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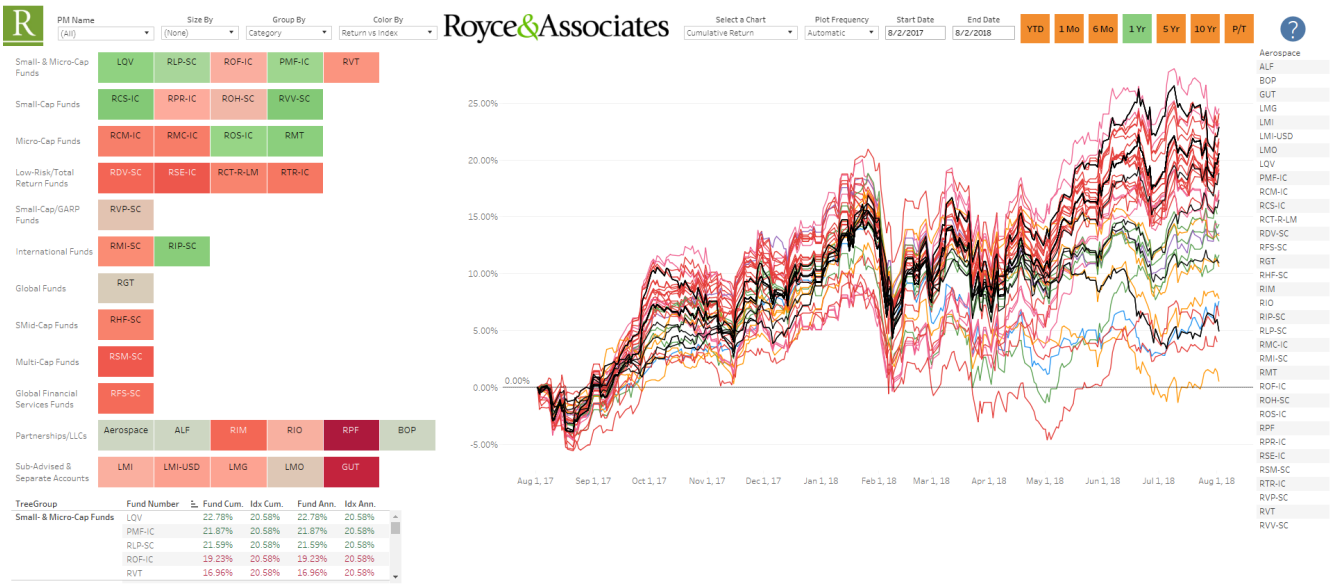
# Tableau Performance Visualizer

## Maintenance and Development Guide

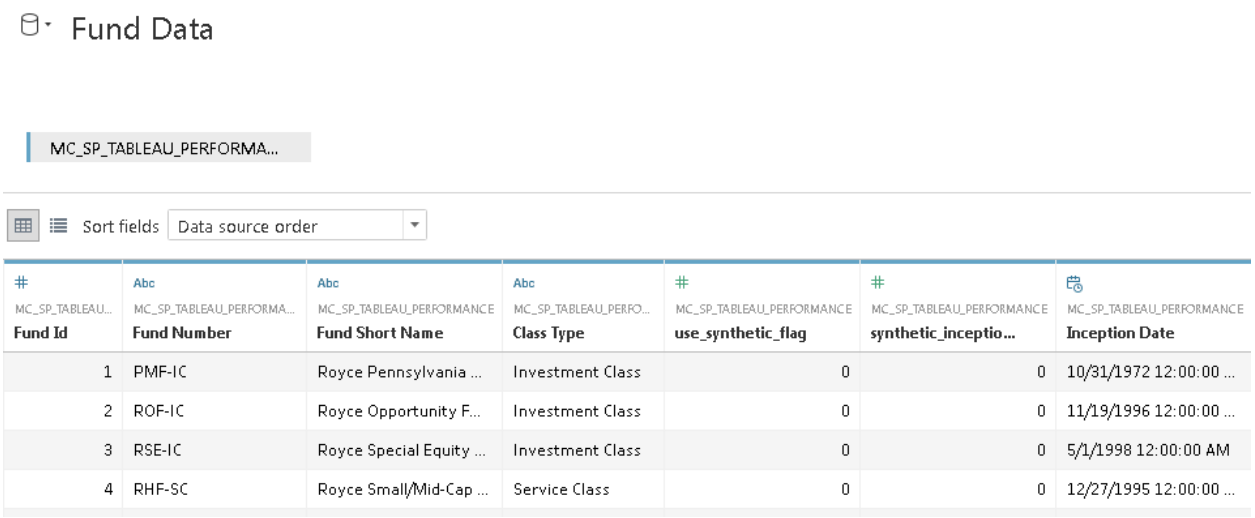



## Introduction:

The Royce Performance Visualizer is a powerful and easy to use tool that allows you to make insights about fund performance that you could never have made just looking at raw numerical data. The dashboard can be found on http://ranybi01:8000/#/site/Research/views/PerformanceVisualizer/PerformanceVisualizer and contains many curated default views that we believe are the most helpful to Royce. These default views allow inexperienced users to be able to quickly make important insights from the most commonly used performance scenarios, but are all able to be thoroughly customized to show different types of funds, charts, periods of time, and more. With this instructional guide, we hope to not only inform you about the ways to maintain and update the dashboard, but also how to know how to create custom visuals that users and other people at the company may be interested in.

