

# 透過 Microsoft Power BI 將 資料融入生活

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Microsoft DX

# 01

## Power BI 簡介以及 Power BI 家族

- 新一代商業智慧 (BI, Business Intelligence)
- 認識 Microsoft Power BI
- Power BI 功能概觀
- 開始使用 Power BI

# 新一化的商業智慧 (BI) 工具

時至今日, 每個人都需要 BI

3rd wave  
用戶型 BI



每個人自行操作

2nd wave  
自助式 BI



由分析師提供

1st wave  
技術型 BI



由 IT 人員提供

# 新一化的商業智慧 (BI) 工具

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將資料轉換成商業洞察 (business insights) 很有挑戰性

## 常見的 BI 挑戰包括了...



### 端至端的視野

資料經常散落在各地，如果想要看到整個商業全貌就會有點麻煩



### 多重資料來源

有些資料儲存在 SaaS 服務中，或是其它外部地點，若要安全地經常更新資料也會很麻煩



### 在對的時間將對的資料 呈現給對的用戶

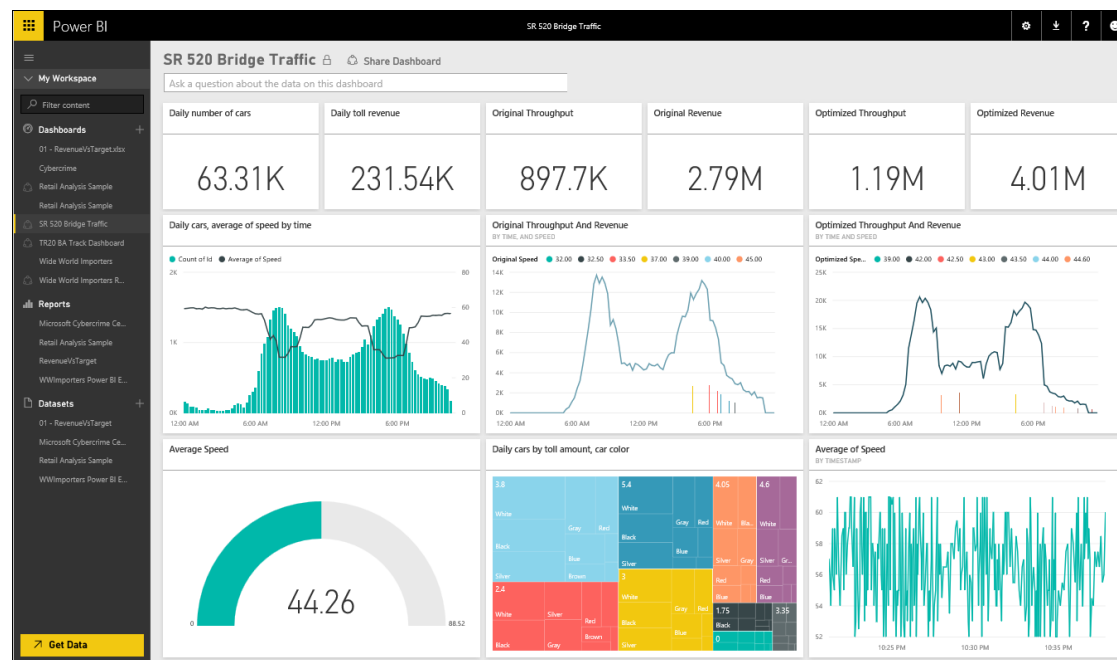
不同的角色有不同的需要，而做商業決策的人可能需要最新的資料

# 認識 Microsoft Power BI

重新認識你的資料，不論它們是哪種形式...

Power BI 是一個以雲端為基礎的商業分析服務，它讓用戶能夠：

- 快速且容易存取到資料
- 即時檢視 360° 的商業面貌
- 發現及探索資料的內涵
- 從任何裝置中讀取洞察結果
- 在組織間共享文件
- 任何人都能輕易視覺化或分析資料



# 認識 Microsoft Power BI

## 主要特色及差異化



內建由知名 SaaS 服務所組成儀表板、報表的內容套件



即時儀表板更新



安全、即時連結您的資料來源，不論是在自家機房還是在雲端平台



使用自然語言查詢直觀的資料探索



與熟悉的微軟產品整合，並且透過 Azure 得到延展性及可得性



快速部署、混合式設定、安全並且與既有的 IT 系統整合



# Power BI 概觀


## 資料來源

-  SaaS 解決方案  
E.g. Marketo, Salesforce, GitHub, Google analytics
-  傳統機房內的資料  
E.g. Analysis Services
-  組織的內容套件  
Corporate data sources, or external data services
-  Azure 服務  
E.g. Azure SQL, Stream Analytics
-  Excel 檔案  
Workbook data or data models
-  Power BI Desktop 檔案  
Related data from files, databases, Azure, and other sources

## Power BI 服務

-  內容套件
-  即時儀表板
-  視覺化
-  報表
-  資料集
-  資料更新

 自然語言查詢

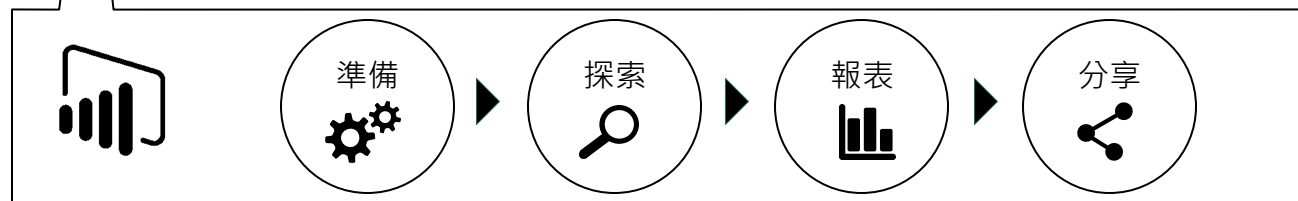
 分享與協作



# Power BI 概觀



## Power BI Desktop



自然語言查詢 (Natural Language Query)

分享與協作 (Sharing and Collaboration)



## Power BI REST API

```
{  
  "name": "(String)",  
  "tables": [  
    ...  
  ]  
}
```

```
{  
  "name": "(String)",  
  "columns": [  
    {  
      "name": "(String)",  
      "dataType": "(String)"  
    },  
    ...  
  ]  
}
```



# Power BI 概觀

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不論身處何種產業、擔任何種職位，Power BI 都與您有關

## 商務人士

- 從 SaaS 服務中匯入資料，並且操作報表及儀表板

## 商業分析師

- Import, reshape, integrate and model data
- Create compelling reports and visualizations
- Create content packs to share insights

## BI professional

- Connect to live Azure data services
- Connect to on-premises Analysis Services databases
- Empower colleagues to create their own reports

## Developer

- Integrate applications with Power BI
- Create real-time dashboards
- Develop custom visuals

# 開始使用 Power BI

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## 免費註冊、幾秒內就能開始使用

- Power BI 僅支援公司、組織或學校的帳號

**Let us help you bring  
your data to life**

Power BI transforms your company's data into rich visuals for you to collect and organize so you can focus on what matters to you. Stay in the know, spot trends as they happen, and push your business further.

Use it free

By clicking Use it free, you agree to the Power BI Preview Terms of Service

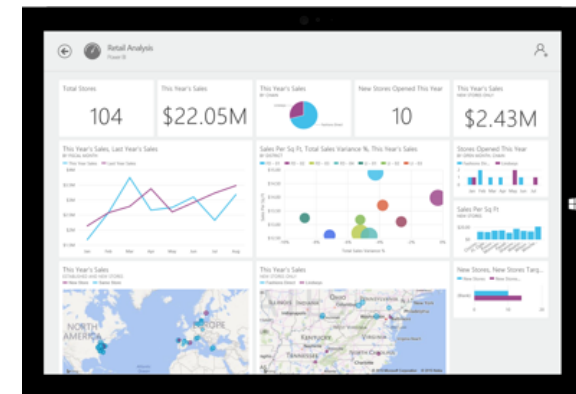
# 行動裝置應用程式

在您的行動裝置上，使用原生的應用程式來存取儀表板，支援：

- Windows
- iOS (iPhone and iPad)
- Android

行動應用程式的功能：

- 針對重要的視覺化圖表設定最愛
- 縮放檢視視覺化圖表
- 在圖表上標記並分享給其它人
- 針對關鍵的商業指標設定警示或通知



# 02

## 認識並建立資料集

- 內容套件
- 連接資料來源
- DirectQuery

# 從 Power BI 連接資料來源

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➤ Get Data

從 Power BI 中連接資料很簡單，並且支援多種不同的格式：

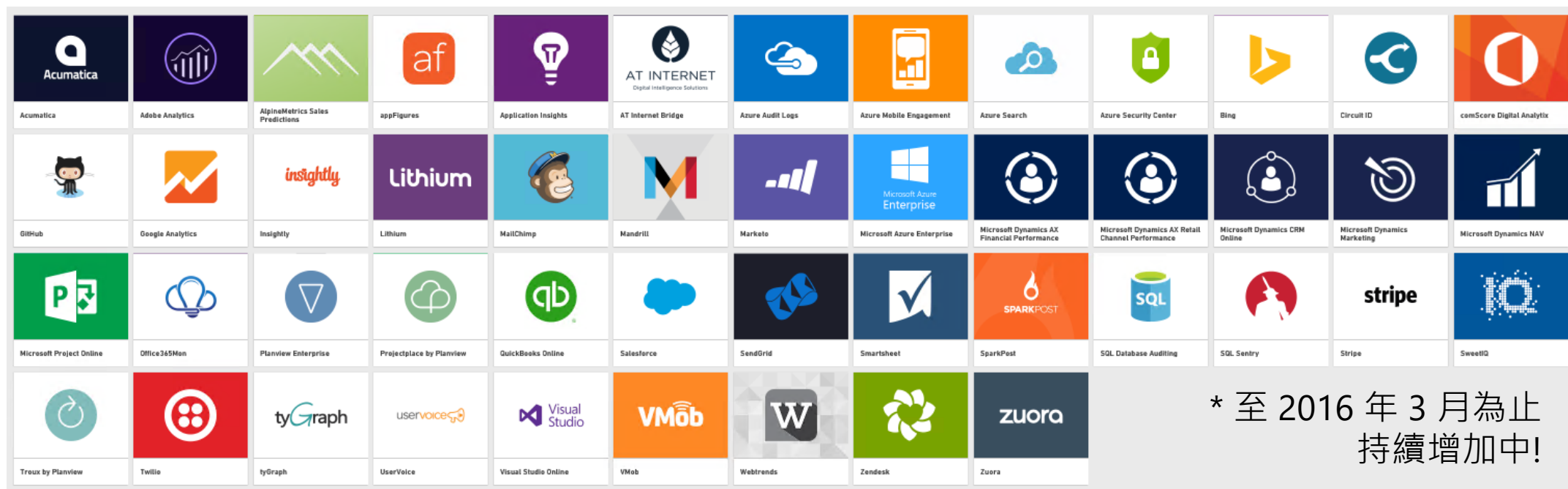
- 內容套件：
  - 從我的組織
  - 網路服務
- 檔案，包括：
  - Power BI Desktop 檔案
  - Excel 工作簿
- 資料庫及資料服務 – 同時包含雲端平台及傳統機房

