## **Student & Instructor Virtual Machine Setup**

**Tableau Desktop**

The Tableau Desktop executable 2020.2 version is located in the Downloads folder and needs to be executed on each instructor and student virtual machine. As part of the install process, each machine will be forced to restart. After the restart, Tableau must be launched and the registration needs to be completed. The information provided in the registration should be generic and not include anyone’s personal information. After the setup is completed, every time Tableau is launched, the students/instructor will be prompted to continue the Tableau trial and should click the Continue Trial button to activate the Tableau interface.

**Tableau Prep**

The Tableau Prep executable 2020.2 version is located in the Downloads folder and needs to be executed on each instructor and student virtual machine after the Tableau Desktop install has been completed. Once Tableau Desktop has been installed for this class, Tableau Prep takes only about 2 minutes to install, with no restarts. When “register” is selected at the end, it picks up nearly all the fields from the Tableau Desktop install. Only the city and two company fields need to be filled in. The information provided in the registration should be generic and not include anyone’s personal information.

## **Instructor Delivery Information**

All class files for this class are located in: C:\Learning Tableau with a shortcut on the Desktop. Each chapter has a corresponding folder that contains a starter and completed workbook and any other resource files necessary to complete the topics in that chapter, including but not limited to, data sources and image files.

This book is divided into four sections, with multiple chapters in each section. Each topic within the chapters are illustrated nicely in an easy step-by-step fashion and should be followed by the instructor throughout each topic unless otherwise noted in this document. Any changes in content will be detailed within this document and should be followed by every instructor to provide consistency for all delivered sessions.

Throughout each topic, the book directs saved work to be overlaid to the starter document. It is recommended to not perform this so that the starter documents stay with the original content for possible future reference if necessary. **Every chapter workbook should be saved in C:\Documents\My Tableau Repository\Workbooks which is the default save location.** If students would like to take their finished workbooks, they can only use webmail or cloud service to do so. Each file should be attached or uploaded one at a time to avoid crashing the virtual machine. If they do not have the current version of Tableau, the files will not open as Tableau is not backwards compatible.

**SECTION 1 – Tableau Foundations**

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**Chapter 1 - Taking Off with Tableau**

Instructor will do entire chapter hands-on with the students, pointing out all the details so that the students gain a strong foundation of Tableau’s interface and basic navigation. This will provide an easier approach and more comprehensible knowledge of Tableau supporting demo and lab work for the remainder of the book. The instructor should follow the step-by-step instructions in conjunction with the screen shots to provide all details to develop and discuss each visualization throughout the chapter.

**Timing**: 45 min - 60 min

This timing is dependent on how many are in class and if all students are completely new to Tableau. If an instructor gets a class of really savvy users, with some previous Tableau experience, this chapter can be used as a review for the rest of the book. However, for most students, this will be an introduction to Tableau so it is important to give it the proper amount of time and cover all topics thoroughly.

**Page 11**: Creating a NEW tableau workbook using a CSV file found in the Chapter 1 resource folder on the Desktop. This is designed to have students connect to a data file and learn the navigation around Tableau.

**Page 15**: Students will open the STARTER workbook found in the Chapter 1 resource folder on the Desktop. This chapter introduces the Tableau design interface, dragging fields into Marks Card, rows and columns shelves and basic navigational techniques and terms. The instructor will lead the students through topics by viewing different prebuilt visualizations.

**Page 20**: The students will create their first new visualization.

**Page 22**: The students will alter existing visualizations.

**Page 24-29**: The students will see how date fields work in Tableau as they can be represented as discrete or continuous.

**Page 33**: Show the students how to adjust the final map view with altering the Color and Size shelves. Drag the sliders on both to alter Opacity and size so that Sales and Profit match the picture in the book.

**Page 34**: Show the students Stepped Color.

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**Chapter 2 – Working with Data in Tableau**

This chapter focuses on Data Connections, starting with Excel Files, then moving to SQL Server and Google Sheets. There are many other data topics including extracts, blends, joins, and filters. The details for the Data Connection demos, including logins are listed below by page number.

**Timing**: 60 – 75 minutes Instructor will conduct hands-on demos with students following along on their machine for this entire chapter

**Data Source**: The data sources needed are included in the Starter workbook or will be created as the students step through the demos with the instructor.

**Page 49-53**: It is important to cover the Tableau query process so that students understand how to view the cache and how it is used instead of the full query process when the data elements do not change.

**Pages 55-57**: Connecting to Excel is the first Data Source covered. Easy to follow steps and the Data Source interface should be covered.

**Pages 58-59**: Connecting to data on a server - SQL Server Connection (Azure). The book does not have step-by-step instructions for this demo so follow the steps provided below.

1. Click the Connect to SQL Server tab.
2. Activate the Data>>New Data Source menu option.
3. Activate the Microsoft SQL Server option under the To A Server section in the data connect panel using the following information:

**SQL Server Sign In:**

Server: onlcdb.database.windows.net

Database: AdventureWorks

Sign In Option: Use a specific username and password

UserName: Student

Password: Pa55w.rd

**Build the SQL Server Data Source and a Query**:

1. Double click the Sales Order Header table to activate the data in the Data Source window.
2. Click the Automatic Update button.
3. Click the Connect to SQL Server tab.
4. Drag the Customer ID dimension to the Rows shelf and the Total Due measure to the Text shelf.

**Pages 60-61**: Connecting to Data in the Cloud using Google Sheets

1. Click the Connect to Google Sheets tab.
2. Double click the title.
3. Copy to the clipboard the URL provided.
4. Activate the Data>>New Data Source menu option.
5. Activate the Google Sheets option under the To A Server section in the data connect panel using the following information:

**Google Gmail Sign In (for Google Sheet data)**:

Username: onlclearntableau@gmail.com

Password: Pa55w.rd

Continue to follow the book starting on page 61, step #5 to complete the query. It is not necessary to change the data source to an extract as directed in step #7.

