2024 Bea Sanders/AICPA EDGE in Teaching Award Honorable Mention

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NASCAR: Using a Lean Mindset

Abstract

Introduction

Traditional textbooks often emphasize lean concepts in a manufacturing environment, and students have difficulty relating to the concepts. Most students believe they will never work in manufacturing, so they have the misconception that lean accounting concepts are boring or irrelevant to their future careers.

To help students with these concepts, we developed a teaching case for managerial accounting students using real NASCAR data to reinforce lean accounting concepts in a non-manufacturing setting. Students are tasked with looking for waste and inefficiencies in recent race results and making recommendations to management on how to improve team outcomes. Students are first required to clean the data sets using Tableau Prep, and then use the clean data to create visualizations within Tableau. Students must critically analyze their results and look for insights in the data. Based on their insights, students create a story within Tableau to include an introduction, key insights, and a conclusion with recommendations to management based upon their analysis.

The objective of this project is threefold. First, we aim to develop students' data analytics skills by providing them with a guided, hands-on experience using the tools (Tableau Prep and Tableau). Next, our goal is to increase students' critical thinking skills by requiring them to create and evaluate their visualizations for key insights and make recommendations to management based on their findings. Our final objective is to increase student engagement in learning lean accounting concepts by using real-world, operational data from NASCAR rather than "traditional" financial accounting data. We see one of the strongest benefits to using the NASCAR case is its ability to be easily modified by the instructor and used regardless of class size or format. It can also be used in principles, undergraduate, and graduate level courses, and there is no cost for faculty to implement this case within their classes.

Resources available

1. Teaching case
2. Narrated, tutorial PowerPoint videos for Tableau Prep (2) and Tableau (1)
3. Dirty data files (for both pit and results data) in Excel
4. Clean data files (for pit, results, and driver data) in Excel
5. Teaching notes and rubric

AICPA core competencies addressed by the NASCAR case

We created a teaching case to help instructors to reinforce lean accounting principles and develop students' data analytics and critical thinking skills. The case utilizes real data from NASCAR and students must clean the data using Tableau Prep and create visualizations using Tableau (addressing AICPA Accounting competencies and AICPA Business competencies). Based upon their analysis, students must create a story within Tableau and make recommendations to management on how to improve team performance (addressing AICPA Professional competencies).

Learning Objectives

Students often find lean accounting concepts boring or irrelevant because textbooks tend to emphasize lean within a manufacturing environment. To help students with these concepts, we developed a teaching case for managerial accounting students using real NASCAR data to reinforce lean accounting concepts in a non-manufacturing setting. Students are tasked with looking for waste and inefficiencies in recent race results and making recommendations to management on how to improve team outcomes.

In this case, student must:

1. Apply lean accounting principles to identify inefficiencies.
2. Extract, Transform and Load (ETL) data files.
3. Create visualizations to analyze data.
4. Build a story to communicate recommendations to management.

Case Study

NASCAR: Using a Lean Mindset

Jennifer Cainas, University of South Florida
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Winning is what counts! We have to eliminate waste and work together as a team. Let's hear what these accountants have to say about the Lean Mindset and see if we can apply it to our operations. I think if we do, we will win the Bill France Cup, or at least the Harley J. Earl trophy.

BACKGROUND AND COMPANY DESCRIPTION

You are fresh out of your accounting degree at Close State University, and you are working on your CMA certification. Your first job is in the finance department of FrontRow Motorsports, a company involved in NASCAR. (See https://www.nascar.com/racing-teams/hendrick-motorsports/). Your company competes against 16 other NASCAR teams in the NASCAR Cup series (see NASCAR teams in Exhibit 1). You join the team in the Controller's office to discuss the recent budgets and variance analysis. They are complaining about being on a losing streak and how it affects sponsorship revenue.

You know very little about racing cars, but you were an A+ student in Cost Accounting. You wonder if the principles of Lean manufacturing could apply to this setting. Your "go big or go home" mentality springs to action, and you ask if the team had ever considered using Lean principles to improve performance. They say, "No. What do you mean?" You provide the following information on Lean:

LEAN MINDSET (TAKEN FROM GRASSO LEAN MANAGEMENT OVERVIEW ON AAAHQ WEBSITE).

You begin with "Lean management is a non-zero-sum principle-based management system focused on creating value for end-use customers and eliminating waste, unevenness, and unreasonableness using the scientific method." Then you continue on with almost a college lecture, "So, Lean is principle-based, focused on creating value for customers, systematically reducing waste from processes, and creating cooperative, win-win results for stakeholders.

The two key principles on which Lean management is based are respect for people and continuous improvement. Respect for people enables an atmosphere of cooperation and trust, so that all employees can and will participate in continuous improvement. Respect for customers is necessary for the customer focus and understanding the value we do or can create for customers. Respect for suppliers and other business partners allows improvement and waste elimination to extend beyond the boundaries of the organization. Finally respect for people focuses on win-win solutions leaving all parties better off. Continuous improvement (or kaizen) is achieved through controlled experiments using the scientific method. This is different than haphazard 'trial and error.' The trials are designed and controlled, and we learn from the failed trials.

In Gemba Academy's Introduction to Lean video, they referred to lean as an operational excellence strategy. It is certainly true that *any organization adopting lean management necessarily has operational excellence as a key feature of their strategy*.

Lean thinking represents a different way of viewing the world. Pascal Dennis refers to this as the lean mental model. System thinking is one way that the lean mental model

differs from the conventional management mental model. Conventional management thinking tries to isolate operations and performance and focus on the parts. Lean sees the parts as components of a dependent system. The parts can only be understood in the context of the whole system. Similarly, lean management is a system. Lean principles, practices and tools are part of a whole system and they can only be truly understood in the context of the entire system. Managers often bring their conventional mindset to lean and consider one, or a few lean tools in isolation. The result is often modest improvement that stalls out, and sometimes the result is complete failure. Toyota management developed a house of lean production as an image of the lean management system as a whole. Other lean adopters have followed this practice, creating their own variations of Toyota's lean house of production. Before you can eliminate waste, you have to be able to recognize waste and see where it is occurring. To help people see waste, Taichi Ohno identified and labeled seven types of waste encountered in production. Other lean thinkers have added an eighth waste to his list. The eight wastes are: Defects, Over Production, Waiting, Non-utilized Talent, Transportation, Inventory, Motion, Extra Processing (DOWNTIME)." As you finish, the whole team is staring at you.

ASSIGNMENT

You see a variety of reactions from around the table. You see the "What the heck – it's their first day!", some "This is ridiculous. This kid clearly knows nothing about our industry." And some "Wow. What if we worked on this in our organization?". The latter won out, and your boss assigned you a project. They say "Take the data that we have on some recent races and finishes and see if you can find where there is waste

and unevenness. Compare our team to the other teams. Make some recommendations." You look aghast. "Why did I open my big mouth?" you ask yourself. You take a deep breath, remember your favorite accounting professor and her advice. "Start with your questions, then find the problems, consider alternatives, and communicate your recommendations." You head off to your new desk and fancy computer with three monitors to do some analysis. Your boss wants this on their desk by 8 a.m. next Friday. It's going to be a busy two weeks!

NEXT STEPS

Part 1:

1. To begin, you will need to download both the pit data files and the race results data files for the 10 races in 2019 and will need to clean the data using Tableau Prep. There are two step-by-step narrated videos with PowerPoints provided to show you how to do this. Once you have completed the cleaning steps, turn in both output files to receive credit.
2. Once you have cleaned the data, you need to import the two output files you created in Tableau Prep into Tableau, and a join will be created. Then, you need to create some visualizations to help you gather some insights into what's going on. This is the part where you get to be creative! Please complete at least 5 visualizations to analyze the data.
3. Once you have created your visualizations, create a story to identify for management where you believe inefficiencies exist and make your recommendations. In your story, please create an introduction and identify the problem, highlight the inefficiencies, and in your conclusion, make your

recommendations to management. To provide you some suggestions, here is a quick tutorial video that shows you how to create stories in Tableau.

https://www.youtube.com/watch?v=LxjL-tVH_ZU

4. Upload your tableau workbook as a .twbx file, to ensure your data files are packaged with the tableau workbook.
5. Some suggestions of visualizations you might want to create:
    a. Average Finishing position by team, car number, car manufacturer and driver
    b. Average Finishing position by Team
    c. Stop Time by Team
    d. Left Jack Time by Team, Right Jack Time by Team
    e. Restart times by driver or team
    f. Tires by Team
    g. Total Time in Pit by Team
    h. Whatever else you think might be relevant!

Data Dictionary

Pit stop data

All times are in seconds.

- P - not used. Just indicates it's pit data
- Team - car number
- Lap - The lap the pit occurred on. You mean notice that the NASCAR website is 1 lap less than what is actually in this data
- Road Time - The amount of time the car spent driving on pit road
- Stop Time - The amount of time the car spent stopped
- Tires - number of tires replaced
- Left Jack Time - The total time the team spent with the car jacked on the left side
- Right Jack Time - The total time the team spent with the car jacked on the right side,
- Left Jack Up Time - The number of seconds from when the car entered pit road until the left side of the car is jacked up
- Left Jack Down Time - The number of seconds from when the car entered pit road until the left side of the car is dropped down from the jack
- Right Jack Up Time - The number of seconds from when the car entered pit road until the right side of the car is jacked up
- Right Jack Down Time - The number of seconds from when the car entered pit road until the right side of the car is dropped down from the jack
- Total Time - total time the car spent on pit road (Road Time + Stop Time)
- Restart time - the time when the car is restarted down pit road (you can figure out how long it takes the driver to exit their pit spot by subtracting left jack down time from this number
- Time To Stop - How long it took the car to go from pit road entry to full stop at their pit spot
- Race number – within the year, what race this is (matches file name)
- Track name
- Date of race

If a line looks like this:

P,32,159,0.000,0.000,0,HAWKEYE

It's usually a fuel stop but there's no data on how long the stop was.

Race results data

- Finishing position: Place the driver finished; 1 indicates the driver finished 1st.
- Driver: Driver of car for that race; could have different drivers for the same car # in different races.
- Car number: Number assigned to the car
- Car manufacturer
- LAPS: Number of laps completed
- START: Starting position on the track; it's determined by a qualifying race, normally the day before.
- LED: # of laps that car led (crossed the finish line first)
- PTS: Points earned for that race for each driver.
- Bonus: Bonus points earned by each driver (can be for winning, leading a lap, etc.)
- Penalty: Penalty points assigned due to violations, etc.
- Race Number: Assigned by NASCAR and corresponds with track name
- Track Name: Name of track
- Date of race: Date race occurred

EXHIBITS

Exhibit 1 Nascar Teams 2019

Team	
Beard Motorsports	
Chip Ganassi Racing	
Front Row Motorsports	
Gaunt Brothers Racing	
Germain Racing	

Go Fas Racing

Hendrick Motorsports

Joe Gibbs Racing

JTG Daugherty Racing

Leavine Family Racing

MBM Motorsports

Petty Ware Racing

Premium Motorsports

Richard Childress Racing

Richard Petty Motorsports

Rick Ware Racing

Roush Fenway Racing

Spire Motorsports

StarCom Racing 

Stewart-Haas Racing 

Team Penske 

Tommy Baldwin Racing 

Wood Brothers Racing 

XCI Racing 

CITATIONS

HTTPS://AAAHQ.ORG/EDUCATION/RESOURCES/LEAN-ACCOUNTING

MASKELL, BRIAN H., BRUCE BAGGALEY, LARRY GRASSO, (2004) PRACTICAL LEAN ACCOUNTING: A PROVEN SYSTEM FOR MEASURING AND MANAGING THE LEAN ENTERPRISE, TAYLOR & FRANCIS.

TEACHING NOTES

SUGGESTED INSTRUCTORS' NOTES

The purpose of these teaching notes is to provide implementation guidelines and solutions for the NASCAR Case. The following sections describe the technology requirements, available options with using the activity, implementation guidelines, and grading.

Technology Requirements

The NASCAR case requires students to utilize both Tableau Prep and Tableau to clean and analyze the data. Tableau and Tableau Prep can run on both MAC or Windows operating system. To obtain a product key for your own academic use, go to the Tableau Academic web page at https://www.tableau.com/academic/teaching and fill out the forms to "request individual license" (for the instructor.) You can use this Tableau product key to activate Tableau for your individual instructor needs.

How students obtain Tableau

Students can obtain a license for Tableau for the semester (or year) using one of two methods.

Method 1: Students individually sign up for Tableau Prep and Tableau

To request their license keys for Tableau, students will need to do the following steps:

1. Go to the Tableau for Students site: www.tableau.com/students
2. Select the "Get Tableau for Free" button and fill out the form.
3. Students should receive their key in a few hours once the form is submitted and Tableau verifies that they're enrolled at the university. The license is good for 1 year.
4. While students wait for their key, they can download the 14-day trial (http://www.tableau.com/products/desktop/download), and start working with Tableau immediately (until the 14-day trial period is finished)

Method 2: Obtain a license key for your students for the class

The other option you have is to obtain a product key for your course for the current semester and share that product key with your students. Go to the Tableau Academic web page at https://www.tableau.com/academic/teaching and fill out the forms to "request individual license" (for the instructor) and "request course software" (for your students). The course software option will give you one license key that you can share with your students. It will be good for the duration of the semester, based on the course start and end dates you specify on the form. It can take Tableau up to two weeks to issue the licenses, so fill out the request forms at least a few weeks before your students will need to use Tableau. You will receive an email from the Tableau Academic team with a product key that you can provide to your class. It will allow students to download both Tableau Prep and Tableau.

Available Options

We have designed the project to have several available resources and options, depending on the experience level of both the instructor and the students. Available resources include:

- Example case with instructions (and can be modified by the instructor)
- Uncleaned data sets (results and pit data)
- Cleaned data sets (results and pit data)
- Tableau prep solution files
- Narrated PowerPoint videos with PDFs for Tableau Prep/Data Cleaning Steps
- Example Tableau visualizations, by team

Implementation Guidelines

The NASCAR activity is typically performed after coverage of lean concepts for manufacturers, which we typically discuss with activity-based costing. This project is designed to provide students a real-world application of lean accounting concepts, so we expect students have read information and been assigned some homework questions related to lean concepts, but this project does not require any additional preparation. We also have tailored the case so that it can be

implemented whether or not students have any prior knowledge of Tableau Prep or Tableau, depending on how an instructor decides to use the case and available resources.

Depending on the level of assistance given the students, this project can take from one hour (assuming using clean data and assigning only the Tableau visualizations) to approximately six hours (assigning both data cleaning exercises, visualizations in Tableau, and summarizing in a story). We introduce the NASCAR case by describing (briefly) what NASCAR is and show a quick video of a car making a stop in the pit during a NASCAR race. We then introduce the case and explain that lean concepts can be applied outside of a manufacturing setting and focuses on eliminating inefficiencies and waste. For NASCAR, time spent in the pit can be crucial to winning or losing the race, depending on how quickly they can make the necessary stops. We highlight that in practice, accountants may be asked to analyze different types of data (not just financial data), with the goal of making recommendations to management to improve operations.

We provide several different options to provide instructors with flexibility regarding how they implement this project, and with which courses.

Tableau Prep:

In our experience, few students have had experience with Tableau Prep prior to taking our courses. Because data cleaning is such an integral (and often arduous) task in the real world, we feel it's important to expose students to working with dirty data. The students are working with two files: the pit data (obtained directly from NASCAR) and the results data (which is publicly available). We have created two, step-by step tutorial videos (one for each data file) that show students exactly how to clean the data and create an output file that will be imported into Tableau. Each data cleaning exercise takes approximately one hour to complete. We also provide cleaned

data files for any instructors that want to skip this step and have students focus only on creating Tableau visualizations.

Tableau:

The second part of this project has students take the cleaned output files, import them into Tableau, and create visualizations to identify inefficiencies or trends in the data. Most of our students have some prior knowledge of Tableau, so we have not created a narrated PowerPoint presentation to show students how to create specific visualizations. Instead, we give students some suggested visualizations they can create within the case requirements but encourage them to be creative. As part of the instructor solutions, we provide visualizations for each NASCAR team but instructors could also provide some screenshots of certain visualizations to their students if they want to provide further guidance.

Students summarize their recommendations using the story feature of Tableau, but this requirement can easily be modified by the instructor. When using the case in a principles of managerial accounting course, we had students write a memo of their recommendations rather than create a story.

Grading

The objectives of this project are to build students' data analytics competencies by applying lean accounting concepts to real-world data. Typically, we have graded this project based on effort and clarity of recommendations based on the data. We want students to realize that data in real-life can often be messy and there is not necessarily just one right answer. Rather, we want students to support their recommendations with the data they have analyzed. We provide a grading rubric here, but this can easily be modified by the instructor.

TABLE 1
Suggested Rubric

Criteria	Excellent	Average	Needs work	Total	Comments
Viz 1	3 points	2 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
Viz 2	3 points	2 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
Viz 3	3 points	2 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
Viz 4	3 points	2 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
Viz 5	3 points	2 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
Overall Recommendations	5 points	2 - 4 points	0 - 1 points		
	Student creates appropriate visualization that is clear and easy to read	Student creates visualization that is not relevant or easy to understand	Visualization is not complete, concise, or relevant for the problem being discussed		
	TOTAL POINTS (out of 20 points)				

Data Analytics Case

NASCAR AND LEAN

Featuring Tableau Prep and Tableau

Version 2022.1

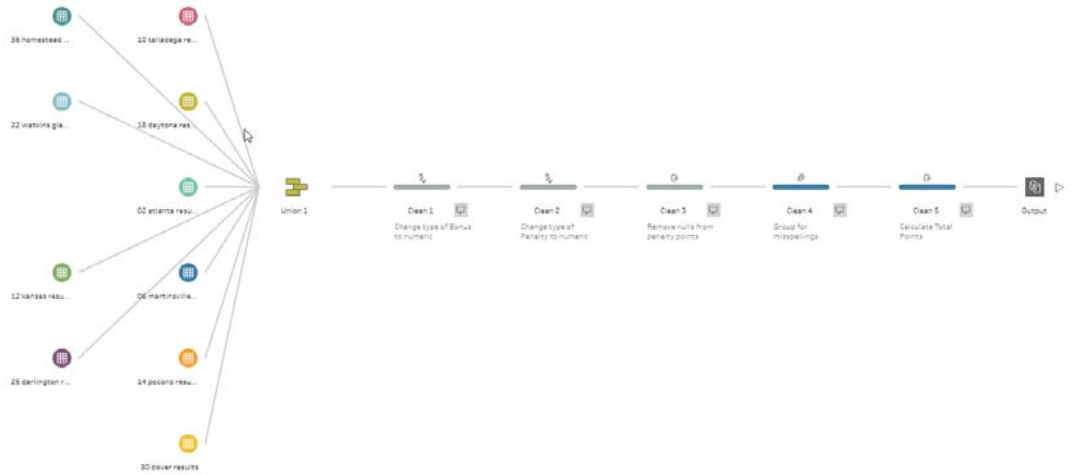
ETL Project

Part 1: Data Cleaning Pit Data



Agenda

- This is the first of two tutorials about ETL for NASCAR data
- In this tutorial we:
  - Remind what the ETL process is
  - Merge 10 text files
  - Execute 5 clean steps
  - Save the output



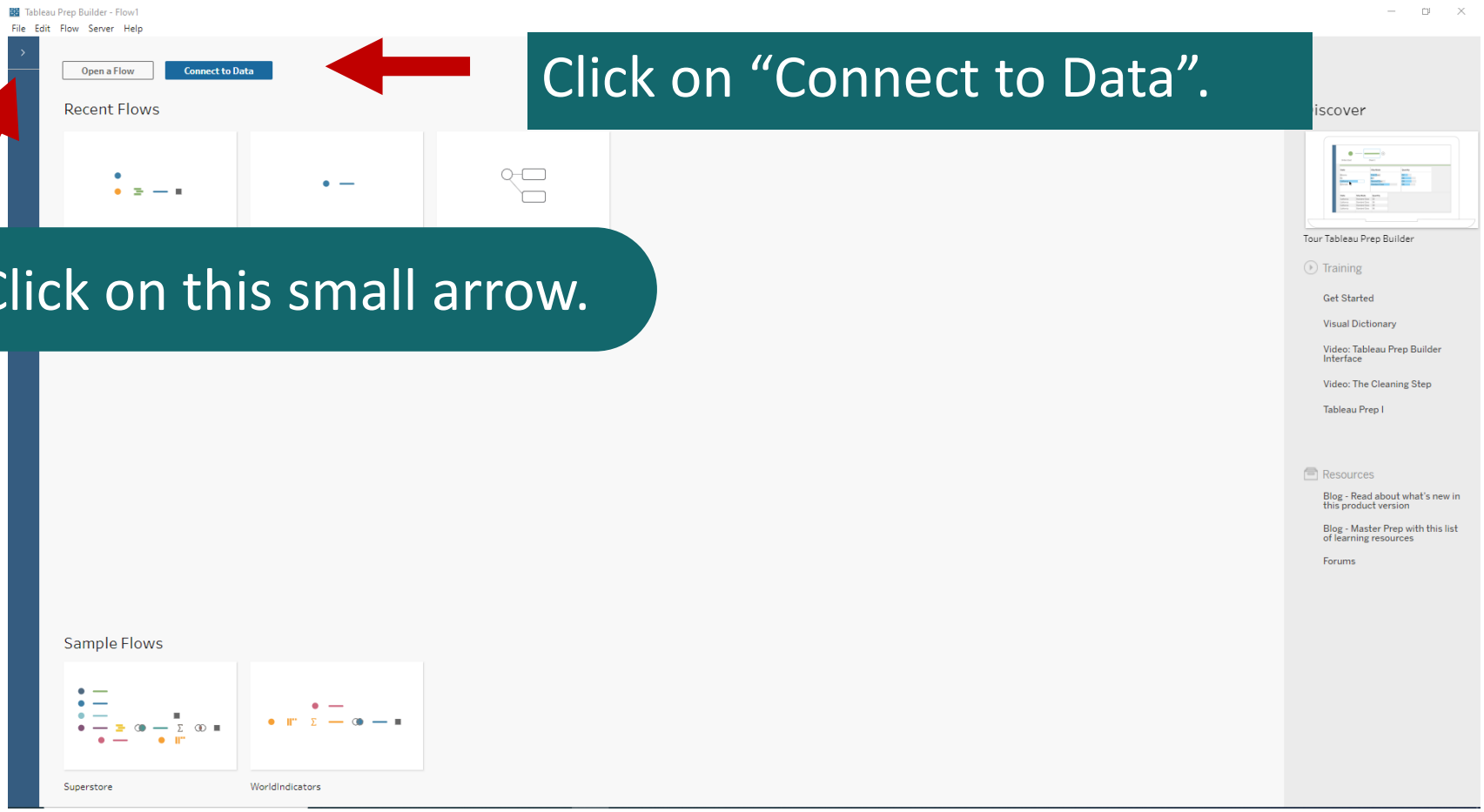
Remember from the first NASCAR Tableau Prep Tutorial: ETL

- Extract, Load, and Transform
- Data needs to be cleaned prior to use

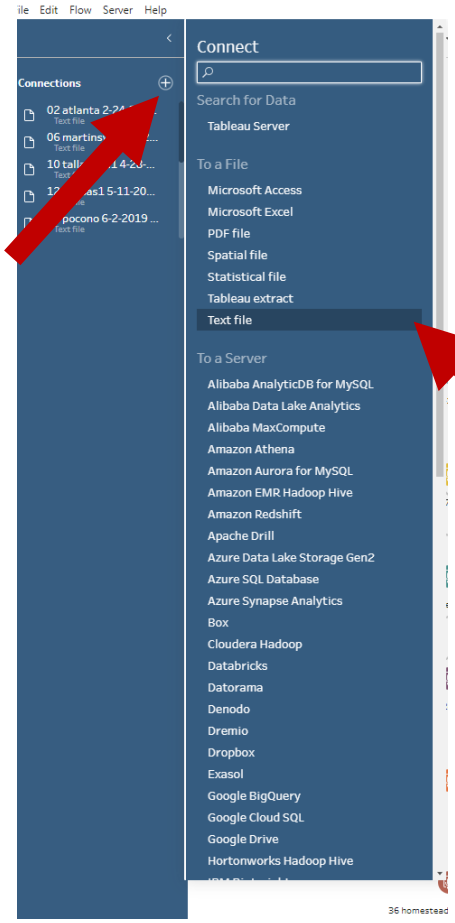
Step 01

Input and view data

Begin a new flow

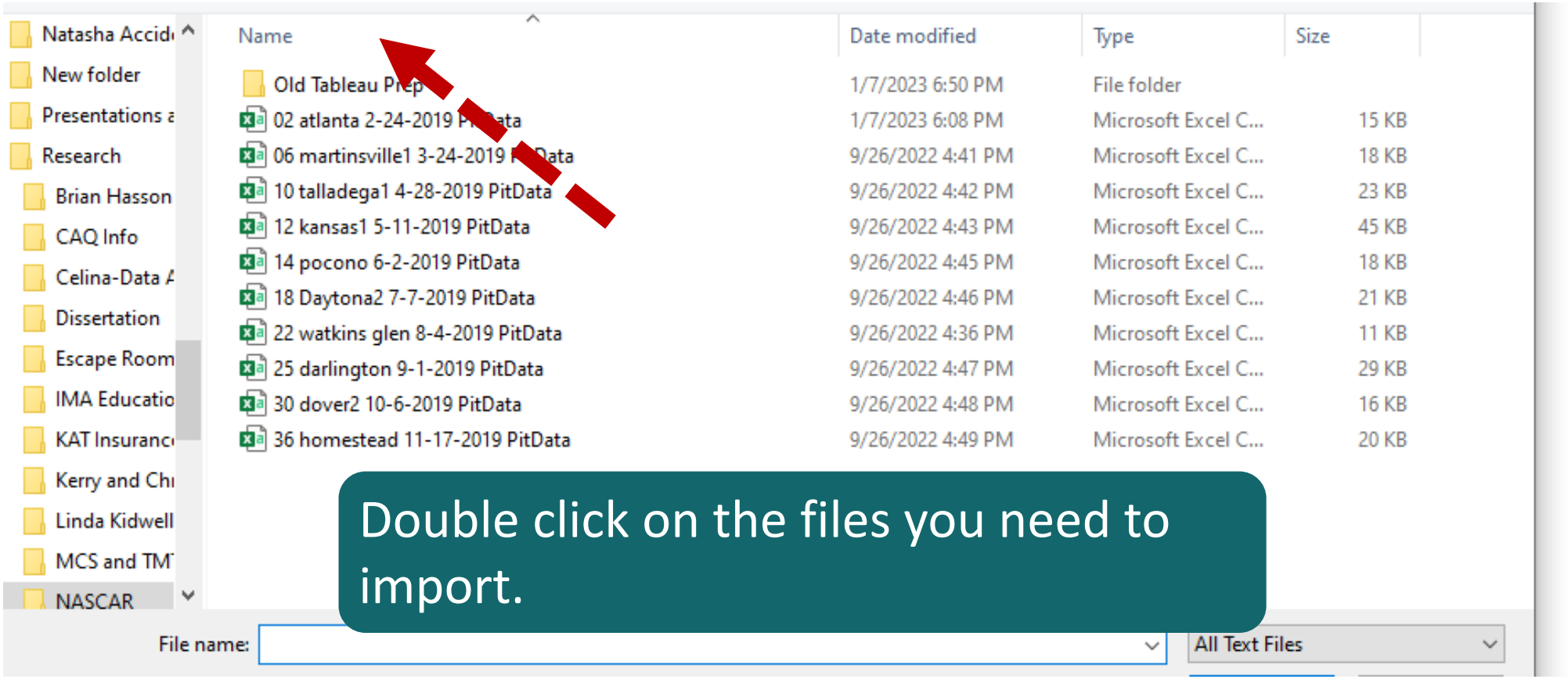


Begin a new flow

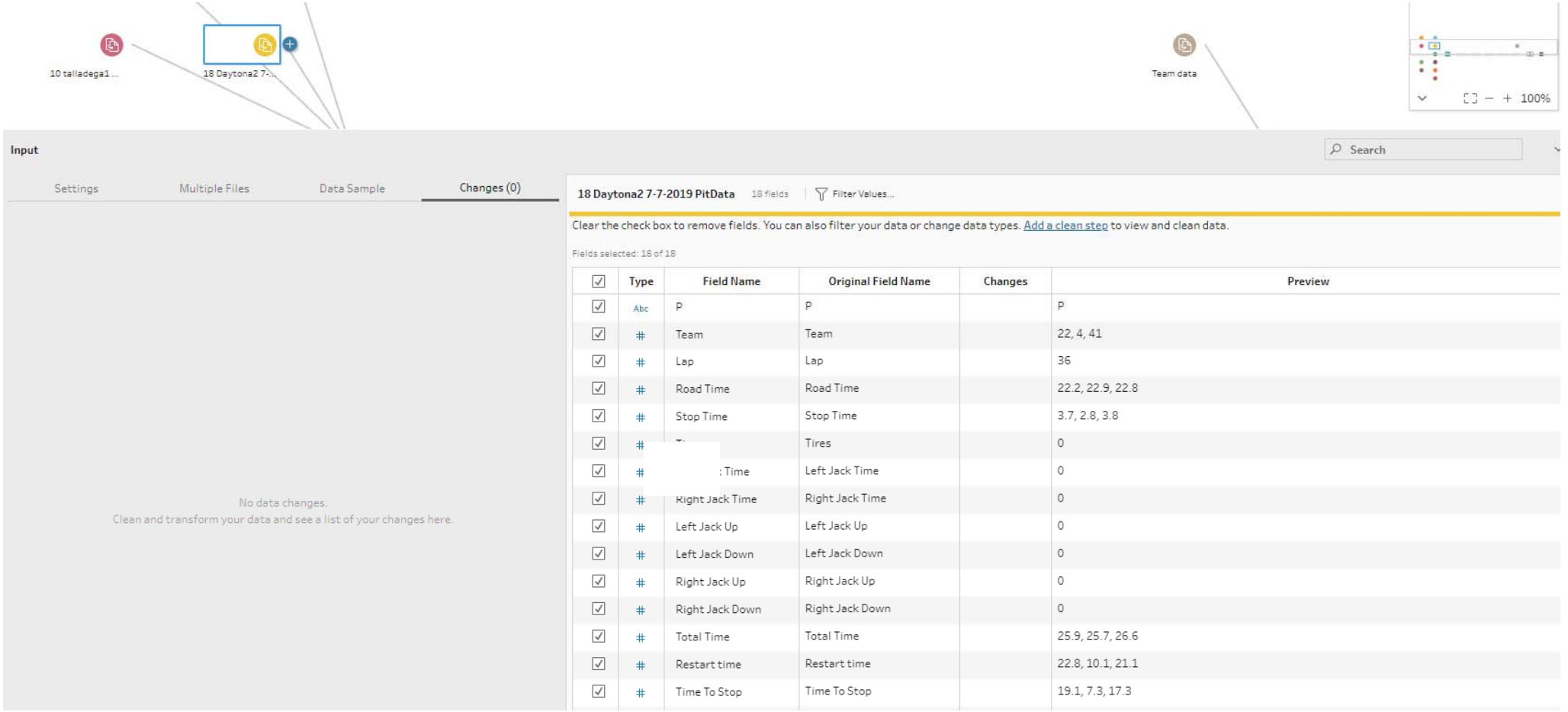


Click on the “+” next to connections, and then click on Text File.

