

Integrating Power BI with Excel 2016 and Excel Online



Agenda

- Understanding Excel Integration with Power BI
- Designing Data Models in Excel 2016
- Importing Excel Workbook Data into Power BI
- Publishing Data Models using Excel Workbooks
- Using the Power BI Publishing for Excel Add-in
- Connecting from Excel to a Power BI Dataset



Excel 2016 Integration with Power BI

- Excel as a query and data modeling tool
 - Similar query and data modeling features to Power BI Desktop
 - Excel data model can be imported to create Power BI dataset
- Excel as a tool to publish worksheet content to Power BI
 - Excel worksheets can be rendered inside Power BI service
 - Provides best way to create PivotTables in Power BI custom solution
 - **Power BI publisher for Excel** add-in allows publishing to dashboard
- Analyze in Excel Feature
 - Makes it possible to connect Excel workbook to Power BI Dataset
 - Create PivotTables to analyze datasets running in Power BI service



Excel Online Integration with Power BI

- Excel Online used to render Excel workbooks in browser
 - Workbooks in OneDrive & SharePoint can be accessed thru browser
 - Excel Online rendering service can be hosted inside Power BI report



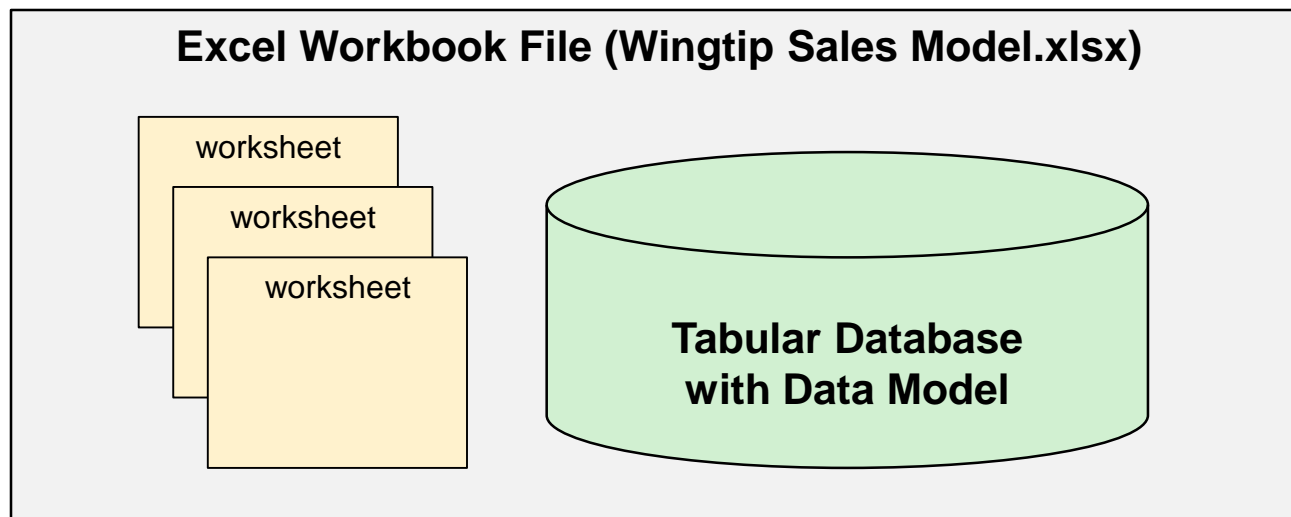
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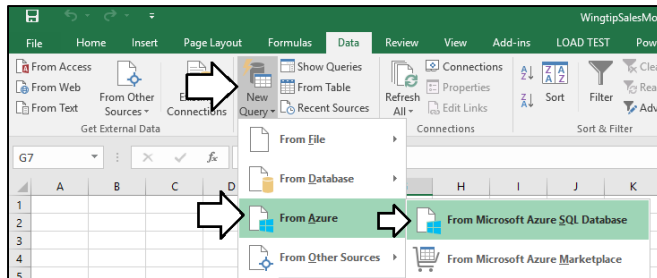
The Excel Data Model

- Every Excel workbook file contains a data model
 - Data model stored as tabular database inside XLSX file
 - Based on **xVelocity** database engine just like PBIDT and SSAS
- When importing data with from an Excel query...
 - You can add the imported data as a table in a worksheet
 - You can add the imported data as a table in the data model

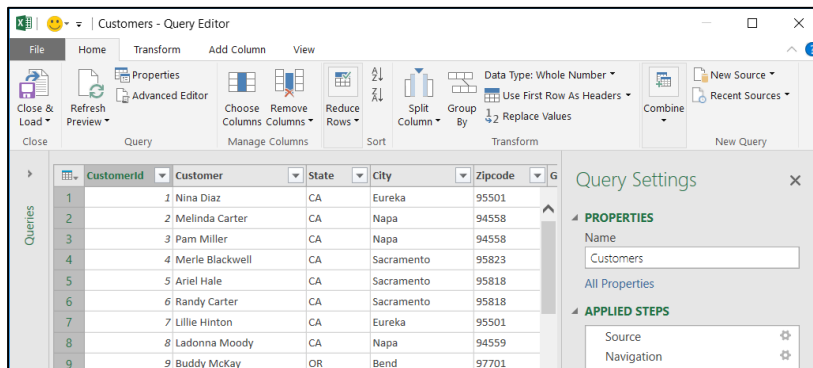


Working with Query Tools in Excel 2016

- Excel 2016 provides query tools similar to PBIDT
 - Included with Excel 2013/2010 using Power Query add-in
 - Included natively in Excel 2016 – Power Query add-in retired
 - Query functionality provided in Query tab in ribbon



- Excel queries are edited in separate Query Editor window



Working with the Power Pivot Add-in

- Data Modeling requires activation of Power Pivot add-in
 - Not activated by default in Excel 2016 or Excel 2013
 - Not activated nor even installed by default in Excel 2010