**Pages 64-91**: There are not any lab exercises. The instructor should cover all of these topics in some fashion and should not skip them. Below are examples of demos that should be performed:

**Pages 66-70**: Creating/Using Extracts

1. Start a new Tableau workbook.
2. Use Excel Superstore located in the Learning Tableau - Chapter 2 folder on the Desktop.
3. Select the Orders table.
4. Click Extract in the top, right under Connection. Point out how now the extract includes ALL data.
5. Click Edit next to Extract.
6. Click Add button under Filters.
7. Click Region and choose East and West.
8. Click the OK button twice.
9. Click the Orange tab labeled Sheet 1 at the bottom.
10. Save the .hyper file in the default directory, My Tableau Repository\Datasources, and name it EastandWest.hyper.
11. Drag the Region dimension to Rows to show that only East and West are included in the data extract.
12. Right click the extract data source in the Data pane. Click Use Extract to unselect. Show how all regions are now there.
13. Click the Data Source tab to show that the data source is now a Live connection and no longer using the extract.
14. Discuss that this toggle to use or not use the extract is available in this workbook because this is where it was created.
15. Return to the Chapter 2 workbook and click the Extract tab.
16. Click Data>>New Data Source menu.
17. Click More… under To A File in the New Data Source panel.
18. Navigate to My Tableau Repository>>Datasources.
19. Select EastandWest.hyper to build the data source.
20. Click the Extract sheet.
21. Drag the Region dimension to Rows to show that only East and West regions are included in the data extract.
22. Point out that if only the Extract were provided to the end user that they have no access to the other Regions. Right click the extract data source in the Data pane to show that the Use Extract option is not available.
23. Point out that they could potentially still create new extracts from this extract.
24. Right click the extract data source in the Data pane to show the Publish to Server option. This would allow the extract to be published to Tableau Server if the user has the proper server permissions.
25. Cover the additional information on pages 68-73 (and top of 74) to be sure extracts are covered fully.

**Pages 74-80**: Joining Tables - Cover the text/diagrams for all types of joins supported in Tableau Desktop. After discussing the different types of joins, use this example to demonstrate building a join.

**Joins**

1. Click the Joins sheet.
2. Activate the Data>>New Data Source menu option.
3. Use Excel Superstore located in the Learning Tableau - Chapter 2 folder on the Desktop.
4. Select the Orders table.
5. Click the Joins sheet.
6. Drag the Order ID dimension to the Rows. Click Add all members if prompted. Notice that that there are 6455 Marks in the bottom left corner in the status bar representing all orders.
7. Click the Data Source tab
8. Double click the Returns Table.
9. Click the circles in between the tables to show the join type as Inner. Explain this is an exact match based on Order ID matching in both tables which means there will be no nulls.
10. Click the Joins sheet.
11. Drag the Order ID (Returns) from the Returns table to the Rows to the left of the Order ID from the Orders table. Point out that there are now 617 Marks with no nulls. This listing is now showing only the Order Ids that have returns.
12. Click the Data Source tab and click the circles in between the tables.
13. Click the LEFT option.
14. Click the Joins sheet. Notice that ALL the Orders (Left Table) are displaying and for the Returns there is a NULL in place of any order that did NOT get returned. The Marks are back to 6455.
15. Click the Data Source tab and click the circles in between the tables.
16. Click the Right option.
17. Click the Joins sheet. Notice that all the Returns (Right Table) are displaying, but there are still no NULLS because we are looking at ALL the records from the Right Table and any that match from the Left Table. Notice we are back to 617 marks.
18. Click the Data Source tab and click the circles in between the tables.
19. Click the Full Outer option. This will provide the full data set to be returned with 6455 Marks again because we have asked for ALL the records from both tables to appear which includes the NULLS.

NOTE: A website can be given to the students for more join information: [www.w3schools.com](http://www.w3schools.com)

Use the left side panel, under Server Side to activate Learn SQL. Click SQL Joins to read more information and use the Try it Yourself options to practice with more join options.

**Pages 80-84**: Blending Data Sources. Go to Page 83. Discuss the picture on this page in that it is used to blend two data sources together. Each data source needs to have a field in common with the same data type. If a blend is needed to put any data sources together, Tableau will auto blend fields with the same name and data type. If the fields are not alike in this way, a custom blend must be created.

**Blends**

1. Click the Blend sheet.
2. Click the Data>>New Data Source menu option.
3. Click Microsoft Excel under To A File on the Connect Pane.
4. Select the Sales Goals.xlsx file in the Chapter 2 resource folder on the Desktop.
5. Click the Blend sheet.
6. Drag the State Name pill to the Rows.
7. Click the Superstore Data Source in the top of the Data pane.
8. Drag the State pill onto the Rows.
9. Click OK on the Warning Window.
10. Drag the Sales pill to the Text shelf.
11. Click OK on the Warning Window.
12. Point out the \* on the State column and the same number down the Sales column. This is not displaying the data accurately because the data sources do not have any relationship.
13. Point out that the Sales Goals is the primary database and is marked with a blue check and the Superstore is the secondary data source and is marked with an orange checkmark.
14. Click the Data >>Edit Blend Relationships.
15. Ensure Sales Goals is noted as the Primary Data Source.
16. Click Superstore as the Secondary Data Source.
17. Click the Custom Radio Button.
18. Click the Add Button.
19. Click State under the Secondary Data Source Field.
20. Click OK twice. All of the data is now displaying accurately.
21. Point out the red-orange link next to the State pill on the Superstore data source. This indicates that the State field in the Secondary Data Source is blended to the Primary Data Source using this data. If the red-orange link is clicked, the link will break and the fields will no longer display the data accurately.

