Microsoft Power Platform

Power BI
Paginated Reports in a Day

December 2022 release

Instructor introduction

Course aim

- This course aims to empower report authors with the technical knowledge required to create, publish, and distribute Power BI paginated reports
- It targets:
  - Power BI report authors
  - Excel analysts
  - Those with SSRS skills, requiring a refresher
  - Crystal Reports authors

Course aim

(Continued)

- On completion of this course, you will have the skills to:
  - Design report layouts
  - Connect to data sources to retrieve report data
  - Work with parameters
  - Visualize report data
  - Add interactivity features
  - Publish, consume, deliver, and embed paginated reports

Course aim

Prerequisites

- There are no specific prerequisites
- It will be helpful, however, if you have basic familiarity with other reporting tools

Course modules

01: Power BI Reporting

02: Designing Report Layouts

03: Retrieving Report Data

04: Working with Parameters

05: Visualizing Report Data

06: Adding Interactivity Features

07: Beyond Report Development

Labs

01A: Get Started 15 minutes

02A: Create Your First Report 20 minutes

02B: Develop a Report Template 30 minutes

03A: Develop a List Report 45 minutes

04A: Work with Parameters 45 minutes

05A: Develop a Table Report – Part 1 60 minutes

05B: Develop a Table Report – Part 2 20 minutes

06A: Add Interactivity Features 10 minutes

07A: Use the Paginated Report Visual 10 minutes

Labs

Scenario

- The labs are based on the sales activities of the fictitious Adventure Works company
- The Adventure Works company:
  - Represents a bicycle manufacturer that sells bicycles and accessories to global markets
  - Accumulates operational data in an Azure SQL Database
  - Needs to explore and discover deeper insight from their data
- In the labs, as their report author, you will develop several sales performance reports

Labs

PC setup

- You must use your own computer with:
  - Windows 7, or later
  - Microsoft .NET Framework version 4.7.2, or later
  - Latest version of Power BI Report Builder (15.7.01704.0001—September 2022)
  - Microsoft Edge (based on Chromium) recommended—or another web browser supported by Power BI
- It is **recommended** you have:
  - Another device like a tablet—you can use it to view the lab PDF documents
  - A mouse—report authoring involves precision design

Labs

Getting setup

- The self-study kit and setup instructions are available from:
  - https://aka.ms/priad-online-course#self-study-kit
- Setup instructions:
  1. Download the self-study kit (.zip) locally
  2. Edit the file properties, and "unblock"
  3. Extract the file contents to your file system
     - The lab documents will refer to this location as **<CourseFolder>**
- The presentation is available as a PDF document found in the **<CourseFolder>\PowerBIPRIAD\Presentations** folder
  - It includes many links to useful reference material

Labs

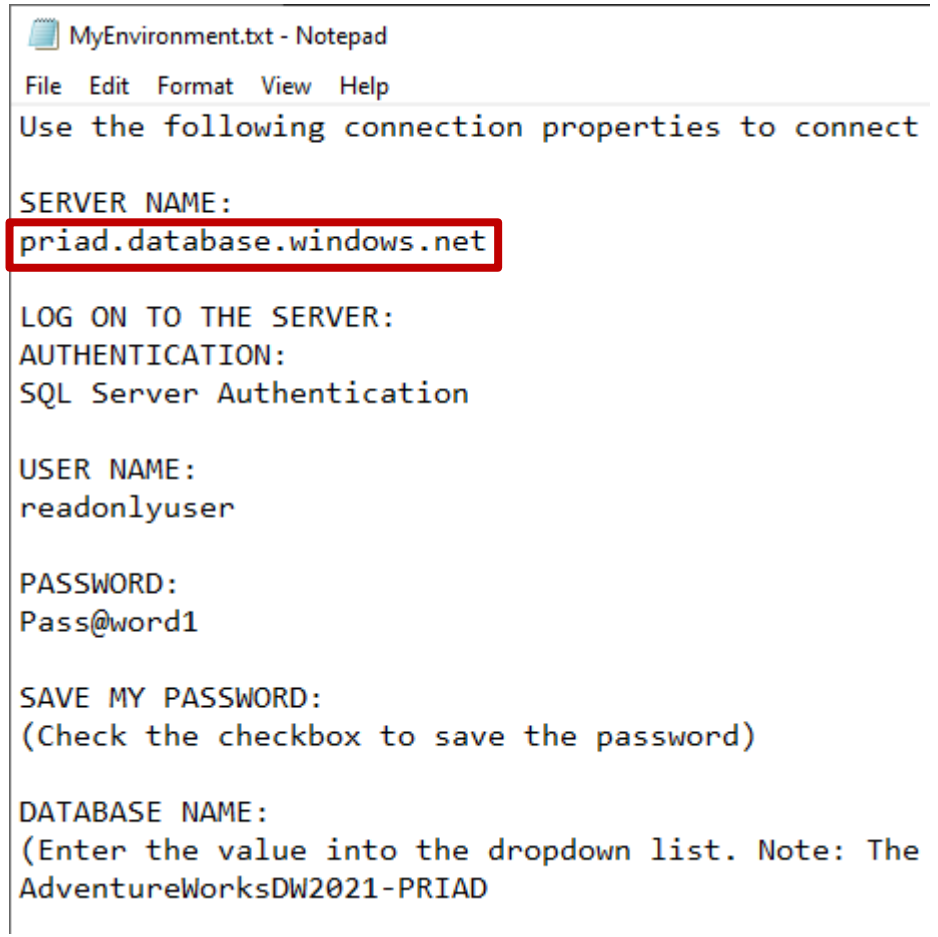
Power BI account

- You may be provided with a Power BI account to use in the labs
- Or—you can use your own account **providing you can create a workspace**

Labs

Azure SQL Database server name

- Some of your lab reports will query an Azure SQL Database
- The instructor may provide you with a different database server name
  - In this case, open the **<CourseFolder>\PowerBIPRIAD\MySolution\MyEnvironment.txt** file and replace the server name value
  - Remember to save the file



Labs

Snippets

- To improve accuracy and reduce typing, many labs involve copying and pasting from snippet files
- When snippet files are available, **do not copy from the lab documents**—rich-formatted text blocks often paste incorrectly
- Avoid the temptation to just copy-and-paste
- Take the time to understand the intention of each snippet

Feedback

- Your feedback is important to help us understand how well we meet your needs, and to improve the experience for future attendees
- On completion of the class, you will be asked to complete and hand in an evaluation form
- If you must leave the class early, please request a form in advance

Resources

Online course

This course is available to watch online, free of charge

Check out all 26 videos, including bonus content

https://aka.ms/priad-online-course

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 01

Power BI Reporting

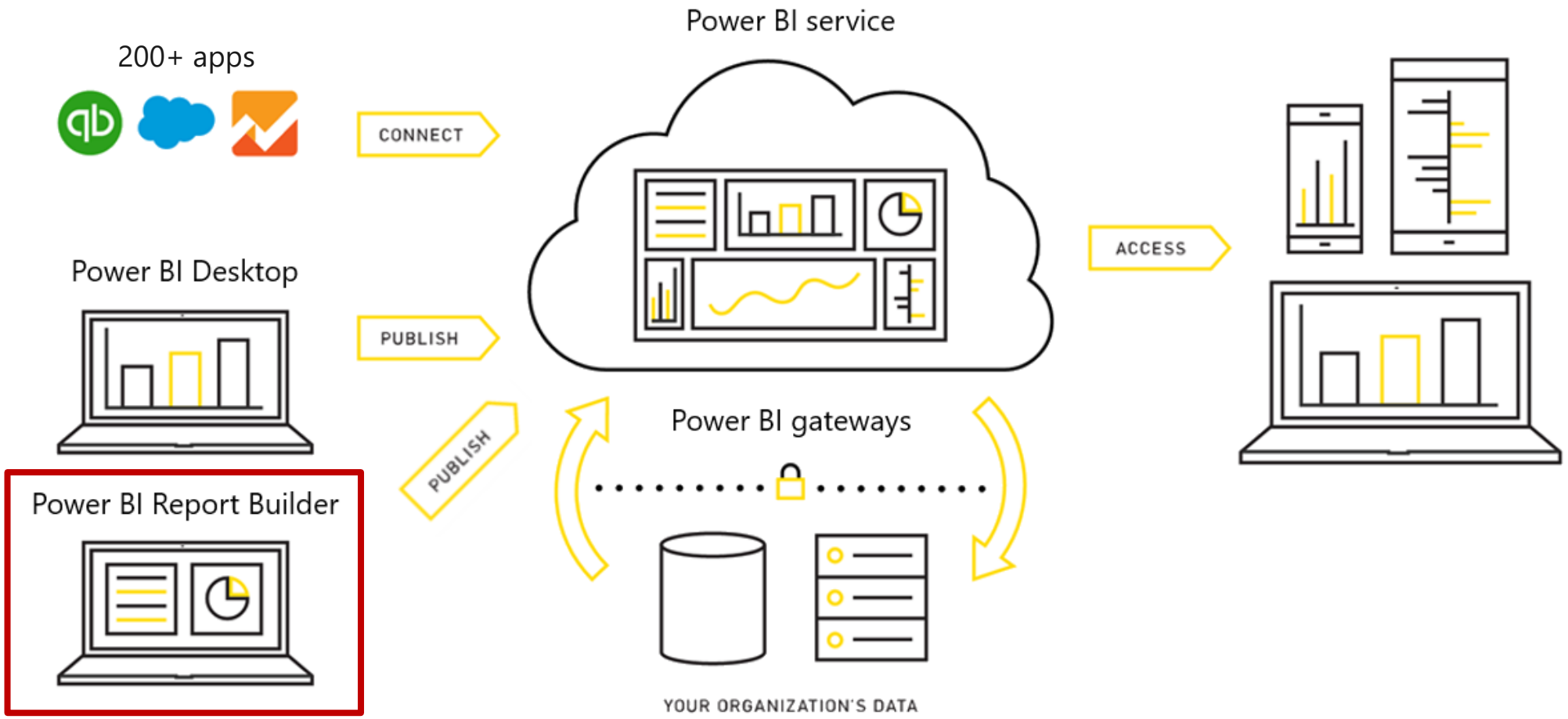
Module outline

01: Power BI Reporting

- Introducing Power BI
- Power BI reporting
- Paginated reporting

Introducing Power BI

Experience your data: Any data, any way, anywhere



Introducing Power BI

Product portfolio

Author

Power BI Desktop

Power BI Report Builder

Free data analysis and report authoring tools

Share and collaborate

Power BI Service

Cloud-based modern business analytics service

Large scale deployments

Power BI Premium

Dedicated capacity for increased performance

Share and collaborate

Power BI Report Server

On-premises report server

App dev

Power BI Embedded

Visual analytics embedded in your applications

Introducing Power BI

Product portfolio » Power BI Report Server

- Do not confuse paginated reports with **Power BI Report Server**
  - This product is for on-premises scenarios

This course does not cover Power BI Report Server

Note: Reports can be migrated from SQL Server Reporting Services (SSRS) or Power BI Report Server

Power BI reporting

- Power BI supports two different report types:
  - Power BI reports
  - Power BI paginated reports

Power BI reporting

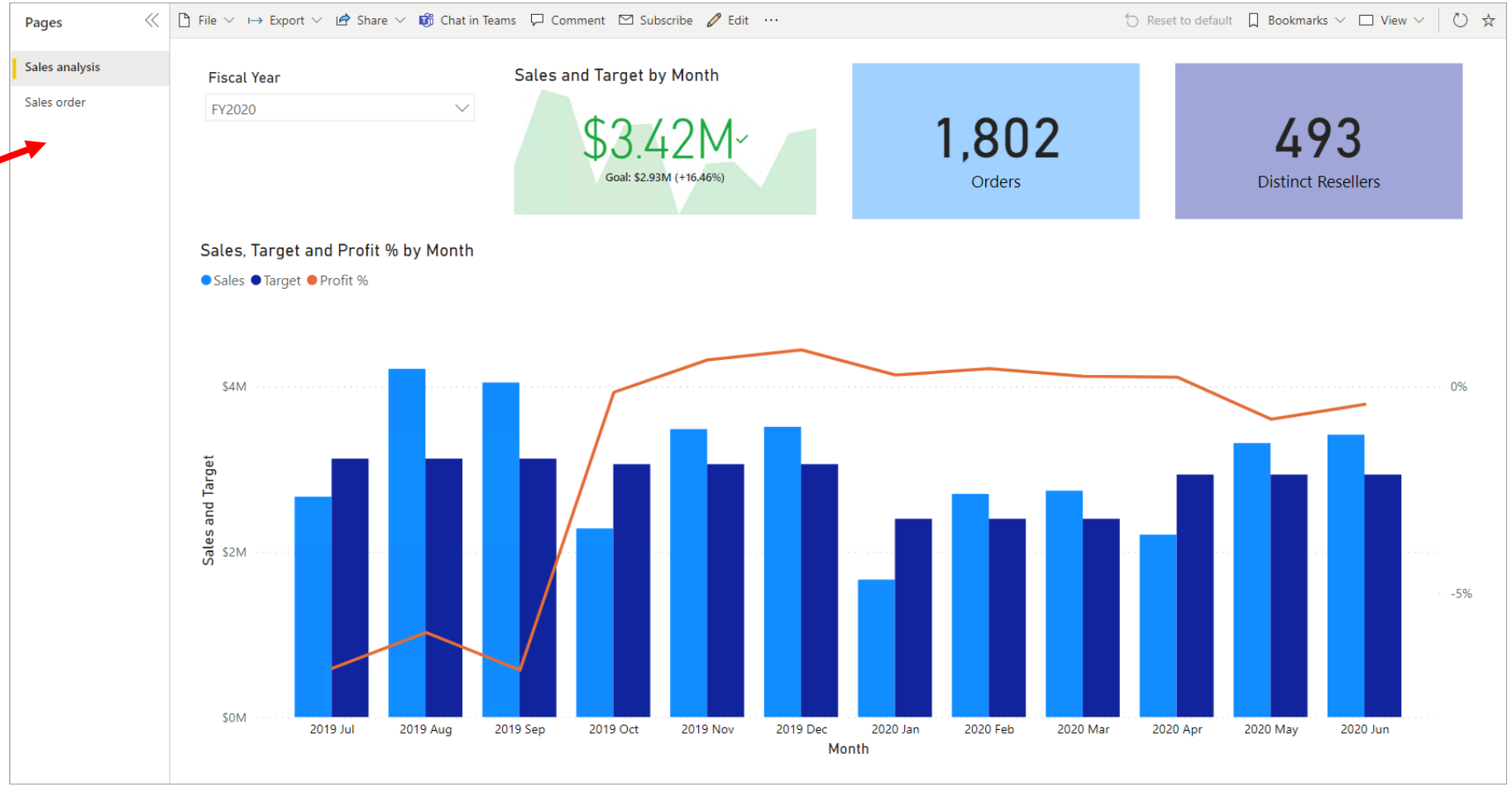
Power BI reports

- **Power BI reports** are optimized for exploration and interactivity
- They present your data using a comprehensive range of ultra-modern visuals
- They are:
  - Ideal for analytic reports, enabling your report users to explore data, and to discover relationships and patterns
  - Developed in the Power BI service, or Power BI Desktop
- You can refer to these reports as *interactive analytic reports*

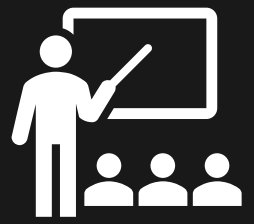
Power BI reporting

Power BI reports » Example

Can be multi-page, but fixed page size



Demo 01A



- Power BI reports

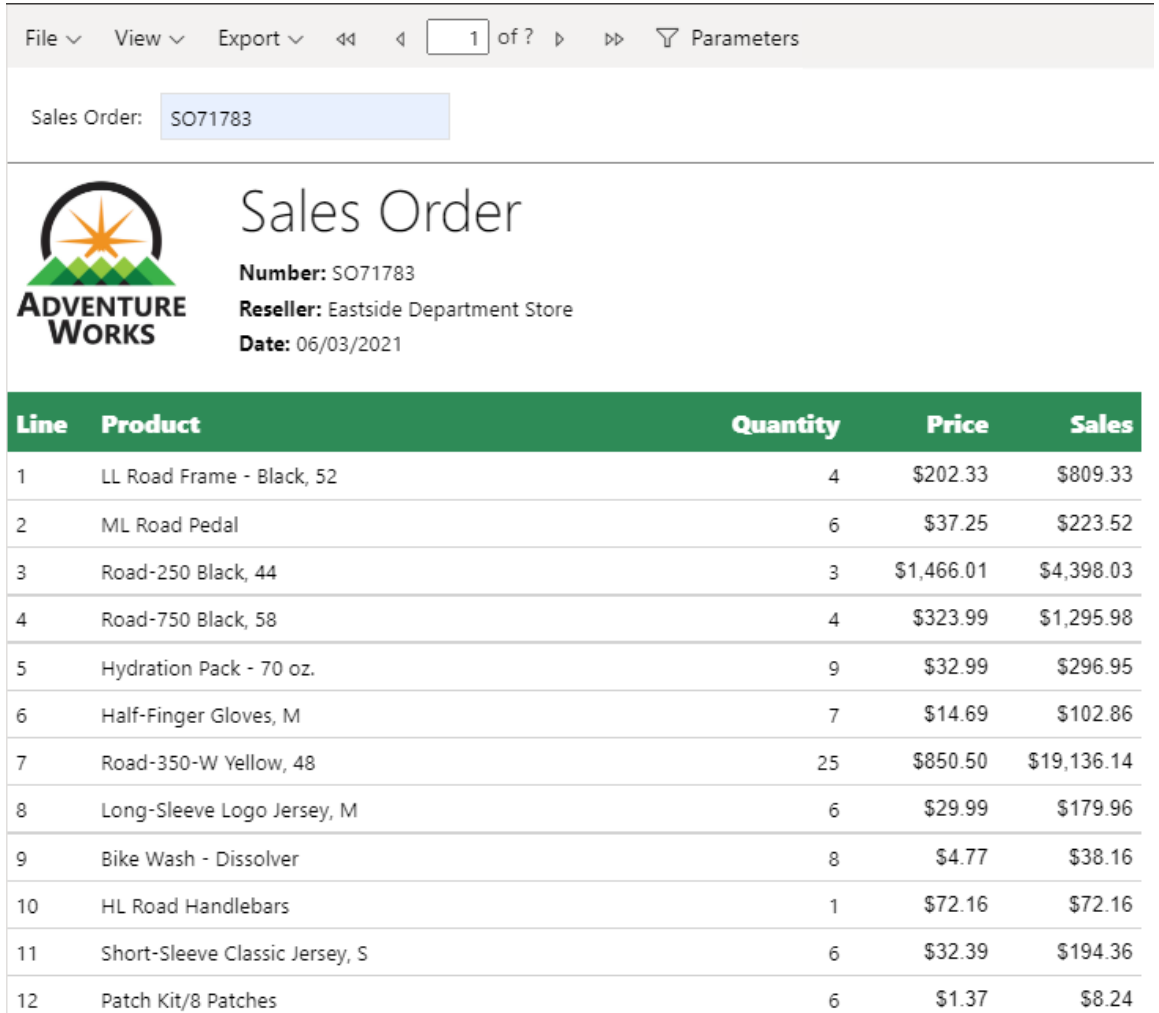
Power BI reporting

Power BI paginated reports

- **Power BI paginated reports** are optimized for printing, or PDF generation
- They provide you with the ability to produce highly formatted, pixel-perfect layouts
- They are:
  - Based on SQL Server Reporting Services (SSRS) Report Definition Language (RDL) reports
  - Ideal for operational reports like sales invoices
  - Developed using Power BI Report Builder
- You can refer to these reports as *pixel-perfect reports*

Power BI reporting

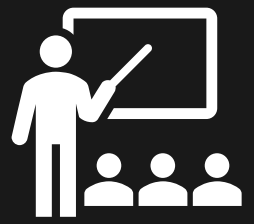
Power BI paginated reports » Example



Line	Product	Quantity	Price	Sales
1	LL Road Frame - Black, 52	4	$202.33	$809.33
2	ML Road Pedal	6	$37.25	$223.52
3	Road-250 Black, 44	3	$1,466.01	$4,398.03
4	Road-750 Black, 58	4	$323.99	$1,295.98
5	Hydration Pack - 70 oz.	9	$32.99	$296.95
6	Half-Finger Gloves, M	7	$14.69	$102.86
7	Road-350-W Yellow, 48	25	$850.50	$19,136.14
8	Long-Sleeve Logo Jersey, M	6	$29.99	$179.96
9	Bike Wash - Dissolver	8	$4.77	$38.16
10	HL Road Handlebars	1	$72.16	$72.16
11	Short-Sleeve Classic Jersey, S	6	$32.39	$194.36
12	Patch Kit/8 Patches	6	$1.37	$8.24

Can overflow to multiple pages

Demo 01B



- Power BI paginated reports

Paginated reporting

- Licensing
- Data sources
- Report consumption

Paginated reporting

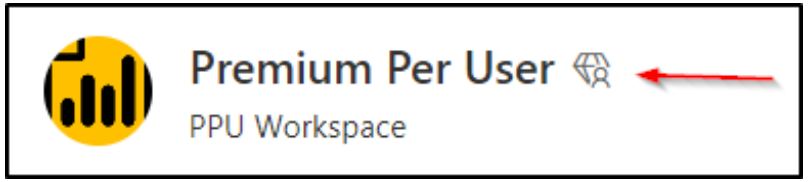
Licensing

- Paginated reporting is available for all licensing deployments:
  - Power BI Pro
  - Power BI Premium Per User (PPU)
  - Power BI Premium (P SKUs)
  - Power BI Embedded (A SKUs, A4-A6)

Paginated reporting

Licensing » Power BI Premium Per User (PPU)

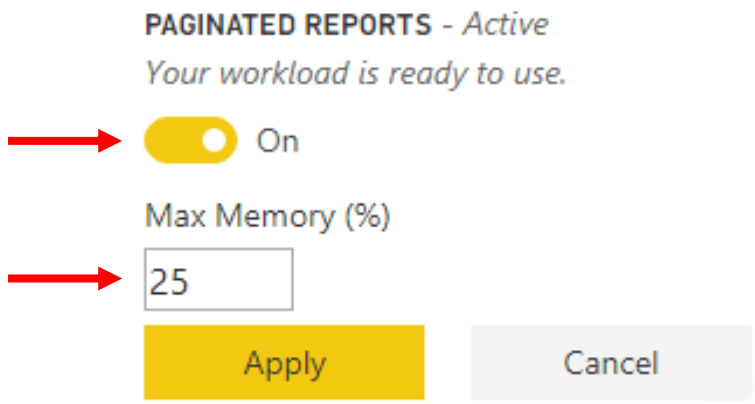
- Power BI Premium Per User allows organizations to license Premium features on a per-user basis
- Premium Per User (PPU) includes all Power BI Pro license capabilities
  - It also adds features such as AI, Model size limit increase, and other capabilities that are only available to Premium subscribers
- Any user accessing content in a PPU workspace must have a PPU license
- PPU workspaces are identified with a diamond/user icon



Paginated reporting

Licensing » Power BI Premium

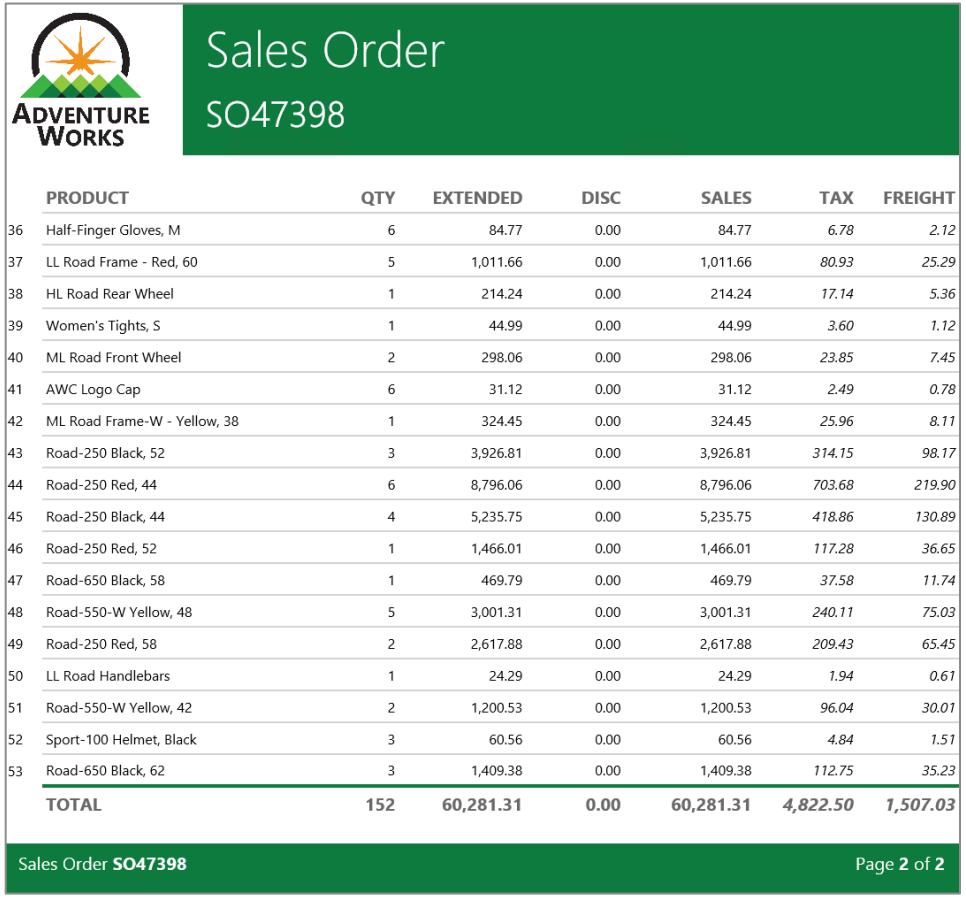
- For Power BI Premium, the **Paginated Reporting** workload must be enabled for the capacity
  - A configured proportion of capacity memory is reserved for paginated reporting
  - Requires capacity admin privileges
- The A SKUs (A4-A6) are supported for embed or test/dev scenarios only
- Premium capacity workspaces are identified with a diamond icon



