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Leveraging the power of the cloud

Bardur Knudsen, Gert Robyns, Vincent Nicolas, Esben Nyhuus Kristoffersen
MICROSOFT DEVELOPMENT CENTER COPENHAGEN

When you are passionate about
Microsoft Dynamics NAV/365 Business Central

Leveraging the power of the cloud



Bardur Knudsen
Gert Robyns
Esben Nyhuus Kristoffersen
Vincent Nicolas



TDK

IEC I / TYPE I NORMAL POSITION

AD90

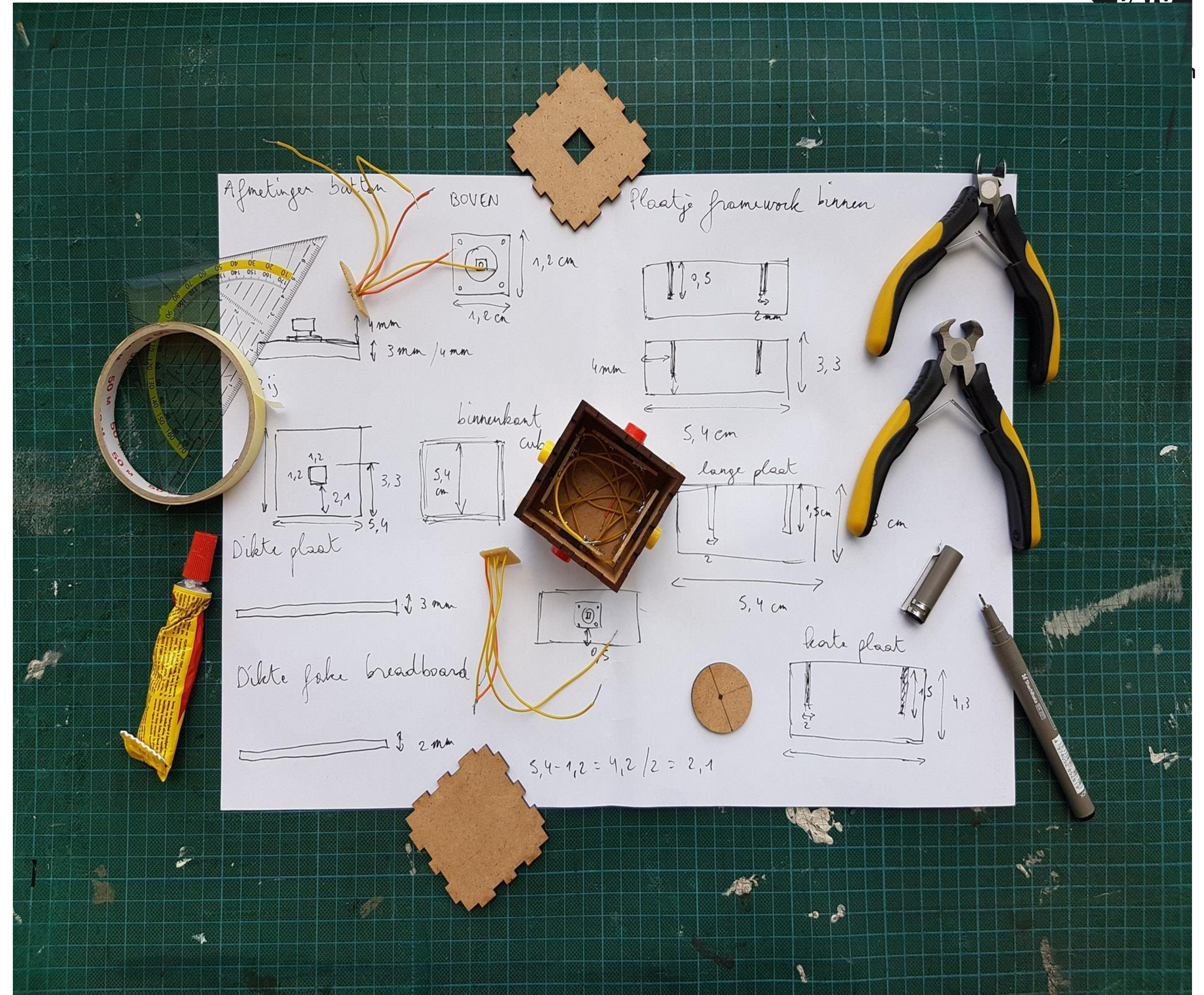
HF-S90

NORMAL BIAS 120µs EQ
Crystal Gamma

SONY

90
TYPE I (NORMAL)

Prototype vs Production



Shared Key Access



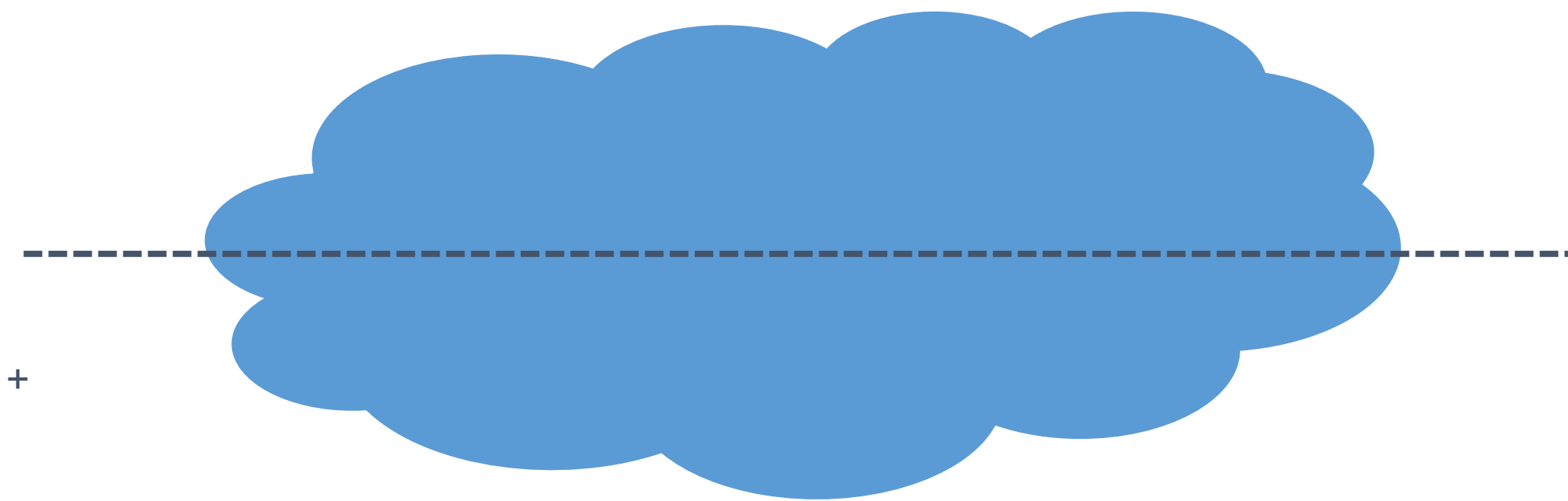
Shared Access Key Principles

Client

Service REST API

Sign the request

Request Signature = Hash(Key Request Attributes +
Timestamp, Shared Key)



Verify the request

Ok := Request Signature = Hash(Key Request
Attributes + Timestamp, Shared Key)

Azure Service Bus + Shared Access Signatures



SharedAccessSignature sig=<signature-string>&se=<expiry>&skn=<keyName>&sr=<URL-encoded-resourceURI>

Key	Value
se	Token expiry instant. Integer reflecting seconds since the epoch 00:00:00 UTC on 1 January 1970 (UNIX epoch) when the token expires.
skn	Name of the authorization rule.
sr	URI of the resource being accessed.
sig	<div>Signature. SHA-256 hash computed using the <u>key</u> for the selected <u>policy</u> over the resource URI and the string representation of the token expiry instant, separated by LF.</div> <div>E.g.</div> <div>SHA-256('https://<yournamespace>.servicebus.windows.net/'+'\\n'+ 1438205742)</div>

Files & Storage



DEMO

Azure BLOB Storage

Supported BLOB Service REST API's

Operation	Ressource Type	Description
List Containers	Account	Lists all of the containers in a storage account.
Create Container	Container	Creates a new container in a storage account.
Delete Container	Container	Deletes the container and any blobs that it contains.
List Blobs	Container	Lists all of the blobs in a container.
Put Blob	Block, append, and page blobs	Creates a new blob or replaces an existing blob within a container.
Get Blob	Block, append, and page blobs	Reads or downloads a blob from the Blob service, including its user-defined metadata and system properties.
Copy Blob	Block, append and page blobs	The Copy Blob operation copies a blob to a destination within the storage account.
Delete Blob	Block, append and page blobs	Marks a blob for deletion.
Delete Blobs	Block, append and page blobs	Marks blobs for deletion based on a prefix.

*Thanks to Bart van Beek

Setting Up the BLOB Storage Service

Home > esbenksouthuk - Access keys

esbenksouthuk - Access keys

Storage account

Search (Ctrl+ /)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Data transfer

Storage Explorer (preview)

Settings

Access keys

Geo-replication

Use access keys to authenticate your applications when making requests to this Azure storage account. Store your access keys securely - for example, using Azure Key Vault - and don't share them. We recommend regenerating your access keys regularly. You are provided two access keys so that you can maintain connections using one key while regenerating the other.

When you regenerate your access keys, you must update any Azure resources and applications that access this storage account to use the new keys. This action will not interrupt access to disks from your virtual machines. [Learn more](#)

Storage account name
esbenksouthuk

key1

Key
VeaoPKsa1eZPms0rxp5imNmOAb1ZUtsKOC5gi

Connection string
DefaultEndpointsProtocol=https;AccountName=esbenksouthuk;AccountKey=VeaoPKsa1eZPms0rxp5imNmOAb1ZUtsKOC5gi

Dynamics 365 Business Central

CRONUS USA, Inc.

Service Connections: All

EDIT - AZURE STORAGE ACCOUNT SETUP

General

Account Name
esbenksouthuk

Is Enabled
☒

Shared Access Key

Close

Enabled

Example: How to upload a file to BLOB Storage

```
procedure UploadFile()
var
    AzureBlobStorage: codeunit AzureBlobStorage;
    ins: InStream;
    name: Text;
begin
    UploadIntoStream('', '', '', name, ins);
    AzureBlobStorage.PutBlob('MyContainer/' + name,
        ins,
        AzureBlobStorage.GetContentTypeFromFileName(name));
end;
```


External functionality



DEMO

Azure Functions

MakeMonochrome Azure Function

```
[FunctionName("MakeMonochrome")]
public static async Task<IActionResult> Run(
    [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
    ILogger log)
{
    try
    {
        MemoryStream memoryStream = new MemoryStream();

        using (Image<Rgba32> image =
            Image.Load(Convert.FromBase64String(new StreamReader(req.Body).ReadToEnd()))))
        {
            image.Mutate(x => x.Grayscale());
            image.SaveAsJpeg(memoryStream);
        }
        return (ActionResult)new OkObjectResult(Convert.ToBase64String(memoryStream.GetBuffer()));
    }
    catch (System.Exception e)
    {
        return new BadRequestObjectResult(e.Message);
    }
}
```

Image
Conversion

Calling MakeMonochrome Azure Function

```
local procedure MakeMonochrome(TempBlob: codeunit "Temp Blob");
```

```
var
```

```
    Base64Convert: codeunit "Base64 Convert";
```

```
    ImageAsString: Text;
```

```
    Content: HttpContent;
```

```
    Client: HttpClient;
```

```
    Response: HttpResponseMessage;
```

```
    Ins: InStream;
```

```
    Outs: OutStream;
```

```
    len: Integer;
```

```
begin
```

```
    len := TempBlob.Length();
```

```
    TempBlob.CreateInStream(Ins);
```

```
    ImageAsString := Base64Convert.ToBase64(Ins);
```

```
    Content.WriteFrom(ImageAsString);
```

```
    Client.Post(
```

```
        'https://imagehelper2019.azurewebsites.net/api/MakeMonochrome?code=aMmhBXEgbYsTFI0Br9vqzpjxdfh1kdaG/BL8V81JbY2qikoBhng==',
```

```
        Content,
```

```
        Response);
```

```
    if not Response.IsSuccessStatusCode() then
```

```
        Error('MakeMonochrome: ' + Response.ReasonPhrase());
```

```
    Response.Content().ReadAs(ImageAsString);
```

```
    TempBlob.CreateOutStream(Outs);
```

```
    Base64Convert.FromBase64(ImageAsString, Outs);
```

```
end;
```