Import data from CSV



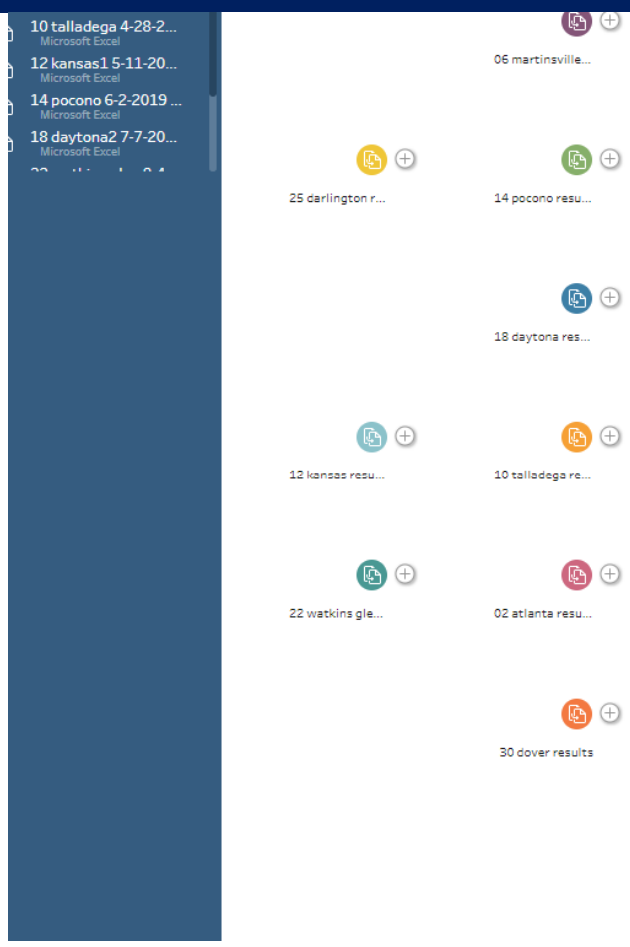
Import data from CSV



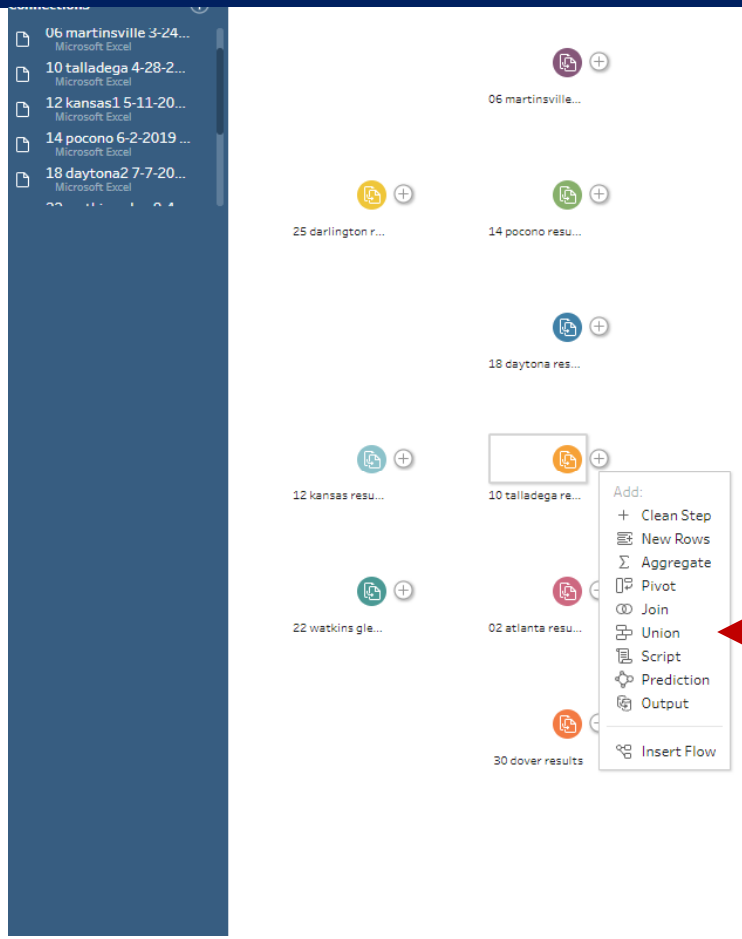
Step 02

Create a Union

Create a Union

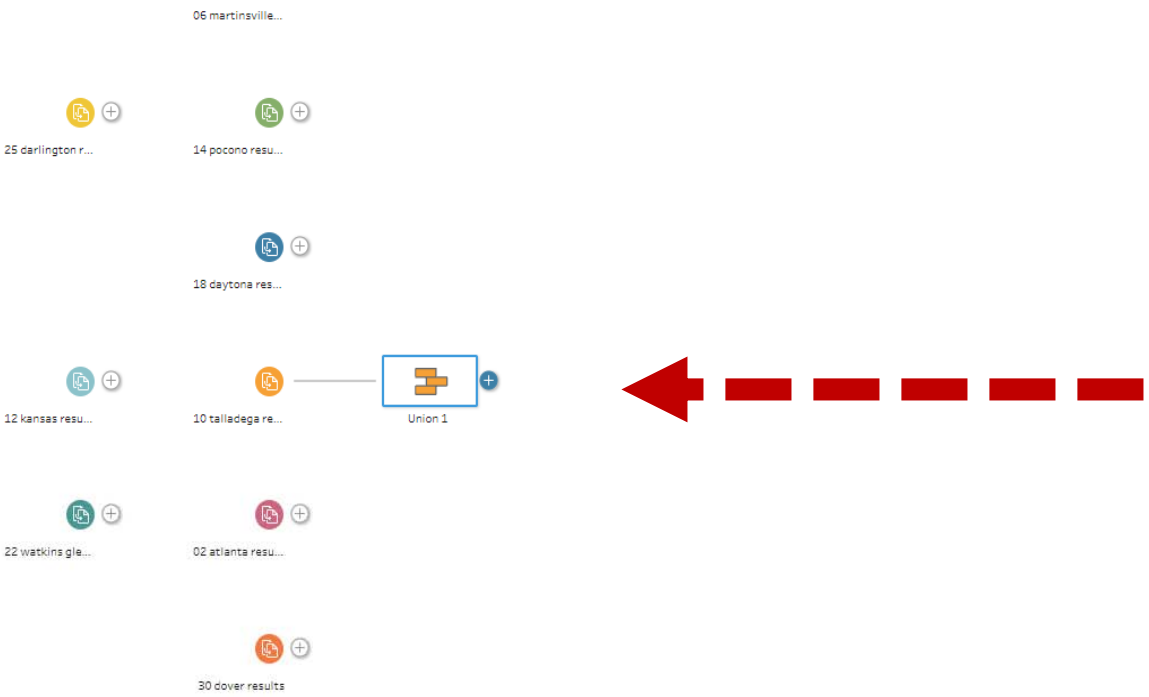


Create a Union

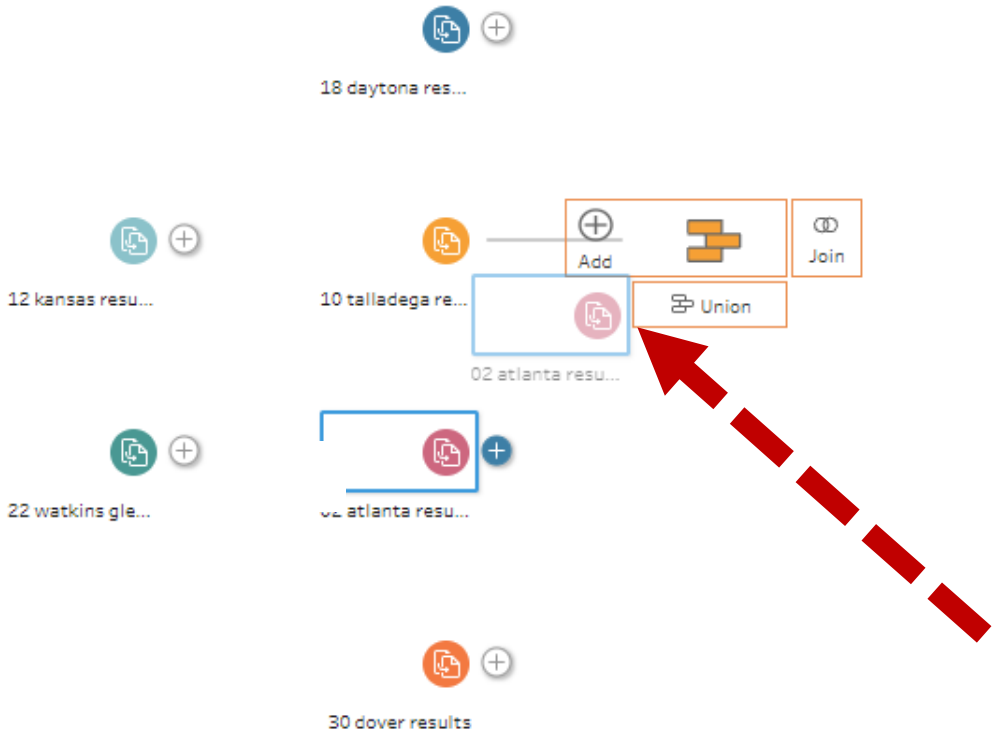


Click “+”sign and select Union

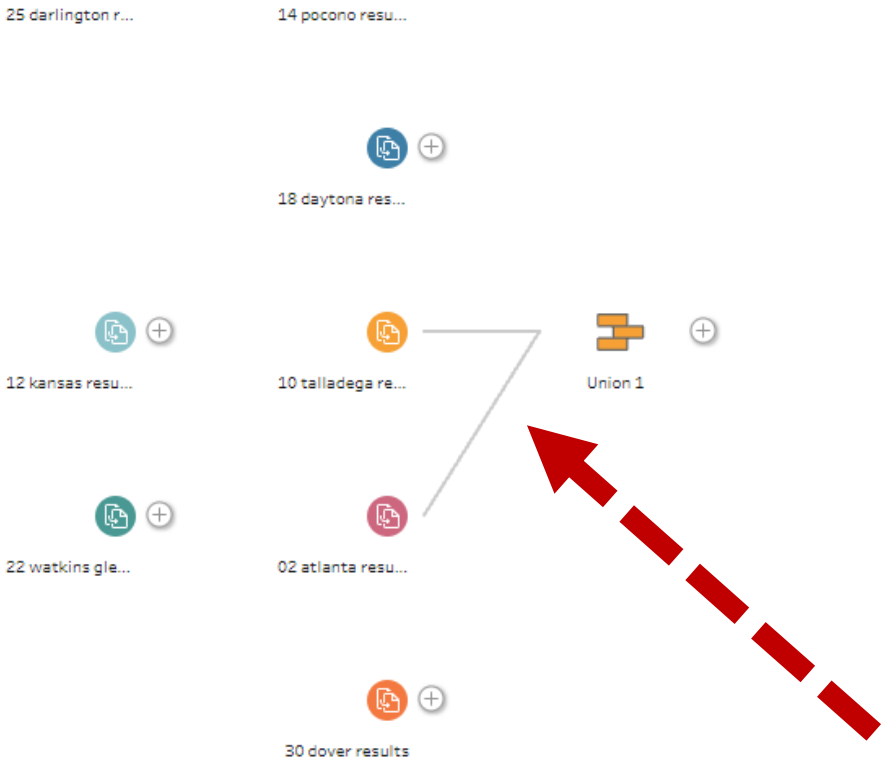
Create a Union



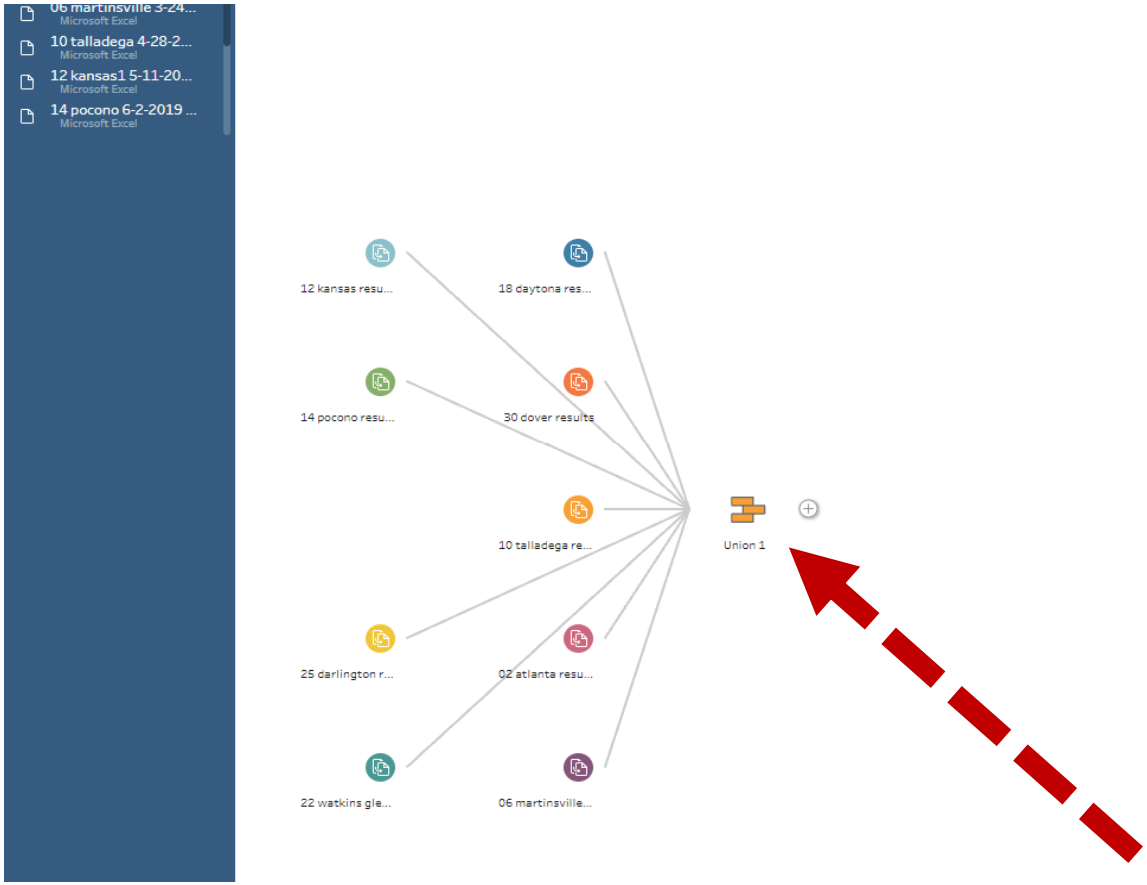
Create a Union



Create a Union



Create a Union



Create a Union

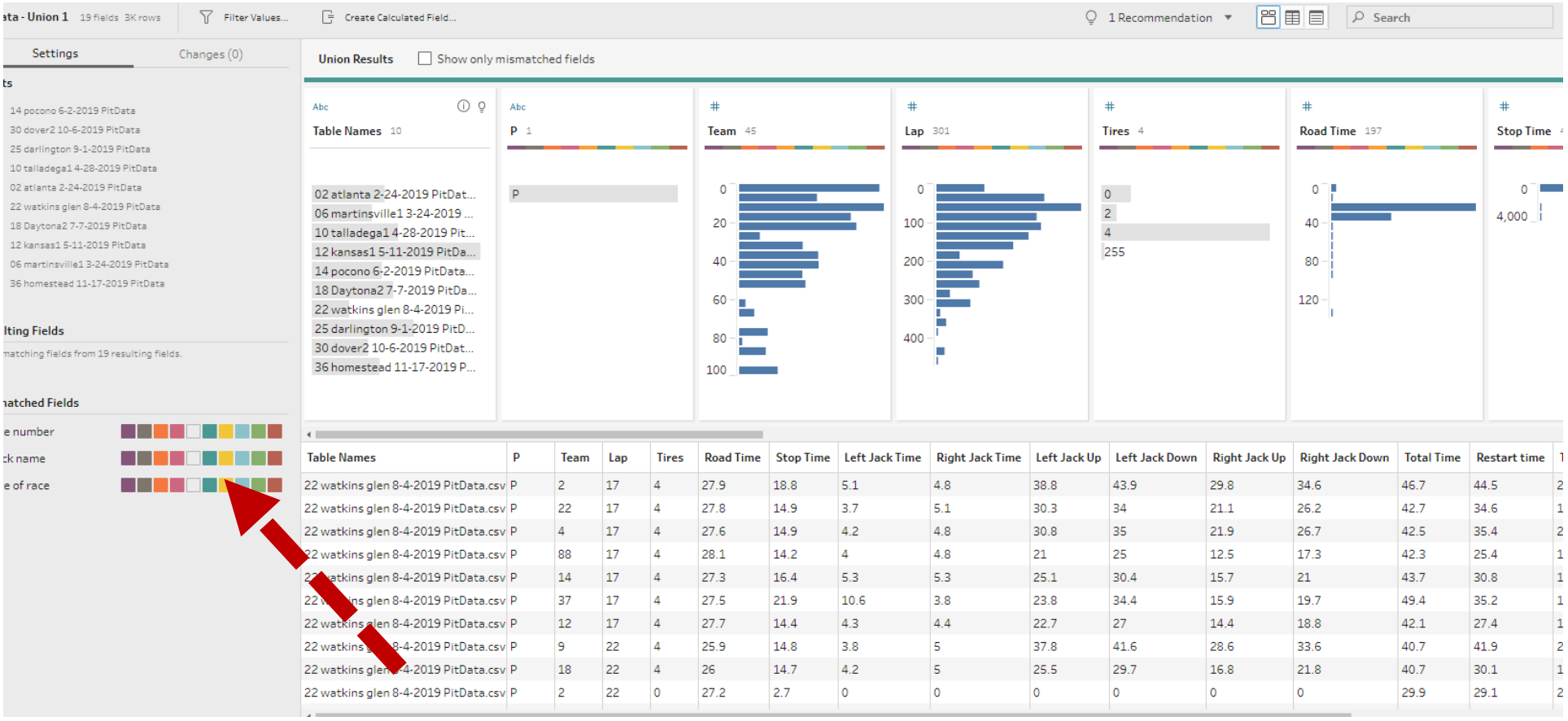
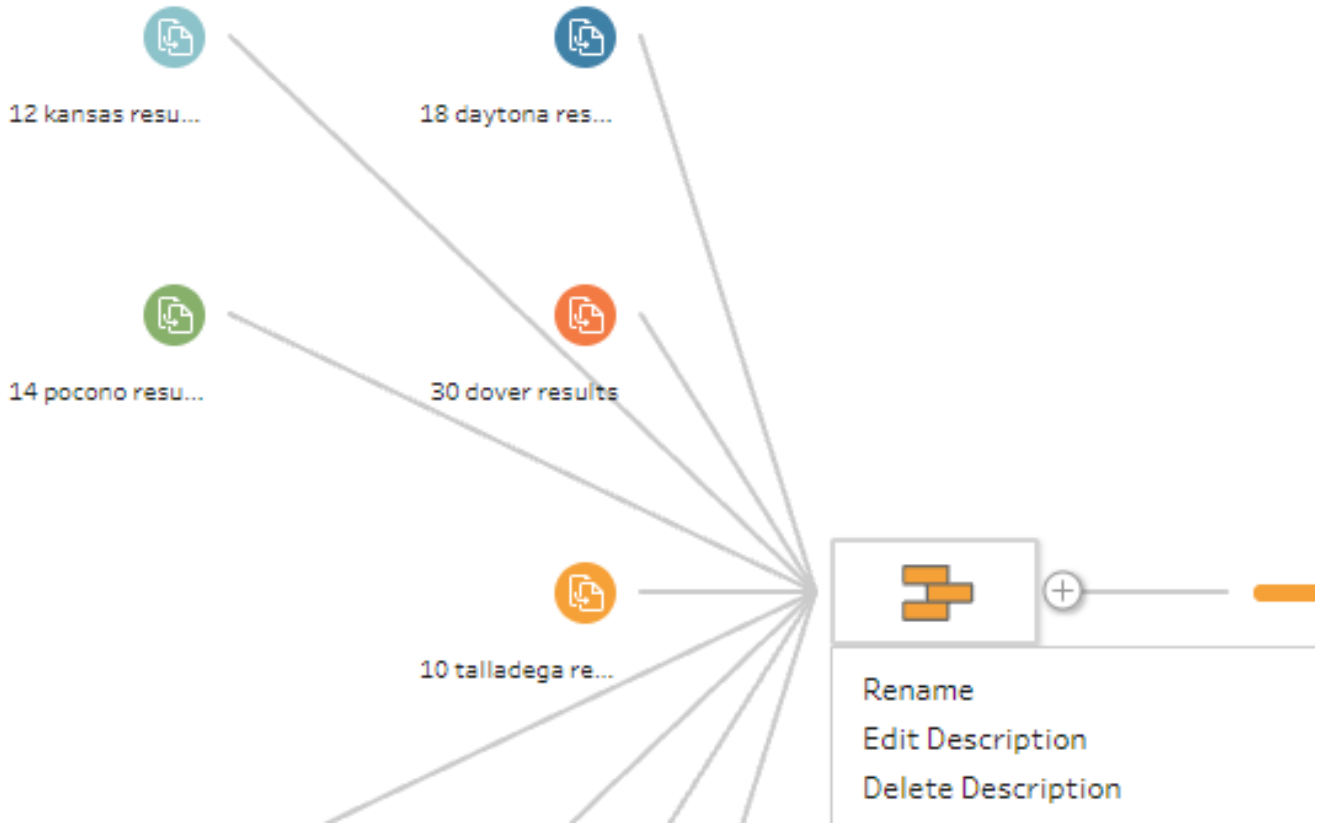


Table Names	P	Team	Lap	Tires	Road Time	Stop Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	T
22 watkins glen 8-4-2019 PitData.csv	P	2	17	4	27.9	18.8	5.1	4.8	38.8	43.9	29.8	34.6	46.7	44.5	2
22 watkins glen 8-4-2019 PitData.csv	P	22	17	4	27.8	14.9	3.7	5.1	30.3	34	21.1	26.2	42.7	34.6	1
22 watkins glen 8-4-2019 PitData.csv	P	4	17	4	27.6	14.9	4.2	4.8	30.8	35	21.9	26.7	42.5	35.4	2
22 watkins glen 8-4-2019 PitData.csv	P	88	17	4	28.1	14.2	4	4.8	21	25	12.5	17.3	42.3	25.4	1
22 watkins glen 8-4-2019 PitData.csv	P	14	17	4	27.3	16.4	5.3	5.3	25.1	30.4	15.7	21	43.7	30.8	1
22 watkins glen 8-4-2019 PitData.csv	P	37	17	4	27.5	21.9	10.6	3.8	23.8	34.4	15.9	19.7	49.4	35.2	1
22 watkins glen 8-4-2019 PitData.csv	P	12	17	4	27.7	14.4	4.3	4.4	22.7	27	14.4	18.8	42.1	27.4	1
22 watkins glen 8-4-2019 PitData.csv	P	9	22	4	25.9	14.8	3.8	5	37.8	41.6	28.6	33.6	40.7	41.9	2
22 watkins glen 8-4-2019 PitData.csv	P	18	22	4	26	14.7	4.2	5	25.5	29.7	16.8	21.8	40.7	30.1	1
22 watkins glen 8-4-2019 PitData.csv	P	2	22	0	27.2	2.7	0	0	0	0	0	0	29.9	29.1	2

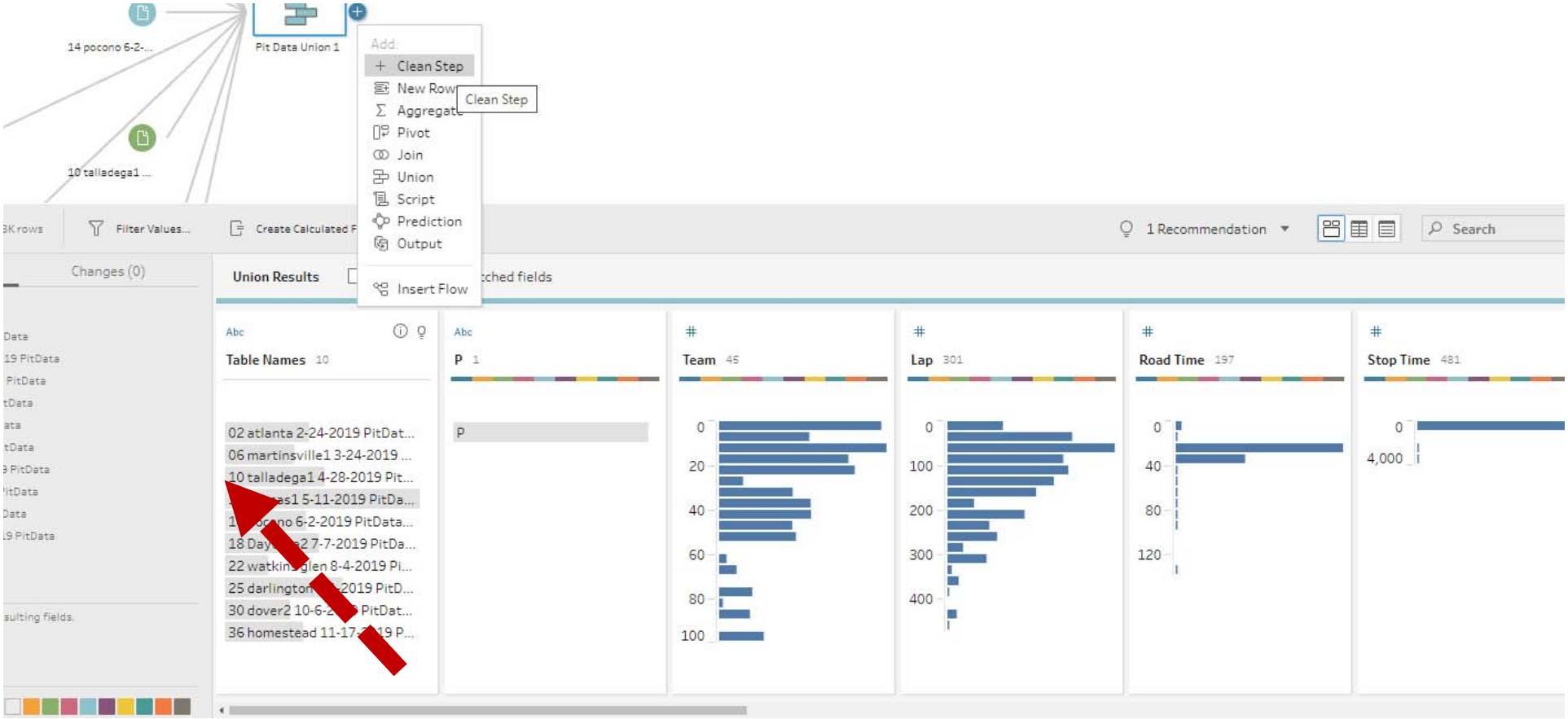
Create a Union



Step 03

Rename a field

Rename Field



Rename Field

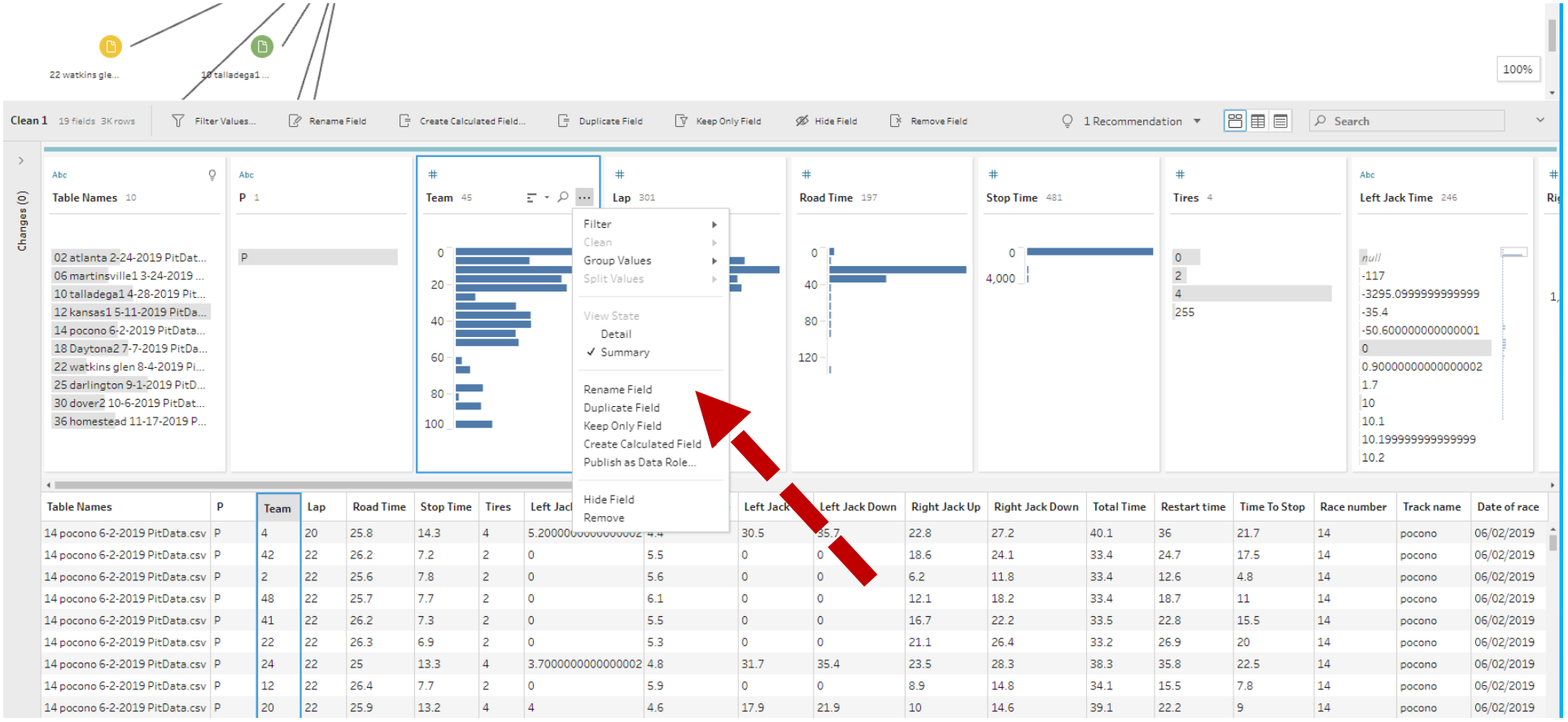


Table Names	P	Team	Lap	Road Time	Stop Time	Tires	Left Jack		Left Jack	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Date of race
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	P	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	39.1	22.2	9	14	pocono	06/02/2019

Rename Field

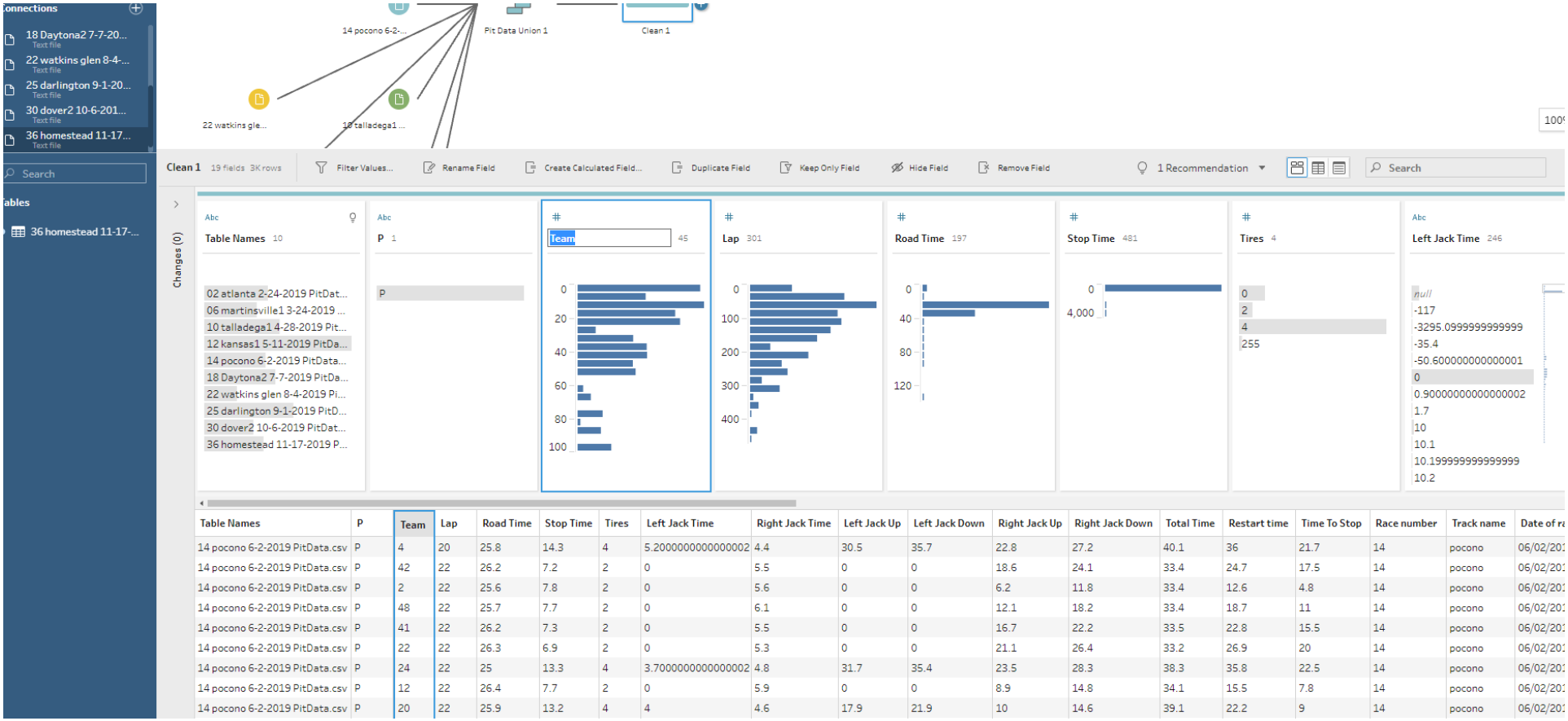


Table Names	P	Team	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Date of ra
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06/02/201
14 pocono 6-2-2019 PitData.csv	P	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	39.1	22.2	9	14	pocono	06/02/201

Rename Field

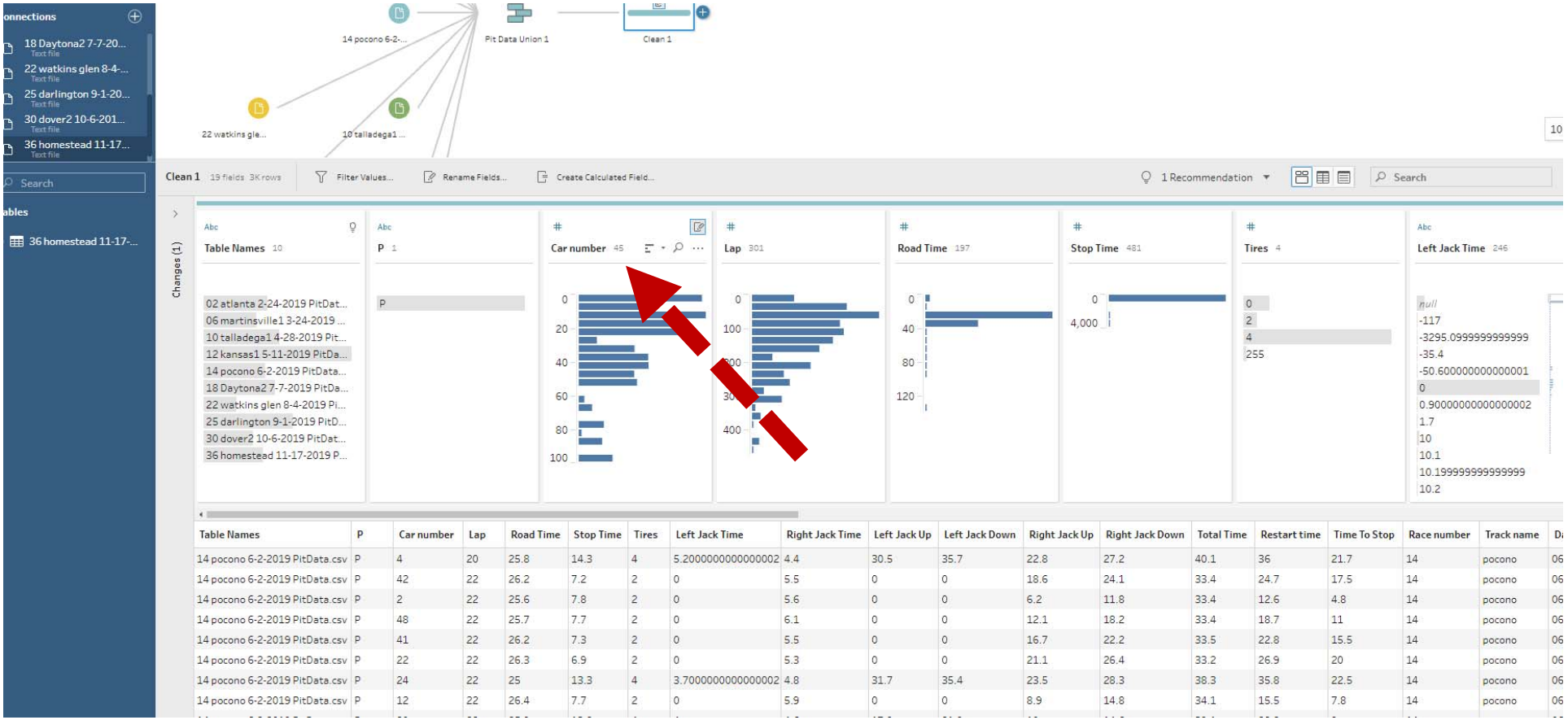


Table Names	P	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	D
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06
14 pocono 6-2-2019 PitData.csv	P	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06

Rename Field

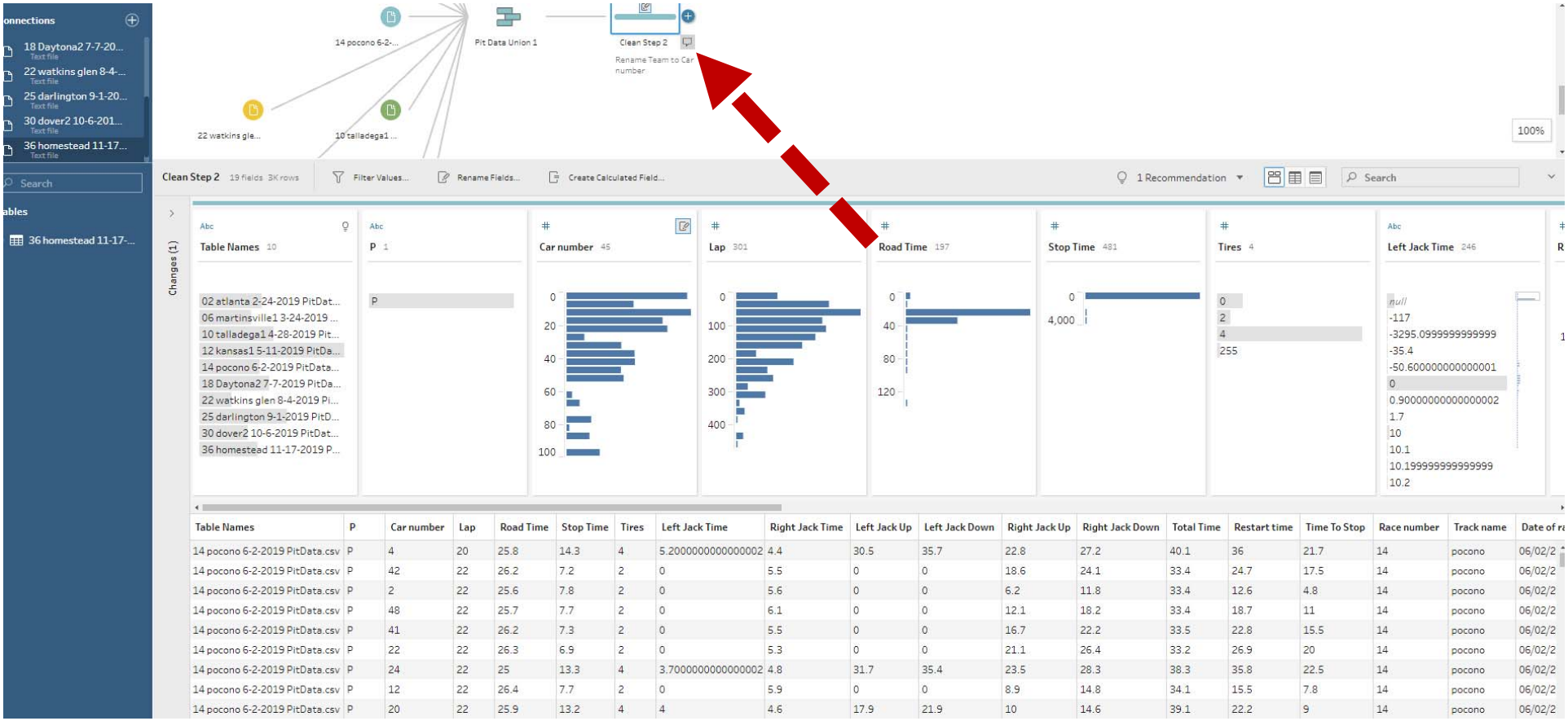


Table Names	P	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Date of ra
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06/02/2
14 pocono 6-2-2019 PitData.csv	P	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	39.1	22.2	9	14	pocono	06/02/2

Step 04

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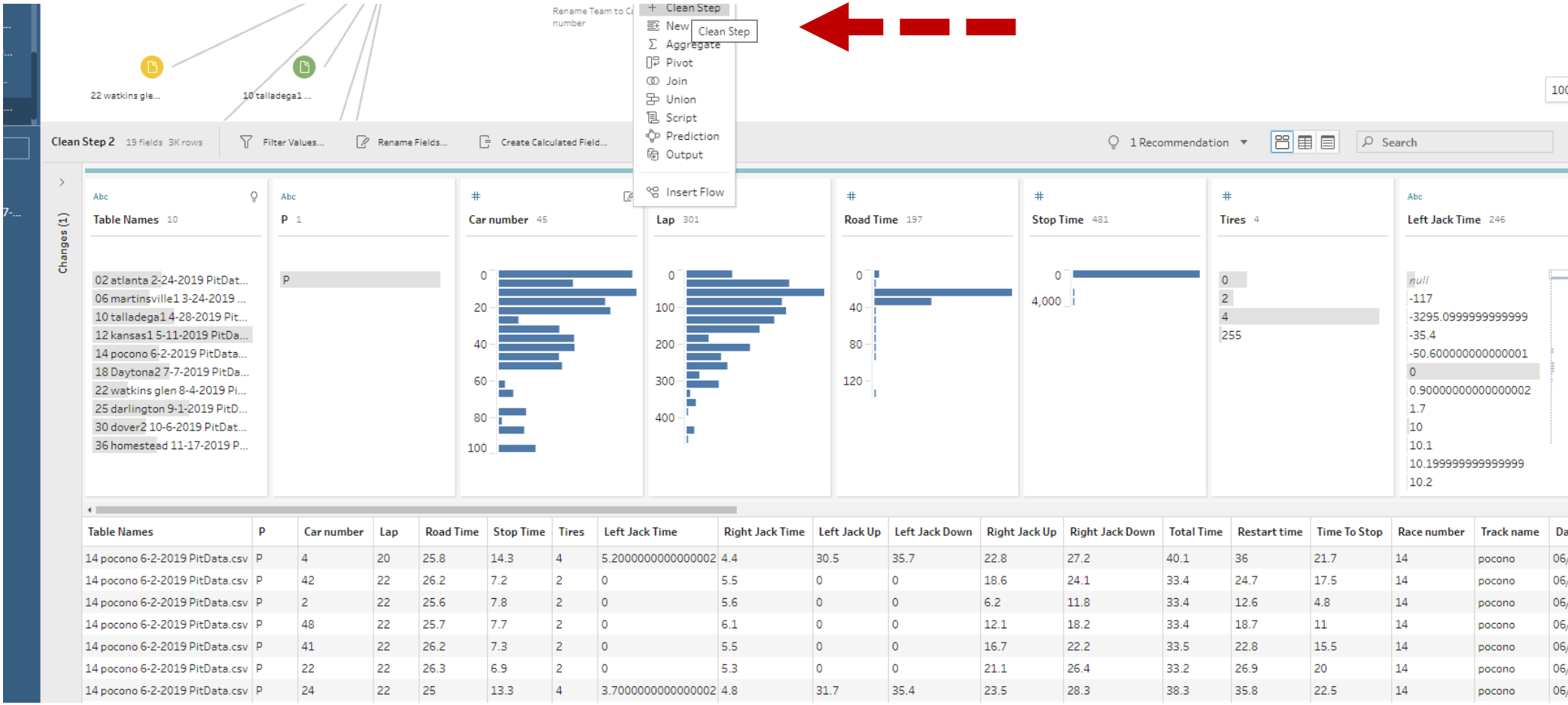


Table Names	P	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Da
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06/
14 pocono 6-2-2019 PitData.csv	P	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/