Paginated reporting

Data sources

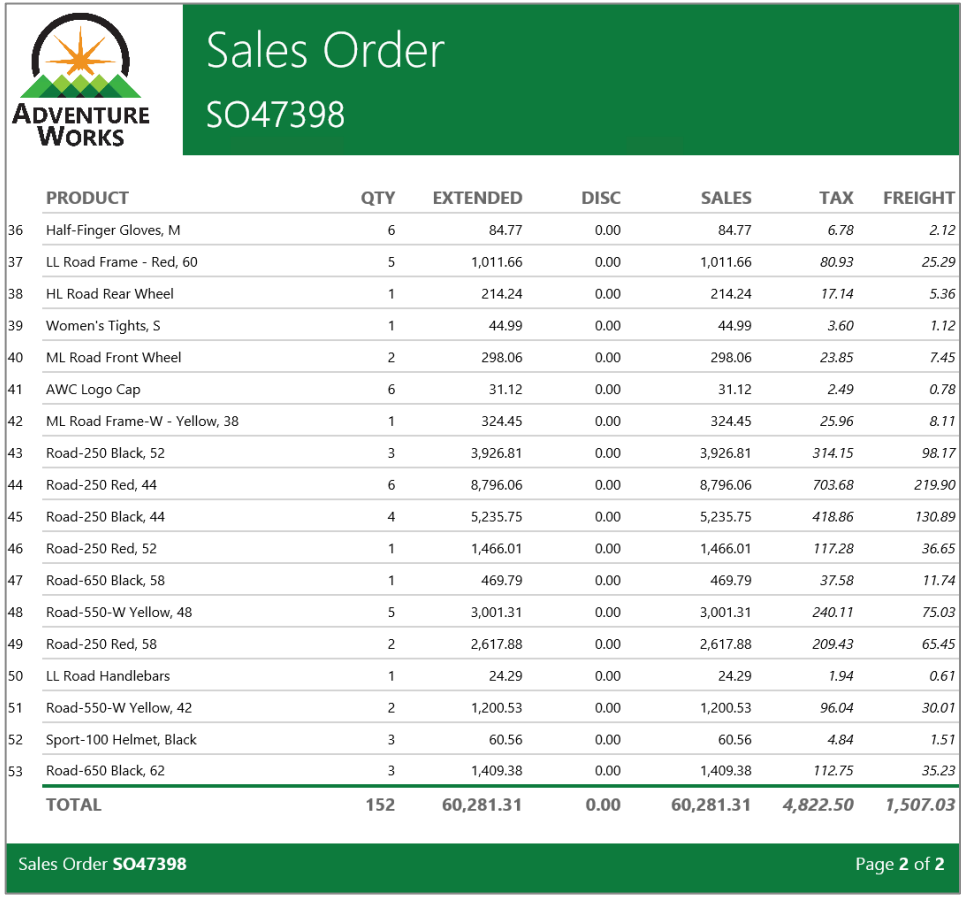
- Paginated reports can present data stored in:
  - Azure cloud sources
    - Azure SQL Database, plus other relational services
    - Azure Analysis Services
  - On-premises sources (via gateway):
    - SQL Server
    - SQL Server Analysis Services
    - Oracle
    - Teradata



Paginated reporting

Report consumption

- Paginated reports are made available in the same was as Power BI reports—in workspaces, or distributed in apps
- Consume reports in:
  - Power BI service
  - Power BI mobile app
  - Custom apps and portals
- Export reports to different formats:
  - Word, Excel, PowerPoint, PDF, TIFF file, MHTML, CSV, or XML
- Deliver reports with subscriptions



	PRODUCT	QTY	EXTENDED	DISC	SALES	TAX	FREIGHT
36	Half-Finger Gloves, M	6	84.77	0.00	84.77	6.78	2.12
37	LL Road Frame - Red, 60	5	1,011.66	0.00	1,011.66	80.93	25.29
38	HL Road Rear Wheel	1	214.24	0.00	214.24	17.14	5.36
39	Women's Tights, S	1	44.99	0.00	44.99	3.60	1.12
40	ML Road Front Wheel	2	298.06	0.00	298.06	23.85	7.45
41	AWC Logo Cap	6	31.12	0.00	31.12	2.49	0.78
42	ML Road Frame-W - Yellow, 38	1	324.45	0.00	324.45	25.96	8.11
43	Road-250 Black, 52	3	3,926.81	0.00	3,926.81	314.15	98.17
44	Road-250 Red, 44	6	8,796.06	0.00	8,796.06	703.68	219.90
45	Road-250 Black, 44	4	5,235.75	0.00	5,235.75	418.86	130.89
46	Road-250 Red, 52	1	1,466.01	0.00	1,466.01	117.28	36.65
47	Road-650 Black, 58	1	469.79	0.00	469.79	37.58	11.74
48	Road-550-W Yellow, 48	5	3,001.31	0.00	3,001.31	240.11	75.03
49	Road-250 Red, 58	2	2,617.88	0.00	2,617.88	209.43	65.45
50	LL Road Handlebars	1	24.29	0.00	24.29	1.94	0.61
51	Road-550-W Yellow, 42	2	1,200.53	0.00	1,200.53	96.04	30.01
52	Sport-100 Helmet, Black	3	60.56	0.00	60.56	4.84	1.51
53	Road-650 Black, 62	3	1,409.38	0.00	1,409.38	112.75	35.23
	TOTAL	152	60,281.31	0.00	60,281.31	4,822.50	1,507.03

Lab 01A

15 minutes

Get Started

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab01A

1. Sign in to Power BI
2. Create a workspace
3. Upload a Power BI Desktop file
4. Install Power BI Report Builder

Resources

Power BI site

http://powerbi.com

Power BI community

http://community.powerbi.com/

Power BI ideas

http://ideas.powerbi.com/

Power BI blog

https://blog.powerbi.com/

Power BI documentation

https://docs.microsoft.com/power-bi/

Tip: Power BI is evolving at a rapid rate—one of the best ways to keep pace with updates is to subscribe to the Power BI blog

Resources

(Continued)

Paginated reports in Power BI: FAQ

https://docs.microsoft.com/power-bi/paginated-reports-faq

What are paginated reports in Power BI Premium?

https://docs.microsoft.com/power-bi/paginated-reports-report-builder-power-bi

Power BI Premium Per User FAQ

https://docs.microsoft.com/power-bi/admin/service-premium-per-user-faq

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 02

Designing Report Layouts

Module outline

02: Designing Report Layouts

- Introducing Report Builder
- Designing report layouts
- Setting dynamic properties

Introducing Report Builder

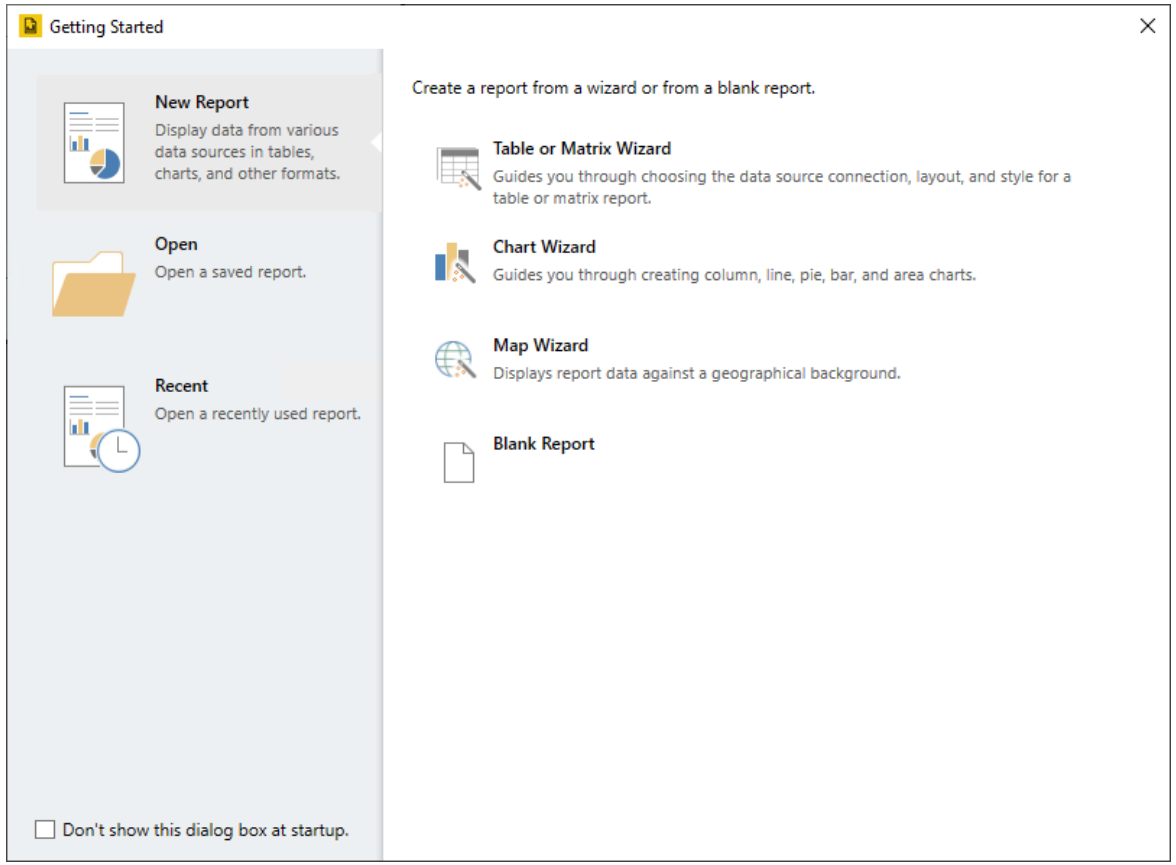
- Use Report Builder (RB) to:
  - Author reports
  - Preview reports
  - Publish reports to the Power BI service
- Available from Microsoft downloads
  - http://aka.ms/pbireportbuilder
- System requirements:
  - Windows 7, or later
  - Microsoft .NET Framework 4.7.2

RB is a tool for developers—it is not intended to be used as a report consumption app

Introducing Report Builder

Getting started window

- Use the **Getting Started** window to:
  - Create a new report
    - Using wizards
    - Blank report
  - Open an existing report
    - From the file system
    - From a list of recently opened reports
- It opens automatically each time RB is started
  - It can be disabled



Introducing Report Builder

Layout

- Presents a report canvas for designing a single report
  - Optionally, view the ruler to help layout report objects
- Design functionality is available from:
  - Quick access commands—save, undo, redo
  - Ribbon commands
  - Various panes

Working with RB functionality will be described in later modules

Introducing Report Builder

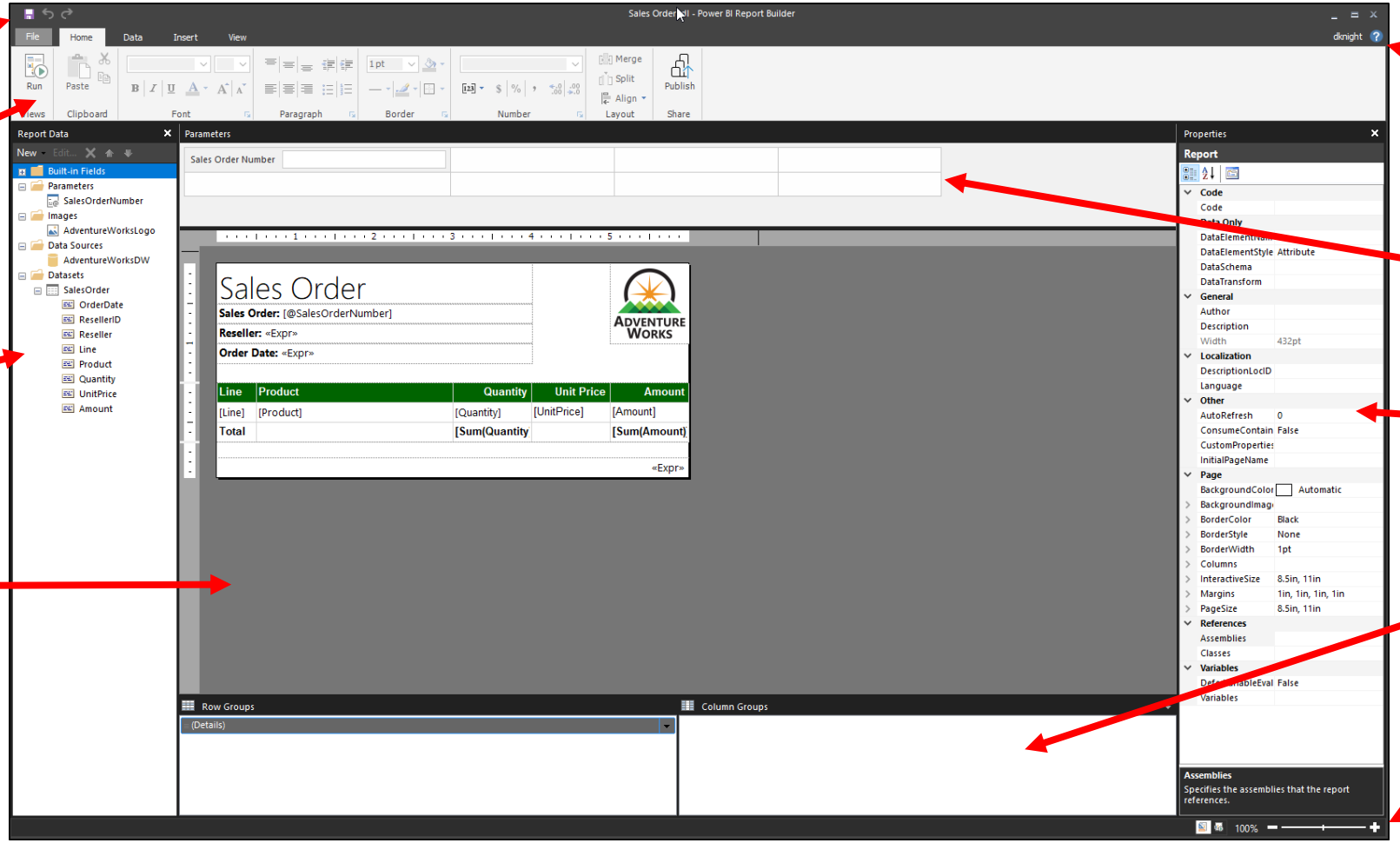
Layout

Quick access commands

Ribbon

Report Data pane

Report canvas



Authenticated user or switch account

Parameters pane

Properties pane

Grouping pane

Zoom, toggle preview/ design

Introducing Report Builder

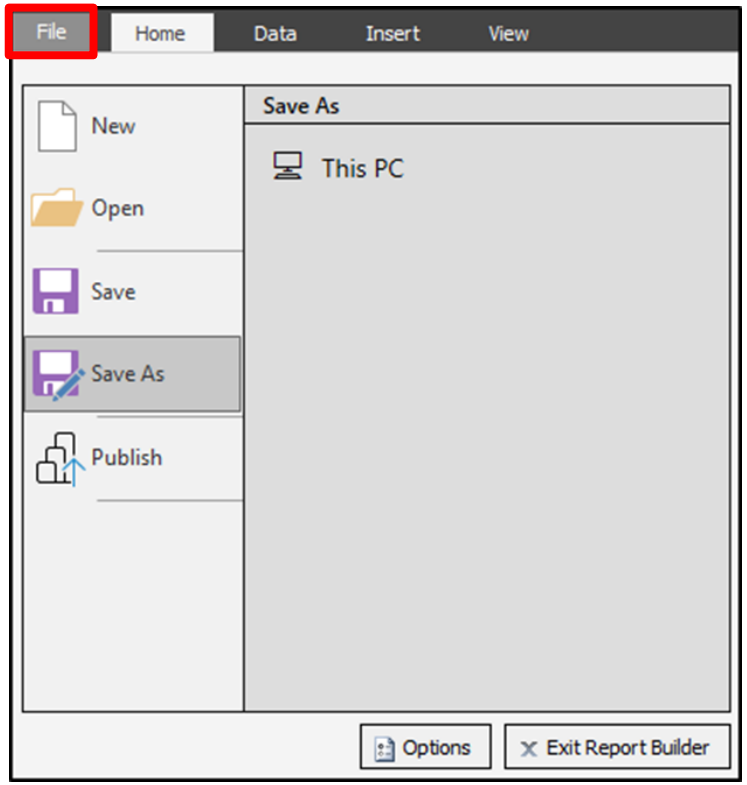
Layout » Ribbon tabs

- There are four ribbon tabs:
  - File
  - Home
  - Data
  - Insert
  - View

Introducing Report Builder

Layout » Ribbon tabs » File

- Use **File** to:
  - Create a new report
  - Open an existing report
  - Save the current report
  - Open **Options**
- Reports can be saved locally during development
  - Reports are saved as **.rdl** files
- Finalized reports are published to the Power BI service

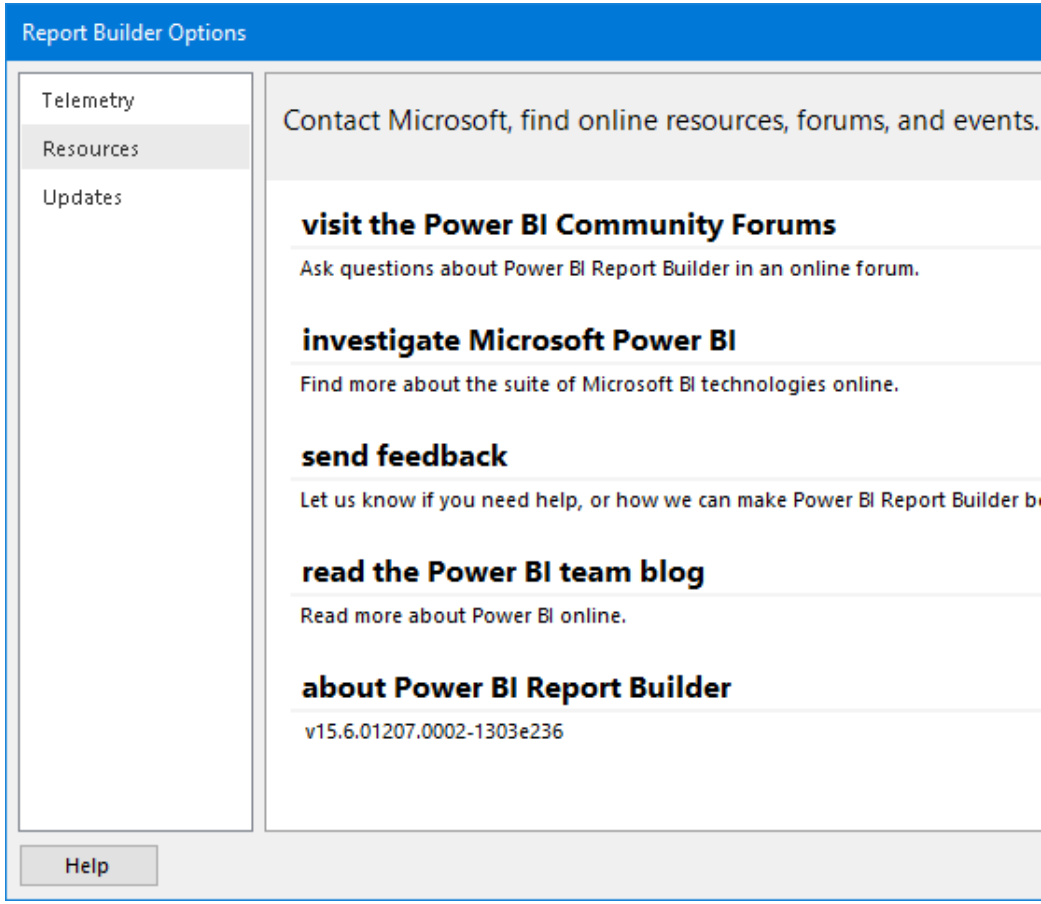


Publication is covered in Module 07

Introducing Report Builder

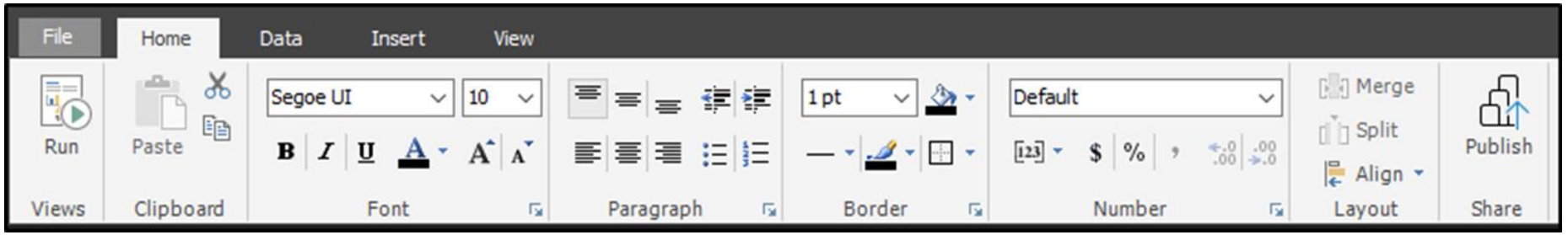
Layout » Ribbon tabs » File » Options

- Use **Options** to:
  - Enable usage data and errors to be sent to Microsoft (on by default)
  - Access resources, including:
    - Community forums
    - Feedback
    - Power BI team blog
    - Version information
  - Check for updates
    - Automatic checks can be enabled



Introducing Report Builder

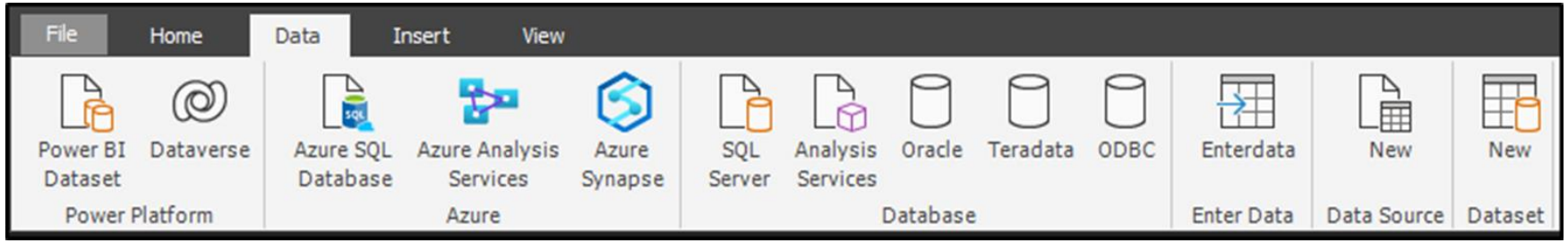
Layout » Ribbon tabs » Home



- Use the **Home** ribbon tab to:
  - Run (preview) the report
  - Copy/paste
  - Apply formatting:
    - Font, paragraph, border, number, and layout

Introducing Report Builder

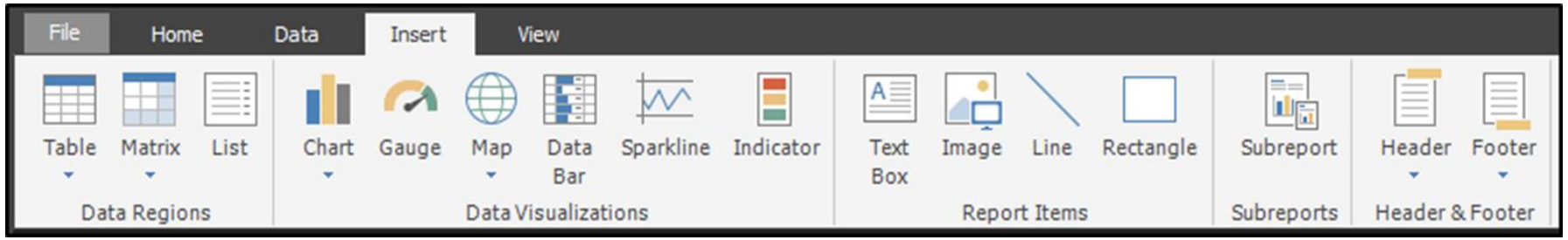
Layout » Ribbon tabs » Data



- Use the **Data** ribbon tab to:
  - Connect to data sources
  - Create manual data sets

Introducing Report Builder

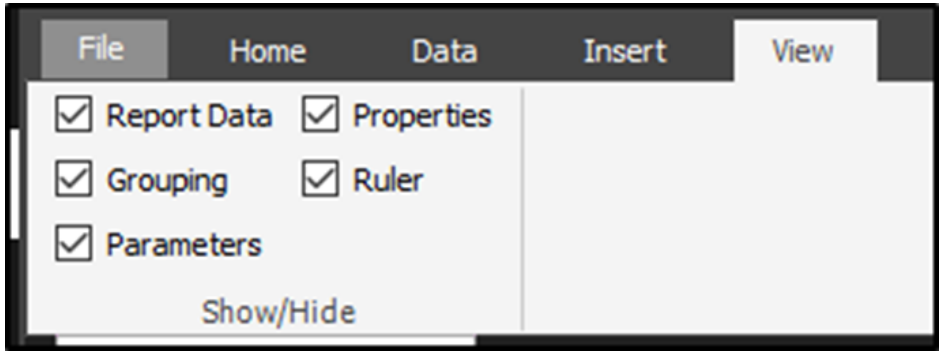
Layout » Ribbon tabs » Insert



- Use the **Insert** ribbon tab to:
  - Add data regions, data visualizations, and report items
  - Add subreports
  - Enabled headers and/or footers

Introducing Report Builder

Layout » Ribbon tabs » View



- Use the **View** ribbon tab to show/hide:
  - Ruler
  - Panes:
    - Report Data
    - Properties
    - Grouping
    - Parameters

Introducing Report Builder

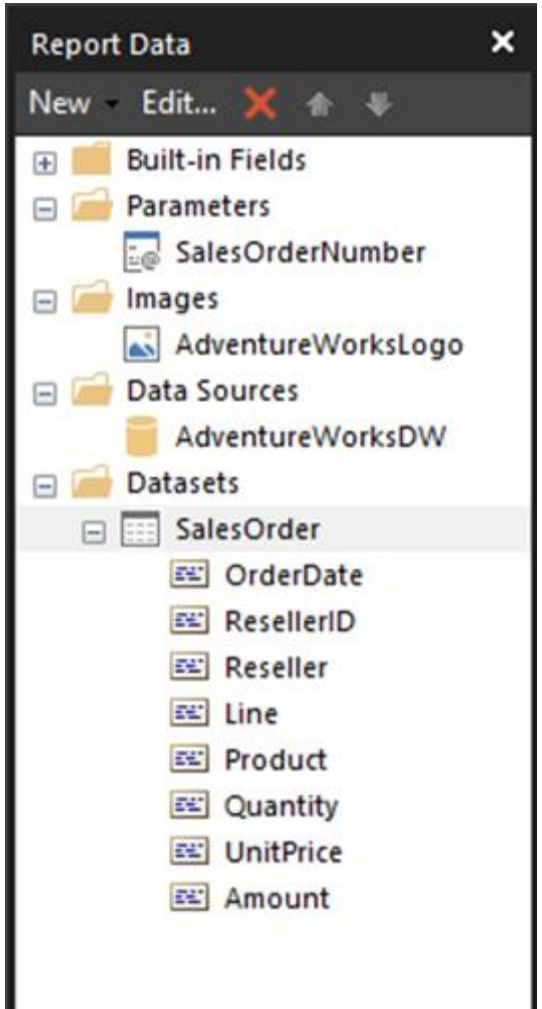
Layout » Panes

- There are four panes:
  - Report Data
  - Properties
  - Grouping
  - Parameters

Introduced in later modules

Introducing Report Builder

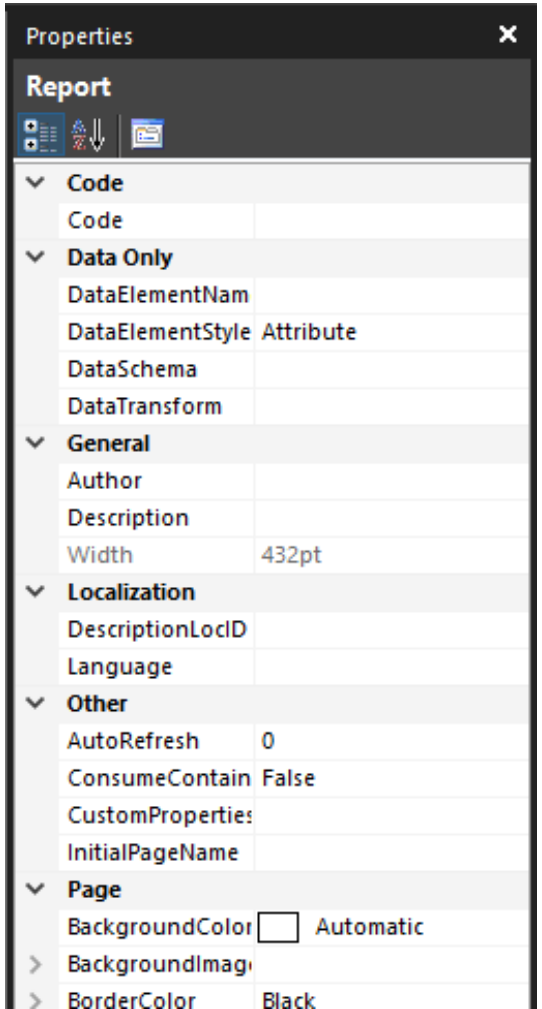
Layout » Panes » Report Data



- Use the **Report Data** pane to manage and explore resources available for designing the report layout:
  - Built-in fields—also known as global objects
  - Report parameters
  - Images
  - Data sources
  - Datasets and their fields
- Built-in fields, report parameters, images and dataset fields can be dragged to the report canvas