# 從 Power BI 連接資料來源

格式: 內容套件: SaaS 應用程式

## Power BI 能夠連接 SaaS 應用程式

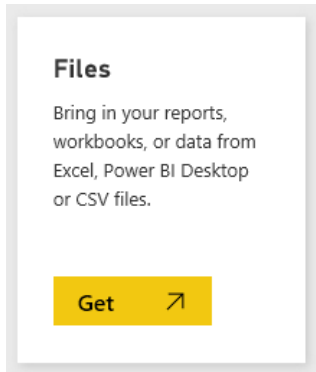
- 必須原本就擁有帳號
- 每個內容套件提供預先建立好的儀表板及報表



# 從 Power BI 連接資料來源

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格式: 檔案



## 透過上傳、或是連接至商務用 OneDrive 或個人用 OneDrive 來存取檔案資料

- 在 OneDrive 上檔案內容若有更新，儀表板及報表上的資料也會自動更新

## 支援的檔案類型:

- Power BI Desktop 檔案
- Excel 工作簿
- CSV 檔案

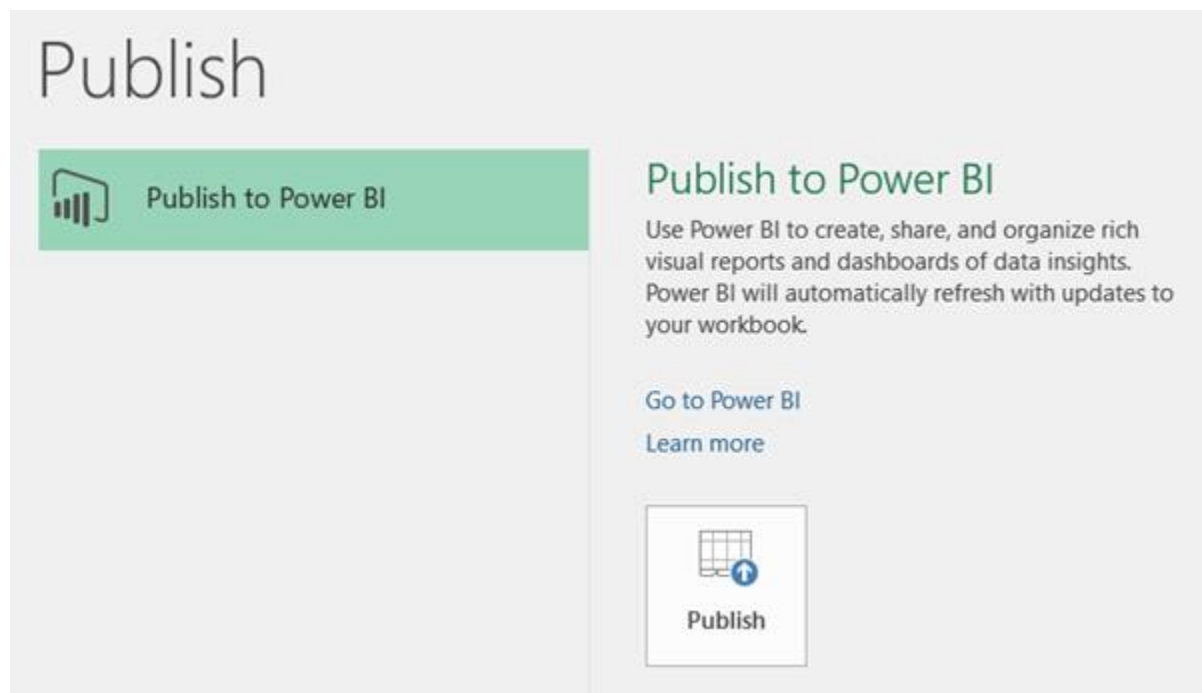
## 檔案大小上限: 250MB

# 從 Power BI 連接資料來源

格式: 檔案: Excel 2016

## Excel 2016 可以直接發佈至 Power BI 服務

- 發佈必須透過商務用 OneDrive
- 從 Excel 2016 更新資料內容也會反映在 Power BI 資料集中





# 從 Power BI 連接資料來源

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格式: 檔案: Power BI 名稱轉換

## Power BI Desktop 檔案:

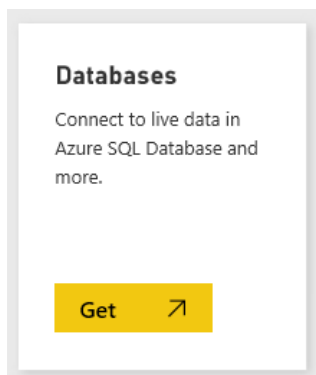
- 檔案 ► Power BI 資料集
- 報表 ► Power BI 報表
- An empty dashboard is automatically created, with a token tile to connect to the dataset (i.e. Q&A ready)

## Excel 工作簿:

- Data model content takes precedence over worksheet content
- Workbook data model ► Power BI dataset
- Power View sheets ► Pages of a Power BI report
- PivotTables, PivotCharts and custom fields are not recognized

# 從 Power BI 連接資料來源

格式: 資料庫及資料服務



## 透過 direct connect 功能連接，特定 Azure 服務

- 回到 Azure 上進行查詢並回傳資料 (儀表板上的磚每 15 分鐘更新)
- These experiences are intended for users who are familiar with the databases and entities they connect to
- 必須要用 **Power BI Pro** 授權才能使用



# 從 Power BI 連接資料來源

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Formats: Database and data services: SQL Server Analysis Services



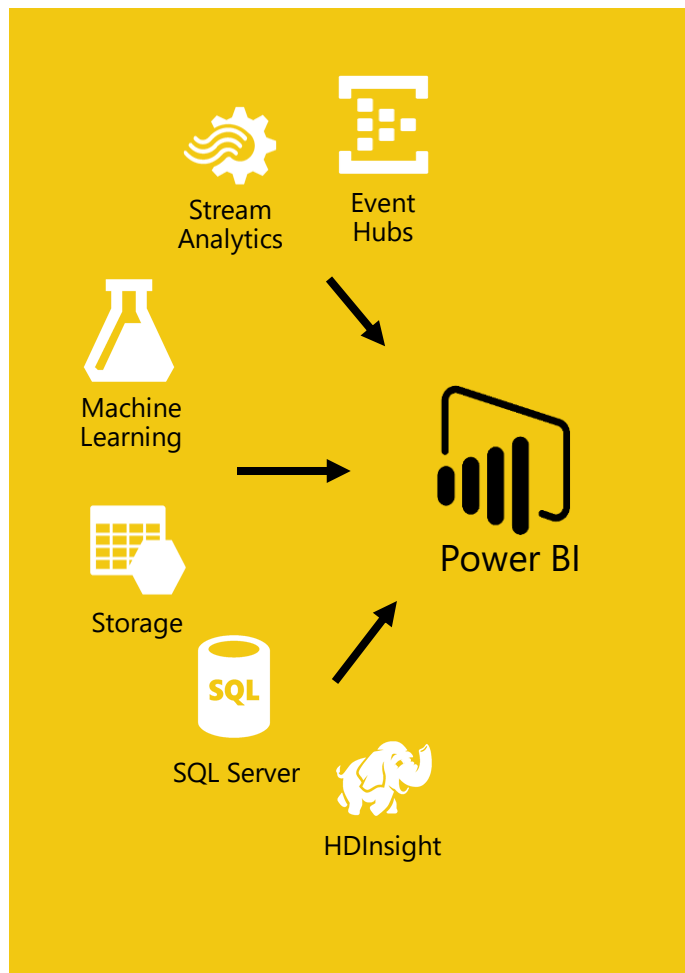
Live connections to on-premises data can be made to SQL Server Analysis Services

- Supported for SQL Server 2012 and later
- The user's identity is passed through, and so read access is required, and role permissions (row filters) will be enforced
- Q&A natural language querying is not supported
- Only available with the **Power BI Pro** license

Note: You can now work with live data from Analysis Services with the Power BI Gateway—Enterprise.