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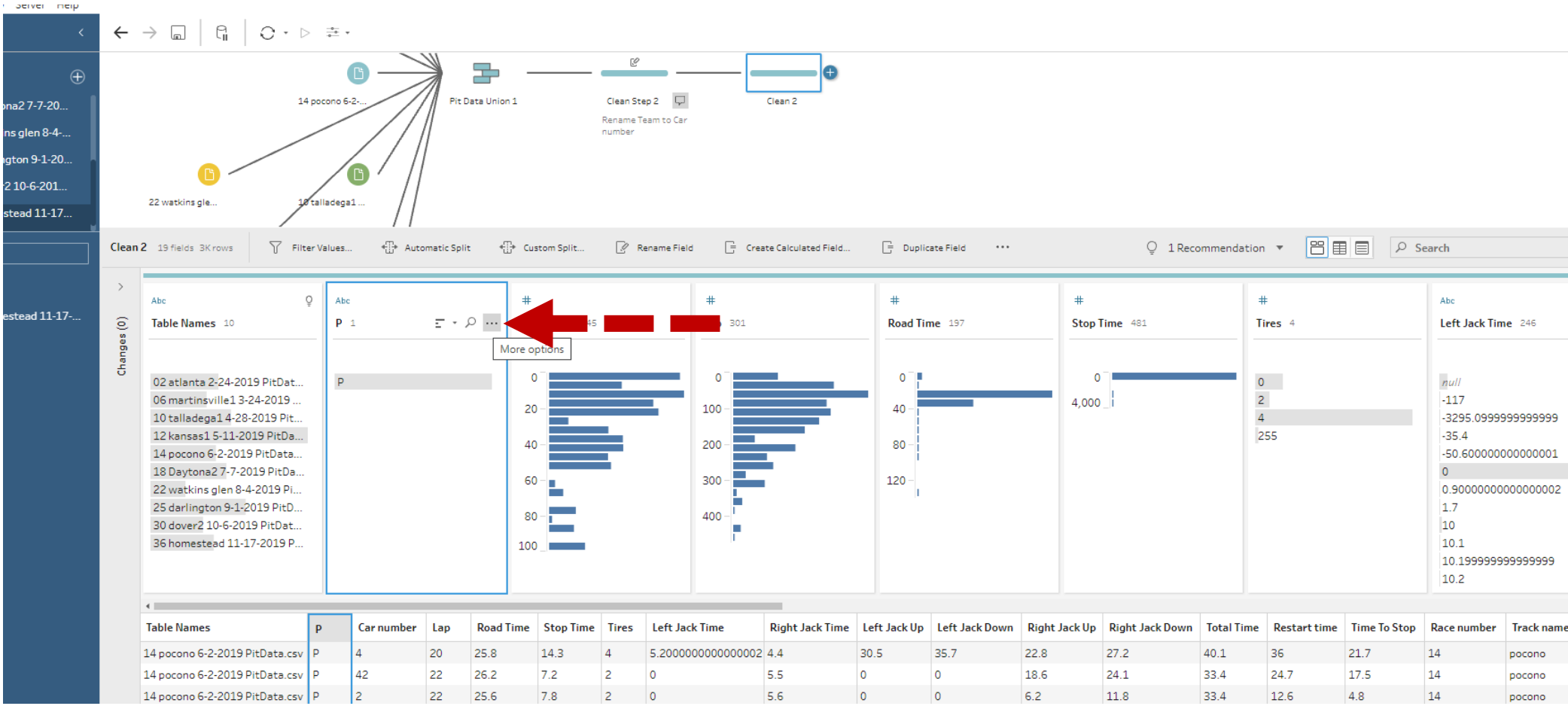
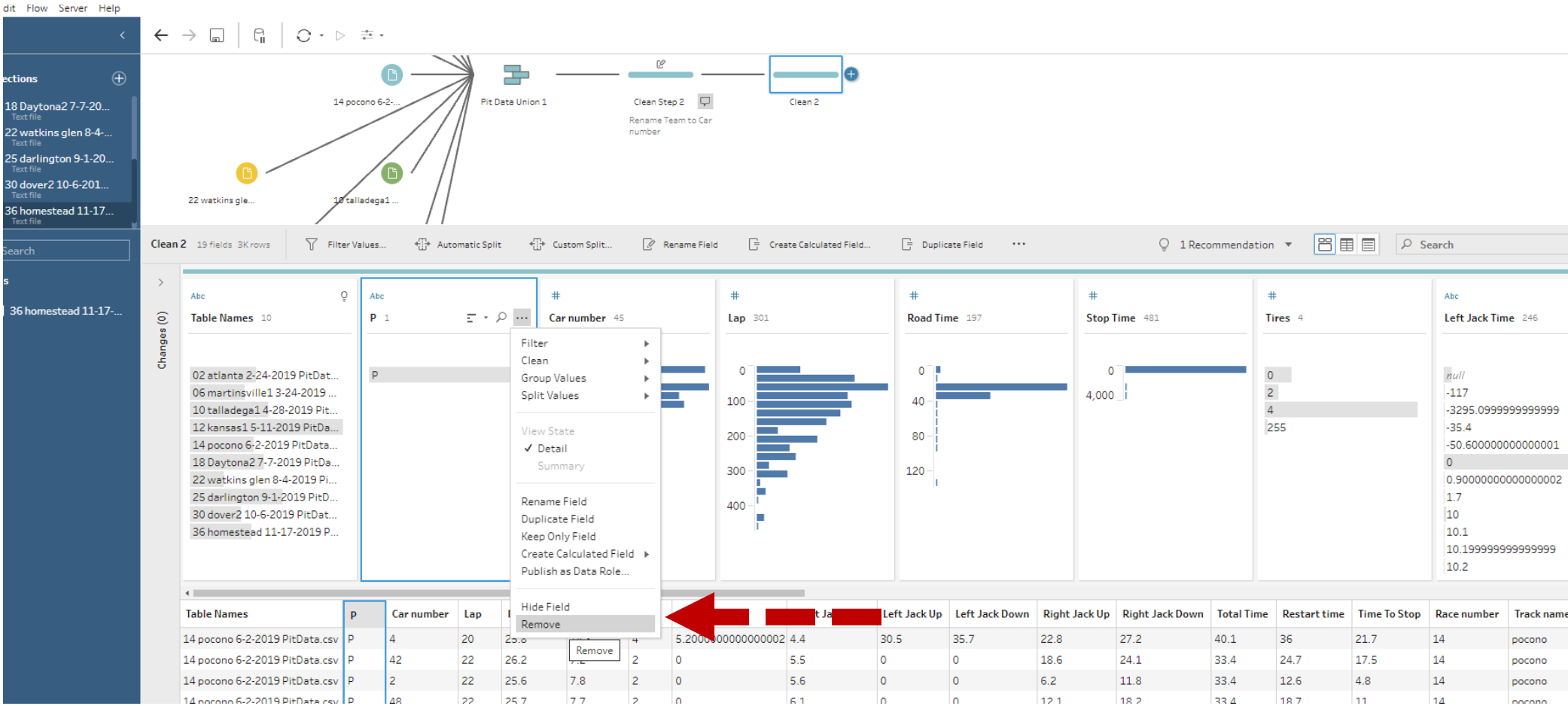


Table Names	P	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name
14 pocono 6-2-2019 PitData.csv	P	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono
14 pocono 6-2-2019 PitData.csv	P	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono
14 pocono 6-2-2019 PitData.csv	P	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono

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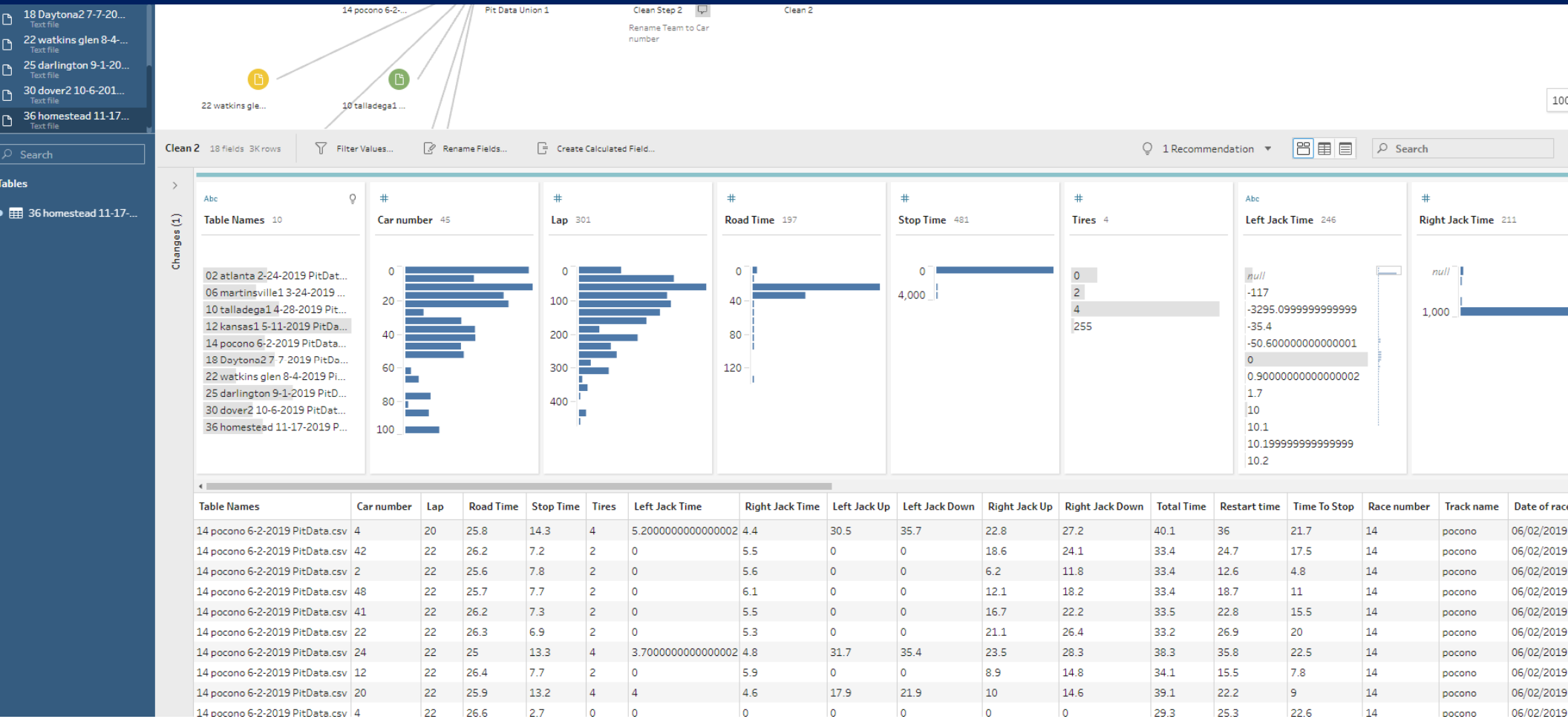


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Date of rac
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	39.1	22.2	9	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	4	22	26.6	2.7	0	0	0	0	0	0	0	29.3	25.3	22.6	14	pocono	06/02/2019

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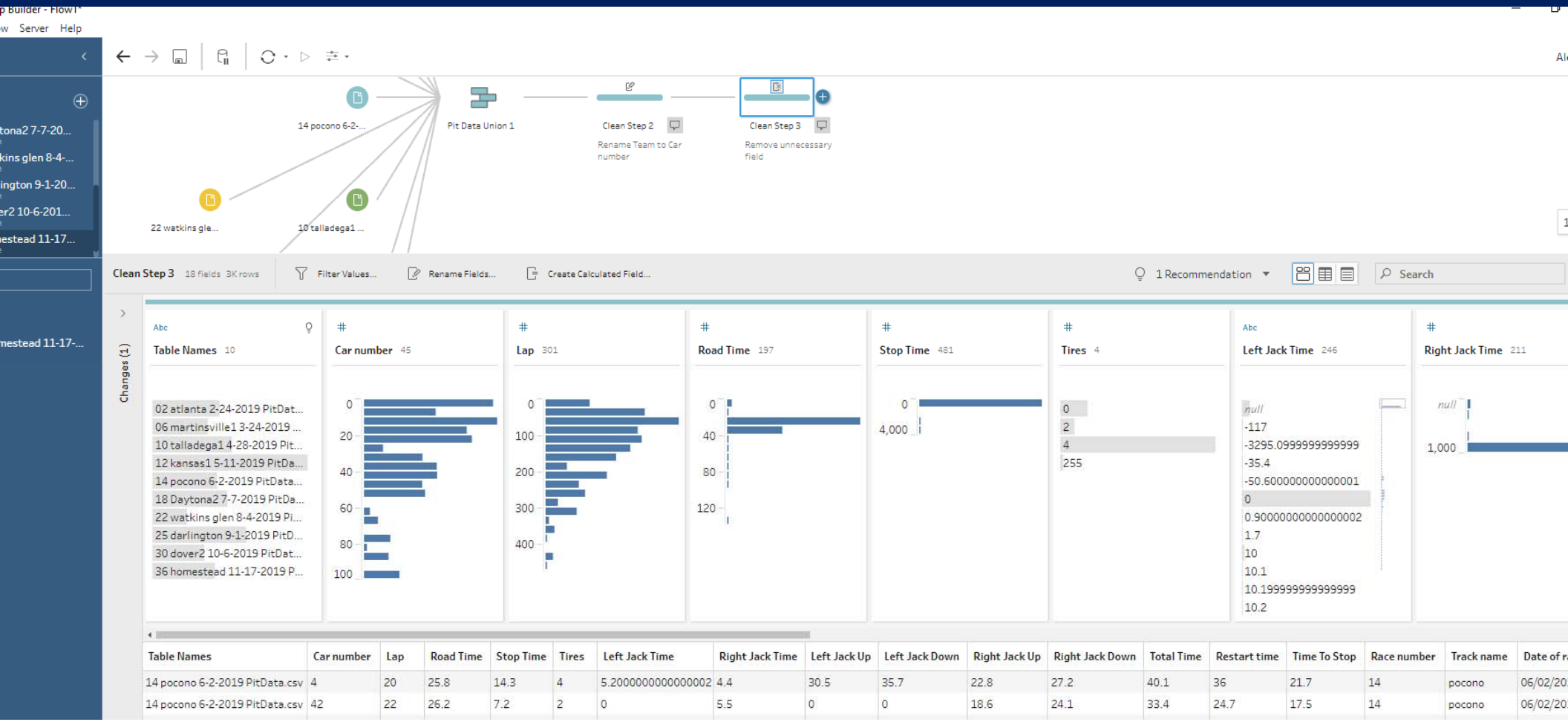


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track name	Date of r
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono	06/02/20
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono	06/02/20

Step 05

Create Calculated Field

Calculated Field

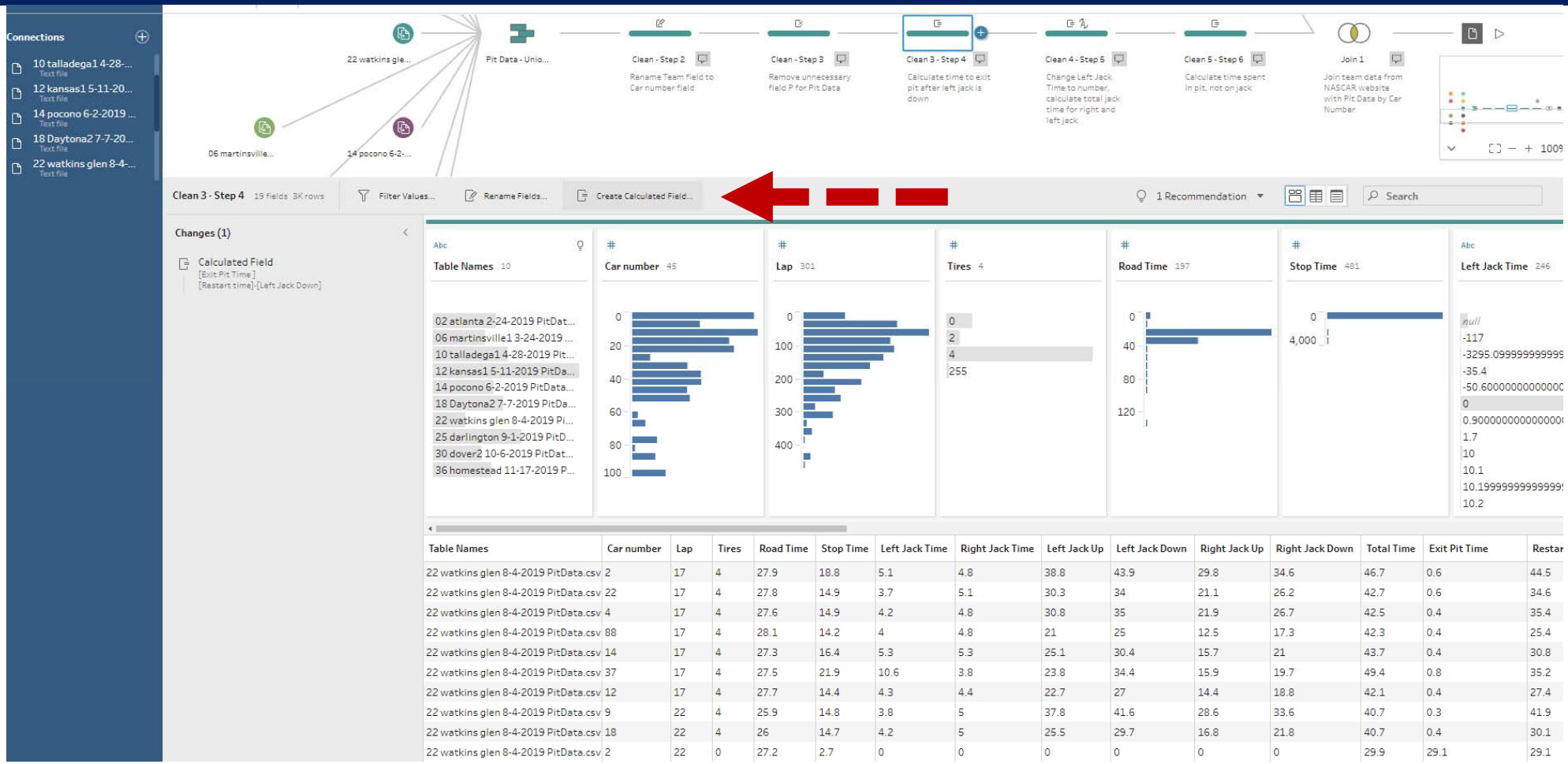


Table Names	Car number	Lap	Tires	Road Time	Stop Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Exit Pit Time	Restar
22 watkins glen 8-4-2019 PitData.csv	2	17	4	27.9	18.8	5.1	4.8	38.8	43.9	29.8	34.6	46.7	0.6	44.5
22 watkins glen 8-4-2019 PitData.csv	22	17	4	27.8	14.9	3.7	5.1	30.3	34	21.1	26.2	42.7	0.6	34.6
22 watkins glen 8-4-2019 PitData.csv	4	17	4	27.6	14.9	4.2	4.8	30.8	35	21.9	26.7	42.5	0.4	35.4
22 watkins glen 8-4-2019 PitData.csv	88	17	4	28.1	14.2	4	4.8	21	25	12.5	17.3	42.3	0.4	25.4
22 watkins glen 8-4-2019 PitData.csv	14	17	4	27.3	16.4	5.3	5.3	25.1	30.4	15.7	21	43.7	0.4	30.8
22 watkins glen 8-4-2019 PitData.csv	37	17	4	27.5	21.9	10.6	3.8	23.8	34.4	15.9	19.7	49.4	0.8	35.2
22 watkins glen 8-4-2019 PitData.csv	12	17	4	27.7	14.4	4.3	4.4	22.7	27	14.4	18.8	42.1	0.4	27.4
22 watkins glen 8-4-2019 PitData.csv	9	22	4	25.9	14.8	3.8	5	37.8	41.6	28.6	33.6	40.7	0.3	41.9
22 watkins glen 8-4-2019 PitData.csv	18	22	4	26	14.7	4.2	5	25.5	29.7	16.8	21.8	40.7	0.4	30.1
22 watkins glen 8-4-2019 PitData.csv	2	22	0	27.2	2.7	0	0	0	0	0	0	29.9	29.1	29.1

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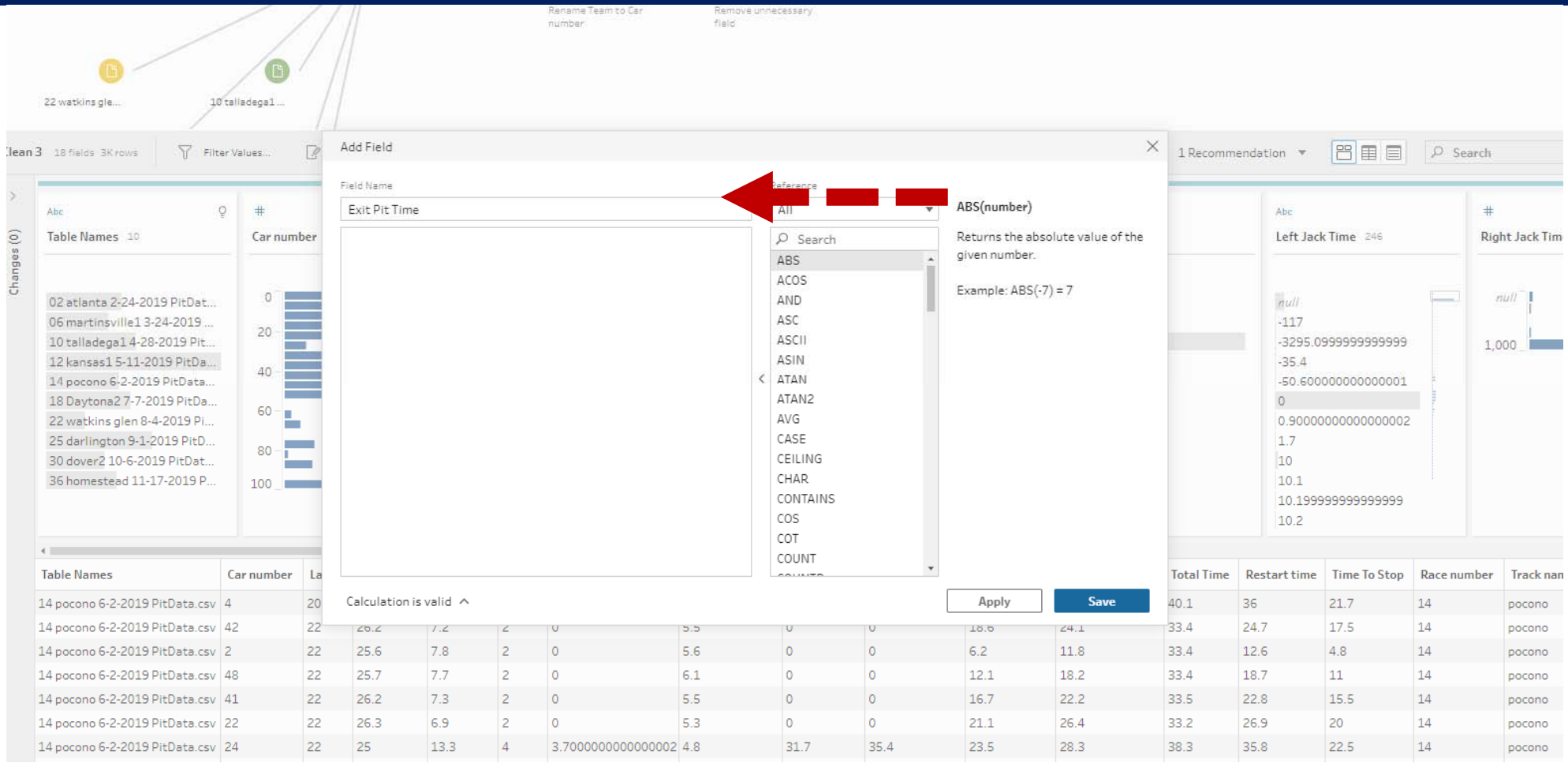
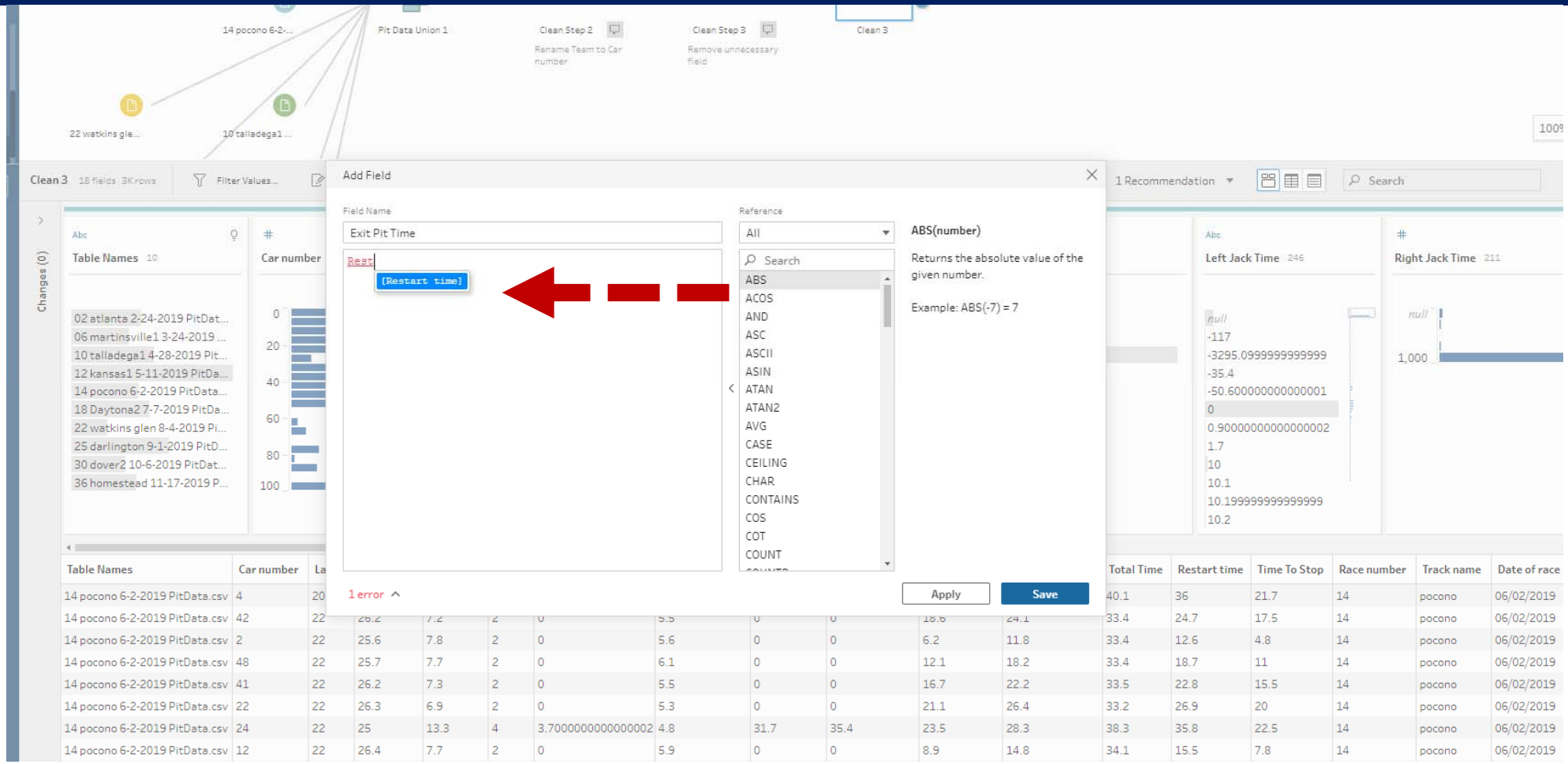
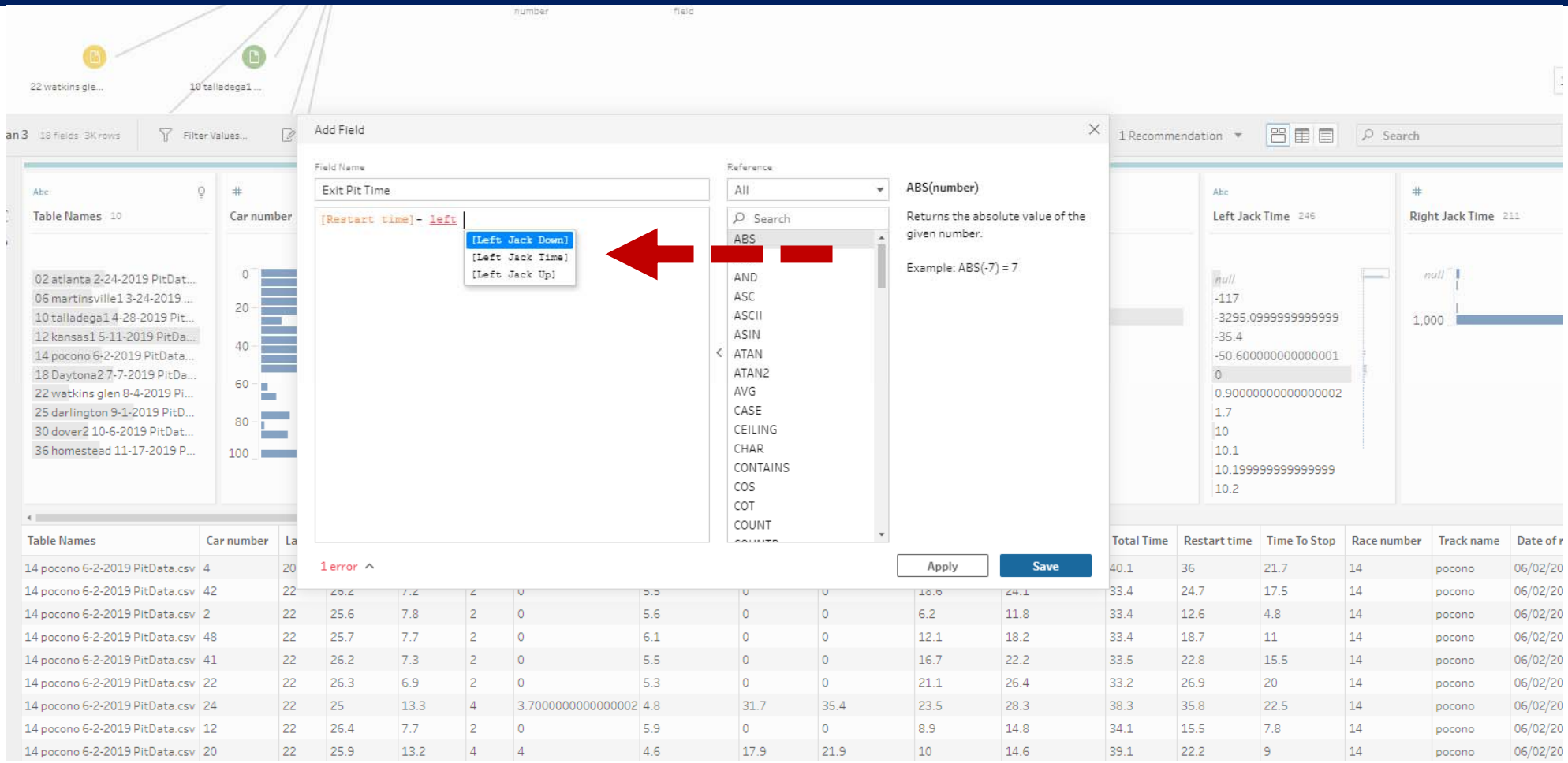


Table Names	Car number	La										Total Time	Restart time	Time To Stop	Race number	Track nan
14 pocono 6-2-2019 PitData.csv	4	20										40.1	36	21.7	14	pocono
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono

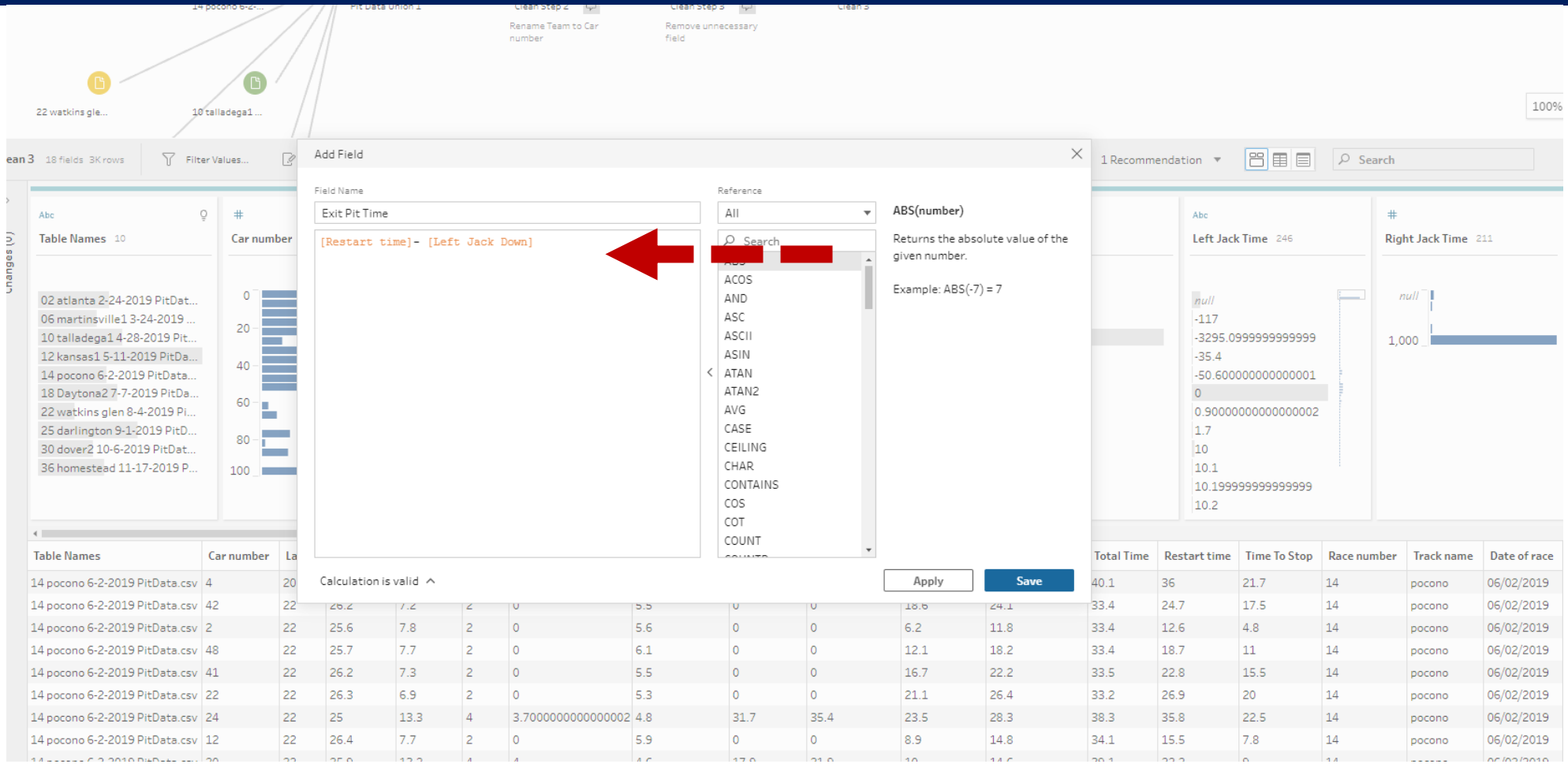
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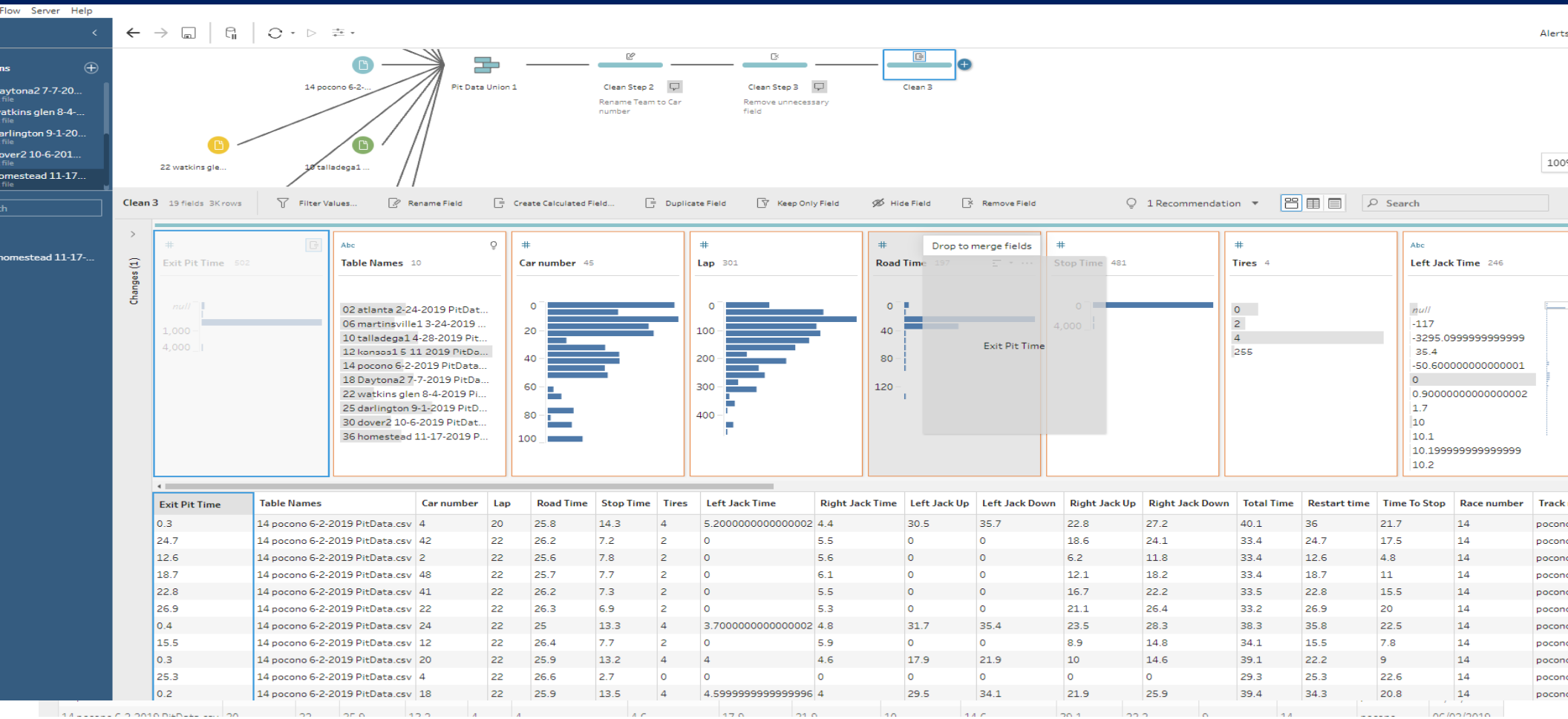
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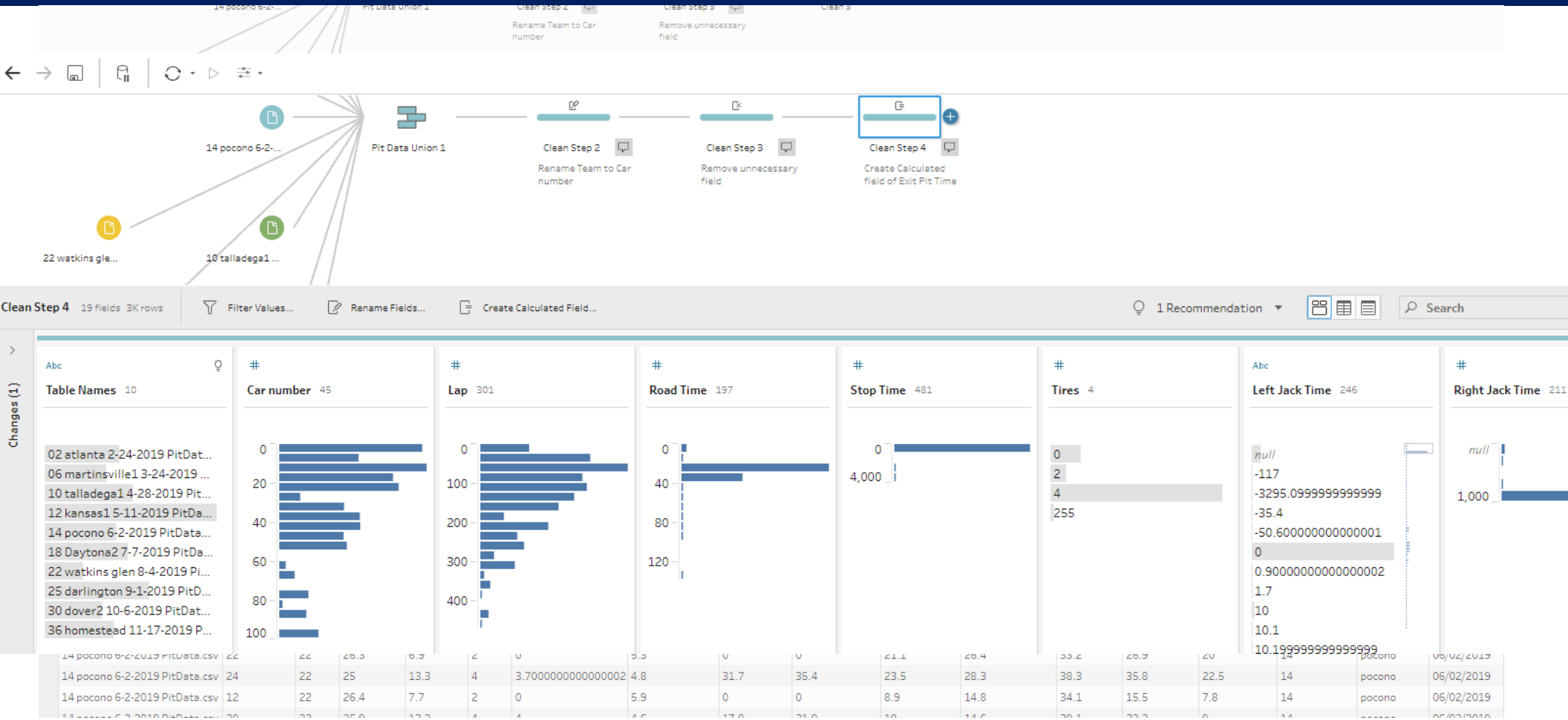