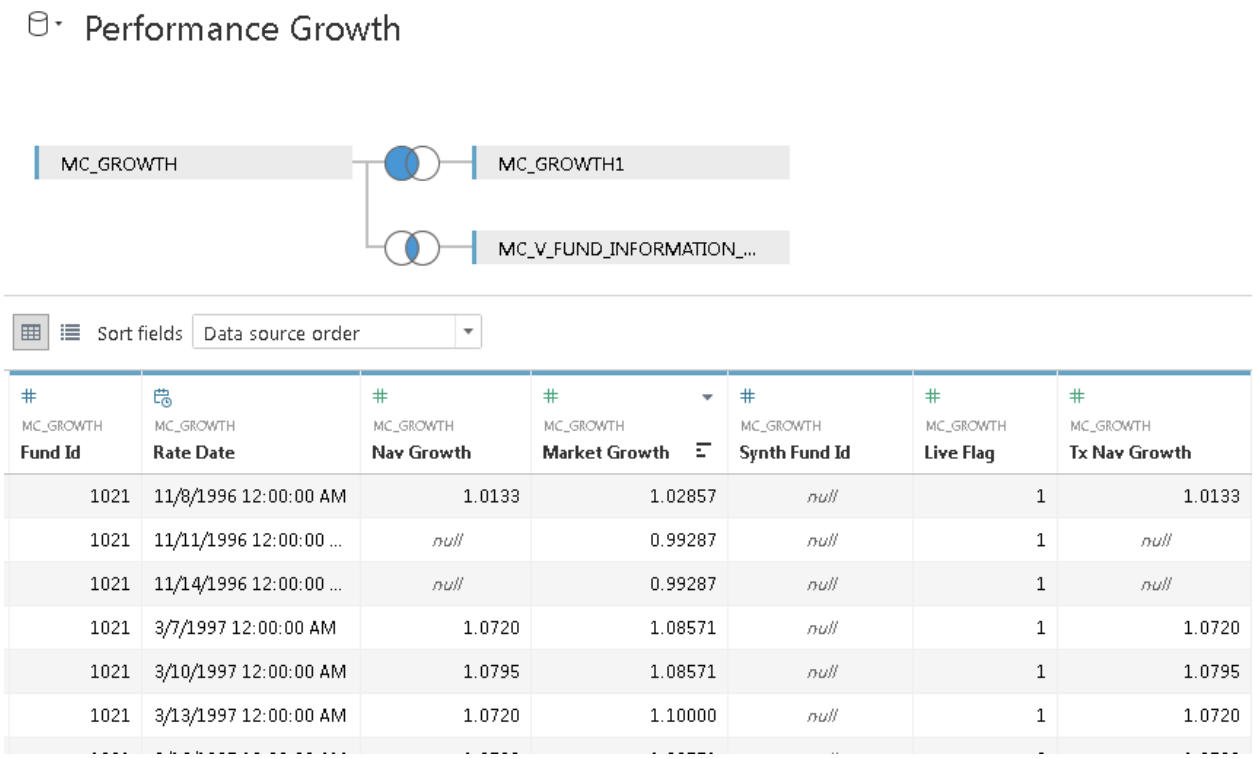
**Data Sources:**

PerfViz (the Performance Visualizer) uses three published data sources on the ranybi01 Tableau server: Fund Data, Performance Growth, and PM Table. These three data sources are all either extracted or live connected to the PERFORMANCE database of the Microsoft SQL server, ranysql02. The data sources all use an embedded username and password (user is rareader, a read only account. Dean knows the pw) that allow all users to connect to the data sources without being prompted for login credentials that they don't have. The only time that the password is ever needed is when accessing the PerfViz Data Source Updater workbook.