Introducing Report Builder

Layout » Panes » Properties



- Use the **Properties** pane to manage and list the properties for the selected item(s)
  - Properties can be grouped by category, or listed alphabetically
  - Some properties can be managed for multi-selected items
- Alternatively, right-click a report object to open the **Properties** pages to access to commonly configured properties

Introducing Report Builder

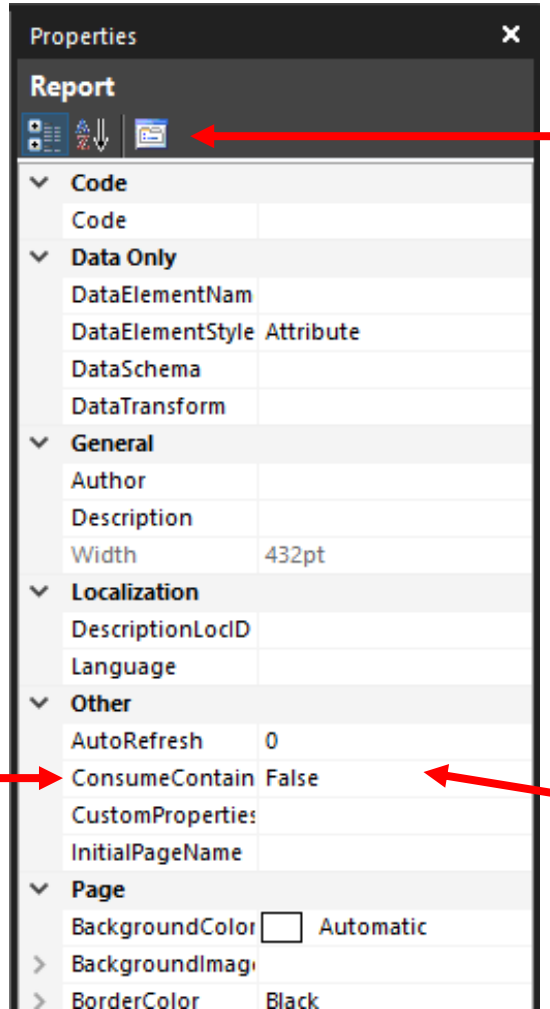
Layout » Panes » Properties (Continued)

Selected item

Toggle property order

Expand property group to reveal sub-properties

Property name



Click to open the **Properties** pages (if available)

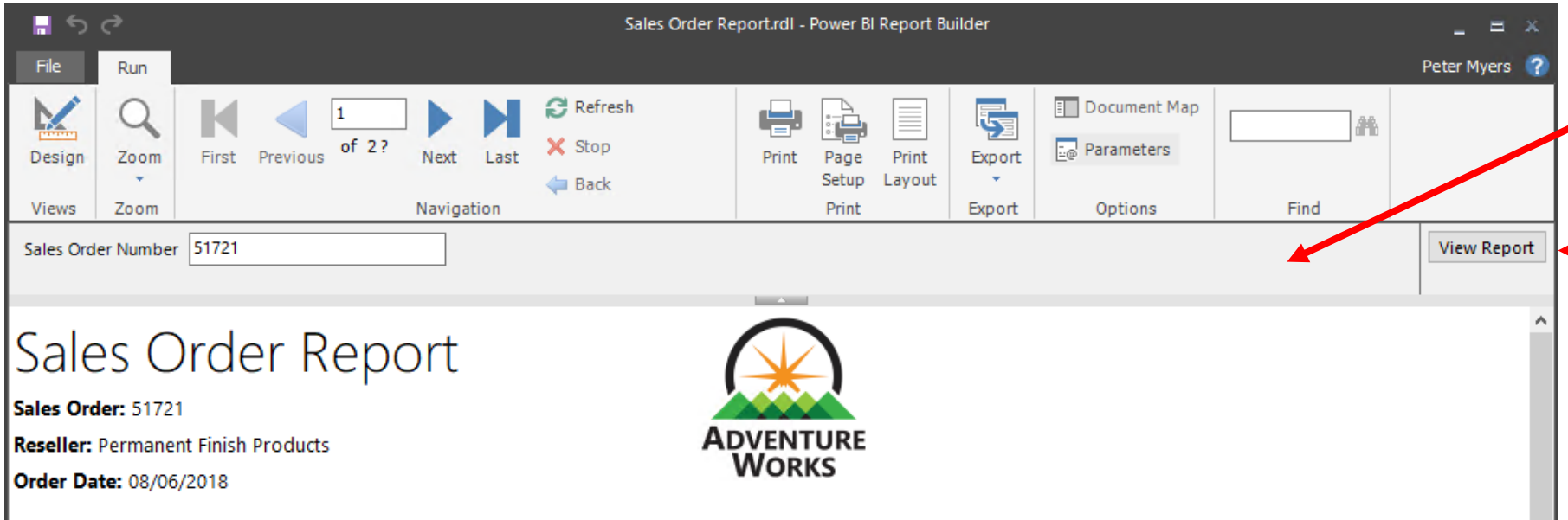
Property value

Tip: To configure a property, click its name, and then commence typing to overwrite the current value

Introducing Report Builder

Report preview

- Preview mode is helpful to test the report design, rendered in HTML
- Once all report parameter values are entered, click View Report
  - The report will render automatically if all parameters have default values



Parameter pane

View report

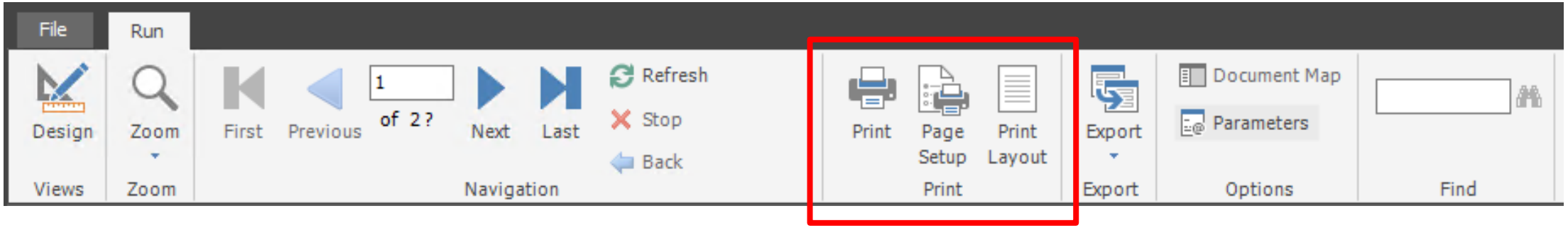
Introducing Report Builder

Report preview » Ribbon tabs » Run

- Use the **Run** ribbon tab to:
  - Return to design mode
  - Zoom
  - Navigate between pages
  - Refresh, or stop refreshing
  - Print, or export
  - Show parameters pane
  - Find text values

Introducing Report Builder

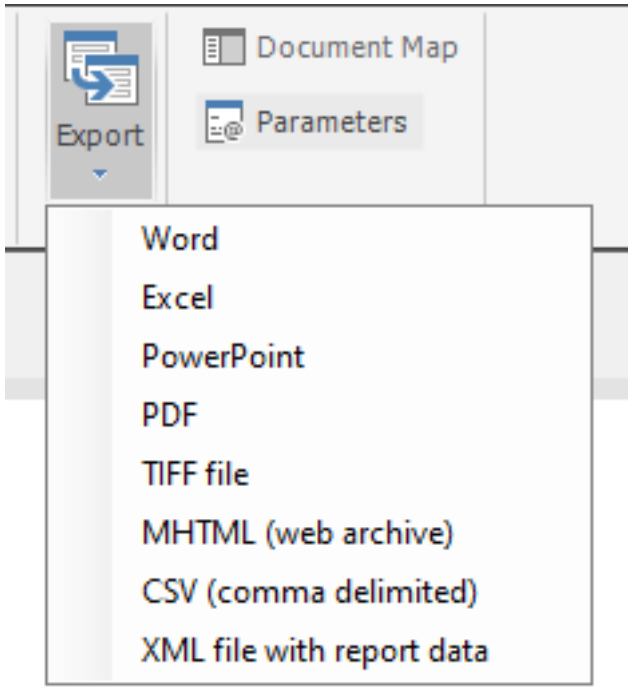
Report preview » Print options



- The preview report can be output to a printer
  - Optionally, set page range and number of copies
- Use **Page setup** to set paper size, page orientation, and margins
- Use **Print layout** to see how the report will look when it is printed

Introducing Report Builder

Report preview » Export

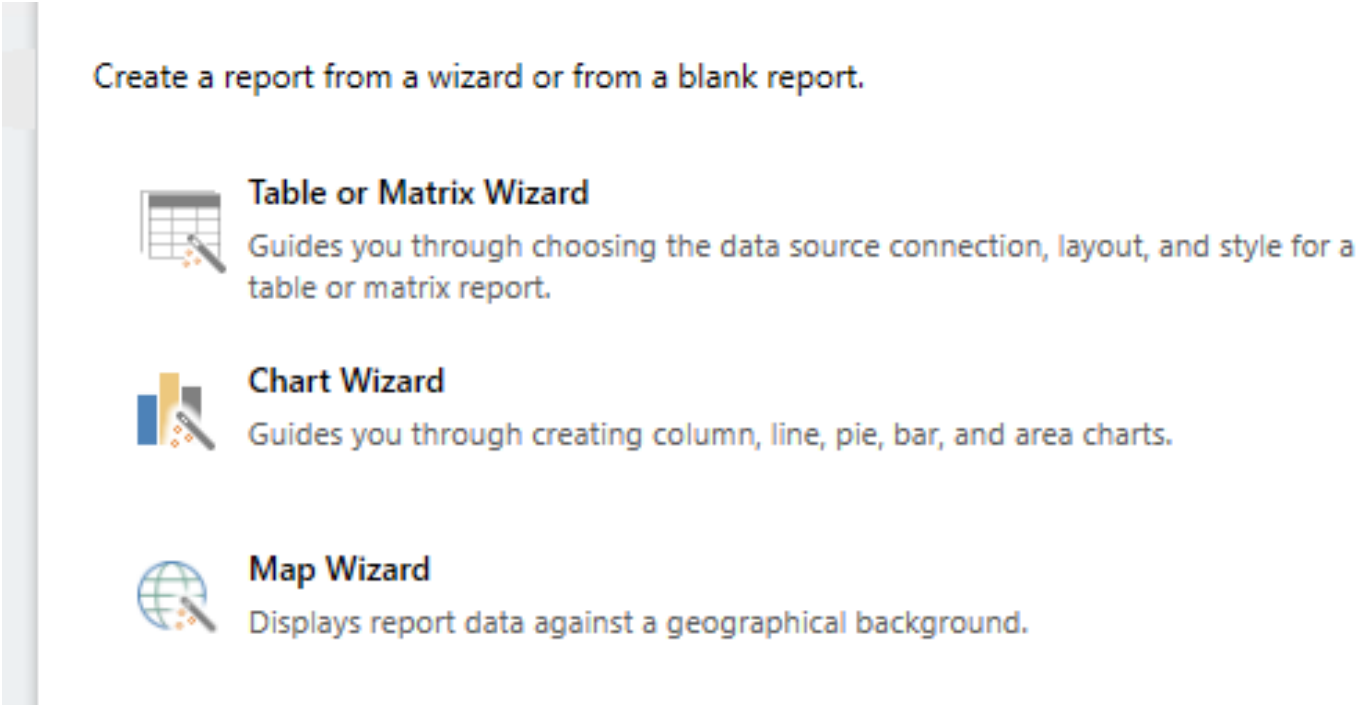


- The preview report can be exported using a different format:
  - Word
  - Excel
  - PowerPoint
  - PDF (regular or accessible)
  - TIFF file
  - MHTML (web archive)
  - CSV (command delimited)
  - XML file with report data

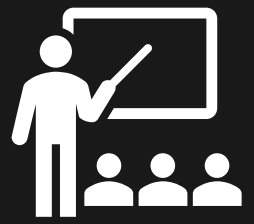
Introducing Report Builder

Wizards

- To accelerate development, there are three wizards:
  - Table or matrix wizard
  - Chart wizard
  - Map wizard
- They can be launched from:
  - **Getting Started** window
  - **Insert** ribbon tab



Demo 02A



- Create a Wizard-designed report

Introducing Report Builder

Development methodology

- A typical development methodology covers these steps:

1. Create the report
2. Create a data source
3. Define dataset(s) to retrieve data
4. Define report parameters
5. Design the report layout
6. Test the report design (in preview mode)
7. Publish the report to the Power BI service
8. Configure any post-publication tasks

Lab 02A

20 minutes

Create Your First Report

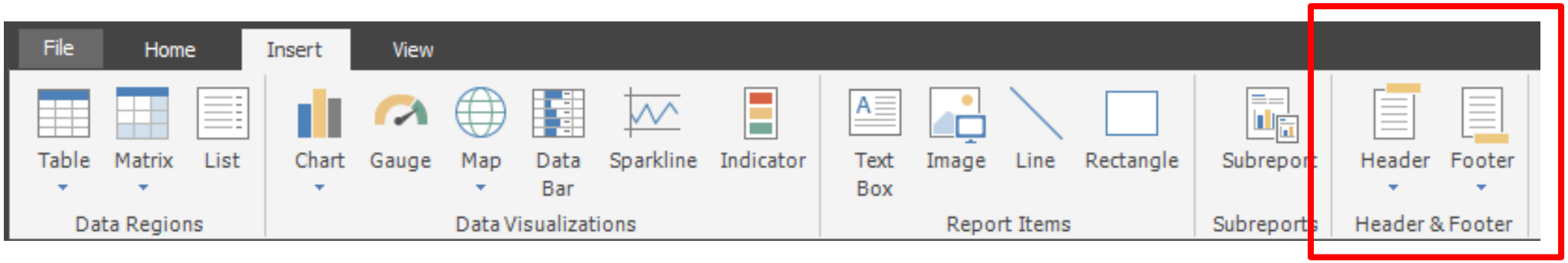
You must successfully complete **Lab 01A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab02A

1. Create the Report

Designing report layouts

- Each report consists of a body, and can optionally include a header and/or footer that repeat for each page
  - Headers/footers can be omitted for the first and/or last pages



Designing report layouts

Report

- Configure the report with the properties page to set:
  - Page units (inches or centimeters)
  - Page orientation
  - Page size—using standard sizes, or custom width and height
  - Margins
- The page size *less margins* determines the available page space for the report design

Tip: Take care to ensure that the report body width fits within the page size, factoring in margins and header/footers

Designing report layouts

Report » Additional properties

- Use the properties pane to configure additional report properties:
  - Author
  - Description
  - Language
  - Columns
  - Background color, or image
  - Auto refresh interval (in seconds)

Designing report layouts

Report » Variables

- Use a **report variable** to hold a value for time-dependent calculations
- They are calculated once, and can be used in expressions throughout a report
- They are read-only by default, and can be set to read-write
- The value is preserved throughout a session, until the report is processed again

Variables are an advanced design concept

Designing report layouts

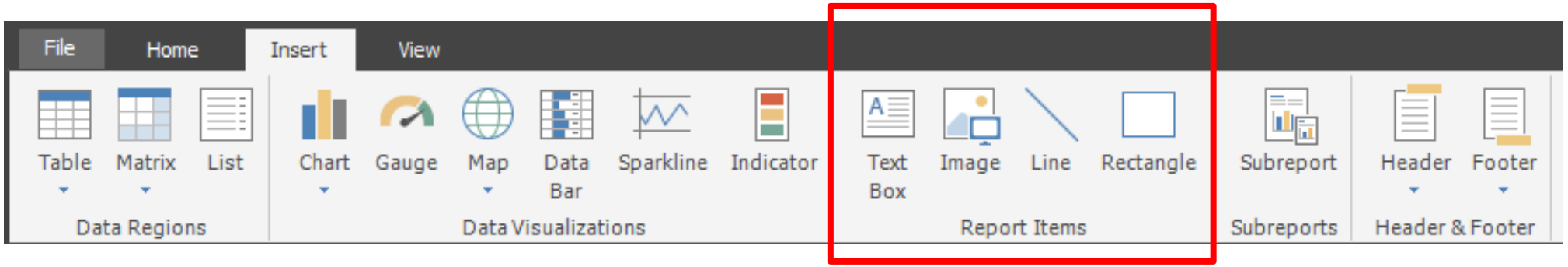
Report objects

- Report objects can be added from the **Insert** ribbon tab
- They consist of:
  - Data regions
  - Data visualizations
  - Report items
  - Subreports

Introduced in Module 05

Designing report layouts

Report objects » Report items



- Use **report items** to add visual interest to the layout
  - They are often configured independent of report data
- Report items include:
  - Textbox
  - Image
  - Line
  - Rectangle

Designing report layouts

Report objects » Report items » Textbox

- Use a **Textbox** to display a value
  - Value can be static text or an expression
  - Can consist of multiple text placeholders, each for a different value and format
  - HTML tags can be rendered in placeholder text
- Formatting properties:
  - Font
  - Color (fore color) and background color
  - Borders
  - Padding
  - Can grow
  - Visibility
  - Writing mode

Expressions will be covered later in this module

Designing report layouts

Report objects » Report items » Image

- Use an **Image** to display a graphic like a company logo
- Image storage:
  - On a web server
  - Embedded within the report
  - In a database, which can be retrieved by a dataset

Designing report layouts

Report objects » Report items » Image (Continued)

- Image usage:
  - Free-standing logo, or picture
  - Pictures associated with rows of data
  - Background for certain report items:
    - Report body
    - Textbox
    - Rectangle
    - Table, matrix, or list

Designing report layouts

Report objects » Report items » Line

- Use a **Line** to add visual effects
  - Properties determine length, width, color, and style
- However, consider using textbox borders to achieve a similar effect
  - Borders expand or contract as textbox size changes
  - These lines, however, have a fixed size and cannot be diagonal

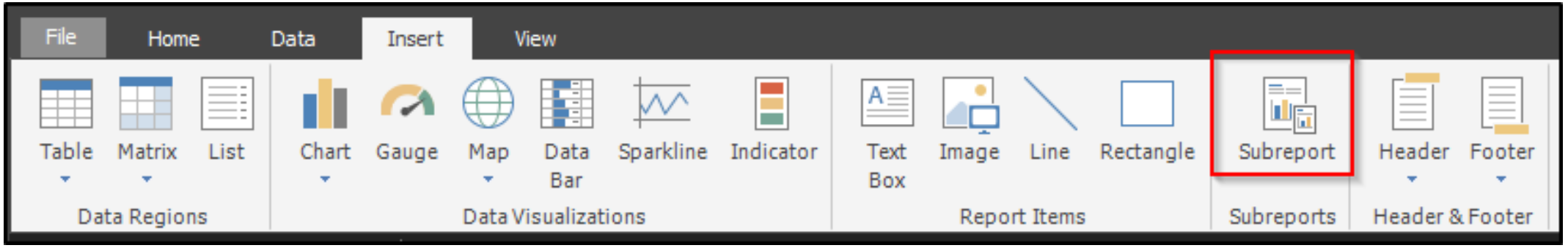
Designing report layouts

Report objects » Report items » Rectangle

- Use a **Rectangle** to add visual effects
  - Properties determine length, width, color, and style
- Also, use a rectangle as a container
  - Data regions and report items can be placed inside a rectangle
  - Items contained within a rectangle move with it and retain relative position
- The body, and page header/footer are special instances of a rectangle

Designing report layouts

Report objects » Subreports



- Use a **Subreport** to display another paginated report inside the body of a main paginated report
  - Conceptually, it is similar to a frame in a web page
- Any paginated report can be embedded, providing it is stored in the same workspace as the parent report

Designing report layouts

Report objects » Subreports (Continued)

- Typically, the parent reports passes parameters to the subreport
- Subreports can repeat within data regions, especially the List

Parameters will be covered in Module 04

Lists will be covered in Module 05

Setting dynamic properties

- Use **expressions** to assign dynamic values to properties
  - Every expression must commence with an equals sign (=)
- Expressions can be assigned to:
  - Textbox and placeholder values (very common)
  - Style and formatting properties
  - As well as many other report object properties—but not location or size, or data source connection strings
- Use functions from:
  - A variety of .NET namespaces
  - Custom code (code block)

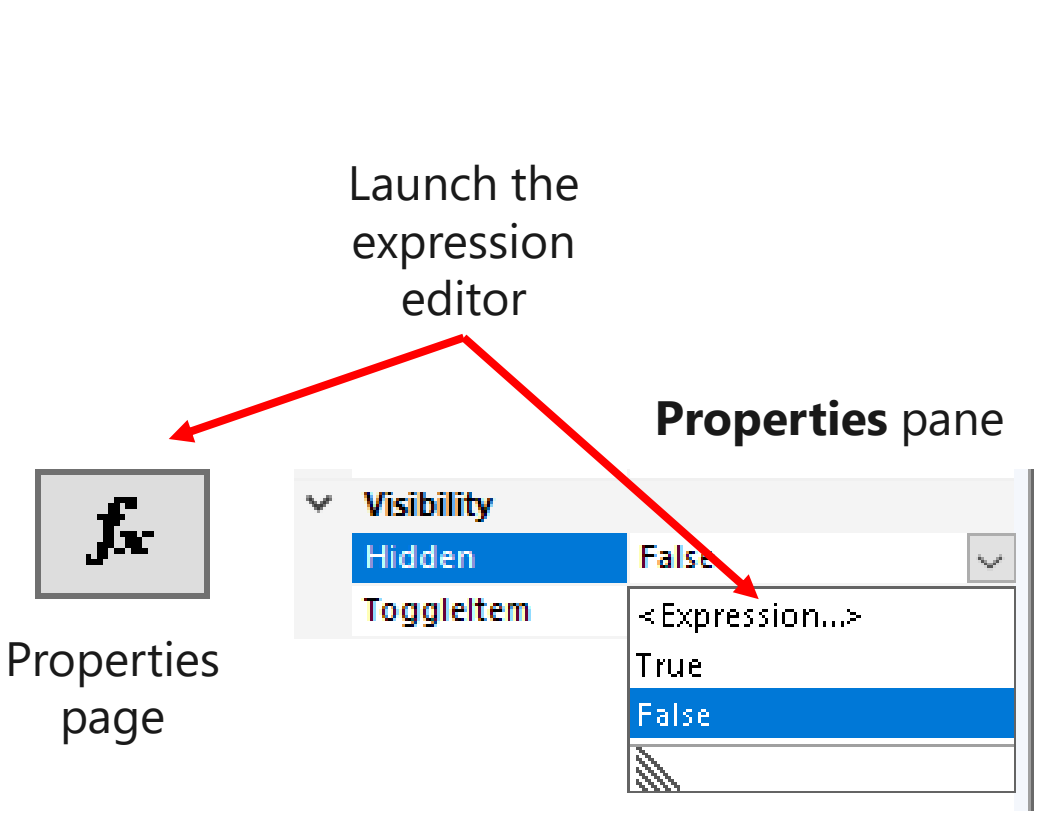
Setting dynamic properties

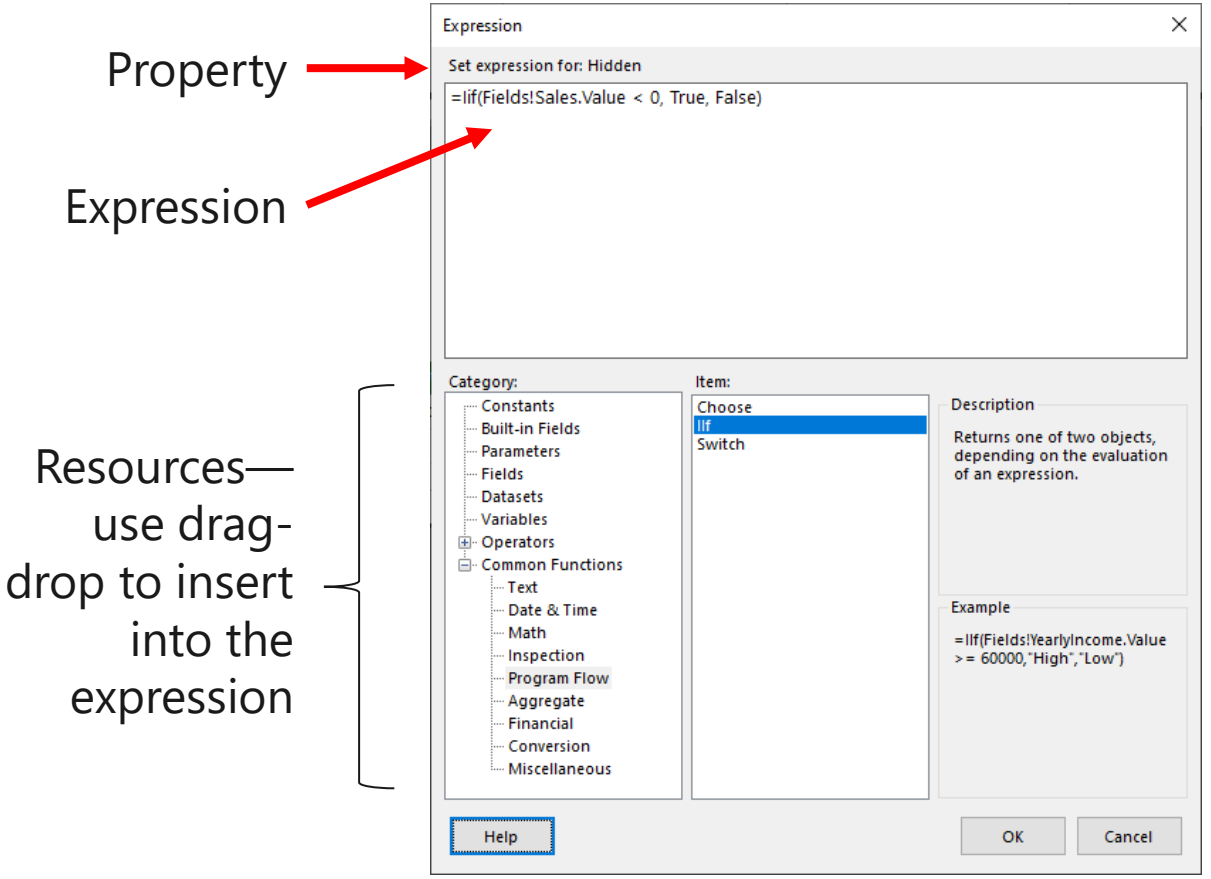
Expression editor

- Use the **Expression editor** to help construct expressions
- Launch from the **Properties** pane or from a **Properties** page
- Provides access to helpful resources:
  - Constants, and report collections
  - Operators
  - Common functions