# 與 Azure 服務整合

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Azure 與 Power BI 已經內建一些連接與整合，便於讓資料能順暢流通。這些整合可以讓 IT 減少設計複雜程序的負擔：

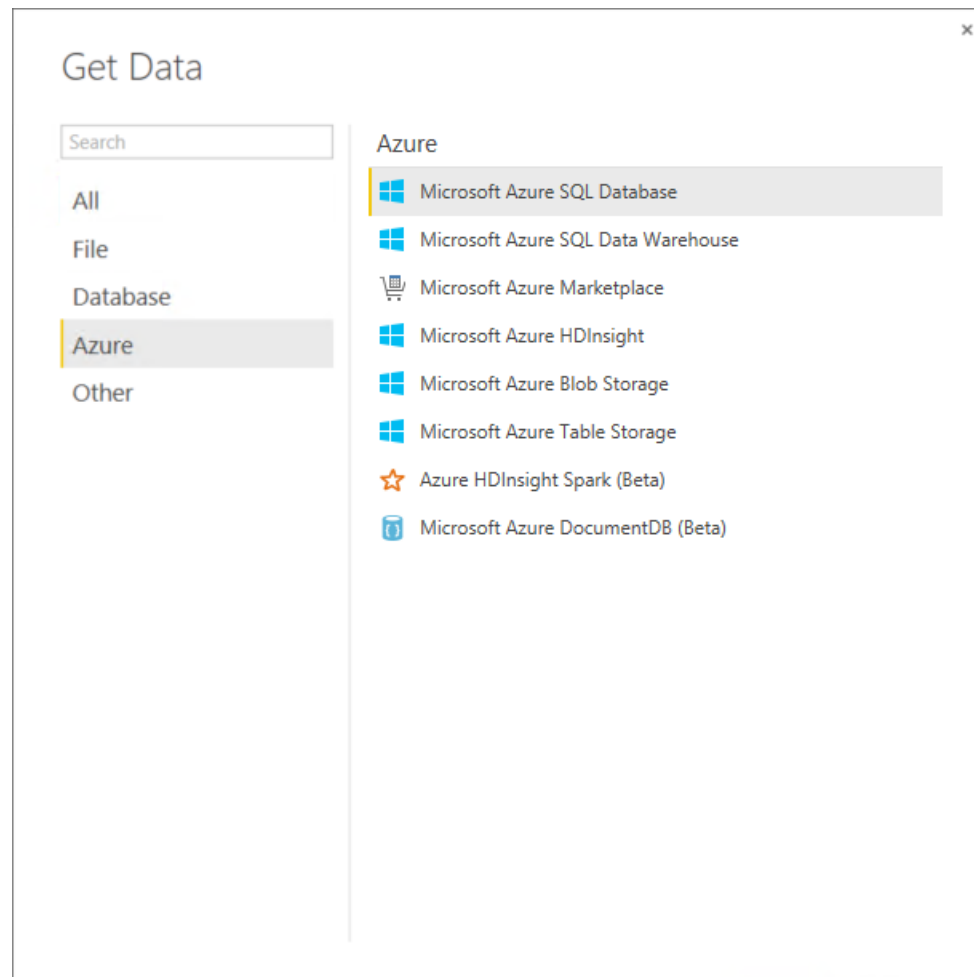
- Direct connect:
  - Azure SQL Database
  - Azure SQL Data Warehouse
  - Spark on Azure HDInsight
- Power BI Desktop
- 透過 Azure Stream Analytics 做即時儀表板更新

# 與 Azure 服務整合

Power BI Desktop

## 連接到不同的 Azure 服務，並且建立查詢

- 查詢可以與不同的資料來源進行整合，不一定要是 Azure
- 從 Power BI Desktop 檔案中取出的資料集也可以重新讀取

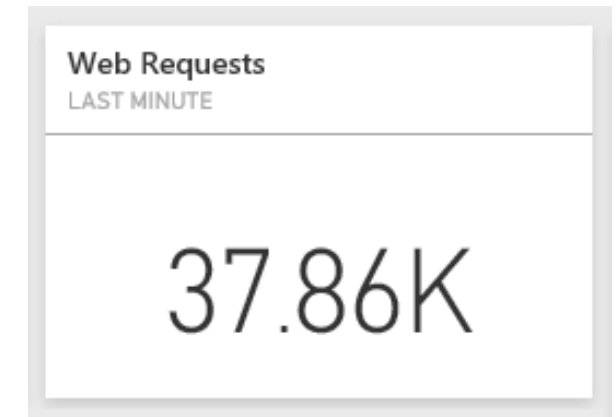


# 與 Azure 服務整合

透過 Azure Stream Analytics 做即時儀表板更新

## Use Azure Stream Analytics to push live, streaming data to Power BI

- Enables real-time dashboards at scale, over data from devices and applications
- Can stream millions of events per second
- Can perform aggregation over time windows



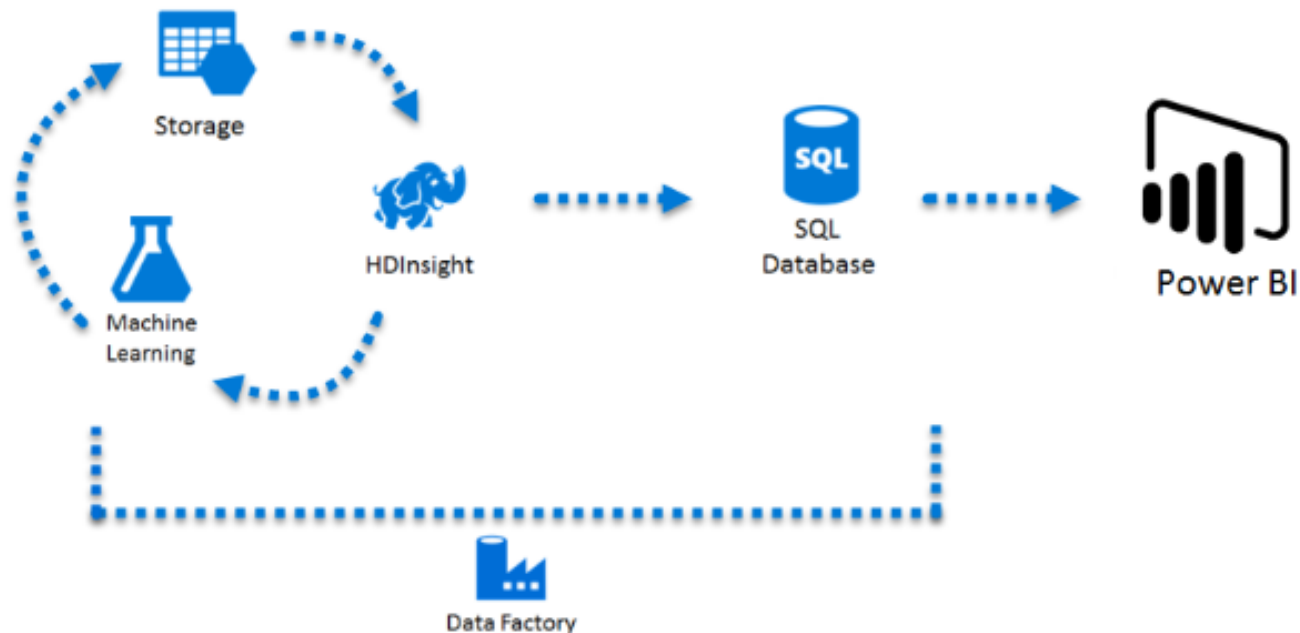
Tip: Use Q&A to ask: "Show Web Requests where Timestamp is last minute"

# 與 Azure 服務整合

進階分析操作

組合 Azure 服務來驅動進階資料分析：

- **Azure HDInsight:**  
處理大數據
- **Azure Machine Learning:**  
預測性分析
- **Azure Data Factory:**  
排程及延展



# 03

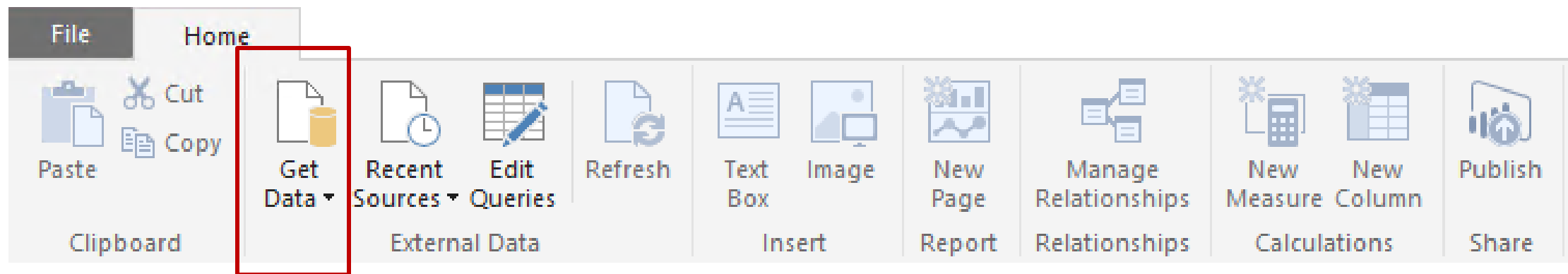
## 從資料集拉出報表

- 認識 Power BI Desktop
- 視覺化工具
- 上傳至 PowerBI.com
- 儀表板



# 從 Power BI Desktop 開始

用戶操作: 取得資料



“取得資料 (getting data)” 被定義為一種查詢

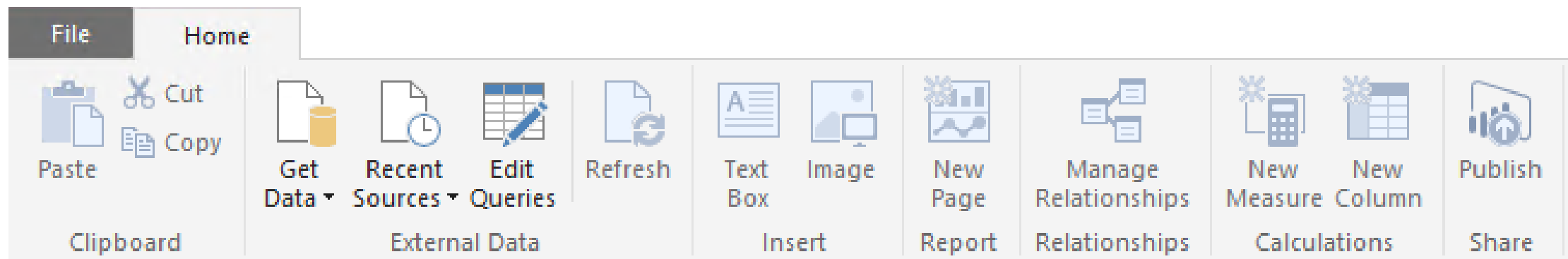
- 資料來源包括檔案、資料庫、Azure 及其它

能簡單快速地以 “as is” 載入資料

- 基本操作: Select type ► Define connection ► Authenticate ► Load
- Optionally, the **Query Editor** can be used to transform queries