| # MC_SP_TABLEAU... Fund Id | Abc MC_SP_TABLEAU_PERFORMA... Fund Number | Abc MC_SP_TABLEAU_PERFORMANCE Fund Short Name | Abc MC_SP_TABLEAU_PERFO... Class Type | # MC_SP_TABLEAU_PERFORMANCE use_synthetic_flag | # MC_SP_TABLEAU_PERFORMANCE synthetic_inceptio... | MC_SP_TABLEAU_PERFORMANCE Inception Date |
|---|---|---|---|---|---|---|
| 1 | PMF-IC | Royce Pennsylvania ... | Investment Class | 0 | 0 | 10/31/1972 12:00:00 ... |
| 2 | ROF-IC | Royce Opportunity F... | Investment Class | 0 | 0 | 11/19/1996 12:00:00 ... |
| 3 | RSE-IC | Royce Special Equity ... | Investment Class | 0 | 0 | 5/1/1998 12:00:00 AM |
| 4 | RHF-SC | Royce Small/Mid-Cap ... | Service Class | 0 | 0 | 12/27/1995 12:00:00 ... |

Fund Data is live connected to a Stored Procedure written by Mike Connors (MC_SP_TABLEAU_PERFORMANCE) that pulls what is essentially a header table for all of the funds in the database. The SP takes a start and end date as parameters in order to calculate the cumulative and annualized return, net assets, and other single values for the entire time period specified by the parameters for every fund that contains information for that entire time period. Funds that started after the start date or do not have information for the end date will not have the calculations done by the SP, only funds that have information for the whole time period. Regardless of missing performance data to calculate these calculated columns in the SP, the qualitative information for the funds (name, id#, index, category, etc.) will always be returned by the SP. The parameters for the SP are linked to the Start Date and End Date parameters in Tableau (called Parameter 6 and Parameter 7 internally) and allow the user to directly type in the dates that the SP will actually run a query from. Fund Data is used as the Primary Data Source for all of the worksheets that only show a summary of data that doesn't need to be duplicated for every day in the range, like the treemaps and summary table rather than a full view of performance over time.




| MC_GROWTH Fund Id | MC_GROWTH Rate Date | MC_GROWTH Nav Growth | MC_GROWTH Market Growth | MC_GROWTH Synth Fund Id | MC_GROWTH Live Flag | MC_GROWTH Tx Nav Growth |
|---|---|---|---|---|---|---|
| 1021 | 11/8/1996 12:00:00 AM | 1.0133 | 1.02857 | *null* | 1 | 1.0133 |
| 1021 | 11/11/1996 12:00:00 ... | *null* | 0.99287 | *null* | 1 | *null* |
| 1021 | 11/14/1996 12:00:00 ... | *null* | 0.99287 | *null* | 1 | *null* |
| 1021 | 3/7/1997 12:00:00 AM | 1.0720 | 1.08571 | *null* | 1 | 1.0720 |
| 1021 | 3/10/1997 12:00:00 AM | 1.0795 | 1.08571 | *null* | 1 | 1.0795 |
| 1021 | 3/13/1997 12:00:00 AM | 1.0720 | 1.10000 | *null* | 1 | 1.0720 |

Performance Growth is an extract of several joined tables from the PERFORMANCE database, refreshed every morning at ~5am. The first table, MC_GROWTH, contains the NAV and MKT growth for every fund in the database for every day in the fund's existence for all rate dates. MC_GROWTH also lists each fund's Fund Id, a unique numerical identifier used to internally track funds. This table is inner joined to the MC_V_FUND_INFORMATION_OVERRIDE table on the Fund Id. FUND_INFO links each Fund Id to a Primary Index Id (the Fund Id of the original fund's benchmark), allowing us to join the NAV growth of the indices to their respective funds by left joining the MC_GROWTH and FUND_INFO tables to another MC_GROWTH table by linking the Primary Index Id from FUND_INFO to the FUND_ID of the second MC_GROWTH table. The fully joined table will now list the growth information for every fund for every day, as well as the fund's index's growth data on the same row. While this does give us some duplication of data, it allows us to more closely link index and fund growth information and provide more useful visuals in Tableau. Performance Growth is used as the Primary Data Source for worksheets that need to track performance over time like all of the line graphs and the fund rankings table.