Prepare
Arguments

Azure Function
Call

Return Result



Examples of integration to the “real” world



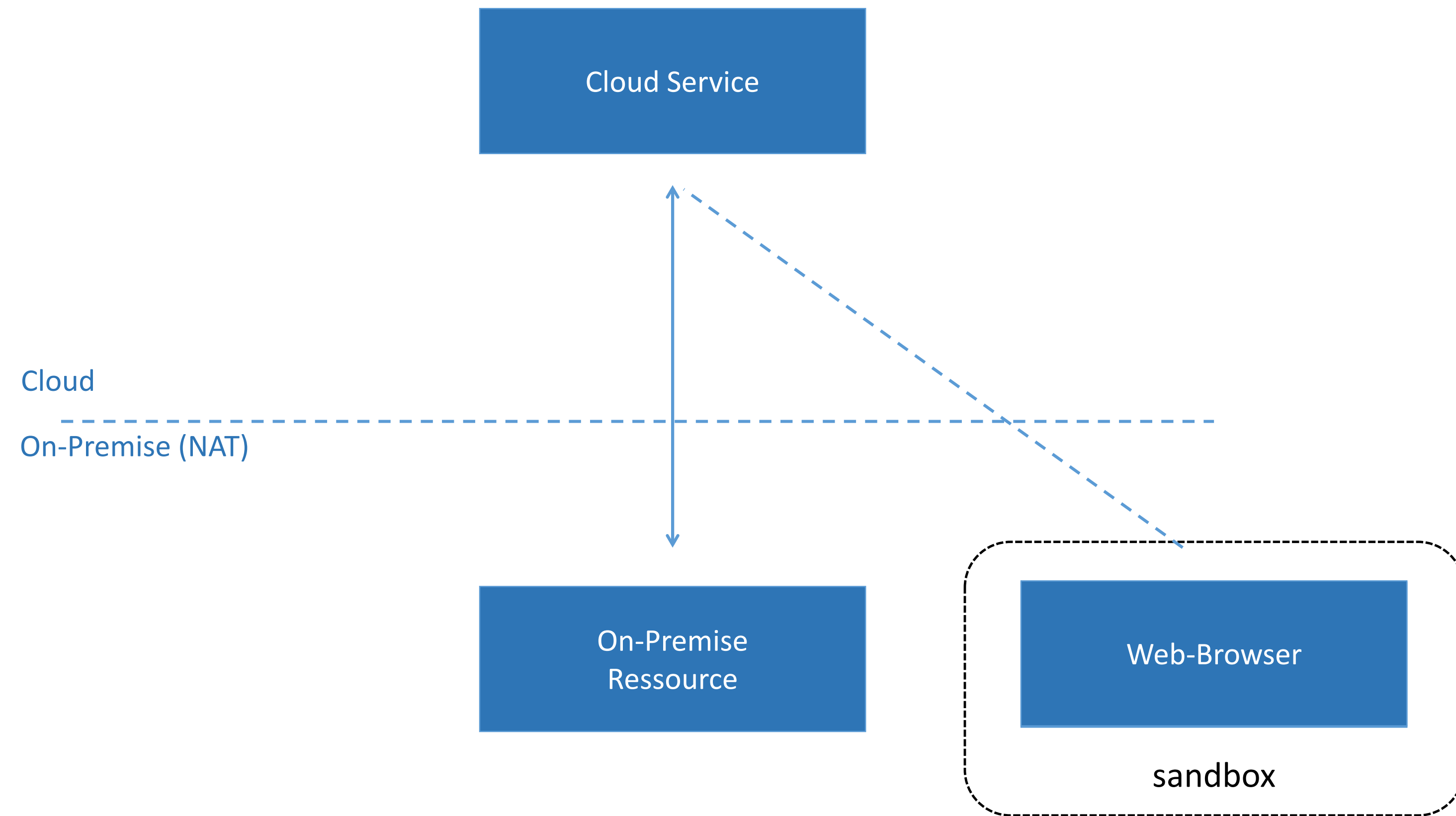
Barcode scanners, Payment terminals



Scales



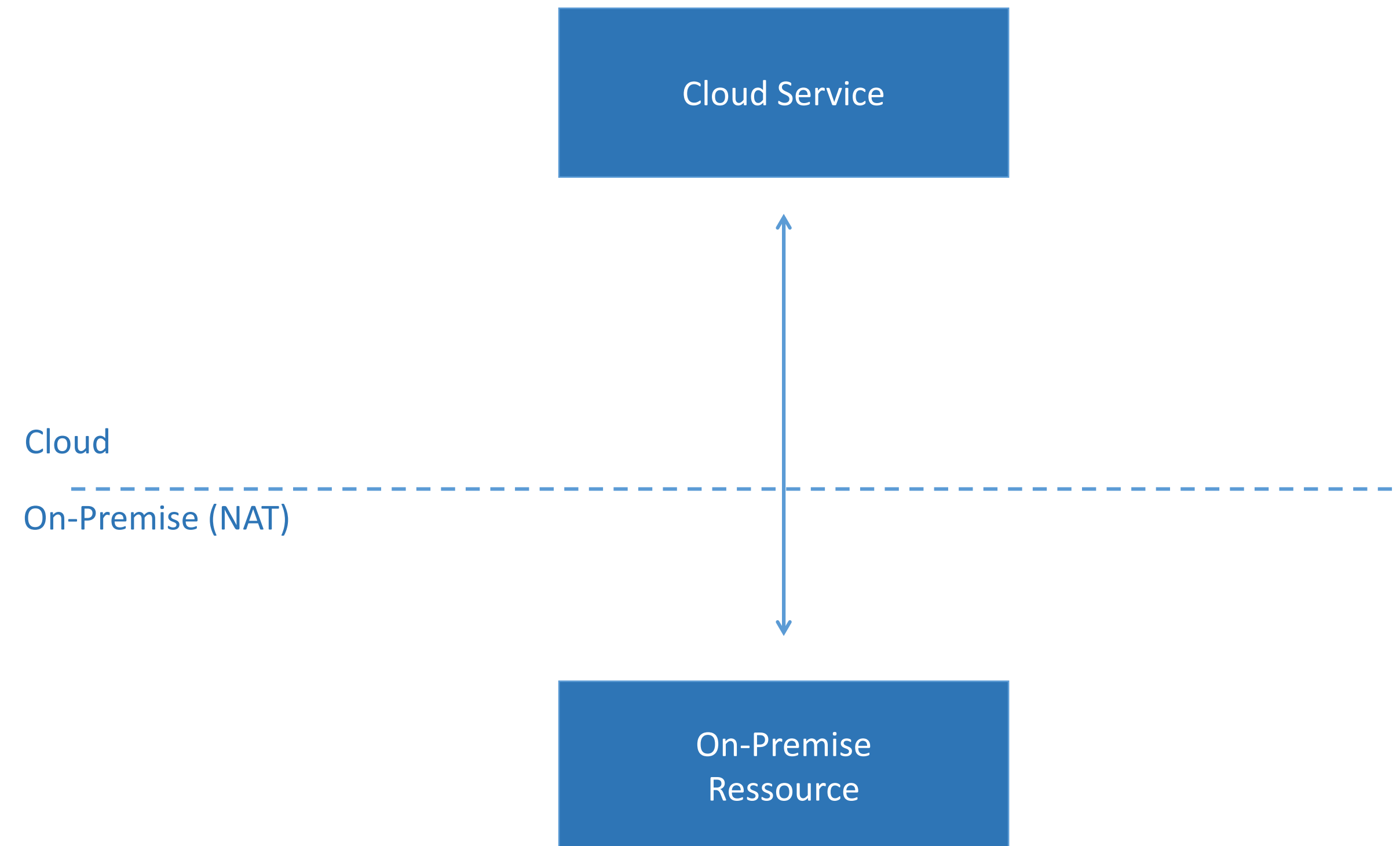
Production equipment



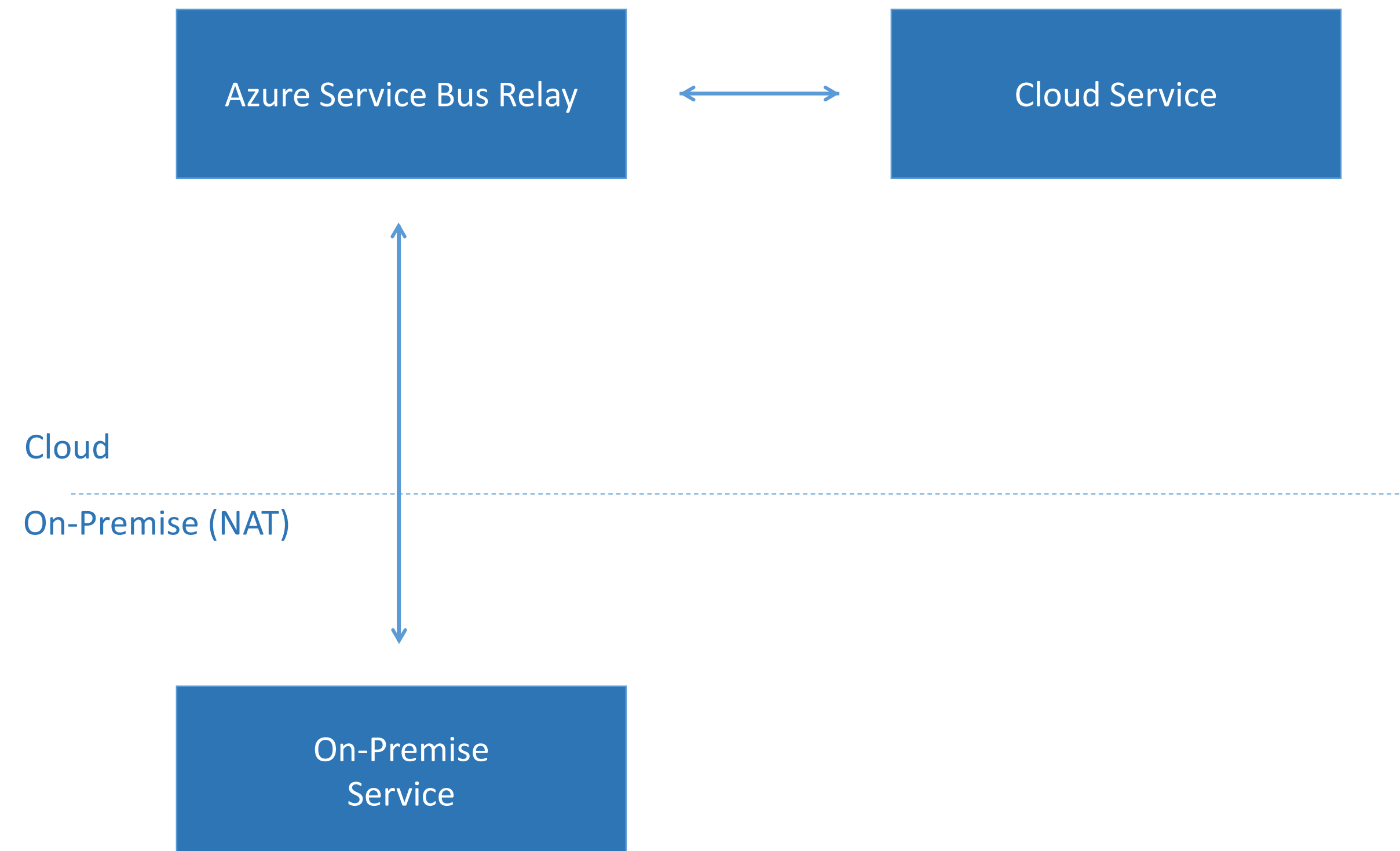
DEMO

Local File Browsing

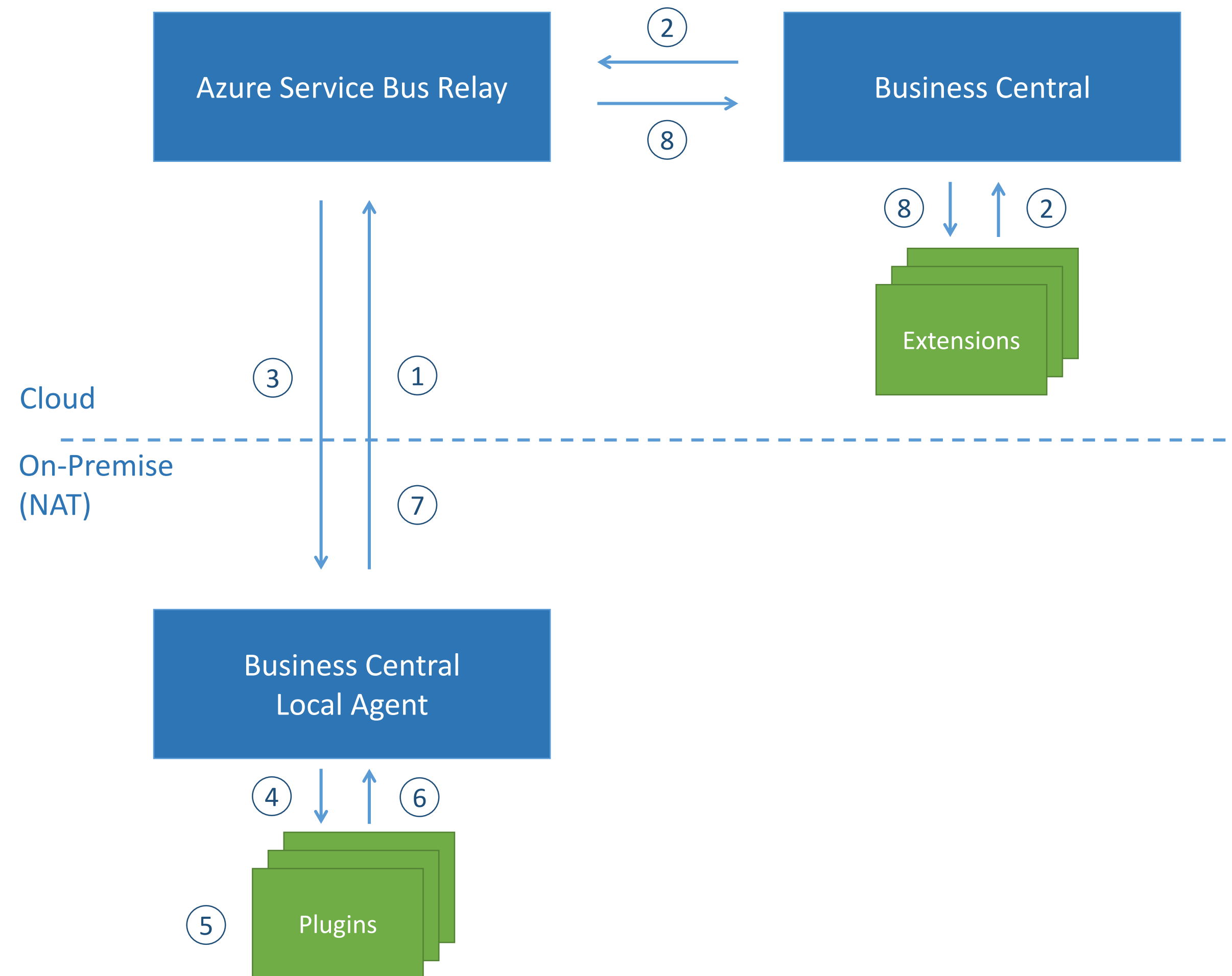
“The Problem”



Azure Service Bus Relay



BC Local Agent



- ① The Agent establish a listener connection to the Relay endpoint.
- ② Extension X uses HttpClient to send a request to Plugin X
- ③ Azure Relay forwards request to the local Agent
- ④ The local Agent forwards the request to the right plugin based on the relative Uri
- ⑤ Plugin X is processing the request with access to local resources.
- ⑥ Plugin X is returning the result to the local Agent
- ⑦ The Agent returns the result in the Response content
- ⑧ Azure Relay returns the result to the extensions

Plugins + Extensions

```
namespace CalculatorPlugin
{
    using Microsoft.Dynamics.BusinessCentral.Agent.Common;

    [AgentPlugin("calculator/V1.0")]
    public class Calculator : IAgentPlugin
    {
        [PluginMethod("GET")]
        public decimal Add(decimal a, decimal b)
        {
            return a + b;
        }

        [PluginMethod("GET")]
        public decimal Subtract(decimal a, decimal b)
        {
            return a - b;
        }
    }
}
```

```
codeunit 50130 Calculator
{
    var
        ServiceBusRelay: codeunit ServiceBusRelay;
        CalculatorPluginName: Label '/calculator/V1.0', Locked = true;
        AddFuncDef: Label '/Add?a=%1&b=%2', Locked = true;
        SubtractFuncDef: Label '/Subtract?a=%1&b=%2', Locked = true;

    procedure Initialize(ServiceRelayUri: Text; keyName: Text; keyValue: Text;
        ttl: Integer);
    begin
        ServiceBusRelay.Initialize(ServiceRelayUri + CalculatorPluginName,
            keyName, keyValue, ttl);
    end;

    procedure Add(a: Decimal; b: Decimal) Result: Decimal;
    var
        ResultText: Text;
    begin
        ServiceBusRelay.Get(StrSubstNo(AddFuncDef, Format(a, 0, 9), Format(b, 0, 9)),
            ResultText);
        Evaluate(Result, ResultText, 9);
    end;

    procedure Subtract(a: Decimal; b: Decimal) Result: Decimal;
    var
        ResultText: Text;
    begin
        ServiceBusRelay.Get(StrSubstNo(SubtractFuncDef, Format(a, 0, 9),
            Format(b, 0, 9)), ResultText);
        Evaluate(Result, ResultText, 9);
    end;
}
```


Configuration – Business Central

The image displays the configuration interface for Business Central, specifically focusing on the 'myhandler - Shared access policies' section. The interface is divided into three main panels:

- Left Panel (Navigation):** Contains a search bar and a list of settings. The 'Shared access policies' setting is highlighted with a red circle. Red arrows point from this circle to the 'Azure Relay Names...' and 'Shared Access Poli...' fields in the 'EDIT - AZURE SERVICE BUS RELAY SETUP' dialog.
- Middle Panel (Policy Selection):** Shows a list of policies under the heading 'POLICY'. The 'Sender' policy is selected and highlighted with a red circle. A red arrow points from this circle to the 'Shared Access Poli...' field in the dialog.
- Right Panel (SAS Policy: Sender):** Displays the configuration for the 'Sender' policy. It includes fields for 'Primary Key', 'Secondary Key', and 'Primary Connection String'. The 'Primary Key' and 'Secondary Key' fields are circled in red. A red arrow points from the 'Primary Key' field to the 'SharedAccessKey' field in the dialog.