**Pages 84-90**: Filtering Data Sources. It is important to point out that any pill can be directly placed onto the filter shelf and does not have to also be included anywhere else in the visualization.

**Filters**

Instructor can make up any filter on the fly for this example or this example will provide a quick, easy example:

1. Click the Filters sheet.
2. Select the Superstore data source.
3. Drag Region dimension to Rows.
4. Drag Ship Mode to Rows.

Note that there are 3 Ship Modes. Let’s assume that “Delivery Truck” is not needed.

1. Click the Ship Mode pill down arrow on the Rows shelf and choose Filter.
2. Uncheck “Delivery Truck”. Click OK.
3. Click the down arrow on the Ship Mode pill in the Filter shelf. Choose Show Filter. Point out that this is the way the filter can be provided for user interactivity with the data.
4. Drag Order Date to Columns.
5. Click Order Date down arrow on Columns and select Show Filter.

**Pages 86-89**: Be sure to cover the information on the differences with filters being discrete or continuous. This can be easily covered using the Order Date field that is on Columns.

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**Chapter 3 – Venturing onto Advanced Visualizations**

**Timing**: 2 hours – 2.5 hours Instructors can use most of this chapter as a lab for the students. There a few items that are mentioned below that should be covered before the students start on the lab. A lab chat should be conducted at the conclusion of the allotted time given to students to complete the lab.

**Data Source**: The data sources needed for this chapter are located in the Starter workbook that is located in the Chapter 3 resource folder on the Desktop.

**Pages 95-129 –** Advanced Charts

There are 26 charts in total to be created in this chapter. Allow the students to do as many of these charts as they can within 90 minutes. The instructor can choose to work the charts with the students if they feel that the students can keep up so that the chapter can be completed in the allotted time.

Instructor should introduce the topics, perform a quick demonstration on calculations and share any pre-lab instructions. The charts and directions are very clear, yet some of the charts do not have every detailed step-by-step included. The students will use the screen shots in the book and the supporting text to complete the charts. The students can also open the completed workbook to see what each finished chart should look like and to see what techniques were completed on the visualization design.

There are new datasets that will be used including, Hospital Goals, Hospital Visits and Log (Process Times). The data sources are already included in the Starter workbook, so the students will not have to create them. The instructor needs to show the students how to click on the proper data source in the upper section of the Data Pane for each sheet as directed in the book.

Although calculations will be taught in a later chapter, they are used here. It is necessary before the students begin to demonstrate how to create a calculation. Also covered are quick calculations and histograms. The instructor should do a demo of each one. The instructor should demo how to look at completed calculations from the solution and copy and paste them into another workbook as an option if the students do not want to create the calculations from scratch.

The instructor should perform a lab chat after the allotted lab time is completed. Be aware there are a lot of charts, therefore, it is recommended to use the solution workbook to point out items that are important, rather than building each visualization. When working through the labs, provide to the students an idea of what types of charts are used for different situations. For example, Gantt charts are used to compare completion based on dates or tasks.

**Page 129-143:** Instructor should conduct step-by-step demonstrations for these charts and concepts, following the book and using the screen shots, as they are more complicated, such as Jittering, Distribution visualizations and Dual Axis charts. The students will need more detail discussion on these topics.

**SECTION 2 – Leveraging the Full Power of Tableau**

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**Chapter 4 – Starting an Adventure with Calculations**

**Timing**: 45min -1 hour Hands-on with students

30 minutes Lab at the end that the students should work on independently

**Data Source**: The data source needs to be edited and reconnected to the Vacation Rentals.csv file that is located in the Chapter 4 resource folder on the Desktop.

**Page 149**: The Calculation window image is covered. The instructor needs to cover this and especially focus on the dynamic help area that is displayed on the right.

**Page 153-154**: Two calculations, Room and Building, are created. They will both be listed in the Dimensions section of the data pane after they are created. If the students ask why they are dimensions, it is because they are both string functions and do not result in a value that is an aggregate or numeric value.

The visualization on page 154 should be created to show the results of the two new calculations. The Revenue pill on the Columns shelf is mislabeled. The Rent measure pill should be used instead.

**Page 156**: The instructor can cover any of the code to help the students understand different approaches to managing calculations. The last calculation, Full Name, will need to be created as it will be used later in this chapter.

**Page 157:** Edit the Measure pill called: INVALID: Cannot Mix Aggregate and Non-Aggregate by clicking the drop down arrow on the pill and select Edit. The calculation is stated as follows:

[Discount] / Sum(Rent)

1. Click the red drop down arrow on the message at the bottom of the calculation window: The calculation contains errors. The instructor can explain how mixing aggregates and non-aggregates is not allowed in a calculation. In addition, Rent is not properly punctuated with square brackets.
2. Fix the calculation to read: SUM([Discount]) / SUM([Rent])
3. Rename the calculation as: Discount %
4. Follow the TIP to put a permanent format on the Discount % pill.

**Page 162:** Using the diagrams, explain the difference between row-level and aggregate-level processing.

**Page 164-167**: Level of Detail calculations need to be covered with the different keyword options. The instructor should create each of the three examples of the LOD calculations to produce the visualizations across all of these pages.

**Page 168-171**:Parameters do not have a demo to illustrate how they work. The instructor should use this example to show the students how they work.