PM Table

MC_V_TABLEAU_PM

Sort fields Data source order

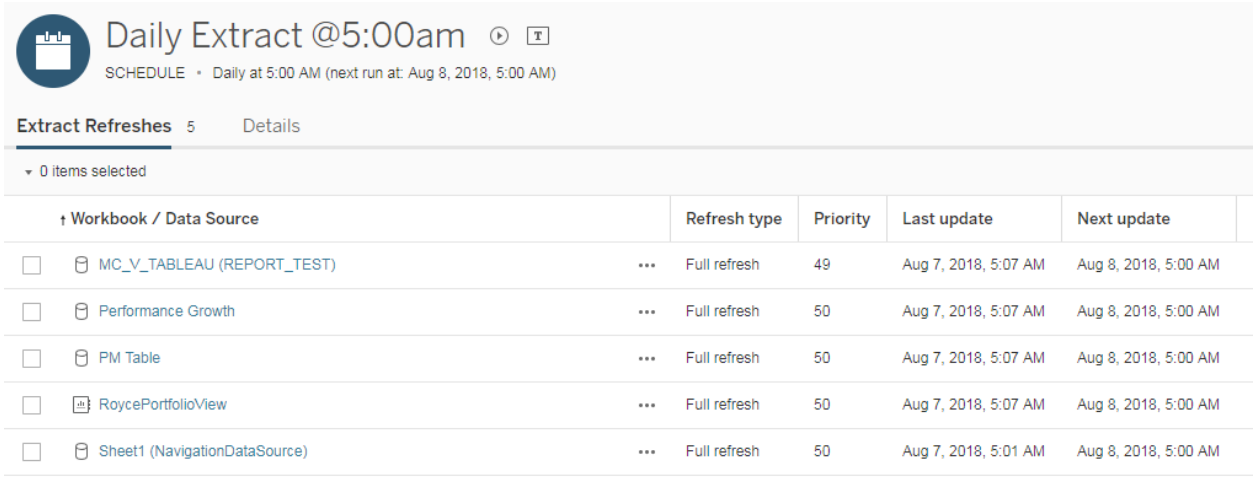
| MC_V_TABLEAU_... Fund Id | MC_V_TABLEAU_PM Person Id | MC_V_TABLEAU... Title Id | MC_V_TABLEAU_PM Title Start Date | MC_V_TABLEAU_PM Last Name | MC_V_TABLEAU_PM First Name |
|---|---|---|---|---|---|
| 18 | 3 | 2 | 5/1/2005 12:00:00 AM | Flynn | Christopher |
| 19 | 3 | 2 | 5/1/2009 12:00:00 AM | Flynn | Christopher |
| 244 | 4 | 4 | 7/12/2017 12:00:00 AM | Necakov | George |
| 15 | 4 | 2 | 5/1/2005 12:00:00 AM | Necakov | George |
| 617 | 5 | 1 | 7/13/2004 12:00:00 AM | Dreifus | Charles |
| 616 | 5 | 1 | 12/29/2003 12:00:00 ... | Dreifus | Charles |

PM Table is an extract of the MC_V_TABLEAU_PM table from the PERFORMANCE database that lists the names of the portfolio managers and the fund id of the fund that they manage. Because many funds have multiple managers, and many managers manage multiple funds, Mike Connors chose to create a unique row for every combination of fund and manager. Because this table has a very different level of granularity than the other data sources that we use in the Tableau workbook, we use this data source only for very specific filtering actions.

**Scripts and Automation:**

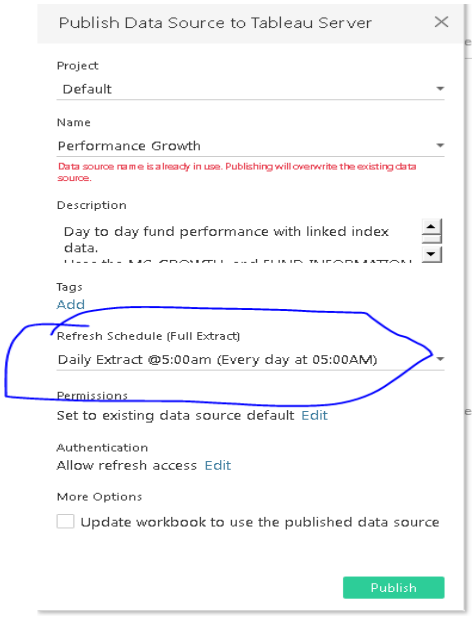
In order to automate most of the day to day maintenance of PerfViz, Tableau, as well as several custom scripts and scheduled tasks run to keep all of the relevant workbooks and data sources up to date.

Using Tableau Server's scheduling feature, we are able to automatically refresh the extracts of Performance Growth and PM Table at 5am every day.