The 'EDIT - AZURE SERVICE BUS RELAY SETUP' dialog is shown in the foreground, with the 'General' tab selected. It contains the following fields:

- Azure Relay Names...:** BCDemoAgent
- Hybrid Connection...:** myhandler
- Shared Access Poli...:** Sender
- SharedAccessKey...:** [Redacted]
- Is Enabled...:** [Toggle Switch]

Red annotations and arrows highlight the configuration flow: the 'Shared access policies' setting is selected, the 'Sender' policy is chosen, and the 'Primary Key' is copied to the 'SharedAccessKey' field in the relay setup dialog.

Configuration - BCAgent

The image shows the configuration of the BCAgent in the Azure portal. It consists of three main components: the Azure portal interface, the 'SAS Policy: Sender' dialog, and a Windows PowerShell terminal window.

Azure Portal: myhandler - Shared access policies

- The breadcrumb navigation is: Home > BCDemoAgent - Hybrid Connections > myhandler - Shared access policies.
- The left sidebar shows the 'Shared access policies' section under 'Settings'.
- The main area shows a list of policies with 'Sender' and 'Listener' selected.

SAS Policy: Sender

- The 'Send' checkbox is checked.
- The 'Primary Key' is: r33tJEFcnzchQo2JiEHXhSiIWVR2KmG+...
- The 'Secondary Key' is: 7bH+l/pCb4ZUloDEb7D8s0yZNBQ1syV...
- The 'Primary Connection String' is: Endpoint=.../bcdemoagent-servicebus...