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Exit Pit Time	Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Total Time	Restart time	Time To Stop	Race number	Track
0.3	14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	40.1	36	21.7	14	pocono
24.7	14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	33.4	24.7	17.5	14	pocono
12.6	14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	33.4	12.6	4.8	14	pocono
18.7	14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	33.4	18.7	11	14	pocono
22.8	14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	33.5	22.8	15.5	14	pocono
26.9	14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	33.2	26.9	20	14	pocono
0.4	14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono
15.5	14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono
0.3	14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	39.1	22.2	9	14	pocono
25.3	14 pocono 6-2-2019 PitData.csv	4	22	26.6	2.7	0	0	0	0	0	0	0	29.3	25.3	22.6	14	pocono
0.2	14 pocono 6-2-2019 PitData.csv	18	22	25.9	13.5	4	4.5999999999999996	4	29.5	34.1	21.9	25.9	39.4	34.3	20.8	14	pocono

Calculated Field



14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	38.3	35.8	22.5	14	pocono	06/02/2019
14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	34.1	15.5	7.8	14	pocono	06/02/2019

Step 06

Change data format and create calculated field

Calculated Field

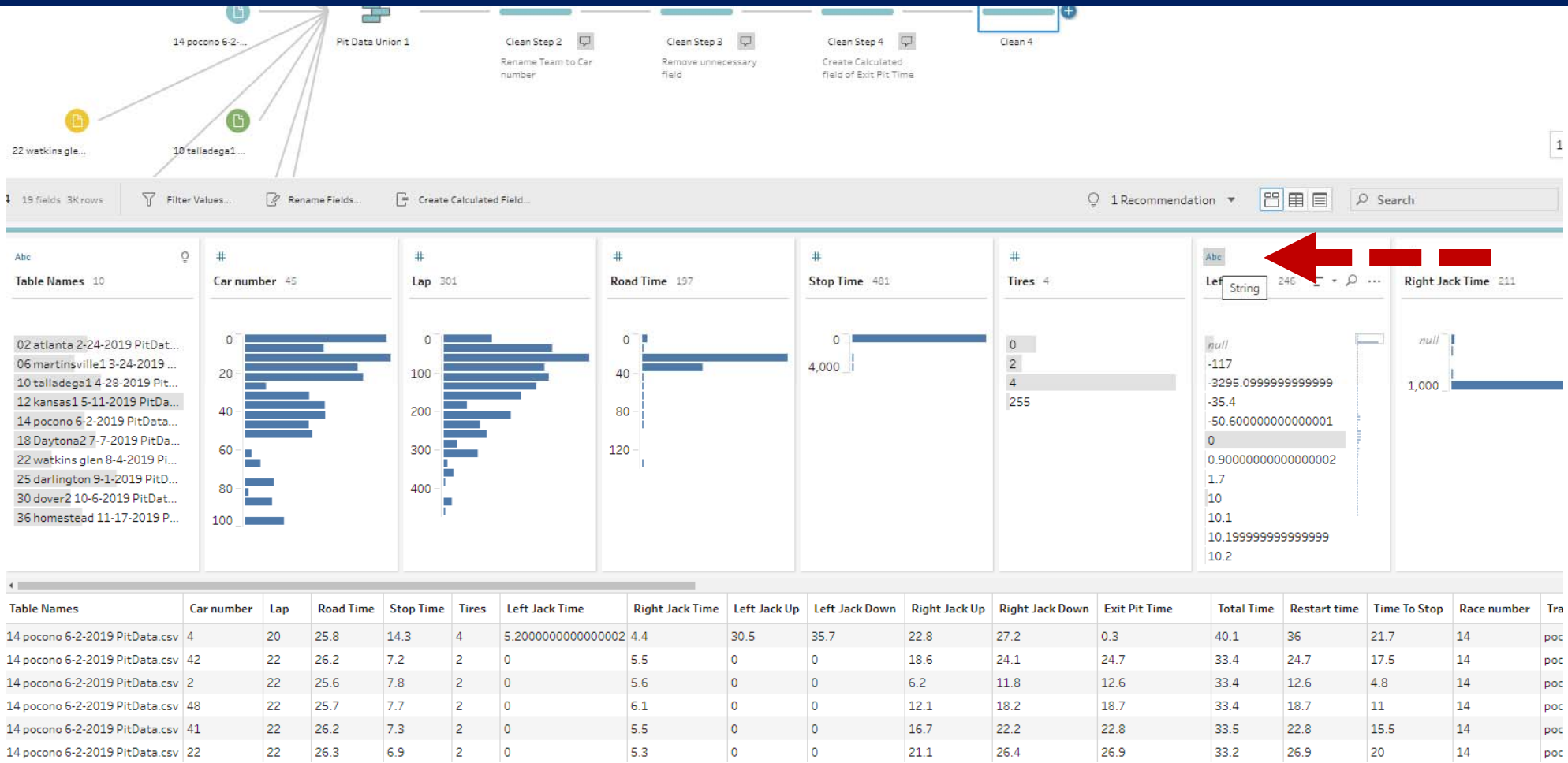


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To Stop	Race number	Tra
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7	14	poc
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5	14	poc
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14	poc
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14	poc
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5	14	poc
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20	14	poc

Calculated Field

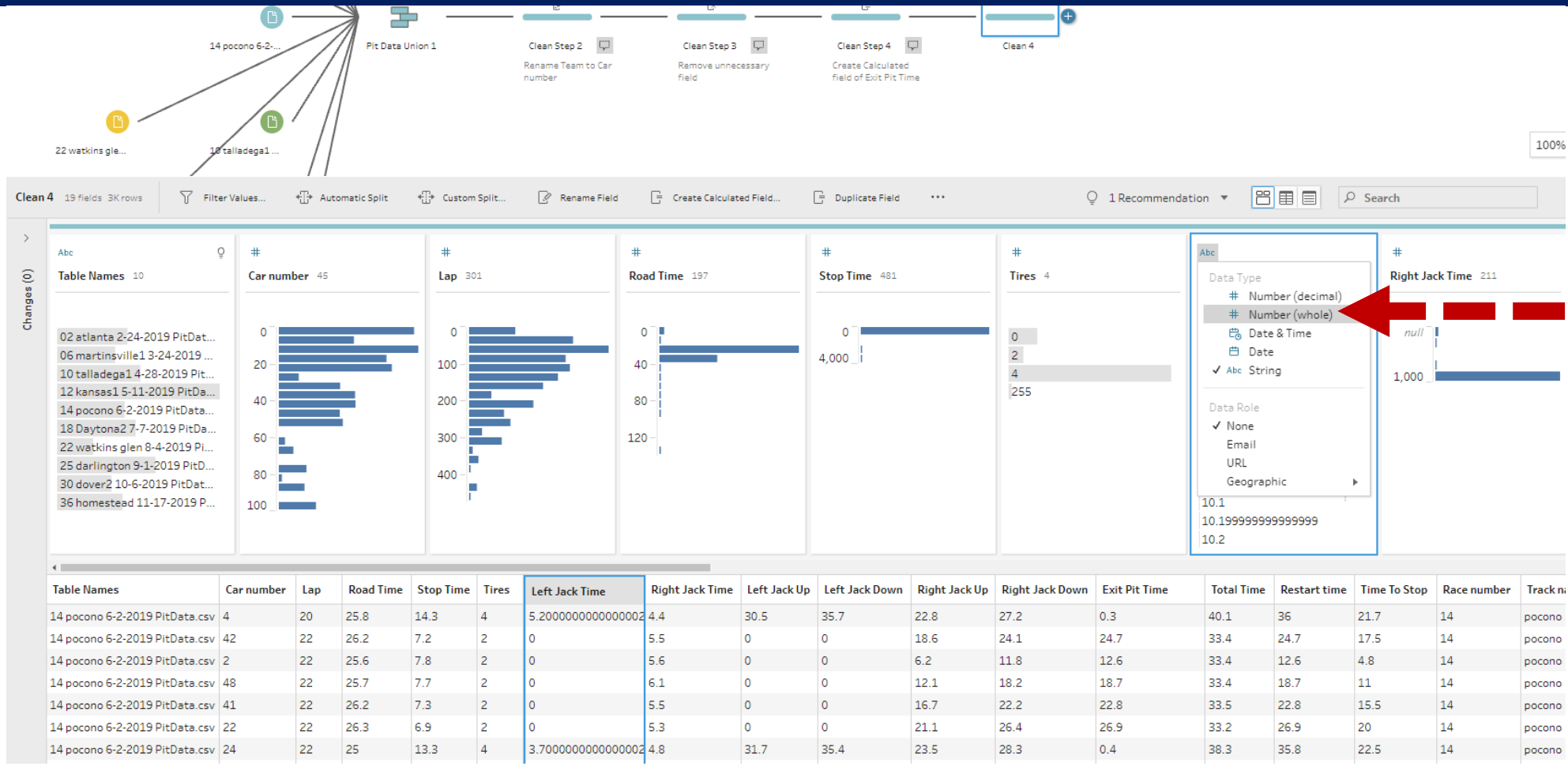


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To Stop	Race number	Track n
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5.2000000000000002	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7	14	pocono
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5	14	pocono
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14	pocono
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14	pocono
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5	14	pocono
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20	14	pocono
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3.7000000000000002	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5	14	pocono

Calculated Field

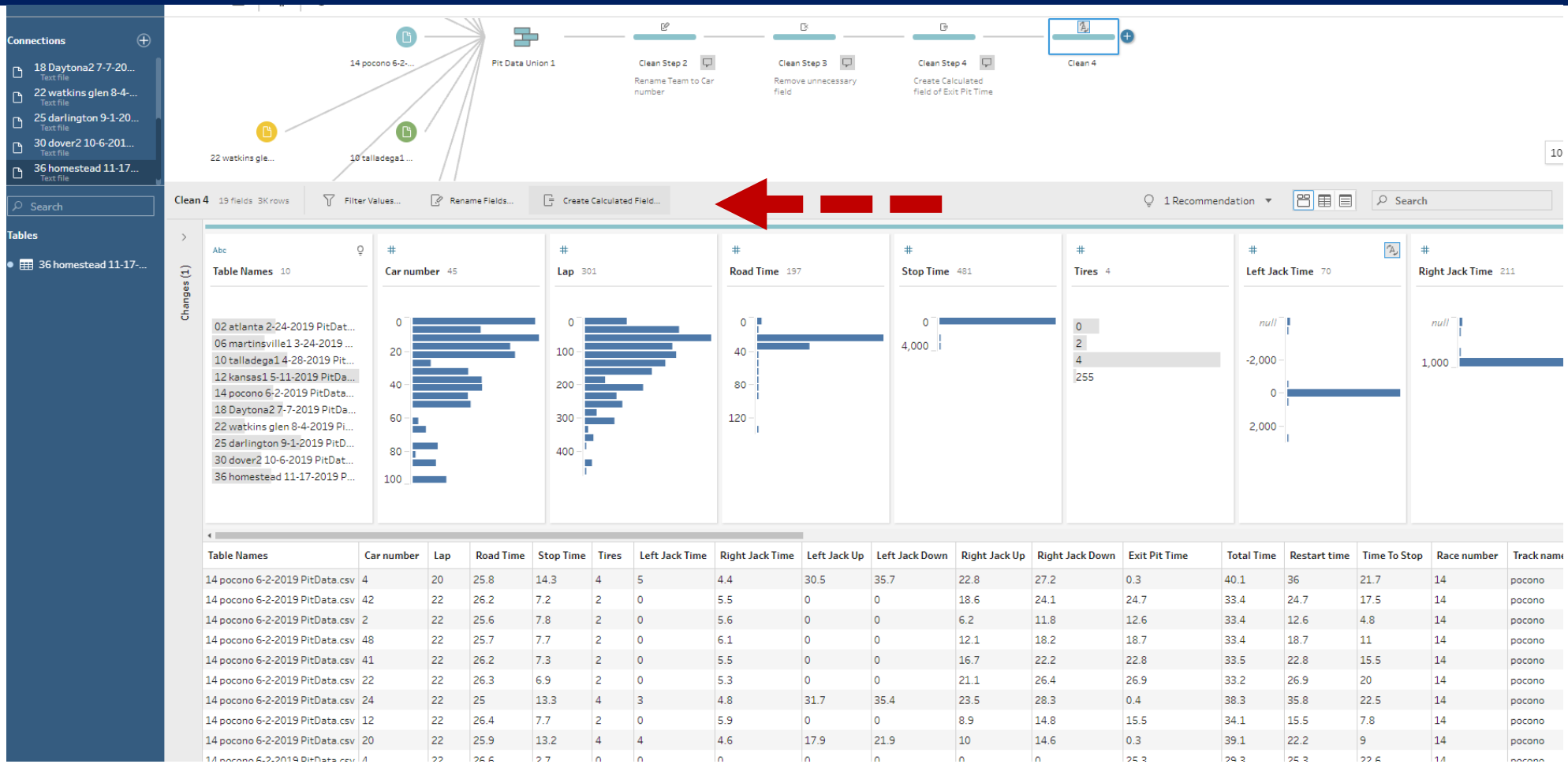


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To Stop	Race number	Track name
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7	14	pocono
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5	14	pocono
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14	pocono
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14	pocono
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5	14	pocono
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20	14	pocono
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5	14	pocono
14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	15.5	34.1	15.5	7.8	14	pocono
14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	4	4.6	17.9	21.9	10	14.6	0.3	39.1	22.2	9	14	pocono

Calculated Field

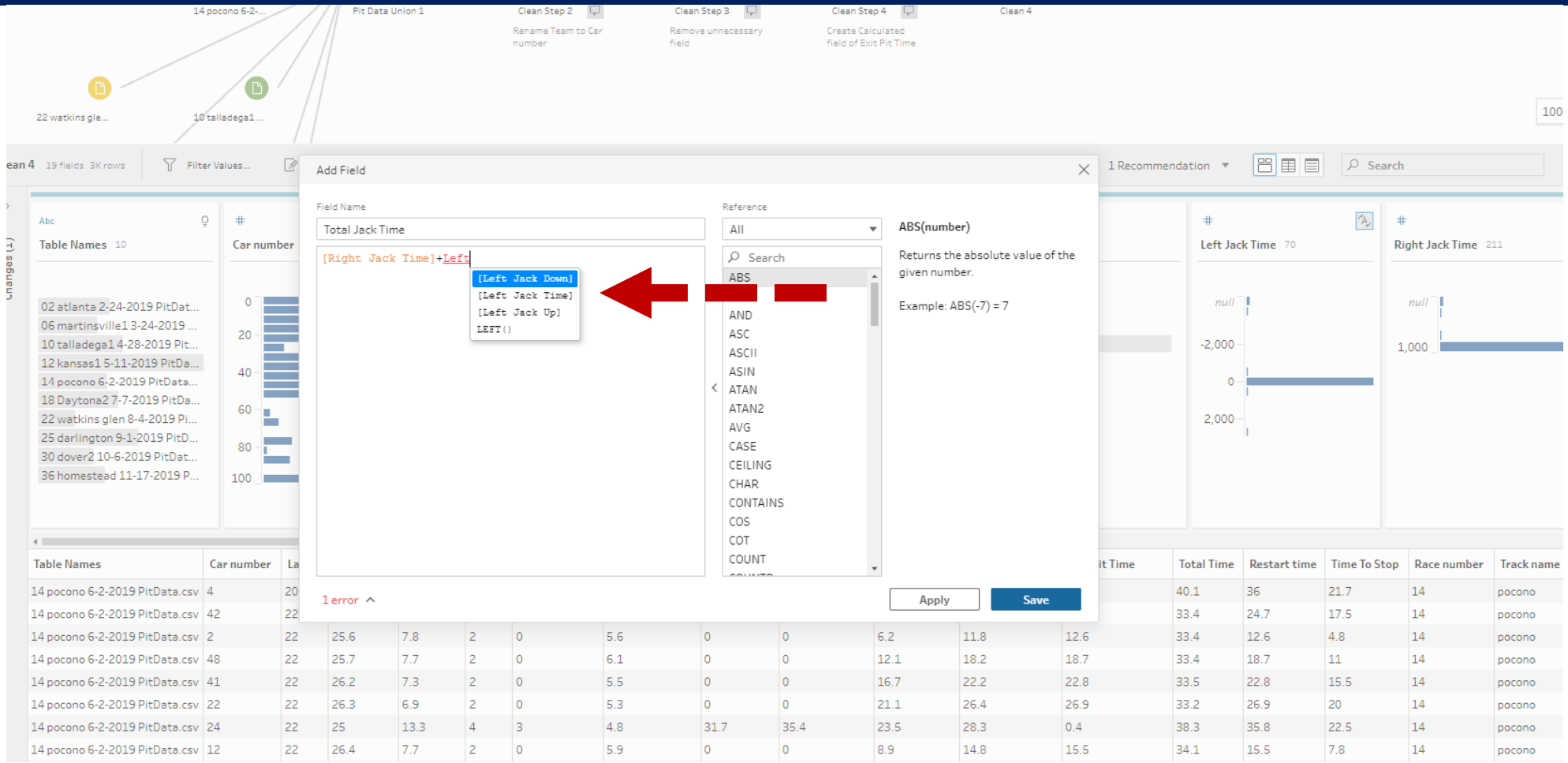
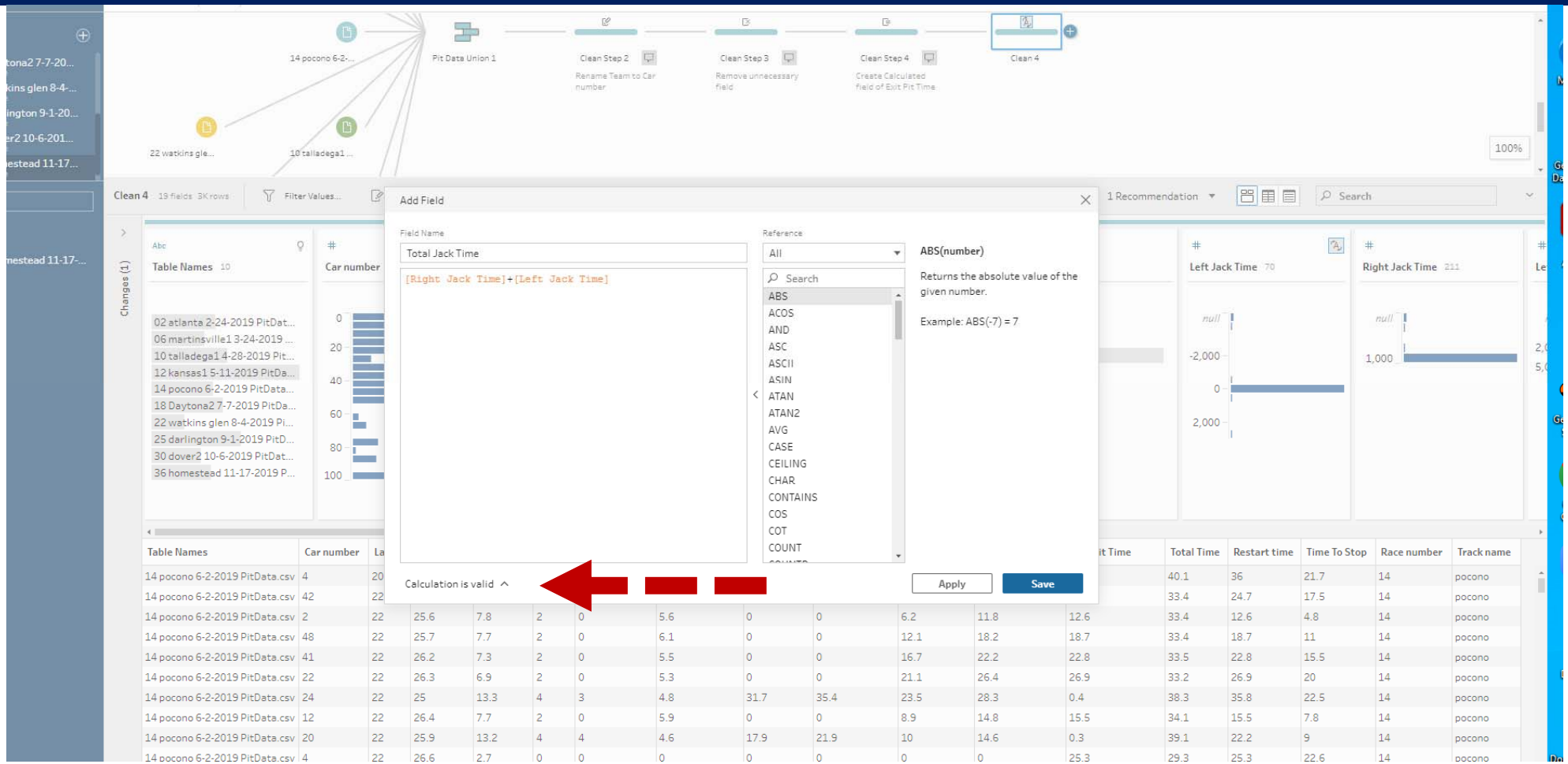


Table Names	Car number	La											Total Time	Restart time	Time To Stop	Race number	Track name
14 pocono 6-2-2019 PitData.csv	4	20											40.1	36	21.7	14	pocono
14 pocono 6-2-2019 PitData.csv	42	22											33.4	24.7	17.5	14	pocono
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14	pocono
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14	pocono
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5	14	pocono
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20	14	pocono
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	3	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5	14	pocono
14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	0	5.9	0	0	8.9	14.8	15.5	34.1	15.5	7.8	14	pocono

Calculated Field



Calculated Field

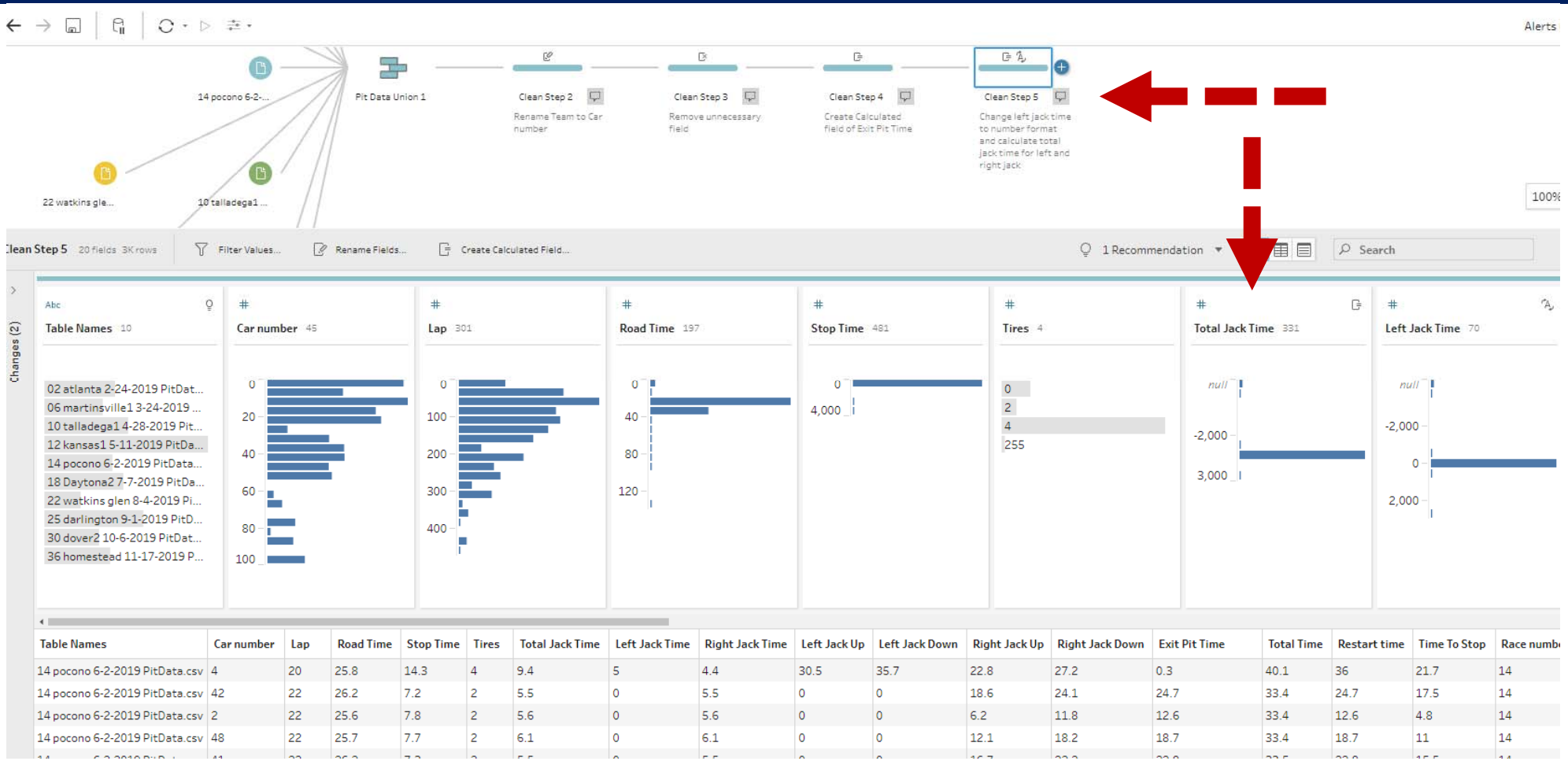


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To Stop	Race numb
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	9.4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7	14
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	5.5	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5	14
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	5.6	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	6.1	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14

Step 07

Create a calculated field

Calculated Field

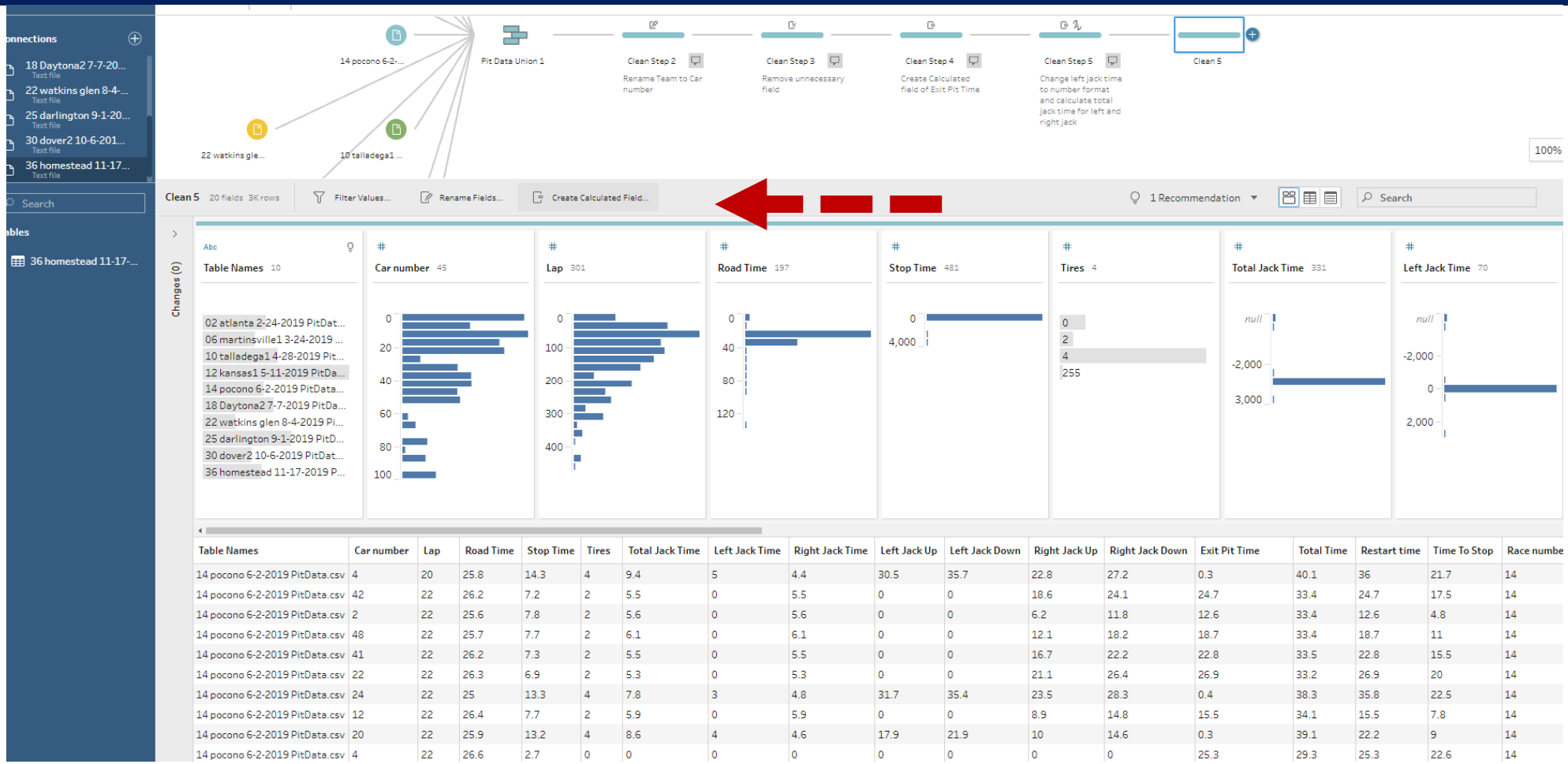
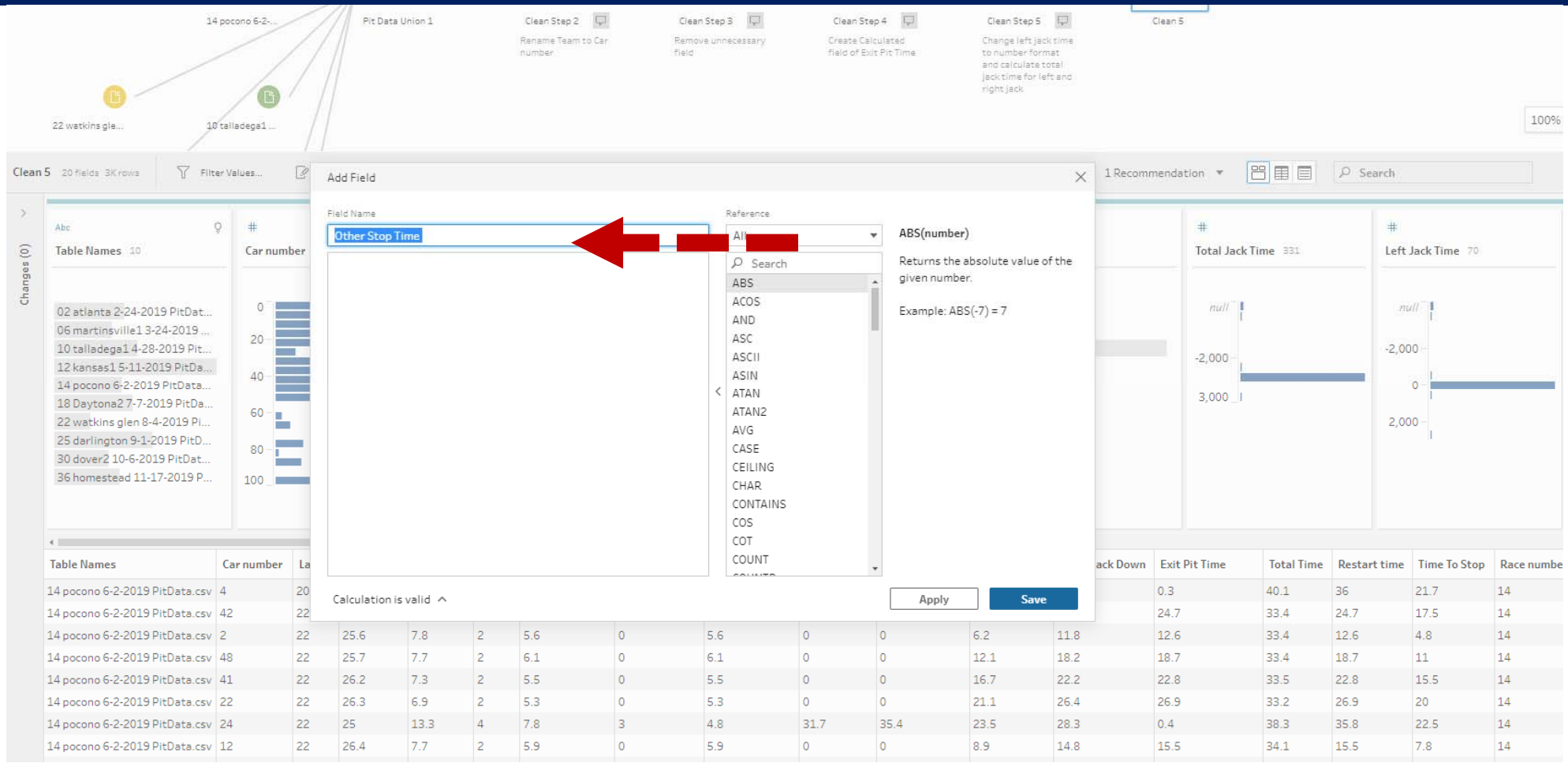
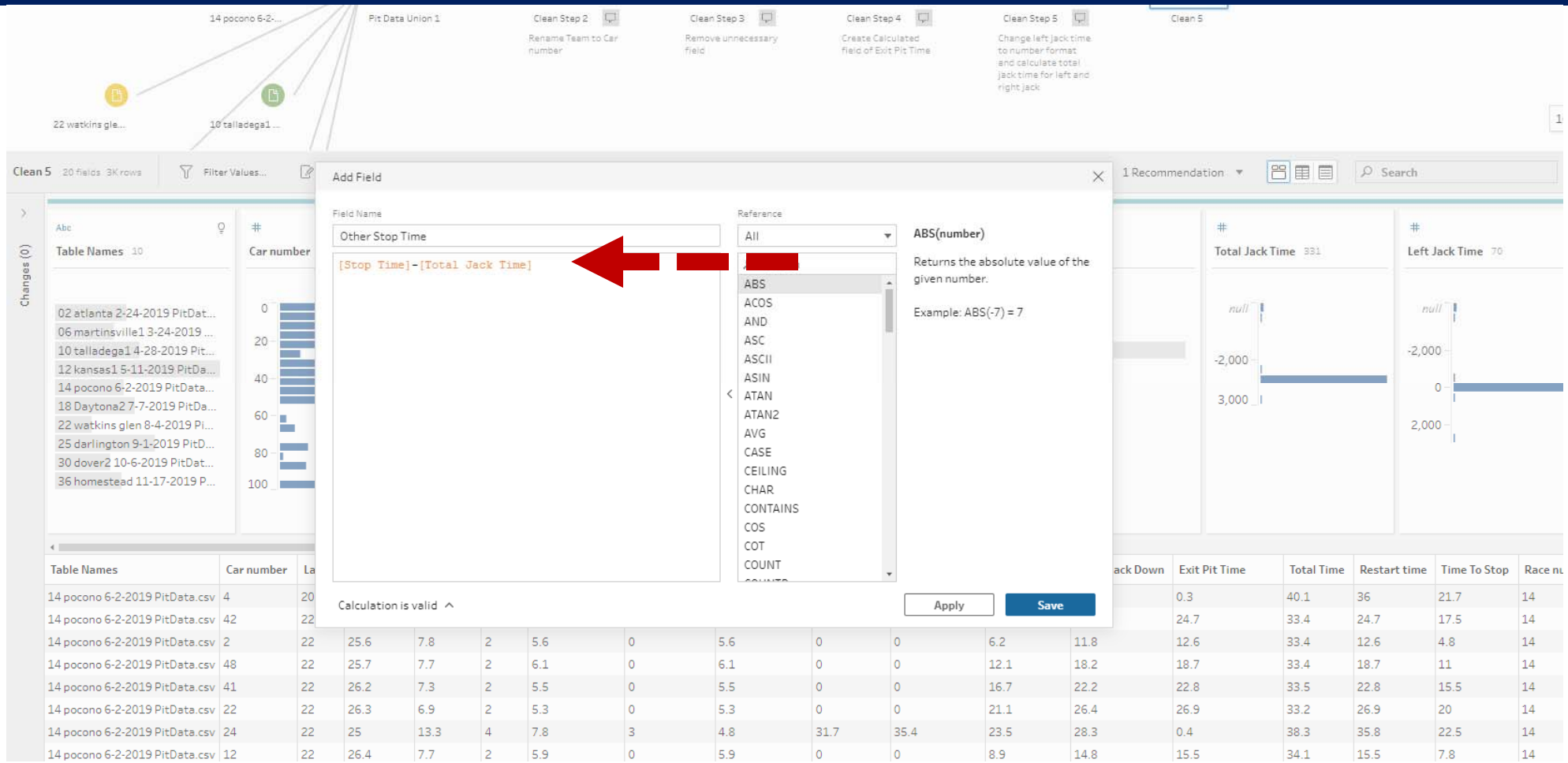