# 從 Power BI Desktop 開始

用戶操作: 三種內容檢視



——→ 報表 檢視



——→ 資料 檢視



——→ 關聯 檢視

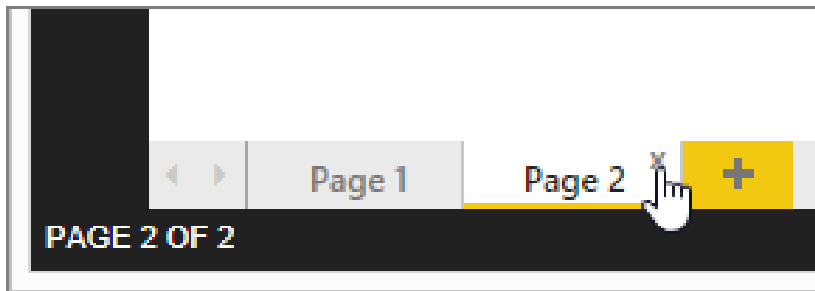
# 從 Power BI Desktop 開始

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User experience: Report view

Work in **Report View** to create any number of report pages with visualizations

- It provides almost the same design experience as the report Editing View in the Power BI service
- A report will have at least one blank page to start, and any number of pages can be added
- Pages appear, and can be managed, in the navigator pane



# Introducing Power BI Desktop

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User experience: Report view: Continued

The intent of the application is to land the user on the report canvas as quickly as possible

- Built-in intelligence will often infer relationships, and detect data types and categories
- Evidence suggests that most schemas are relatively simple, and so the optimized path is: Load data ► Visualize

Many model transformations can be applied while working in Report View

- Change data types, formats, calculation formulas
- Rename fields
- Sort columns
- Manage relationships

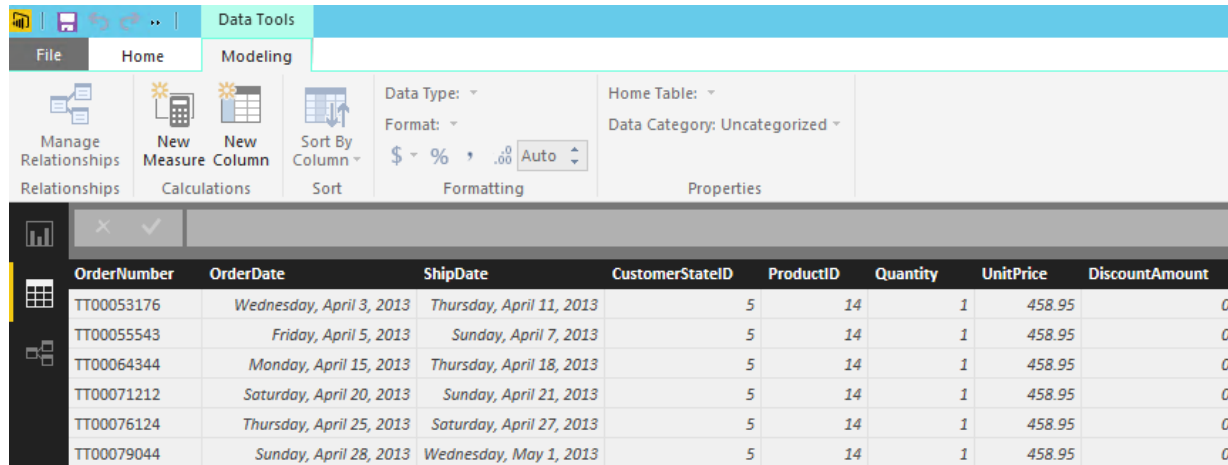
Note: The versatility of Report View, and the immediate visualization of model transformations, is a strong competitive advantage over many other data analysis and reporting products

# Introducing Power BI Desktop

User experience: Data view

Work in **Data View** to inspect, explore, and understand data in the model

- It is a different experience from how you can view tables, columns, and data in **Query Editor**
- This is a view of the data after it has been loaded into the model



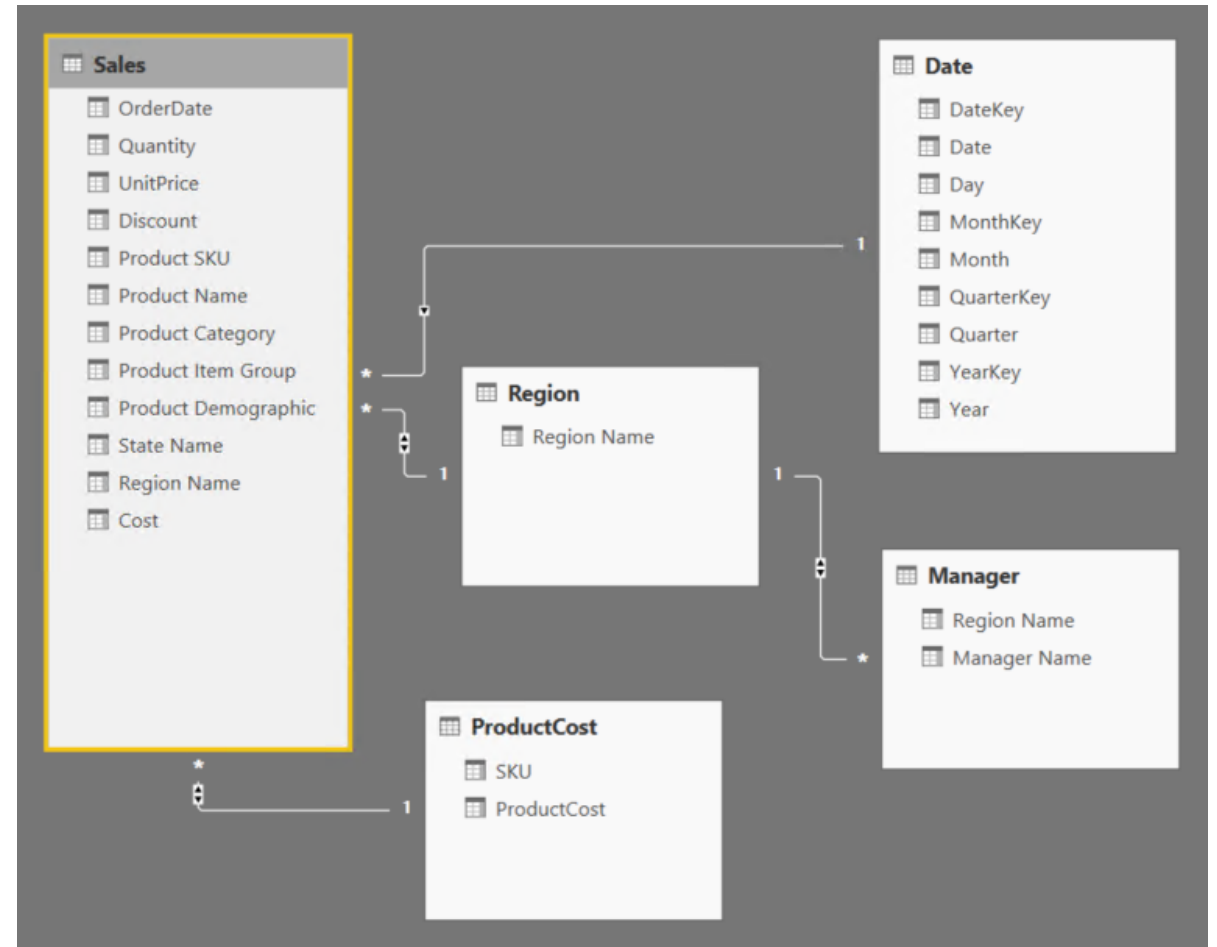
The screenshot displays the Power BI Desktop interface in Data View. The top ribbon includes 'File', 'Home', and 'Modeling'. The 'Modeling' tab is active, showing options for 'Manage Relationships', 'New Measure', 'New Column', 'Sort By Column', 'Data Type', 'Format', 'Home Table', and 'Data Category'. Below the ribbon, a table of order data is displayed. The table has columns for OrderNumber, OrderDate, ShipDate, CustomerStateID, ProductID, Quantity, UnitPrice, and DiscountAmount. The data shows six orders from April 3, 2013, to May 1, 2013, all with a quantity of 14 and a unit price of 458.95.

OrderNumber	OrderDate	ShipDate	CustomerStateID	ProductID	Quantity	UnitPrice	DiscountAmount
TT00053176	Wednesday, April 3, 2013	Thursday, April 11, 2013	5	14	1	458.95	0
TT00055543	Friday, April 5, 2013	Sunday, April 7, 2013	5	14	1	458.95	0
TT00064344	Monday, April 15, 2013	Thursday, April 18, 2013	5	14	1	458.95	0
TT00071212	Saturday, April 20, 2013	Sunday, April 21, 2013	5	14	1	458.95	0
TT00076124	Thursday, April 25, 2013	Saturday, April 27, 2013	5	14	1	458.95	0
TT00079044	Sunday, April 28, 2013	Wednesday, May 1, 2013	5	14	1	458.95	0

# Introducing Power BI Desktop

User experience: Relationships view

Work in  
**Relationships View**  
to view all tables,  
columns, measures  
and relationships in  
the model



# Introducing Power BI Desktop

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Complex schemas: Development methodology

In contrast to the simple and quick “get then visualize” approach, more complex schemas may follow this methodology:

1. Create queries and use the **Query Editor** to filter, cleanse and reshape data
2. Configure/refine relationships to establish the foundations of a model
3. Enrich the model with calculation logic and formatting
4. Design interactive reports with a broad range of modern data visualizations
5. Publish solutions directly to the Power BI service

Create  
queries

Configure  
relationships

Enhance the  
model

Design  
reports

Publish to  
Power BI

# 04

## 開發及擴充 Power BI

- Extending Power BI
- Power BI REST API
- Custom visuals



# 擴充 Power BI

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開發人員有下列幾種方式可以加強或客製化 Power BI 的功能及使用體驗

- Power BI REST API
- 自訂視覺化元件
- 將 Power BI 整合進應用程式中

# Power BI REST API

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在應用程式中使用 Power BI REST API 直接把資料推送到 Power BI 資料集