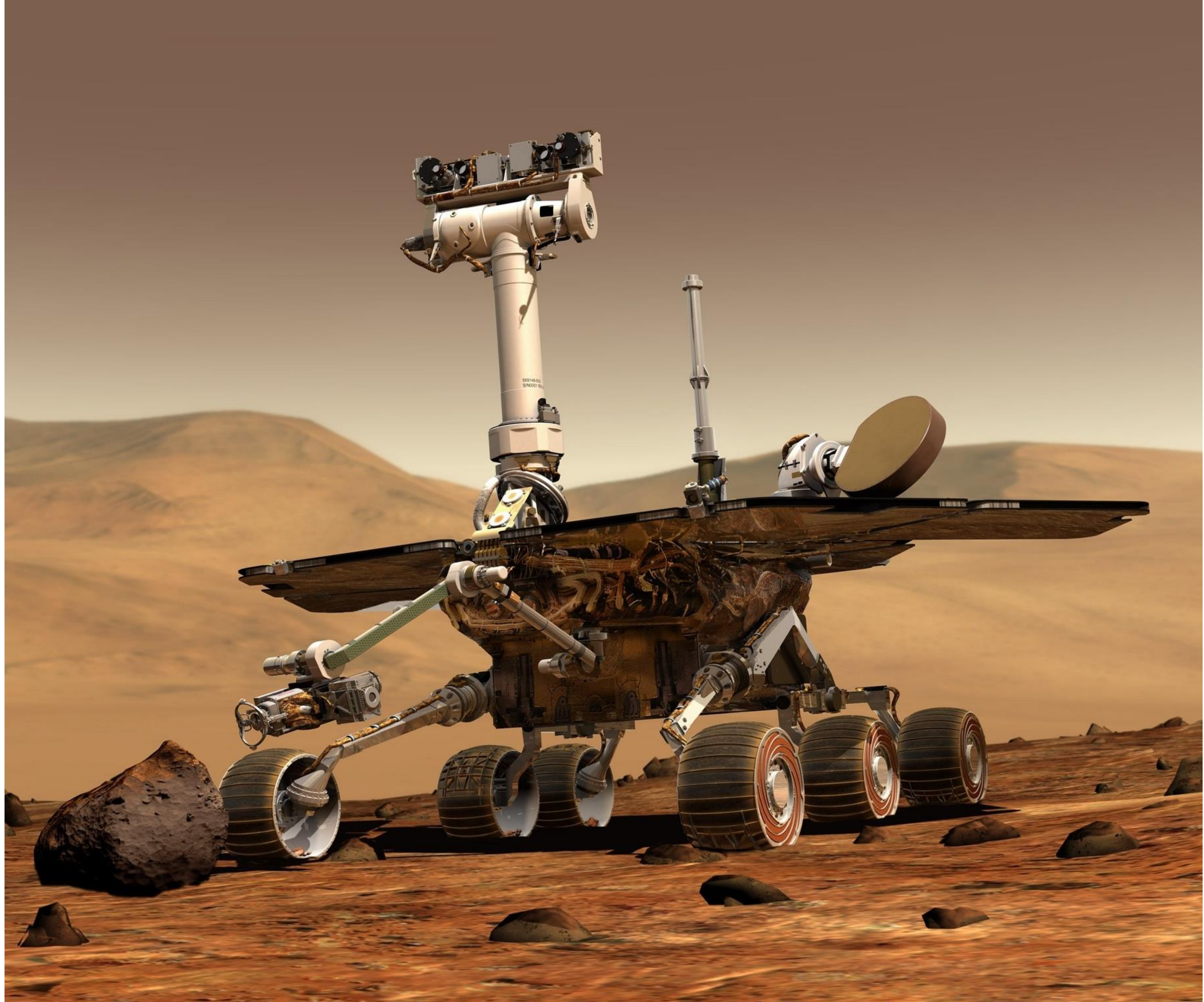
Windows PowerShell

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell! https://aka.ms/pscore6

PS C:\Users\esbenk> BCAGENT -namespace:BCDemoAgent.servicebus.windows.net -connectionname:myhandler
-keyname:Listener -key:91hSMN/CvsRONuM72743hShs28N3W0Z6vfYEyQldrdOw0=
```

Red annotations highlight the 'myhandler' connection name, the 'Listener' policy, the 'Send' checkbox, the 'Primary Key', and the 'BCAGENT' command in the PowerShell terminal.



LEGO Mindstorms

NXT 2.0

Released in 2009

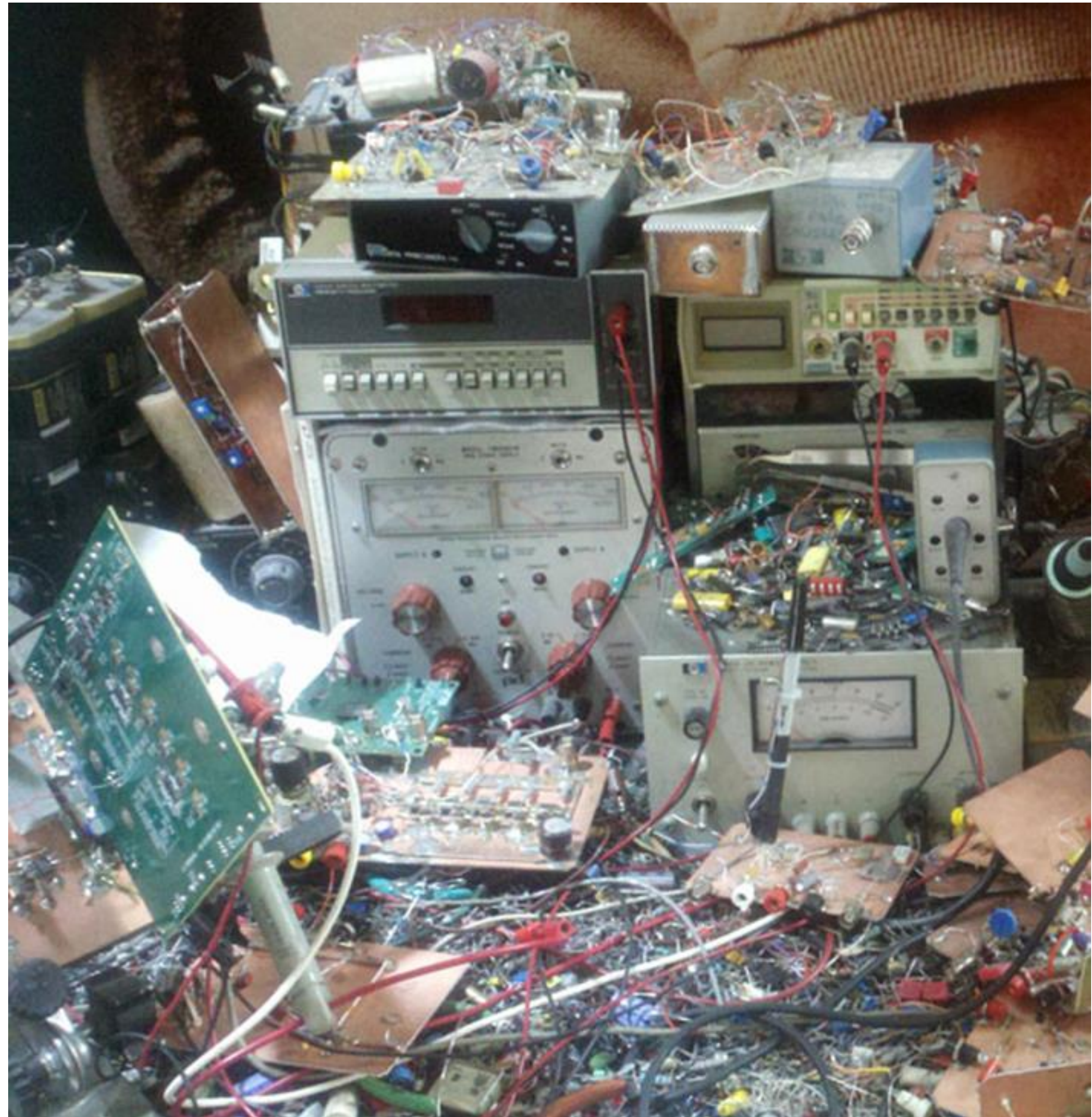
Has been hiding in my basement



DEMO

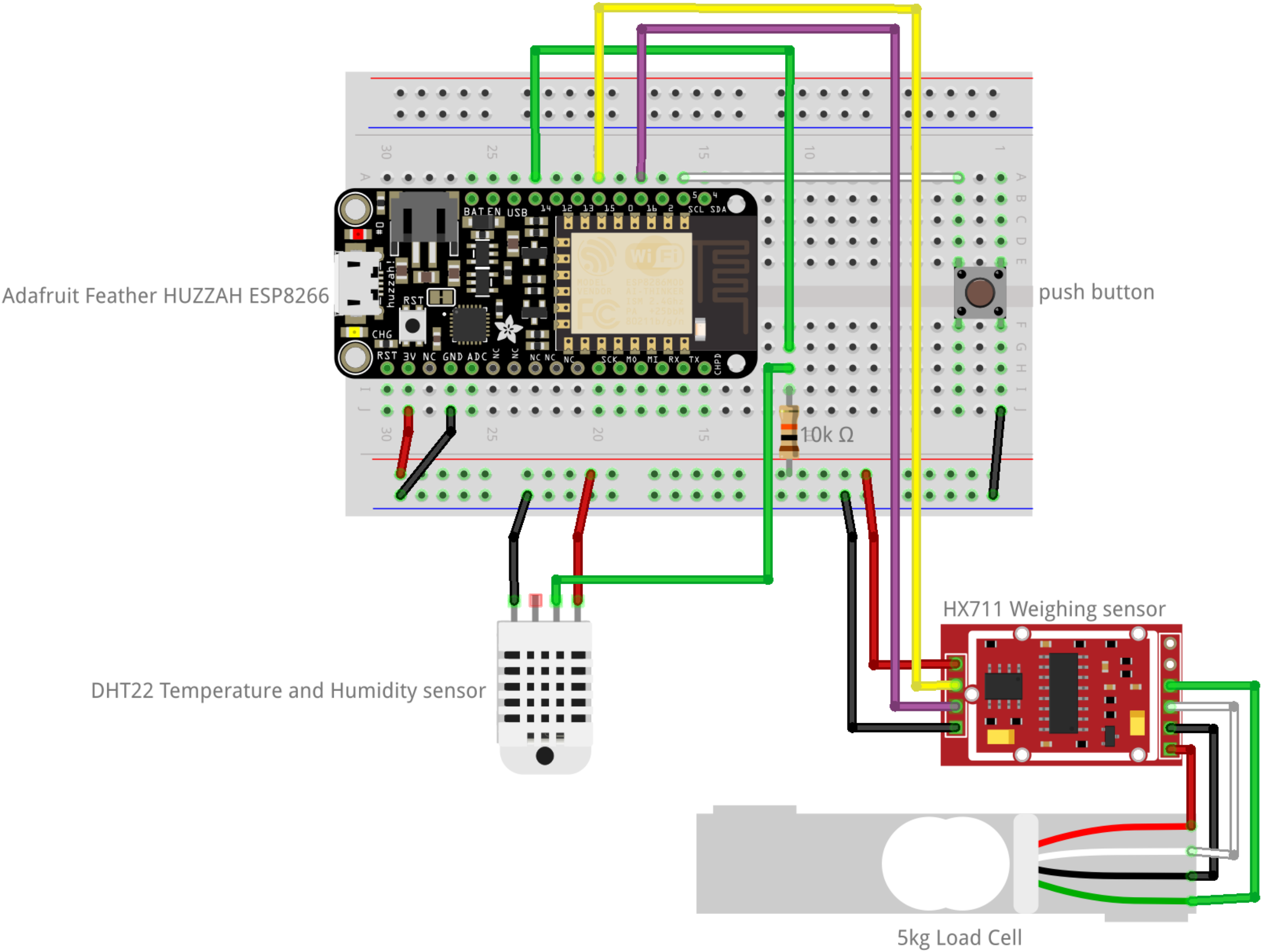
LEGO Robot Demo

Internet of Things





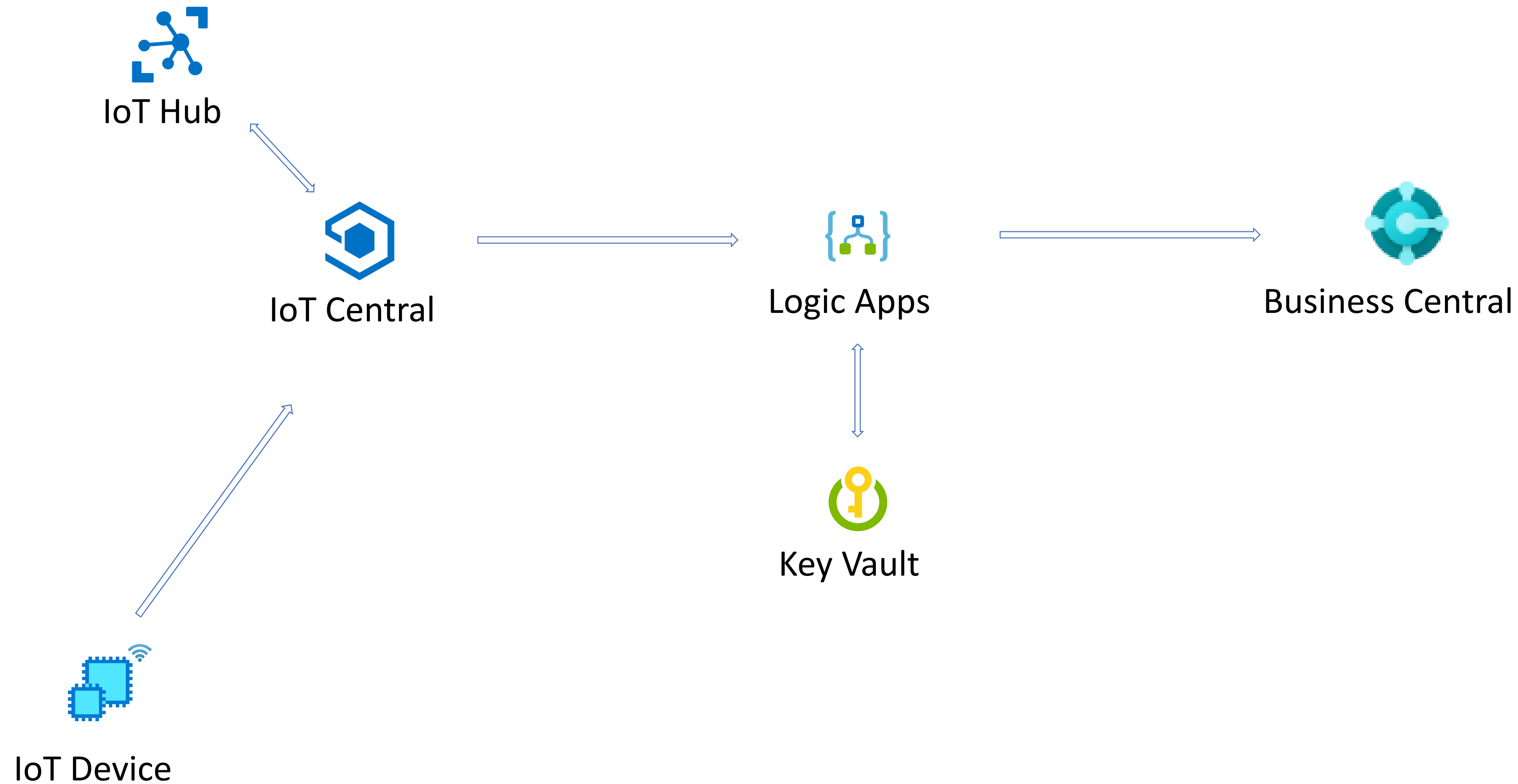
Cookie jar wiring diagram:



DEMO

IoT Central to Business Central

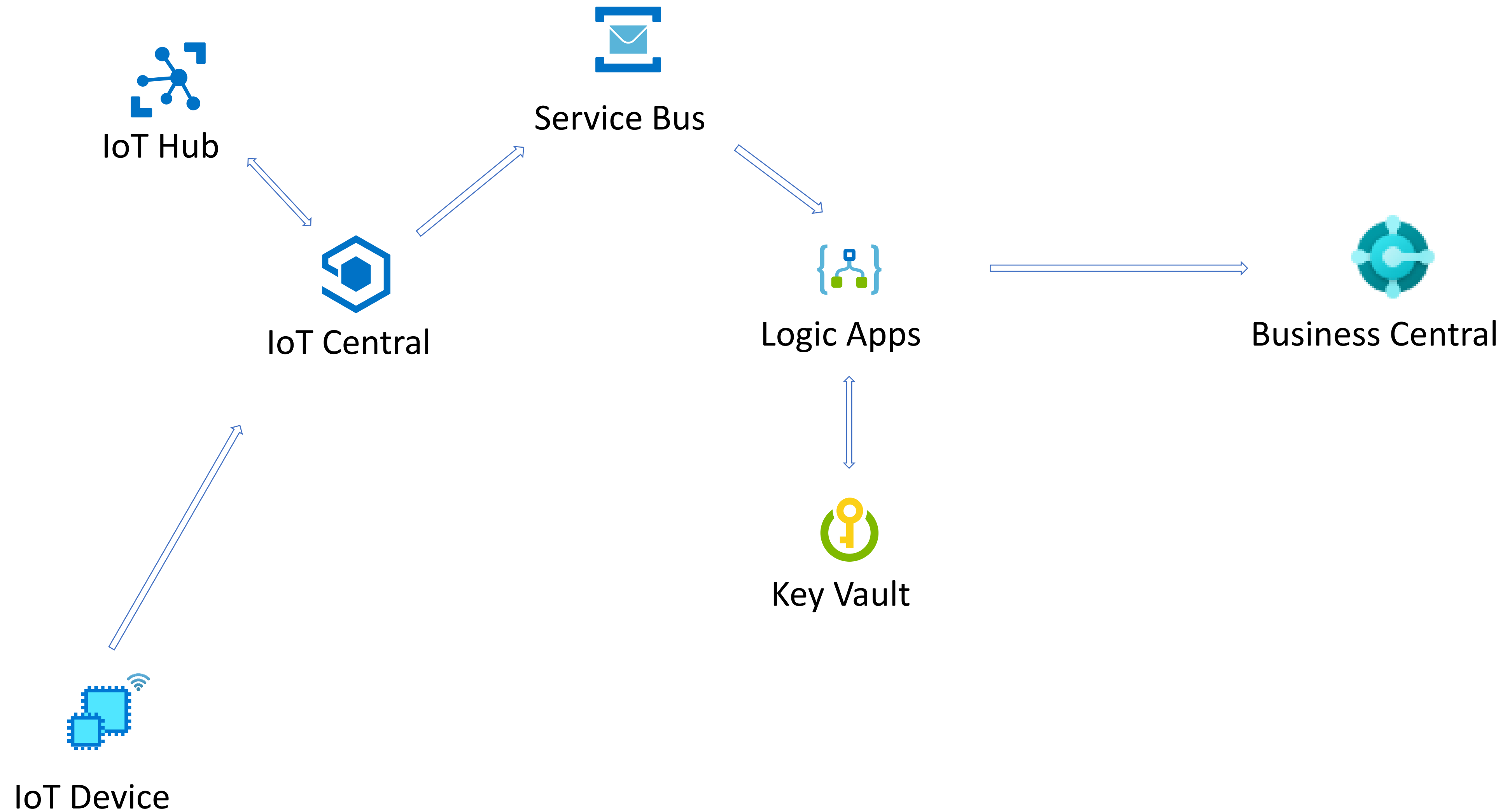
IoT device to Business Central



DEMO

IoT Central continuous export

IoT device info to Business Central



Other IoT & ERP scenarios

- Time registration:
automate using smart devices
- Shipping:
track your shipment in real-time
- Inventory Mgmt:
accurate real-time inventory, track consumption, scrap etc...
- WMS:
automate pick lists using RFID tags / scanners
- Service Mgmt:
use device telemetry on equipment to investigate outages or even detect issues before a customer is affected

Azure Cognitive Services – Vision / OCR



Azure AI + Machine Learning

AI + Machine Learning

Create the next generation of applications using artificial intelligence capabilities for any developer and any scenario

Cognitive Services

Add smart API capabilities to enable contextual interactions

Azure Bot Service

Intelligent, serverless bot service that scales on demand

Machine Learning

Build, train, and deploy models from the cloud to the edge

Azure Databricks

Fast, easy, and collaborative Apache Spark-based analytics platform







Azure Cognitive Search

AI-powered cloud search service for mobile and web app development

Cognitive Services






Vision

Recognize, identify, caption, index, and moderate your pictures, videos, and digital ink content.

-  [Computer Vision](#)
-  [Custom Vision](#)
-  [Face](#)
-  [Form Recognizer \(Preview\)](#)
-  [Ink Recognizer \(Preview\)](#)
-  [Video Indexer](#)




Language

Allow your apps to process natural language with pre-built scripts, evaluate sentiment and learn how to recognize what users want.

-  [Immersive Reader \(Preview\)](#)
-  [Language Understanding \(LUIS\)](#)
-  [QnA Maker](#)
-  [Text Analytics](#)
-  [Translator Text](#)




Speech

Convert speech into text and text into natural-sounding speech. Translate from one language to another and enable speaker verification and recognition.

-  [Speech Services](#)
-  [Speaker Recognition \(Preview\)](#)
-  [Bing Speech \(Retiring\)](#)











Decision

Build apps that surface recommendations for informed and efficient decision-making.

-  [Anomaly Detector \(Preview\)](#)
-  [Content Moderator](#)
-  [Personalizer](#)





Search

Add Bing Search APIs to your apps and harness the ability to comb billions of webpages, images, videos, and news with a single API call.

-  [Autosuggest Search](#)
-  [Custom Search](#)
-  [Entity Search](#)
-  [Image Search](#)
-  [Local Business Search \(Preview\)](#)
-  [News Search](#)
-  [Spell Check](#)
-  [Video Search](#)
-  [Visual Search](#)
-  [Web Search](#)

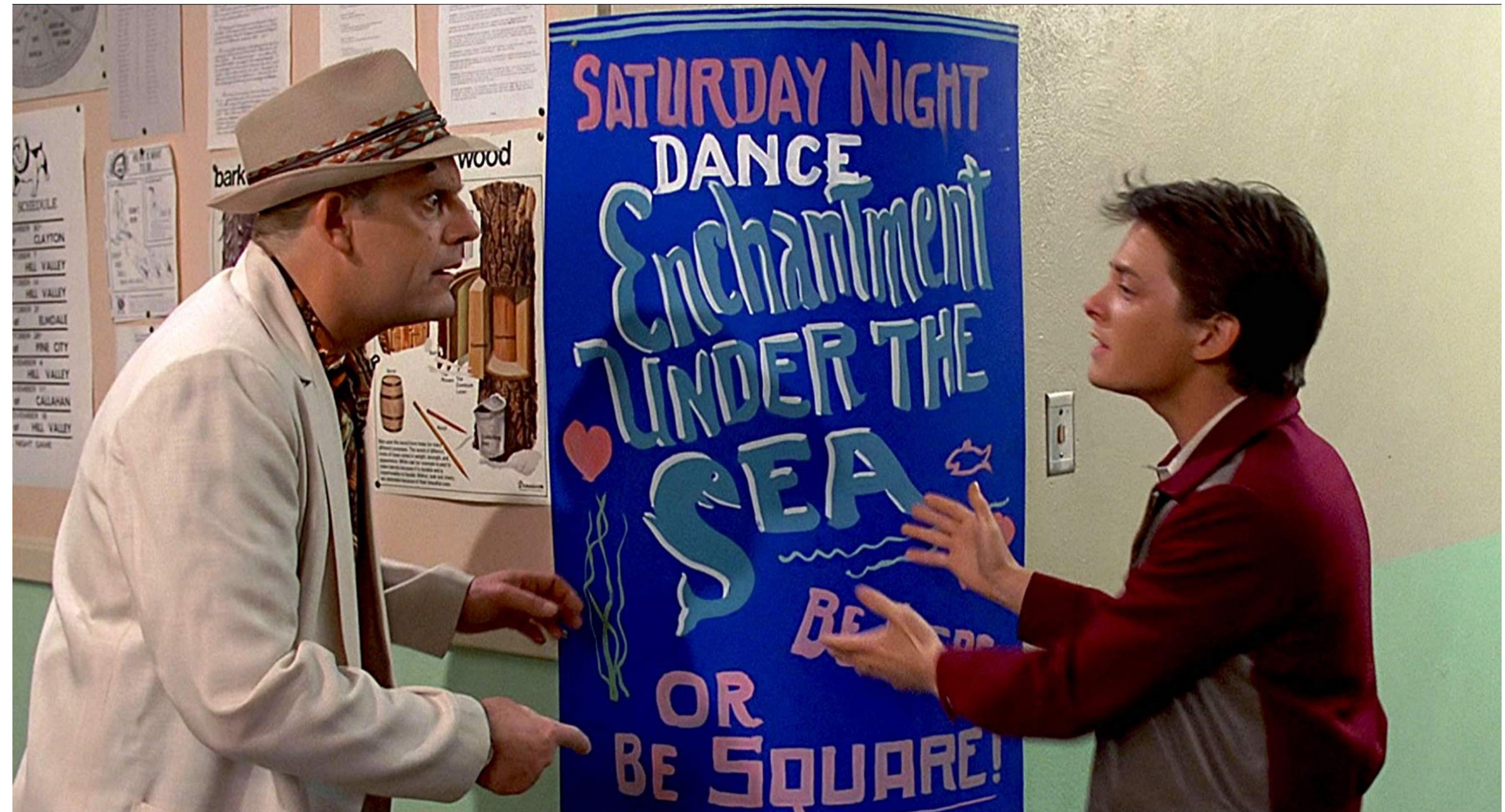
Cognitive Service Containers

Container support in Azure Cognitive Services allows developers to use the same rich APIs that are available in Azure, and enables flexibility in where to deploy and host the services that come with Docker containers.

-  [Cognitive Service Containers](#)
-  [Create containers for reuse](#)
-  [Deploy and run container on Azure Container Instance](#)
-  [Deploy to Azure Kubernetes Service](#)
-  [Use Docker Compose to deploy multiple containers](#)
-  [Cognitive Services containers FAQ](#)

Computer Vision

- Analyze Images
- Moderate content
- Extract text
 - OCR of printed text
 - Recognize handwritten and printed text in a picture



6 wood SATURDAY NIGHT bark DANCE
Enchantment UNDER THE SEA RE OR BE
SQUARE!

C# app on github

Vision API

Subscription Key Management

Select a scenario:

- Analyze Image
- Analyze Image with Domain Model
- Describe Image**
- Generate Tags
- Recognize Text (OCR)
- Recognize Text V2 (English)
- Get Thumbnail
- Get AreaOfInterest

Describe an Image


Please click either [Load Image] or paste in an image URL and click [Describe]

English

Load Image

<https://oxfordportal.blob.core.windows.net/vision/Analysis/2-1.jpg> Describe

Describing Done



[22:58:40.552955]: Image Dimensions : 1754 x 1293
[22:58:40.554956]: Description :
[22:58:40.556955]: Caption : a group of young men playing a game of football; Confidence : 0.797263449303999
[22:58:40.575956]: Caption : a young boy playing football on a field; Confidence : 0.796263449303999
[22:58:40.582956]: Caption : a group of young men playing a game of football on a field; Confidence : 0.758837332095924
[22:58:40.589956]: Tags : grass, soccer, person, ball, outdoor, playing, young, field, game, boy, child, building, group, small, man, girl, player, uniform, park, grassy, little, control, woman, people, blue,

Vision API

Subscription Key Management

Select a scenario:

- Analyze Image
- Analyze Image with Domain Model
- Describe Image
- Generate Tags
- Recognize Text (OCR)
- Recognize Text V2 (English)**
- Get Thumbnail
- Get AreaOfInterest

Recognize Text (English)


Choose a mode and image to recognize by clicking either [Load Image] or paste in an image URL and then clicking [Recognize Text]

Printed

Load Image

<https://raw.githubusercontent.com/Microsoft/Cognitive-Vision-Windows/master/Assets/2-1.jpg> Recognize Text

Text recognition finished!



[23:00:06.541707]: Calling ComputerVisionClient.GetTextOperationResultAsync()...
[23:00:06.589710]: Text:
STADIUM

ALEX PETERSEN

NOLAGT 1903

CT

<https://docs.microsoft.com/en-us/azure/cognitive-services/Computer-vision/tutorials/csharp/tutorial>

git clone --recurse-submodules <https://github.com/Microsoft/Cognitive-Face-Windows.git>

User Story

Contacts – Profile Questionnaire

←

...ACT CARD | ARBEJDS DATO: 28-01-2021

+

✓ GEMT

CT100006 · A. Gibson's Law Firm

Process | Report | Flere indstillinger

General

Vis mere

No. CT100006 ...

Type Company ▾

Name A. Gibson's Law Firm ...

Company Name A. Gibson's Law Firm ▾ ...

Communication

Vis mere

ADDRESS

CONTACT

Address 2570 Swimthor Street

Phone No.

Address 2

Mobile Phone No.

Post Code MO2 4RT ...

Email a.gibsons.law.firm@contoso.com

City Manchester ...

Home Page

Country/Region Code GB ▾

Language Code ENG ▾

Show Map

Foreign Trade >

Questionnaire - Handouts

CRONUS International Ltd.

Profile Questionnaire Header: Code: COMPANY

COMPANY General company information

Number of Answers	Description	Answer
One only	Name:	
One only	Email:	
One only	No. of employees	
	1..99	<input type="checkbox"/>
	100..499	<input type="checkbox"/>
	500..999	<input type="checkbox"/>
	1000+	<input type="checkbox"/>
One only	Company Ownership	
	Stock Exchange	<input type="checkbox"/>
	Family	<input type="checkbox"/>
	Foundation	<input type="checkbox"/>
	Government	<input type="checkbox"/>
	Institution	<input type="checkbox"/>
One only	Additional Business Relations	
	Partner	<input type="checkbox"/>
	Competitor	<input type="checkbox"/>

Profile Questionnaire		Administrer		
Question	Answer	Questions Answered (%)	Last Date Updated	
→ Company Ownership	Stock Exchange		31-01-2021	
No. of employees	1..99		31-01-2021	

Filled-in Questionnaires

Questionnaire - Handouts
CRONUS International Ltd.

Profile Questionnaire Header: Code: COMPANY

COMPANY General company information

Number of Answers	Description	Answer
One only	Name:	Gert Grobyns
One only	Email:	grobyns@microsoft.com
One only	No. of employees	
	1..99	
	100..499	
	500..999	
	1000+	
One only	Company Ownership	
	Stock Exchange	
	Family	
	Foundation	
	Government	<input type="checkbox"/>
	Institution	<input type="checkbox"/>
One only	Additional Business Relations	
	Partner	<input checked="" type="checkbox"/>
	Competitor	<input type="checkbox"/>



Questionnaire - Handouts
CRONUS International Ltd.

Profile Questionnaire Header: Code: COMPANY

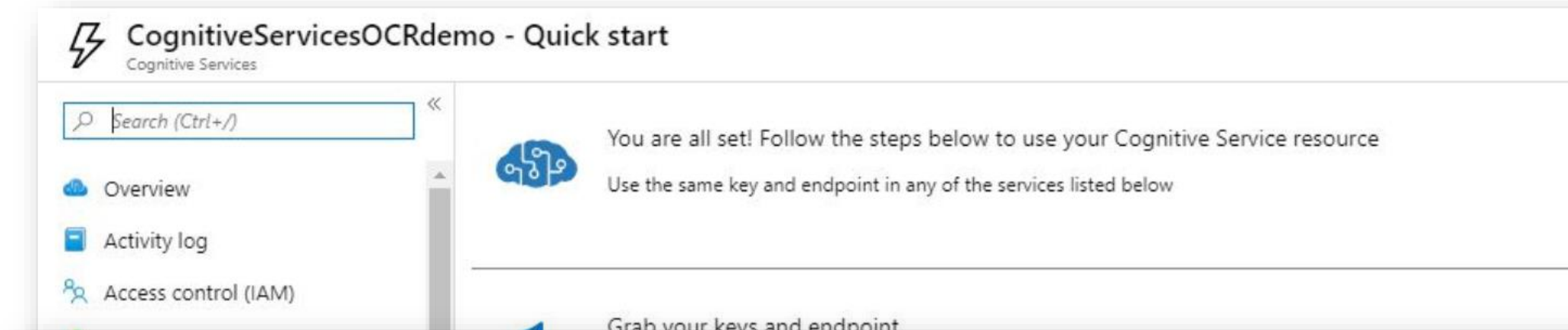
COMPANY General company information

Number of Answers	Description	Answer
One only	Name:	Barndtson
One only	Email:	barndtson@microsoft.com
One only	No. of employees	
	1..99	<input checked="" type="checkbox"/>
	100..499	<input type="checkbox"/>
	500..999	<input type="checkbox"/>
	1000+	<input type="checkbox"/>
One only	Company Ownership	
	Stock Exchange	<input type="checkbox"/>
	Family	<input checked="" type="checkbox"/>
	Foundation	<input type="checkbox"/>
	Government	<input type="checkbox"/>
	Institution	<input type="checkbox"/>
One only	Additional Business Relations	
	Partner	<input type="checkbox"/>
	Competitor	<input checked="" type="checkbox"/>

Recipe

1. Obtain a subscription
2. POST a request
3. GET the result
4. Parse the json result