- Once activated, new **Power Pivot** tab appears in ribbon



Building Data Models in Excel Workbooks

- You create data model just like in Power BI Desktop
 - Convert column types and format column values
 - Add calculated columns using DAX expressions
 - Add measures using DAX expressions
 - Add a calendar table to support DAX time intelligence
 - Add dimensional hierarchies
- Excel data model supports adding KPIs
 - Power BI Desktop does not provide equivalent feature



Using Power Pivot Add-in for Excel

Power Pivot for Excel - Wingtip Sales Model 1.xlsx

File Home Design Advanced

Paste Get External Data Refresh PivotTable

Data Type : Text
Format : Text

\$ % & #

Clear All Filters Sort by Column

Find

AutoSum Create KPI

Diagram View Show Hidden Calculation Area

Clipboard

[Age Group] = SWITCH (TRUE(),
[Age] >= 65, "Ages 65 and over",
[Age] >= 50, "Ages 50 TO 65",
[Age] >= 40, "Ages 40 TO 49",
[Age] >= 30, "Ages 30 TO 39",
[Age] >= 18, "Ages 18 TO 23",
[Age] < 18, "Ages under 18"

	State	City	Zipcode	Gender	State Name	Sales Region	Age	Age Group
1	CA	San Jose	95133	Female	California	Western Region	48	Ages 40 TO 49
2	CA	San Jose	95133	Female	California	Western Region	74	Ages 65 and over
3	CA	San Jose	95133	Female	California	Western Region	73	Ages 65 and over
4	CA	San Jose	95133	Female	California	Western Region	25	Ages 18 TO 23

Measure ? X

Table name: Sales

Measure name: Sales Revenue RT

Description:

Formula: fx Check formula

```
=CALCULATE(
    SUM(Sales[SalesAmount]),
    FILTER(
        ALL(Calendar),
        Calendar[Date] <= MAX(Calendar[Date])
    )
)
```

Formatting Options

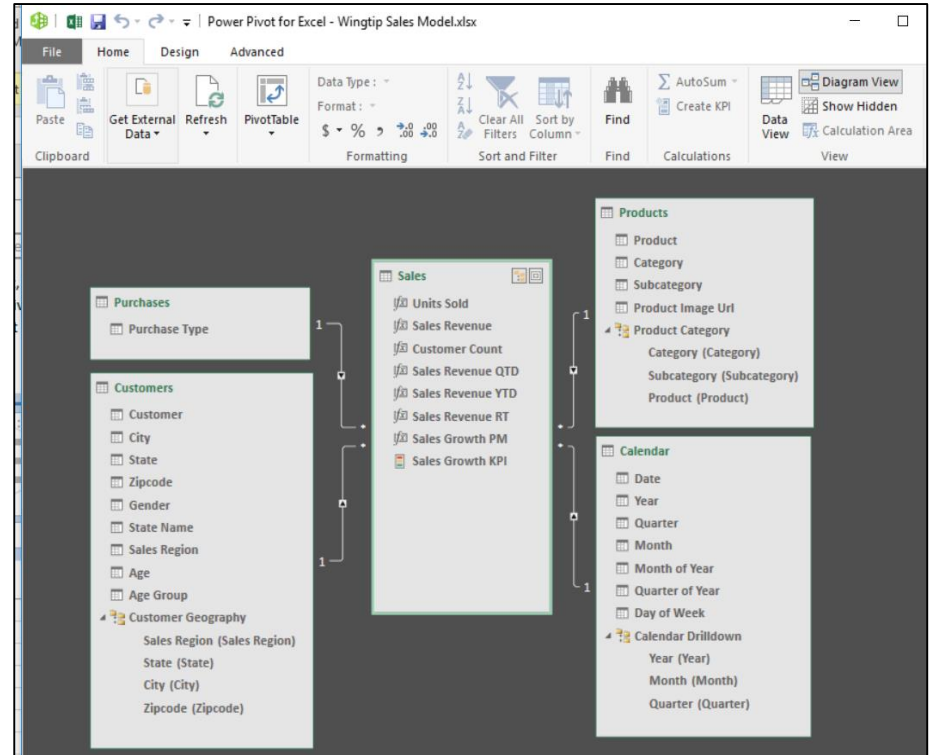
Category:
 General
 Number
Currency
 Date
 TRUE/FALSE

Symbol: \$

Decimal places: 0

☒ Use 1000 separator (,.)

OK
Cancel



Adding Hierarchies to an Excel Data Model

- Excel data model supports dimensional hierarchies
 - All column in a hierarchy must be from single table
 - Provides the same effect as dimensional hierarchies in PBIDT
 - Technique for creating hierarchies in Excel different from PBIDT



Creating PivotTables from Excel Data Model

- Excel allows creation of PivotTables from data model
 - PivotTables are very popular with business users and data analysts
 - PivotTable allows user-friendly drilldown during data analysis
 - Excel PivotTables can be published to Excel Online
 - Power BI currently offers no visualization that matches Excel PivotTable

	A	B	C	D	E
1	Customer Location	Customer Count	Sales Revenue	Units Sold	
2	Western Region	25,739	\$12,733,888	1,598,125	
3	Central Region	12,733	\$5,915,449	994,680	
4	Eastern Region	25,211	\$11,081,180	1,959,240	
5	CT	1,219	\$516,478	81,757	
6	Greenwich	409	\$167,352	21,210	
7	New Britain	37	\$17,263	4,139	
8	North Haven	127	\$50,702	9,225	
9	Stamford	142	\$56,437	8,614	
10	Trumbull	220	\$96,771	14,936	
11	Waterbury	56	\$25,604	5,301	
12	Waterford	107	\$46,998	6,012	
13	Windsor	121	\$55,352	12,320	
14	FL	5,897	\$2,592,242	446,167	
15	GA	3,251	\$1,490,282	275,491	
16	MA	1,341	\$543,241	96,465	
17	NC	3,270	\$1,479,238	256,200	
18	NH	559	\$233,917	35,512	
19	NJ	1,151	\$530,241	93,232	
20	NY	2,995	\$1,265,458	231,956	
21	PA	1,831	\$792,634	154,598	
22	RI	468	\$193,897	31,703	
23	SC	1,007	\$439,328	79,195	
24	VA	2,222	\$1,004,225	176,964	
25	Grand Total	63,683	\$29,730,517	4,552,045	
26					
27					

