**Part 4: Data Analysis Using Excel**

Here's a step-by-step guide to import your data from the MySQL database into Excel, analyze it using pivot tables and charts, and create an interactive dashboard.

**1. Import Data from MySQL to Excel**

**Step 1: Open Excel and Create a New Workbook**

* Open Microsoft Excel.
* Start a new workbook.

**Step 2: Connect to MySQL Database**

* Go to the **Data** tab in Excel.
* Click on **Get Data** > **From Database** > **From MySQL Database**.
* If MySQL isn't listed, you might need to install the MySQL ODBC connector. [**CLICK HERE FOR THE INSTALLATION STEPS**](#MySQLODBC)

**Step 3: Enter Connection Details**

* Enter the server name (e.g., localhost) and port (usually 3306).
* Enter your MySQL username and password.
* Click on **OK**.

**Step 4: Select the Database and Tables**

* After connecting, a navigator window will show the available databases.
* Select amr\_db.
* Choose the tables you want to import (e.g., Country, Region, Hospital, Patient, Antibiotic, AMR\_Test).
* Click on **Load** to import the data into Excel.

**2. Analyze Data Using Pivot Tables and Charts**

**Step 5: Create a Pivot Table**

* Select the data range (all imported data).
* Go to the **Insert** tab.
* Click on **PivotTable**.
* Choose where you want the PivotTable report to be placed (e.g., new worksheet).
* Click on **OK**.

**Step 6: Set Up Your Pivot Table**

* Drag fields into the **Rows**, **Columns**, **Values**, and **Filters** areas to analyze your data.
  + Example: Drag region\_name to **Rows**, antibiotic\_name to **Columns**, and num\_resistant to **Values**.
* This will allow you to analyze resistant AMR test results by region and antibiotic.

**Step 7: Create Charts**

* With the PivotTable selected, go to the **Insert** tab.
* Choose the chart type you want (e.g., **Bar Chart**, **Pie Chart**, **Line Chart**).
* This will help visualize your data insights.

**3. Create an Interactive Excel Dashboard**

**Step 8: Design the Dashboard Layout**

* Create a new sheet for the dashboard.
* Use different sections for various charts and tables.
* Place PivotTables and charts in this sheet to create a summary of your analysis.

**Step 9: Add Slicers for Interactivity**

* Click on a PivotTable or chart.
* Go to the **Insert** tab and select **Slicer**.
* Choose the field you want to filter (e.g., region\_name, antibiotic\_name).
* Place slicers on your dashboard to allow interactive filtering.

**Step 10: Customize the Dashboard**

* Format your charts and PivotTables for clarity.
* Add labels, titles, and descriptions to make the dashboard user-friendly.
* Use conditional formatting to highlight key metrics.

**Step 11: Save and Share**

* Save your Excel file with the dashboard.
* You can share it with stakeholders or use it for presentations.

To install the MySQL ODBC connector on Windows 10, follow these steps:

**Step 1: Download MySQL ODBC Connector**

1. **Go to the MySQL Website:**
   * Open your web browser and go to the official MySQL website: [MySQL Downloads](https://dev.mysql.com/downloads/connector/odbc/).
2. **Select the Connector/ODBC:**
   * Find the section for **MySQL Connector/ODBC**.
   * Choose the version that matches your system architecture (Windows 32-bit or 64-bit).
3. **Download the Installer:**
   * Click on the **Download** button for the Windows (x86, 64-bit) MSI Installer or the version that matches your architecture.
   * You may need to log in or sign up for a free Oracle account, but you can also choose the option to **No thanks, just start my download**.

**Step 2: Install MySQL ODBC Connector**

1. **Run the Installer:**
   * Locate the downloaded installer file (e.g., mysql-connector-odbc-8.0.XX-winx64.msi) in your Downloads folder and double-click it to start the installation process.
2. **Start the Installation:**
   * Follow the installation wizard steps. Click **Next** to continue through the setup process.
3. **Accept License Agreement:**
   * Read and accept the license agreement to proceed.
4. **Choose Setup Type:**
   * You can select either **Typical** or **Custom** installation. For most users, the **Typical** installation is sufficient.
5. **Install:**
   * Click on the **Install** button to start the installation.
   * The installer will copy the necessary files to your system.
6. **Finish Installation:**
   * Once the installation is complete, click on **Finish** to exit the setup wizard.

