# POWER BI ASSIGNMENT 2

1. **Explain the advantages of Natural Queries in PowerBi with an example?**

   Sometimes the fastest way to get an answer from your data is to perform a search over your data using natural language. The Q&A features in Power BI let you explore your data in your own words by using natural language. Q&A is interactive, even fun. Often, one question leads to others as the visualizations reveal interesting paths to pursue. Asking the question is just the beginning. Travel through your data, refining or expanding your question, uncovering new information, zeroing in on details, or zooming out for a broader view. The experience is interactive and fast, powered by in-memory storage.

   Even before you start typing; Q&A displays a new screen with suggestions to help you form your question. Start from one of the suggested questions or type your own question. Q&A supports a wide range of questions. You can:

   - Ask natural questions which sale has the highest revenue?
   - Use relative date filtering Show me sales in the last year
   - Return only the top N Top 10 products by sales
   - Provide a filter Show me sales in the USA
   - Provide complex conditions Show me sales where product category is Category 1 or Category 2
   - Return a specific visual Show me sales by product as pie chart
   - Use complex aggregations Show me median sales by product
   - Sort results Show me top 10 countries/regions by sales ordered by country/region code
   - Compare data Show me date by total sales vs total cost
   - View trends Show me sales over time

   Autocomplete:-

   As you type your question, Power BI Q&A shows relevant and contextual suggestions to help you quickly become productive with natural language. As you type, you get immediate feedback and results. The experience is similar to typing in a search engine.

   Red/Blue/Orange underlines:-

   Q&A shows words with underlines to help you see which words the system recognized or didn't recognize. A solid blue underline indicates that the system successfully matched the word to a field or value in the data-model.

   An orange dotted underline indicates that the word or phrase is categorized as low confidence. If you enter a vague or ambiguous word, the field is underlined in orange dots. An example could be the word 'Sales'. Multiple fields could contain the word 'Sales', so the system uses an orange dotted underline to prompt you to choose the field you mean. Another example of low confidence could be if you enter the word 'area', but the column it matches is 'region'. Power BI Q&A recognizes words that mean the same thing thanks to the integration with Bing and Office and also interpreting renames from within a report as potential suggestions. Q&A underlines the word with orange dots, so you know it's not a direct match.

A red double-underline means Q&A didn't recognize the word at all. You could encounter this issue by using a domain-specific term that isn't mentioned anywhere in the data, or the data fields are incorrectly named. An example could be using the word 'Costs' if the word doesn't exist anywhere in the data. The word is in the English dictionary, but Q&A marks this term with a red double-underline to indicate it can't find this term in the data.

Visualization results:-

As you enter your question, Q&A tries to instantly interpret and visualize the answer. As part of the latest updates, Q&A now tries to interpret the question and plot the fields automatically to the correct axis. For example, if you enter 'Sales by year', Q&A detects that year is a date field and always prioritizes placing this field on the X axis. If you want to change the visualization type, enter 'as chart type' after the question. Q&A currently supports these types of visualizations:

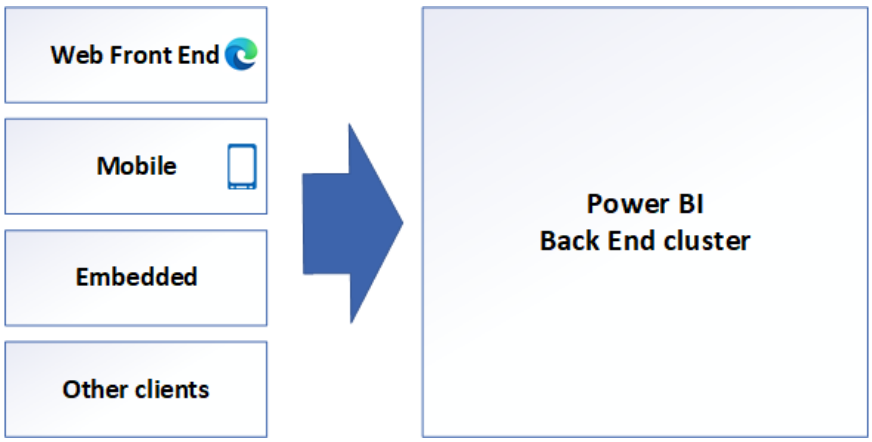
- Line chart
- Bar chart
- Matrix
- Table
- Card
- Area
- Pie chart
- Scatter/Bubble chart
- Map