PivotTable Fields

Active All

Choose fields to add to report:

Search

- Σ Sales
- Calendar
- Calendar
- Customers
 - Customer Geography
 - More Fields

Drag fields between areas below:

Filters	Columns
	Σ Values
Rows	Σ Values
Customer Geography	Customer Count
	Sales Revenue
	Units Sold



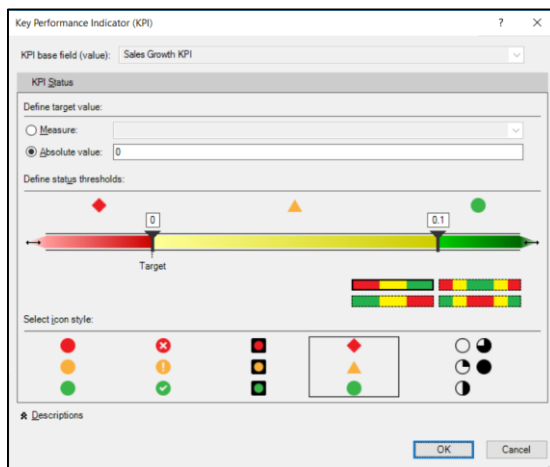
Creating a Chart from an Excel Data Model

- Excel provides rich charting capabilities
 - Excel charts can also be published to Excel Online



KPIs in an Excel Data Model

- Excel supports adding KPIs to data model
 - KPI created as visual layer on top of a measure
 - Power BI Desktop has no equivalent KPI support
 - Excel KPI can be used in Excel PivotTable



Sales Revenue YTD	Sales Revenue RT	Sales Growth PM	Sales Growth KPI Status
\$959,863	\$18,534,277	-41.65 %	🔴
\$1,929,193	\$19,503,607	0.99 %	🟡
\$2,604,726	\$20,179,140	-30.31 %	🔴
\$3,327,182	\$20,901,596	6.95 %	🟡
\$4,025,494	\$21,599,908	-3.34 %	🔴
\$4,811,286	\$22,385,700	12.53 %	🟢
\$5,733,280	\$23,307,694	17.33 %	🟢
\$6,817,469	\$24,391,883	17.59 %	🟢
\$7,906,332	\$25,480,746	0.43 %	🟡
\$9,118,142	\$26,692,556	11.29 %	🟢
\$10,423,171	\$27,997,585	7.69 %	🟡
\$12,156,103	\$29,730,517	32.79 %	🟢
\$12,156,103	\$29,730,517		

PivotTable Fields

Active All

Choose fields to add to report:

Search

☒ Σ Sales Growth PM

☒ Sales Growth KPI

☐ Σ Value (Sales Growth KPI)

☐ Goal

☒ Status

☒ Calendar

☐ Calendar Drilldown

- KPI from Excel data model can be used in Power BI report



Power View Reports in Excel

- Excel 2013 supports creating reports with Power View
 - Power View is reporting layer on top of Excel data model
 - Power View report added as worksheet within workbook file

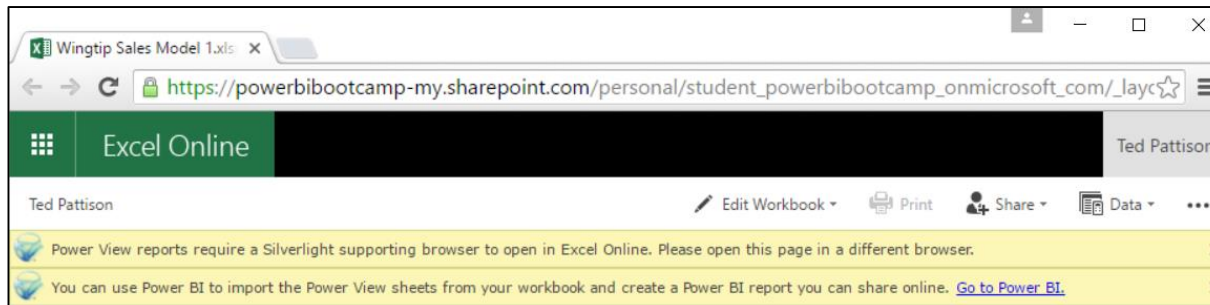


Power View Requires Silverlight

- Use of Power View requires Microsoft Silverlight
 - Required when using Power View in Excel and in Browser
 - Often requires user to install Silverlight



- Silverlight dependencies considered undesirable
 - Power View reports inaccessible to many browsers and mobile devices
 - Microsoft is currently trying to move away from using Silverlight