```
{
  "status": "Succeeded",
  "succeeded": true,
  "failed": false,
  "finished": true,
  "recognitionResults": [
    {
      "page": 1,
      "clockwiseOrientation": 0.82,
      "width": 874,
      "height": 826,
      "unit": "pixel",
      "lines": [
        {
          "boundingBox": [15,9,408,10,407,30,14,29],
          "text": "COMPANY General company information",
          "words": [
            {
              "boundingBox": [17,10,114,10,114,30,17,29],
              "text": "COMPANY"
            }
          ]
        }
      ]
    }
  ]
}
```



```
TempBlob.CreateInStream(InStr);
content.WriteFrom(InStr);
content.GetHeaders(contentHeaders);
contentHeaders.Clear();
contentHeaders.Add('Content-Type', 'application/octet-stream');

uri := QuestionnaireOCRSetup."OCR Url" + '/recognizeText?mode=Handwritten';
OCRHttpClient.DefaultRequestHeaders.Add('Ocp-Apim-Subscription-Key', QuestionnaireOCRSetup."OCR Subscription Key");
if not OCRHttpClient.Post(uri, content, OCRHttpResponse) then
  exit(false);
OCRHttpResponse.Headers.GetValues('Operation-Location', ArrayOfText);
ResultLink := ArrayOfText[1];
```

```
T0 := CurrentDateTime;
while (CurrentDateTime < T0 + 30000) and (httpStatusCode <> 200) do begin
  sleep(1000);
  OCRHttpClient.get(ResultLink, OCRHttpResponse);
  httpStatusCode := OCRHttpResponse.HttpStatusCode;
end;
if httpStatusCode <> 200 then
  exit(false);
OCRHttpResponse.Content.ReadAs(t);
jsonresult.ReadFrom(t);
```


json result

```
{
  "status": "Succeeded",
  "recognitionResult": {
    "lines": [
      {
        "boundingBox": [241, 483, 971, 502, 969, 569, 239, 549],
        "text": "Questionnaire - Handouts",
        "words": [
          {
            "boundingBox": [241, 483, 646, 497, 645, 559, 241, 550],
            "text": "Questionnaire",
            "confidence": "High"
          },
          {
            "boundingBox": [659, 497, 681, 497, 680, 560, 658, 559],
            "text": "-",
            "confidence": "High"
          },
          {
            "boundingBox": [695, 498, 968, 503, 965, 570, 693, 560],
            "text": "Handouts",
            "confidence": "High"
          }
        ]
      },
      {
        "boundingBox": [777, 1403, 952, 1413, 949, 1475, 773, 1465],
        "text": "Name:",
        "words": [
          {
            "boundingBox": [781, 1409, 951, 1413, 949, 1476, 777, 1462],
            "text": "Name:",
            "confidence": "High"
          }
        ]
      },
      {
        "boundingBox": [993, 1376, 2003, 1381, 2002, 1534, 992, 1529],
        "text": "Gert Robyus",
        "words": [
          {
            "boundingBox": [1002, 1383, 1393, 1382, 1393, 1529, 1005, 1525],
            "text": "Gert",
            "confidence": "Low"
          },
          {
            "boundingBox": [1467, 1382, 1997, 1381, 1994, 1537, 1467, 1530],
            "text": "Robyus",
            "confidence": "High"
          }
        ]
      },
      {
        "boundingBox": [773, 1583, 941, 1585, 941, 1646, 772, 1644],
        "text": "Email:",
        "words": [
          {
            "boundingBox": [778, 1586, 940, 1585, 940, 1647, 777, 1643],
            "text": "Email:",
            "confidence": "High"
          }
        ]
      },
      {
        "boundingBox": [987, 1547, 2832, 1535, 2833, 1700, 988, 1711],
        "text": "grobyns@ microsoft.com",
        "words": [
          {
            "boundingBox": [1015, 1560, 1722, 1554, 1726, 1700, 1020, 1700],
            "text": "grobyns@",
            "confidence": "High"
          },
          {
            "boundingBox": [1777, 1554, 2815, 1536, 2816, 1702, 1781, 1700],
            "text": "microsoft.com",
            "confidence": "Low"
          }
        ]
      }
    ]
  }
}
```


json result