1. Create a new sheet and name it Parameter.
2. Create a parameter called Seasonal Discount with the following values:
   1. Summer
   2. Winter
3. Create a calculation called Seasonal Discount Rate with the following code:

CASE [Seasonal Discount]

WHEN “Summer”

THEN SUM([Rent]) \* .10

WHEN “Winter”

THEN SUM([Rent]) \* .20

END

1. Activate the parameter by clicking the down arrow on the pill and selecting Show Parameter Control.
2. Place Rental Property and Full Name on the Rows.
3. Place Rent on the Text shelf.
4. Double click Seasonal Discount Rate to activate Measure Values and Measure Names.
5. Select the values from the parameter to see the values change.
6. Double click the title to use the parameter in the title text.

**Page 172-181**: Lab for students to work independently. The instructor should introduce the calculations/topics that will be covered prior to the students starting.

**Page 172-173**: Fixing data issues: Converting a string to a date is covered by concatenating the year data to the Start and End fields. Create both calculations and display in a visualization to replicate top of page 173.

**Page 173-174**: Extending the data: Use the DATEDIFF function to create the calculation Days Rented to be used to design the visualization on bottom of page 174.

**Page 175-176**: Enhancing user experience, analysis and visualizations: Use a parameter and a reference line to drive changes on which renters get a free night.

**Page 177-179**: Ad hoc Calculations: Create an Ad hoc calculation in the Marks card.

At the end of this chapter, there are two places we can offer as help:

1. Calculation Function Help:

Go to [www.tableau.com](http://www.tableau.com).

Search for “Tableau Functions”.

Explain that the first link is function help by categories or the second link is alphabetical.

Click D. This will display all the date functions available.

1. IF THEN ELSE help:

Click the back arrow.

Click I for the If Then Else function details.

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**Chapter 5 – Diving Deep with Table Calculations**

**Timing**: 1.5 hours Hands-on with students

**Data Source**: The data sources needed are included in the Chapter 05 Starter workbook located in the Chapter 5 resource folder on the Desktop.

**Page 184-186**: The Instructor will cover the overview of Table Calculations sharing how they process differently than row-level, aggregate and LOD calculations by running against the cache instead of the data source. In addition, the Instructor will cover the topics of Aggregation, Filtering, Late Filtering and Performance with Table Calculations.

**Page 188**: Demonstrate a Quick Table Calculation by recreating the screen shot using the Superstore data source on the Quick Table Calc-Running Sum tab.

1. Place the Order Date field on the Columns and make it a Continuous Month.
2. Drag the Sales measure to the Rows.
3. Perform CTRL + Drag to copy the Sales measure to create a second pill to the right of the first one. (Remind the students that this is a dual chart similar to what they saw in Chapter 2).
4. Click the down arrow on the second Sales pill. Select the Quick Table Calculation menu option and click “Running Total” to compare with the book.

**Page 189 (Top)**: Click the Some Examples of Quick Table Calcs tab and show each of the SUM(Sales) pills in the Measure Values shelf. Click Edit Table Calculation on each pill individually to see the Table Calculation that was applied and compare to the results in the visualization.

**Page 189 (Bottom)-192 (Top)**: Click the Tables, Panes, Cells tab to discuss Relative vs Fixed and Scope and Direction.

**Page 192 (Bottom)-195 (Top)**: Edit the Calculation named INDEX and describe how it functions. Place the INDEX Calculation on the Text shelf and remove the SALES pill. Click the drop-down arrow on the INDEX pill and step through each of the different Scope/Direction illustrated on the pages.

**Page 195 (Bottom)-201**: Explain the differences with using Addressing and Partitioning. Click the Swap Rows and Columns tool bar button to see how the INDEX function follows the dimension data. Cover Advanced Addressing and Partitioning options.

**Page 202-206**: Explain each group of Table Calculation functions available in the Calculations editor window. Each topic has a corresponding tab that has a completed visualization illustrating the specific Table Calculations. Edit each Table Calculation to show the syntax and code, then review the results to explain how they function in each visualization.

**Page 207-210 (Top)**: Create Year Over Year Growth on the corresponding tab using the screen shot on the top of page 208.

**Page 210-212**: Create the top two calculations on the bottom of page 211 (The third calculation, Size, is already created). There is an error in the second formula noted at the bottom of page 211, so use the following code instead:

WINDOW\_SUM(MIN(1))

Perform the following to show all three options in the Caption and one of them in the title:

1. Drag and drop all three of the calculations on the Detail shelf.
2. Activate the Worksheet>>Show Caption menu option.
3. Double click the Caption text in the bottom of the visualization.
4. Add the three calculations in the window by using the Insert drop down.
5. Click OK.
6. Double click the title.
7. Add the number of states by including one of the calculations by using the Insert drop down.

**Page 213-214**: Use the Late Filtering and late Filtering (Fixed) tabs to illustrate the differences of applying a Regular Filter versus a Late Filter by using a Table Calculation.

**Page 215-219 (Top)**: Starting on Page 215 (and the rest of the chapter) data densification is covered. Activate the Data Densification – Rows and Columns tab.

1. Actively describe why there is data in each intersection of Ship Mode and Container.
2. Remove the Index pill from the Detail shelf. There are now empty cells.
3. Explain why there are now empty intersections. This is a great opportunity to review INDEX() function again.
4. Use the Undo function to illustrate that the fields are filled again.
5. Click the Turning Off Densification based on Rows and Columns tab. Review the change to Ship Mode to an Attribute on the Columns shelf and Ship Mode added to the Details shelf to correct the Data Densification.

**Page 219-224**: This example covers Table Calculations that can be used to force Data Densification. The instructor should review the three main views of the data and how it changes across the tabs Generators (Original), Generators (Enabling Data Densification) and Generators (Complete).