- Client application
- Web application

透過程式管理資源

- Datasets
- Tables

儀表板會在資料載入時即時更新

- No more waiting, or needing to press the Refresh button! 😊

# Power BI REST API

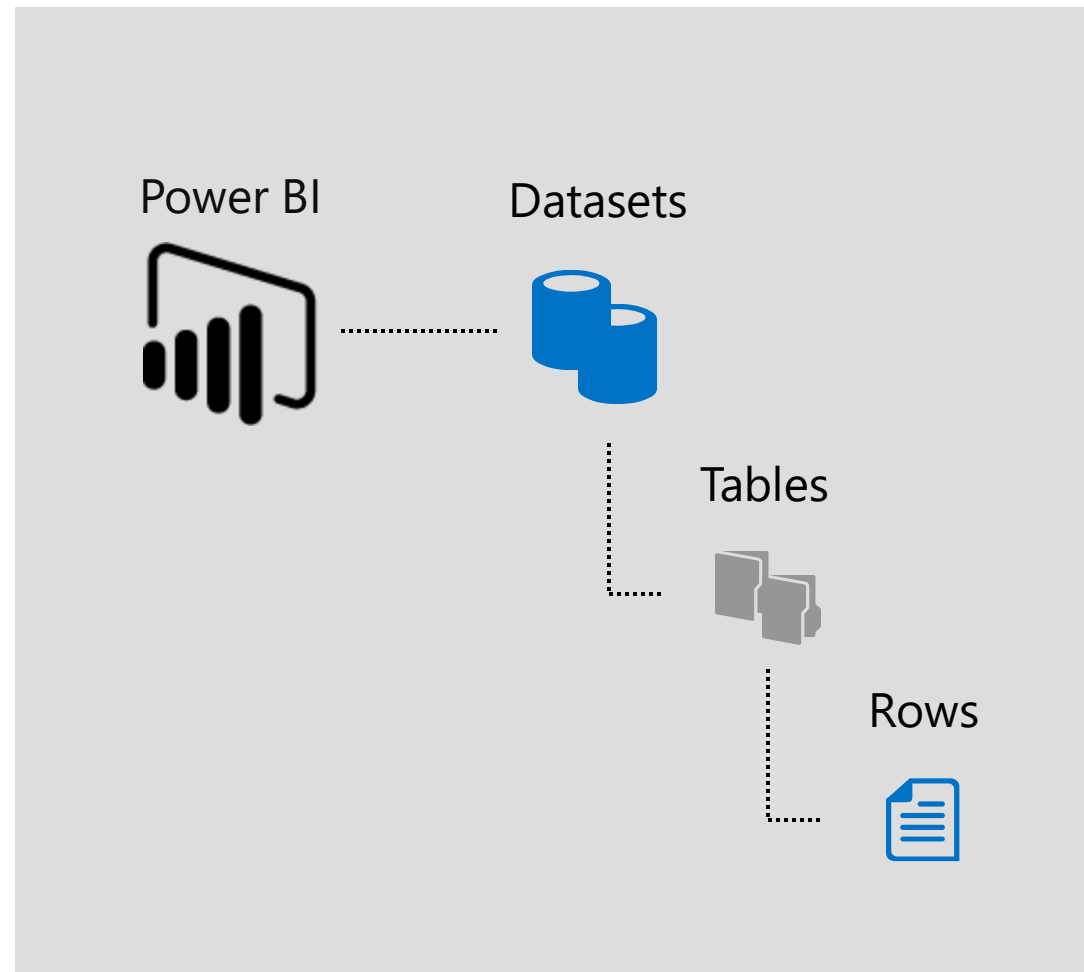
Object model hierarchy

一個 Power BI 容器可以有多組資料集，每個資料集會有獨一無二的 GUID 作識別

A dataset can:

- Be owned by a user or a group
- Have multiple tables, which are referenced by name

A table has multiple rows



# Power BI REST API

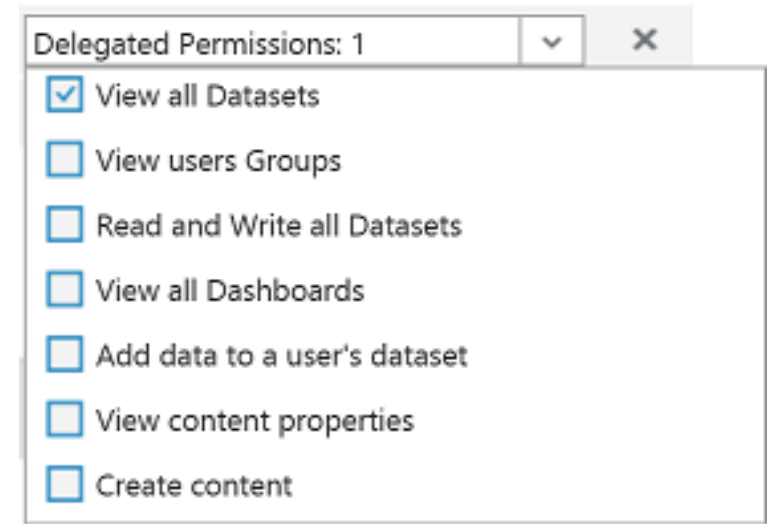
---

## Authentication

An application must be registered, and is required to establish an identity for the application

- Applications are identified by their **Client ID**
- Permissions are delegated to the Power BI service

REST API calls are made on behalf of an authenticated user by passing a token in the "Authorization" header



# Power BI REST API

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## Application registration

An application can be registered with

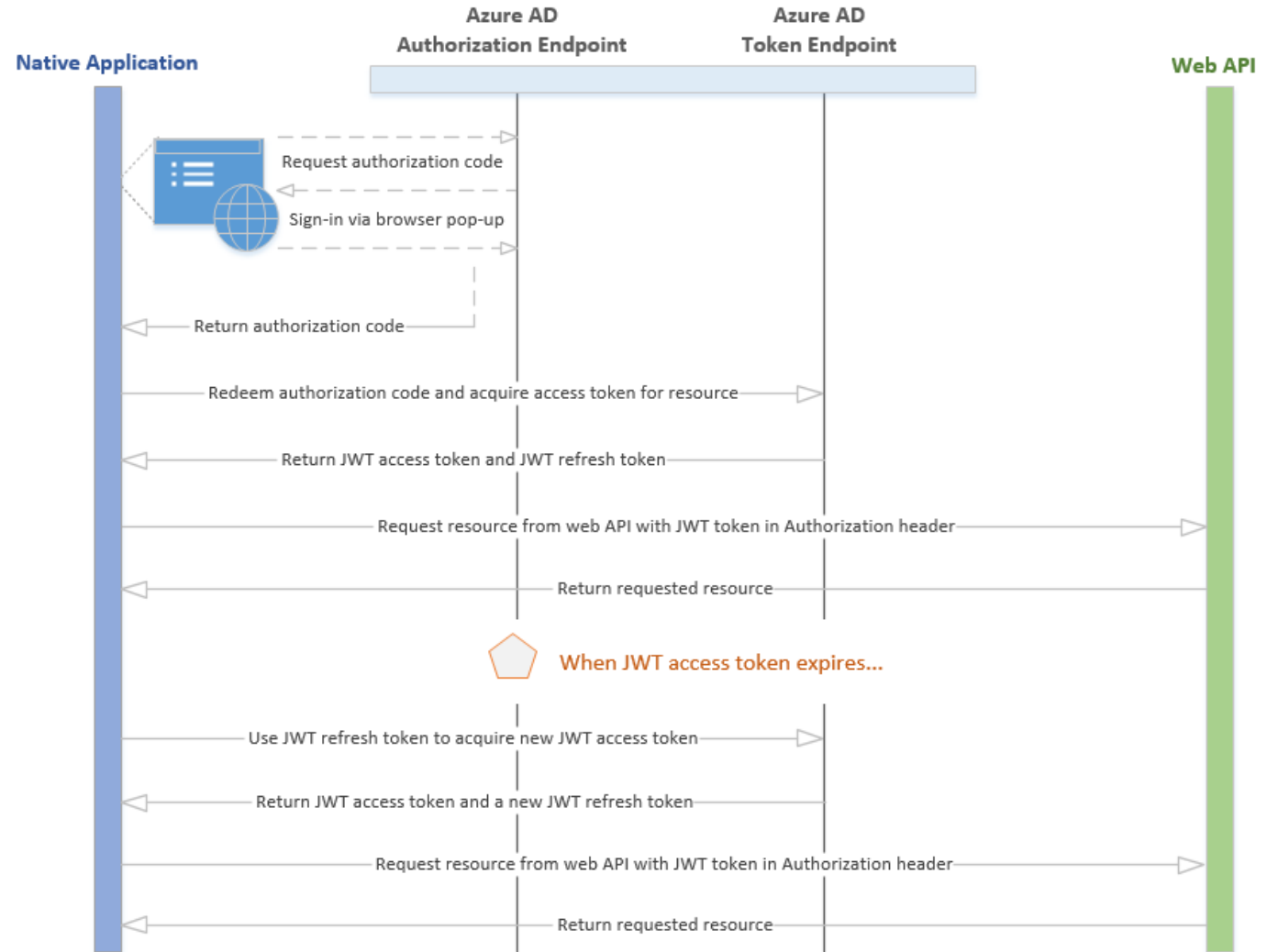
- Power BI App Registration Tool at <http://dev.powerbi.com/apps>, or
- Azure Management Portal

The Power BI App Registration Tool is the easiest option since there are just a few fields to fill in

If you want to make changes to you app, this can only be done through the Azure Management Portal