You can integrate natural language in your reports in various ways:-

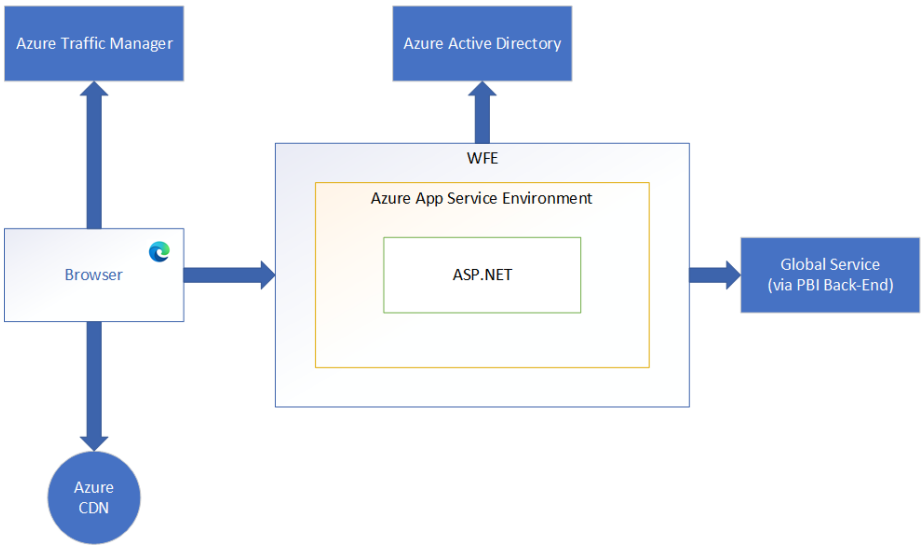
- Use Q&A to explore a dashboard. Every dashboard has a Q&A field in the upper left corner. Type a natural language question to explore your data.
- Use a Q&A visual in a report. If a report creator has added a Q&A visual to a report, use and reuse that visual to explore your data.
- Create and save Q&A results to a dashboard or report. Report designers use Q&A to explore data and create visualizations in reports.
- Create a Q&A visual in a report and share it with others.

2. **Explain Web Front End (WFE) cluster from Power BI Service Architecture?**

The Power BI service is built on Azure, Microsoft's cloud computing platform. Power BI is currently deployed in many datacenters around the world – there are many active deployments made available to customers in the regions served by those datacenters, and an equal number of passive deployments that serve as backups for each active deployment.




Web front-end cluster (WFE)
The WFE cluster provides the user's browser with the initial HTML page contents on site load, and pointers to CDN content used to render the site in the browser.




A WFE cluster consists of an ASP.NET website running in the Azure App Service Environment. When users attempt to connect to the Power BI service, the client's DNS service may communicate with the Azure Traffic Manager to find the most appropriate (usually nearest) datacenter with a Power BI deployment. For more information about this process, see Performance traffic-routing method for Azure Traffic Manager.
Static resources such as *.js, *.css, and image files are mostly stored on an Azure Content Delivery Network (CDN) and retrieved directly by the browser. Note that Sovereign Government cluster deployments are an exception to this rule, and for compliance reasons will omit the CDN and instead use a WFE cluster from a compliant region for hosting static content.

3. **Explain Back End clusters from Power BI Service Architecture?**
The back-end cluster is the backbone of all the functionality available in Power BI. It consists of several service endpoints consumed by Web Front End and API clients as well as background working services, databases, caches, and various other components.

The back end is available in most Azure regions, and is being deployed in new regions as they become available. A single Azure region hosts one or more back-end clusters that allow unlimited horizontal scaling of the Power BI service once the vertical and horizontal scaling limits of a single cluster are exhausted.