The first tab, Generator (Original) shows the data as it is in the data source with empty spaces. Review the data source if necessary, to understand the raw data in the data source. The next tab, Generators – Enabling Data Densification adds a Table Calculation that fills all of the intersections of data, even though that data is not in the data source. In the final tab, Generators (Complete), shows an additional Table Calculation that takes all of the filled-in values and totals them to produce a visualization that shows the totals only.

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**Chapter 6 – Making Visualizations That Look Great and Work Well**

**Timing**: 45 minutes Hands-on with students

**Data Source**: The data sources needed are included in the Chapter 06 Starter workbook located in the Chapter 6 resource folder on the Desktop.

**Page 228:** Show options available by selecting the menu Format>>Workbook

**Page 229-234**: Go to the tab Formatting Parts of the View. Cover all parts of the view identified by the numbers in the illustration on the top of page 230. Go to the FORMAT menu and play with all the options for Font, Alignment, Shading, Borders and Lines.

**Page 234**: Cover formatting at the field level

**Page 236-237**: Step through the options to manage the display of NULLS.

1. Click the tab Show at Indicator.
2. Click dropdown arrow on SUM(Profit (some null values) pill in the Rows.
3. Select Format.
4. Click Pane tab at top of format pane.
5. Show Special Values (e.g. NULL) in the Marks field.

Repeat Steps 2-5 for the tabs: Show at Default Value, Hide (Connect Lines), and Hide (Break Lines).

**Page 239**: Show how to use Data Densification to manage missing records.

1. Click the tab Data Densification.
2. Remove Index Table Calculation on the Detail shelf to show how Tableau connects the line across missing records.
3. Click Undo to return Index() function to Detail shelf to show how line no has breaks where there are missing records.

**Page 240**: Click the tab Bar Chart Indicates Missing Days. Discuss how a bar chart will show missing records successfully.

**Page 240-246**: View the tabs Sales Trends, Some Formatting and Dramatic Formatting. Step through the additional formatting topics as stated in the book.

**Page 247-249**: Click the tab Tooltips. Follow the instructions on page 249 to add code into the tooltip card to display another sheet. Be sure to point out that the data point that is displaying the tooltip will act as a filter to only display the other sheet based on the data point.

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**Chapter 7 – Telling a Data Story with Dashboards**

**Timing**: 2-2.5 hours Hands-on with students and independent lab time

**Data Source**: The data sources needed are included in the Chapter 06 Starter workbook located in the Chapter 6 resource folder on the Desktop.

**Page 254-260:** Discuss the points made on Dashboards throughout these pages. Specifically, ensure that the Dashboard Approaches/Types on pages 255-256 are covered. Walk through pages 257-260 by showing the students all of the components of the Dashboard design interface.

**Page 260-267:**

1. Open the SOLUTION and take about 5-10 minutes to get a feel for the Dashboard interface and the dashboard that is about to be created in the lab.
2. Activate a new Dashboard sheet.
3. Demo how to create a dashboard by showing drag and drop (or double-click) worksheets onto the dashboard.
4. Show briefly how to create a map with Tableau. Explain how Tableau uses Geographic data to create maps instantly based on the Geographic Role being set on a pill. Show how to change a symbol map to a filled map as they will be using this in the lab.
5. Show a few objects on the left to put on a Dashboard (text, blank, image, web page). The instructor can demo or just point them out but they will need the text object for the lab.
6. Note the use of the term “the grip” to refer to the grey square at the top of a container in the dashboard that is used to drag objects around the dashboard.

**LAB 1** **Page 260-267:** 30 minutes

The instructor can demo and lead the students to build a Dashboard or the students can create the views and a first Dashboard on their own. No matter which one, the instructor needs to explain the scenario on page 260 that is the premise used to build their first dashboard.

1. Open the Chapter 07 Starter document. Use the Superstore Sales data source included in the workbook. Save the workbook as Chapter 07 – Dashboards.twbx in My Documents>>My Tableau Repository>>Workbooks folder.
2. Instruct the students to perform all steps to build the visualizations and the dashboard, keeping in mind that some of the steps are expecting the students to build based on the illustrations. Emphasize that the lab stops at Page 267.
3. Conduct a lab chat to cover the basics of the lab and answer questions.

**Page 268-269:** Demo Dashboard Actions using the Filter button or building a Filter action in the Actions window.

**Page 270-271:** Demo Context Filters. Have students test all of their filters.

**Page 273-275:** Demo different devices and displays.

**Page 276-285:** Demo the details of Actions using the SOLUTION workbook. It is important for the students to understand “Source” and “Target” as Actions are demoed. Show the particular Dashboard Action by activating the Dashboard>>Actions menu option on each action example.

Filter Action: There are two Dashboards and corresponding sheets labeled Source and Target to show how Tableau applies the filters on the sheets to process the filtering on the Dashboard.

* Source and Target Example (top page 279)
* Source and Target (with multiple dimensions) (bottom page 279)

Highlight Action: There is one Dashboard to show Highlight action. Click any Region bar in the Sales by Region sheet to show highlighting on Sales and Profit By State and Regions sheets.

* Highlighting Example sheet (p281)

URL Action: There is not an example in the SOLUTION workbook for URL Actions. The instructor should show how to activate an URL Action by activating the menu Dashboard>>Actions menu option. Discuss the options available and how an URL Action works with a Web Page Object.

Set Action: There is one Dashboard to show Set action. Click any Region to show how the Dashboard works. Click the Go To Sheet option on the Sales by Category (for set example) sheet. Review with students how the sheet is setup. Discuss the purpose of a Set.