```
{
  "status": "Succeeded",
  "recognitionResult": {
    "lines": [
      {
        "boundingBox": [241, 483, 971, 502, 969, 569, 239, 549],
        "text": "Questionnaire - Handouts",
        "words": [
          {
            "boundingBox": [241, 483, 646, 497, 645, 559, 241, 550],
            "text": "Questionnaire",
            "confidence": "Low"
          },
          {
            "boundingBox": [659, 497, 681, 497, 680, 560, 658, 559],
            "text": "-",
            "confidence": "Low"
          },
          {
            "boundingBox": [695, 498, 968, 503, 965, 570, 693, 560],
            "text": "Handouts",
            "confidence": "Low"
          }
        ]
      },
      {
        "boundingBox": [777, 1403, 952, 1413, 949, 1475, 773, 1465],
        "text": "Name:",
        "words": [
          {
            "boundingBox": [781, 1409, 951, 1413, 949, 1476, 777, 1462],
            "text": "Name:",
            "confidence": "Low"
          }
        ]
      },
      {
        "boundingBox": [993, 1376, 2003, 1381, 2002, 1534, 992, 1529],
        "text": "Gert Robyns",
        "words": [
          {
            "boundingBox": [1002, 1383, 1393, 1382, 1393, 1529, 1005, 1525],
            "text": "Gert",
            "confidence": "Low"
          },
          {
            "boundingBox": [1467, 1382, 1997, 1381, 1994, 1537, 1467, 1530],
            "text": "Robyns",
            "confidence": "Low"
          }
        ]
      },
      {
        "boundingBox": [773, 1583, 941, 1585, 941, 1646, 772, 1644],
        "text": "Email:",
        "words": [
          {
            "boundingBox": [778, 1586, 940, 1585, 940, 1647, 777, 1643],
            "text": "Email:",
            "confidence": "Low"
          }
        ]
      },
      {
        "boundingBox": [987, 1547, 2832, 1535, 2833, 1700, 988, 1711],
        "text": "grobyns@microsoft.com",
        "words": [
          {
            "boundingBox": [1015, 1560, 1722, 1554, 1726, 1700, 1020, 1700],
            "text": "grobyns@",
            "confidence": "Low"
          },
          {
            "boundingBox": [1777, 1554, 2815, 1536, 2816, 1702, 1781, 1700],
            "text": "microsoft.com",
            "confidence": "Low"
          }
        ]
      }
    ]
  }
}
```

Questionnaire - Handouts
CRONUS International Ltd.

Profile Questionnaire Header: Code: COMPANY

COMPANY General company information

Number of Answers	Description	Answer
One only	Name:	Gert Robyns
One only	Email:	grobyns@microsoft.com
One only	No. of employees	<div><div>1..99</div><div>100..499</div><div>500..999</div><div>1000+</div><div><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/></div></div>
One only	Company Ownership	<div><div>Stock Exchange</div><div>Family</div><div>Foundation</div><div>Government</div><div>Institution</div><div><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div></div>
One only	Additional Business Relations	<div><div>Partner</div><div>Competitor</div><div><input checked="" type="checkbox"/> <input type="checkbox"/></div></div>

Extension UI

New

More options

 Process Picture

 Setup

General

Profile Code

COMPANY

Created On

11/12/2019 3:29 PM

Contact No.

Questionnaire Response Subpage		Manage	
Question	Response Text	Response Selection	
→ Name:	Gert Robyus	<input type="checkbox"/>	
Email:	grobyns@ microsoft.com	<input type="checkbox"/>	
No. of employees	1000+	<input checked="" type="checkbox"/>	
Company Ownership	Stock Exchange	<input checked="" type="checkbox"/>	
Additional Business Relations	Partner	<input checked="" type="checkbox"/>	

Questionnaire Response Picture

Questionnaire - Handouts

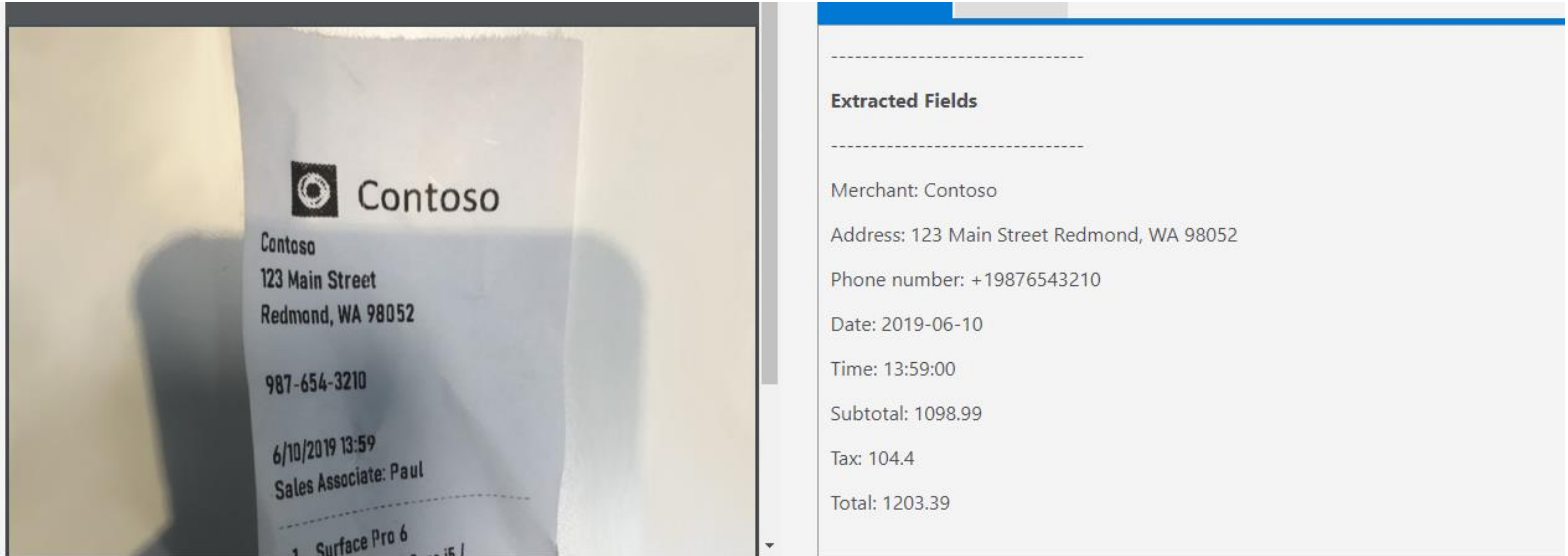
CROWN International Ltd.

Profile Questionnaire Header Code: COMPANY

COMPANY General company information

Number of Answers	Description	Answer
One only	Name	Gert Robyus
One only	Email	grobyns@microsoft.com
One only	No. of employees	<div><div>1-99</div><div>100-499</div><div>500-999</div><div>1000+</div></div> <div><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input checked="" type="checkbox"/></div>
One only	Company Ownership	<div><div>Stock Exchange</div><div>Family</div><div>Foundation</div><div>Government</div><div>Institution</div></div> <div><input checked="" type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/></div>
One only	Additional Business Relations	<div><div>Partner</div><div>Competitor</div></div> <div><input checked="" type="checkbox"/><input type="checkbox"/></div>

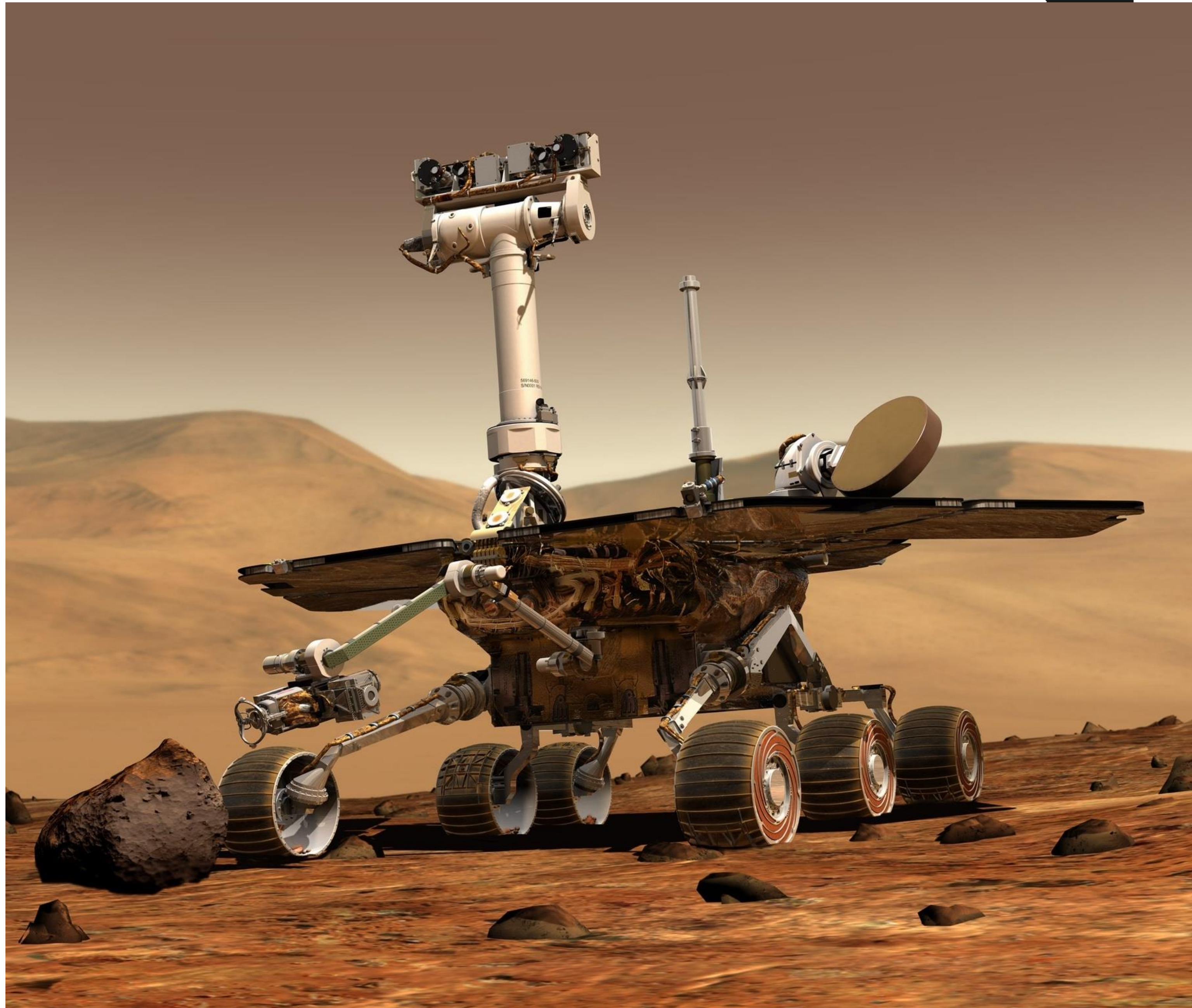
(Preview) Form Recognizer



The screenshot displays the Azure Form Recognizer interface. On the left, a receipt from 'Contoso' is shown. The receipt includes the company logo, name, address (123 Main Street, Redmond, WA 98052), phone number (987-654-3210), date and time (6/10/2019 13:59), sales associate (Paul), and a list of items (Surface Pro 6). On the right, the 'Extracted Fields' section lists the following information:

Field	Value
Merchant	Contoso
Address	123 Main Street Redmond, WA 98052
Phone number	+19876543210
Date	2019-06-10
Time	13:59:00
Subtotal	1098.99
Tax	104.4
Total	1203.39

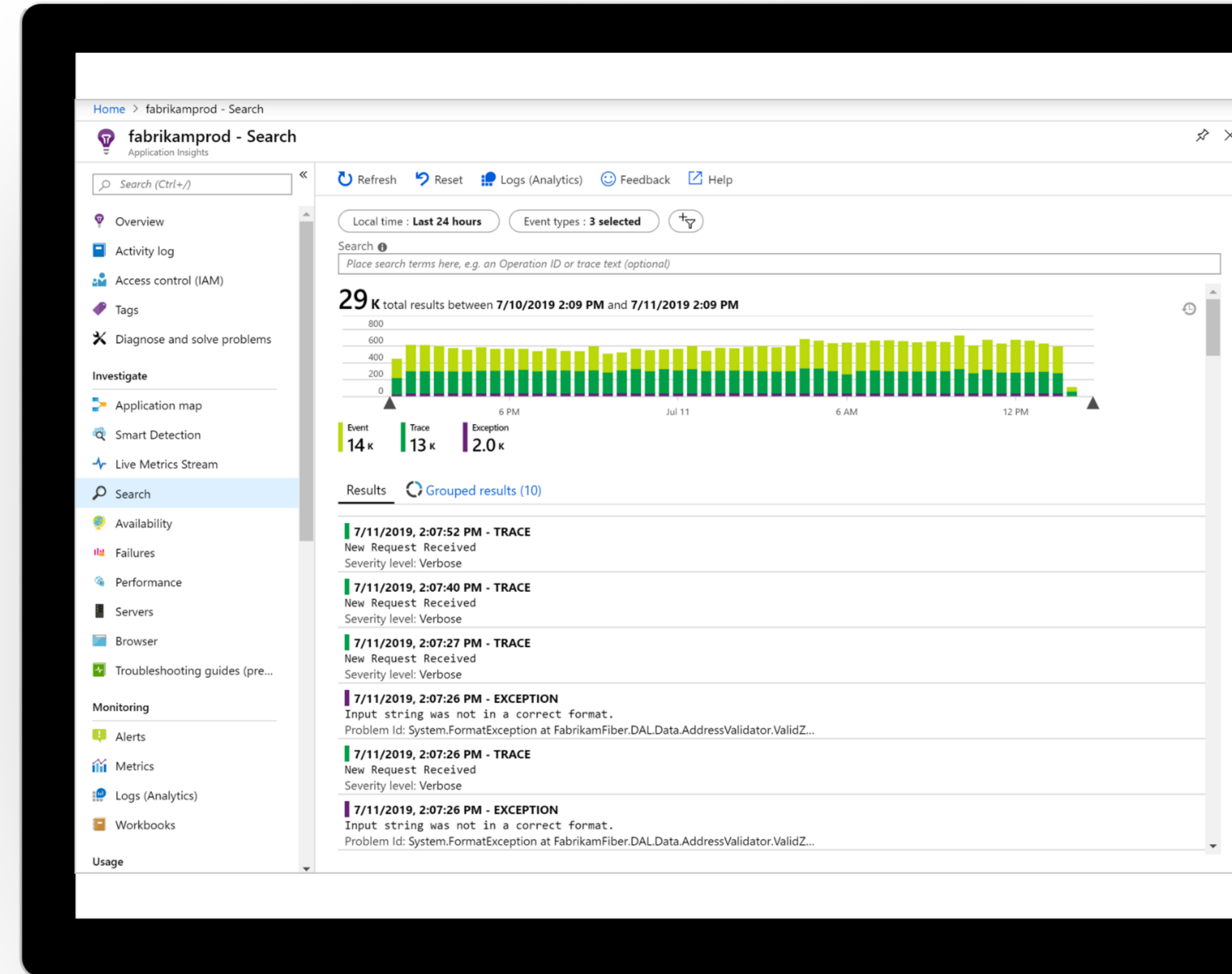
Telemetry



What is telemetry?

From Wikipedia:

“Telemetry is the collection of measurements or other data at remote or inaccessible points and their automatic transmission to receiving equipment for monitoring”



Different types of telemetry

Monitoring
and
Alerting

“What is going on”

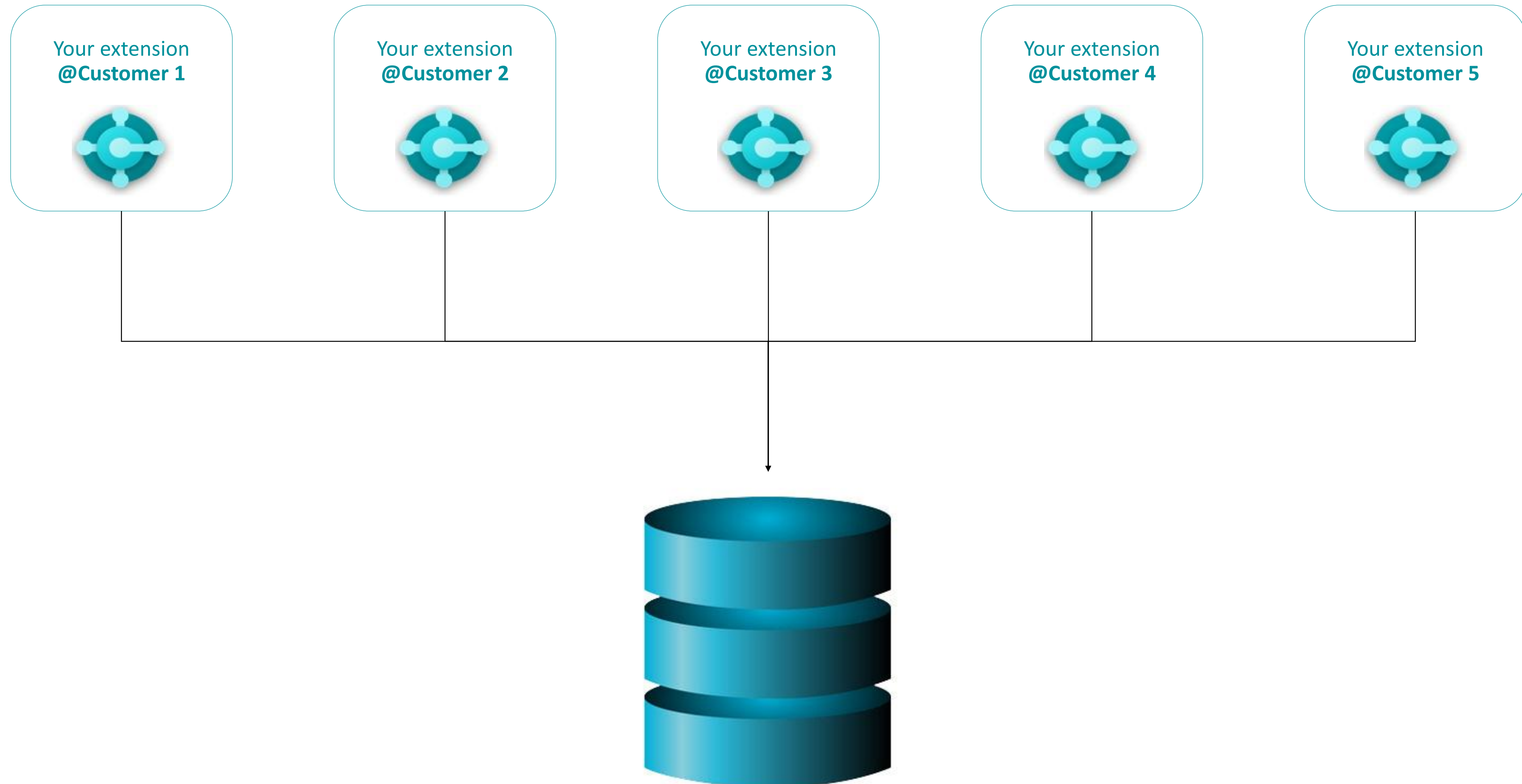
Diagnostics
and
troubleshooting

“What happened”

Usage

“What features of my application
are used and how ”

Data aggregation across users and tenants

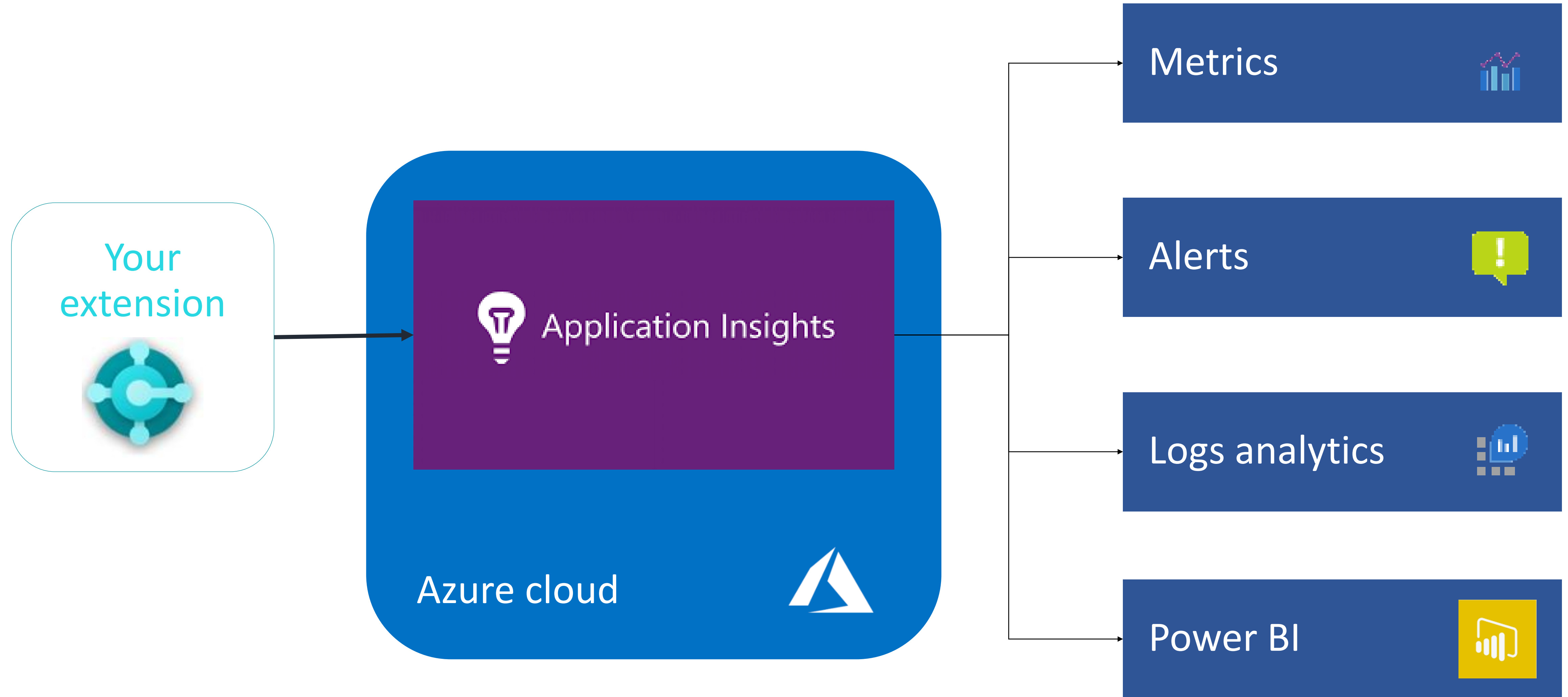


Introducing:



Application Insights

How does Application Insights works?



Type of telemetry emissions

TrackPageView

Which pages
are shown

TrackTrace

Diagnostic log
messages

TrackEvent

User actions
Other events
User behavior
Performance

TrackException

Failures for
diagnosis and
trouble-
shooting

TrackMetric

Performance
not related to
other event

TrackDependency

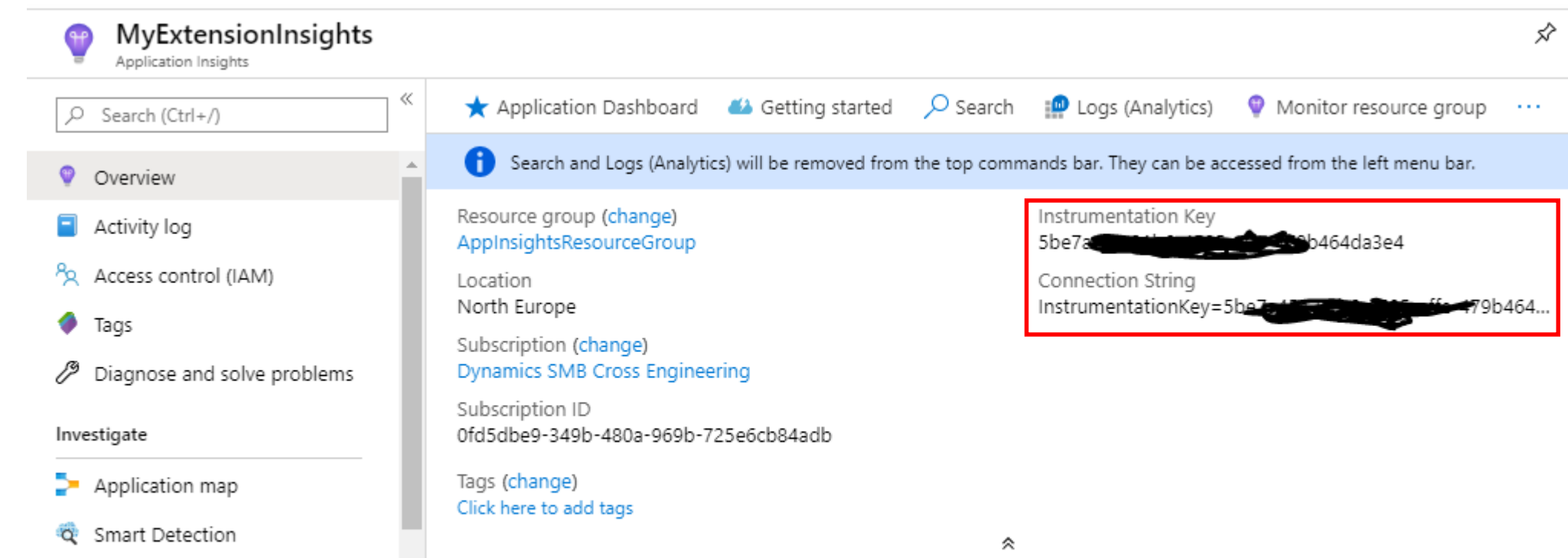
Logging the
duration and
frequency of
calls to
external
components
that your app
depends on

DEMO

Application Insights

Anatomy of an Application Insights telemetry emission

Application Insights instrumentation key



HTTP Post request to <https://dc.services.visualstudio.com/v2/track>

JSON information in the body