Setting dynamic properties

Expression editor » Usage





Setting dynamic properties

Expression editor » Resources

- Built-in fields
  - **Globals**
    - ExecutionTime
    - OverallPageNumber and OverallTotalPages
    - PageName
    - PageNumber and TotalPages
    - ReportFolder *
    - ReportName
    - ReportServerUrl *
  - **RenderFormat**
    - RenderFormat.IsInteractive
    - RenderFormat.Name
  - **User**
    - Language and UserID
- Dataset fields
- Report parameters
- Variables
- Report items

* Not applicable to Power BI service

Setting dynamic properties

Expression editor » Resources » Different behavior

- Note: Some built-in fields behave differently in RB, and the Power BI service

Built-in field	Report Builder	Power BI service
ExecutionTime	Local time	Co-ordinated Universal Time (UTC)
ReportName	Empty string	Report name, as named in workspace
UserID	NT account name For example, AW\mblythe	User Principal Name (UPN) For example, m.blythe@adventureworks.com

The **UserID** built-in field is useful for managing data per-user permissions, and it is covered in the next module

Setting dynamic properties

Expression syntax

```
Collection!ObjectName.Property
=Fields!Sales.Value

Collection.Item("ObjectName").Property
=Fields.Item("Sales").Value

Collection("ObjectName").Property
=Fields("Sales").Value
```

Most common form

Setting dynamic properties

Expression examples

- Report title

```
=Globals!ReportName
```

- Page numbering

```
="Page " & Globals!PageNumber & " of " & Globals!TotalPages
```

- Report execution details

```
="Generated: " & Format(Globals!ExecutionTime, "f") & " UTC"
```

- Conditional formatting (assigned to the **Color** property)

```
=Iif(Fields!Profit.Value < 0, "Red", "Black")
```

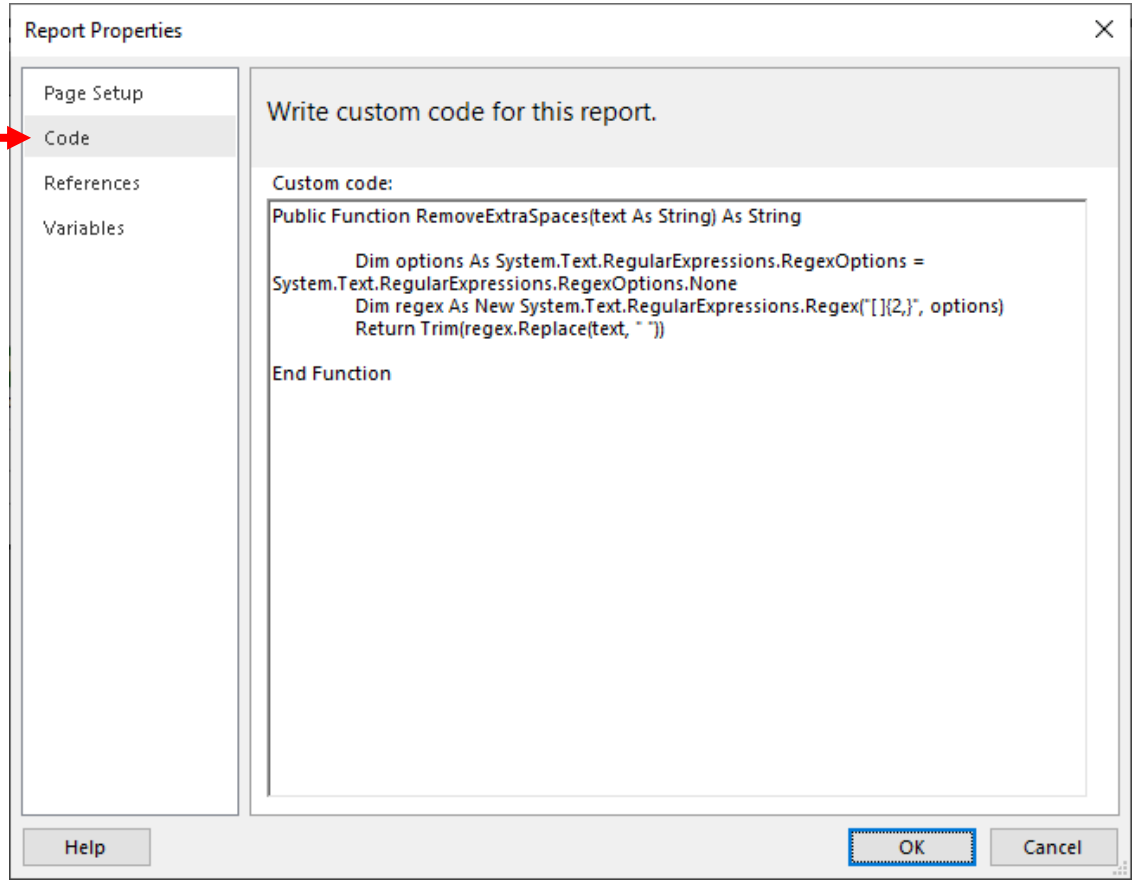
Setting dynamic properties

Code block

- Use the **Code block** to embed complex functions, or functions that are used multiple times within a single report
- Code must be written in VB.NET, and can leverage any available .NET Framework libraries
- Power BI automatically adds references to:
  - Microsoft.VisualBasic
  - System.Convert
  - System.Math

Setting dynamic properties

Code block » Usage



- The **Report** properties page has a simple text interface to enter code
  - It does not support auto-complete or Intellisense

Setting dynamic properties

Code block » Expression

- Use the **Code** element in expressions to refer to constants or functions in the code block

```
=Code.RemoveExtraSpaces(Join(Parameters!SalespersonGroup.Label, ", "))
```

Lab 02B

30 minutes

Develop a Report Template

You must successfully complete **Lab 01A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab02B

1. Create the report
2. Explore Report Builder
3. Design the report layout
4. Finalize the design

Resources

Power BI Report Builder

https://docs.microsoft.com/power-bi/report-builder-power-bi

Download Power BI Report Builder

https://aka.ms/pbireportbuilder

Getting around in Report Design View for paginated reports

https://docs.microsoft.com/power-bi/paginated-reports-report-design-view

Previewing reports in Power BI Report Builder

https://docs.microsoft.com/power-bi/report-builder-previewing-reports

Planning a report in Power BI Report Builder

https://docs.microsoft.com/power-bi/report-builder-planning-report

Resources

(Continued)

Pagination in Power BI paginated reports
https://docs.microsoft.com/power-bi/paginated-reports-pagination

Expression examples in Power BI Report Builder
https://docs.microsoft.com/power-bi/report-builder-expression-examples

Image use guidance for paginated reports
https://docs.microsoft.com/power-bi/guidance/report-paginated-image

Subreports in Power BI paginated reports
https://docs.microsoft.com/power-bi/paginated-reports/subreports

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 03

Retrieving Report Data

Module outline

03: Retrieving Report Data

- Creating data sources
- Creating datasets

Creating data sources

- Use **Data Sources** to connect to data stores
- They can connect to:
  - Power BI datasets
  - External data stores (using .NET managed providers)
  - Static sets of data
- One—or more—data sources can be created in a report by defining:
  - Name
  - Type (data provider)
  - Connection string
  - Authentication option

Creating data sources

Data source type » Power BI datasets

- A data source can connect to Premium and non-Premium Power BI datasets
- Requirements:
  - The Power BI dataset must reside in the same tenant as the report (when published)
  - Report author must have **Build** permission for the Power BI dataset
- If the Power BI dataset represents a live connection (to Analysis Services), you must connect directly to the data source, instead
- XMLA can only be used to connect to Premium Power BI datasets

Creating data sources

Data source type » External data sources

- External data source are relational or analytic databases
- They are either hosted in the cloud or are on-premises

Cloud sources
Azure SQL Database
Azure Synapse
Azure SQL Managed Instance
Azure Analysis Services

On-premises sources
SQL Server, 2005+
SQL Server Analysis Services, 2012+ (tabular or multidimensional)
Oracle, 9.x+
Teradata, 12+

- Power BI accesses on-premises sources using the **On-premises data gateway**—even when sources are hosted inside cloud VMs

Creating data sources

Data source type » Static sets of data

- Use the **Enter Data** source to define a static source of data
- It can be useful for:
  - Supplementary data
  - Demonstrations
  - Proof of concepts (POCs)

Creating data sources

Authentication options

- Windows integrated security
  - Use this option when an external data source must be queried by using the security context of the report user—applies only to cloud sources:
  - Azure SQL Database
  - Azure Synapse
  - Azure Analysis Services
  - For on-premises sources, Kerberos delegation must be configured if the data source does not reside on the gateway server
- Specific credentials
  - Can be Windows, or database credentials

Creating data sources

Authentication options » Authentication types

Source	Supported authentication type
Power BI dataset	SSO (Single-Sign On)
Azure SQL Database Azure Synapse	Basic (user name and password) SSO OAuth2 (stored AAD token)
Azure SQL Managed Instance	Basic, via Public Endpoint using the Azure SQL Database Extension
Azure Analysis Services	SSO, OAuth2
SQL Server SQL Server Analysis Services Oracle Teradata	Stored credential in gateway data source

Data sources default to using SSO, when applicable

Creating data sources

Note

- In Power BI Report Builder, data source connections are made directly to data sources
- Once published, however, data sources will connect:
  - Directly to Power BI datasets or cloud data sources
  - Via gateways to on-premises data sources
- In the Power BI service, some report data sources will require post-publication configuration

Post-publication tasks are covered in Module 07

Creating datasets

- Use a **Dataset** to retrieve a tabular result from a report data source
- One—or more—datasets can be created in a report by defining:
  - Name
  - Data source
  - Command type (text, or stored procedure)
  - Query
  - Timeout (in seconds)
  - Collation, case sensitivity, and other options

Note: The term dataset is used by Power BI, and by Power BI Report Builder. They are different concepts. In this course, we always fully qualify a reference to a Power BI dataset.

Creating datasets

Query

- When the command type is Text, the **Query** defines the statement used to retrieve data
  - It must produce a tabular result, consisting of uniquely named columns
- Either enter a query statement, or use a built-in query designer to generate a query statement
- For relational data sources, it is possible to define a dynamic query by assigning an expression

Creating datasets

Query » Query designers

- Query designers allow:
  - Exploring metadata
  - Building queries
  - Parameterizing queries
  - Previewing query results
- There are three designers:
  - Relational query designer—only supported for Microsoft database products
  - Analysis Services designer DAX
  - Analysis Services designer MDX

Creating datasets

Query » Query designers » Relational query designer

- Use the **relational query designer** to construct and test a relational query, based on:
  - Tables or views
  - Stored procedures
- Configure:
  - Field selection
  - Grouping and aggregation
  - Relationships (table join types: INNER or LEFT/RIGHT/FULL OUTER)
  - Filters, with optional parameterization
- Switch to text editor mode, to customize the query statement

Creating datasets

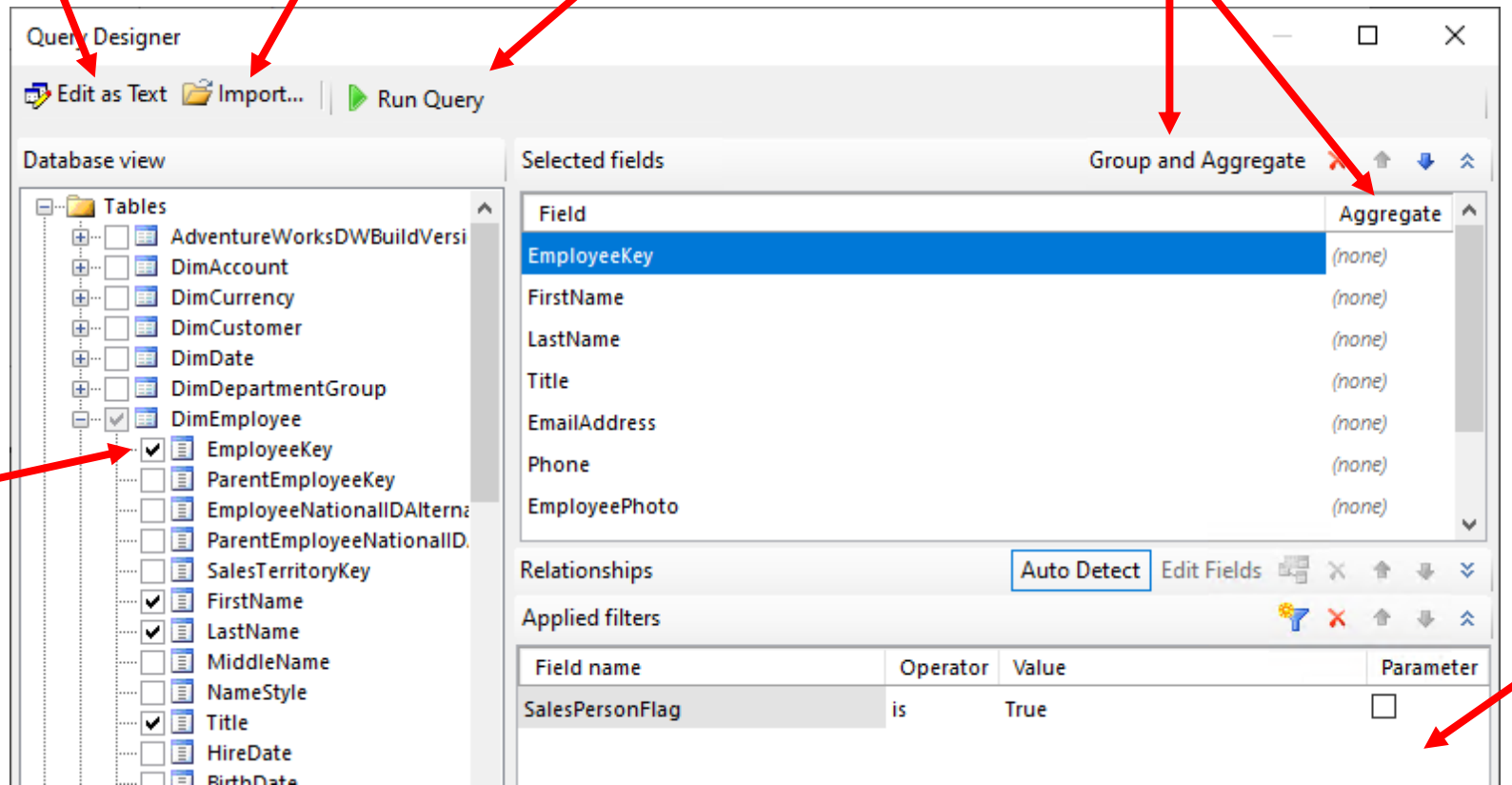
Query » Query designers » Relational query designer

Switch to text mode

Import from a query file

Execute the query

Configure grouping and summarization

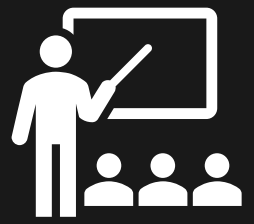


Select columns from tables, views, or stored procedures

Expand to configure relationships

Add filters, and optionally parameterize

Demo 03A



- Create a data source
- Create a dataset

Creating datasets

Query » Query designers » Analysis Services query designers

- You must use the **Analysis Services Designers** for the following data sources:
  - Power BI dataset
  - Azure Analysis Services
  - SQL Server Analysis Services
- The designers construct either MDX or DAX queries
  - DAX = Data Analysis EXpressions
  - MDX = MultiDimensional EXpressions
- MDX queries always return a tabular result

Creating datasets

Query » Query designers » Analysis Services query designers (Continued)

- The designers allow constructing a query statement in either language
- Data source models must define measures to achieve summarization
  - It is possible to connect to a model or a perspective
- There are two development modes:
  - **Design mode**—use drag-drop to construct a query statement
  - **Query mode**—customize the query statement

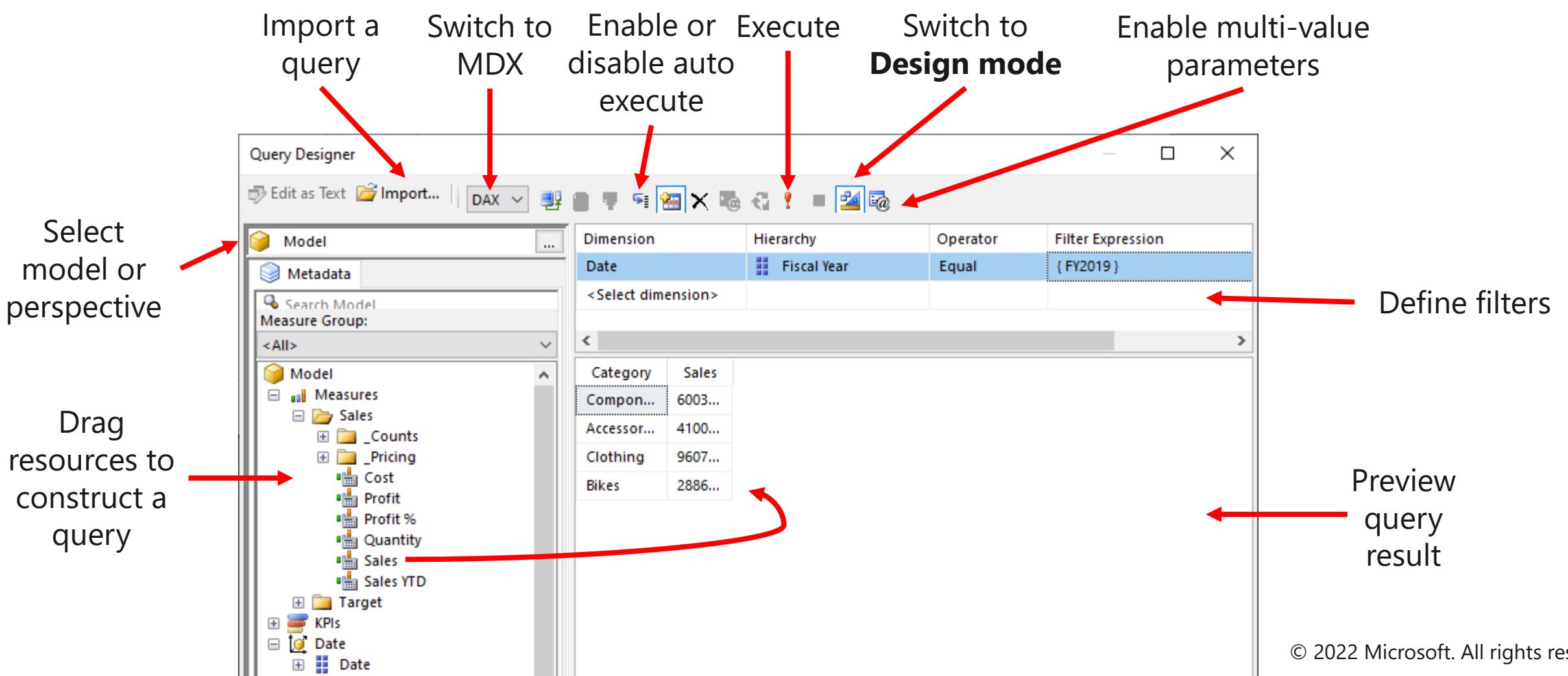
Creating datasets

Query » Query designers » Analysis Services DAX query designer

- Use the DAX query designer to construct and test a DAX query
- Drag-drop model resources to construct a query:
  - Columns
  - Hierarchies and levels
  - Measures and KPI metrics
- Add filters, with optional parameterization
- Switch to design mode to customize the query statement

Creating datasets

Query » Query designers » Analysis Services DAX query designer



Creating datasets

Query » Query designers » Analysis Services MDX query designer

- Use the **MDX query designer** to construct and test an MDX query
  - It is almost identical to the DAX query designer
- Drag-drop model resources to construct a query:
  - Columns
  - Hierarchies and levels
  - Measures and KPI metrics
- Add:
  - Calculated members, which are defined using MDX
  - Filters, with optional parameterization
- Switch to design mode to customize the query statement

Creating datasets

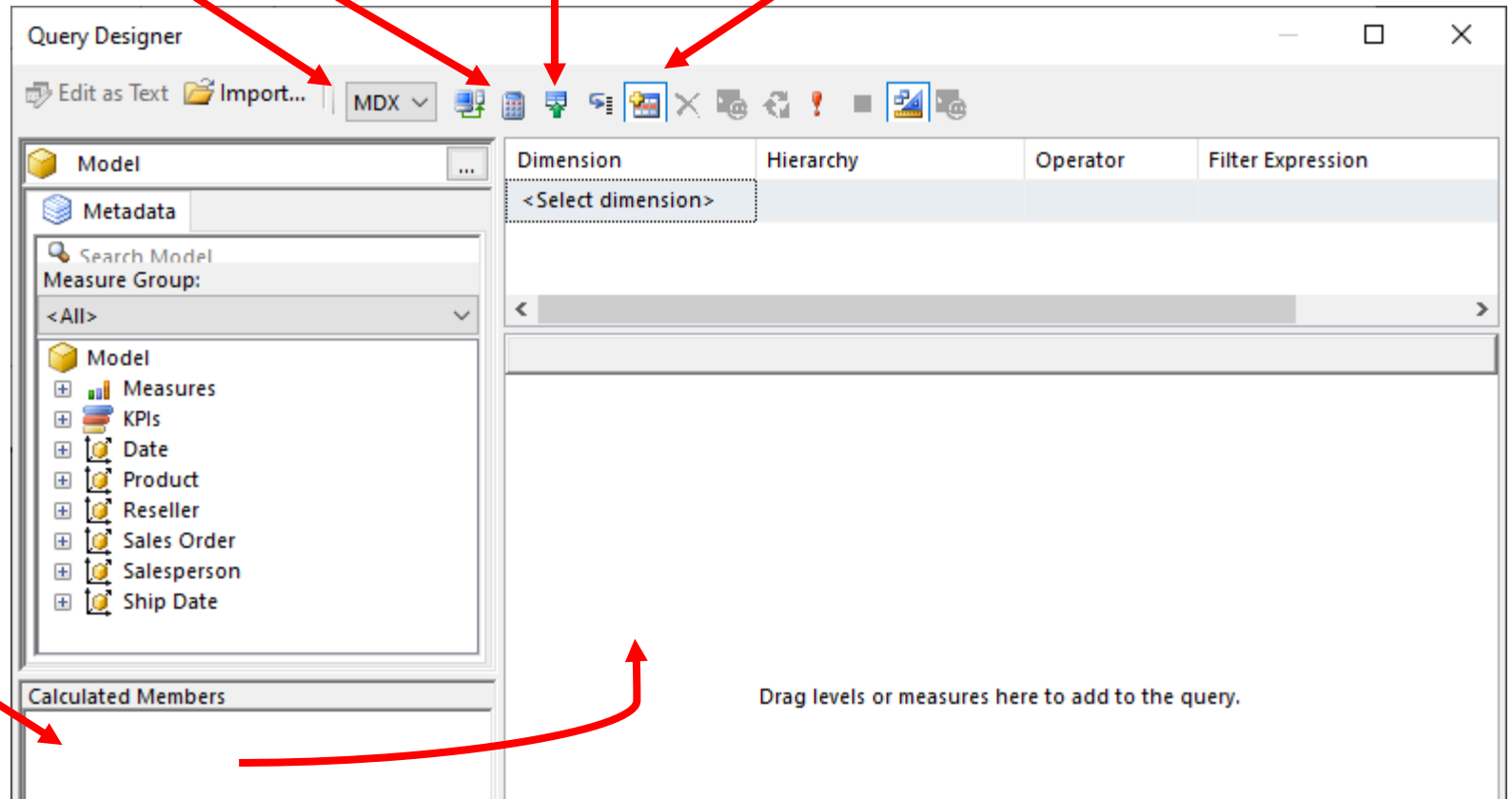
Query » Query designers » Analysis Services MDX query designer

Switch to DAX

Create calculated member

Show empty cells

Show aggregations



Drag calculated members

Creating datasets

Query » Query designers » Analysis Services MDX query designer » Aggregations

- The use of the **Aggregate** function in the report design will modify the query to also retrieve server aggregates
  - Note: Not supported by the DAX query designer
- It ensures that summarization is calculated by the model, which is important because:
  - Reports cannot always produce correct summarizations (i.e. distinct count)
  - Reports do not need to assume, or duplicate, summarization logic
  - Usually results in better performance, because:
  - Analytic databases are optimized for summarization
  - Can reduce the amount of data the report needs to retrieve to produce the summarization

The **Aggregate** function will be covered in Module 05

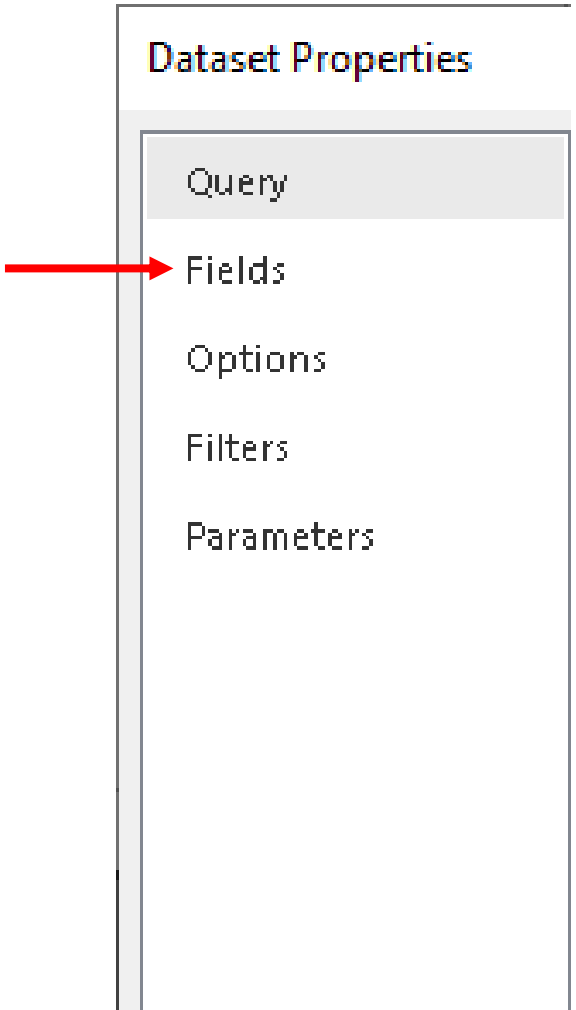
Creating datasets

Dataset collections

- A dataset has a collection of:
  - **Fields**—used to layout report designs
  - **Filters**—used to filter *retrieved data*
  - **Parameters**—used to pass values to the data source, typical to *filter source data*

Creating datasets

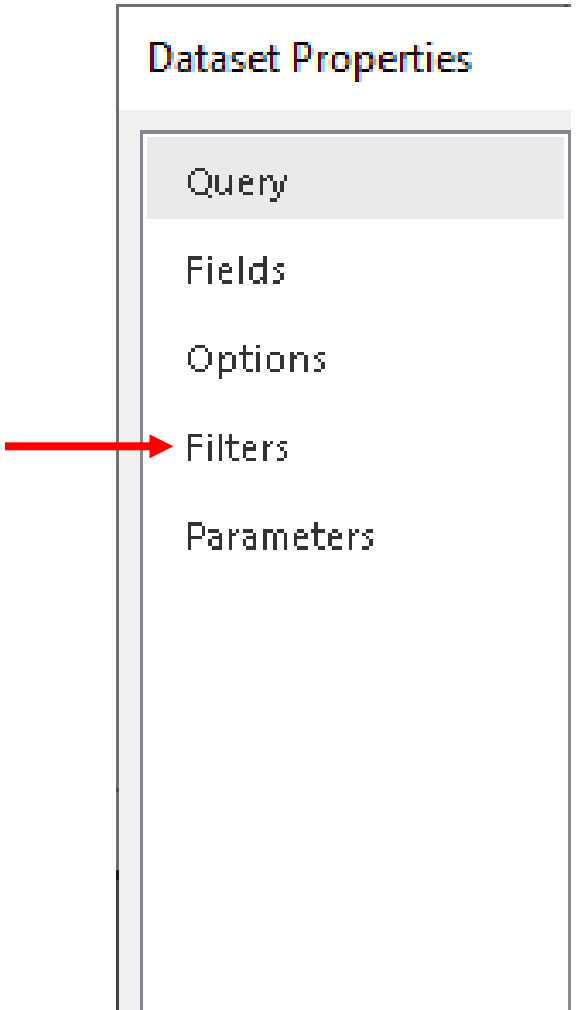
Dataset collections » Fields



- **Fields** represents the tabular structure of the dataset
  - Each column retrieved from the data source is a field
- A calculated field can be created by using an expression