* Set Actions Example (p286)

**Lab 2 Page 289-293**: 20-30 minutes

The parameter and calculations are already included in the data source of the STARTER document. Instruct the students to open each of these entities to see how they are developed.

This is an excellent lab but if the instructor is running short on time or the students are overwhelmed, just have everyone open the SOLUTION and the instructor should walk the students through all aspects of how it is designed.

**Page 294-300**: Cover Story development by following the step-by-step demo provided.

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CHAPTER 8 – Digging Deeper – Trends, Clustering, Distributions and Forecasting

**Timing**: 45-60 minutes Hands-on with students and independent lab time

**Data Source**: The data sources needed are included in the Chapter 08 Starter workbook located in the Chapter 8 resource folder on the Desktop.

**Page 304-312:** Discuss Trend Lines by creating the visualizations as described

Open the Chapter 08 Starter workbook. The first worksheet uses the World Population.xlsx file to create the view on top of page 306. Show how to add another Trend Line for specific mark values as displayed on page 307.

Duplicate the first worksheet and click the view to remove the specific mark values. Create calculation on page 308 to change visualization as shown. Edit Axis to show different time frames.

The second worksheet uses the Real Estate.xlsx file. Create the view on page 309 and discuss the options when editing the trend line (page 310-311).

**Page 313-320:** Go back to view the Population Trends sheet. Walk through the various trend models described by right clicking the trend line, changing the line to each type.

**Page 321**: Covering this is optional. The instructor can demo how to export or have the students walk through it too.

**Page 323-325**: R or Python will not be covered in detail. Explain that ONLC offers a Tableau With R class and the class schedule can be found on the ONLC website. Share with the students that R and Python are both “open source” languages in which a designer can truly customize most things in Tableau and that covering the details on “how to” is out of the scope of this course.

**Page 326-340**: Clustering, Distributions and Forecasting

The instructor should demo and discuss each of the analytics and then allow students to complete the work as a lab. All of the examples use the Real Estate data source.

NOTE: Suggest to the students to try different background maps for Clustering. Since the data is about real estate, the street map looks really nice.

**SECTION 3 – Data Prep and Structuring**

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**Chapter 9 – Cleaning and Structuring Messy Data**

**Timing**: 20-30 minutes Lecture Only

NOTE: The instructor should get through this chapter as quickly as possible, but still covering all of the topics. It should be explained that there is a tool called “Tableau Prep” which can help someone perform the tasks in this chapter, much quicker and with many more options. Explain that Tableau Prep is the covered in Chapter 10.

**Data Source**: There are many data sources used in this chapter but there are no labs. This lecture only chapter will use the Chapter 09 Complete workbook located in the Chapter 9 resource folder on the Desktop.

**Page 346-377:** Use the worksheets in the Completed workbook to illustrate the topics in this chapter. It is important to make it clear that data can sometimes be “messy” and we have to clean it to design good visualizations. However, in many companies, there are entire departments dedicated to this task or an individual database expert to manage this cleanup process.

Walk through each concept/topic, identifying data issues and the repairs to make it better for visualization design. For example:

On page 346, have the students look at the Using Wide Data sheet. This is not a good data design as nobody makes a column per year. Then, have them go to the Using Tall Data sheet to see that all the years have been collapsed into a column called year. This is a much-preferred data design.

On Page 356, have the students look at the Country Data from Excel Data Interpreter sheet. Explain that in many companies the database administrators or programmers would do what is discussed here. Click the Data Source tab to view the World Population Data. Show that Tableau has a built in “Data Interpreter” that can be activated to “clean” the data. To show the changes made by this option, remove the check on the Cleaned with Data Interpreter option. Click the option again to reactivate the Data Interpreter. Show how the Split function was used to turn the Country Name and Code column into two separate columns. Discuss the Pivot option to get all of the year values into one column with the corresponding Population data.

On page 361, have the students look at the Text File Union sheet. Click the Data Source tab. A Union is illustrated as a combination of text files shown on page 362. Point out that there are multiple text files already combined and show as another table is dragged towards the tables on the right that the prompt Drag Table To Union displays.

On Page 366, have the students look at the Patients in Hospital sheet. Click the data source tab to display the data for this sheet. Explain about joins, specifically the concept of using multiple data source files in one data source known as Cross Database Joins. Do not overwhelm here with detail.

On Page 371, have the students look at the Measures Per Apartment sheet. Discuss how the data is reported at different levels of detail. Use the sheets Trying to get Rent per Square Foot and Solving Rent per Square Foot with LOD to show how to report the different levels of detail data accurately. LOD calculations were covered in Chapter 4, page 164.

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**Chapter 10 – Introducing Tableau Prep**

Tableau Prep is now called Tableau Prep Builder which is the client application that is used to design data flows. The Tableau Server version is called Tableau Prep Conductor which provides the scheduling and automation of data flows. For the purpose of these instructions, Tableau Prep will be used when referring to the Tableau Prep Builder application.

**Timing**: 60-75 minutes Instructor Led Demonstrations & Potential Student Lab

**Data Source**: There are many data sources used in this chapter but there are no labs. This lecture only chapter will use the Chapter 09 Complete workbook located in the Chapter 9 resource folder on the Desktop.

**Page 379-386**: Start out by explaining that Tableau Prep is an amazing “prep” tool for data. Explain that Chapter 9 told us a bit about putting data into a format that supports easy visualization development, but that this chapter is designed to make those tasks quicker with the ability to do more.

Read/cover page 379-380 with the students. Have everyone turn and briefly look at pages 381-383. Cover all of the terms within the Tableau Prep interface. Open an existing flow document with the students if that makes it easier to discuss. Tell them that we will take time to look at all the upcoming screens later.