DEMO

Working with Query and Data Modeling Features in Excel 2016

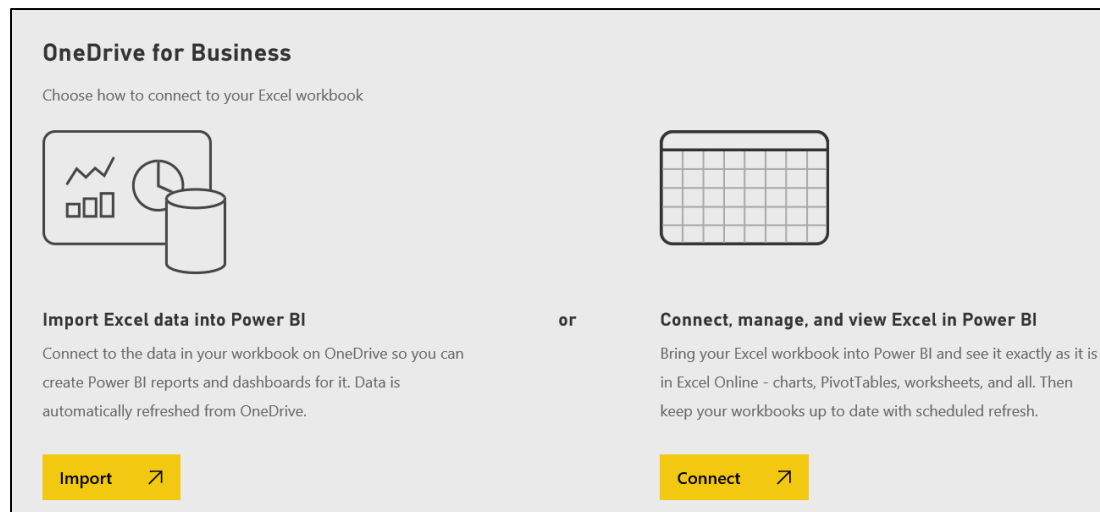
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Connect versus Import

- Connecting to a Workbook from Power BI
 - Excel workbook file becomes live source of data
 - Power BI service hosted Excel Online to render Excel workbook
 - Power View reports can be viewed in browser but require Silverlight
- Importing a Workbook into Power BI
 - Data model from workbook file is converted into Power BI dataset
 - Power View reports converted to Power BI reports



Hosting Excel Online inside Power BI

- What happens when you "Connect To" an Excel workbook?
 - Excel workbook renders inside Power BI using Excel Online hosting
 - Makes it easy to add Excel workbooks into Power BI user experience
 - Best way to provide true PivotTables from a Power BI solution

The screenshot shows the Power BI interface with a sidebar on the left containing navigation options like 'Featured dashboard', 'Favorites', 'My Workspace', 'Dashboards', 'Reports', and 'Datasets'. The main area displays an Excel Online spreadsheet titled 'Wingtip Sales Model 1'. The spreadsheet has a table with columns for Month, Sales Revenue, Sales Revenue QTD, Sales Revenue YTD, Sales Revenue RT, Sales Growth PM, and Sales Growth KPI Status. The table is filtered by Year (2012-2015), Purchase Type (Mail Order Purchase, Online Purchase, Store Purchase), and Sales Region (Western Region, Central Region, Eastern Region). The bottom of the interface shows a 'Get Data' button and a row of tabs: 'Customer PivotTable', 'Customer Chart', 'Sales KPI', and 'Customers PV'.

Month	Sales Revenue	Sales Revenue QTD	Sales Revenue YTD	Sales Revenue RT	Sales Growth PM	Sales Growth KPI Status
Jan-2014	\$629,969	\$629,969	\$629,969	\$7,930,132	-18.13 %	Red Diamond
Feb-2014	\$609,637	\$1,239,606	\$1,239,606	\$8,539,770	-3.23 %	Red Diamond
Mar-2014	\$628,618	\$1,868,225	\$1,868,225	\$9,168,388	3.11 %	Yellow Triangle
Apr-2014	\$661,588	\$661,588	\$2,529,812	\$9,829,976	5.24 %	Yellow Triangle
May-2014	\$748,193	\$1,409,780	\$3,278,005	\$10,578,168	13.09 %	Green Circle
Jun-2014	\$814,333	\$2,224,114	\$4,092,338	\$11,392,502	8.84 %	Yellow Triangle
Jul-2014	\$788,469	\$788,469	\$4,880,807	\$12,180,970	-3.18 %	Red Diamond
Aug-2014	\$869,143	\$1,657,611	\$5,749,950	\$13,050,113	10.23 %	Green Circle
Sep-2014	\$890,958	\$2,548,569	\$6,640,908	\$13,941,071	2.51 %	Yellow Triangle
Oct-2014	\$988,789	\$988,789	\$7,629,697	\$14,929,860	10.98 %	Green Circle
Nov-2014	\$999,574	\$1,988,363	\$8,629,271	\$15,929,434	1.09 %	Yellow Triangle
Dec-2014	\$1,644,980	\$3,633,343	\$10,274,251	\$17,574,414	64.57 %	Green Circle
Jan-2015	\$959,863	\$959,863	\$959,863	\$18,534,277	-41.65 %	Red Diamond
Feb-2015	\$969,330	\$1,929,193	\$1,929,193	\$19,503,607	0.99 %	Yellow Triangle
Mar-2015	\$675,533	\$2,604,726	\$2,604,726	\$20,179,140	-30.31 %	Red Diamond
Apr-2015	\$722,456	\$722,456	\$3,327,182	\$20,901,596	6.95 %	Yellow Triangle
May-2015	\$698,311	\$1,420,768	\$4,025,494	\$21,599,908	-3.34 %	Red Diamond
Jun-2015	\$785,793	\$2,206,560	\$4,811,286	\$22,385,700	12.53 %	Green Circle
Jul-2015	\$921,994	\$921,994	\$5,733,280	\$23,307,694	17.33 %	Green Circle
Aug-2015	\$1,084,189	\$2,006,183	\$6,817,469	\$24,391,883	17.59 %	Green Circle
Sep-2015	\$1,088,863	\$3,095,046	\$7,906,332	\$25,480,746	0.43 %	Yellow Triangle
Oct-2015	\$1,211,810	\$1,211,810	\$9,118,142	\$26,692,556	11.29 %	Green Circle
Nov-2015	\$1,305,029	\$2,516,839	\$10,423,171	\$27,997,585	7.69 %	Yellow Triangle
Dec-2015	\$1,732,932	\$4,249,771	\$12,156,103	\$29,730,517	32.79 %	Green Circle
Grand Total	\$22,430,354	\$4,249,771	\$12,156,103	\$29,730,517		