Creating datasets

Dataset collections » Fields



- **Filters** are used to filter retrieved data
- This way, a report design can operate over a subset of dataset rows

Creating datasets

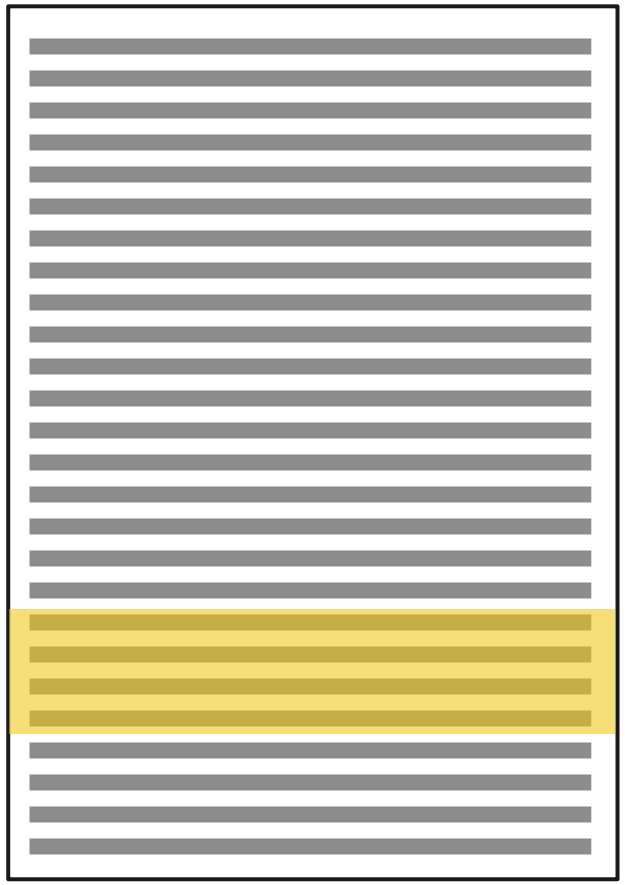
Dataset collections » Filters » Example

1 Report user requests report for year **2019**

3 Power BI renders the report by **filtering** the dataset

4 Report user now requests year **2020**

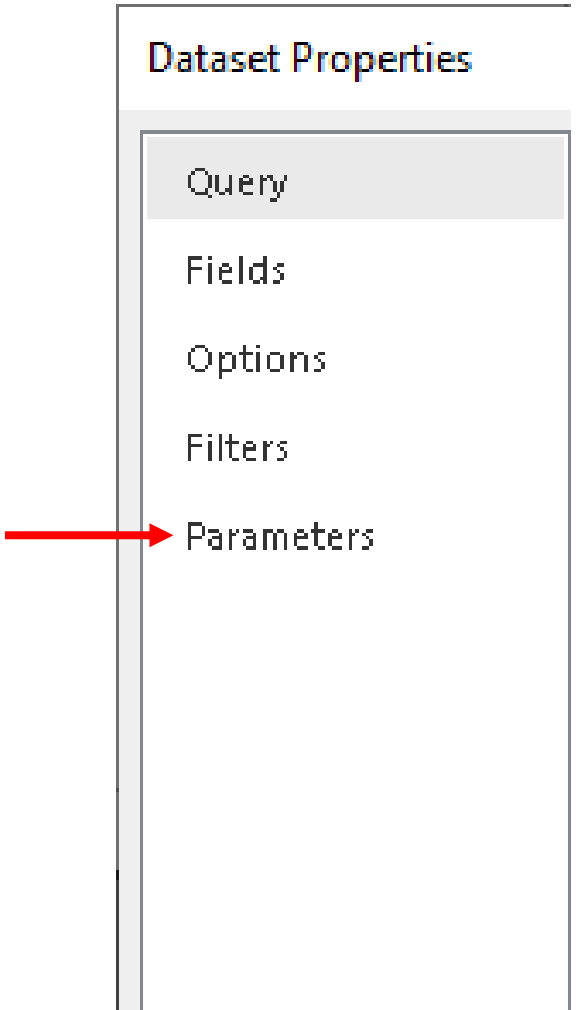
5 The existing data is filtered



2 Power BI retrieves data for **all years**

Creating datasets

Dataset collections » Parameters



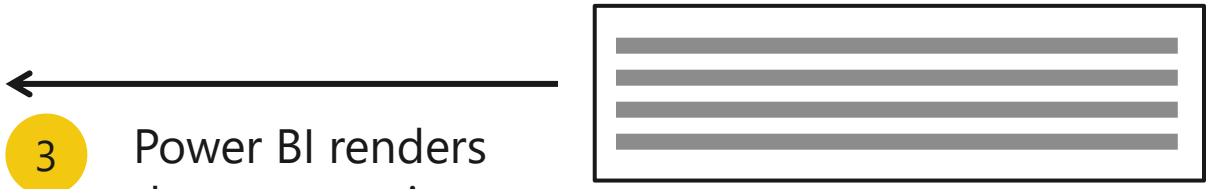
- Use **Parameters** to pass values to the data source
- Typically, parameters are embedded into query filter clauses—or, passed into stored procedure parameters—to limit the data to be retrieved
- It is common that report parameters (set by the report user) map to dataset parameters

Report parameters are introduced in Module 04

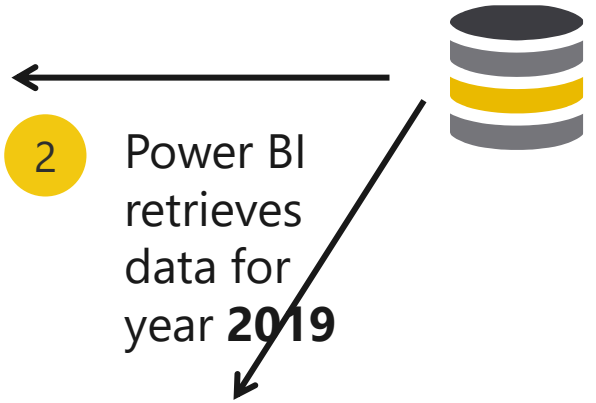
Creating datasets

Dataset collections » Parameters » Example

1 Report user requests report for year **2019**

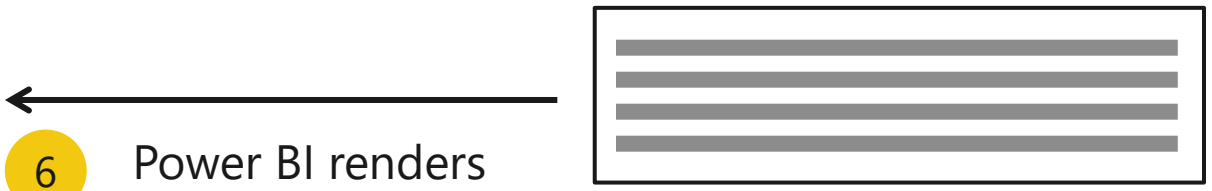


3 Power BI renders the report using the entire dataset



2 Power BI retrieves data for year **2019**

4 Report user now requests year **2020**



6 Power BI renders the report using the entire dataset

5 Power BI retrieves data for year **2020**

Creating datasets

Data set collections » Parameters » Securing report data

- Report data can be secured on a per-user basis by passing the built-in **UserID** field to a query parameter
  - The field returns the User Principal Name (UPN) of the report user
- Providing the data source has stored users and their UPN values, the dataset query can apply appropriate filters

Take care when developing reports that pass the **UserID** built-in field—in Power BI Report Builder, it returns the NT account name—not the UPN

Lab 03A

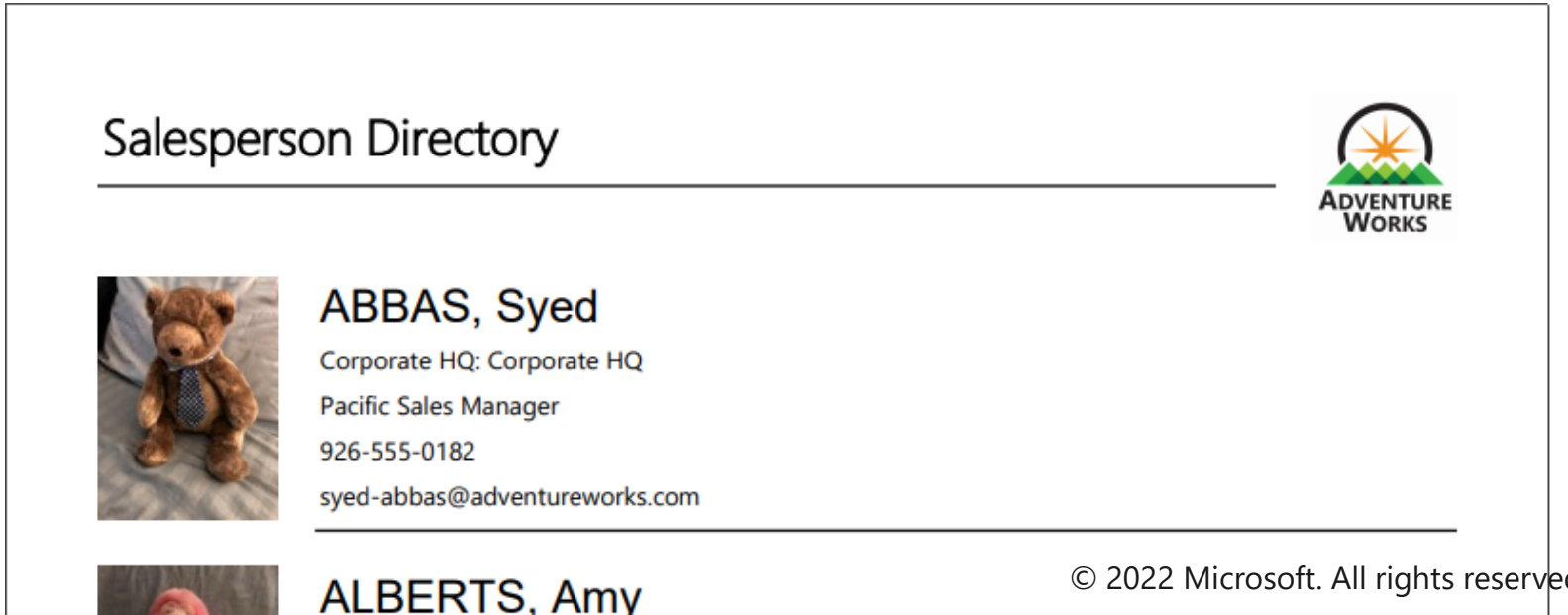
45 minutes

Develop a List Report

You must successfully complete **Lab 02A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab03A

1. Create the report
2. Create the data source
3. Create the dataset
4. Develop the report layout
5. Publish the report



Recommended practices

- If your data source is not natively supported, use Power BI Desktop to create a model first
- Use stored procedures, when possible:
  - Better performance
  - Re-use of logic
  - Ease of maintenance
- For Power BI Desktop or Analysis Services sources, use the DAX query designer—unless you need server aggregates or calculated members

Resources

Supported data sources for Power BI paginated reports
https://docs.microsoft.com/power-bi/paginated-reports-data-sources

Report data in Power BI Report Builder
https://docs.microsoft.com/power-bi/report-builder-data

Data retrieval guidance for paginated reports
https://docs.microsoft.com/power-bi/guidance/report-paginated-data-retrieval

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 04

Working with Parameters

Module outline

04: Working with Parameters

- Introducing parameters
- Creating report parameters
- Creating query parameters
- Working with parameters

Introducing parameters

- Parameters are typically used to filter report data
- There are two types, and while their purposes are different, they are often related:
  - Report parameters
  - Query parameters

Creating report parameters

- Use **report parameters** to retrieve value(s) at report execution time
- Commonly, report users are prompted to enter report parameter values

Creating report parameters

Usage

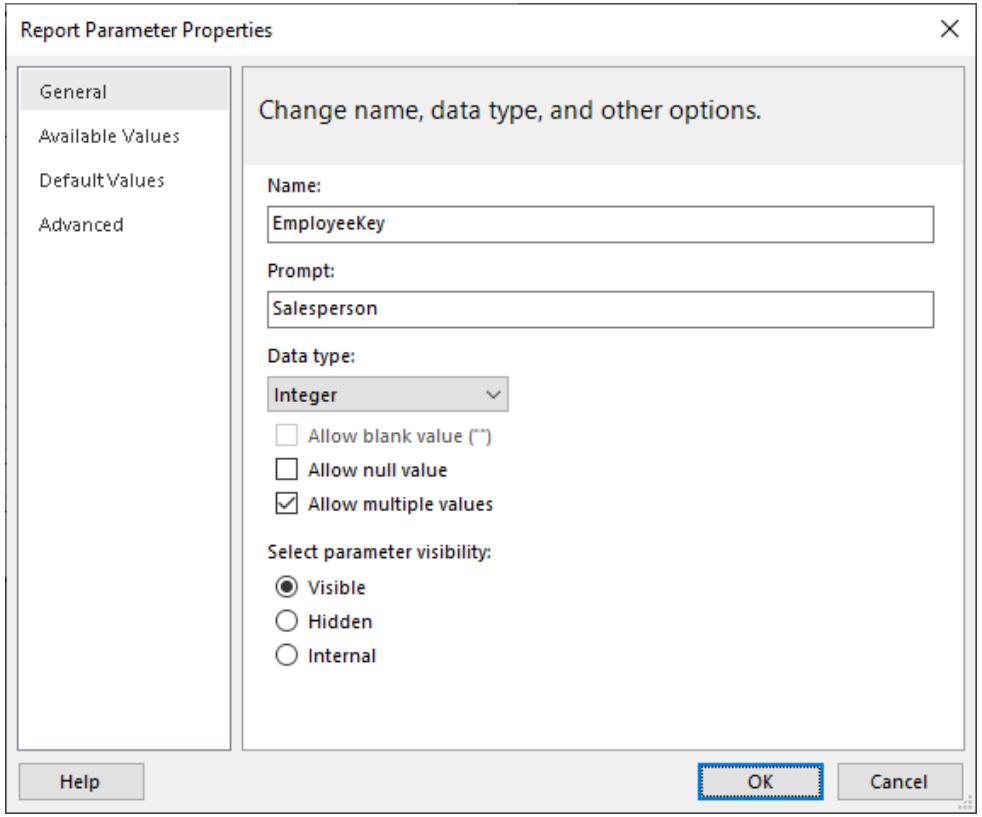
- A report parameter can filter data by:
  - Mapping to a dataset query parameter
  - Filtering a dataset, data region, or visualization
- Other uses:
  - Formatting the report presentation
  - Customizing data region sorting or grouping
  - Hiding—or, showing—report objects
  - Configuring subreports and report drillthrough actions

Query parameters are introduced later in this module

Creating report parameters

Configuration

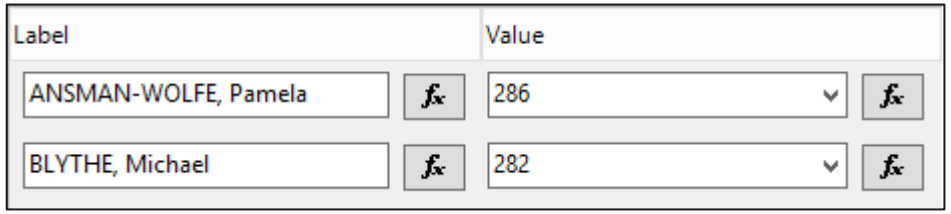
- Properties:
  - Name, and Prompt
  - Data type
  - Multi-value
  - Visibility
- Available values:
  - Non-queried or from query
- Default values:
  - Null
  - Non-queried or from query



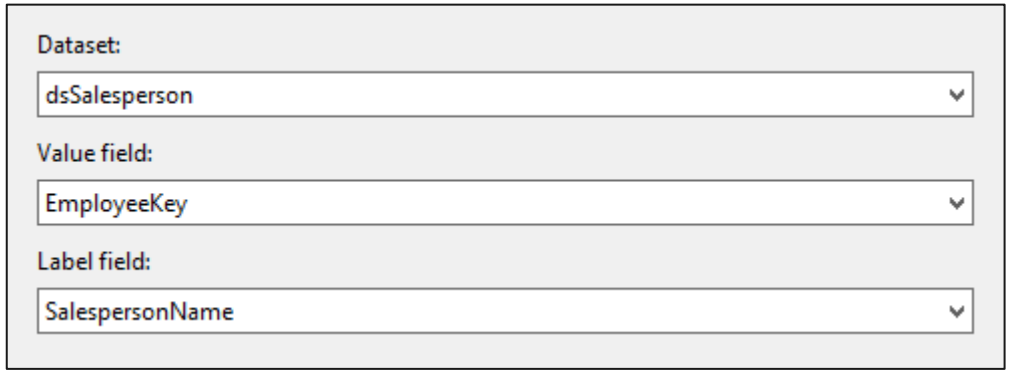
Creating report parameters

Configuration » Available values

- Use **available values** to present a dropdown list
- Non-queried values are static:



- Queried values are retrieved from a dataset:



Creating report parameters

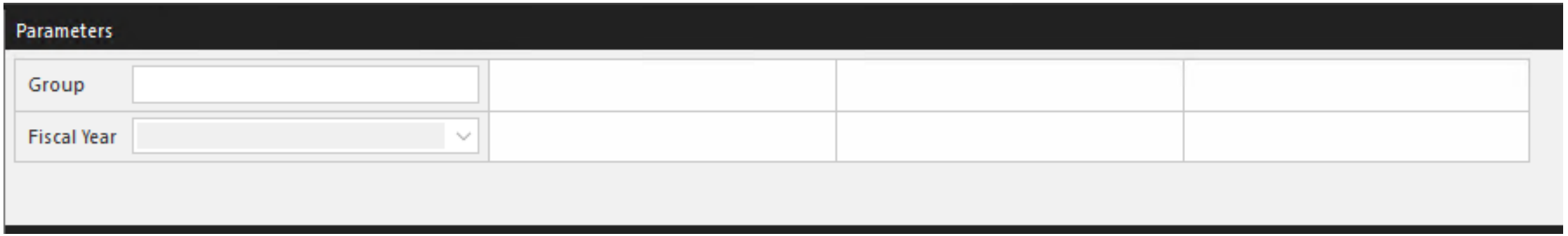
Configuration » Default values

- Use **default values** to automatically set report parameter values
- Default values can be sourced from a static list, dynamic expressions, or retrieved from a dataset
  - If multiple rows are returned by the dataset for a single-value report parameter, the first row is applied
- When previewing a report, the report is processed automatically if all report parameters have valid default values
  - If one or more report parameters do not have valid default values, the report user must choose a value for each unassigned parameter, and then, on the report toolbar, click **View Report**

Creating report parameters

Configuration » Parameters pane

- Use the **Parameters** pane to organize report parameters into a grid layout



Working with query parameters

- Use **query parameters** to pass values to a dataset query
- They can be used to pass values to:
  - Query statements like WHERE clause predicates
  - Stored procedure parameters
- Adding a query parameter to a dataset query automatically creates a report parameter and mapping
  - Query parameters for SQL Server and Analysis Services data sources are prefixed with the @ symbol

Working with query parameters

Example

```
SELECT * FROM [dbo].[DimEmployee]
WHERE [EmployeeKey] = @EmployeeKey
```

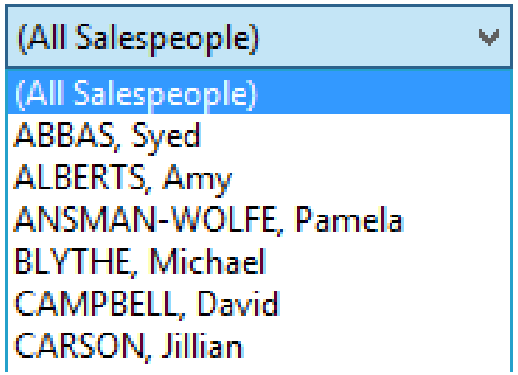
Query parameter

Working with parameters

- Adding an “All” item
- Multi-value parameters
- Cascading parameters
- Parameters built-in collection
- Configuring with designers

Working with parameters

Adding an "All" item



- Insert a new item into the available values of the report parameter

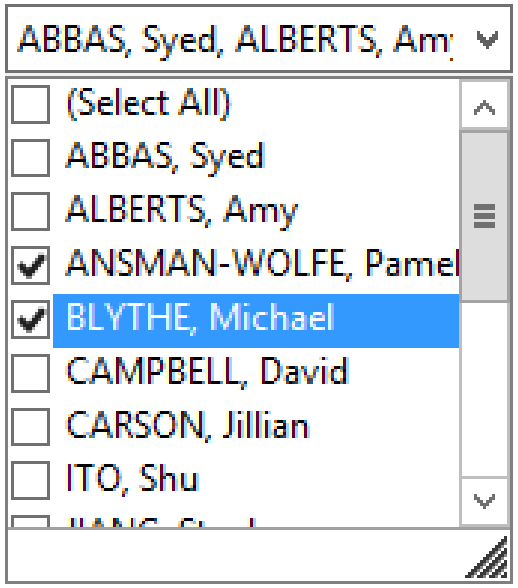
```
SELECT -1 AS [EmployeeKey], '(All Salespeople)' AS [SalespersonName]
UNION
SELECT [EmployeeKey], CONCAT(UPPER([LastName]), N', ', [FirstName])
FROM [dbo].[DimEmployee]
WHERE [SalesPersonFlag] = 1
ORDER BY [SalespersonName]
```

- Modify the dataset query WHERE clause

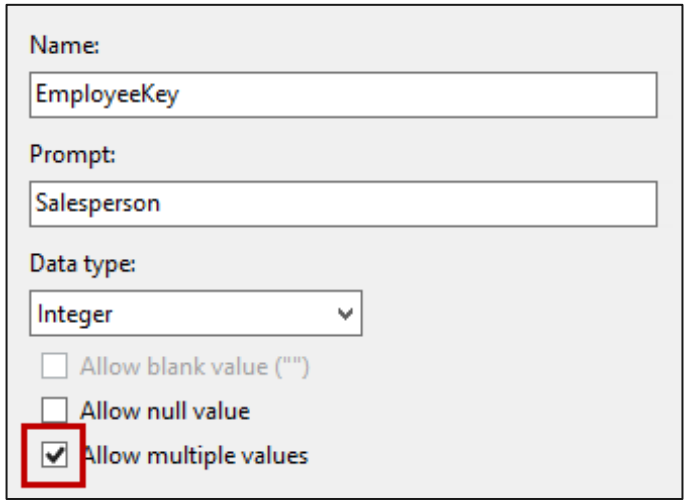
```
…
AND ([e].[EmployeeKey] = @EmployeeKey OR @EmployeeKey = -1)
```

Working with parameters

Multi-value parameters



- Configure the report parameter as multi-value:



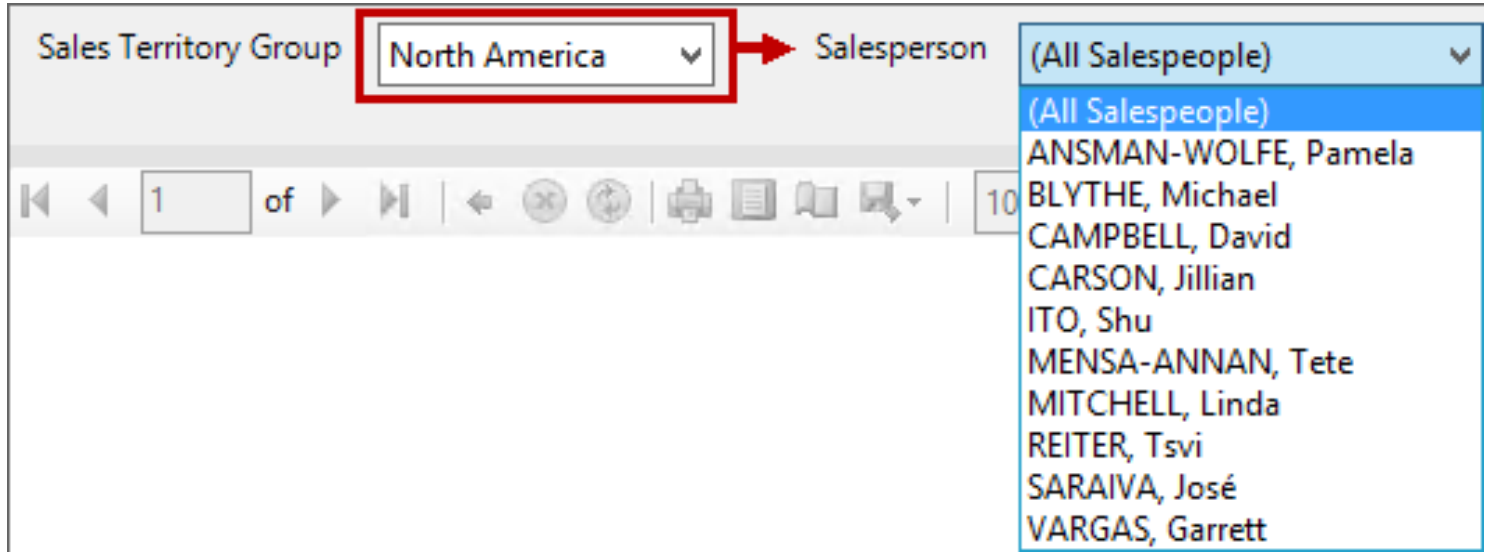
- Modify the dataset query WHERE clause

```
…
AND [e].[EmployeeKey] IN (@EmployeeKey)
```

Working with parameters

Cascading parameters

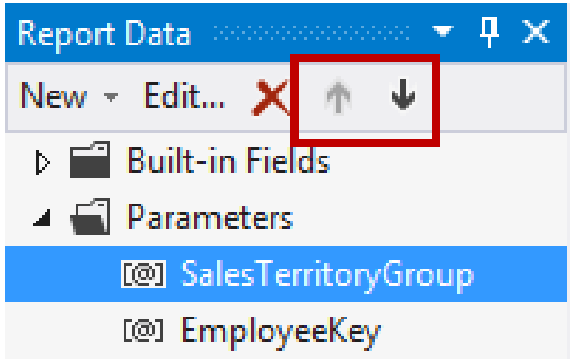
- Available values can be dynamically retrieved based on the selection of another, previous, report parameter



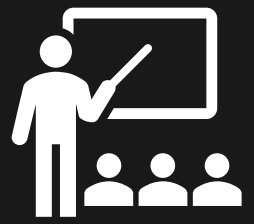
Working with parameters

Cascading parameters » Configuration

- The cascading report parameter must retrieve its available values from a query
- A query parameter is added to the available values dataset of the latter report parameters, and its value is set to the value of the former report parameter
- Ensure the report parameters are sequenced in the correct cascading order