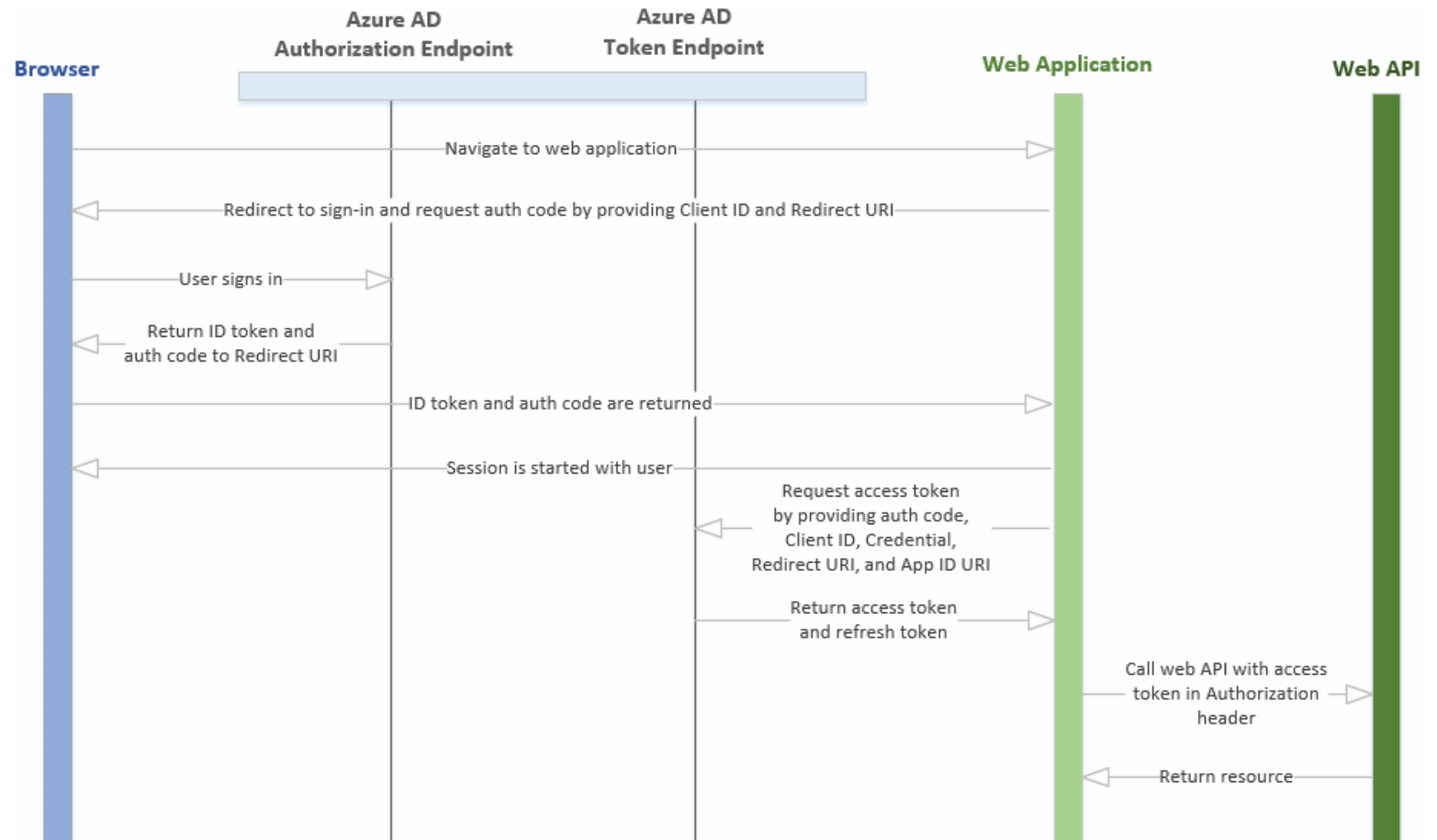
# Power BI REST API

## Authentication flow: Client application



# Power BI REST API

## Authentication flow: Web application



# Power BI REST API

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## Operations

Operation	Method	
List all datasets	GET	Returns a JSON list of all dataset objects that includes a name and dataset ID
Create a dataset	POST	Creates a new dataset with the schema definition that is in the JSON body, and returns the dataset ID and the properties of the objects created
List all tables	GET	Returns a JSON list of tables for the specified dataset
Update an existing table schema	PUT	
Add rows to a table in a dataset	POST	
Clear the rows in a table	DELETE	
List all groups	GET	Returns a JSON list of all the groups of which the user is a member
List all dashboards	GET	(In preview)
List all tiles	GET	(In preview) Returns a JSON list of tiles for the specified dashboard. Use this method to retrieve the embed URL.
List all reports	GET	(In preview) Use this method to retrieve the embed URL



# Power BI REST API

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Example: List all datasets

---->

## Request

```
GET https://api.powerbi.com/v1.0/myorg/datasets HTTP/1.1
Authorization: Bearer {AAD Token}
Content-Type: application/json; charset=utf-8
```

<----

## Response

```
{
  "datasets": [
    {
      "id": "2C0CCF12-A369-4985-A643-0995C249D5B9",
      "name": "Music"
    },
    {
      "id": "C446840B-94AD-4B23-8896-C276E69B8FAA",
      "name": "SalesMarketing"
    }
  ]
}
```

# Power BI REST API

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Example: Add a row to a table in a dataset

---->

## Request

```
POST https://api.powerbi.com/v1.0/myorg/datasets/2C0CCF12-A369-4985-A643-0995C249D5B9/Tables/Product/Rows HTTP/1.1
```

```
Authorization: Bearer {AAD Token}
```

```
Content-Type: application/json; charset=utf-8
```

```
{
  "rows":
  [
    {
      "ProductID":1,
      "Name":"Adjustable Race",
      "Category":"Components",
      "IsCompete":true,
      "ManufacturedOn":"07/30/2014"
    }
  ]
}
```

# Power BI REST API

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## Restrictions

Maximum rows per single push: 10K

- Note that ingestion rates are restricted by license:
  - **Power BI** license: 10K rows/hour
  - **Power BI Pro** license : 1M rows/hour

Maximum rows per table: 5M

- A dataset is defined with a retention policy:
  - **none**: Rows will be collected to the limit
  - **basicFIFO**: Will keep up to 200K rows, and remove the oldest rows as new rows are added

Maximum pending requests: 5

# Integrate Power BI

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Integrate a Power BI tile or report into an app with an IFrame HTML element

- For example, create a custom mobile app to display real-time Power BI tiles and reports on the user's mobile device

Use the REST API to retrieve the embed URL

Once embedded, a click event handler can be added to enable navigation to the dashboard

This capability is presently in preview

# Custom visuals

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Developers can develop custom visuals for use in Power BI solutions

To help developers get started, Microsoft has published the code for all of their visualizations

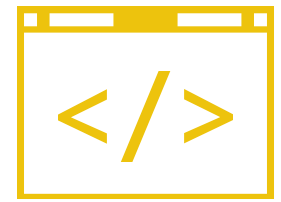
- This is all available as an open source project on GitHub
  - The project contains over 20 visualization types, the framework to run them, and the testing infrastructure that enables you to build high quality visualizations
  - The framework provides all the interfaces required to integrate fully with Power BI's selection, filtering, and other UI experiences
- Developers are encouraged to submit their custom visuals to the Power BI Visuals Gallery for sharing with the Power BI community

# 05

## Power BI Embedded

- Power BI Embedded
- Power BI Embedded API

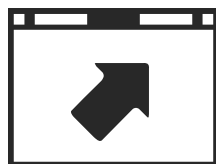
# 輕鬆嵌入視覺化圖表



適用於任何裝置、迅速提升價值

- 輕鬆在您的應用程式中，透過 REST APIs 以及 Power BI SDK 內嵌互動式視覺化圖表
- 確保在跨裝置間一致性、不失真的資料體驗
- 提供順暢的身份驗證與授權流程
- Realize faster time-to-value without redesigning your app

# Power BI Embedded 定位



您的應用程式



Azure 資料服務

資料儲存	資料分析	物聯網	存取控制
<ul style="list-style-type: none"><li>• SQL DB</li><li>• Document DB</li><li>• Blob Storage</li><li>• StorSimple</li><li>• SQL Data Warehouse</li></ul>	<ul style="list-style-type: none"><li>• <b>Power BI Embedded</b></li><li>• Data Lake Analytics</li><li>• Data Lake Store</li><li>• HDInsight</li><li>• Stream Analytics</li></ul>	<ul style="list-style-type: none"><li>• IoT Hub</li><li>• Event Hubs</li><li>• Machine Learning</li><li>• Notification Hubs</li></ul>	<ul style="list-style-type: none"><li>• Azure Active Directory</li><li>• Multi-factor authentication</li></ul>



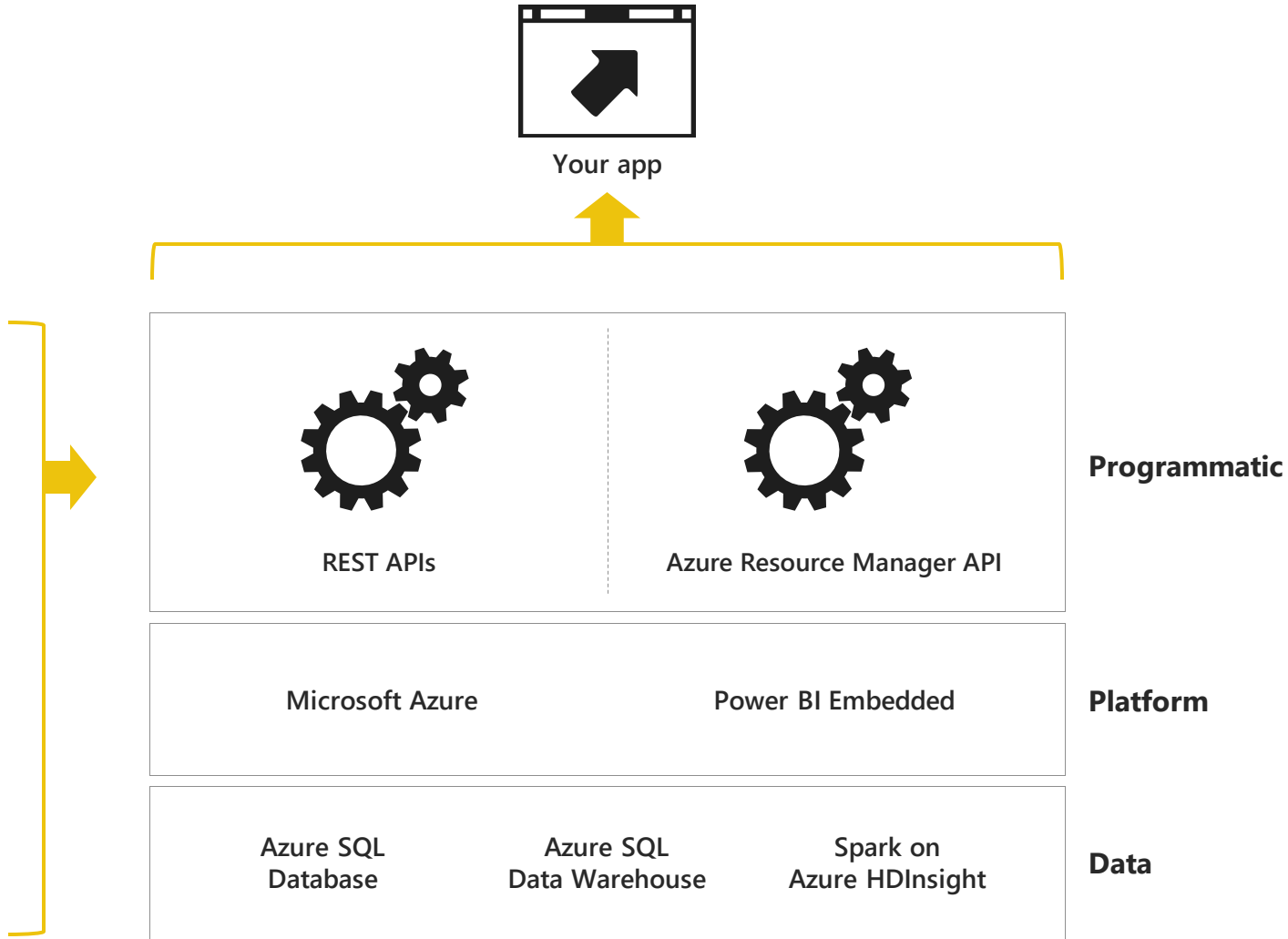
# Power BI Embedded API 架構

## Power BI APIs

- Discovery:** Enumerate datasets and reports
- Content Creation:** Provision datasets and reports
- Embed:** Embed reports
- Utility:** Set connection strings and credentials

