates for Office are ready to be installed, but first we need to close some apps. Update now

Book1 - Excel

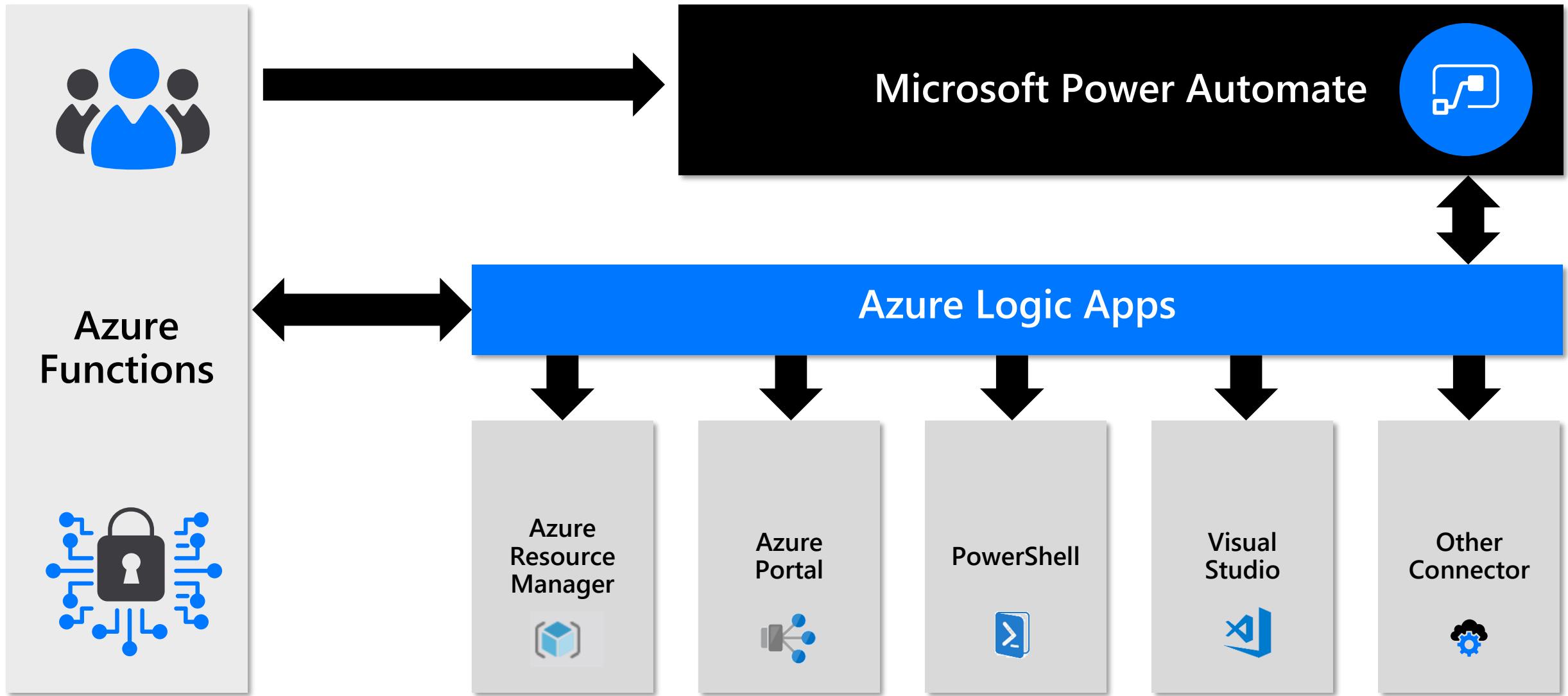
G9

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Date	Average	On Peak	Off Peak	Average	On Peak	A Off Peak	Average								
2	#####	25.97	28.48	20.97	26.26	28.7		21.38								
3	#####	32.33	33.09	30.8	26.34	28.69		21.64								
4	#####	34.77	35.31	33.7	26.22	28.62		21.41								
5	#####	29.31	32.17	23.6	25.95	28.4		21.03								
6	#####	20.28	25.4	10.05	25.96	28.35		21.18								
7	#####	23.05	25.82	17.52	26.19	28.45		21.68								
8	#####	20.16	28.06	4.36	26.02	28.12		21.81								
9	Monthly A	26.55286	29.76143	20.14286	26.13429	28.47571										
10																
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21																

Sheet1

<https://www.youtube.com/watch?v=5745NyIUSX8>

# Power Automate, Logic Apps, Functions



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**What do the analysts say?**



August 2020

# A Leader in Enterprise Integration Application Platform as a Service\*

## Magic Quadrant

Figure 1. Magic Quadrant for Enterprise Integration Platform as a Service



\*Gartner "Magic Quadrant for Enterprise Integration Platform as a Service," by Eric Thoo, Bindu Bhullar, Massimo Pezzini, Keith Guttridge Abhishek Singh Shaheem Pillai 21 September 2020

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September 2020

## A Leader in Full Life Cycle API Management\*

Figure 1. Magic Quadrant for Full Life Cycle API Management



Source: Gartner (September 2020)

\*Gartner "Magic Quadrant for Full Life Cycle API Management," by Paolo Malinverno, Kimihiko Iijima, Mark O'Neill, John Santoro, Shameen Pillai, Akash Jain 22 September 2020

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August 2019

# A Leader in Enterprise Low-Code Application Platforms\*



\*Gartner "Magic Quadrant for Enterprise Low-Code Application Platforms," by Paul Vincent, Kimihiko Iijima, Mark Driver, Jason Wong, Yefim Natis, 08 August 2019

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# Key Takeaways



Choose technology based upon your requirements



Power Automate, Logic Apps and Azure (Durable) Functions are NOT competing technologies. Same applies for Event Grid and Service Bus!



Apply the best practices and leverage Azure Well-Architected Framework

# Sources to explore!

- [Azure Integration Services](#)
- [Serverless Notes](#)
- [Azure Well-Architected Framework](#)
- [Codit Blog](#)
- [Power Automate](#)
- [Enterprise Integration Patterns](#)
- [Integration Usergroup](#)
- [Microsoft Learn](#)





# Thanks for attending!



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