Table Names	Car number	Lap	Road Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To Stop	Race numbe
14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	9.4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7	14
14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	5.5	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5	14
14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	5.6	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8	14
14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	6.1	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11	14
14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	5.5	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5	14
14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	5.3	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20	14
14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	7.8	3	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5	14
14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	5.9	0	5.9	0	0	8.9	14.8	15.5	34.1	15.5	7.8	14
14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	8.6	4	4.6	17.9	21.9	10	14.6	0.3	39.1	22.2	9	14
14 pocono 6-2-2019 PitData.csv	4	22	26.6	2.7	0	0	0	0	0	0	0	0	25.3	29.3	25.3	22.6	14

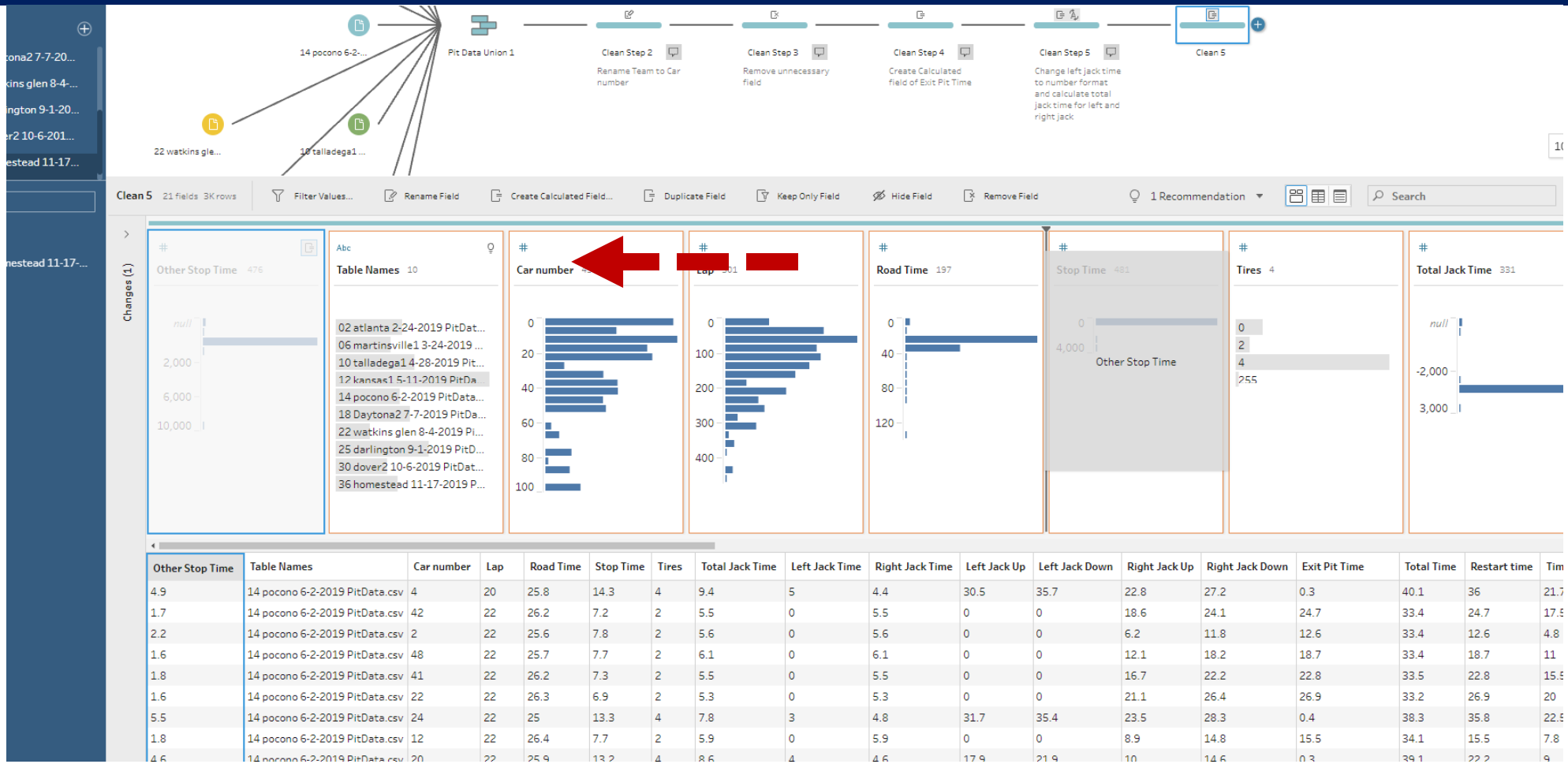
Calculated Field



Calculated Field



Calculated Field

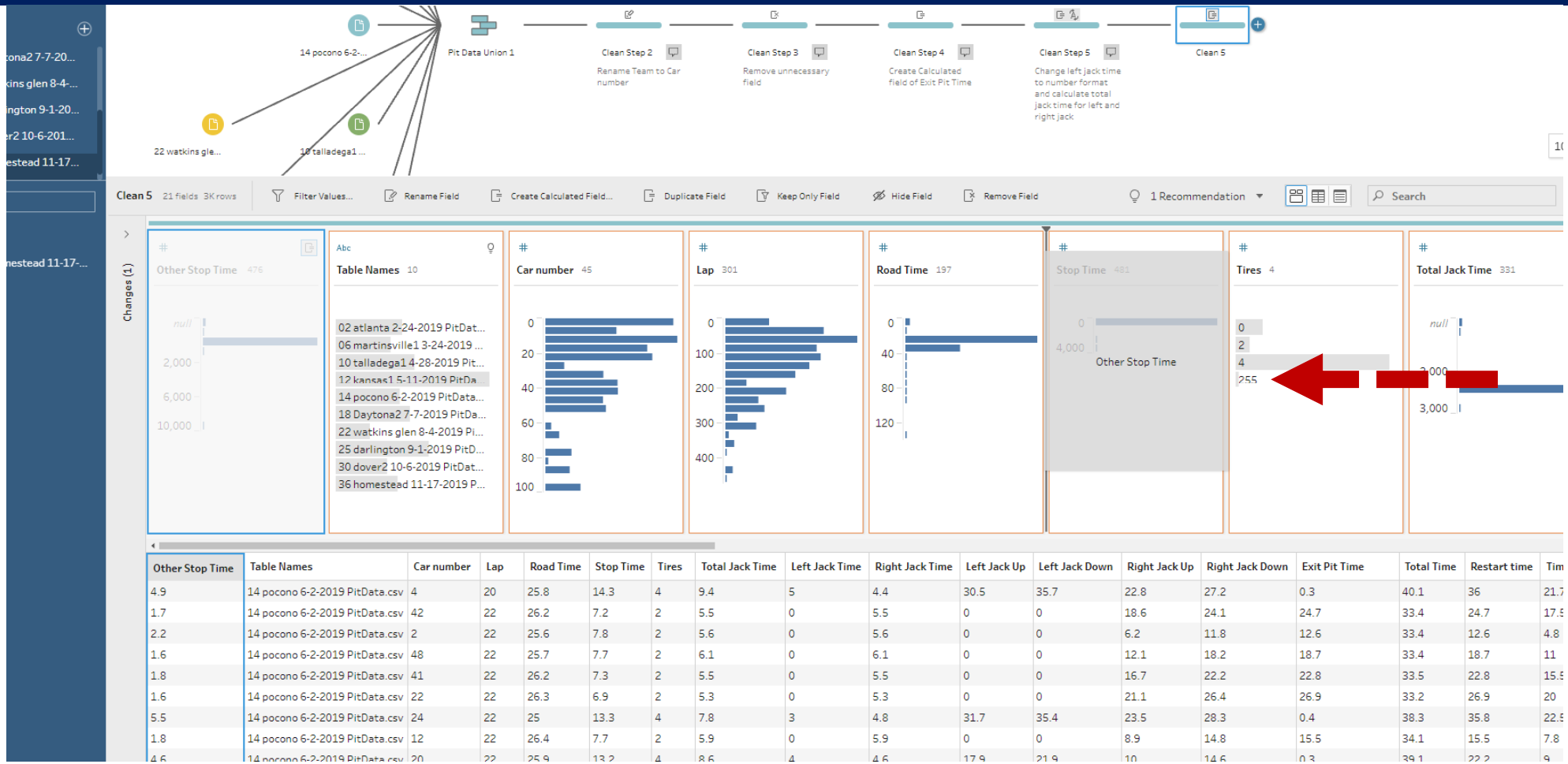


Other Stop Time	Table Names	Car number	Lap	Road Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Tim
4.9	14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	9.4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7
1.7	14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	5.5	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5
2.2	14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	5.6	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8
1.6	14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	6.1	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11
1.8	14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	5.5	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5
1.6	14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	5.3	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20
5.5	14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	7.8	3	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5
1.8	14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	5.9	0	5.9	0	0	8.9	14.8	15.5	34.1	15.5	7.8
4.6	14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	8.6	4	4.6	17.9	21.9	10	14.6	0.3	39.1	22.2	9

Step 08

Review Data

Data Review



Other Stop Time	Table Names	Car number	Lap	Road Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Tim
4.9	14 pocono 6-2-2019 PitData.csv	4	20	25.8	14.3	4	9.4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7
1.7	14 pocono 6-2-2019 PitData.csv	42	22	26.2	7.2	2	5.5	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5
2.2	14 pocono 6-2-2019 PitData.csv	2	22	25.6	7.8	2	5.6	0	5.6	0	0	6.2	11.8	12.6	33.4	12.6	4.8
1.6	14 pocono 6-2-2019 PitData.csv	48	22	25.7	7.7	2	6.1	0	6.1	0	0	12.1	18.2	18.7	33.4	18.7	11
1.8	14 pocono 6-2-2019 PitData.csv	41	22	26.2	7.3	2	5.5	0	5.5	0	0	16.7	22.2	22.8	33.5	22.8	15.5
1.6	14 pocono 6-2-2019 PitData.csv	22	22	26.3	6.9	2	5.3	0	5.3	0	0	21.1	26.4	26.9	33.2	26.9	20
5.5	14 pocono 6-2-2019 PitData.csv	24	22	25	13.3	4	7.8	3	4.8	31.7	35.4	23.5	28.3	0.4	38.3	35.8	22.5
1.8	14 pocono 6-2-2019 PitData.csv	12	22	26.4	7.7	2	5.9	0	5.9	0	0	8.9	14.8	15.5	34.1	15.5	7.8
4.6	14 pocono 6-2-2019 PitData.csv	20	22	25.9	13.2	4	8.6	4	4.6	17.9	21.9	10	14.6	0.3	39.1	22.2	9

Data Review

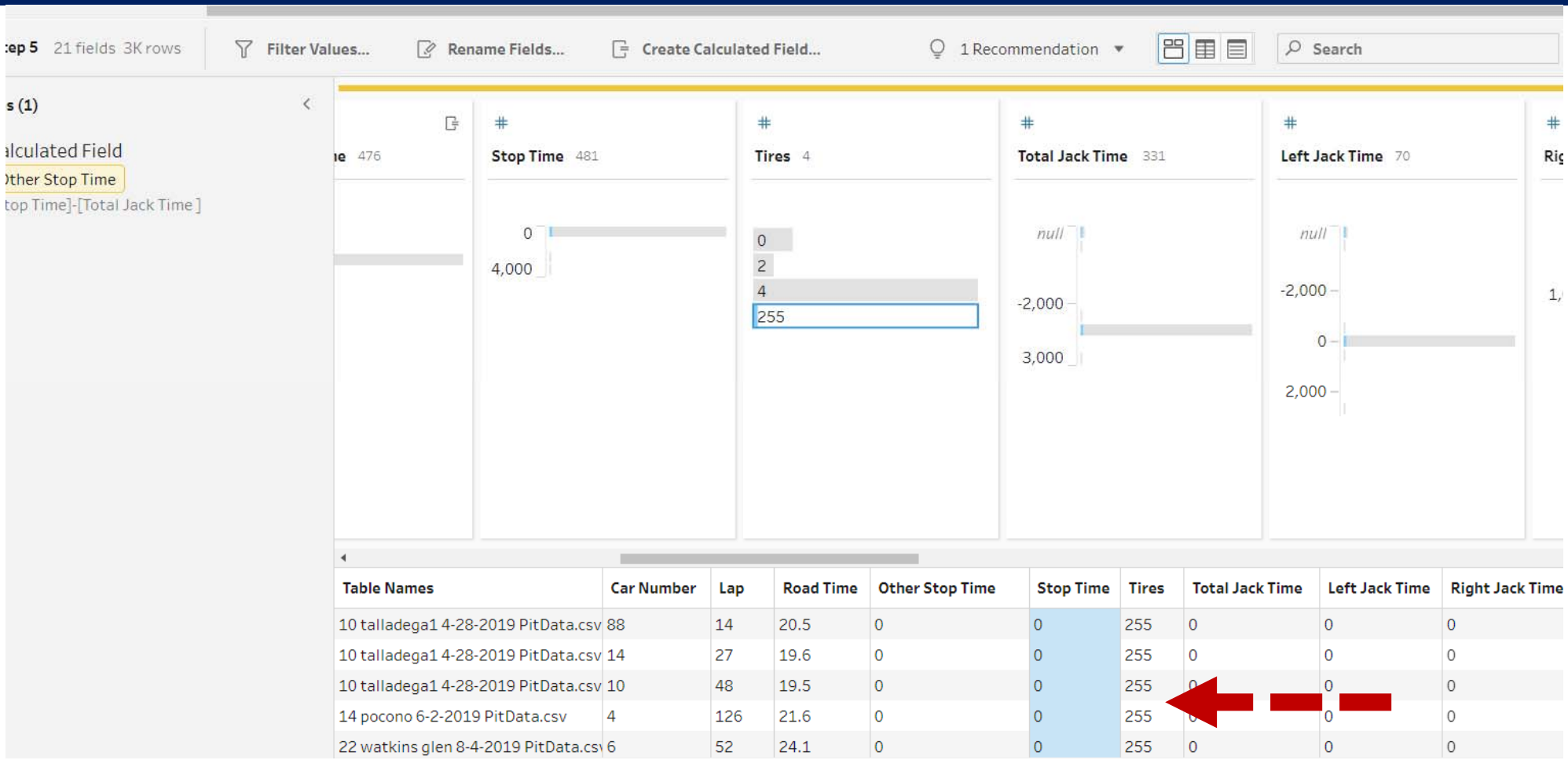


Table Names	Car Number	Lap	Road Time	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time
10 talladega1 4-28-2019 PitData.csv	88	14	20.5	0	0	255	0	0	0
10 talladega1 4-28-2019 PitData.csv	14	27	19.6	0	0	255	0	0	0
10 talladega1 4-28-2019 PitData.csv	10	48	19.5	0	0	255	0	0	0
14 pocono 6-2-2019 PitData.csv	4	126	21.6	0	0	255	0	0	0
22 watkins glen 8-4-2019 PitData.csv	6	52	24.1	0	0	255	0	0	0

Data Review

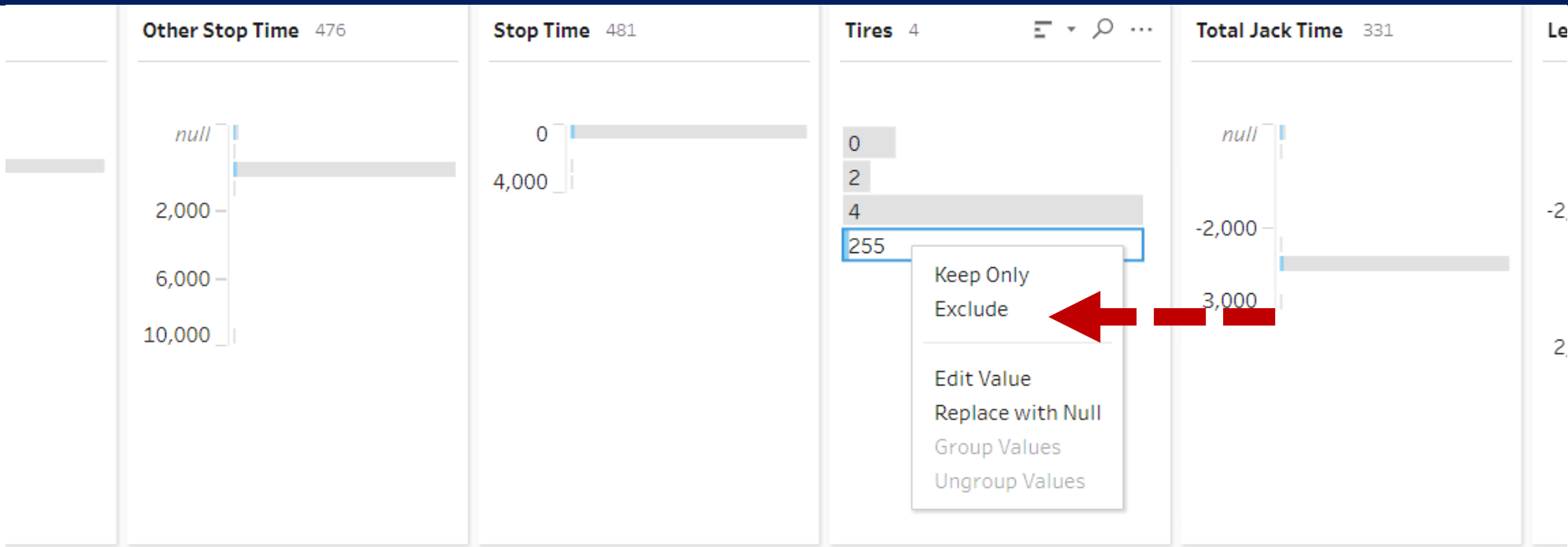


Table Names	Car Number	Lap	Road Time	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Ja
10 talladega1 4-28-2019 PitData.csv	88	14	20.5	0	0	255	0	0	0
10 talladega1 4-28-2019 PitData.csv	14	27	19.6	0	0	255	0	0	0
10 talladega1 4-28-2019 PitData.csv	10	48	19.5	0	0	255	0	0	0

Data Review

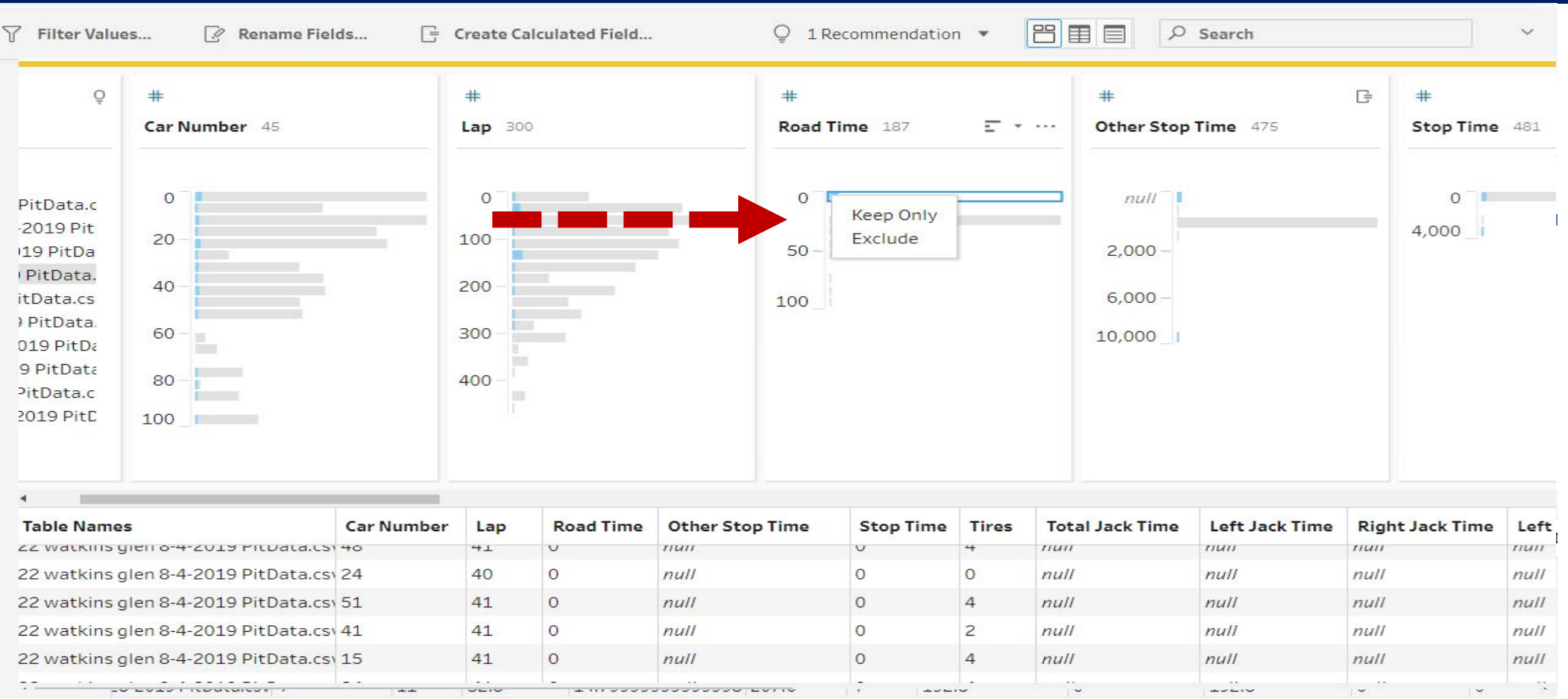


Table Names	Car Number	Lap	Road Time	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left
22 watkins glen 8-4-2019 PitData.csv	24	40	0	null	0	0	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	51	41	0	null	0	4	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	41	41	0	null	0	2	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	15	41	0	null	0	4	null	null	null	null

Data Review

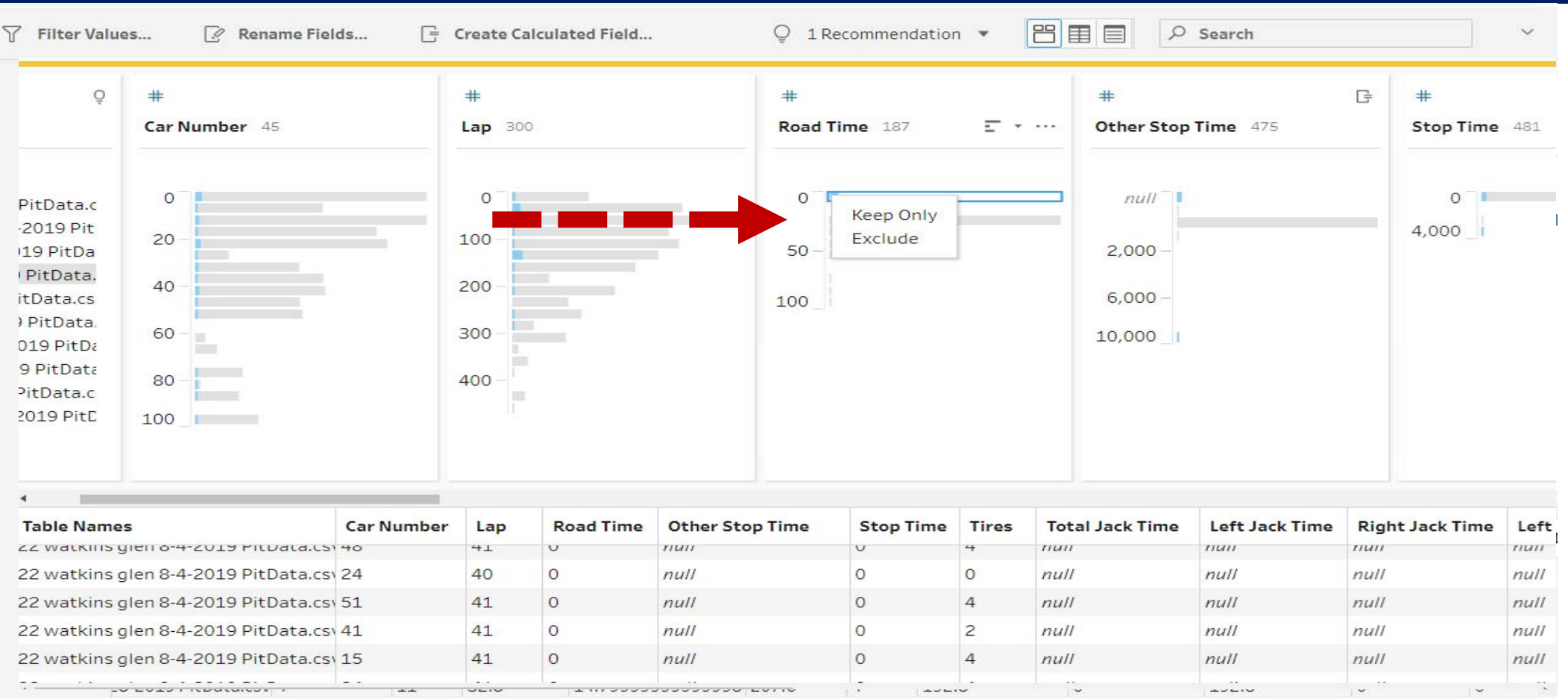
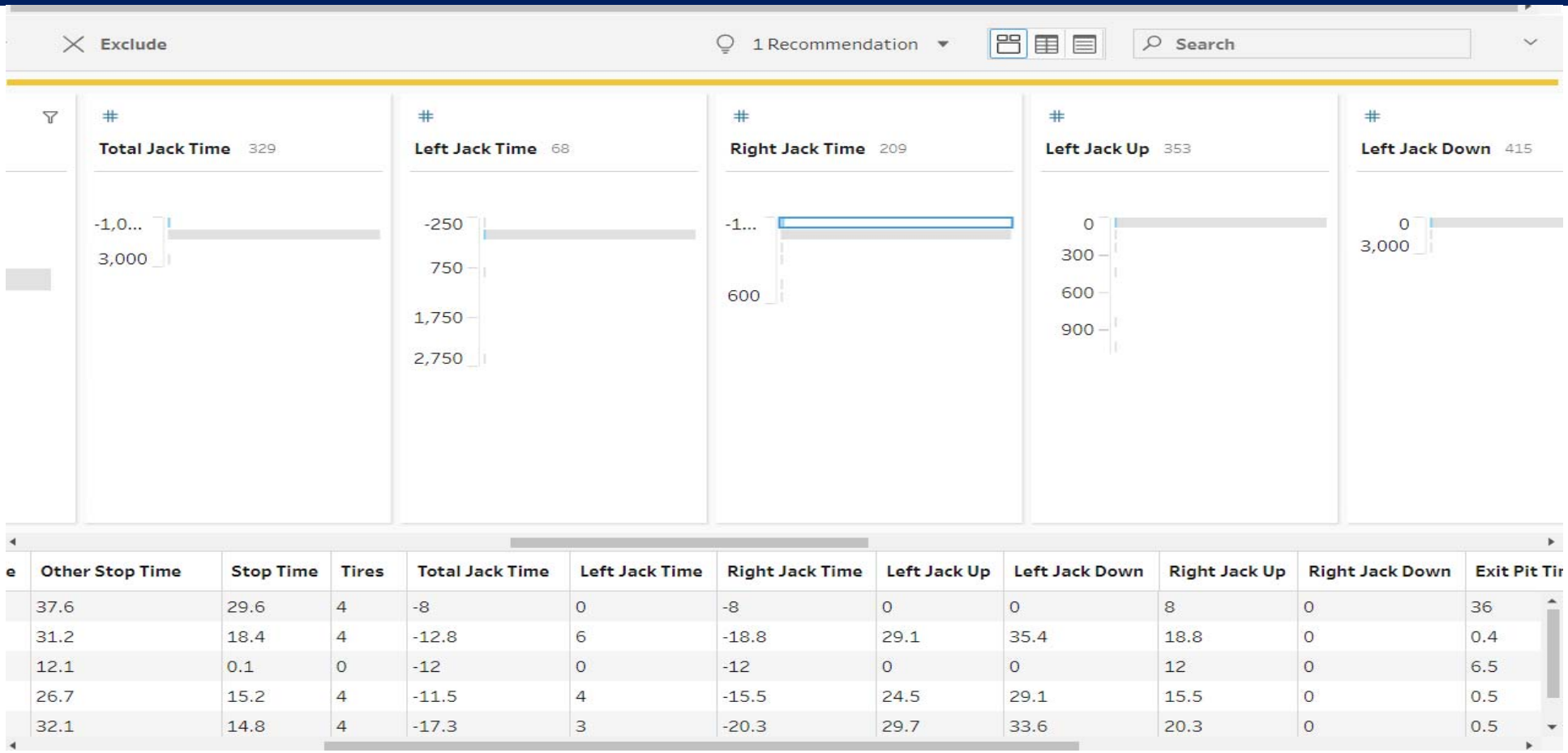


Table Names	Car Number	Lap	Road Time	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left
22 watkins glen 8-4-2019 PitData.csv	24	40	0	null	0	0	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	51	41	0	null	0	4	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	41	41	0	null	0	2	null	null	null	null
22 watkins glen 8-4-2019 PitData.csv	15	41	0	null	0	4	null	null	null	null

Data Review



e	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Tir
	37.6	29.6	4	-8	0	-8	0	0	8	0	36
	31.2	18.4	4	-12.8	6	-18.8	29.1	35.4	18.8	0	0.4
	12.1	0.1	0	-12	0	-12	0	0	12	0	6.5
	26.7	15.2	4	-11.5	4	-15.5	24.5	29.1	15.5	0	0.5
	32.1	14.8	4	-17.3	3	-20.3	29.7	33.6	20.3	0	0.5

Step 09

Create an output file

Create an Output File

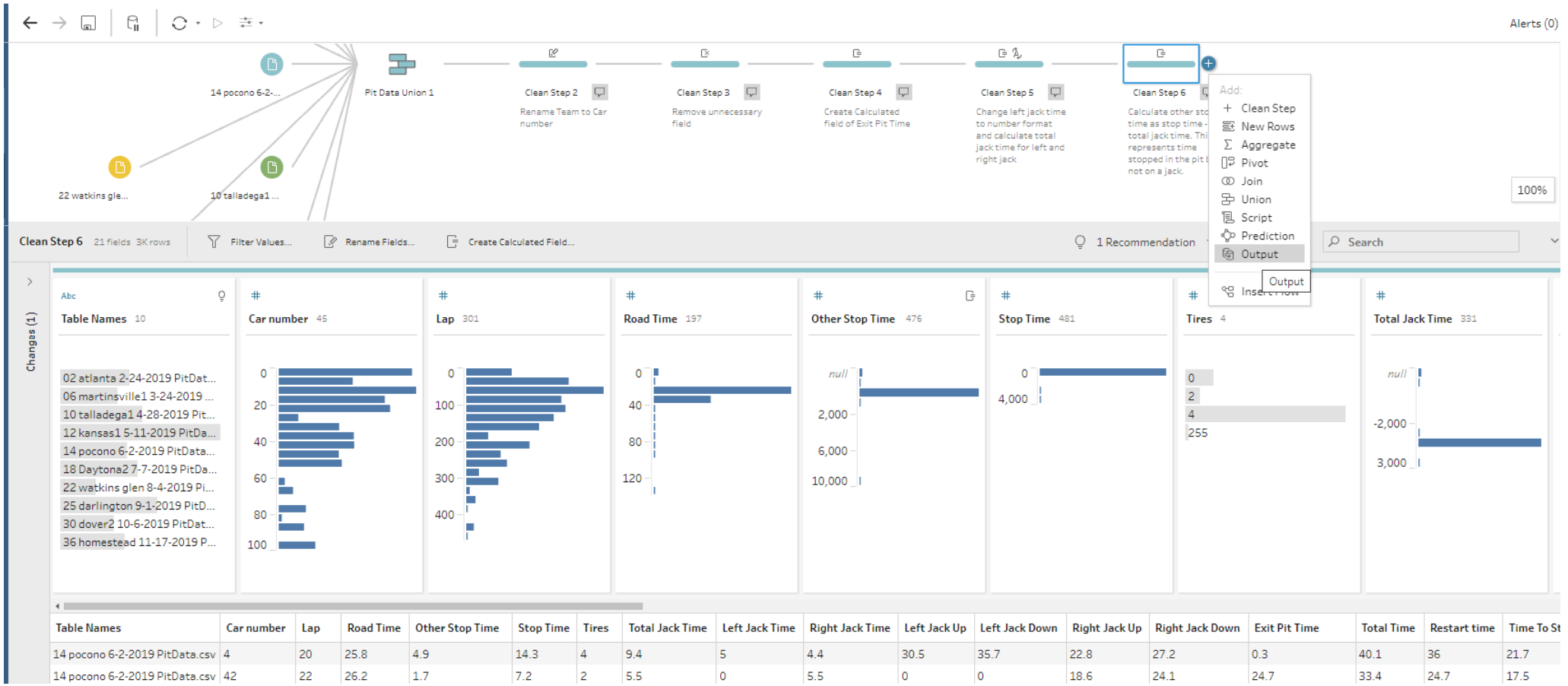
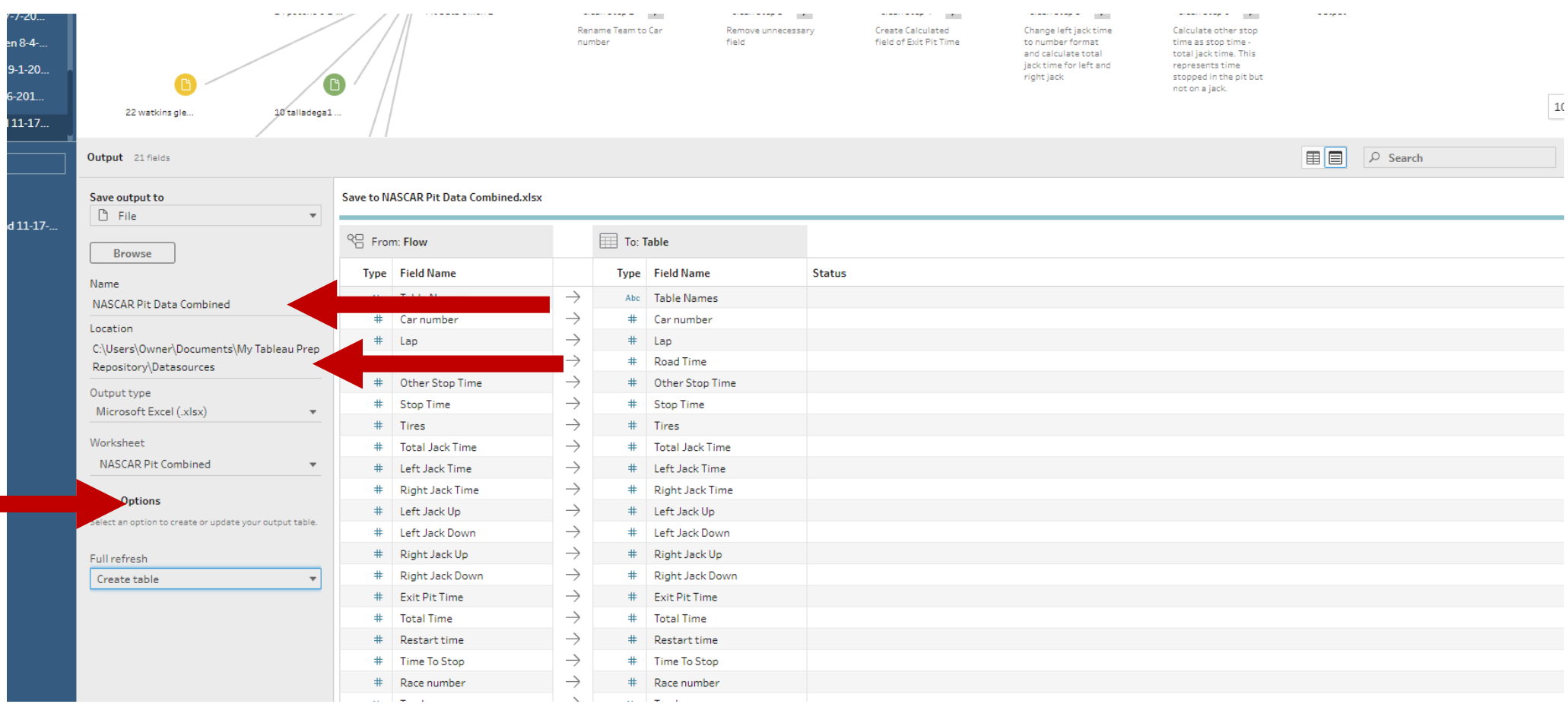
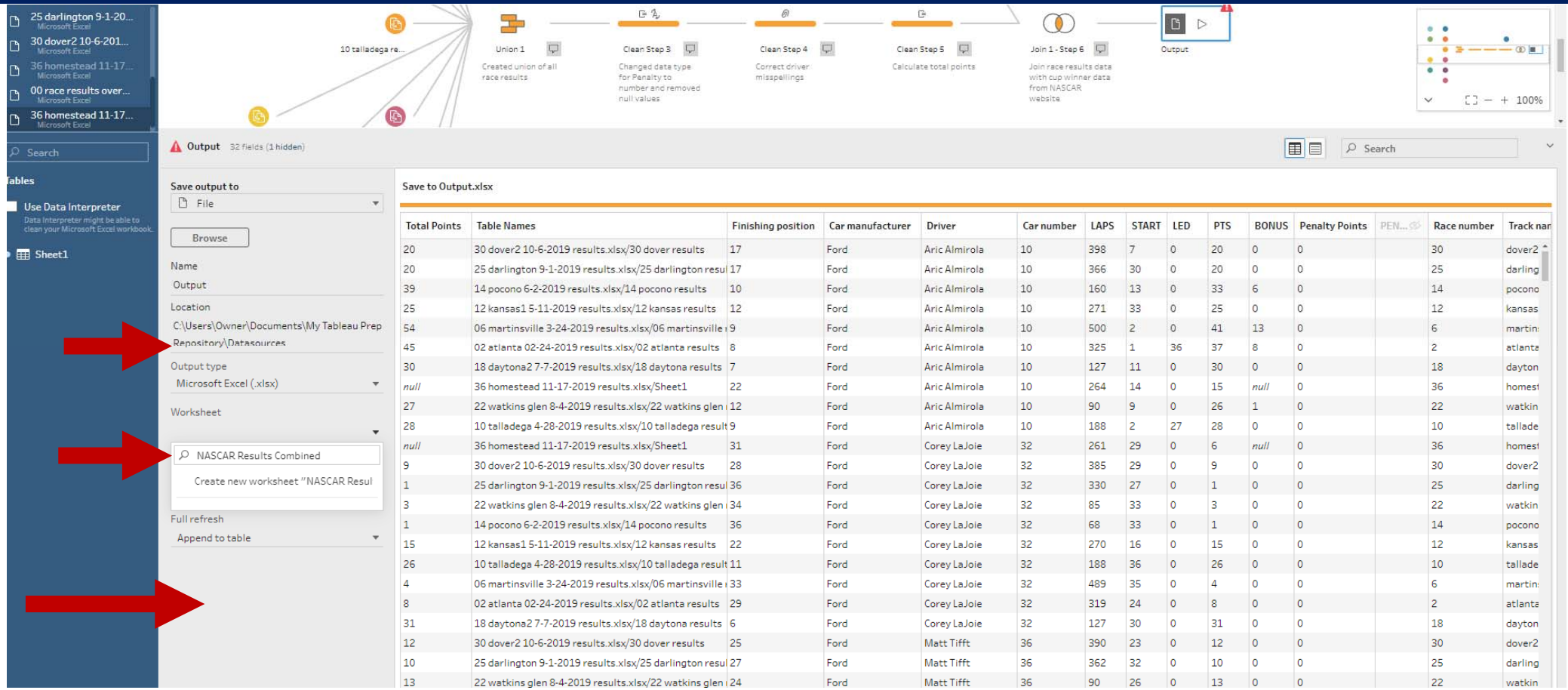