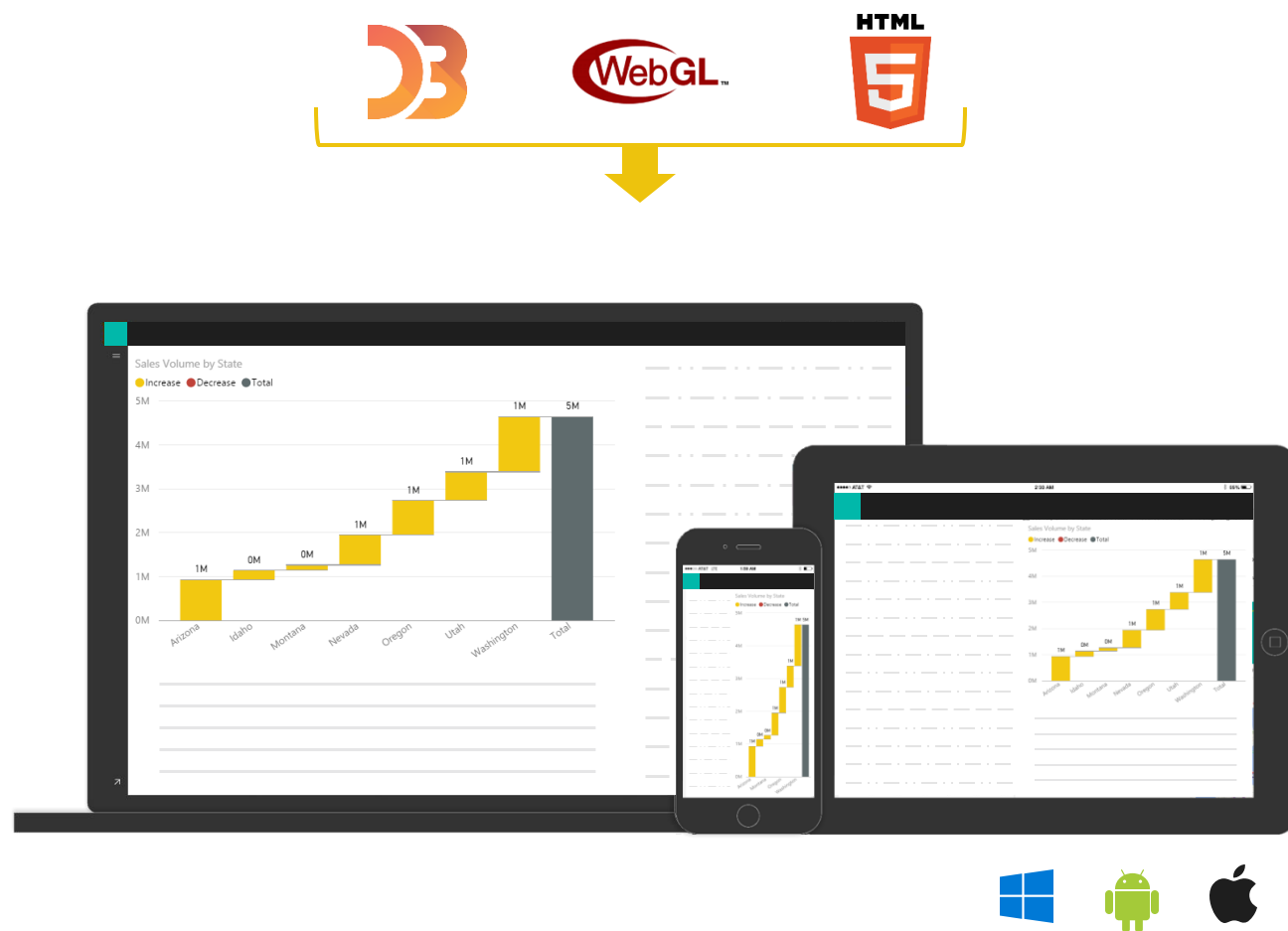
## Azure APIs for automation

- Provision workspace collections
- De-provision workspace collections
- Manage API keys