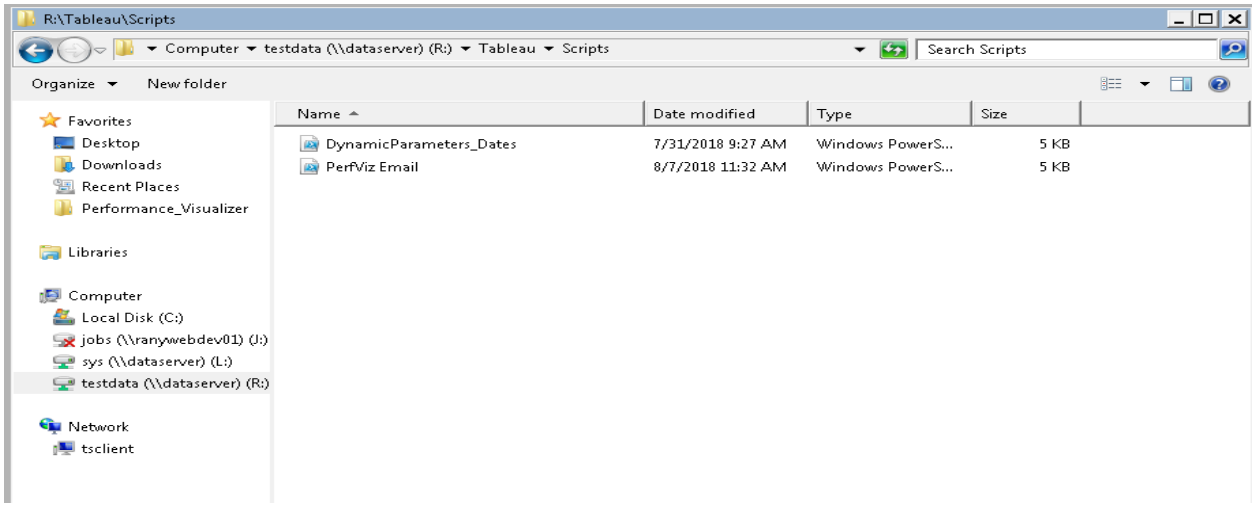



| Workbook / Data Source | Refresh type | Priority | Last update | Next update |
|---|---|---|---|---|
| MC_V_TABLEAU (REPORT_TEST) | Full refresh | 49 | Aug 7, 2018, 5:07 AM | Aug 8, 2018, 5:00 AM |
| Performance Growth | Full refresh | 50 | Aug 7, 2018, 5:07 AM | Aug 8, 2018, 5:00 AM |
| PM Table | Full refresh | 50 | Aug 7, 2018, 5:07 AM | Aug 8, 2018, 5:00 AM |
| RoycePortfolioView | Full refresh | 50 | Aug 7, 2018, 5:07 AM | Aug 8, 2018, 5:00 AM |
| Sheet1 (NavigationDataSource) | Full refresh | 50 | Aug 7, 2018, 5:01 AM | Aug 8, 2018, 5:00 AM |

This task is shared with extracts that other Tableau workbooks are using to make daily extracts, so be careful when removing items from or editing this task. To change which scheduling task is being used to update the data sources or change the time that they are being updated, create a new schedule under the schedule tab on Tableau Server and republish the data source with that schedule.



The other scripts that we use to to maintain our dashboard were custom made by Alex Necakov in order to get around some of the limitations of Tableau's native automation features. Both of these scripts can be found in **R:\Tableau\Scripts** and run using Powershell (version 3.0 or greater) and Tabcmd (Tableau's command line package). These scripts both currently run as scheduled tasks on John Necakov's machine and will be maintained by him.




The first script runs at 8:45am and is our workaround for date parameters not automatically updating to the correct dates on Tableau server without the workbook actually getting republished with the desired date parameters set. This script will publish **ALL** non-hidden views in the workbook.

```
# ------------------------------------------------------------
#   Title: Tableau Dynamic Parameter Updater
# ------------------------------------------------------------
#   This script is used to automatically update the default dates of the "Tableau Performance Visualizer" workbook view by
#   1. Downloading the current version of the WB from the server
#   2. Editing the parameters in XML, then
#   3. Republishing the edited workbook
#
#   This script runs every morning M-F to ensure that the "Performance Visualizer" view will display the correct default dates,
#   or else the defaults will still be the same as whatever the last published version of the WB was.
#
#   This script will update the end date of all of the views, but some of the non-default views may not update properly.
#   If this happens, please manually change them to have the correct start date once every month or so.
# ------------------------------------------------------------
#   Requires: MS Powershell V3.0, TabCMD from Tableau - make sure that the directory reference is correct.
# ------------------------------------------------------------
#   Alex Necakov : Created : 7/25/18
# ------------------------------------------------------------
```

The second script runs at 9am on Fridays and allows more customizable email subscriptions to the dashboard to be made using the internal qmail program.