Demo 04A



- Create a cascading parameter

Working with parameters

Parameters built-in collection

- Use the **Parameters** built-in collection to reference report parameters in an expression
  - The **Value** property returns the parameter value
  - The **Label** property returns the parameter label, frequently used as the display name in a dropdown list of available values
- When a report parameter is configured as multi-value, the **Value** and **Label** properties each return an array

Tip: It is a best practice to relay the user report parameter selection in the report header

Working with parameters

Parameters built-in collection » Examples

- Single-value parameter expressions:

```
=Parameters!EmployeeKey.Value
=Parameters!EmployeeKey.Label
```

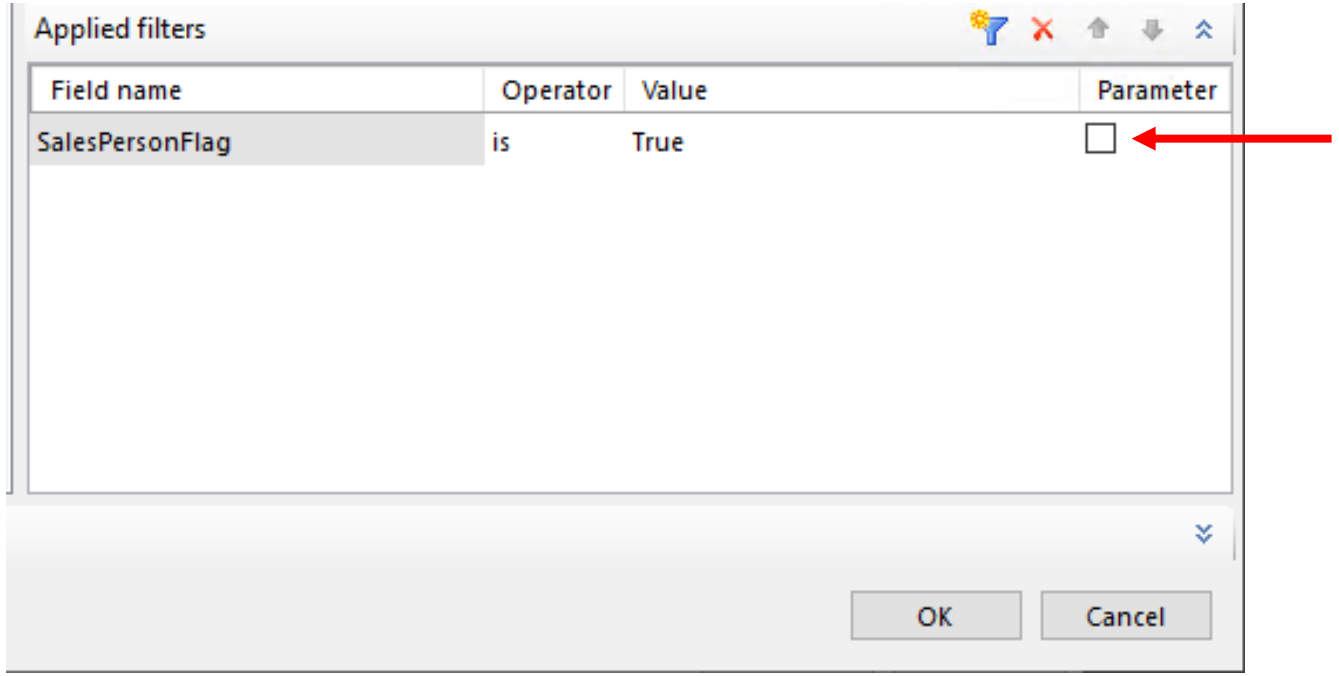
- Multi-value parameter expressions:

```
=Parameters!EmployeeKey.IsMultiValue
=Parameters!EmployeeKey.Count
=Parameters!EmployeeKey.Value(n)
=Parameters!EmployeeKey.Label(n)
=Split("286,282,298", ",")
=Join(Parameters!EmployeeKey.Value, ", ")
```

Working with parameters

Configuring with designers » Relational query designer

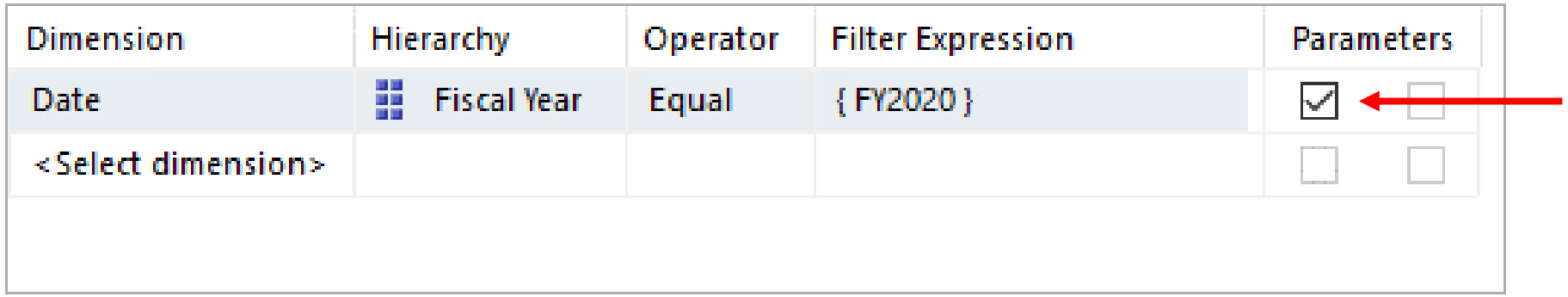
- In the relational query designer, parameterize the filter by checking the **Parameter** checkbox



Working with parameters

Configuring with designers » Analysis Services query designers

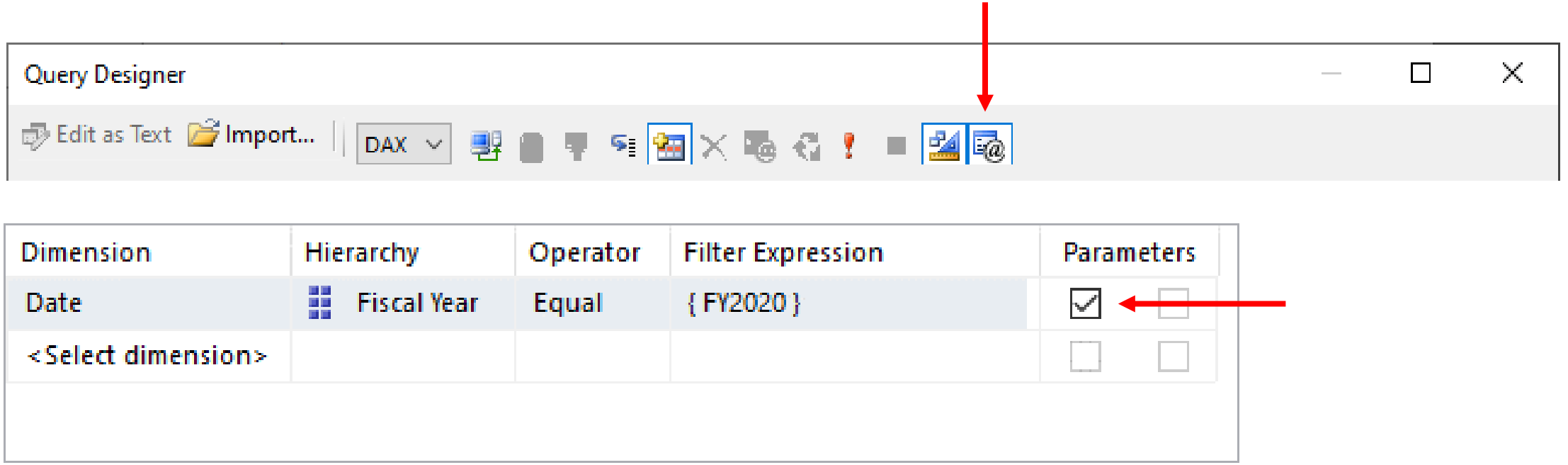
- In the Analysis Services query designers, parameterize the filter by checking the **Parameter** checkbox
- Parameterized filters automatically create report parameters to prompt the user at report execution time
  - A hidden dataset is automatically generated to provide available values for the dropdown list



Working with parameters

Configuring with designers » Analysis Services query designers » DAX

- For the DAX query designer, if the parameter supports multi-selection, on the toolbar, enable it



Lab 04A

45 minutes

Work with Parameters

You must successfully complete **Lab 03A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab04A

1. Add a query parameter
2. Configure available values
3. Configure default values
4. Configure an All item
5. Configure cascading parameters
6. Configure multi-value parameters
7. Publish the report

Resources

Report parameters in Power BI Report Builder
https://docs.microsoft.com/power-bi/report-builder-parameters

Create parameters for paginated reports in the Power BI service
https://docs.microsoft.com/power-bi/paginated-reports-parameters

Use cascading parameters in paginated reports
https://docs.microsoft.com/power-bi/guidance/paginated-report-cascading-parameter

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 05

Visualizing Report Data

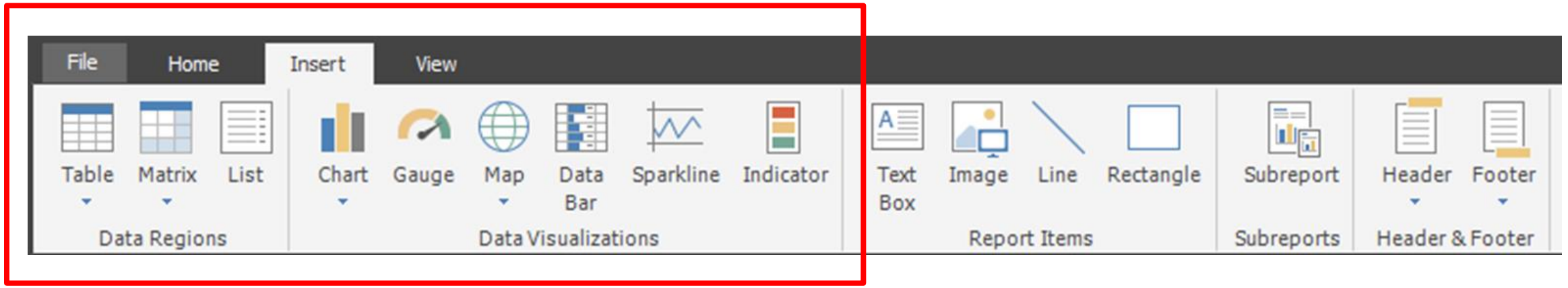
Module outline

05: Visualizing Report Data

- Visualizing report data
- Creating data regions
- Creating data visualizations

Visualizing report data

- The **Insert** ribbon tab contains nine templates to visualize data:



Visualizing report data

(Continued)

- The **Insert** ribbon tab contains nine templates to visualize data:

Data regions
Table
Matrix
List

Variants of the **Tablix** data region

Data visualizations
Chart
Gauge
Map
Data bar
Sparkline
Indicator

Visualizing report data

(Continued)

- All data regions are variants of the Tablix
- The Tablix enables flexible grid layout with groups
- When rendered, it expands according to the dataset rows, and so the layout size is *dynamic*, and can overflow to multiple pages
- In contrast, the layout size of data visualizations is fixed

Creating data regions

Tablix

- Use the **Tablix** for flexible grid layouts
  - **Table**: Fixed columns and dynamic rows
  - **Matrix**: Dynamic columns and rows
  - **List**: Used for free-form reports, possibly in conjunction with other data regions
- Different types of groups can be configured:
  - Nested groups (used to present hierarchical data)
  - Adjacent groups
  - Recursive groups (parent-child)

Creating data regions

Tablix » Example

Table + Matrix

Adjacent groups

Nested groups

Customer	Growth
Retail	
Odin	19%
Bikes, Inc.	322%
Wholesale	
ABC Corp.	-6%
Thor, Ltd.	42%
Grand Total	**9%**

Customer		2018	2019	Total
Retail	Odin	1,115	1,331	2,446
	Bikes, Inc.	152	642	794
Wholesale	ABC Corp.	14,156	13,312	24,468
	Thor, Ltd.	4,523	6,421	7,944
Grand Total		**19,946**	**21,706**	**41,652**

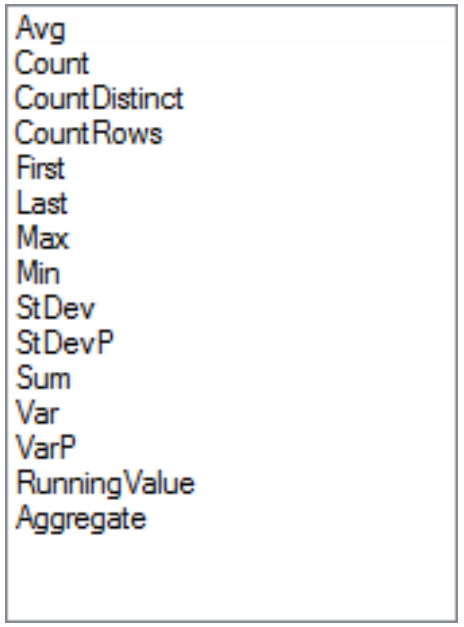
Creating data regions

Tablix » Groups

- Use the **Grouping** pane to manage the Tablix groups
  - Variables can be added to groups
- The **Detail** group represents the dataset rows
  - Numeric fields in the **Detail** level of the Tablix do not require aggregation
  - Numeric fields in other groups should use aggregate functions
- Use **Advanced mode** for fine-grained control
  - For example, repeating table headers on each page

Creating data regions

Tablix » Groups » Aggregate functions

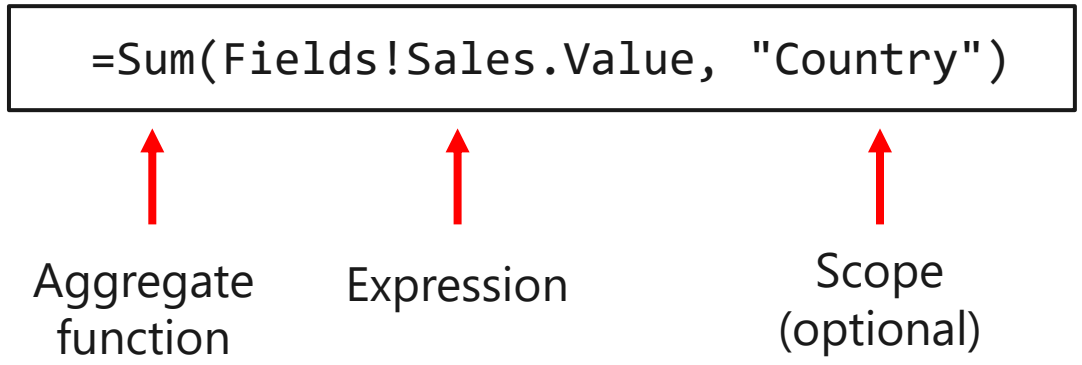


- Each aggregate function can pass the Scope parameter to define the scope in which the aggregate function is performed
- A valid scope is the name of a group, data region or dataset
  - If **Scope** is omitted, the current scope is used
- The **Recursive** keyword can be passed as a third parameter to aggregate parent-child hierarchies

Scope names are case-sensitive

Creating data regions

Tablix » Groups » Aggregate functions » Example



Creating data regions

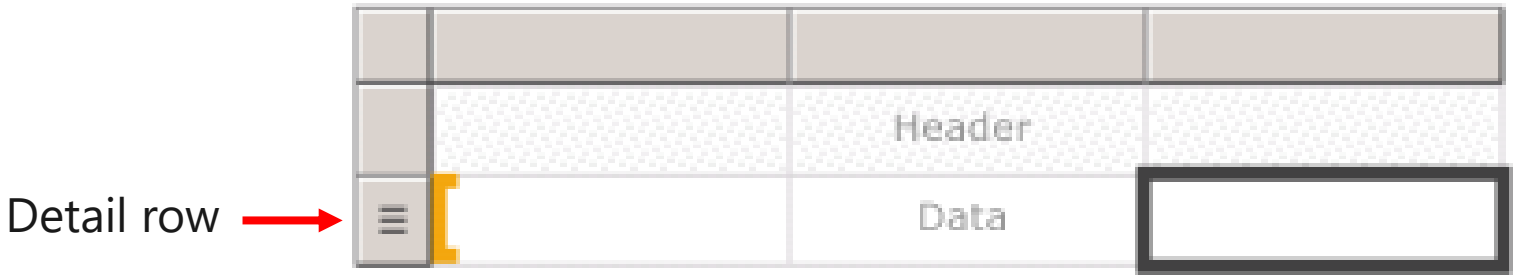
Tablix » Groups » Aggregate functions » Aggregate

- Use the **Aggregate** function to query server aggregates that are calculated by the data model (only when the dataset was developed with the Analysis Services MDX designer)
  - Avoid replicating aggregation logic in the report
  - When possible, query server aggregates for reasons of efficiency and consistency
- Tablix groups must be based on simple expressions (i.e. =Fields!<AttributeOrLevel>.Value)
- Server aggregates cannot appear on a detail level
  - To display values at the detail level, do not use any aggregation function

Creating data regions

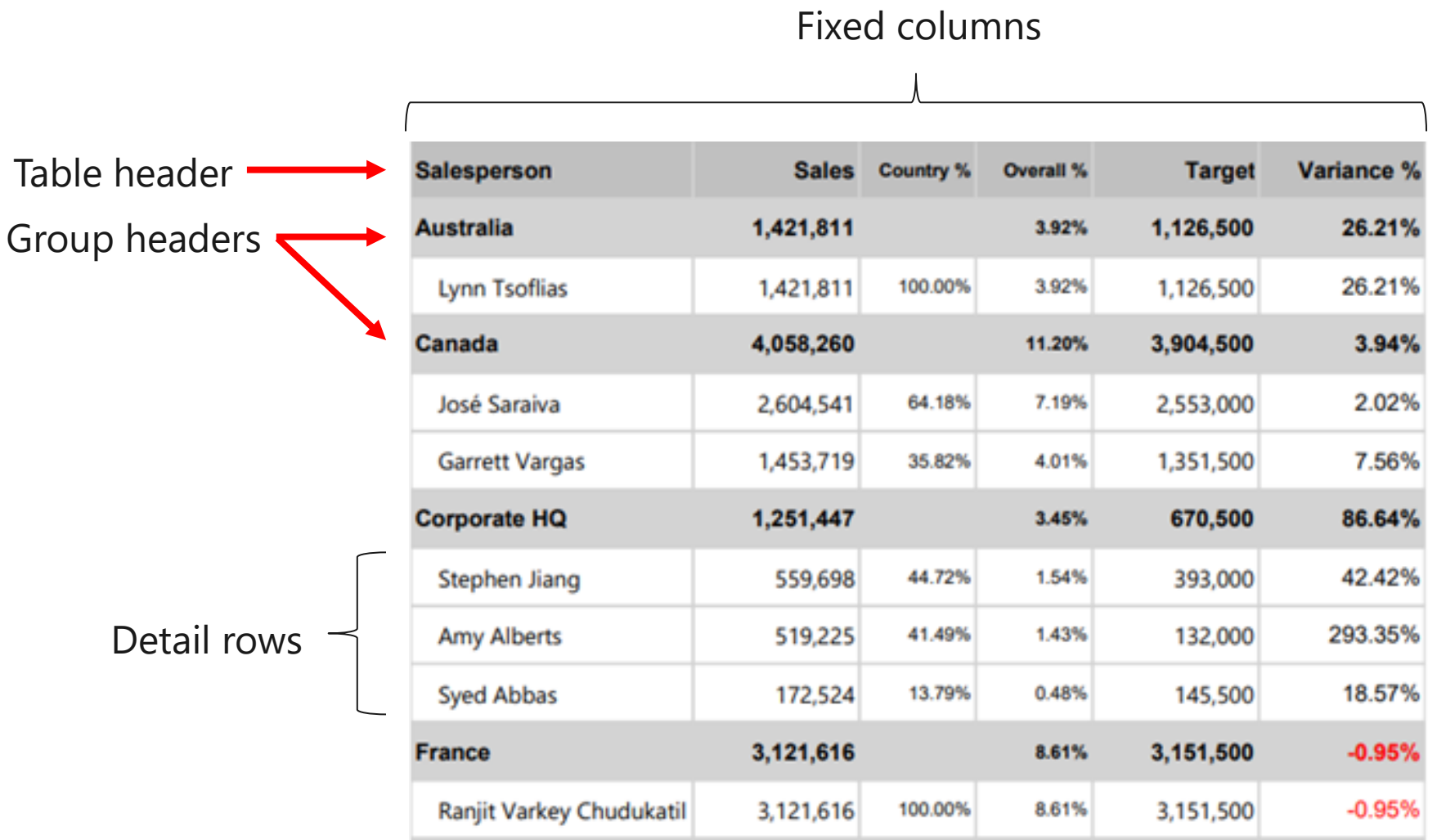
Tablix » Table

- Use a **Table** to present fixed columns and dynamic rows
- The Table template consists of cells which are textboxes
  - Hovering the cursor in a textbox will reveal the Field List
  - Right-click column or row guides to open context menus
    - Add/remove columns or row groups, control visibility
  - Entire columns or rows can be selected for formatting
  - Cells can be merged horizontally only



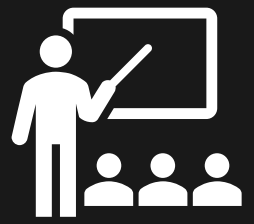
Creating data regions

Tablix » Table » Example



Salesperson	Sales	Country %	Overall %	Target	Variance %
Australia	**1,421,811**		**3.92%**	**1,126,500**	**26.21%**
Lynn Tsoflias	1,421,811	100.00%	3.92%	1,126,500	26.21%
Canada	**4,058,260**		**11.20%**	**3,904,500**	**3.94%**
José Saraiva	2,604,541	64.18%	7.19%	2,553,000	2.02%
Garrett Vargas	1,453,719	35.82%	4.01%	1,351,500	7.56%
Corporate HQ	**1,251,447**		**3.45%**	**670,500**	**86.64%**
Stephen Jiang	559,698	44.72%	1.54%	393,000	42.42%
Amy Alberts	519,225	41.49%	1.43%	132,000	293.35%
Syed Abbas	172,524	13.79%	0.48%	145,500	18.57%
France	**3,121,616**		**8.61%**	**3,151,500**	**-0.95%**
Ranjit Varkey Chudukatil	3,121,616	100.00%	8.61%	3,151,500	-0.95%

Demo 05A

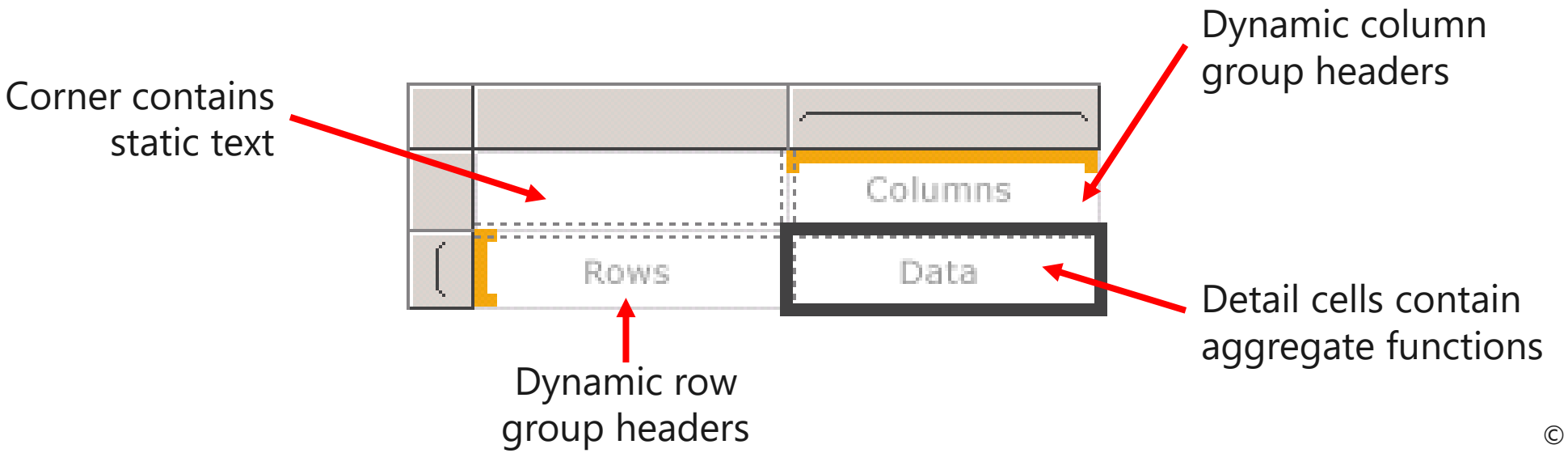


- Add a table data region

Creating data regions

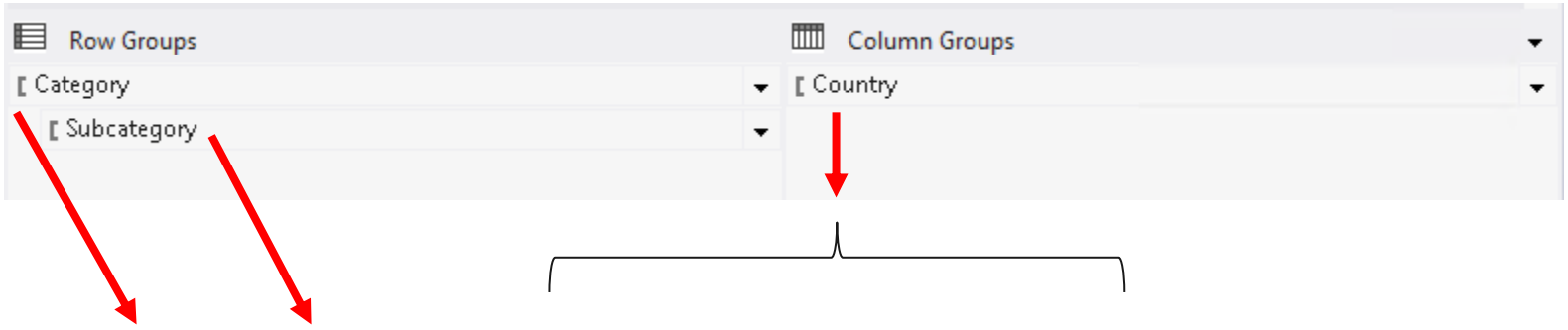
Tablix » Matrix

- Use a **Matrix** to present dynamic columns and rows
- Like the Table, the Matrix template consists of cells which are textboxes
- Functionality is similar to crosstabs and Excel PivotTables



Creating data regions

Tablix » Matrix » Example



Category	Subcategory	France	Germany	United Kingdom	Total
Accessories	Bike Racks	20,563	14,223	22,843	**57,629**
	Bottles and Cages	636	758	754	**2,148**
	Cleaners	1,022	860	1,323	**3,206**
	Helmets	10,904	10,661	15,038	**36,603**
	Hydration Packs	5,750	6,787	7,209	**19,745**
	Tires and Tubes	104	76	121	**301**
	Total	**38,979**	**33,365**	**47,287**	**119,631**
Bikes	Mountain Bikes	599,236	193,872	1,408,279	**2,201,387**
	Road Bikes	689,612	171,869	1,068,527	**1,930,008**
	Touring Bikes	1,115,084	1,012,412	657,324	**2,784,820**
	Total	**2,403,933**	**1,378,152**	**3,134,130**	**6,916,215**

Group total

Detail cells use aggregate functions

Creating data regions

Tablix » List

- Use a **List** to produce free-form reports, possibly in conjunction with other data regions
- Repeats with each group or row in the dataset
- Can be nested within other Lists (providing they are based on the same dataset)