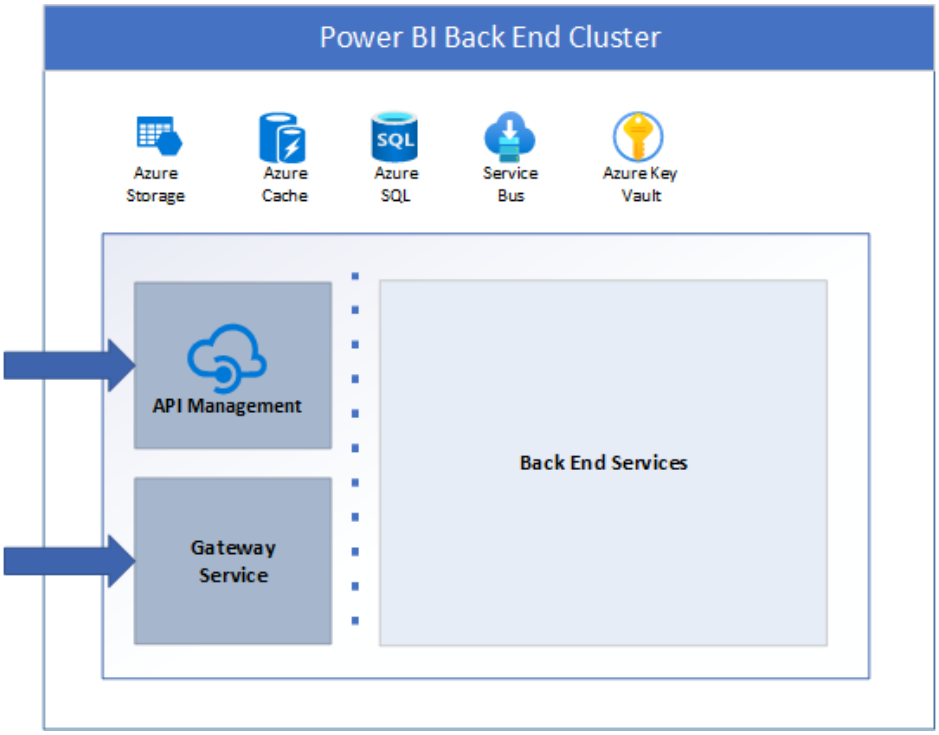
Each back-end cluster is stateful and hosts all the data of all the tenants assigned to that cluster. A cluster that contains the data of a specific tenant is referred to as the tenant's home cluster. An authenticated user's home cluster information is provided by Global Service and used by the Web Front End to route requests to the tenant's home cluster.

Each back-end cluster consists of multiple virtual machines combined into multiple resizable-scale sets tuned for performing specific tasks, stateful resources such as SQL databases, storage accounts, service buses, caches, and other necessary cloud components.

Tenant metadata and data are stored within cluster limits except for data replication to a secondary back-end cluster in a paired Azure region in the same Azure geography. The secondary back-end cluster serves as a failover cluster in case of regional outage, and is passive at any other time.

Back-end functionality is served by micro-services running on different machines within the cluster's virtual network that aren't accessible from the outside, except for two components that can be accessed from the public internet:

- Gateway Service
- Azure API Management




Working of Power BI Service

- Power BI stores its data in two main repositories; Azure block storage and Azure SQL database. Azure block storage stores the datasets uploaded by users and all the metadata and system-related data is stored in the Azure SQL database.

- After Azure API Management authenticates a user request, it is sent to the Gateway Role. The Gateway Role processes the requests and directs them to suitable components like Presentation Role, Background Job Processing Role, Data Role, and Data Movement Role.
- For instance, the Presentation Role handles all the visualization related queries like for dashboards and reports.
- For all the data related queries, the request is sent by the Gateway Role to the Data Role or Data Movement Role.
- Power BI Service back end uses Azure Service Bus to connect on premise data sources with the cloud. Azure Service Bus receives all the requests to fetch data from the on premise data source. Then it processes the request and executes the query on the on premise data source to retrieve data from it to the cloud service.
- The Azure Service Fabric manages all the micro services and components associated with running Power BI.
- Azure AD Cache helps in real-time reporting using the data stored in the in-memory of the Power BI system.