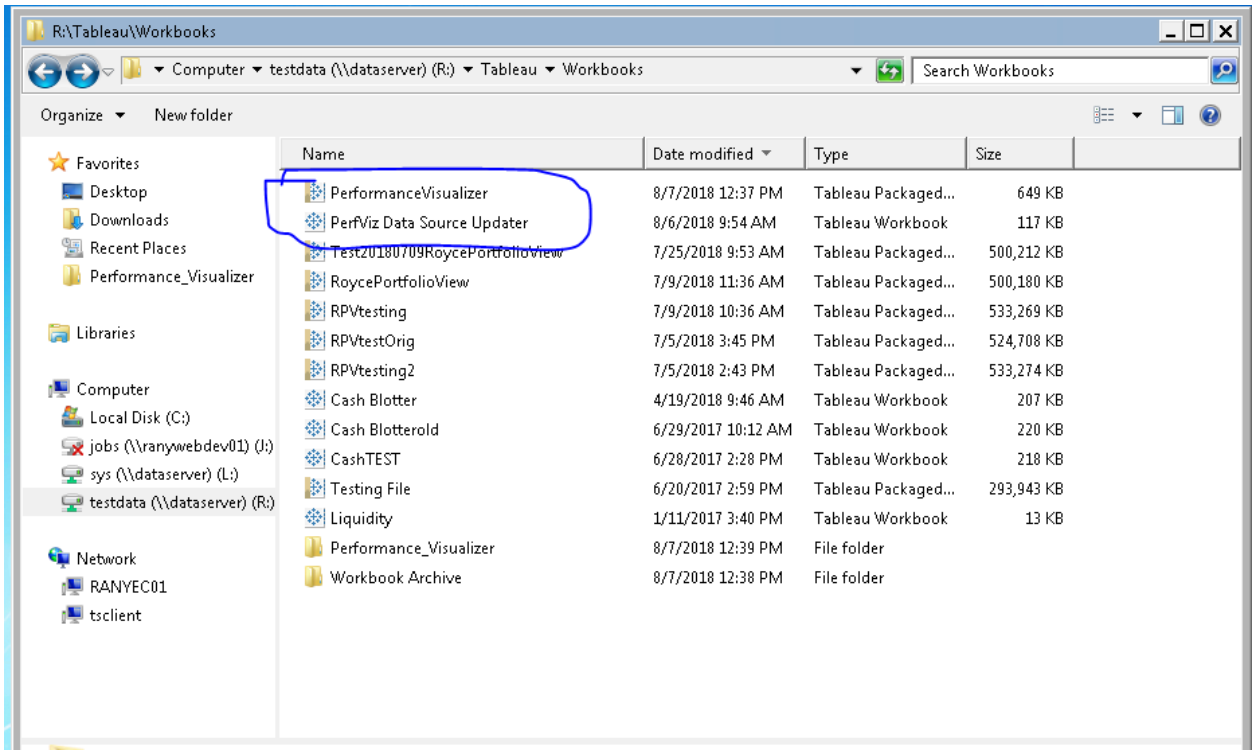
```
# ------------------------------------------------------------
#   Title: Tableau Dynamic Parameter Updater
# ------------------------------------------------------------
#   This script is used to send emails of the Performance Visualizer dashboard as Tableau's native emailing feature resizes the preview image of the dashboard to be completely unreadable
#   1. Downloading the current version of the WB from the server as a png
#   2. Using the internal qmail program to send out the png, embedded in the email, as well as a link to the online version of the dashboard
#
#   To add people to the mailing list, you must copy the line that contains the qmail reference, and change the -t parameter to the intended recipients email address
#
# ------------------------------------------------------------
#   Requires: MS Powershell V3.0, TabCMD from Tableau - make sure that the directory reference is correct.
# ------------------------------------------------------------
#   Alex Necakov : Created : 7/31/18
# ------------------------------------------------------------
```

Both of these scripts create a folder called C:/Automation to store the temporary files that are downloaded using Tabcmd. At the beginning of each script, these folders are purged in

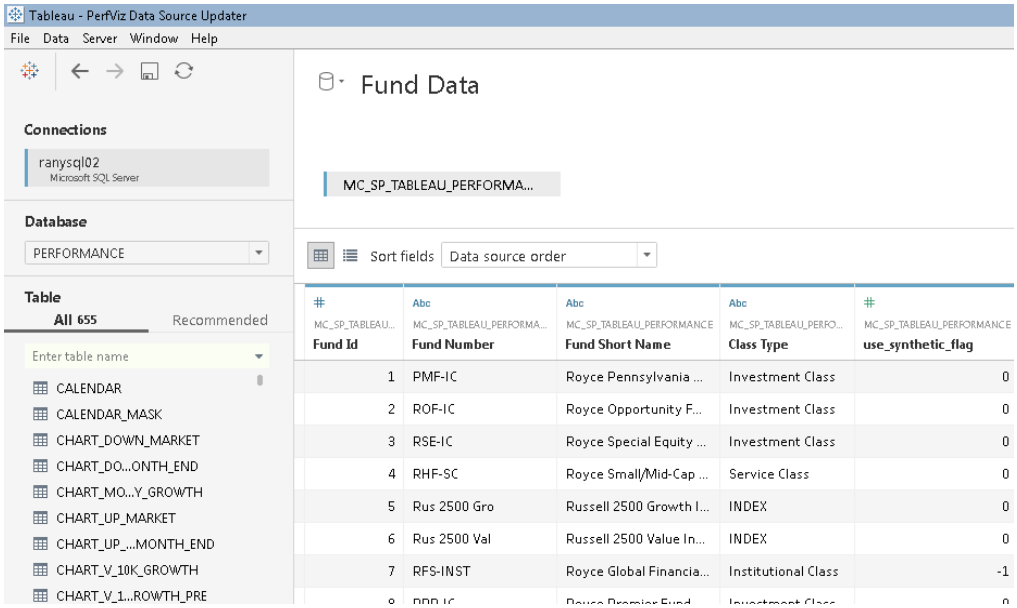
order to reduce publishing errors, so **do not put any other files in these folders**. The folders are not purged after the script is done so you can confirm whether or not the script ran correctly.