# 確保跨裝置體驗一致性

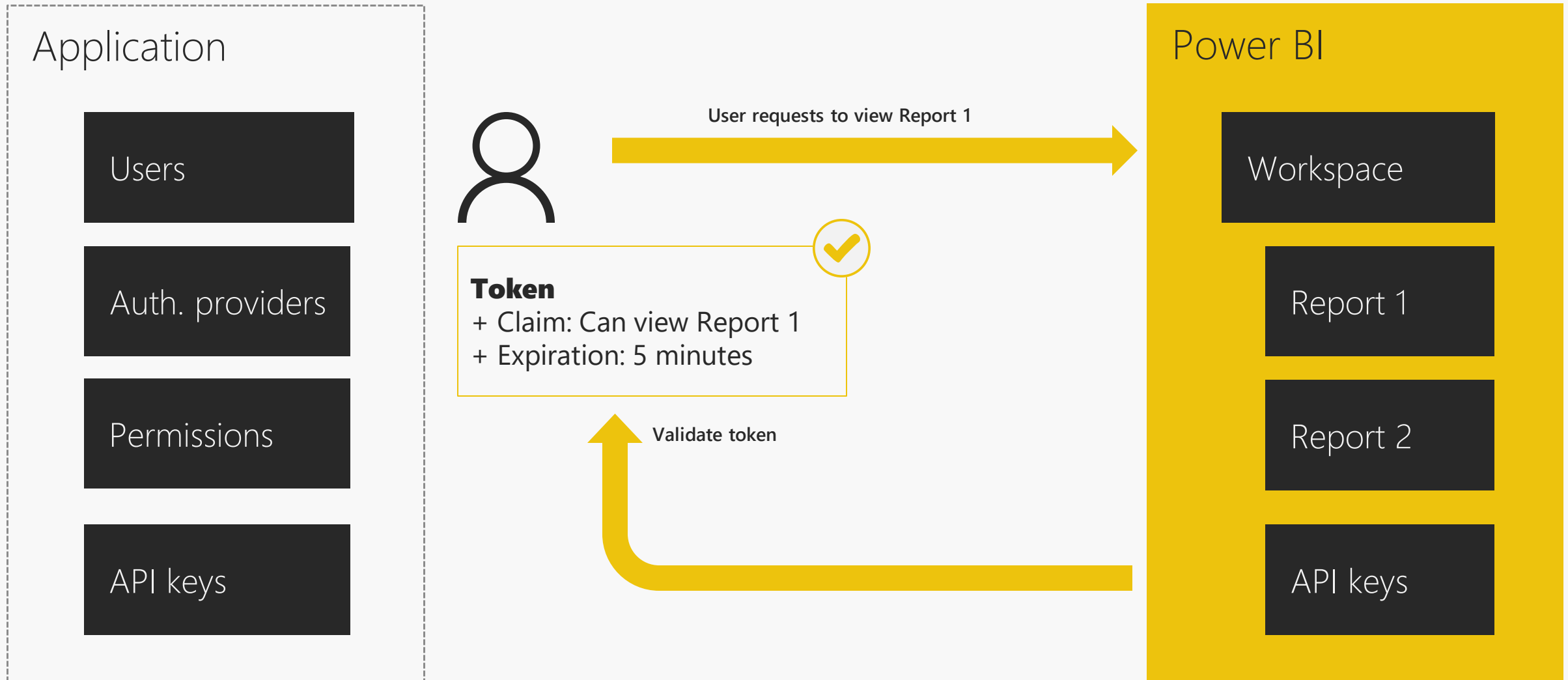
高品質、響應式的視覺化體驗，並且使用開放技術



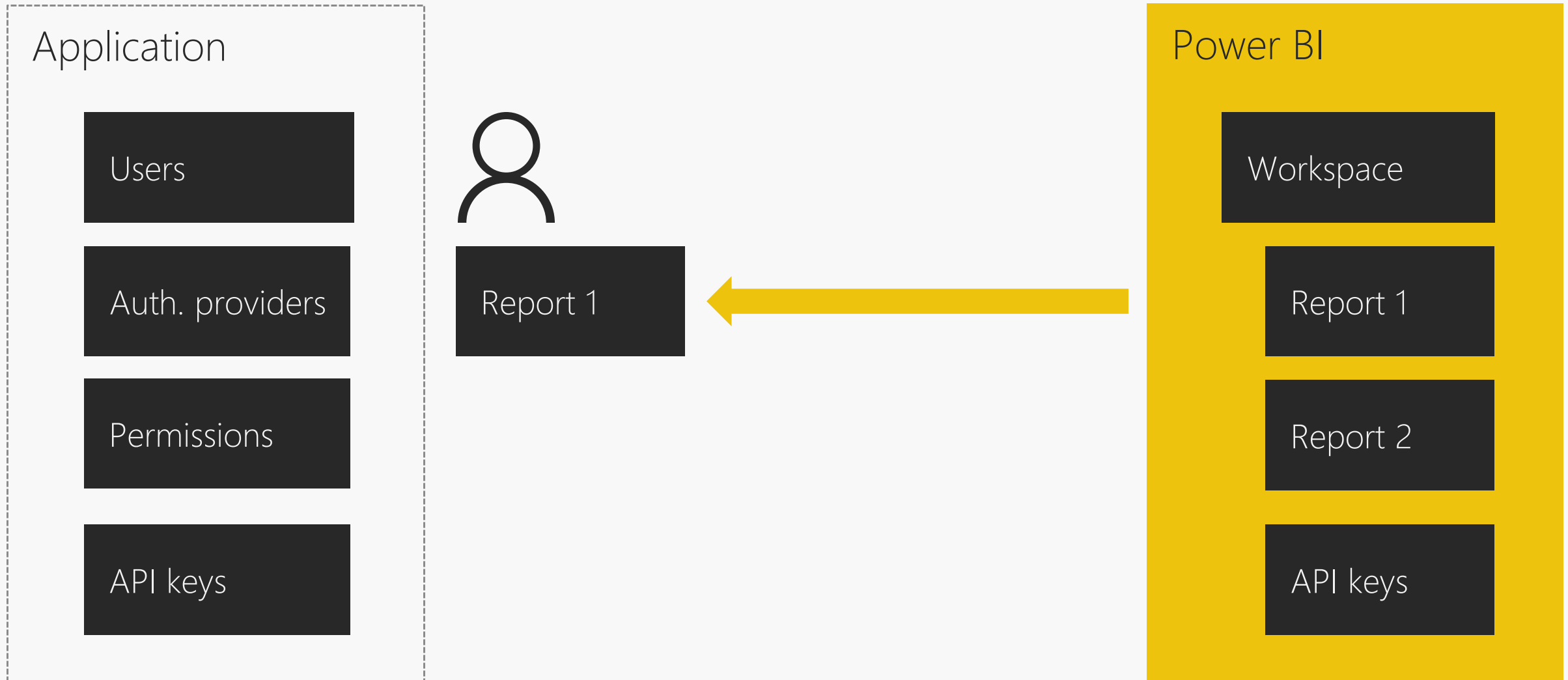
# Provide seamless authentication experiences



# Provide seamless authentication experiences



# Provide seamless authentication experiences



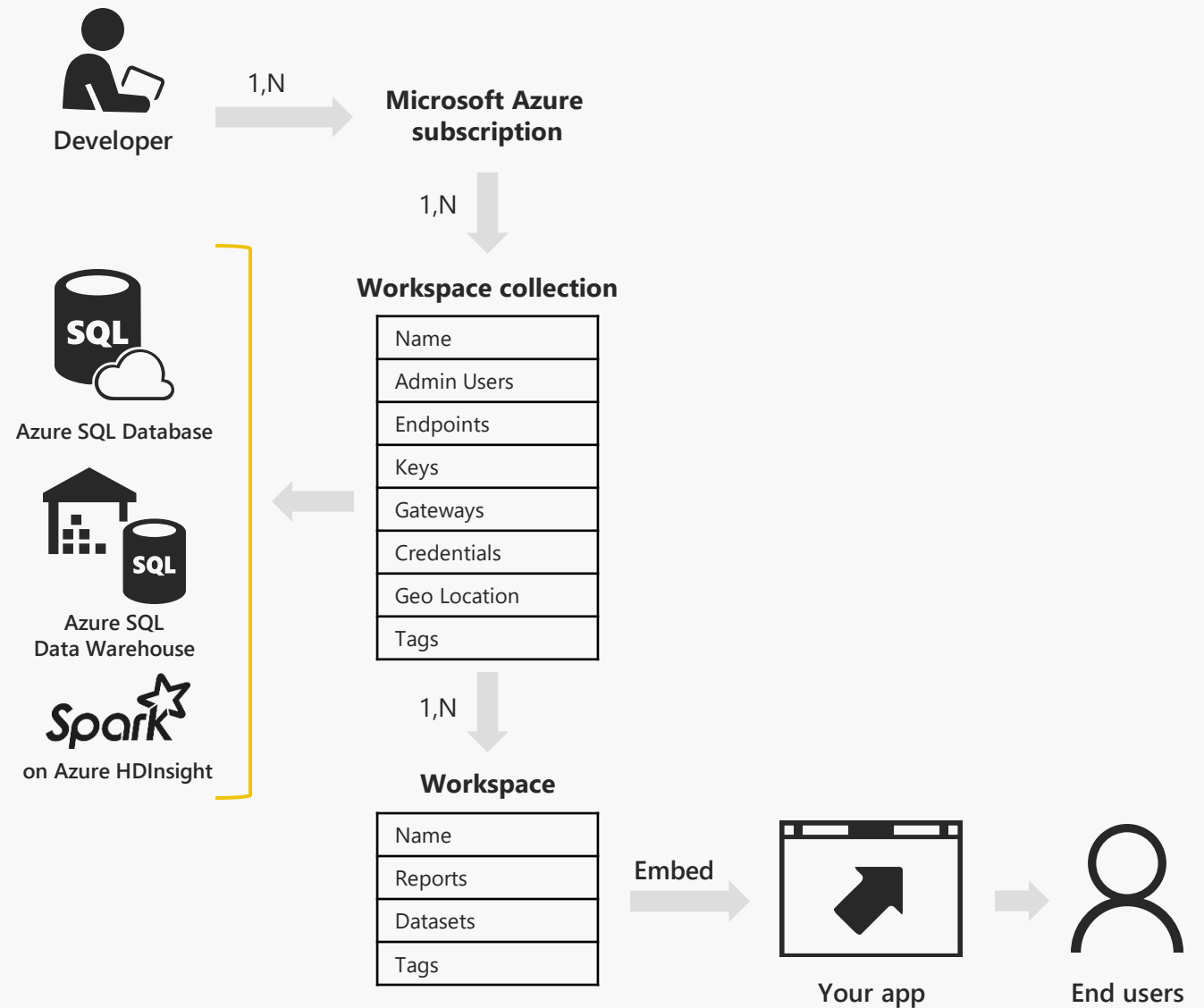
# Manage in a familiar environment—**Azure**

Manually or programmatically provision workspaces

Create datasets and reports

Embed reports in your app

Control refresh behavior and credentials



# 隨用即付, 依照 session 數計價

使用 Power BI Desktop 操作報表  
完全免費

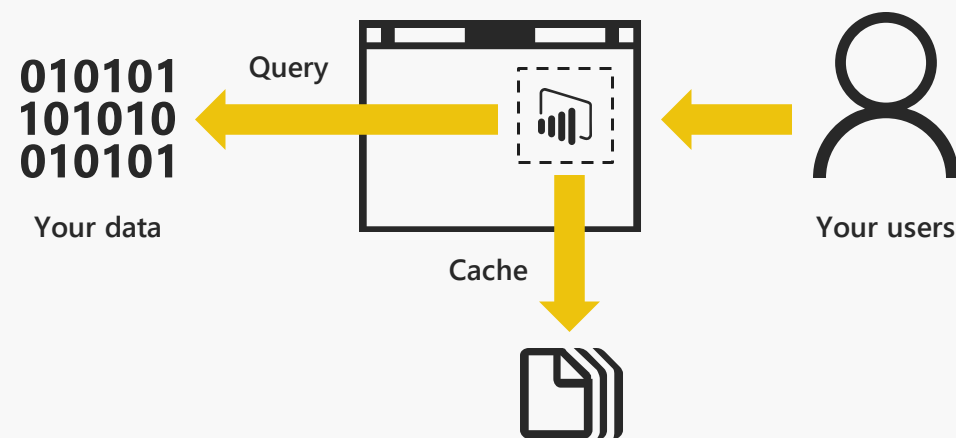
計算成本更輕鬆直覺

每個月根據 session 計費

0-100	免費
100+	\$0.05/session

## Session 如何計算?

當用戶讀取報表時會註冊一個 session，這個 session 60 分鐘有效。

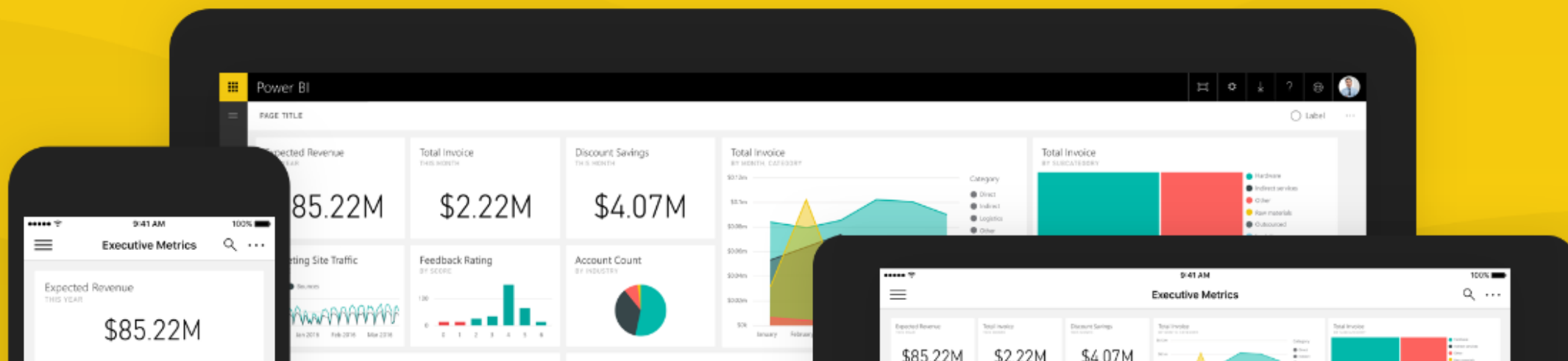


# 今天就開始使用 PowerBI.com

## 將資料融入生活

Power BI 會將貴公司的資料轉換成方便您收集和組織的豐富視覺效果，讓您可以專注於所關切的事項。

免費開始使用





# 相關 Power BI 開發參考資源

Power BI Embedded

<https://azure.microsoft.com/services/power-bi-embedded>

Power BI 開發中心

<http://dev.powerbi.com>

Power BI 開發部落格

<http://blogs.msdn.com/powerbidev>

範例程式碼

<http://github.com/PowerBI>

Power BI Embedded  
Explorer

<https://github.com/Microsoft-DXTW/Power-BI-Embedded-Explorer>

Visuals gallery

<http://visuals.powerbi.com>

發問

<http://stackoverflow.com/questions/tagged/powerbi>