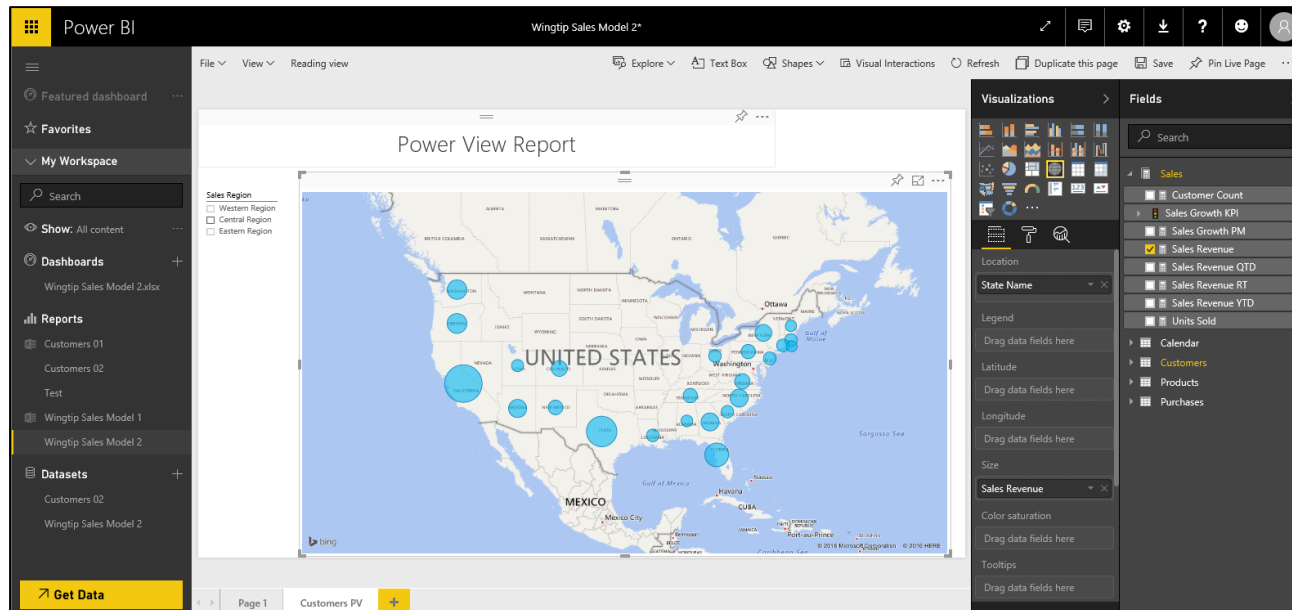
"Connecting To" a Power View Report

- When connecting to workbook with Power Reports...
 - Excel Online can render Power View reports in Power BI service
 - Requires a Silverlight-enabled browser – this can be a pain point



"Importing" Power View Reports

- Importing worksheet with Power View report...
 - Power View report converted into Power BI report
 - Silverlight elements replaced with Power BI visuals
 - Silverlight dependencies removed for broader reach
 - After importing, you can continue to edit report





DEMO

Understanding "Connect" versus "Import" with Excel Worksheets

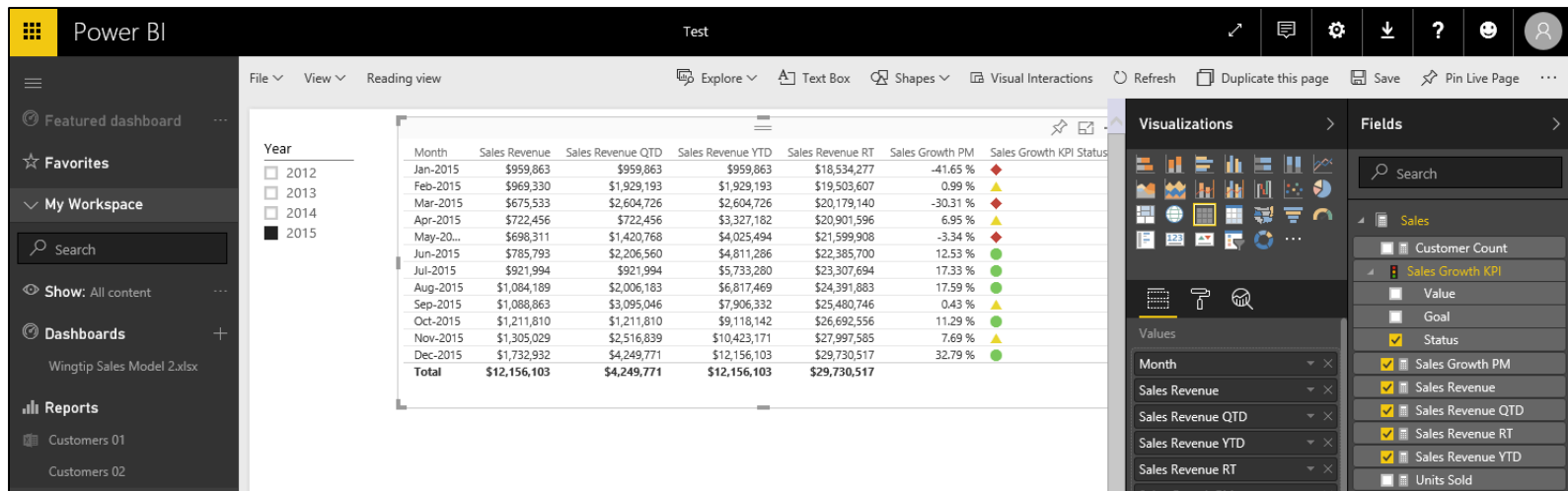
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Importing an Excel Data Model into Power BI