Table Names	Car number	Lap	Road Time	Other Stop Time	Stop Time	Tires	Total Jack Time	Left Jack Time	Right Jack Time	Left Jack Up	Left Jack Down	Right Jack Up	Right Jack Down	Exit Pit Time	Total Time	Restart time	Time To St
14 pocono 6-2-2019 PitData.csv	4	20	25.8	4.9	14.3	4	9.4	5	4.4	30.5	35.7	22.8	27.2	0.3	40.1	36	21.7
14 pocono 6-2-2019 PitData.csv	42	22	26.2	1.7	7.2	2	5.5	0	5.5	0	0	18.6	24.1	24.7	33.4	24.7	17.5

Create an Output File

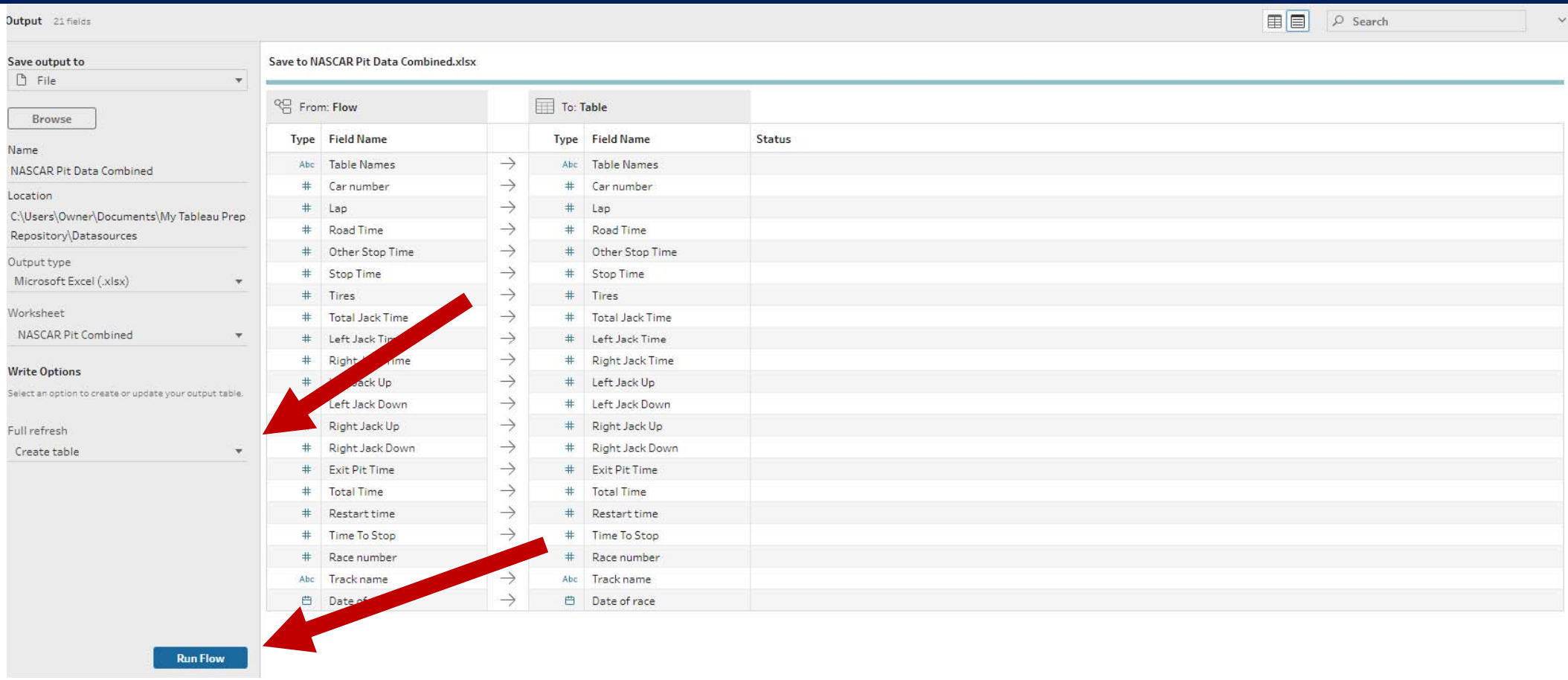


Create an Output File

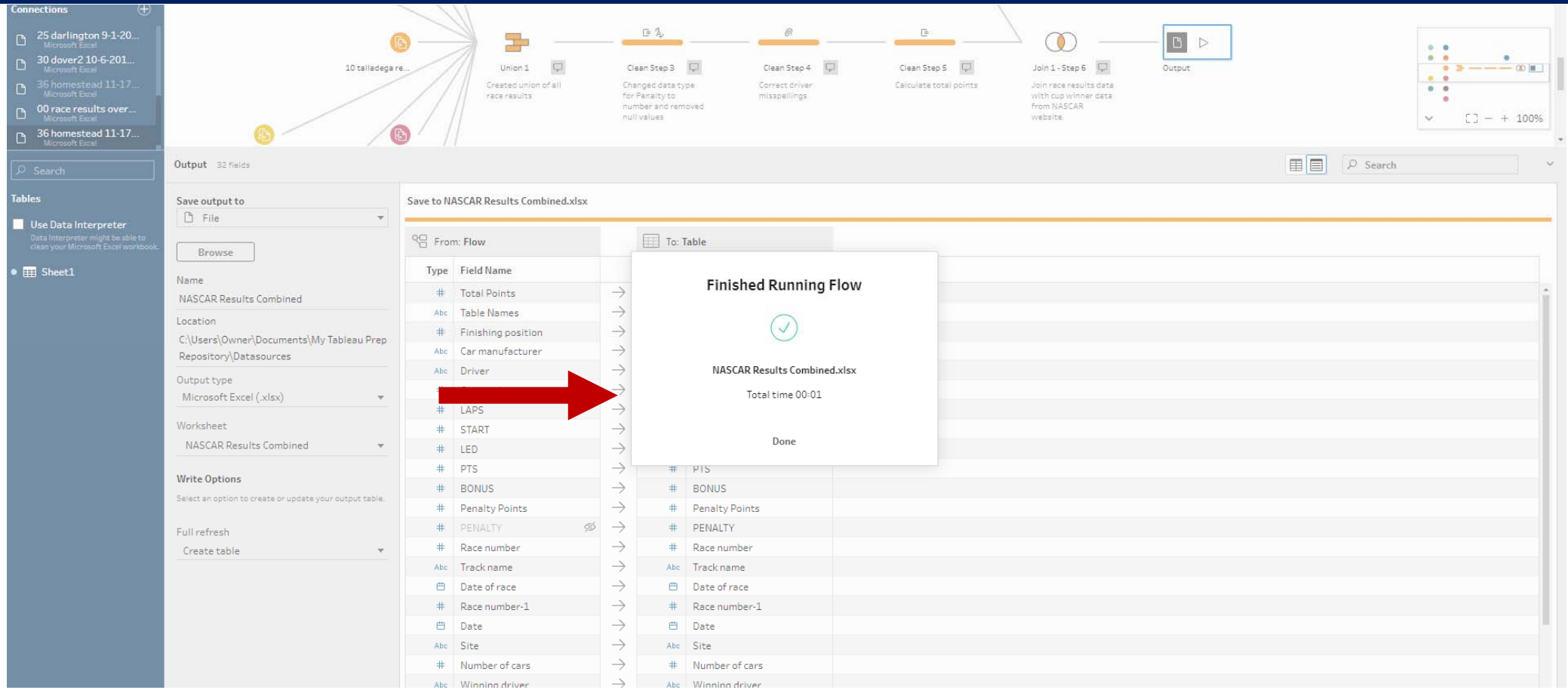


Total Points	Table Names	Finishing position	Car manufacturer	Driver	Car number	LAPS	START	LED	PTS	BONUS	Penalty Points	PEN...	Race number	Track nar
20	30 dover2 10-6-2019 results.xlsx/30 dover results	17	Ford	Aric Almirola	10	398	7	0	20	0	0		30	dover2
20	25 darlington 9-1-2019 results.xlsx/25 darlington resu	17	Ford	Aric Almirola	10	366	30	0	20	0	0		25	darling
39	14 pocono 6-2-2019 results.xlsx/14 pocono results	10	Ford	Aric Almirola	10	160	13	0	33	6	0		14	pocono
25	12 kansas1 5-11-2019 results.xlsx/12 kansas results	12	Ford	Aric Almirola	10	271	33	0	25	0	0		12	kansas
54	06 martinsville 3-24-2019 results.xlsx/06 martinsville	9	Ford	Aric Almirola	10	500	2	0	41	13	0		6	martin
45	02 atlanta 02-24-2019 results.xlsx/02 atlanta results	8	Ford	Aric Almirola	10	325	1	36	37	8	0		2	atlanta
30	18 daytona2 7-7-2019 results.xlsx/18 daytona results	7	Ford	Aric Almirola	10	127	11	0	30	0	0		18	dayton
null	36 homestead 11-17-2019 results.xlsx/Sheet1	22	Ford	Aric Almirola	10	264	14	0	15	*null*	0		36	homest
27	22 watkins glen 8-4-2019 results.xlsx/22 watkins glen	12	Ford	Aric Almirola	10	90	9	0	26	1	0		22	watkin
28	10 talladega 4-28-2019 results.xlsx/10 talladega result	9	Ford	Aric Almirola	10	188	2	27	28	0	0		10	tallade
null	36 homestead 11-17-2019 results.xlsx/Sheet1	31	Ford	Corey LaJoie	32	261	29	0	6	*null*	0		36	homest
9	30 dover2 10-6-2019 results.xlsx/30 dover results	28	Ford	Corey LaJoie	32	385	29	0	9	0	0		30	dover2
1	25 darlington 9-1-2019 results.xlsx/25 darlington resu	36	Ford	Corey LaJoie	32	330	27	0	1	0	0		25	darling
3	22 watkins glen 8-4-2019 results.xlsx/22 watkins glen	34	Ford	Corey LaJoie	32	85	33	0	3	0	0		22	watkin
1	14 pocono 6-2-2019 results.xlsx/14 pocono results	36	Ford	Corey LaJoie	32	68	33	0	1	0	0		14	pocono
15	12 kansas1 5-11-2019 results.xlsx/12 kansas results	22	Ford	Corey LaJoie	32	270	16	0	15	0	0		12	kansas
26	10 talladega 4-28-2019 results.xlsx/10 talladega result	11	Ford	Corey LaJoie	32	188	36	0	26	0	0		10	tallade
4	06 martinsville 3-24-2019 results.xlsx/06 martinsville	33	Ford	Corey LaJoie	32	489	35	0	4	0	0		6	martin
8	02 atlanta 02-24-2019 results.xlsx/02 atlanta results	29	Ford	Corey LaJoie	32	319	24	0	8	0	0		2	atlanta
31	18 daytona2 7-7-2019 results.xlsx/18 daytona results	6	Ford	Corey LaJoie	32	127	30	0	31	0	0		18	dayton
12	30 dover2 10-6-2019 results.xlsx/30 dover results	25	Ford	Matt Tifft	36	390	23	0	12	0	0		30	dover2
10	25 darlington 9-1-2019 results.xlsx/25 darlington resu	27	Ford	Matt Tifft	36	362	32	0	10	0	0		25	darling
13	22 watkins glen 8-4-2019 results.xlsx/22 watkins glen	24	Ford	Matt Tifft	36	90	26	0	13	0	0		22	watkin

Create an Output File

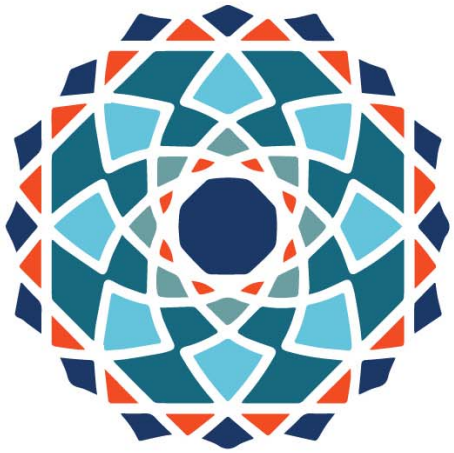


Create an Output File



Data set has been cleaned!





Accounting is Analytics

For additional data analytics resources, see ***AccountingIsAnalytics.com***

Prepared by:
Jennifer Cainas

© 2022

Data Analytics Case

NASCAR AND LEAN

Featuring Tableau Prep and Tableau

Version 2022.1

ETL Project

Part 1: Data Cleaning

Results Data



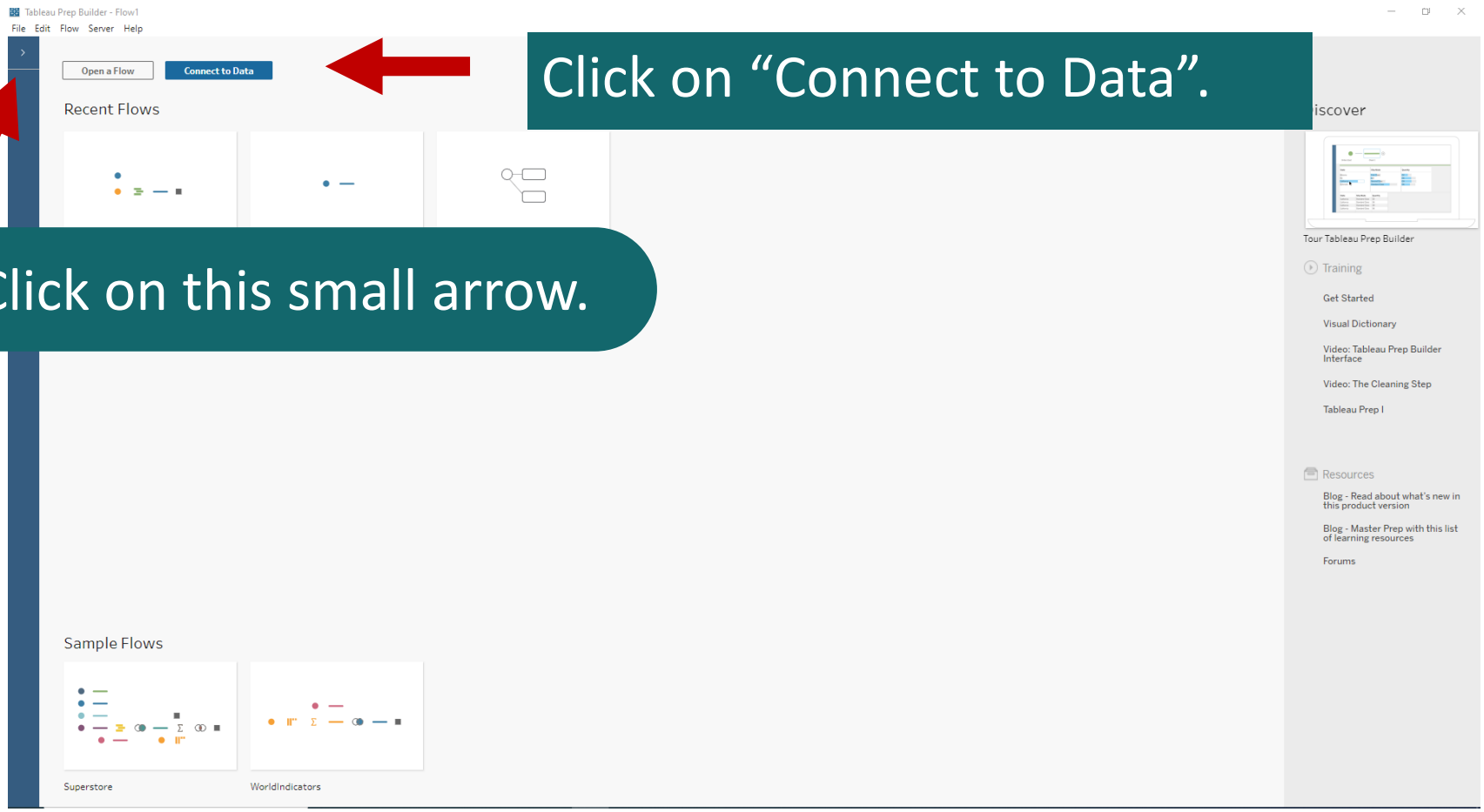
ETL

- Extract, Load, and Transform
- Data needs to be cleaned prior to use

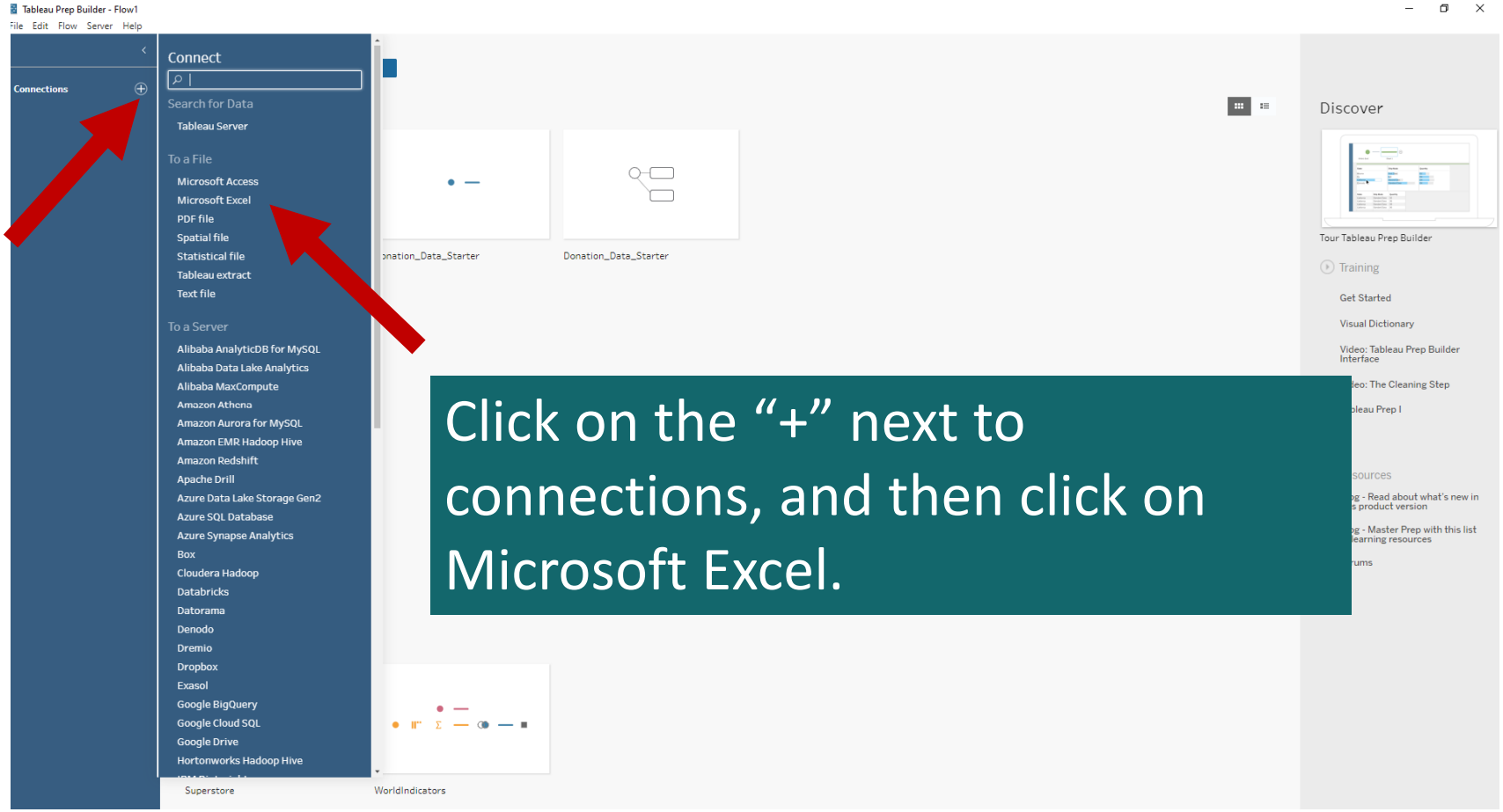
Step 01

Input and view data

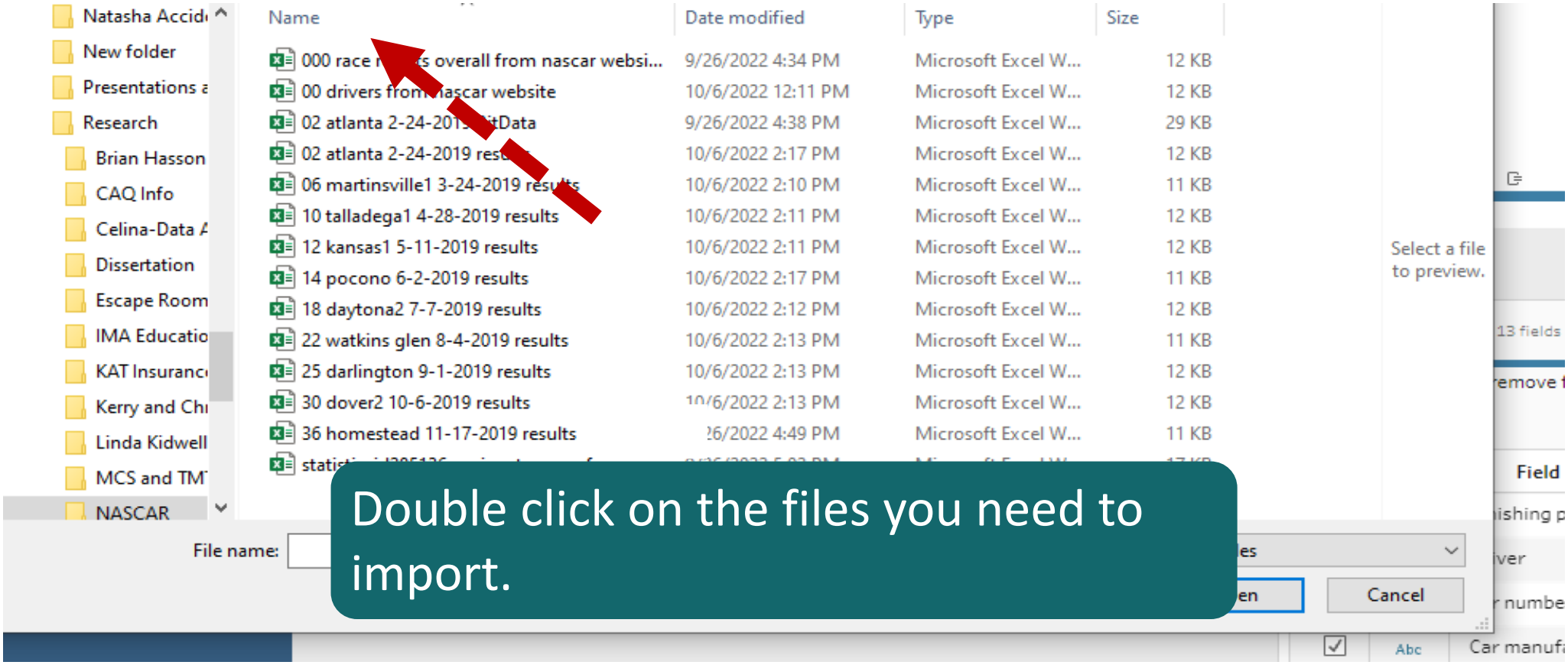
Begin a new flow



Begin a new flow

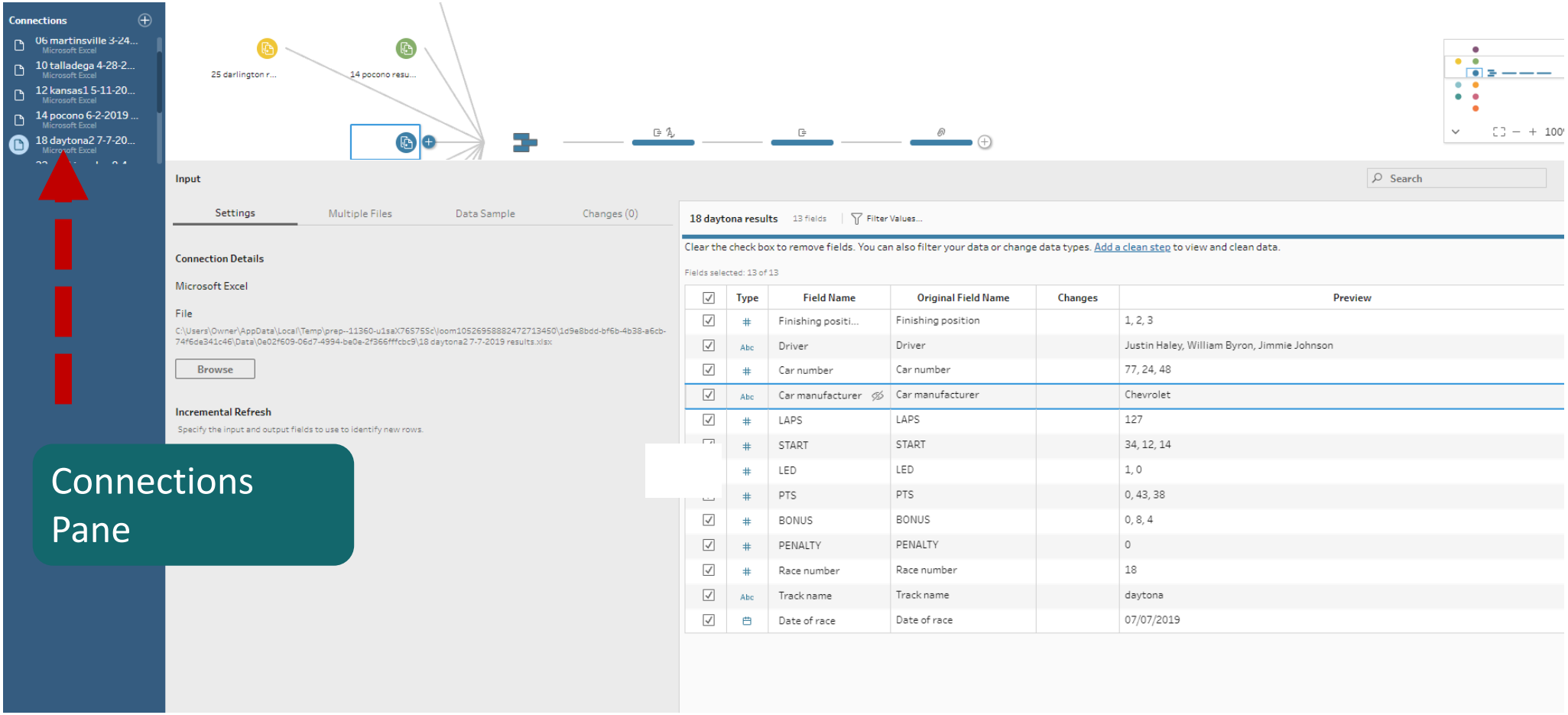


Import data from Excel

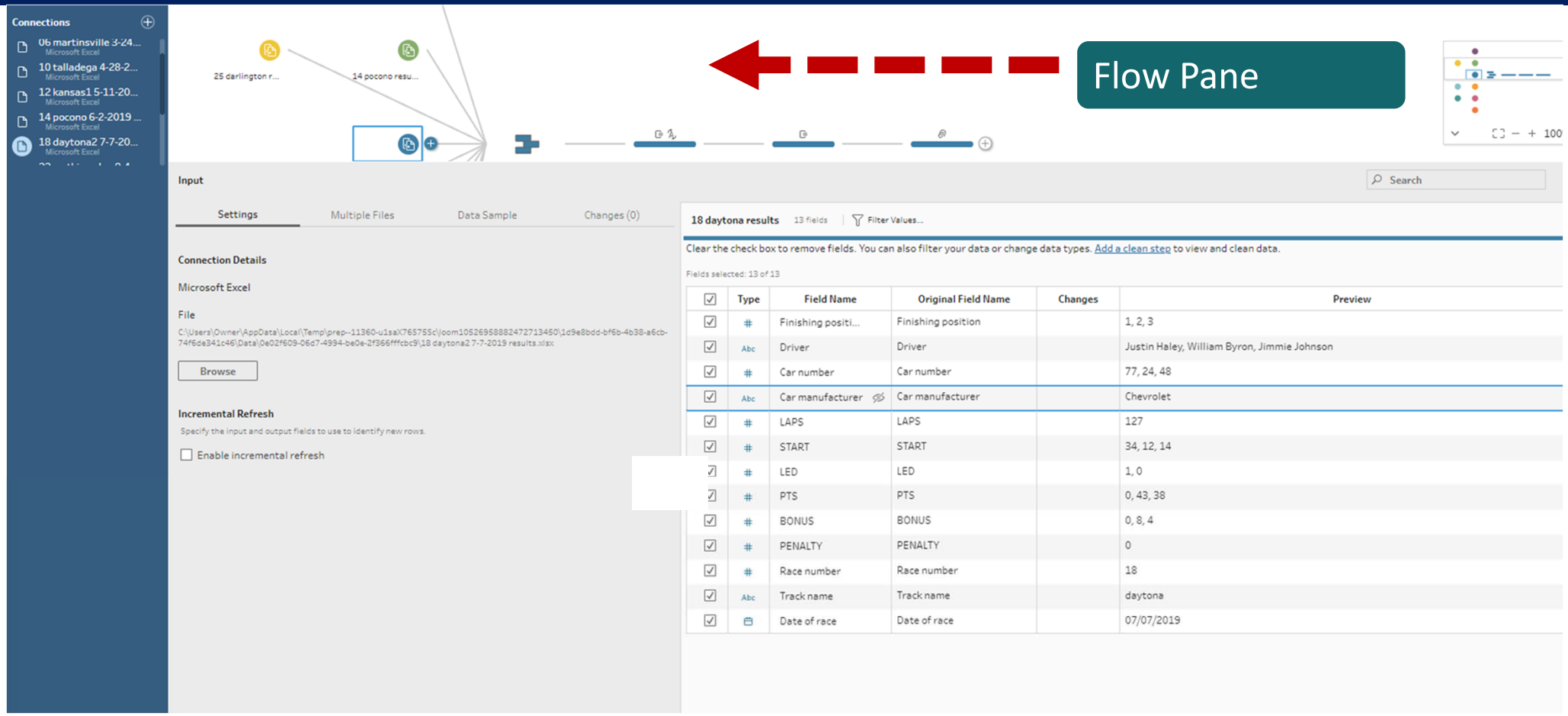


Double click on the files you need to import.