Creating data regions

Tablix » List » Example

Grouped by salesperson

ABBAS, Syed

Corporate HQ: Corporate HQ

Pacific Sales Manager

926-555-0182

syed-abbas@adventureworks.com

ALBERTS, Amy

Corporate HQ: Corporate HQ

European Sales Manager

775-555-0164

amy-alberts@adventureworks.com

ANSMAN-WOLFE, Pamela

North America: Northwest

Sales Representative

340-555-0193

pamela-ansman-wolfe@adventureworks.com

Lab 05A

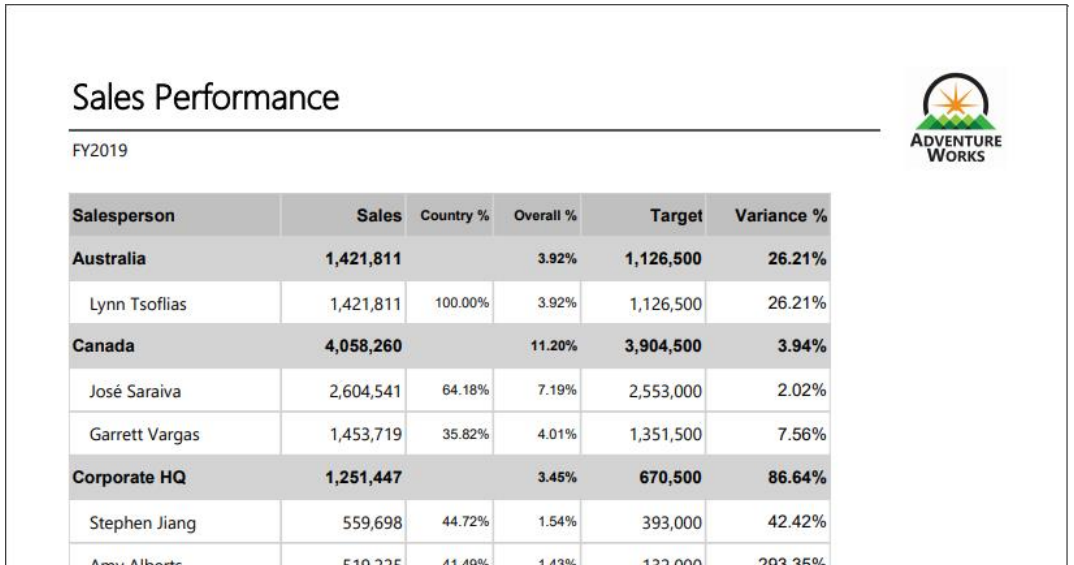
60 minutes

Develop a Table Report – Part 1

You must successfully complete **Lab 04A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab05A

1. Create the report
2. Create the data source
3. Create the dataset
4. Configure the report parameter
5. Develop the table…



Salesperson	Sales	Country %	Overall %	Target	Variance %
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Lynn Tsoflias	1,421,811	100.00%	3.92%	1,126,500	26.21%
Canada	**4,058,260**		**11.20%**	**3,904,500**	**3.94%**
José Saraiva	2,604,541	64.18%	7.19%	2,553,000	2.02%
Garrett Vargas	1,453,719	35.82%	4.01%	1,351,500	7.56%
Corporate HQ	**1,251,447**		**3.45%**	**670,500**	**86.64%**
Stephen Jiang	559,698	44.72%	1.54%	393,000	42.42%

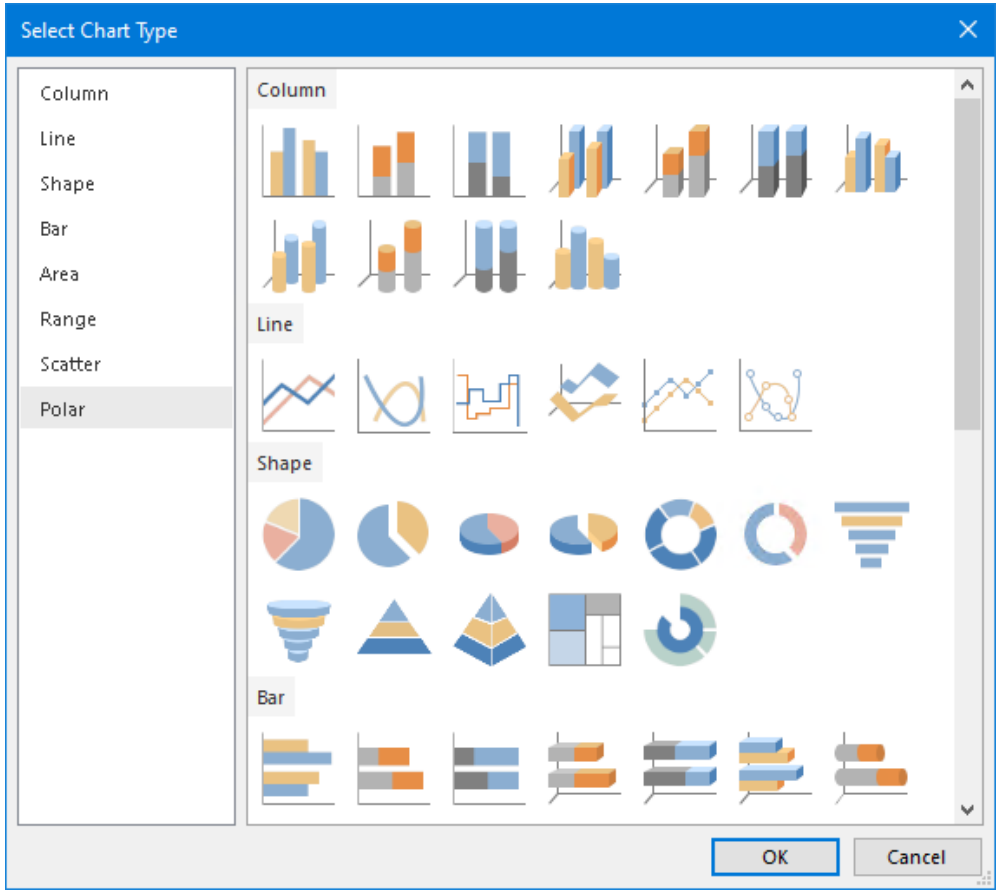
Creating data visualizations

- The are six data visualization templates:
  - Chart
  - Gauge
  - Map
  - Data bar
  - Sparkline
  - Indicator

Creating data visualizations

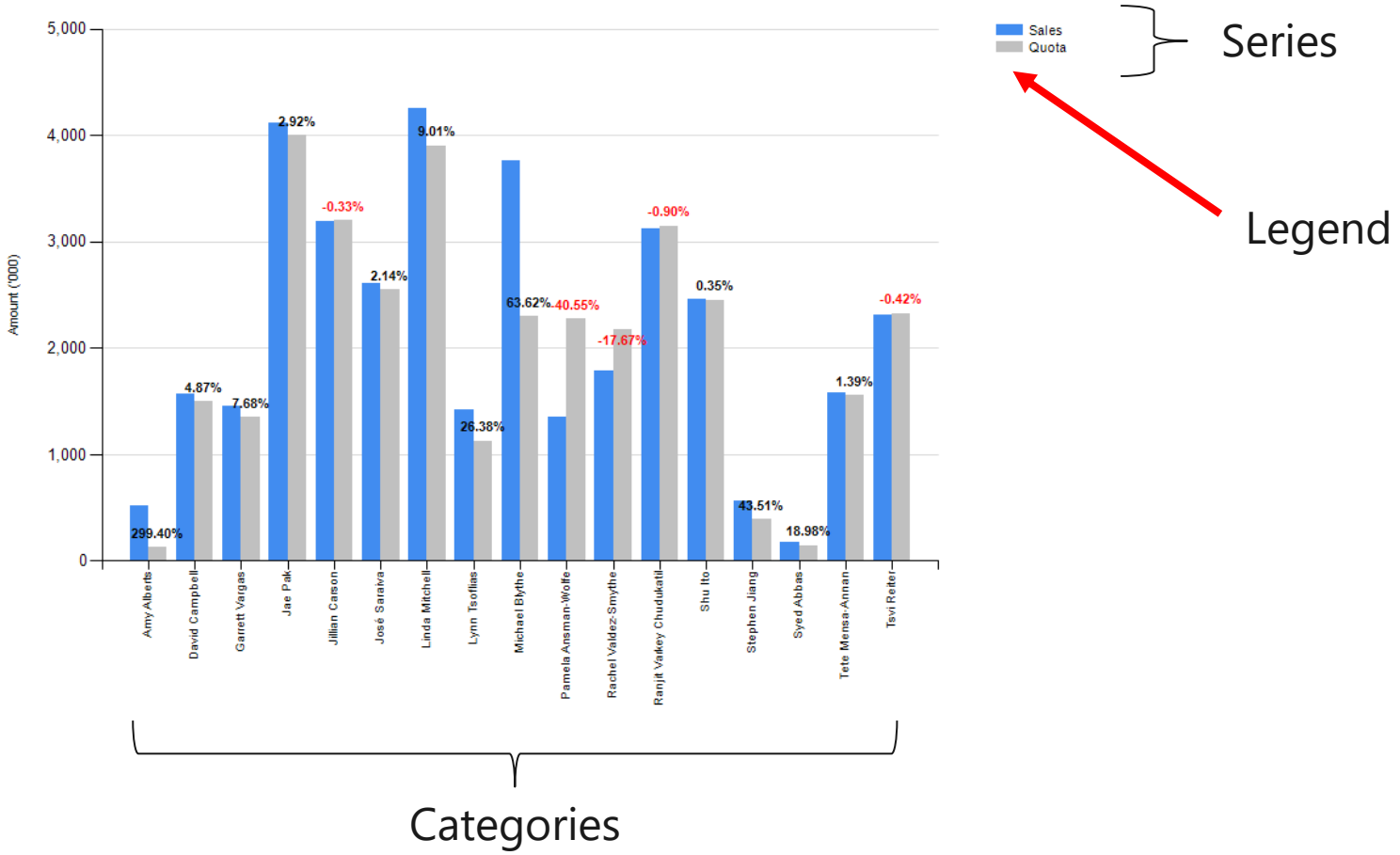
Chart

- Use a **Chart** to graphically present data
- Chart types include:
  - Column
  - Line
  - Shape
  - Bar
  - Area
  - Range
  - Scatter
  - Polar



Creating data visualizations

Chart » Example



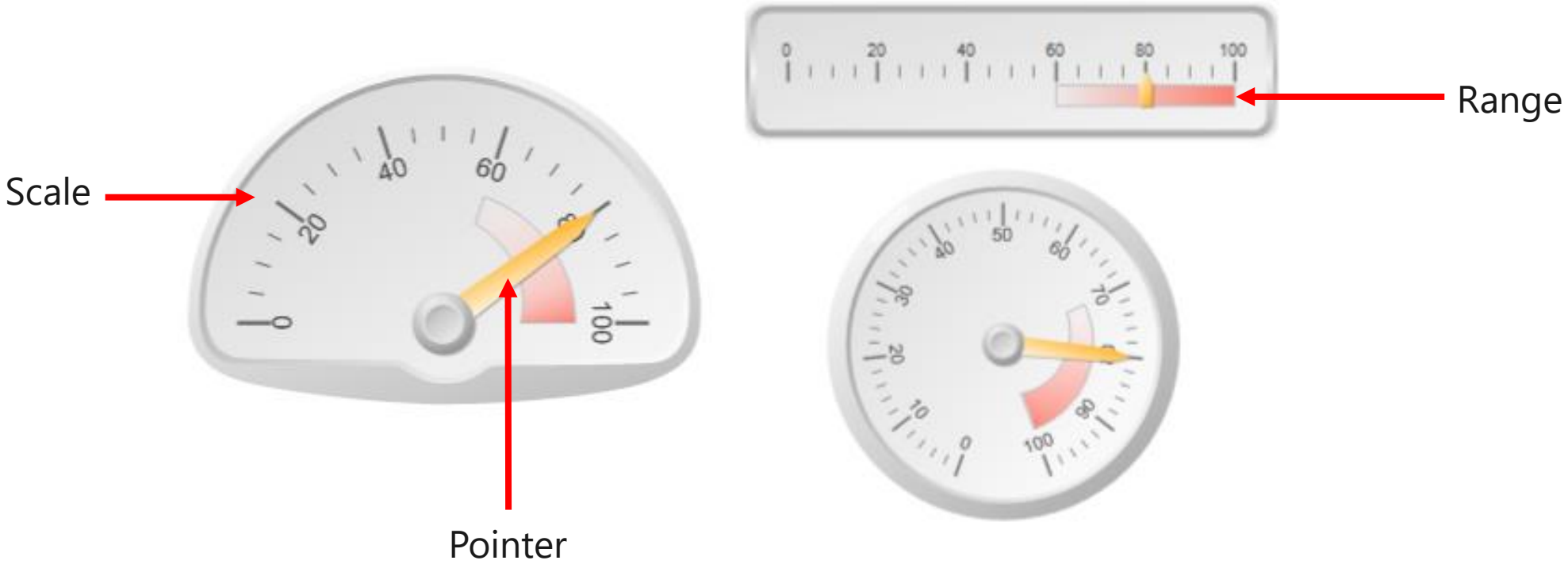
Creating data visualizations

Gauge

- Use a **Gauge** to display a metric along a scale, and with optional ranges to indicate status
- Radial and linear gauge types are available
- Supports various tasks:
  - Display KPIs in a single or radial gauge
  - Place inside a data region
  - Insert multiple gauges into a panel to produce a dashboard to express multiple metrics

Creating data visualizations

Gauge » Examples



Creating data visualizations

Map

- Use a **Map** to spatially present data
- Spatial data can be sourced from:
  - SQL Server spatial data (GEOGRAPHY and GEOMETRY types)
    - Point, Line or Polygon
  - ESRI shape file
    - Complies with Environmental Systems Research Institute (ESRI) spatial data format
  - Map Gallery
    - Available in the Map Wizard
    - United States only

It is not possible to use SQL Server spatial types when retrieving data from SQL Server, as the gateway currently does not support complex data types

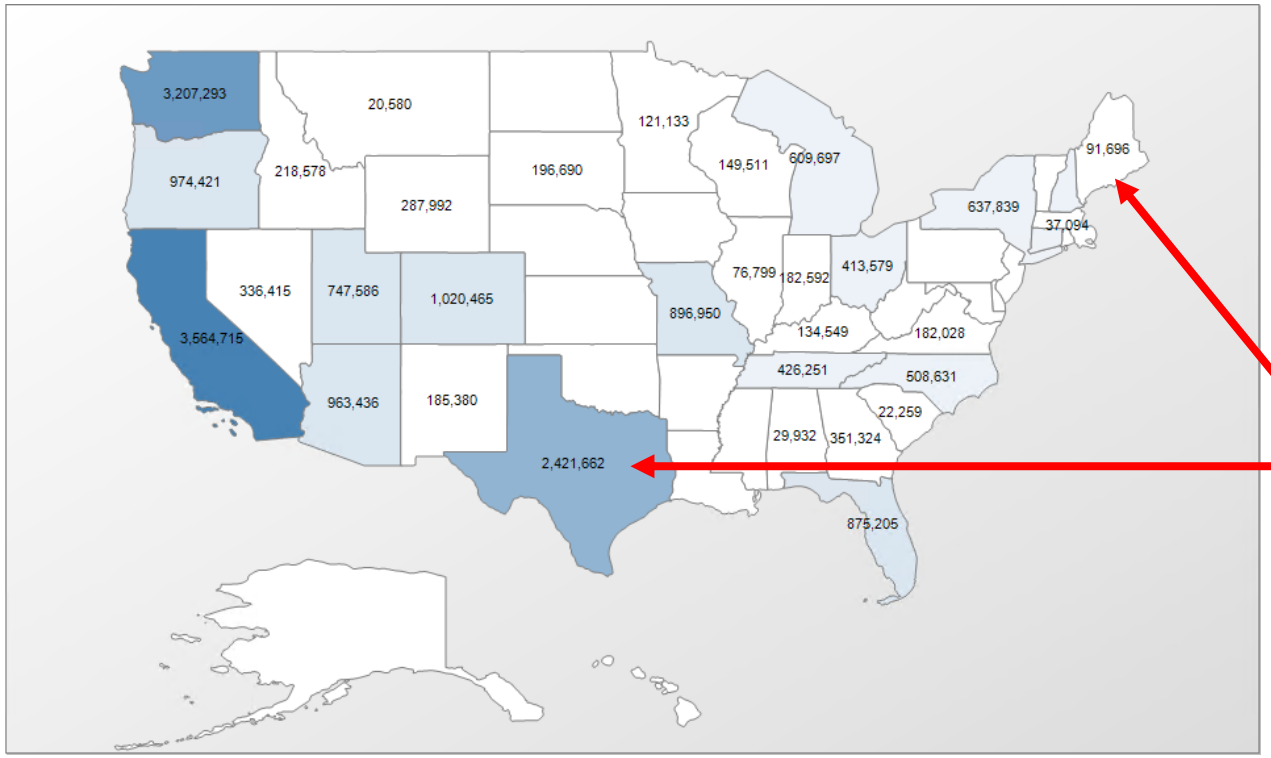
Creating data visualizations

Map (Continued)

- Supports associating analytic datasets
- Supports Bing Map tiles to overlay road, aerial or hybrid views
  - Requires the Report Server to be connected to the Internet
- Includes numerous formatting options:
  - Color and distance scales, legends, titles, markers, tooltips

Creating data visualizations

Map » Example



Creating data visualizations

Data Bar, Sparkline, and Indicator

- Some data visualizations can be used stand-alone or embedded into Tablix data regions:
  - Data Bar
  - Sparkline
  - Indicator
- When embedded into a Tablix, they must be based on the same dataset used by the Tablix

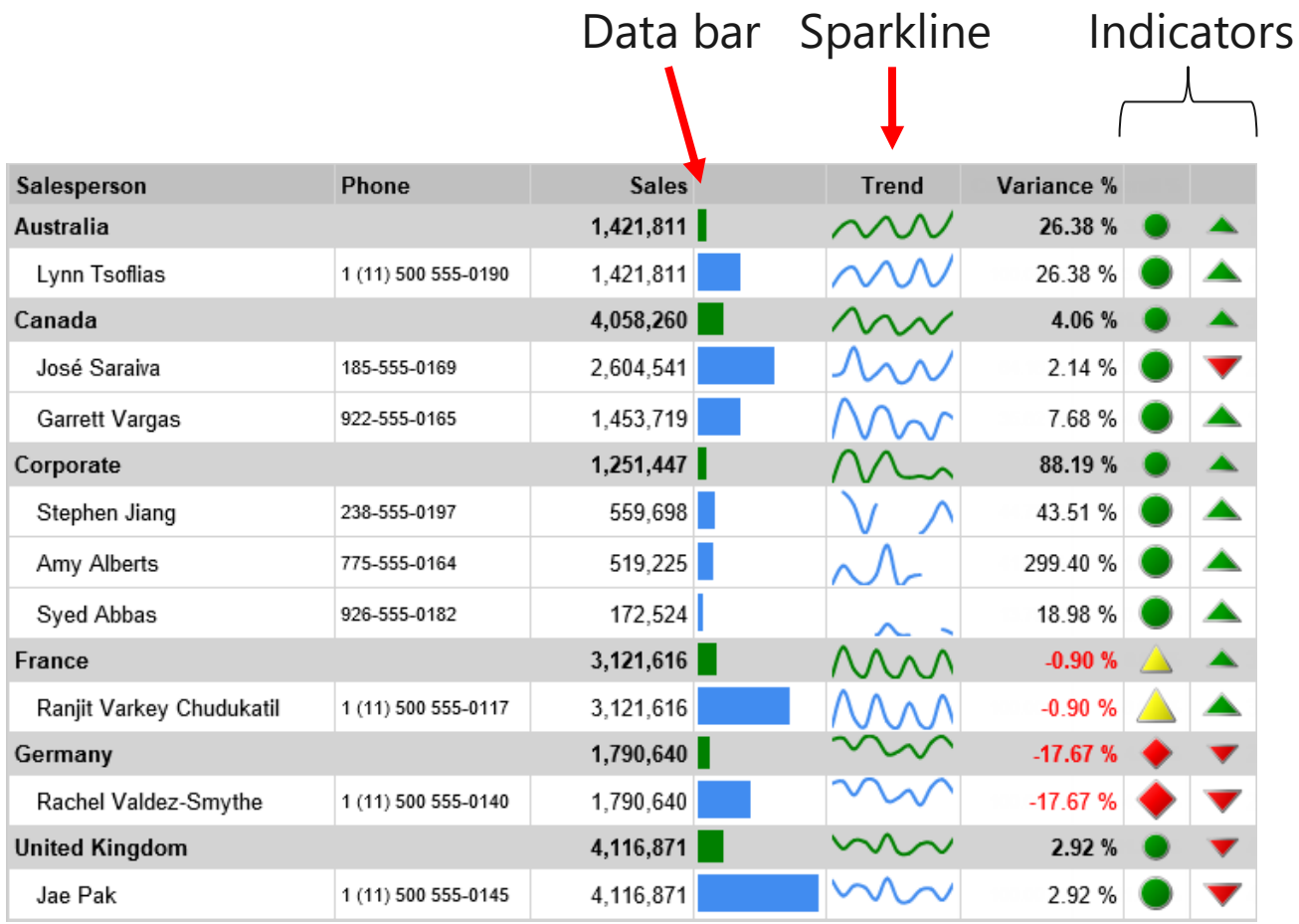
Creating data visualizations

Data Bar, Sparkline, and Indicator (Continued)

- Use **Data Bars** to display a single data point
  - Render as horizontal bars or a vertical columns
- Use **Sparklines** to display multiple data points for a specified group
  - Choose from column, area, line, pie, or range chart types
  - Typically display time series as trend lines
- Use **Indicators** to convey status
  - Choose from a pre-defined set of icons or customize
  - Are ideal to format data model KPI status and trend metrics

Creating data visualizations

Data Bar, Sparkline, and Indicator » Examples



Salesperson	Phone	Sales	Trend	Variance %		
Australia		**1,421,811**		**26.38 %**		
Lynn Tsoflias	1 (11) 500 555-0190	1,421,811		26.38 %		
Canada		**4,058,260**		**4.06 %**		
José Saraiva	185-555-0169	2,604,541		2.14 %		
Garrett Vargas	922-555-0165	1,453,719		7.68 %		
Corporate		**1,251,447**		**88.19 %**		
Stephen Jiang	238-555-0197	559,698		43.51 %		
Amy Alberts	775-555-0164	519,225		299.40 %		
Syed Abbas	926-555-0182	172,524		18.98 %		
France		**3,121,616**		**-0.90 %**		
Ranjit Varkey Chudukatil	1 (11) 500 555-0117	3,121,616		-0.90 %		
Germany		**1,790,640**		**-17.67 %**		
Rachel Valdez-Smythe	1 (11) 500 555-0140	1,790,640		-17.67 %		
United Kingdom		**4,116,871**		**2.92 %**		
Jae Pak	1 (11) 500 555-0145	4,116,871		2.92 %		

Lab 05B

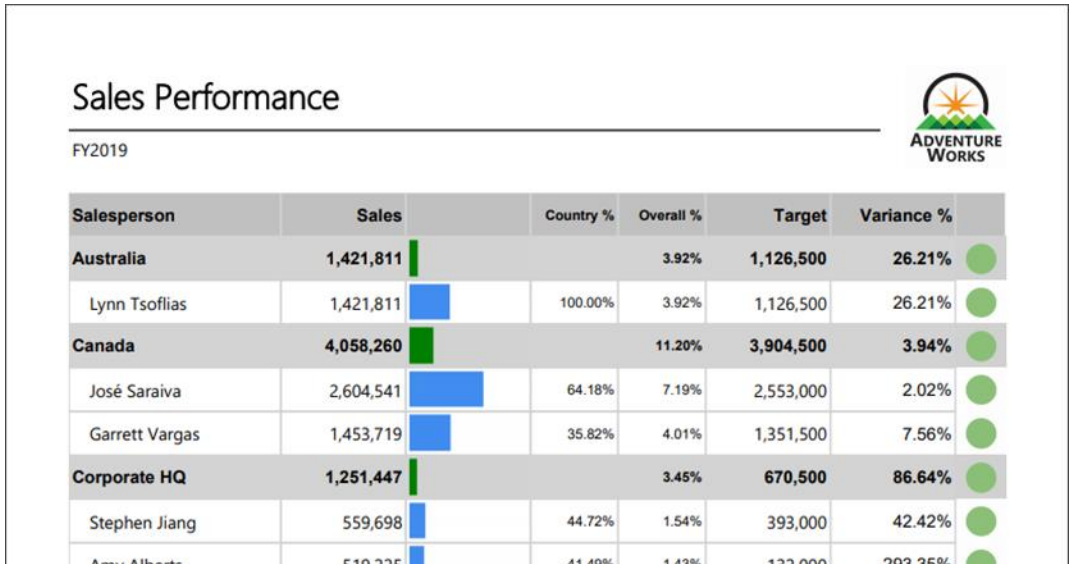
20 minutes

Develop a Table Report – Part 2

You must successfully complete **Lab 05A** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab05B

1. Add data bars
2. Add indicators



Salesperson	Sales		Country %	Overall %	Target	Variance %	
Australia	**1,421,811**			**3.92%**	**1,126,500**	**26.21%**	
Lynn Tsoflias	1,421,811		100.00%	3.92%	1,126,500	26.21%	
Canada	**4,058,260**			**11.20%**	**3,904,500**	**3.94%**	
José Saraiva	2,604,541		64.18%	7.19%	2,553,000	2.02%	
Garrett Vargas	1,453,719		35.82%	4.01%	1,351,500	7.56%	
Corporate HQ	**1,251,447**			**3.45%**	**670,500**	**86.64%**	
Stephen Jiang	559,698		44.72%	1.54%	393,000	42.42%	

Resources

Tables, matrixes, and lists in Power BI Report Builder
https://docs.microsoft.com/power-bi/report-builder-tables-matrices-lists

Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 06

Adding Interactivity Features

Module outline

06: Adding Interactivity Features

- Implementing interactivity features

Implementing Interactivity Features

- Use **Interactivity features** to allow report users to control report display and content
- Features include:
  - Toggling visibility
  - Links
  - Interactive sorting
  - Tooltips

Report parameters can also be considered an interactivity feature, and can be used to customize the report layout, including grouping and sorting