- Excel Data Model can be imported into Power BI
 - Done by importing Excel workbook with a data model
 - Excel data model converted into Power BI dataset
 - Dataset can be used to design reports and dashboards
 - KPIs from data model can be added to Power BI report



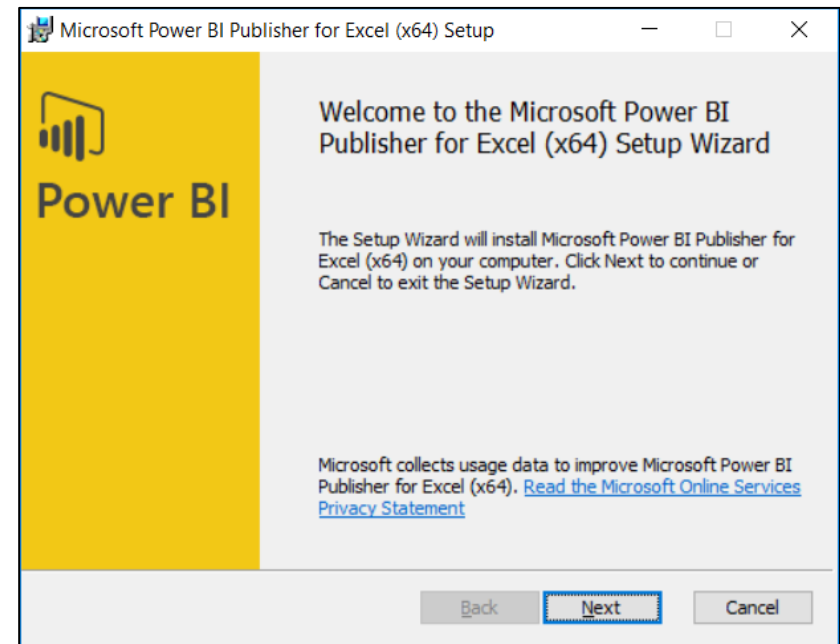
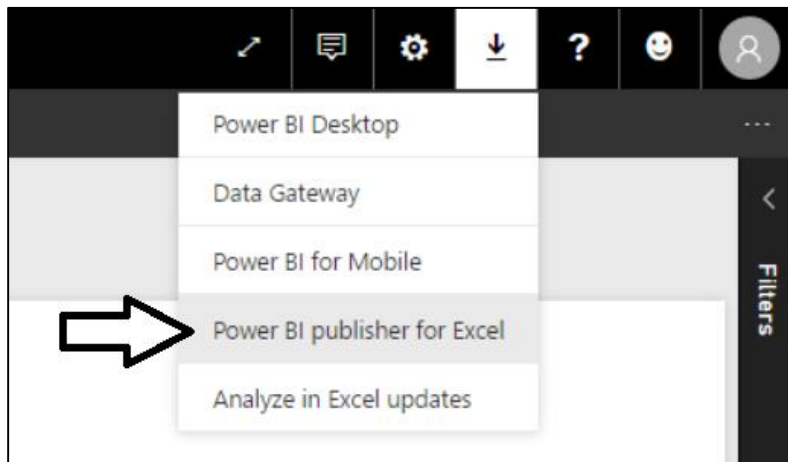
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Power BI Publisher for Excel Add-in

- What is the Power BI Publisher for Excel Add-in?
 - An add-in that you first must download and install
 - A utility to pin Excel elements to Power BI dashboard
 - Worksheet elements are pinned as non-dynamic snapshots
 - Pinned elements can be updated manually when needed



Pinning an Excel Chart to a Dashboard

The screenshot shows the Microsoft Excel interface with the 'Power BI' tab selected. A 'Pin to dashboard' dialog box is open, allowing the user to pin a chart to a dashboard. The dialog box has two main sections: 'Select a workspace to pin to.' and 'Where would you like to pin to?'. The 'New dashboard' option is selected under the second section. The 'Ok' button is highlighted with a green box.

Pin to dashboard

Select a workspace to pin to.

My Workspace

Where would you like to pin to?