**4. Compare Microsoft Excel and PowerBi Desktop on the following features:**

- Data import
- Data transformation
- Modeling
- Reporting
- Server Deployment
- Convert Models
- Cost

| Feature | MS Excel | Power BI Desktop |
|---|---|---|
| Data import | Excel can import and export many different file types aside from the standard .xslx format. If your data is shared between other programs, like a database, you may need to save data as a different file type or bring in files of a different file type. | There are 3 Methods to import data in Power BI:<br>• Import Mode: - In import mode Power BI saves the copy of data in memory & this data consume space in system. Manual & Scheduled refresh applied on dataset to update data. All data sources supports import mode.<br>• Direct Query:-We are not loading data in Power BI. Data remains same in the data source, only keeping metadata in power BI. Supports limited data sources.<br>• Live Connection: - In live data stays in data source |

| | | |
|---|---|---|
| | | only and metadata stored in Power BI. The data refresh does not require. Limited data sources like Azure analysis Services. |
| Data transformation | To transform data in Excel, you can use multiple functions, as well as native and third-party tools to automate processes. | With Power BI Desktop it is possible to manipulate the data for the required analysis. Some of this manipulation happens at the import stage (which we are outlining here) and some can be carried out on the data, post-import, for charting purposes |
| Modeling | It allows integrating data from multiple tables by creating relationships based on a common column.<br>Data models are used transparently, providing tabular data that can be used in a Pivot Table in Excel<br>and Pivot Charts in excel<br>. In addition, it integrates the tables, enabling extensive analysis using pivot tables, power pivot, and Power View in Excel<br>. | With the modeling feature, you can build custom calculations on the existing tables and these columns can be directly presented into Power BI visualizations. This allows businesses to define new metrics and to perform custom calculations for those metrics. |
| Reporting | One of the most common tools people use in Excel to create reports is the chart, table tools and pivot tables. In Excel you generate one report at the time | A Power BI report is a multi-perspective view into a dataset, with visuals that represent findings and insights from that dataset. A report can have a single visual or many pages full of visuals. Like a dashboard, a report is interactive and customizable. |
| Server Deployment | After you finish development of your integrated Excel workbook, you make the final integrated Excel workbook available to end users by deploying the resulting Fusion web application to an application server. Before you | Fabric's deployment pipelines tool provides BI creators with a production environment where they can collaborate to manage the lifecycle of organizational content. Deployment pipelines enable creators to develop and test |

| | | |
|---|---|---|
| | deploy a finalized Excel workbook that integrates with the Fusion web application, you must publish it. After you have published the Excel workbook, you can deploy it. | content in the service before it reaches the users. When you deploy content from the source stage to a target stage, the source content overwrites anything with the same name in the target stage. Content in the target stage that doesn't exist in the source stage remains in the target stage as is. After you select deploy, you'll get a warning message listing the items that will be overwritten. |
| Convert Models | Within Excel, Data Models are used transparently, providing tabular data used in PivotTables and Pivot Charts. A Data Model is visualized as a collection of tables in a Field List. An Excel workbook can contain only one Data Model, but that model can contain multiple tables which can be used repeatedly throughout the workbook. | Power BI allows users to modify existing data models in the Power BI service using actions such as editing relationships, creating DAX measures and managing RLS. In this experience, users can work and collaborate simultaneously on the same data model. |
| Cost | Since we already have Excel, we need to spend additional money to procure this and build dashboards. | Power BI Desktop is free to download and use for personal use, but it takes $10 per month per user to share reports with others. |

**5. List 20 data sources supported by Power Bi desktop.**

The Database category provides the following data connections:

1. SQL Server database
2. Access database
3. Oracle database
4. IBM Db2 database
5. IBM Informix database (Beta)
6. IBM Netezza
7. MySQL database
8. PostgreSQL database
9. SAP Business Warehouse Application Server
10. Amazon Redshift
11. Impala

12. Google BigQuery
13. Google BigQuery (Azure AD)(Beta)
14. Vertica
15. Snowflake
16. Essbase
17. Actian (Beta)
18. Amazon Athena
19. AtScale cubes
20. BI Connector