On Page 384, go through the image and explain “steps” and what the importance is of each step. If anyone is familiar with SQL SERVER AGENT JOBS or SSIS or any tool like it, they will understand steps. For those NOT familiar, explain that they are tasks that follow one another.

Page 386 discusses the document files that are created with Tableau Prep and should be mentioned.

**Page 387-391:** Have the students open the Employee Flights Excel file. This will allow the students to see the data included in this data source, the headers/column headers and the fact that there is a summary table too. At first, Tableau Prep will not understand these fields, until we click the data interpreter in the walkthrough with the students.

Open Tableau Prep (if it is not already opened) and perform the following:

1. Show the opening screen and talk about the two main tasks in Tableau Prep. They are:
   1. **Open Flow** – designed to open an existing flow file
   2. **Connect to Data** – Tableau Prep can open ANY data source and allow the designer to work with that data. In a previous chapter, we learned a little about the Data Interpreter, which was a built-in process to instantly clean data. (However, it does not always clean all the data to get the final layout desired). There is also the same Data Interpreter in Tableau Prep, which can save hours of time.
2. Click the Connect to Data button and navigate to the Employee Flights Excel file located on the Desktop in the Chapter 10 resource folder.
3. Double click the Employee Flights table (not the sub table). Cover pages 388-389 to point out the components of the screens presented.
4. Point out on page 388, #4 in particular that there are bad field names (F2, F3, etc). Click the Data Interpreter box on the left. Notice that Tableau Prep will correctly identify field names.
5. Click the Data Sample link, in the Input section (grey area). There are many options including, Settings, Multiple Files, Data Sample and Changes. The Data Sample option allows control of the amount of data that is used for the flow process.
6. Follow the directions at the bottom of page 388, #5. Click the plus sign (+) next to the Employee Flights input table in the area above the Inputs section. Discuss the different “steps” that can be selected from the menu. Click Clean Step.
7. Click any value of data in the Clean 1 Profile panel. This section provides valuable, detailed options for each field which can be changed and manipulated. The ellipses … button in the upper right of each field provides many options to manage each data field. Specifically, click a value in the Ticket Type field to identify the highlighted data across other fields that includes this data value. In addition, notice that there are statistics included in the Tooltip showing the percentage of rows in the data set that include this data.
8. Open File Explorer to look at the data in the Chapter 10 resource file on the Desktop, noticing all the SouthWestYYYY.csv files. Right click and select Open on the SouthWest2019.csv file. Make note of the type of data included. Close the Excel file.

NOT ENOUGH DATA? Let’s Continue…

The top of page 390 explains that the Employee Flights Excel File doesn’t tell the entire story and there is additional airline booking information split into various files. On page 390, follow the steps 1 & 2 to add one of the SouthWestYYYY.csv files. (2019 is a good example)

1. Follow these steps to add ALL the text files in that same directory so we have access to all of them:
   1. Click the Multiple Files menu from the grey input area.
   2. Click Wildcard Union.
   3. Type Southwest\* in the Matching Pattern section. Before we click the apply button, notice that Tableau Prep finds four .csv files located in the same file directory.
   4. Click the Apply button. Tableau Prep will UNION all files in that directory that match SouthwestYYYY.
2. Add another Clean Step by clicking the plus sign to the right of the Southwest 2019 Input step. (Clean2) Notice that there is a Fare Type field instead of a Ticket Type like in the Employee Flights data.
3. Show the File Paths field at the end of the field listing showing all of the CSV files that are included in this flow.

**Page 392-394**: Now it is time to clean ALL the data!

1. Follow directions on page 392 to drag Clean2 onto Clean1 and drop it into the Union box.
2. Notice two things here:
   1. There is a new step called Union 1 selected on top in the Flow pane.
   2. Page 393 has a screen shot showing the Mismatched Fields and Union Results.
3. Follow the directions on page 393 to merge the Ticket Type and Fare Type Fields because they are the same data.
4. Follow the directions on page 394 to merge Row ID fields and remove fields that are not needed.
5. Click the Union 1 step and open the Changes pane to see the listing of the changes made in this step.

**Page 395-398**: Grouping and Cleaning

1. Follow all directions in this section.
2. Right click Clean 3 and select Preview in Tableau Desktop as seen on page 398. Click Continue Trial to show the clean data in Tableau Desktop! DO NOT CLOSE TABLEAU PREP!

**Page 399-404**: Calculations

Follow all directions on Page 399 to create the “Days from Purchase to Travel” calculation. This works out perfectly and page 400 at the top will allow the Detail view to be changed.

On Page 400 following steps 3 & 4 to add an Aggregate step and rename it Trips Per Person. Then, we will begin to use the Grouping and Aggregates area.

On Page 401, click Settings view and make the screen look like the book. Drag the Person field from Settings to Group on the right. Drag Number of Rows Aggregate to the Aggregated Fields on the right.

On page 402, create another Calculated Field called Type of Traveler. Show how to copy this calculation from the SOLUTION in case it is ever needed:

1. Open the Solution named Chapter 10 – Complete.tflx.
2. Click the Clean 4 step.
3. Hover over the calculation field, Type of Traveler, in the Profile/Changes pane.
4. Click the Edit Pencil icon in the top right corner.
5. Highlight the code.
6. Right click and select Copy.
7. Open the student Tableau Prep File.
8. Click Created Calculated Field.
9. Right click and select Paste.

Pages 402 and 403 will show us how to use a JOIN for the purpose of bringing the data together!

Page 404 will explain JOINS. Briefly go over this.