☐ Existing dashboard

☒ New dashboard

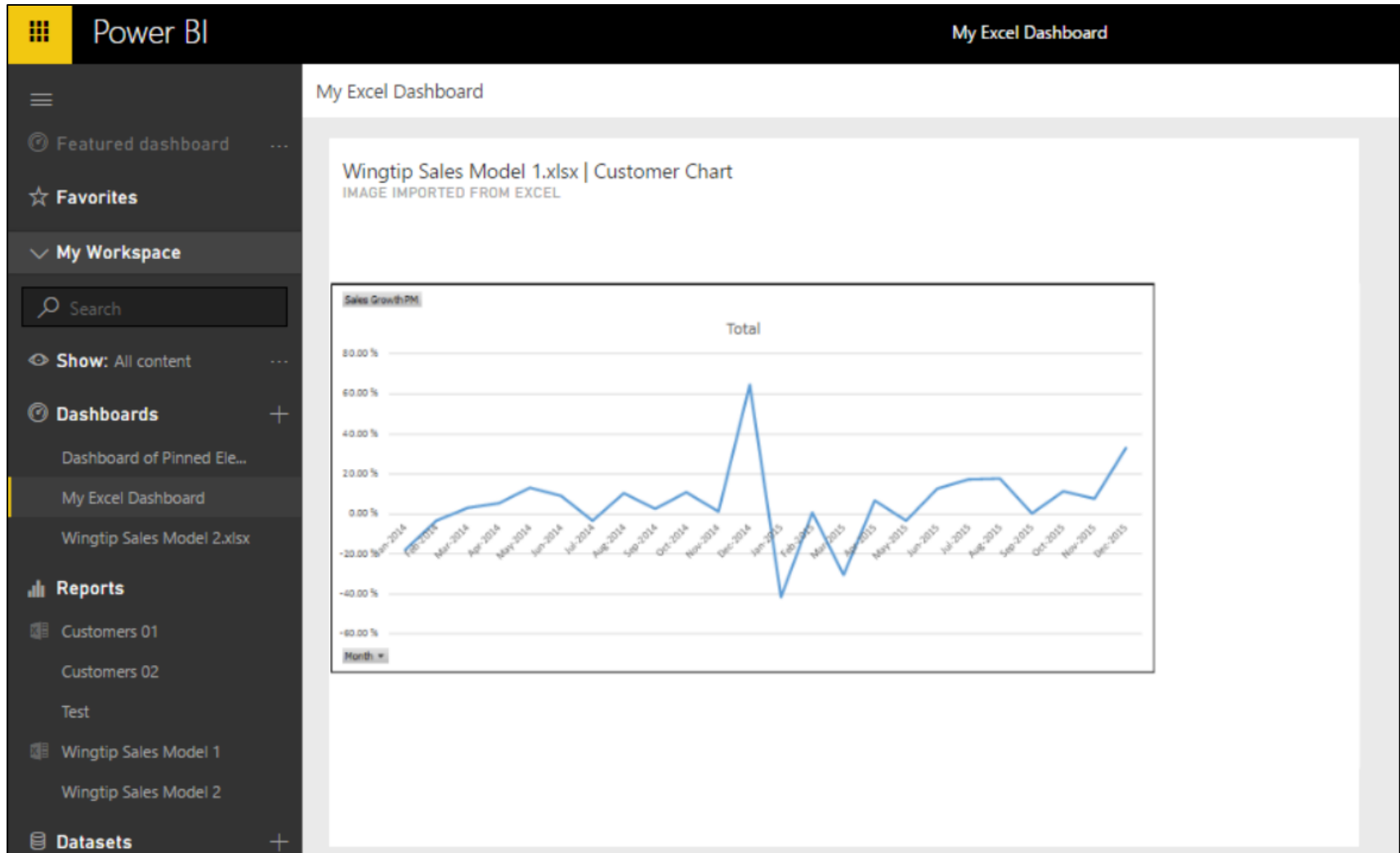
My Excel Dashboard

Ok **Cancel**

The background shows an Excel spreadsheet with a line chart and a table of data. The chart is titled 'Wingtip Sales Model 1.xlsx | Custom...' and is labeled 'IMAGE IMPORTED FROM EXCEL'. The chart shows a line graph with a peak in the middle. The table below the chart has columns for 'Year' and 'Month'.

Year	Month
2012	
2013	
2014	
2015	

A Pinned Excel Chart in a Dashboard



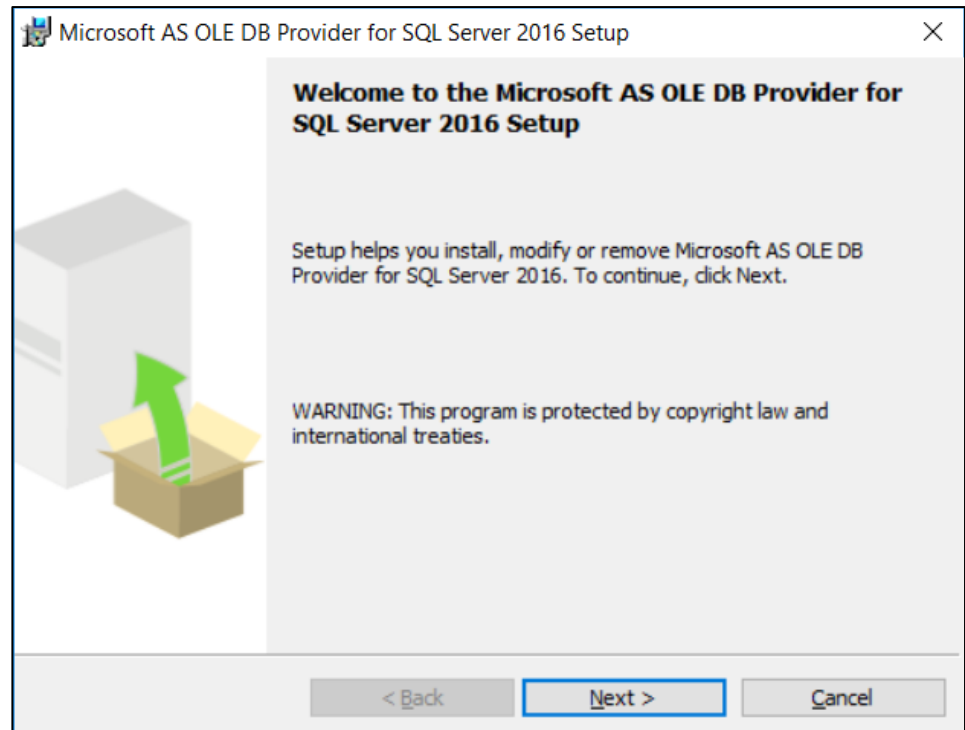
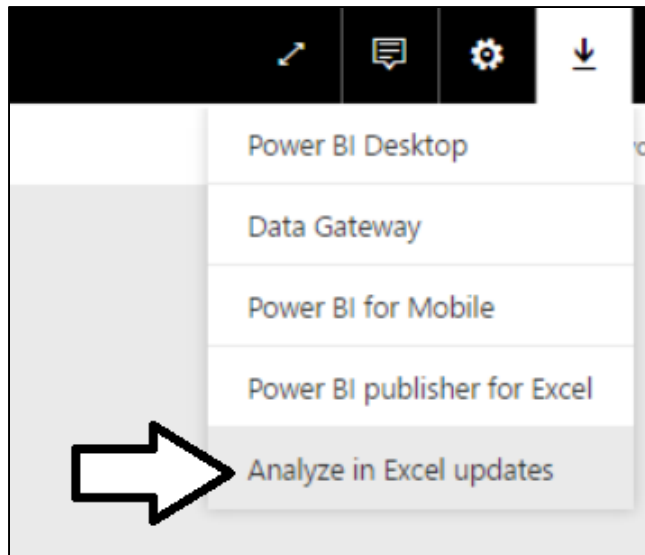
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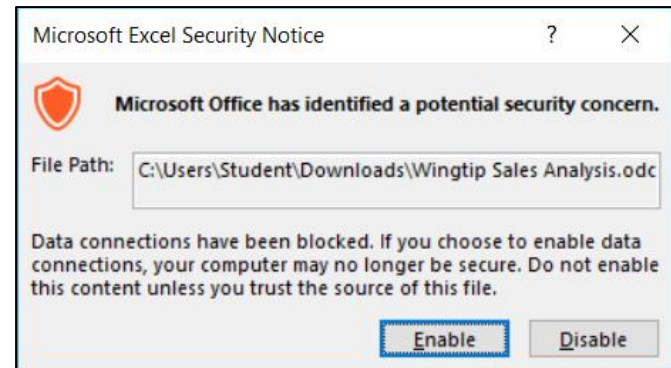
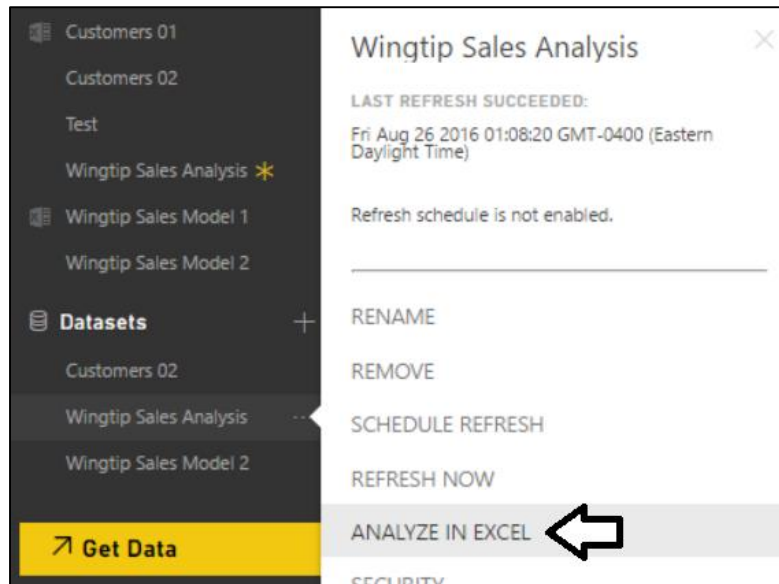
Analyze in Excel