# Workbooks:

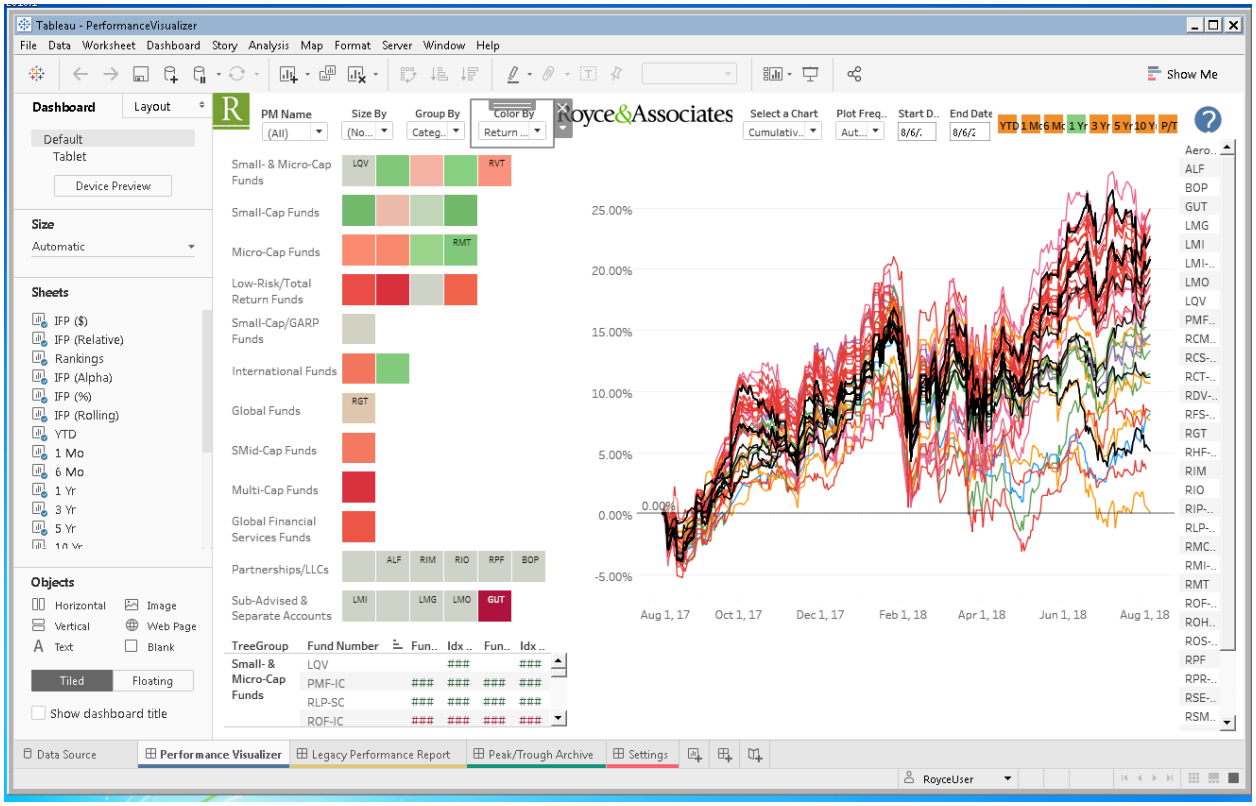
There are two Tableau workbooks that are currently used to operate and update the PerfViz dashboard. Both are located in **R:\Tableau\Workbooks**




The PerfViz Data Source Updater is a supplementary tool that allows changes to be made to the published versions of the Performance data sources.




If any of the data sources need to have their joins changed, tables added, or otherwise customized, that change must take place in the updater workbook. After finishing datasource edits in this workbook, select **Server->Publish Data Source** for each of the updated data sources. Keep the name of the data source the same and push out the update. This will update that data source for every workbook using the published data source. When publishing a data source, all fields that are hidden will be completely inaccessible in the published versions, so it is recommended to hide fields within the workbook using the published data sources instead.