```
{
  "name": "ALExtension.MyExtension",
  "time": "2019-01-21T15:17:34.5563567Z",
  "iKey": "<your instrumentation key>",
  "data": {
    "baseType": "PageViewData",
    "baseData": {
      "ver": 2,
      "name": "MyPage"
    }
  }
}
```


TrackPageView

```
"name": "ALExtension.MyExtension",
"time": "2019-01-21T15:17:34.5563567Z",
"iKey": "<your instrumentation key>",
"data": {
  "baseType": "PageViewData",
  "baseData": {
    "ver": 2,
    "name": "MyPage"
  }
}
```

TrackTrace

```
"name": " ALExtension.MyExtension ",
"time": "2019-01-21T15:17:34.5563567Z",
"iKey": "<your instrumentation key>",
"data": {
  "baseType": "MessageData",
  "baseData": {
    "ver": 2,
    "message": "Some diagnostic message",
    "properties": {
      "property 1": "Value1",
      "property 2": "Value2",
      "property 3": "Value3"
    }
  }
}
```

TrackEvent

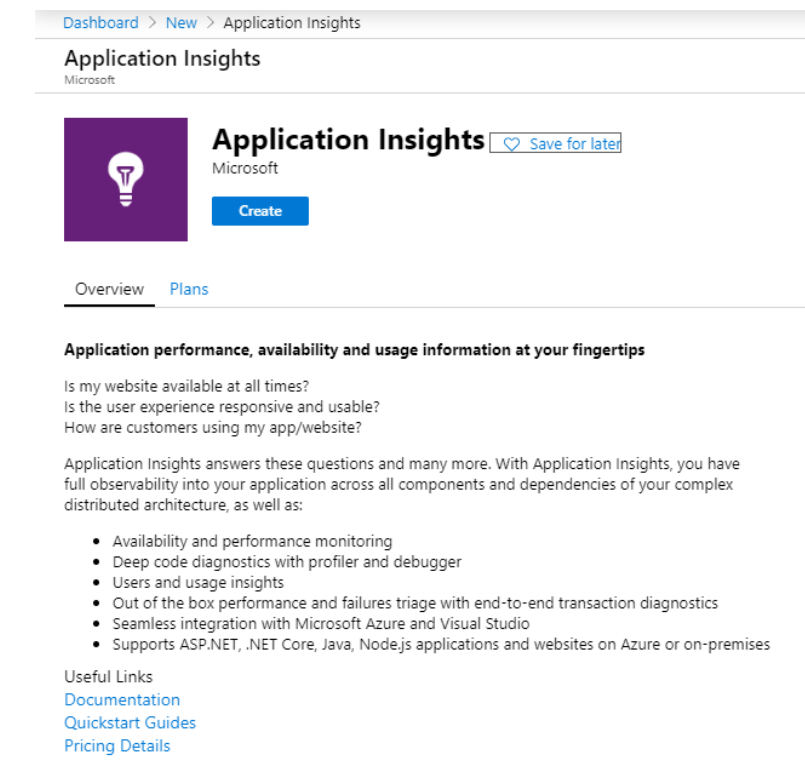
```
"name": "ALExtension.MyExtension",
"time": "2019-01-21T15:17:34.5563567Z",
"iKey": "<your instrumentation key>",
"data": {
  "baseType": "EventData",
  "baseData": {
    "name": "Some event",
    "ver": 2,
    "properties": {
      "Prop1": "Prop1Value",
      "Prop2": "Prop2Value",
      "Prop3": "Prop3Value"
    },
    "measurements": {
      "Metric1": 100.0,
      "Metric2": 11.0,
      "Metric3": 65.0
    }
  }
}
```

TrackException