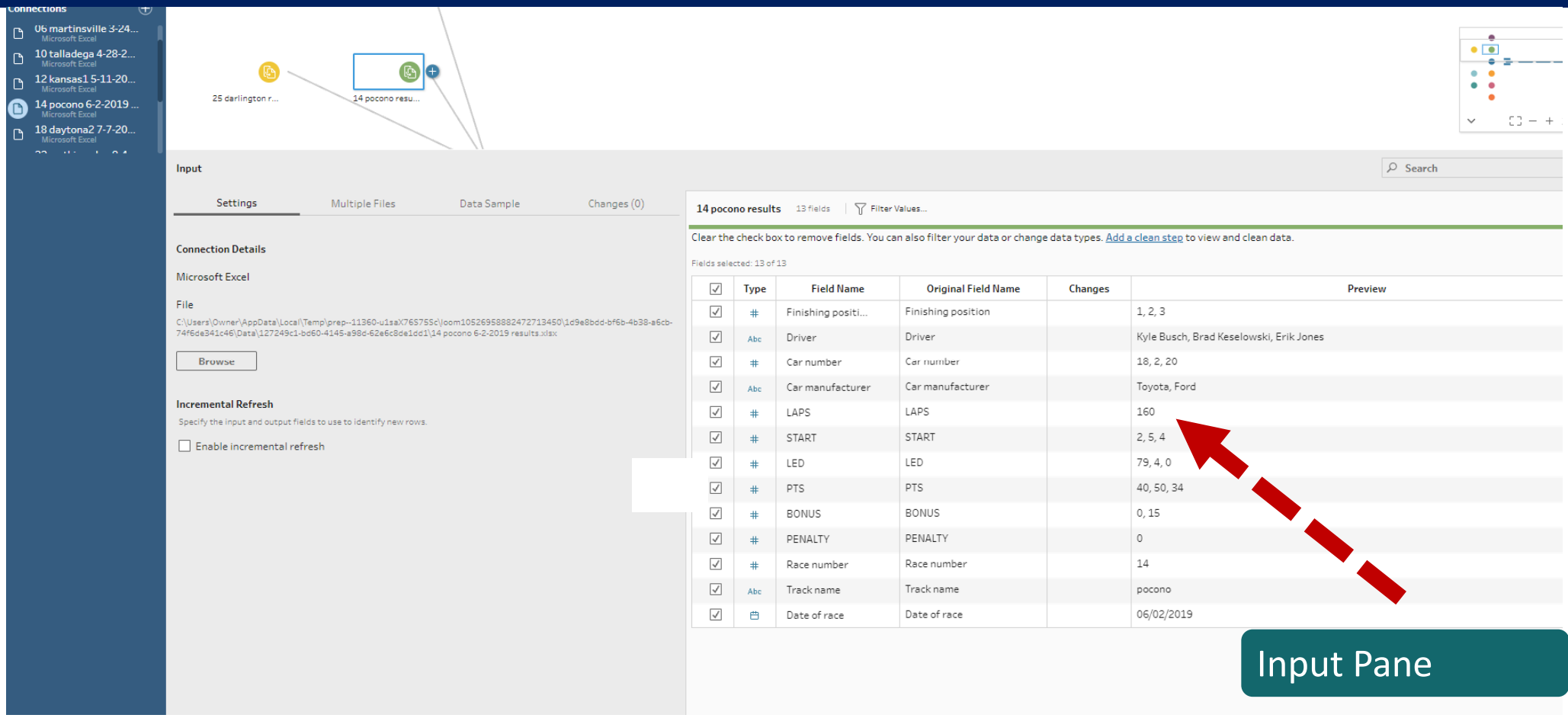
Import data from Excel



Import data from Excel



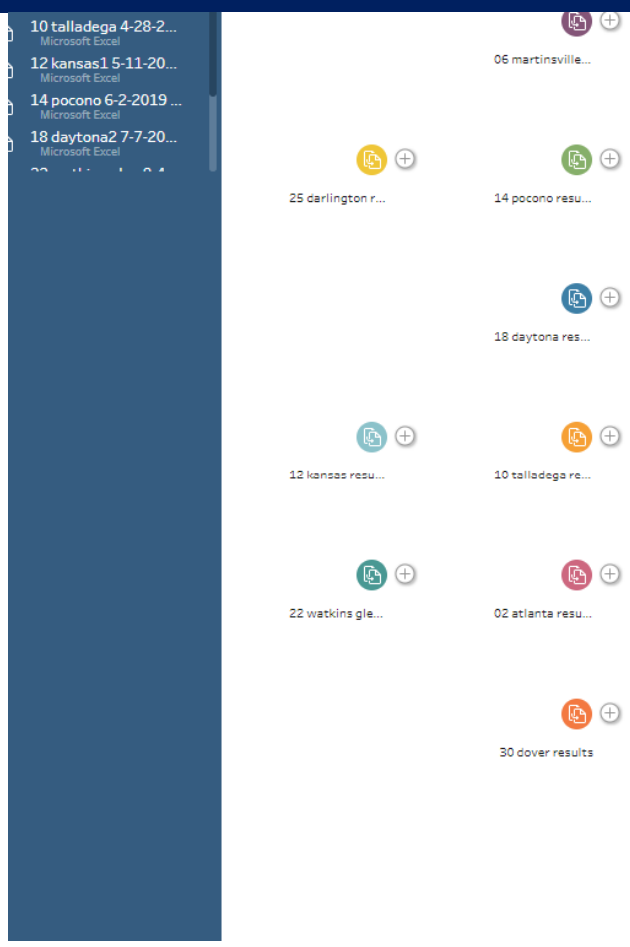
Import data from Excel



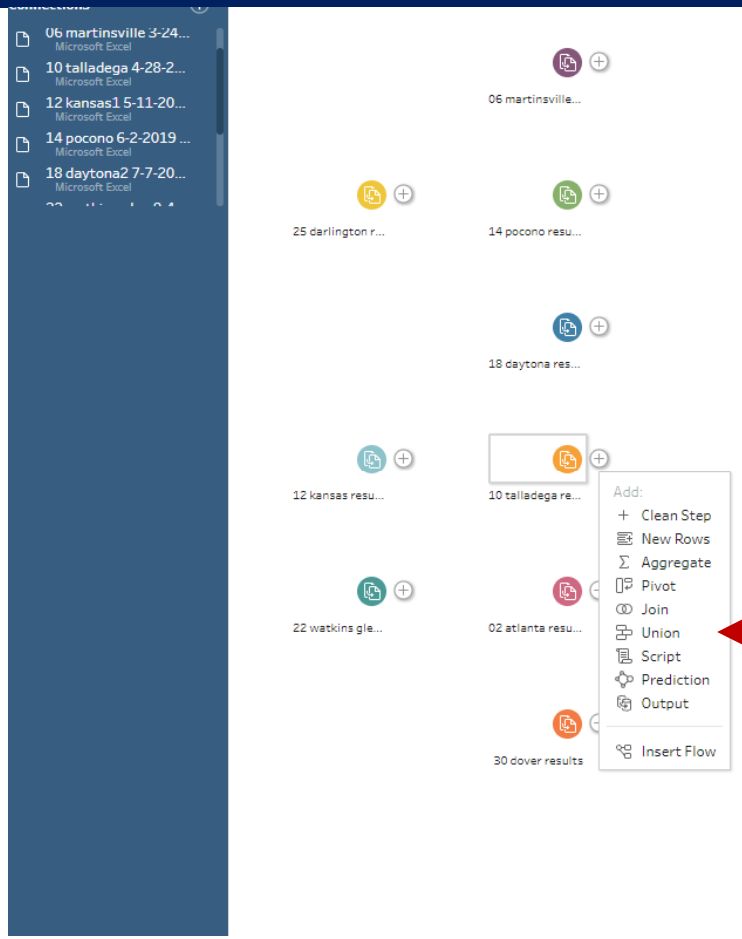
Step 02

Create a Union

Create a Union

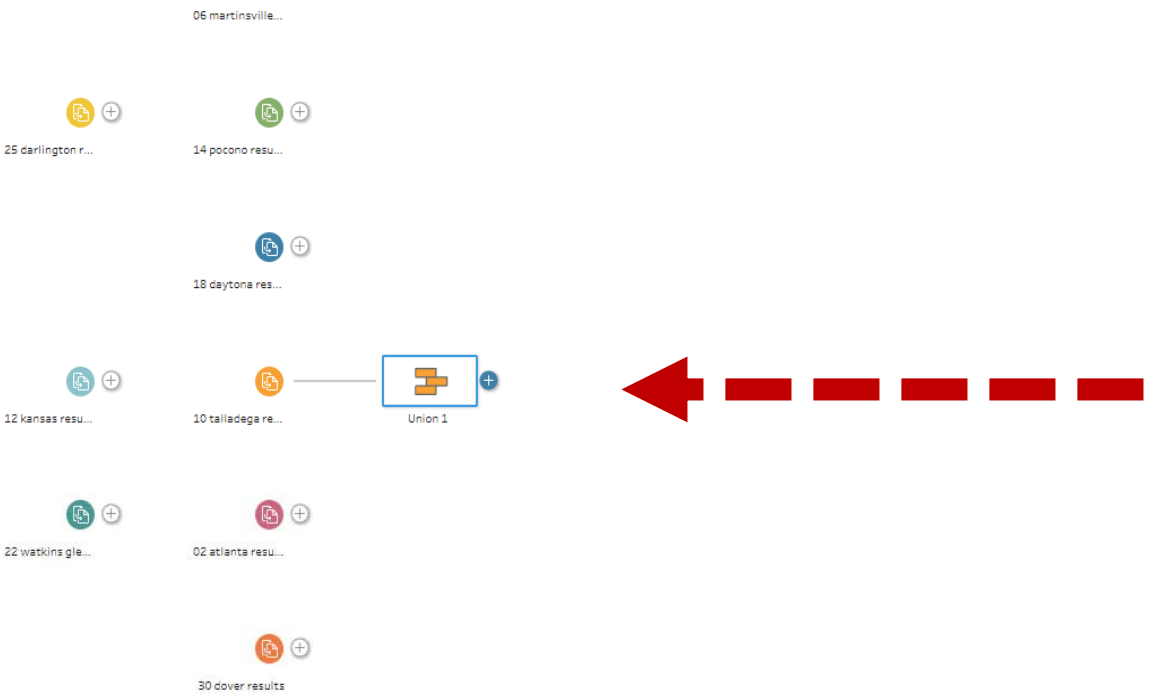


Create a Union

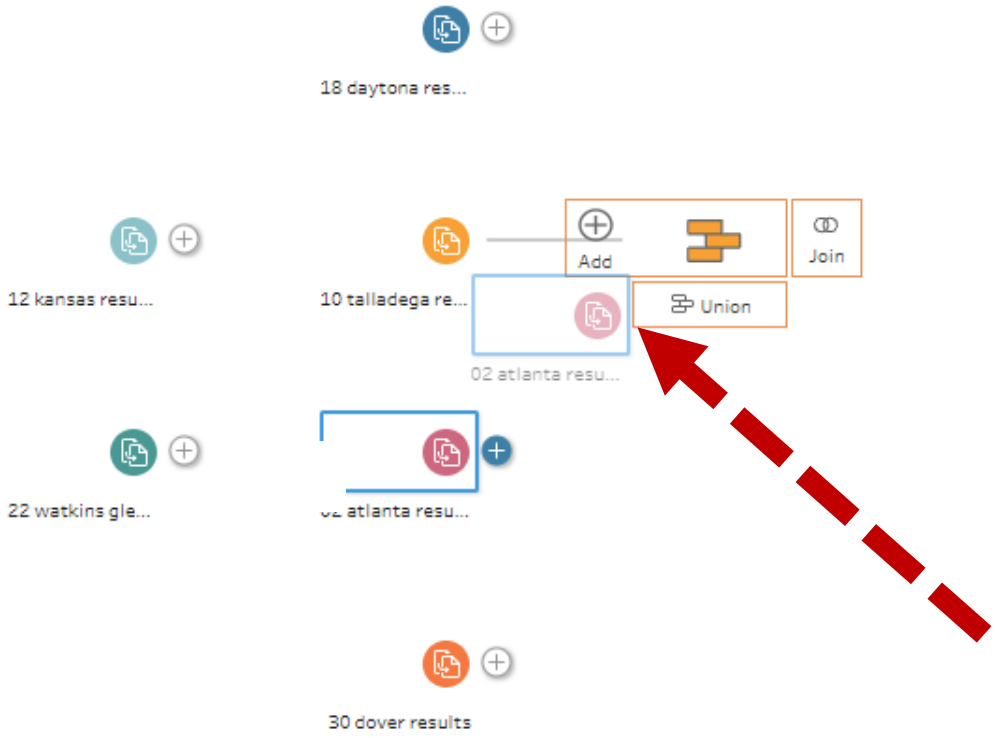


Click “+”sign and select Union

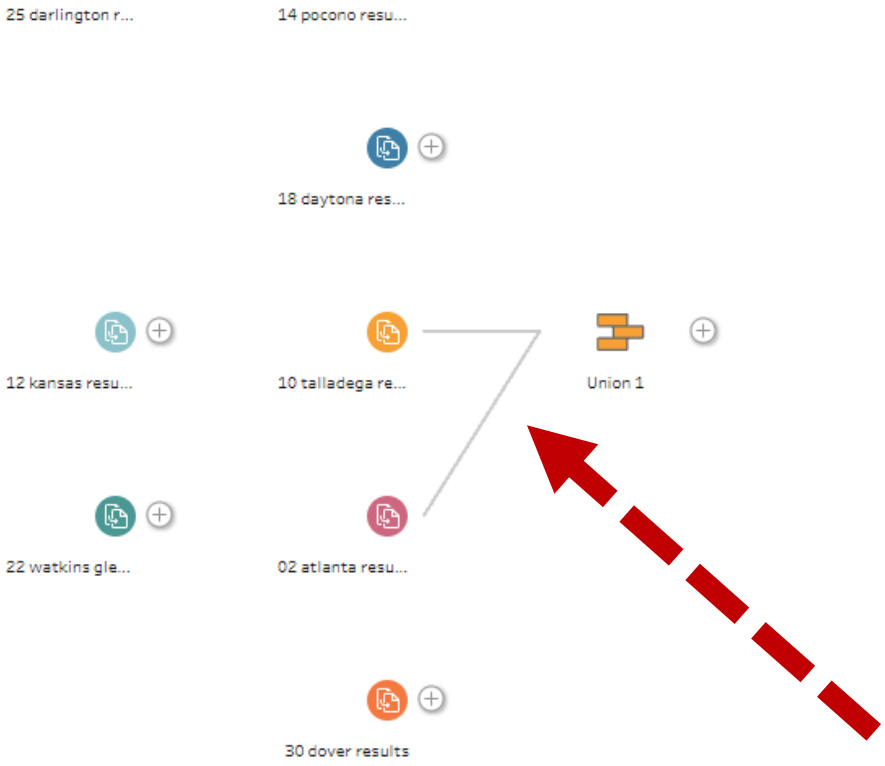
Create a Union



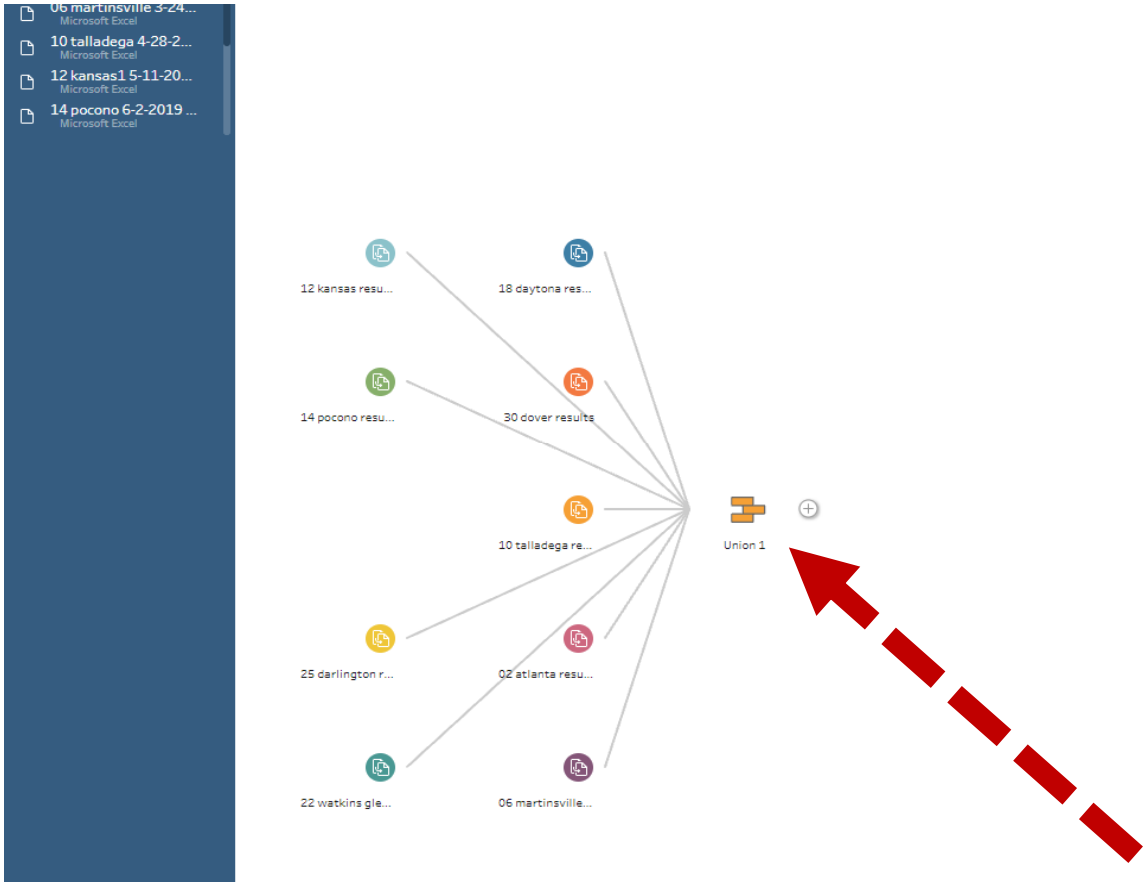
Create a Union



Create a Union



Create a Union



Create a Union

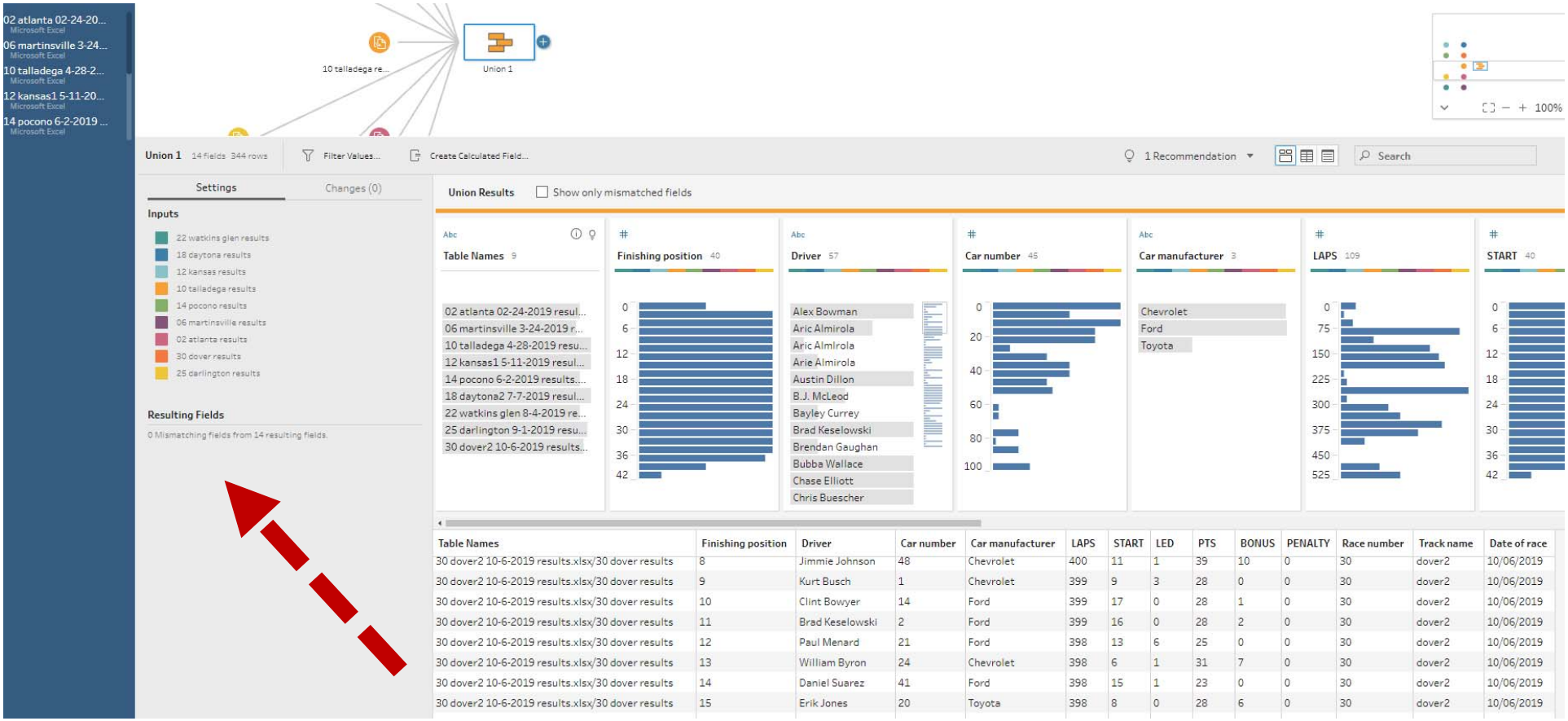
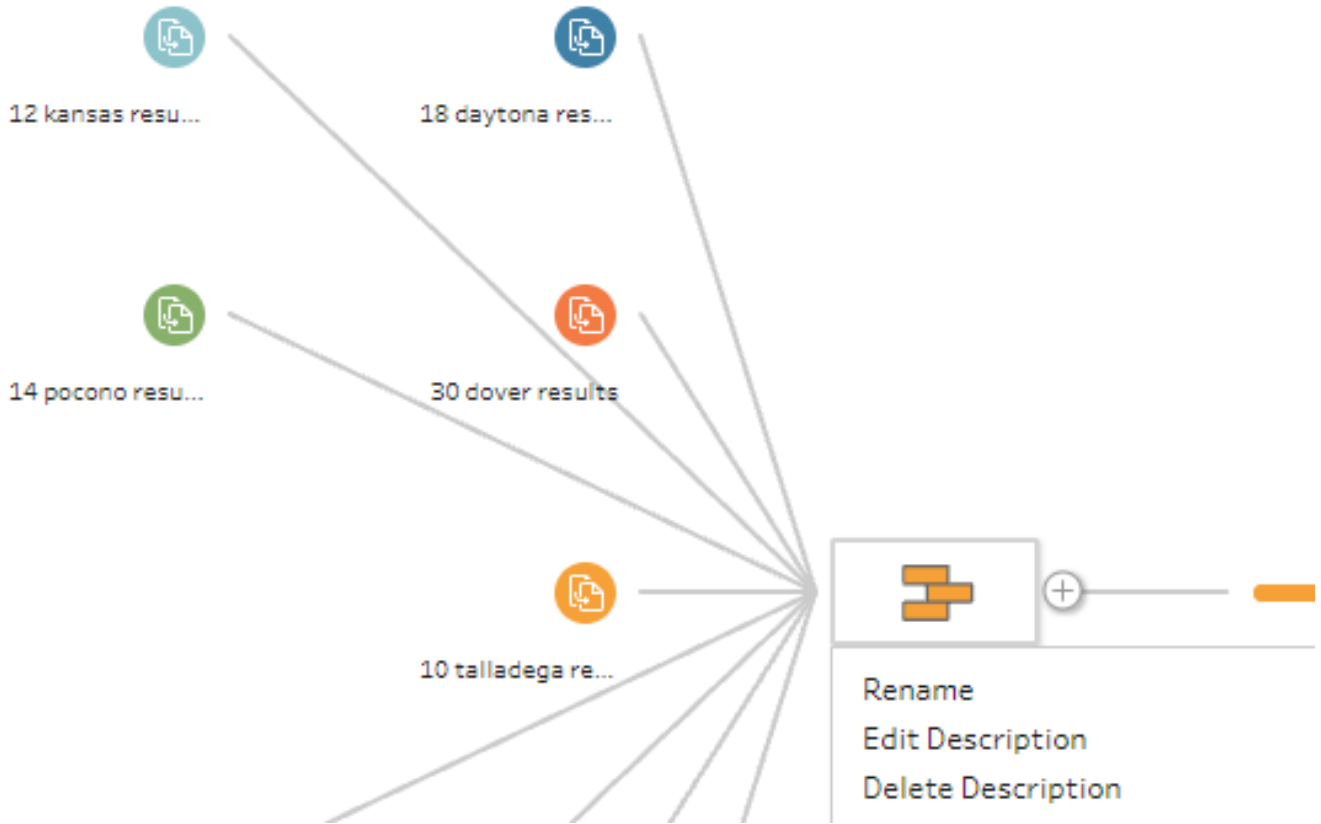


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	PENALTY	Race number	Track name	Date of race
30 dover2 10-6-2019 results.xlsx/30 dover results	8	Jimmie Johnson	48	Chevrolet	400	11	1	39	10	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	9	Kurt Busch	1	Chevrolet	399	9	3	28	0	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	10	Clint Bowyer	14	Ford	399	17	0	28	1	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	11	Brad Keselowski	2	Ford	399	16	0	28	2	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	12	Paul Menard	21	Ford	398	13	6	25	0	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	13	William Byron	24	Chevrolet	398	6	1	31	7	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	14	Daniel Suarez	41	Ford	398	15	1	23	0	0	30	dover2	10/06/2019
30 dover2 10-6-2019 results.xlsx/30 dover results	15	Erik Jones	20	Toyota	398	8	0	28	6	0	30	dover2	10/06/2019

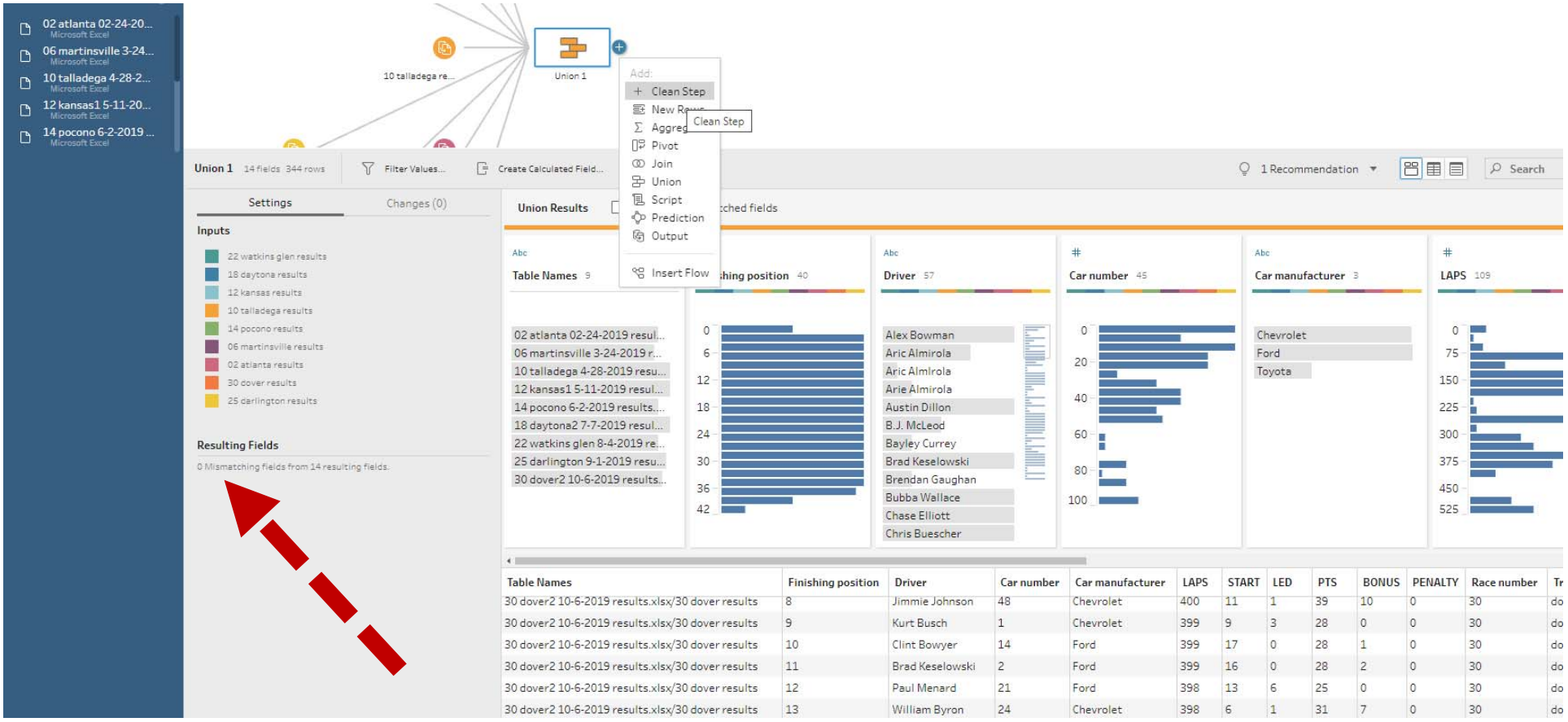
Create a Union



Step 03

Change data formats and remove null data

Change data format



Change data format

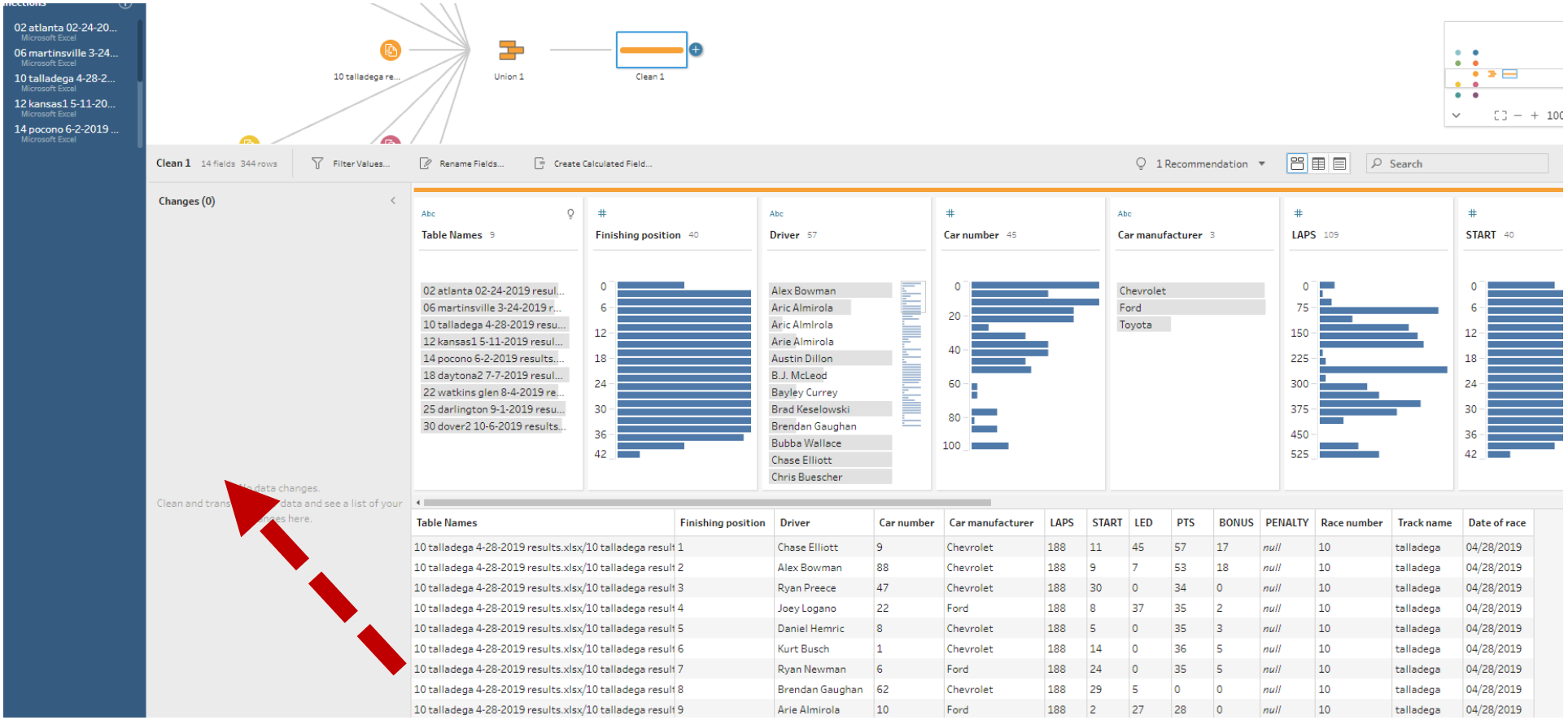


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	PENALTY	Race number	Track name	Date of race
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	9	Arie Almirola	10	Ford	188	2	27	28	0	*null*	10	talladega	04/28/2019

Change data format

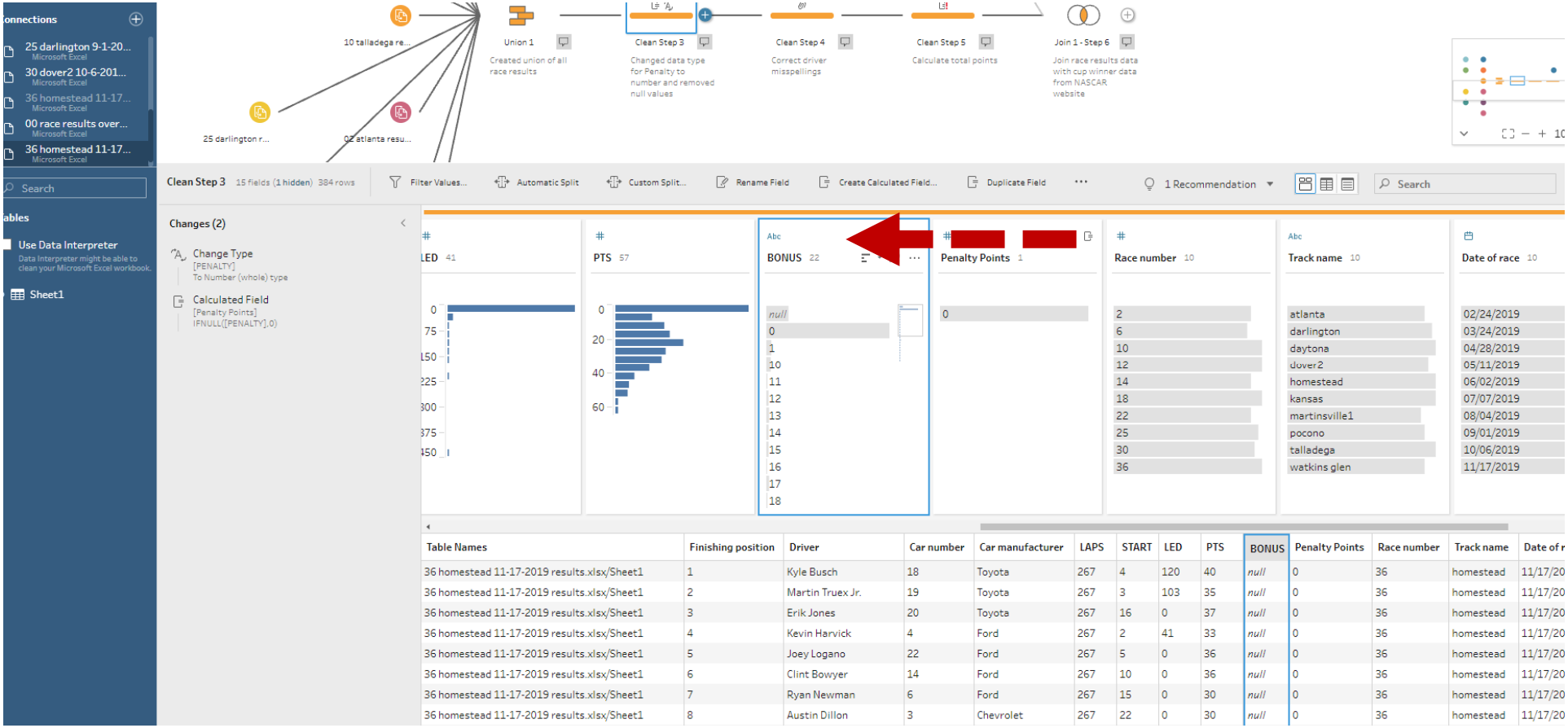
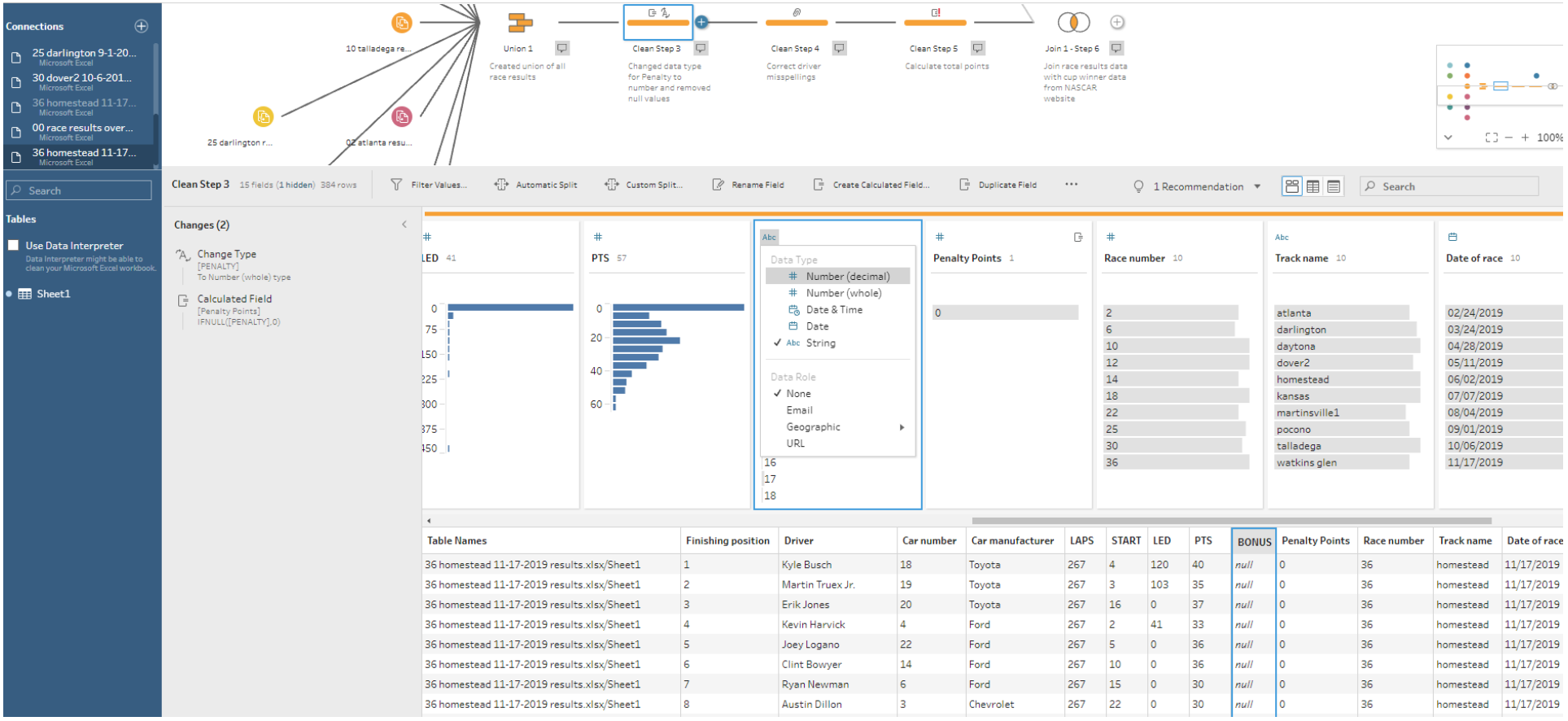


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of r
36 homestead 11-17-2019 results.xlsx/Sheet1	1	Kyle Busch	18	Toyota	267	4	120	40	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	2	Martin Truex Jr.	19	Toyota	267	3	103	35	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	3	Erik Jones	20	Toyota	267	16	0	37	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	4	Kevin Harvick	4	Ford	267	2	41	33	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	5	Joey Logano	22	Ford	267	5	0	36	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	6	Clint Bowyer	14	Ford	267	10	0	36	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	7	Ryan Newman	6	Ford	267	15	0	30	null	0	36	homestead	11/17/20
36 homestead 11-17-2019 results.xlsx/Sheet1	8	Austin Dillon	3	Chevrolet	267	22	0	30	null	0	36	homestead	11/17/20

Change data format



Change data format

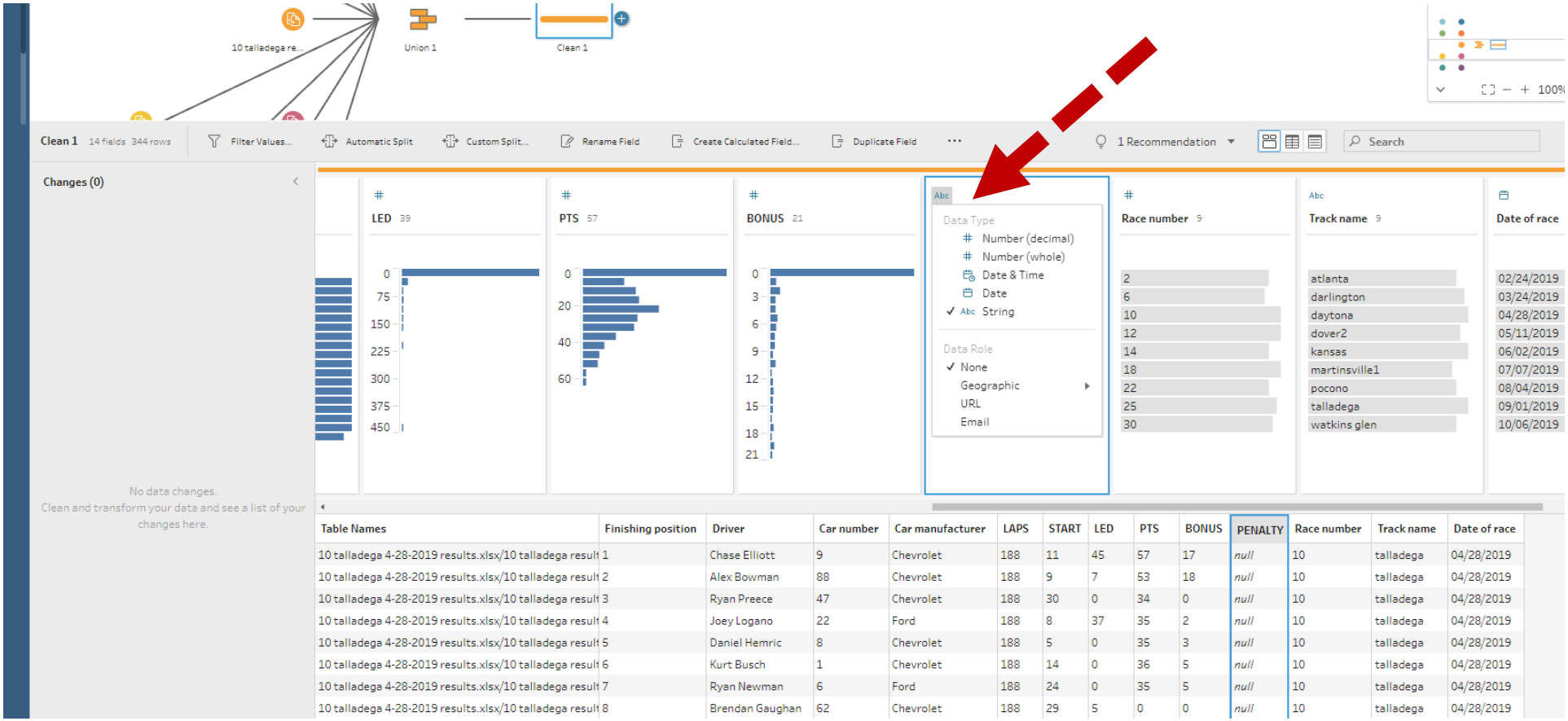


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	PENALTY	Race number	Track name	Date of race
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	*null*	10	talladega	04/28/2019