**Page 405-406**: Create a filter

To apply on an Input step:

1. Click the Employee Flights Input step.
2. Click Filter Values button on Profile pane.
3. Discuss the Add Filter window and that the result will be a Boolean (True/False) result. Only True values will be retained. NOTE: There is not a specific example of this in the book.

To apply on a Clean step:

1. Click the Clean 1 step.
2. Click the ellipse … button in the upper right corner on the field Travel Date.
3. Click the Filter menu option.
4. Select any of the options to use for the filter.

**Page 407–409**: The Split process can take one field and turn it into two for the purposes of analyzing data more accurately. Continue to follow the steps in the book to perform a Split process.

Save the Packaged flow file (.tflx) as Chapter 10 – My First Tableau Prep Flow in the directory Documents\My Tableau Prep Repository\Workbooks.

**Page 410–412**: This is an optional lab that the instructor can allow the students to work on their own to add one more data source and produce the output.

**SECTION 4 – Advanced Techniques and Sharing with Others**

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**Chapter 11 – Advanced Visualizations, Techniques, Tips and Tricks**

There is not a Starter document for this chapter, therefore, the students will be building a workshop from scratch. The students will follow the instructor during the demonstrations to cover all topics covered throughout the chapter.

**Timing**: 90 minutes

**Data Source**: The data source used for pages 416-426 and pages 430-432 is the Superstore CSV file in the Chapter 11 resource file on the Desktop. Pages 427-429 will use the Sample Superstore data source located in My Tableau Repository as noted below.

**Page 416-426**: Use the screen shots and extra notes for each visualization to design each chart.

**Page 427-429**: The Unit/Symbol chart will not work as illustrated on the CSV file. The instructor will need to make the following changes for the chart to be created:

1. Create a new data source connecting to the Orders table in the Excel Sample-Superstore located in the following directory:

C:\Documents\My Tableau Repository\Datasources\2020.2\en\_US-US

1. Add the Region and State pills to the Rows.
2. Alter the Late Shipping calculation to read:

DATEDIFF(‘day’, [Order Date], [Ship Date]) > 6

1. Place a Descending Sort on State based on the Distinct Count of Customer ID.

**Page 430-432**: The Marimekko Chart will use the Superstore CSV file.

**Page 432-437**: Create each visualization and/or dashboard as directed to display sheet swapping. There will be three visualizations and two dashboards created within this topic.

**Page 438-440**: A few things to change in the step-by-step to make this dashboard dynamically show/hide other controls:

* In step #8, do not cover the legend with the Horizontal Layout Container. Place the edges of the Horizontal Layout Container on the bottom edge of the parameter and the top edge of the color legend.
* Click Layout tab in the Left Pane to change the color on the Background to white.

**Page 441-442**: Discuss the different ways that Latitude and Longitude can be provided in mapping.

**Page 443-444**: The exact data used in the illustrations is not available. Use either of the Superstore data sources to map the City pill. Notice there are many Unknowns in the lower right corner. Click the Unknowns message to discuss the options to remedy the unknown data values. In this example, the State pill needs to be added to the Detail shelf and all of the Unknowns will be corrected.

**Page 445-446**: Custom Territories are easily shown by mapping the State pill. Drag and drop a lassoed area around all states West of the Mississippi River and activate the Group option (Paperclip Icon) from the popup window. Edit the State (group) pill and rename the initially created group to West. Name the Other group as East. Rename the group as Territory.

**Page 448-449**: Follow the steps to create a new data source based on the spatial file named tl\_2015\_us\_rails.shp located on the Desktop in the Spatial Objects folder within the Chapter 11 resource folder. Double click Geometry pill. Filter to show Fullname containing “Union Pacific”.

**Page 452-455**: Use the files included on page 453 to setup Background Image to the data source. Image displays properly with X on Rows and Y on Columns. The Floor pill is not included in the data source, so only the Ground Floor.png will be used to illustrate Background Images.

**Page 456**: Use the following to illustrate Animation:

1. Place the continuous Month of Order Date on Columns
2. Place SUM(Sales) on Rows.
3. Place Region pill on the Color shelf.
4. <CTRL> click the Month of Order Data pill on the Columns shelf. Drag a copy of the pill to the Pages shelf.
5. Click Show History and set the options as follows:
   1. Marks to show history for: ALL
   2. Show: BOTH
6. Click Right Arrow to play animation.

**Page 456-457**: The data for this example is not available. Create a simple bar chart with the Superstore data. Create a Dashboard sheet and apply the Oil.png as a Fixed Image and the bar chart as a Floating object. Add a Text object to provide a title.

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**Chapter 12 – Sharing your Data Story**

**Timing**: 20 minutes

Suggestion: Have the students open the Completed file for Chapter one. It’s the simplest one, and will get all the points across that is needed. The Sales Over Time (overlapping lines) tab will work well in this chapter.

**Page 461**: Discuss with students that some of this chapter will be demoed and parts will be skimmed.

**Page 462**: Presenting – have the students click the File Menu and select Export as PowerPoint. Save the file in My Tableau Repository>>Workbooks. Open the PPT file for viewing exported file.

**Page 462-465**: Printing – have the students click the File Menu and select Page Setup. See the options on Page 464. Show students the other Print options, Print to PDF and Print (for printers).

**Page 465**: Exporting – have the students click the Worksheet Menu and select Export. Discuss the available options, image, data, crosstab to excel. Have the students export an image to their Desktop and view the results.

**Page 467-476**: Discuss all topics/each product. We do not have Tableau Server installed, but can show the options for future reference. Share with the students that ONLC has a 2-day Tableau Server classes for anyone interested in learning more. More information can be found on the ONLC’s website.

NOTE: On page 472, discuss that someone has to be a global Tableau Administrator in order to work with Tableau Server.