**Step 3: Configure ODBC Data Source**

1. **Open ODBC Data Source Administrator:**
   * Go to the **Start Menu** and search for **ODBC Data Sources**.
   * Choose **ODBC Data Sources (64-bit)** or **ODBC Data Sources (32-bit)** depending on your system and the version of Excel you are using.
2. **Add a New Data Source:**
   * In the ODBC Data Source Administrator, click on the **System DSN** or **User DSN** tab.
   * Click on **Add**.
3. **Select MySQL ODBC Driver:**
   * From the list of drivers, select **MySQL ODBC 8.0 Unicode Driver** or **MySQL ODBC 8.0 ANSI Driver**.
   * Click on **Finish**.
4. **Configure Data Source:**
   * Enter a **Data Source Name** (e.g., MySQL\_AMR\_DB).
   * Provide your MySQL **server** name (e.g., localhost), **username**, **password**, and **database** name (amr\_db).
   * You can test the connection to ensure it works properly.
5. **Save the Data Source:**
   * Click **OK** to save the data source configuration.

**Step 4: Use the ODBC Connection in Excel**

Now that the ODBC connector is installed and configured, you can use it in Excel to connect to your MySQL database:

1. **Open Excel:**
   * Go to **Data** > **Get Data** > **From Other Sources** > **From ODBC**.
2. **Select Data Source:**
   * Choose the ODBC data source you configured (e.g., MySQL\_AMR\_DB).
3. **Connect to Database:**
   * Follow the prompts to connect to your MySQL database, and then you can start importing data into Excel.

This process will allow you to seamlessly connect Excel to your MySQL database for data analysis and reporting.

Great! Now that your tables are loaded into the **Queries & Connections** panel in Excel, you're ready to proceed with analyzing the data and creating an interactive dashboard. Here’s a step-by-step guide to help you through the process:

**Step 1: Load Data into Worksheets**

1. **Load Each Query/Table:**
   * In the **Queries & Connections** panel, you'll see a list of all the tables you've imported.
   * For each table, right-click on the query and select **Load To...**.
2. **Choose Loading Options:**
   * In the **Import Data** dialog box, decide how you want to load the data:
     + **Table:** Load the data into a new worksheet as a table.
     + **PivotTable Report:** Load directly into a PivotTable.
     + **PivotChart:** Load directly into a PivotChart.
     + **Only Create Connection:** Keep the data in the Data Model without loading it to a worksheet.
     + **Add this data to the Data Model:** Useful for creating relationships between tables.
   * For comprehensive analysis, it’s recommended to **Add this data to the Data Model**.
3. **Repeat for All Tables:**
   * Perform the above steps for each table (e.g., Country, Region, Hospital, Patient, Antibiotic, AMR\_Test).

**Step 2: Establish Relationships Between Tables**

If you've added all tables to the Data Model, you can define relationships to enable comprehensive analysis across multiple tables.

1. **Open the Relationships Dialog:**
   * Go to the **Data** tab.
   * Click on **Relationships**.
2. **Create Relationships:**
   * In the **Manage Relationships** dialog box, click **New**.
   * Define each relationship based on the foreign keys in your database:
     + **Region** → **Country**: Region.country\_id → Country.country\_id
     + **Hospital** → **Region**: Hospital.region\_id → Region.region\_id
     + **Patient** → **Hospital**: Patient.hospital\_id → Hospital.hospital\_id
     + **AMR\_Test** → **Patient**: AMR\_Test.patient\_id → Patient.patient\_id
     + **AMR\_Test** → **Antibiotic**: AMR\_Test.antibiotic\_id → Antibiotic.antibiotic\_id
   * Click **OK** after defining each relationship.

**Step 3: Create Pivot Tables for Data Analysis**

1. **Insert a Pivot Table:**
   * Go to the **Insert** tab.
   * Click on **PivotTable**.
   * In the **Create PivotTable** dialog box, select **Use this workbook’s Data Model**.
   * Choose where to place the PivotTable (e.g., New Worksheet) and click **OK**.
2. **Design Your Pivot Table:**
   * In the **PivotTable Fields** pane, drag and drop fields to the appropriate areas:
     + **Rows:** e.g., Region.region\_name
     + **Columns:** e.g., Antibiotic.antibiotic\_name
     + **Values:** e.g., AMR\_Test.test\_id (set to **Count**)
     + **Filters:** e.g., AMR\_Test.result (to filter by 'resistant' or 'susceptible')