The PerformanceVisualizer workbook is the actual workbook that gets published to the Tableau server. This workbook contains all of the dashboards, worksheets, and other assets that get packaged and published for the user to view.

There are four primary dashboards in this workbook: “Performance Visualizer” (the primary dashboard), “Legacy Performance Report” (a full screen view of all of the return information for each fund based on a customizable timeframe), “Peak/Trough Archive” (an interface that allows users to track data back from any of the major time periods since the Russell index began using URL dashboard actions), and “Settings” (a list of all of the parameters that are hidden by default but are used to get specific/complicated views).

## Notes:

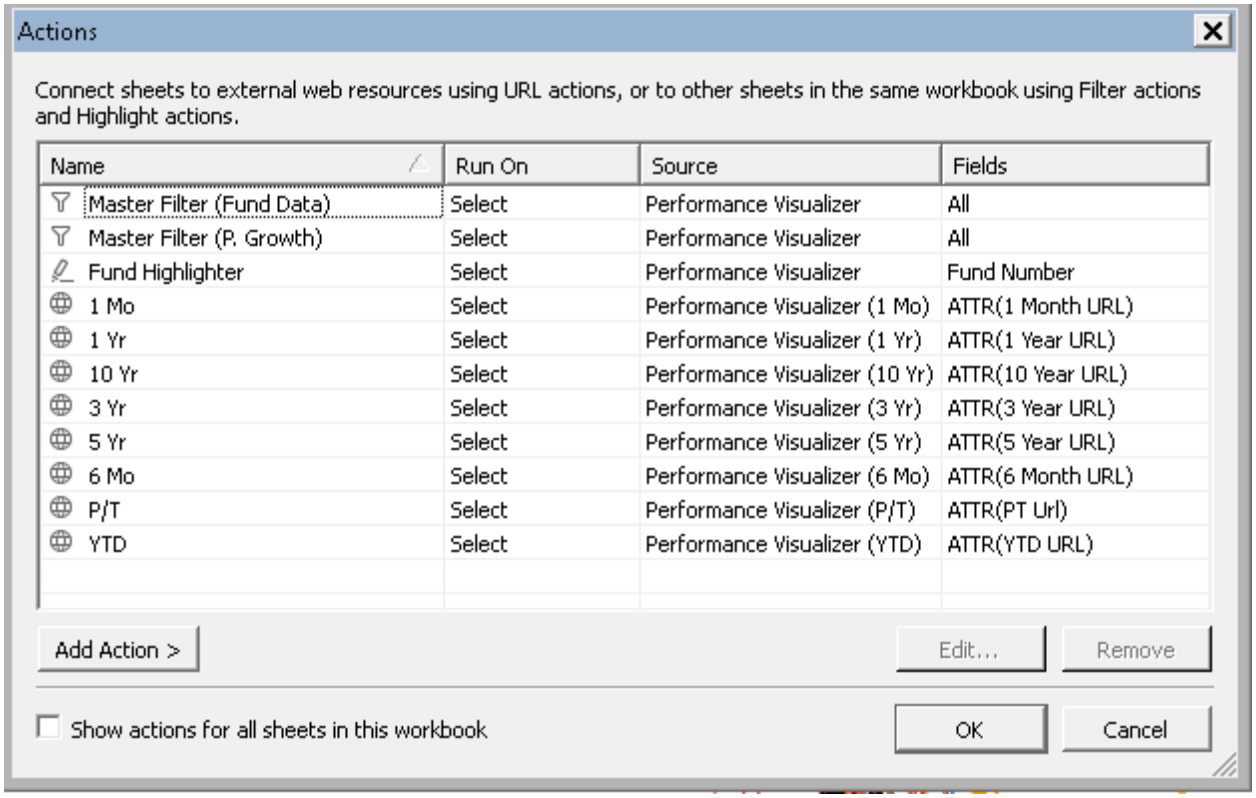
All of the individual worksheets on the Performance Visualizer are hidden by default as the auto-updating script publishes every view not currently hidden on the workbook.

This dashboard uses data blending from all three of our data sources in order to achieve the correct view on every worksheet.

Some worksheets share a spot on the dashboard (the Cumulative Return and Relative Return graphs for example), so in order to toggle between those sheets, we use this method. To

add additional sheets the the switchable spots, just add an option for them in their respective control parameter, filter the sheet based on the new parameter value, and drop the sheet on top of the other sheets controlled by that parameter.

In order to synchronize highlighting and filtering across all sheets, as well as use the custom date buttons, we use many dashboard actions.




Please make sure any new worksheets you create are correctly set within these dashboard actions, try to follow the same standards as the example actions that I have already created to keep all of the dashboard filters working correctly.