```
"name": "ALExtension.MyExtension",
"time": "2019-01-21T15:17:34.5563567Z",
"iKey": "<your instrumentation key>",
"data": {
  "baseType": "ExceptionData",
  "baseData": {
    "ver": 2,
    "exceptions": [
      {
        "typeName": "MyExtensionException",
        "message": "Something wrong happened"
      }
    ]
  }
}
```

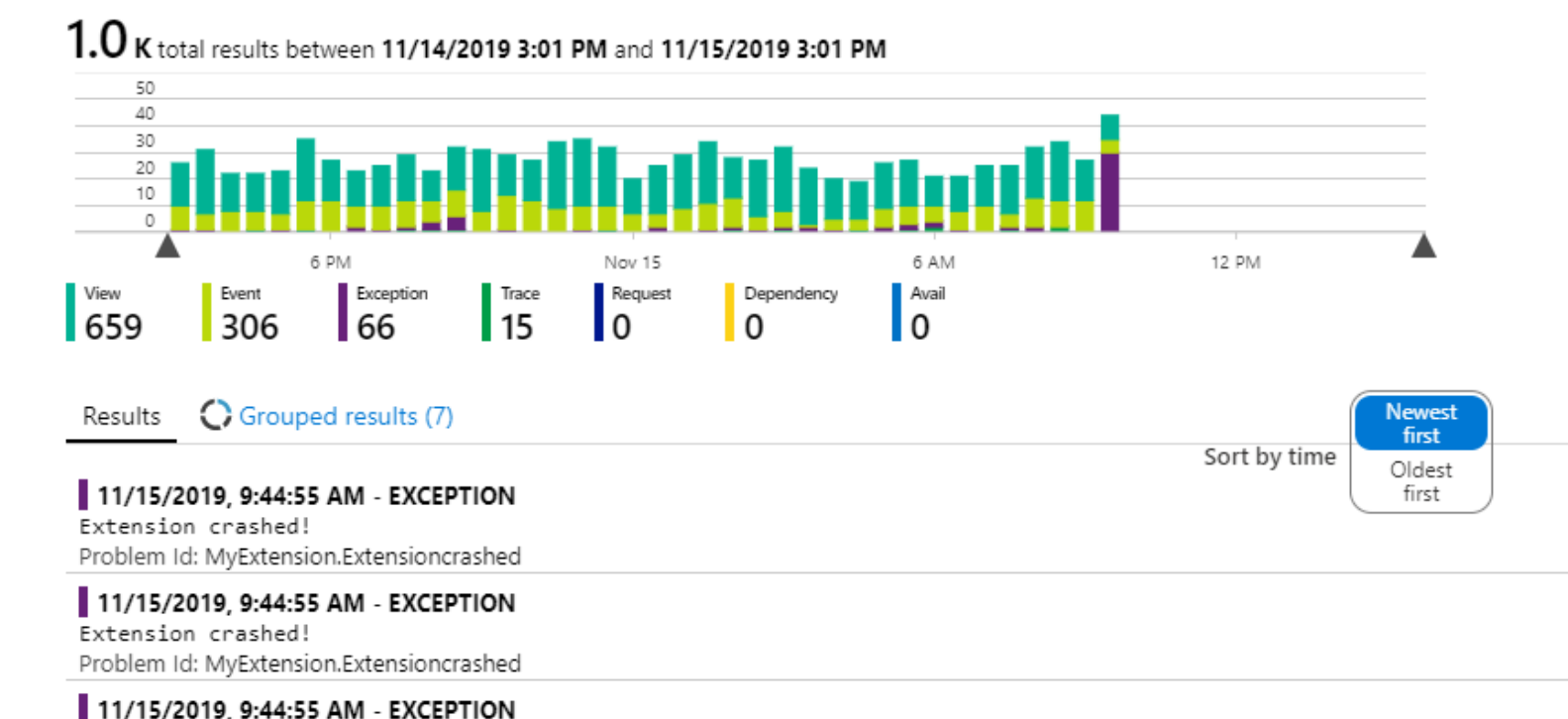
Recipe

1. Create an Application Insights service
2. In AL, create the JSON object with telemetry data
3. Invoke the Application Insights REST API
4. Create dashboards and alerts in Application Insights



```
"name": " ALExtension.MyExtension ",
"time": "2019-01-21T15:17:34.5563567Z",
"iKey": "<your instrumentation key>",
"data": {
  "baseType": "MessageData",
  "baseData": {
    "ver": 2,
    "message": "Some diagnostic message",
    "properties": {
      "property 1": "Value1",
      "property 2": "Value2",
      "property 3": "Value3"
    }
  }
}
```

Post to <https://dc.services.visualstudio.com/v2/track>



Emitting from AL

```
procedure TrackPageView(var PageName: Text) : Text
var
    AppInsightKey: Label '5be7a45c-xxxx-yyyy-zzzz-479b464da3e4';
    URL: label 'https://dc.services.visualstudio.com/v2/track';
    Client: HttpClient;
    Response: HttpResponseMessage;
    Headers: HttpHeaders;
    Content: HttpContent;
    Result: Text;
    JSON: JsonObject;
    JSONData: JsonObject;
    JSONEventData: JsonObject;
    TimeStamp: Text;
begin
    // Build the JSON data
    JSON.Add('name', 'ALExtension.MyExtension');
    TimeStamp := Format(CurrentDateTime(), 0, '<Year4>-<Month,2>-<Day,2>T<Hours24,2>:<Minutes,2>:<Seconds,2><Second dec.>');
    JSON.Add('time', TimeStamp);
    JSON.Add('iKey', AppInsightKey);

    JSONData.Add('baseType', 'PageViewData');
    JSONEventData.Add('name', PageName);
    JSONEventData.Add('duration', '00:00:00');
    JSONEventData.Add('ver', 2);
    JSONData.Add('baseData', JSONEventData);
    JSON.Add('data', JSONData);
```

```
{
  "name": "ALExtension.MyExtension",
  "time": "2019-11-23T11:09:05.8469124Z",
  "iKey": "<your Application Insights key>",
  "data": {
    "baseType": "PageViewData",
    "baseData": {
      "ver": 2,
      "name": "My page"
    }
  }
}
```

```
// Add the JSON data to the request content
Content.Clear();
Content.WriteFrom(Format(JSON));

// Add the Content-Type to the Content headers
Content.GetHeaders(Headers);
Headers.Remove('Content-Type');
Headers.Add('Content-Type', 'application/json');

Client.Post(URL, Content, Response);
Response.Content().ReadAs(Result);
Exit(Result);
end;
```

BYO Application Insights key

- Combine your telemetry with Microsoft's
- Available on version 15.x
- Configurable from the Tenant Admin Center
- First version: Long running queries
- Future:
 - Report execution time
 - OData usage

Translation with Azure cognitive Services



Cognitive Services

Vision

Recognize, identify, caption, index, and moderate your pictures, videos, and digital ink content.

- Computer Vision
- Custom Vision
- Face
- Form Recognizer (Preview)
- Ink Recognizer (Preview)
- Video Indexer

Language

Allow your apps to process natural language with pre-built scripts, evaluate sentiment and learn how to recognize what users want.

- Immersive Reader (Preview)
- Language Understanding (LUIS)
- QnA Maker
- Text Analytics
- Translator Text

Speech

Convert speech into text and text into natural-sounding speech. Translate from one language to another and enable speaker verification and recognition.

- Speech Services
- Speaker Recognition (Preview)
- Bing Speech (Retiring)

Decision

Build apps that surface recommendations for informed and efficient decision-making.

- Anomaly Detector (Preview)
- Content Moderator
- Personalizer

Search

Add Bing Search APIs to your apps and harness the ability to comb billions of webpages, images, videos, and news with a single API call.

- Autosuggest Search
- Custom Search
- Entity Search
- Image Search
- Local Business Search (Preview)
- News Search
- Spell Check
- Video Search
- Visual Search
- Web Search

Cognitive Service Containers

Container support in Azure Cognitive Services allows developers to use the same rich APIs that are available in Azure, and enables flexibility in where to deploy and host the services that come with Docker containers.


- Cognitive Service Containers
- Create containers for reuse
- Deploy and run container on Azure Container Instance
- Deploy to Azure Kubernetes Service
- Use Docker Compose to deploy multiple containers
- Cognitive Services containers FAQ

DEMO


XLIFF files

Translator Text

Microsoft



Dashboard > BCTranslator - Keys

 **BCTranslator - Keys**
Cognitive Services

Search (Ctrl+)

Regenerate Key1 Regenerate Key2

NAME

BCTranslator

KEY 1

[REDACTED]

KEY 2

[REDACTED]

Overview

Microsoft Tra
any solution r
and more.

Extend the r

Translate text

Transliterate

Display text ir
alphabet, and

Bilingual dic

Find alternati

Add both on

With the Micr
translation ca
when it is off

Automaticall

Easily and acc

Build custom

With Custom
vocabulary.

Useful Links

[More about Translator Text API](#)

[Documentation](#)

[API reference](#)

[Pricing](#)

[Regional availability](#)

Overview

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

RESOURCE MANAGEMENT

Keys

Quick start

Pricing tier

Billing By Subscription

Properties

Useful Links
[More about Translator Text API](#)
[Documentation](#)
[API reference](#)
[Pricing](#)
[Regional availability](#)

Translator Text REST API

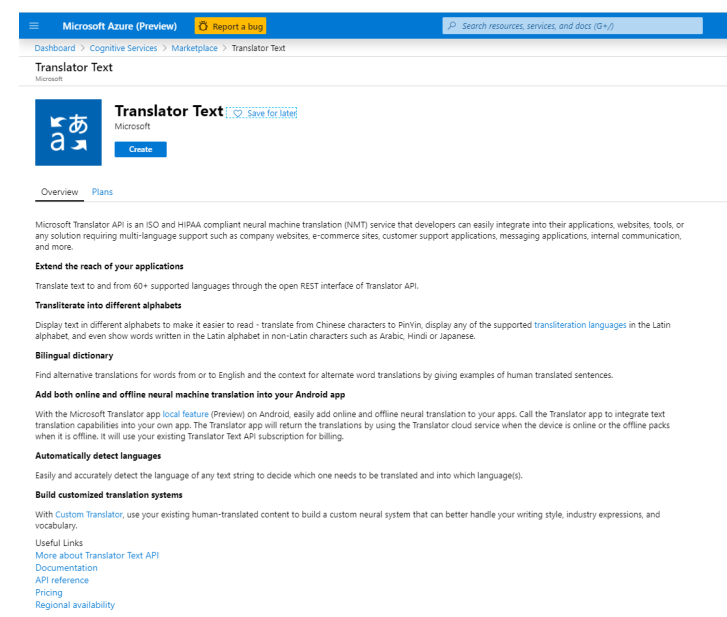
POST <https://api.cognitive.microsofttranslator.com/translate?api-version=3.0&from=sourcelanguage&to=targetlanguage>

Body of the request

```
[
  {
    "Text": "Customer name"
  },
  {
    "Text": "Balance"
  },
  {
    "Text": "Total sales"
  },
  {
    "Text": "Phone no."
  },
  {
    "Text": "Address"
  },
  ...
]
```

Recipe

1. Create a Translator Text service
2. Generate the XLIFF file
3. Extract the strings from the XLIFF file
4. Invoke the Translator Text API
5. Parse the json result
6. Write the strings back to the XLIFF file



In app.json add:
`"features": ["TranslationFile"]`

```
{  
  "Text": "Customer name"  
},  
{  
  "Text": "Balance"  
},  
...
```

<https://api.cognitive.microsofttranslator.com/translate?api-version=3.0&from=sourcelanguage&to=targetlanguage>

```
{  
  "translations": [  
    {  
      "text": "Kundenname",  
      "to": "de"  
    }  
  ],  
},  
{  
  "translations": [  
    {  
      "text": "Gleichgewicht",  
      "to": "de"  
    }  
  ],  
},  
...
```

```
<trans-unit id="Table 3881164589 ..."  
  <source>Customer name</source>  
  <target>Kundenname</target>  
</trans-unit>
```

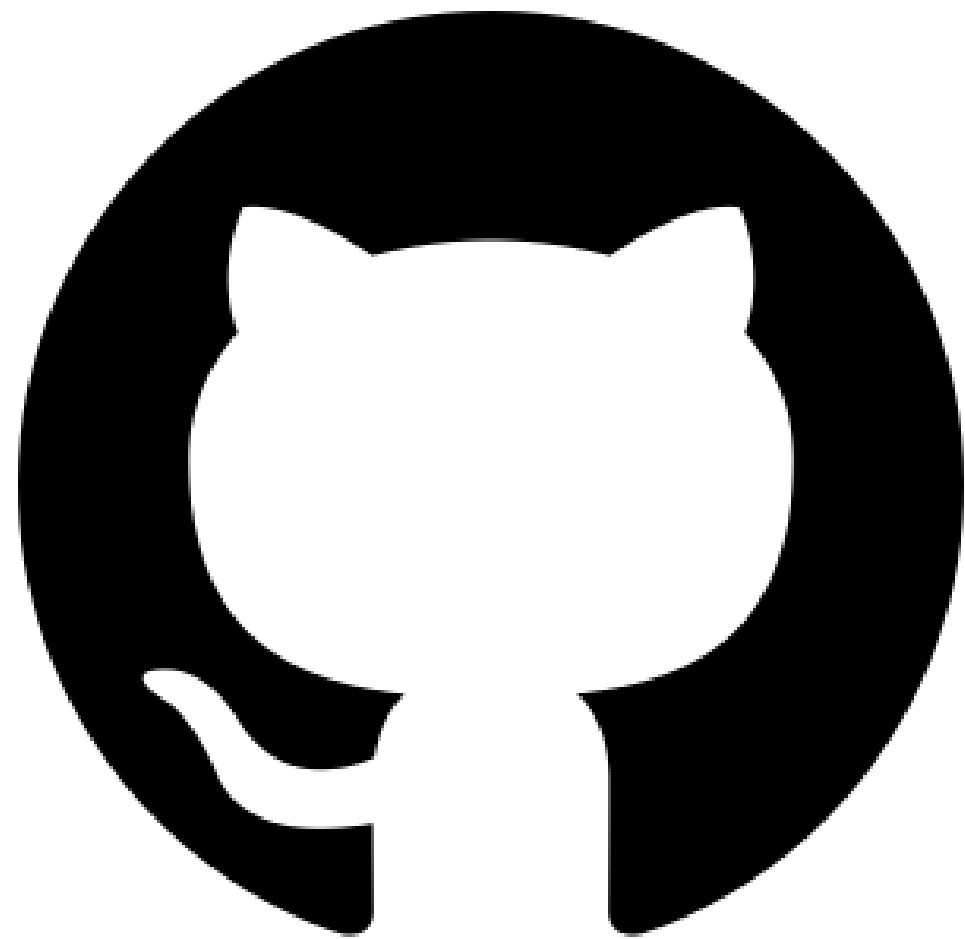

DEMO

*Machine translation in action
in a VS Code extension*

How much does all this cost?

	Free units included	Price
Application Insights	5GB per customer per month	~€2 per GB for more than 5GB
Translator Text	2M characters per month	~€8 per additional million characters
OCR/Text recognition	-	~€1-€2 per 1000 transactions
IoT Central	5 devices	~€1.7 per device/month
Logic Apps		~€2.2 per 100k executions
Key Vault		~€2.7 per million transactions
Service Bus		~€0.043 per million operations
Blob Storage		~€0.001 per GB per month
Service Bus Relay	includes 5 GB of data per month	~€8.25 per listener

<https://azure.microsoft.com/en-us/pricing/calculator/>



<https://www.github.com/Microsoft/BCTech>



<https://aka.ms/BCTech>

*Thank
You!*