Implementing Interactivity Features

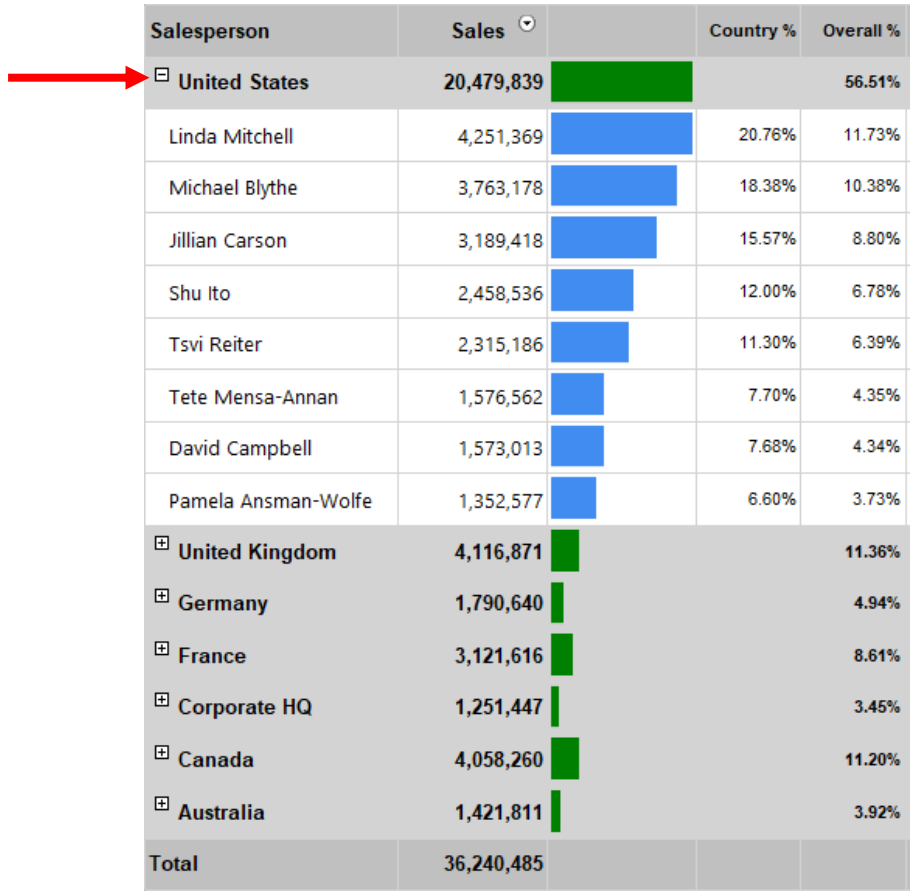
(Continued)

- Not all rendering formats support interactivity features
  - HTML supports all interactivity features
- Built-in fields allow interrogation of rendering format, and can be used to disable a feature when it is not supported:
  - RenderFormat.IsInteractive
  - RenderFormat.Name

Implementing Interactivity Features

Toggling visibility

- **Toggle visibility** to hide/unhide report items, including groups, columns, or rows in a table or matrix
- To achieve drill down/drill up, visibility state can be toggled by clicking another report item
- Hide items to provide a report that shows summary data with ability to drill to detail
- Works only for reports rendered in HTML or Excel



Salesperson	Sales		Country %	Overall %
⊟ United States	20,479,839			56.51%
Linda Mitchell	4,251,369		20.76%	11.73%
Michael Blythe	3,763,178		18.38%	10.38%
Jillian Carson	3,189,418		15.57%	8.80%
Shu Ito	2,458,536		12.00%	6.78%
Tsvi Reiter	2,315,186		11.30%	6.39%
Tete Mensa-Annan	1,576,562		7.70%	4.35%
David Campbell	1,573,013		7.68%	4.34%
Pamela Ansman-Wolfe	1,352,577		6.60%	3.73%
⊞ United Kingdom	4,116,871			11.36%
⊞ Germany	1,790,640			4.94%
⊞ France	3,121,616			8.61%
⊞ Corporate HQ	1,251,447			3.45%
⊞ Canada	4,058,260			11.20%
⊞ Australia	1,421,811			3.92%
Total	36,240,485			

Implementing Interactivity Features

Links

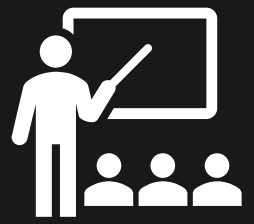
- Use **Links** to let report users:
  - Open other reports
  - Jump to another location within the same report
  - Launch a hyperlink
- Two types of links:
  - Bookmark links
  - Hyperlinks

Implementing Interactivity Features

Interactive sorting

- Use **Interactive sorting** to allow the report user to change sort order and direction
- Allows sorting of data within the details or groups of a table, or matrix
- If interactive sorting is configured for multiple columns, the report user can perform multi-column sorts by pressing the **Ctrl** key
- Works only for:
  - Textboxes located in the table/matrix header, or group headers
  - Reports rendered in HTML

Demo 06A



- Add interactive sorting

Implementing Interactivity Features

Tooltips

- Use **Tooltips** to display additional information
- Tooltips can be applied to all report item types except the Line
- Report users must hover the cursor over the report item to reveal the tooltip
- Works only for reports rendered in HTML

Lab 06A

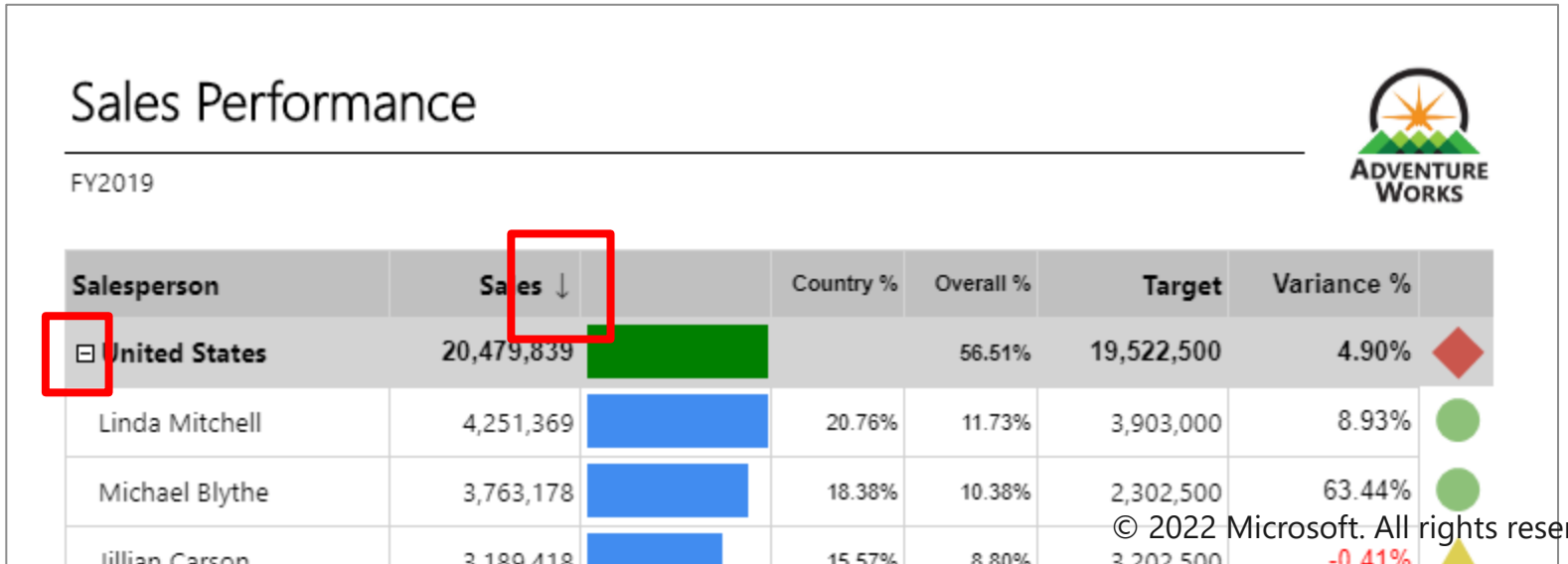
10 minutes

Add Interactive Features

You must successfully complete **Lab 05B** before commencing this lab

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab06A

1. Configure drilldown
2. Configure interactive sorting



Questions?

Microsoft Power Platform

Power BI
Paginated Reports in a Day

Module 07

Beyond Report Development

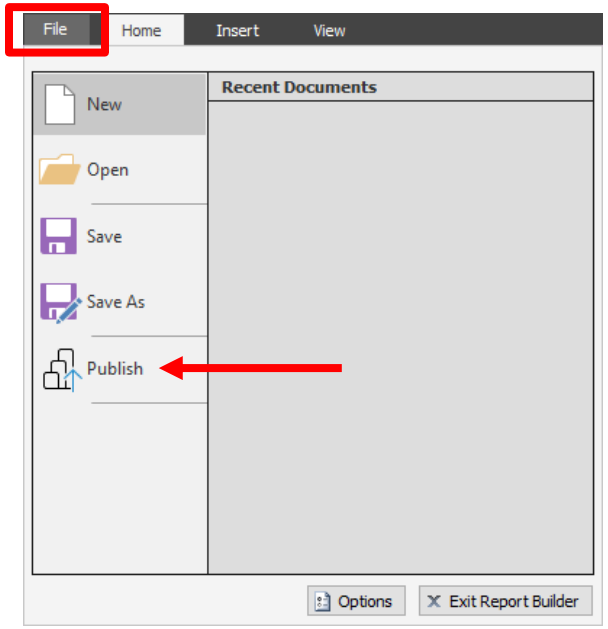
Module outline

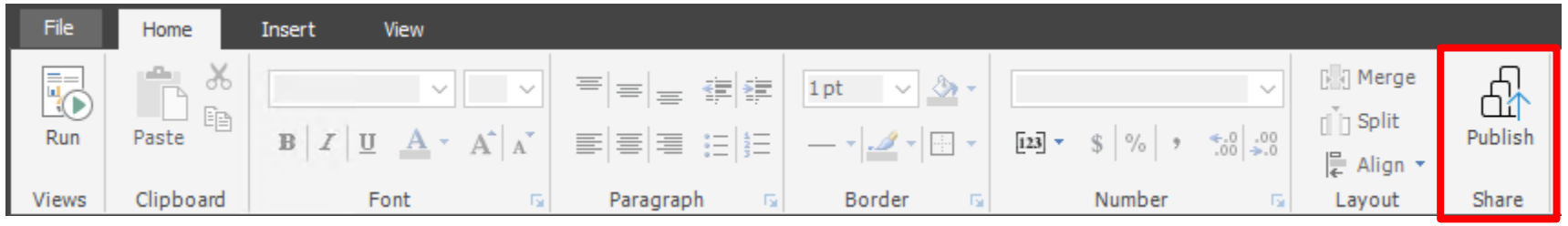
07: Beyond Report Development

- Publishing reports
- Consuming reports
- Delivering reports
- Embedding reports
- Exporting reports
- When to use paginated reports
- Migrate SSRS reports

Publishing reports

- Reports can be published to a Power BI workspace from Report Builder
- It can also be uploaded in the Power BI service by using “Get Data”
- Once published, completing additional tasks may be required before the report can be used





Publishing reports

Post-publication tasks

- Post-publication tasks may involve:
  - Configuring report data sources
    - Cloud sources:
      - Applying credentials to data sources, if required
    - On-premises sources:
      - Installing the on-premises data gateway
      - Creating gateway data sources
      - Mapping gateway data sources to report data sources
    - Configuring the report settings
      - Adding contacts
      - Enabling or disabling comments
    - Sharing or distributing reports to others

Publishing reports

Post-publication tasks » Sharing

- Report users can be granted access to the workspace, but this is not recommended
- Preferably, reports are shared—or distributed—in managed ways:
  - **Share** the report to other users, typically to a select audience
  - **Publish the workspace** to distribute the report in an app, typically with other reports, and to a broad audience
  - **Create subscriptions** to deliver the report attached to an email, typically to a select audience
  - Use the **Power BI export API** to programmatically retrieve reports
- Reports can also be embedded in custom apps or portals

Consuming reports

- Report users can consume reports in:
  - Power BI service
  - Power BI mobile app
  - Custom app or portal

Consuming reports

Power BI service

Print, download, or embed

Turn on page view, or set page settings

Export using choice of render format

Page navigation

Enable, or disable, the parameters pane

Send the report to a printer

Start a conversation with comments

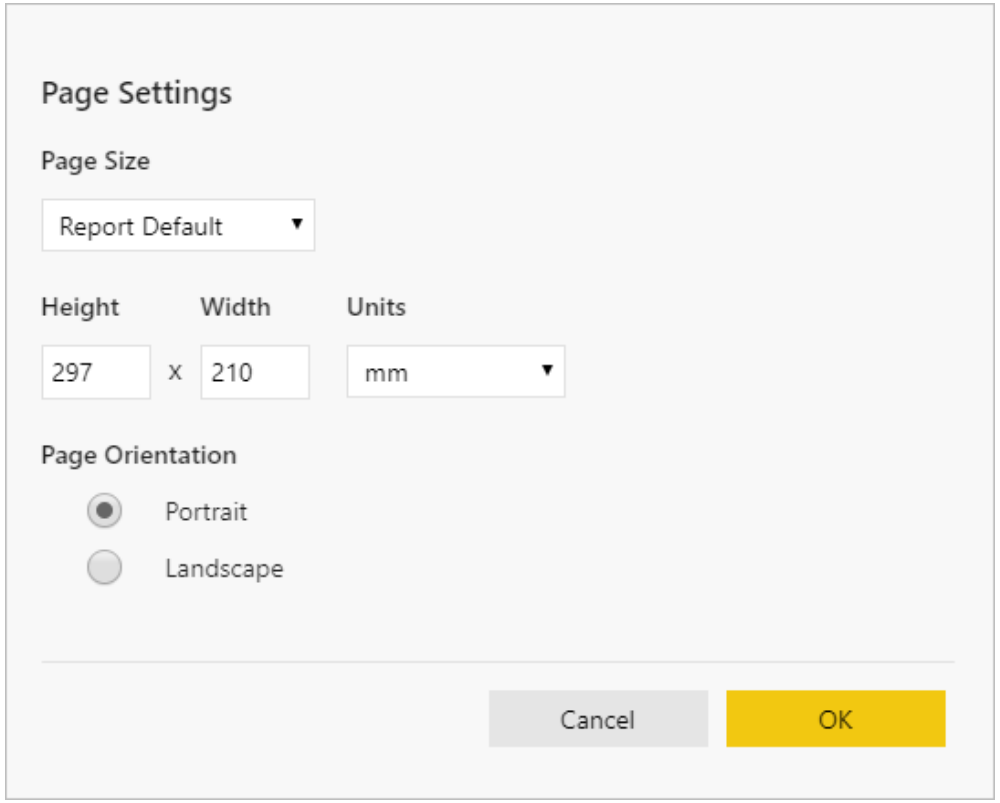
Create, or manage, subscriptions to deliver the report by email

Share the report

Consuming reports

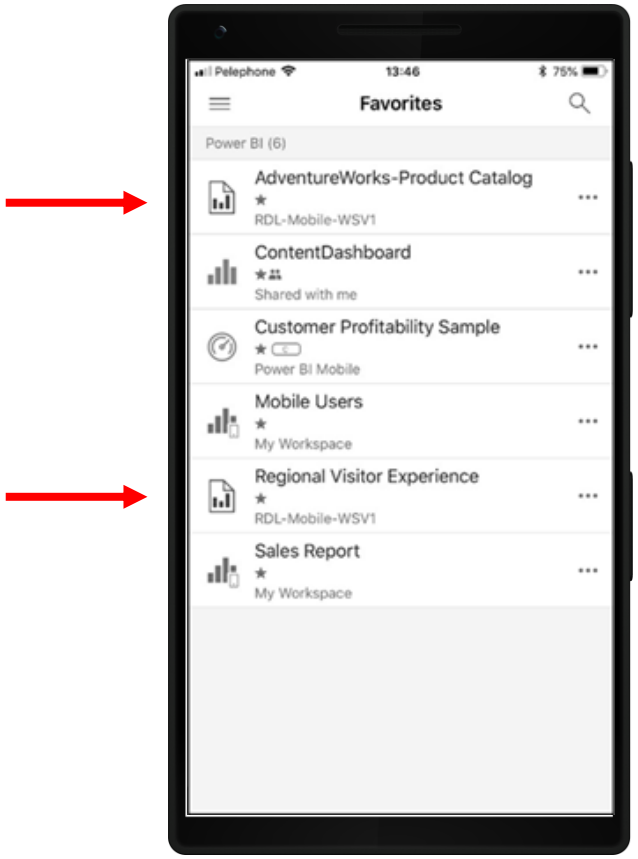
Power BI service » Page view

- Page view is now available in the Power BI service
- Use page view to see the report using the browser's native PDF rendering capability
  - Only supported in Microsoft Edge and Google Chrome browsers
- Page settings allow customizing page size and orientation
  - Can embed as a directive in URL access



Consuming reports

Mobile app



- Mobile report users can:
  - Identify paginated reports
  - Open a paginated report
  - Set report parameter values
  - Navigate between pages
  - View a report in landscape or portrait orientation
  - Mark reports as favorites

Delivering reports

- Create a subscription to deliver the report attached to an email
- Each subscription can:
  - Be run on-demand
  - Be enabled or disabled
  - Be sent to multiple accounts
    - Optionally, granting each account access to the report in Power BI
  - Specify the report format to attach
  - Set report parameter values (using current rendered, or default values)
  - Define subject and optional message
  - Set delivery frequency (hourly, daily, weekly, monthly), time, and validity period
  - Include a link to the Power BI report or embed a preview image

Embedding reports

- Paginated report can be embedded in different ways:
  - Using a link
  - URL access
  - Paginated report visual in a Power BI report

Embedding reports

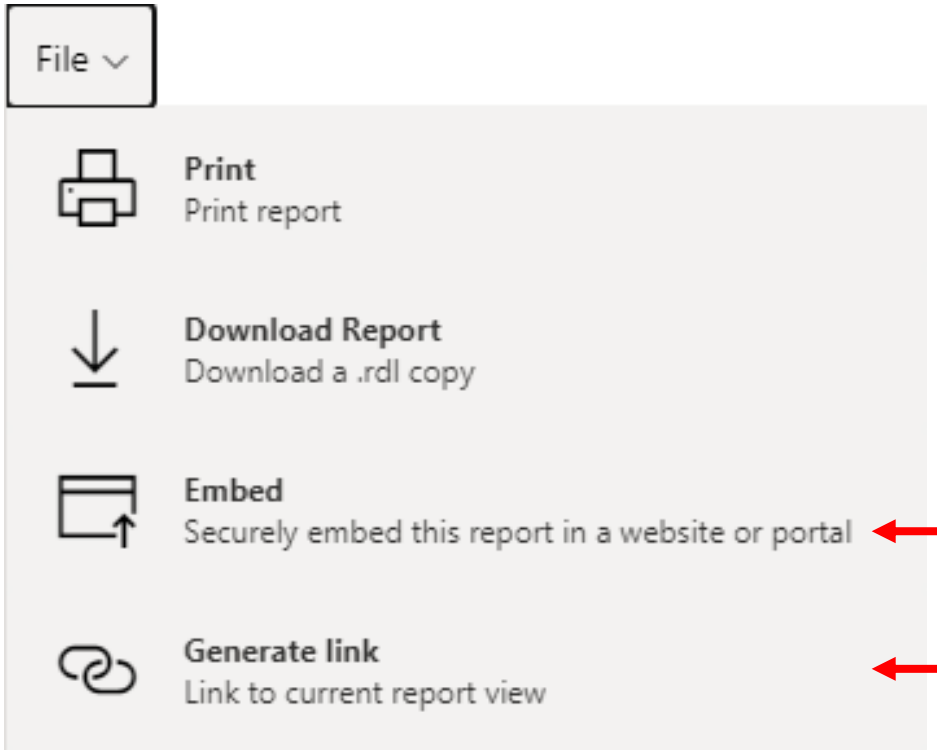
Links and URL access

- Reports can be easily embedded by:
  - Using a link, or HTML fragment (to embed in an iframe)
  - URL access
- Programmatic embedding can also be achieved
  - Especially, embedding on behalf of application users who do not have direct permissions (or Power BI licenses) to open the reports

Programmatic embedding is not covered in this course—see the **Power BI Developer in a Day** course

Embedding reports

Links and URL access » Menu options



Retrieves embed link or HTML fragment

Creates a link, using URL access, based on the current report view

Embedding reports

Links and URL access » URL access

- Add URL access commands to:
  - Set parameter values
  - Hide, or show, the parameters pane
  - Specify export format
  - Specify device info
  - **Device info** allows controlling the rendering for the export format

```
https://app.powerbi.com/groups/260c4234-4939-4c10-be7e-4eed6d07549d/rdlreports/1086ccc8-8324-
4f96-8f54-c88e0652ec0f?rp:SalesOrder=SO43659&rdl:Format=PDF
```

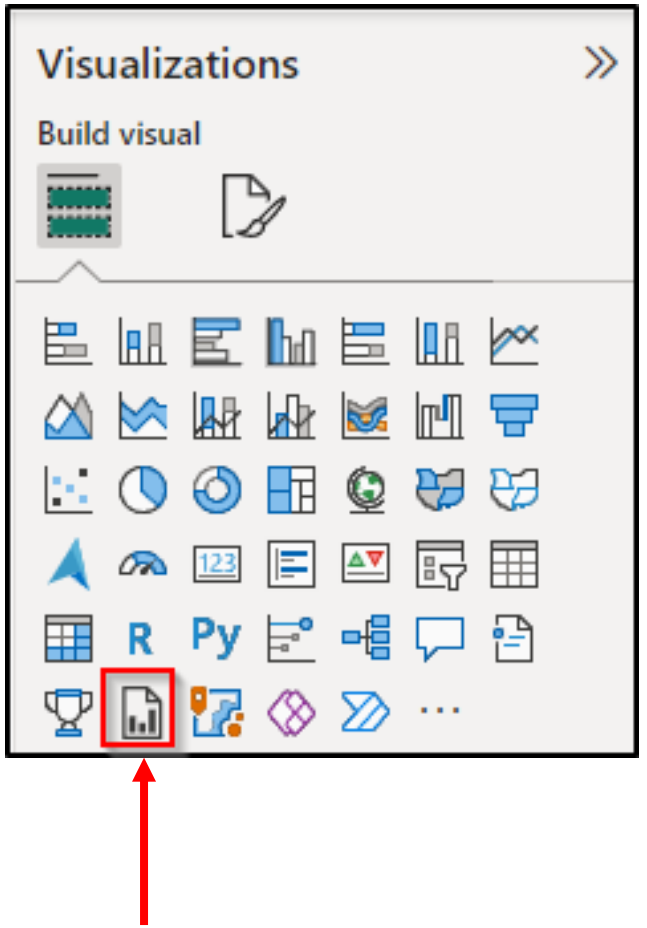
Report parameter

Render format

Embedding reports

Paginated report visual

- The paginated report visual renders a paginated report inside a Power BI report
- Map fields to report parameters
- Report users can:
  - Cross filter the visual
  - Navigate between pages
  - Export



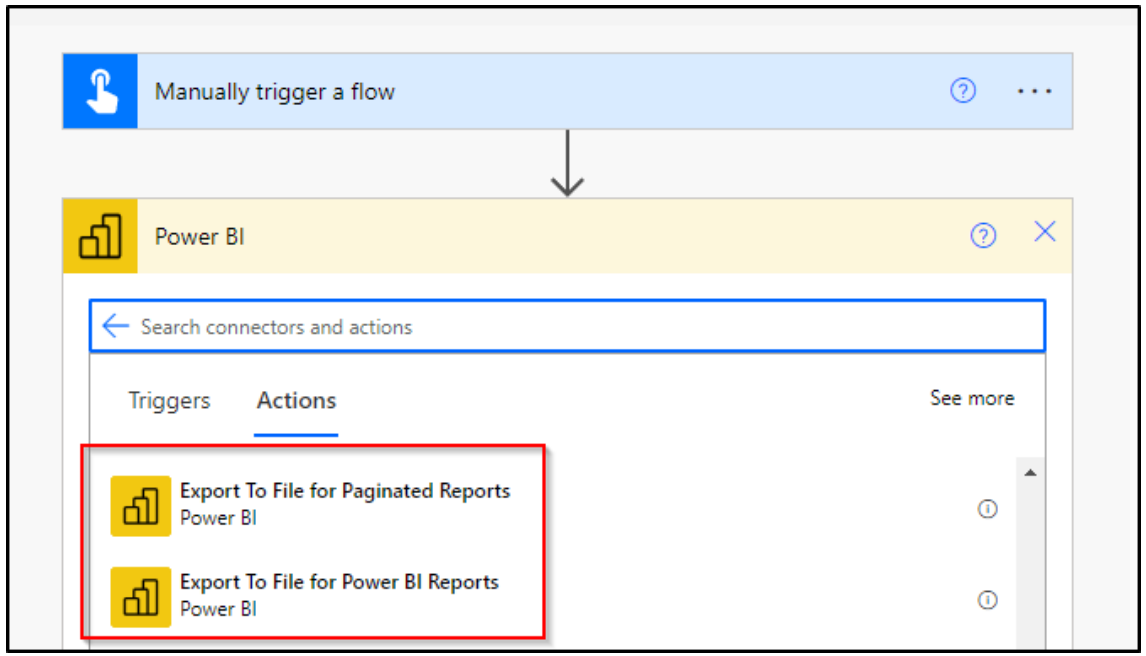
Exporting reports

- Developers can use the **Power BI REST API** to programmatically generate a file of a paginated report
- Supported formats:
  - CSV, DOCX, IMAGE, MHTML, PDF, PPTX, XLSX, and XML
- Parameter values can be passed
- Row-level security is supported for Power BI datasets

Exporting reports

Power Automate

- Use the Power BI connector in Power Automate to export paginated reports in Power Automate workflows
  - No code required! ☺



When to use paginated reports

- Consider using a Power BI paginated report when:
  - It must be printed, or output as a PDF document
  - It must be output using specific formats like Excel, Word, PowerPoint, or data formats like CSV and XML
  - Data grid layouts could expand and overflow
  - The reports already exists (in SSRS)—just migrate it
  - Power BI paginated features and capabilities work in your favor…

When to use paginated reports

20 compelling reasons

- Print-ready
- Choice of render formats
- Precision layout
- Dynamic layout
- Render-specific layout
- Per-user layout
- Native queries
- Graphic query designers
- Static datasets
- Data integration
- Parameterization
- Image data
- Custom code
- Flexible grid layouts
- Spatial data types
- Modern gauges
- HTML rendering of text
- Mail merge reports
- Interactivity features
- Subscriptions

Migrate SSRS reports

- It is possible to migrate SSRS reports to Power BI
  - It is not possible to migrate KPIs or mobile reports
- You can use the unsupported RDL Migration Tool
  - Checks for unsupported features
    - Shared data sources, shared datasets, report drillthrough, and report parts
  - Converts shared data sources and datasets
  - Publishes reports (that pass checks)
- Or, you can open RDL files in Paginated Report Builder to adjust and publish

Lab 07A

10 minutes

Use the Paginated Report Visual

Lab document available at <CourseFolder>\PowerBIPRIAD\Lab07A

1. Use the Paginated Report visual

Resources

Publish a paginated report to the Power BI service
https://docs.microsoft.com/power-bi/paginated-reports-save-to-power-bi-service

URL parameters in paginated reports in Power BI
https://docs.microsoft.com/power-bi/report-builder-url-parameters

Pass a report parameter in a URL for a paginated report in Power BI
https://docs.microsoft.com/power-bi/report-builder-url-pass-parameters

Create and use the paginated report visual
https://docs.microsoft.com/power-bi/visuals/paginated-report-visual

Report design tips in Power BI Report Builder
https://docs.microsoft.com/power-bi/report-builder-design-tips

Resources

SSRS migration

Export report to PDF, PPTX, and PNG files using Power BI REST API

https://powerbi.microsoft.com/blog/export-report-to-pdf-pptx-and-png-files-using-power-bi-rest-api/

Power Automate actions for exporting Power BI and paginated reports

https://powerbi.microsoft.com/blog/power-automate-actions-for-exporting-power-bi-and-paginated-reports-now-available/

When to use paginated reports in Power BI

https://docs.microsoft.com/power-bi/guidance/report-paginated-or-power-bi

Migrate SQL Server Reporting Services reports to Power BI

https://docs.microsoft.com/power-bi/guidance/migrate-ssrs-reports-to-power-bi

RDL migration tool

https://github.com/microsoft/RdlMigration

Resources

Power BI Developer in a Day online course

To learn how to embed Power BI content in apps (including paginated reports), check out all 20 videos, including bonus content

https://aka.ms/deviad-online-course

Power BI Developer in a Day

20 videos

Questions?