- Feature to connect Excel worksheet to Power BI dataset
 - Requires downloading & installing drivers using setup program
 - Once installed, connection is created from within Power BI service



Creating a Connected Workbook

- Dataset provides ANALYZE IN EXCEL menu command
 - Used to create new Excel workbook with connection to dataset
 - Creation of new workbook triggered by download of **.ODC** file
 - Connecting can require user to enable data connections



Analyzing a Power BI Dataset in Excel

- Once you connect Excel workbook to a Power BI dataset
 - You can analyze data just as it were from local data model
 - Power BI dataset plays the role of SSAS in the cloud

	A	B	C	D	E
1	Row Labels	Sales Revenue	Sales Revenue QTD	Sales Revenue YTD	Sales Revenue RT
2	[-] Action Figures	\$10,166,653	\$1,329,609	\$3,973,086	\$10,166,653
3	[-] Cute and Huggable	\$4,949,464	\$502,033	\$1,616,758	\$4,949,464
4	[-] Tough Guys	\$5,217,189	\$827,577	\$2,356,328	\$5,217,189
5	[-] Batman Action Figure	\$225,012	\$31,634	\$88,011	\$225,012
6	[-] Captain America Action Figure	\$855,607	\$142,463	\$408,883	\$855,607
7	[-] GI Joe Action Figure	\$294,231	\$41,800	\$123,592	\$294,231
8	[-] Godzilla Action Figure	\$2,970,735	\$492,745	\$1,379,383	\$2,970,735
9	[-] Green Hulk Action Figure	\$144,842	\$19,810	\$57,292	\$144,842
10	[-] Red Hulk Alter Ego Action Figure	\$28,149	\$3,980	\$11,651	\$28,149
11	[-] Spiderman Action Figure	\$698,614	\$95,144	\$287,516	\$698,614
12	[-] Arts and Crafts	\$4,023,339	\$187,779	\$566,371	\$4,023,339
13	[-] Drawing	\$2,312,202	\$143,174	\$446,491	\$2,312,202
14	[-] Painting	\$1,711,137	\$44,605	\$119,880	\$1,711,137
15	[-] Remote Control Vehicles	\$15,540,525	\$2,732,383	\$7,616,646	\$15,540,525
16	[-] Boats	\$175,393	\$30,742	\$77,597	\$175,393
17	[-] Cars	\$1,917,031	\$331,980	\$936,237	\$1,917,031
18	[-] Helicopter	\$4,294,071	\$773,454	\$2,126,758	\$4,294,071
19	[-] Planes	\$6,166,673	\$1,116,375	\$3,116,069	\$6,166,673
20	[-] Trucks	\$2,987,358	\$479,832	\$1,359,985	\$2,987,358
21	Grand Total	\$29,730,517	\$4,249,771	\$12,156,103	\$29,730,517
22					
23					

PivotTable Fields

Show fields: (All)

Search

Products

- Product Category
- More Fields

Drag fields between areas below:

Filters	Columns
	Σ Values

Rows	Σ Values
Product Category	Sales Revenue
	Sales Revenue QTD
	Sales Revenue YTD
	Sales Revenue RT





DEMO

Use the Analyze in Excel Feature

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