**Example Analysis:**

* + **Number of Resistant Tests by Region and Antibiotic:**
    - **Rows:** Region.region\_name
    - **Columns:** Antibiotic.antibiotic\_name
    - **Values:** AMR\_Test.test\_id (Count)
    - **Filters:** AMR\_Test.result set to 'resistant'

1. **Create Additional Pivot Tables as Needed:**
   * Repeat the above steps to create different Pivot Tables for various analyses, such as:
     + **Percentage of Resistant Tests by Region**
     + **Top Antibiotics with Highest Resistance Rates**

**Step 4: Create Charts for Data Visualization**

1. **Select a Pivot Table:**
   * Click anywhere inside the Pivot Table you want to visualize.
2. **Insert a Chart:**
   * Go to the **Insert** tab.
   * Choose the desired chart type (e.g., **Column Chart**, **Bar Chart**, **Pie Chart**, **Line Chart**).
   * The chart will be generated based on the Pivot Table data.
3. **Customize the Chart:**
   * Add titles, labels, and adjust formatting to enhance readability.
   * Right-click on chart elements to format them as needed.

**Step 5: Create an Interactive Dashboard**

1. **Set Up the Dashboard Sheet:**
   * Add a new worksheet and name it "Dashboard".
2. **Add Pivot Tables and Charts to the Dashboard:**
   * Copy each Pivot Table and its corresponding chart from their original sheets and paste them into the Dashboard sheet.
   * Arrange them logically to provide a clear overview of your data insights.
3. **Add Slicers for Interactivity:**
   * **Insert Slicers:**
     + Click on a Pivot Table within the Dashboard.
     + Go to the **PivotTable Analyze** tab.
     + Click on **Insert Slicer**.
     + Select fields you want to use as filters (e.g., Region.region\_name, Antibiotic.antibiotic\_name).
     + Click **OK** and arrange the slicers on the Dashboard.
   * **Connect Slicers to Multiple Pivot Tables:**
     + Click on a slicer.
     + Go to the **Slicer** tab.
     + Click on **Report Connections**.
     + Check all Pivot Tables that should be controlled by this slicer.
4. **Add a Timeline for Date Filtering (Optional):**
   * **Insert Timeline:**
     + Click on a Pivot Table that includes date fields.
     + Go to the **PivotTable Analyze** tab.
     + Click on **Insert Timeline**.
     + Select the date field (e.g., AMR\_Test.test\_date).
     + Click **OK** and place the Timeline on the Dashboard.
   * **Connect Timeline to Multiple Pivot Tables:**
     + Click on the Timeline.
     + Go to the **Timeline** tab.
     + Click on **Report Connections**.
     + Check all relevant Pivot Tables.
5. **Enhance the Dashboard Layout:**
   * **Organize Elements:**
     + Arrange Pivot Tables, Charts, Slicers, and Timelines neatly.
     + Ensure that the Dashboard is easy to navigate and interpret.
   * **Apply Consistent Formatting:**
     + Use consistent colors, fonts, and styles for a professional look.
   * **Add Descriptive Titles and Labels:**
     + Clearly label each chart and section of the Dashboard to indicate what data they represent.

**Step 6: Finalize and Test the Dashboard**

1. **Test Interactivity:**
   * Use the slicers and timeline to filter data and ensure that all connected Pivot Tables and Charts respond correctly.
2. **Adjust and Optimize:**
   * Make any necessary adjustments to the layout, formatting, or connections based on your testing.
3. **Save Your Workbook:**
   * Save the Excel file to preserve your work. Consider saving it in a shared location if others need access.

**Additional Tips:**

* **Data Refresh:**
  + If your MySQL database updates regularly, set your queries in Excel to refresh automatically:
    - Go to the **Data** tab.
    - Click on **Queries & Connections**.
    - Right-click on a query and select **Properties**.
    - In the **Query Properties** dialog, set options such as **Refresh every X minutes** or **Refresh data when opening the file**.
* **Performance Optimization:**
  + For large datasets, consider limiting the amount of data imported or using Excel's data optimization features to maintain performance.
* **Documentation:**
  + Document your dashboard's structure and functionality to help others understand and use it effectively.

By following these steps, you'll be able to effectively import your MySQL data into Excel, perform detailed analysis using Pivot Tables and Charts, and create an interactive dashboard that provides valuable insights into your AMR data.