Create a calculated field

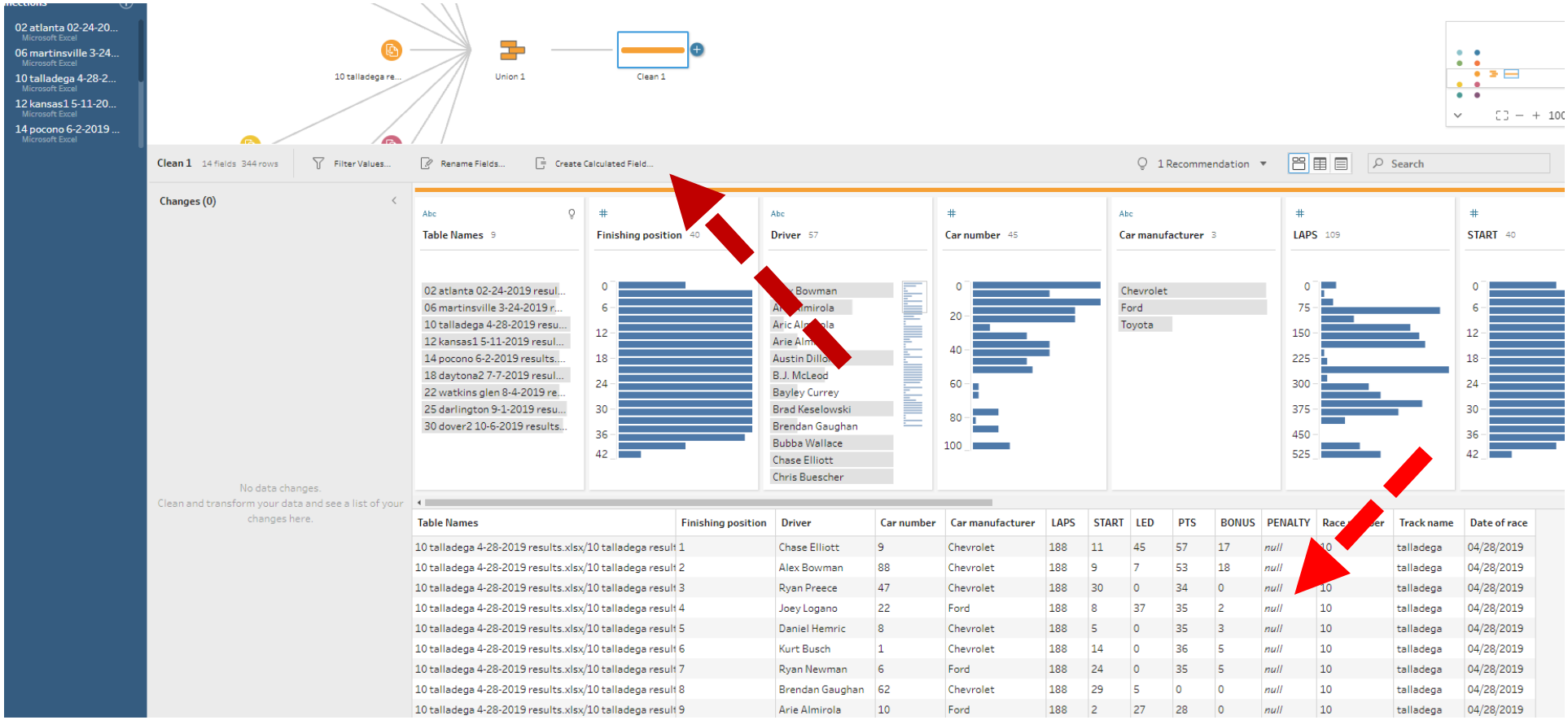
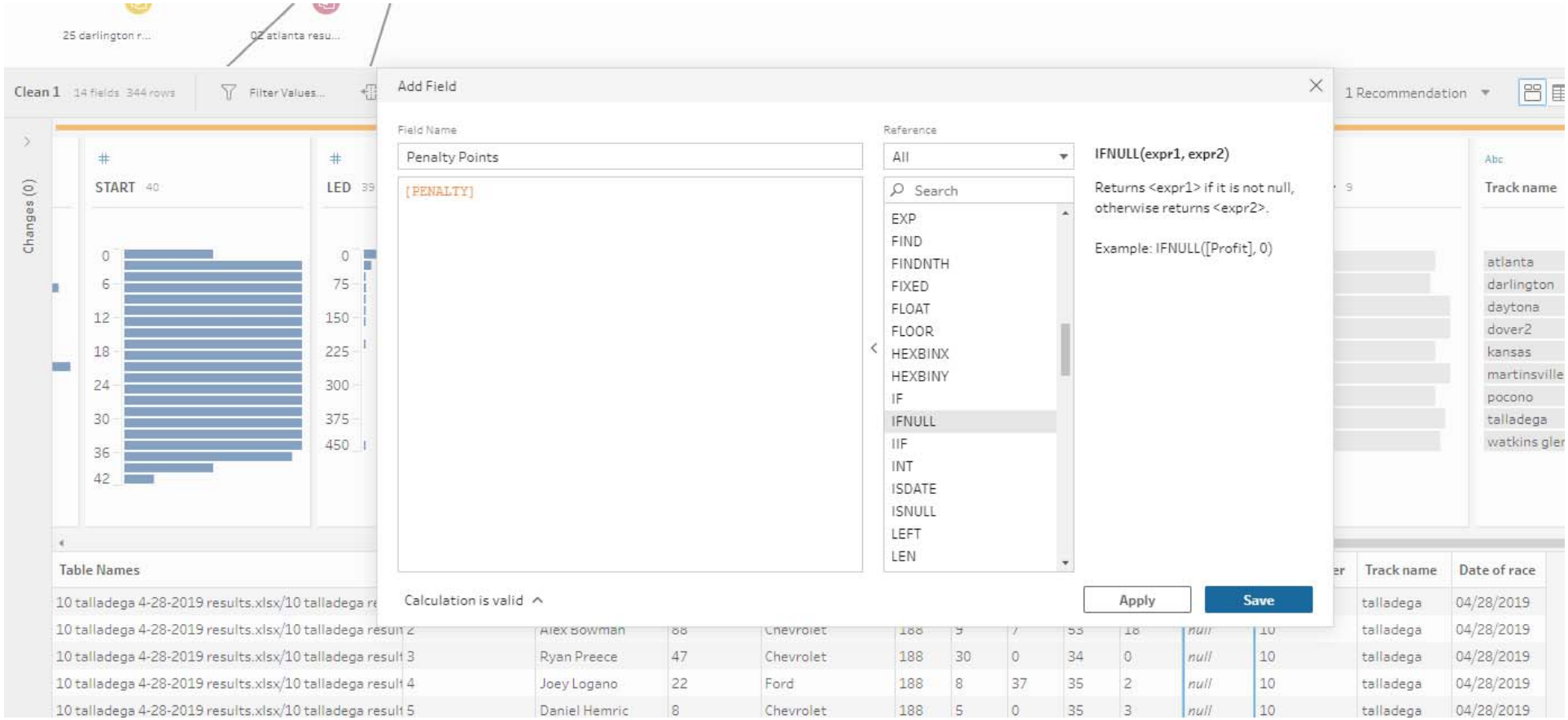
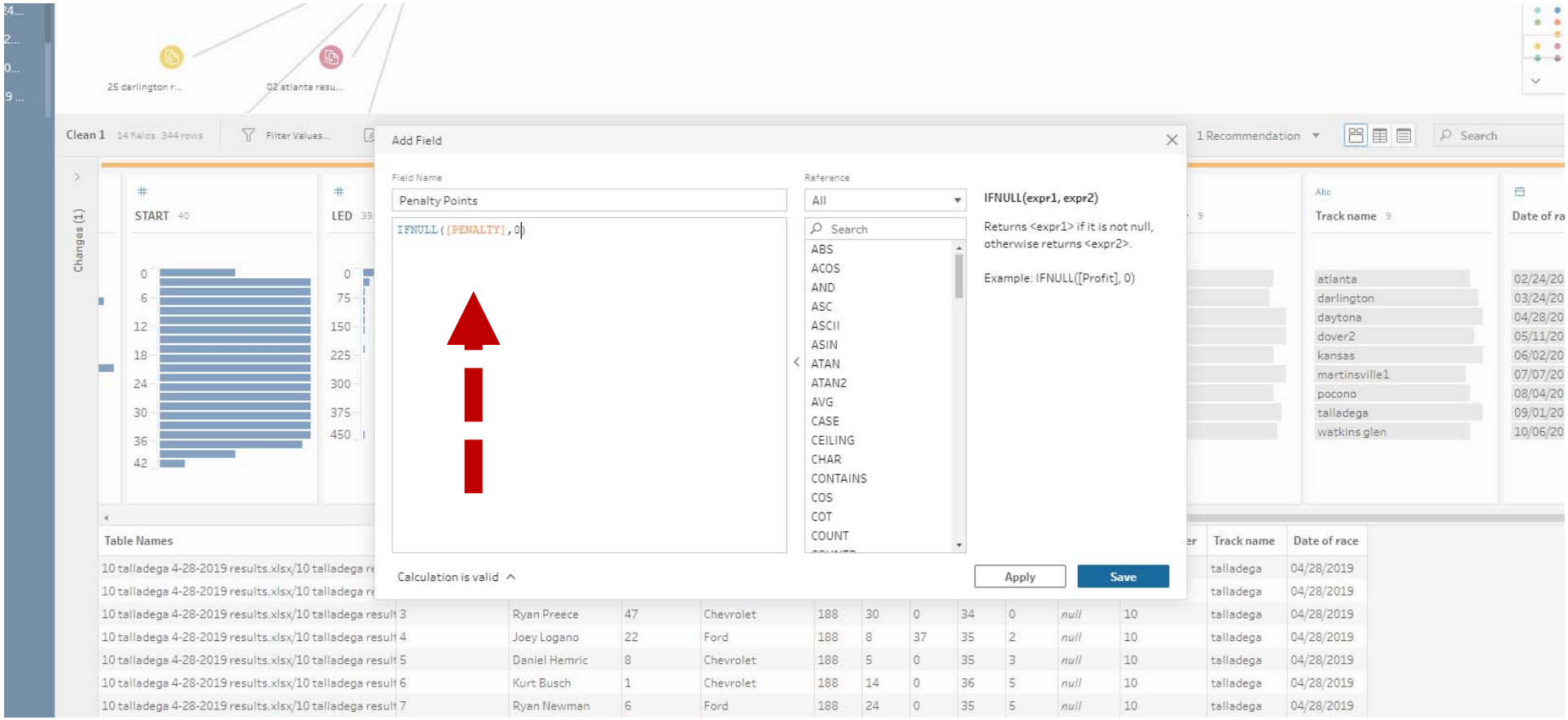


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	PENALTY	Race ...er	Track name	Date of race
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	*null*		talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	*null*	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	9	Arie Almirola	10	Ford	188	2	27	28	0	*null*	10	talladega	04/28/2019

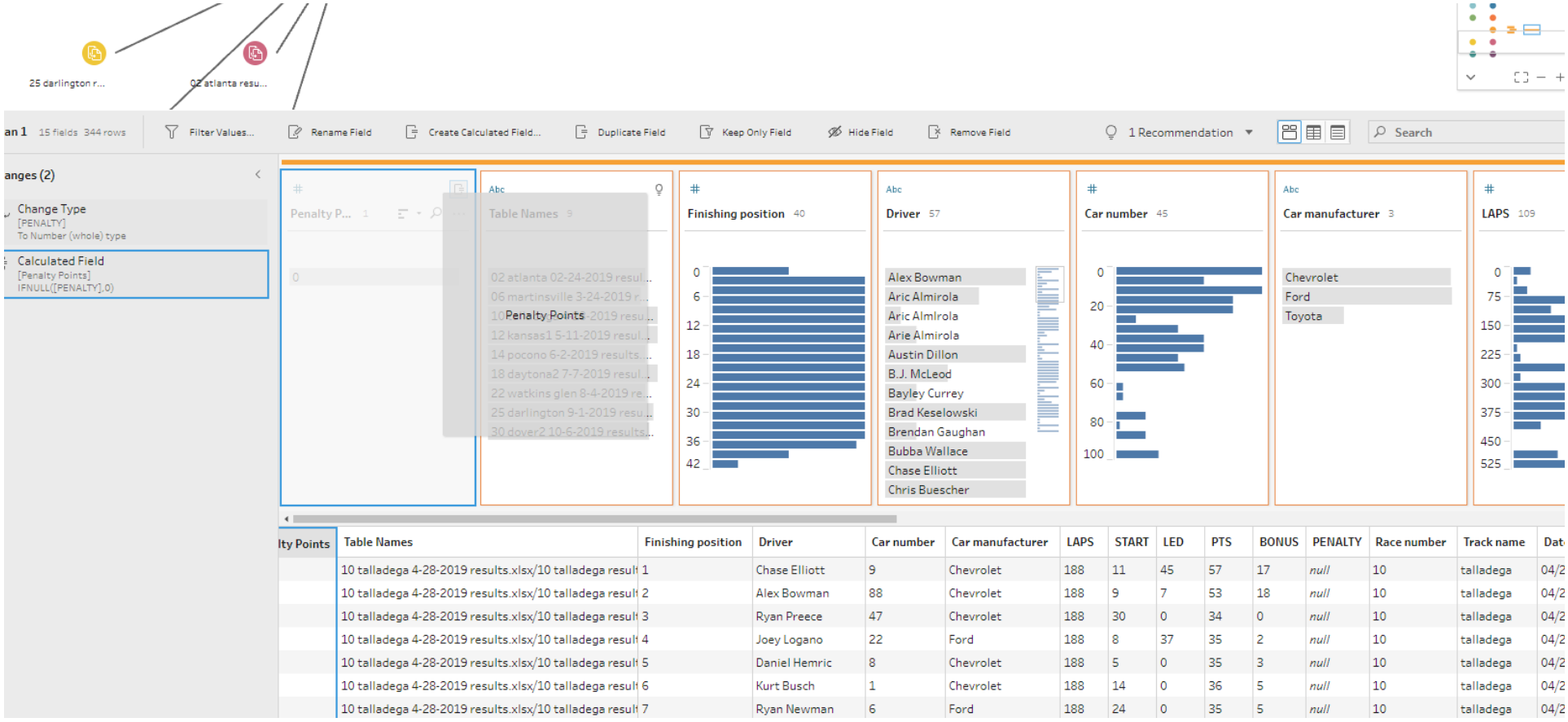
IFNULL Function



IFNULL FUNCTION



IFNULL FUNCTION



lty Points	Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	PENALTY	Race number	Track name	Dat
	10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	*null*	10	talladega	04/2
	10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	*null*	10	talladega	04/2

IFNULL FUNCTION

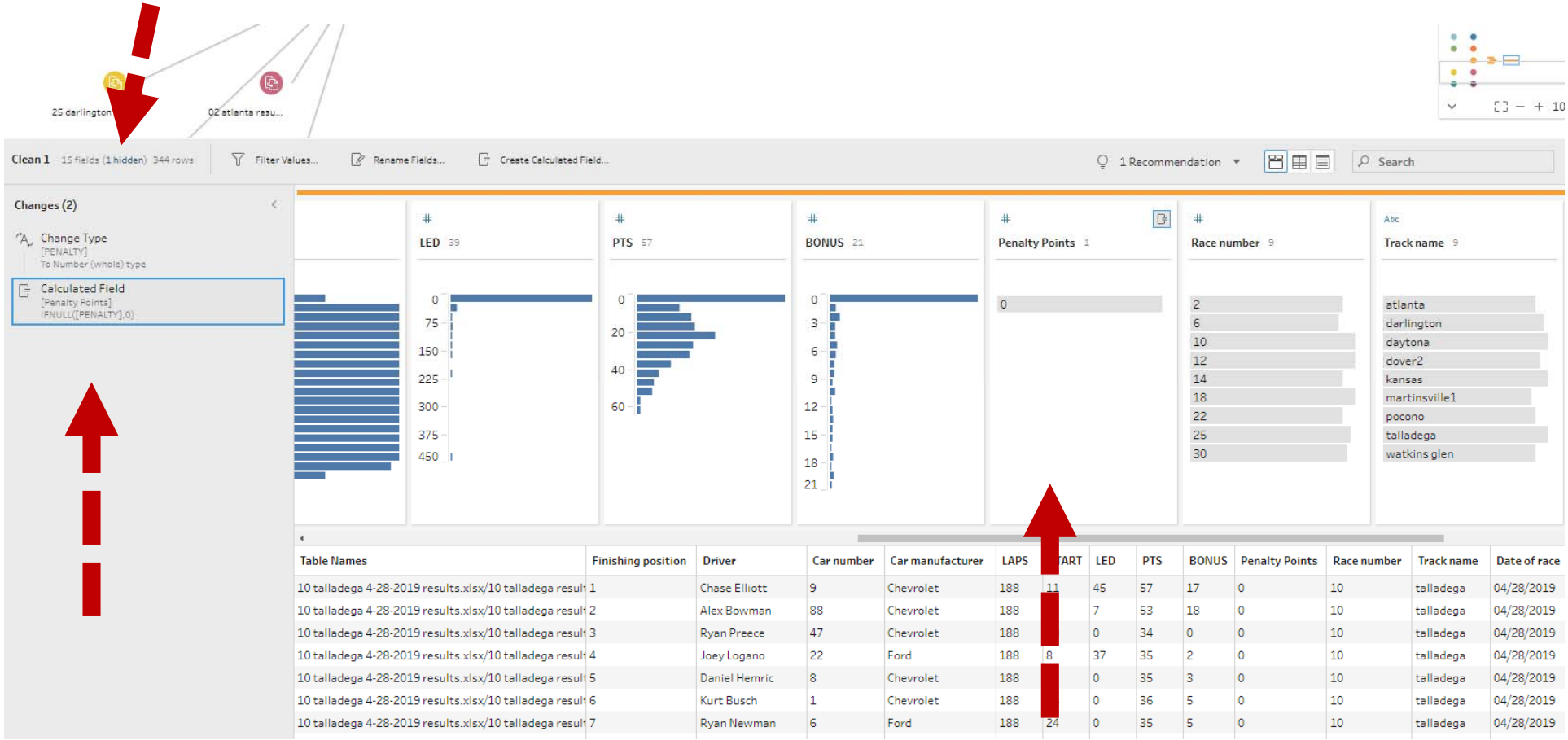


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of race
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	[redacted]	7	53	18	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	[redacted]	0	34	0	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	[redacted]	0	35	3	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	[redacted]	0	36	5	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/28/2019

IFNULL FUNCTION

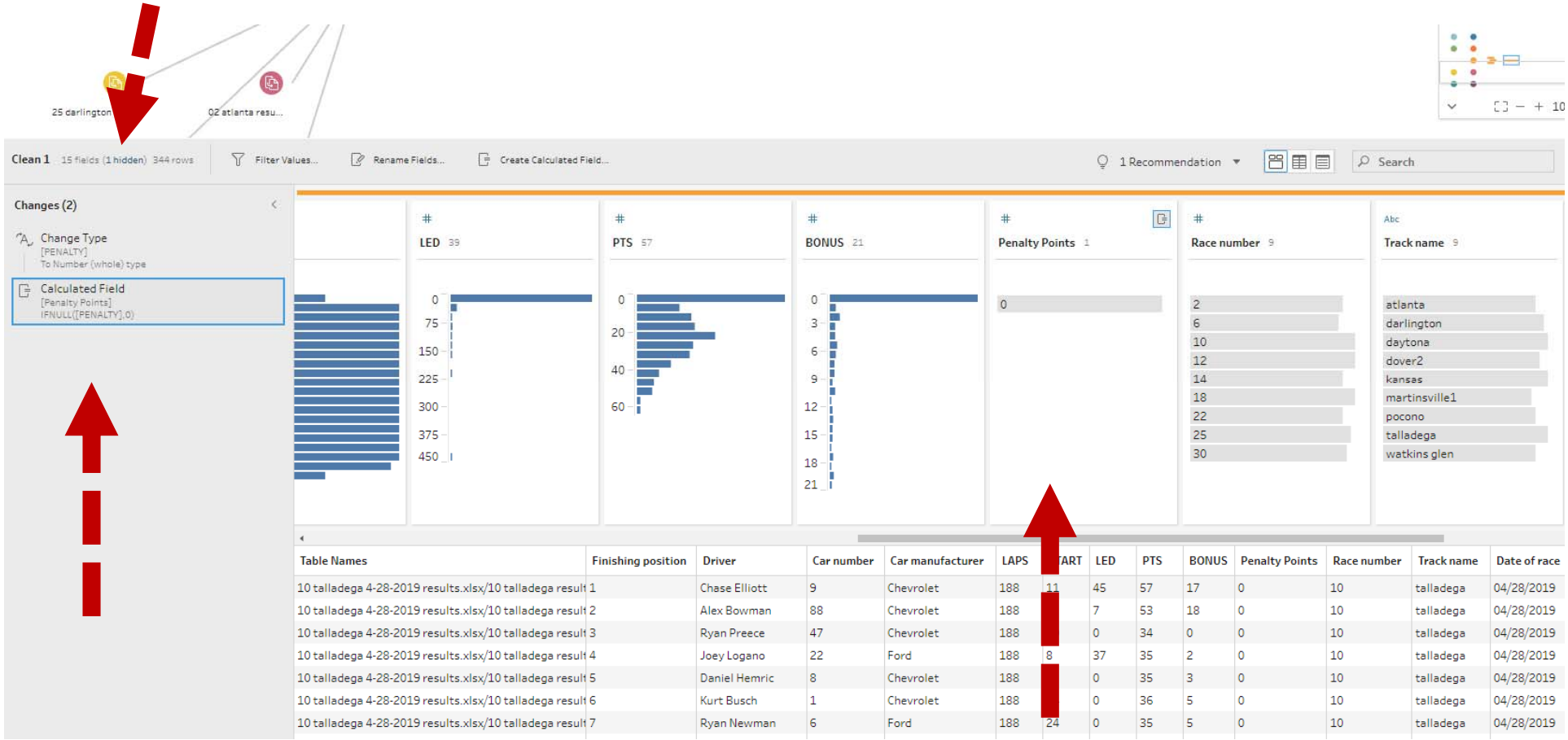
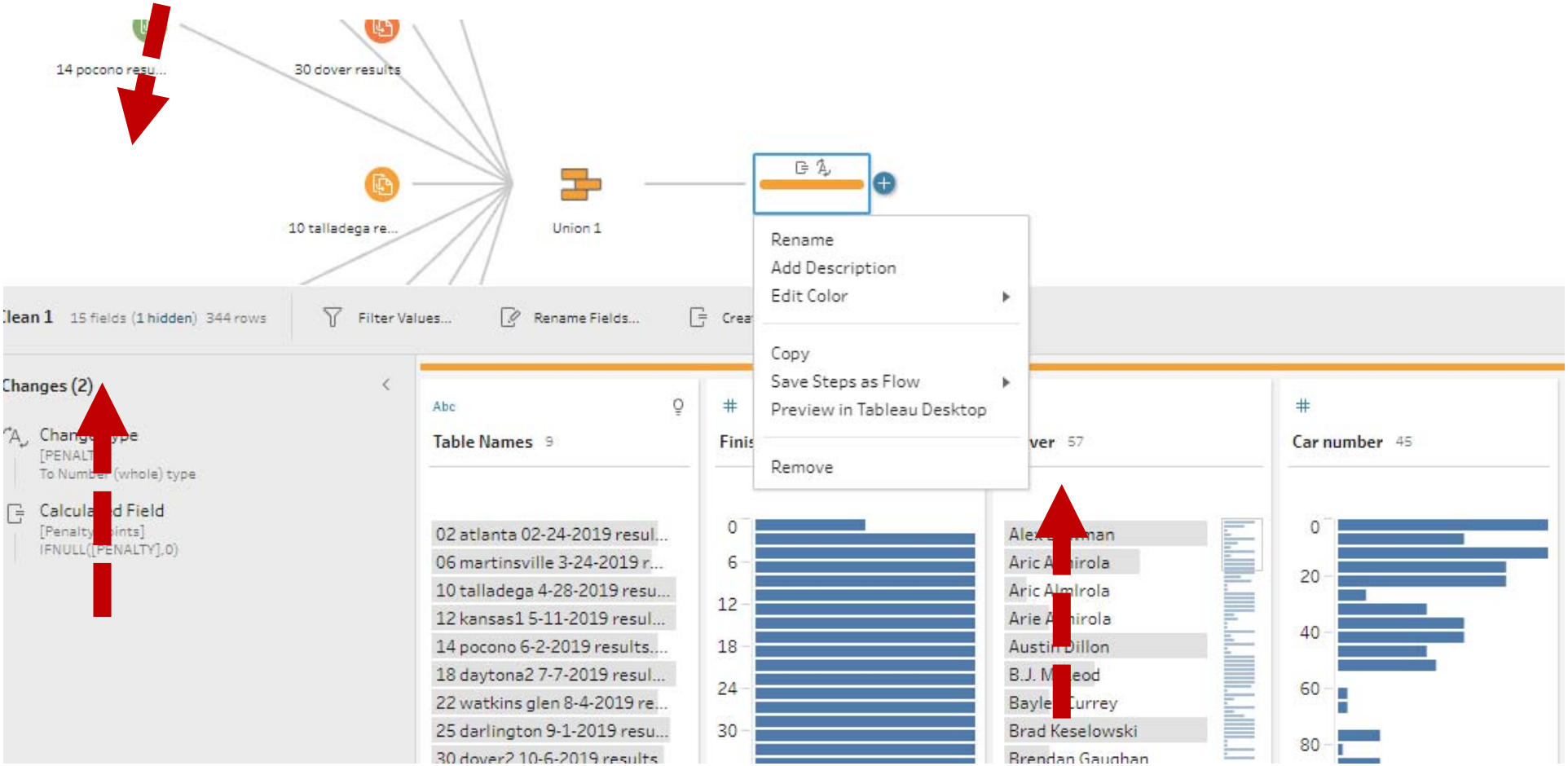


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of race
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10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	[redacted]	7	53	18	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	[redacted]	0	34	0	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	[redacted]	0	35	3	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	[redacted]	0	36	5	0	10	talladega	04/28/2019
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/28/2019

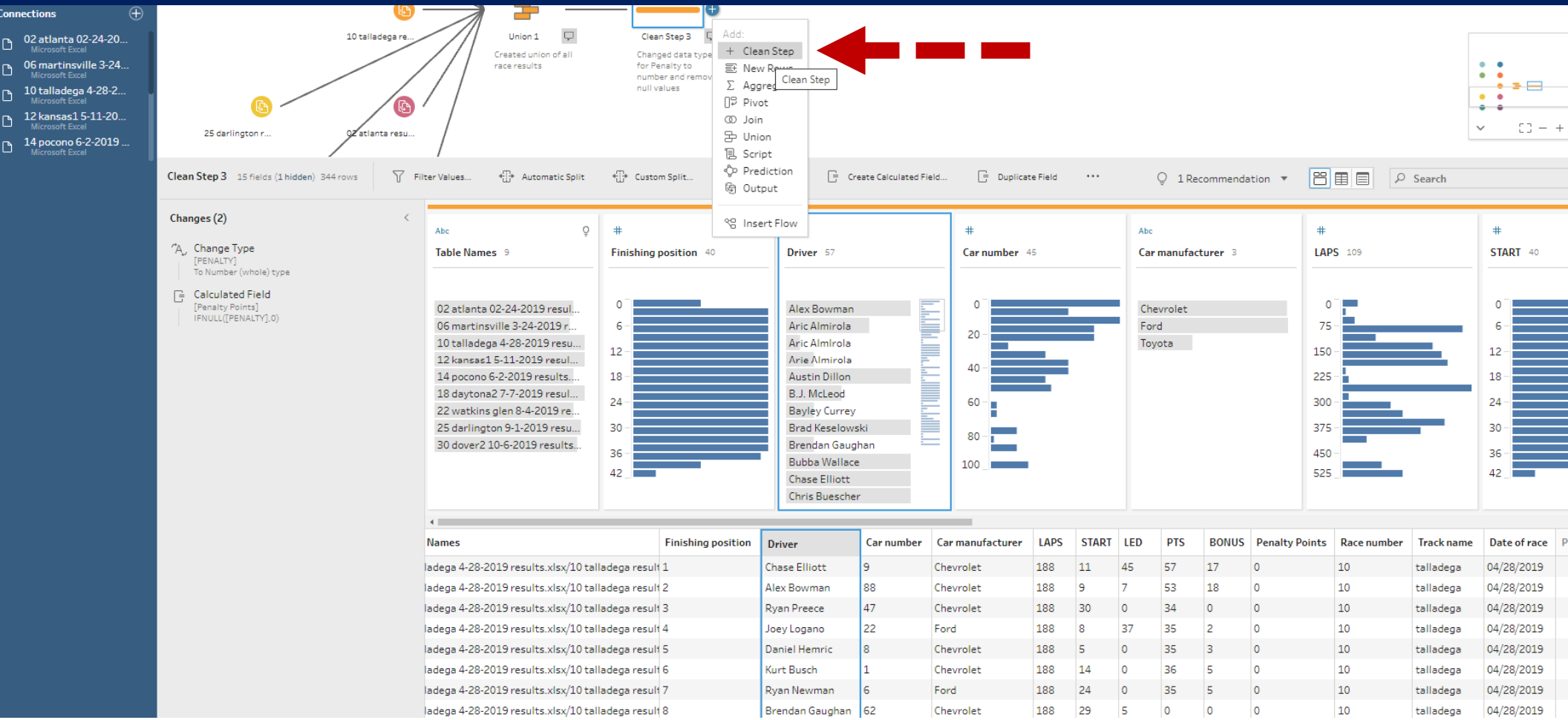
Document your Clean steps



Step 04

Correct Spelling Errors

Correct misspellings



Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of race
ladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/28/2019
ladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	0	10	talladega	04/28/2019

Correct misspellings

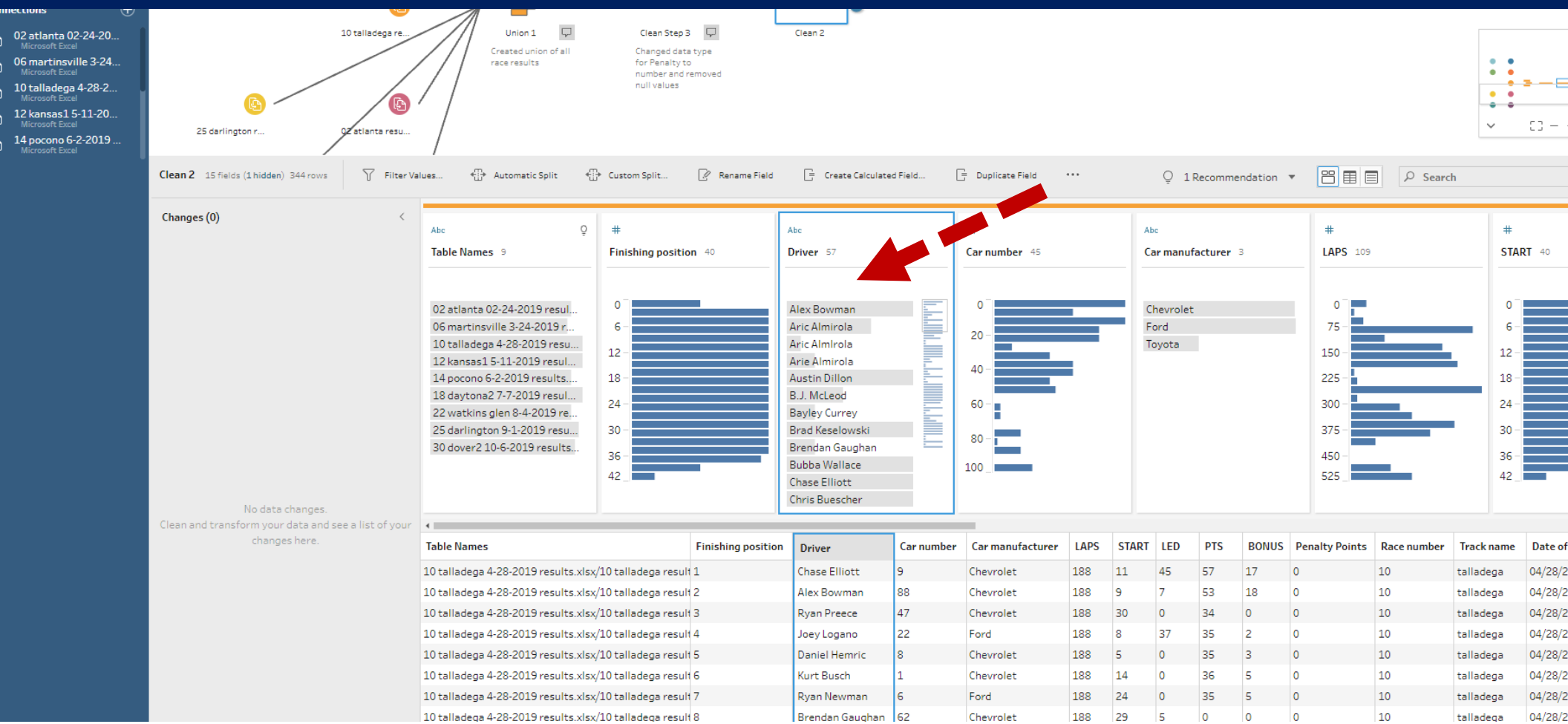
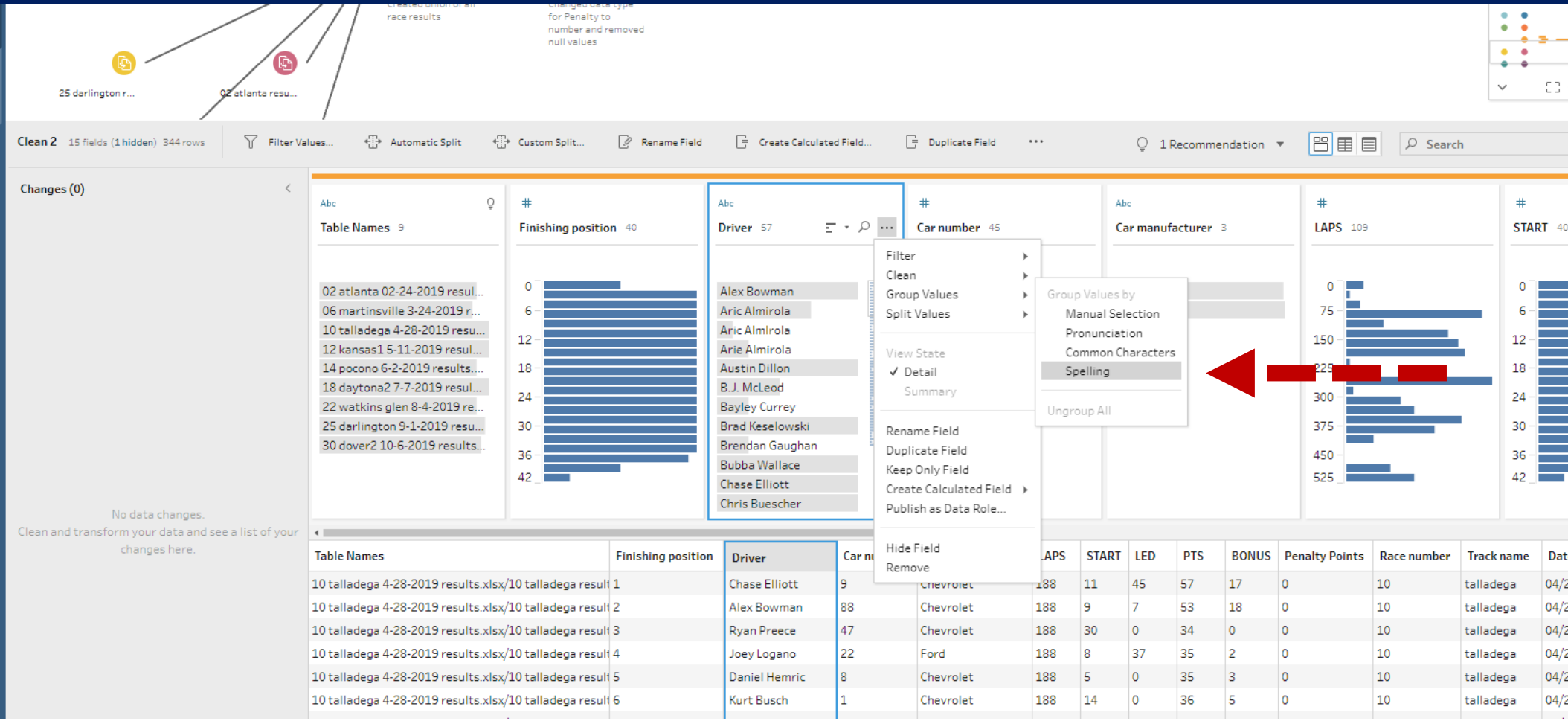
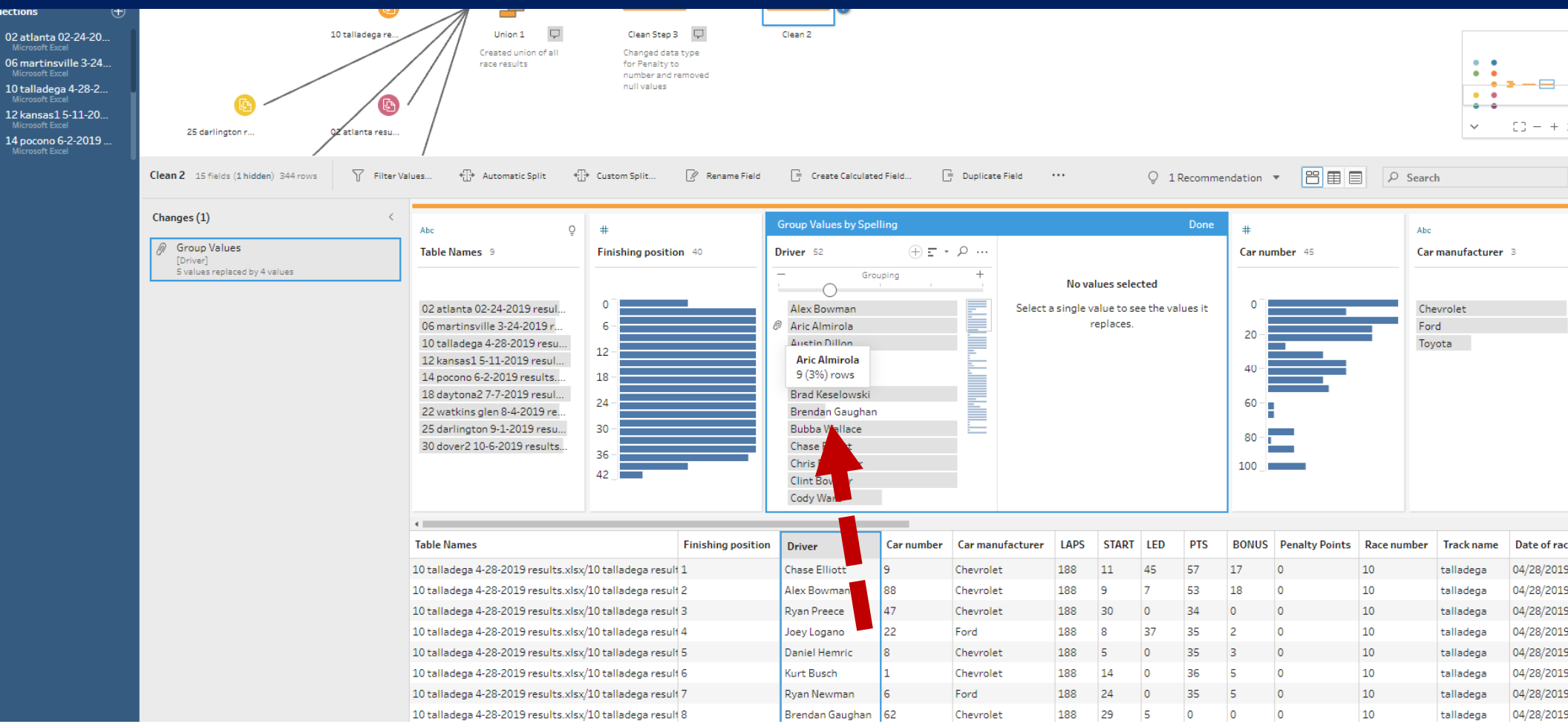


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/28/2
10 talladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	0	10	talladega	04/28/2

Correct misspellings



Correct misspellings



Correct misspellings

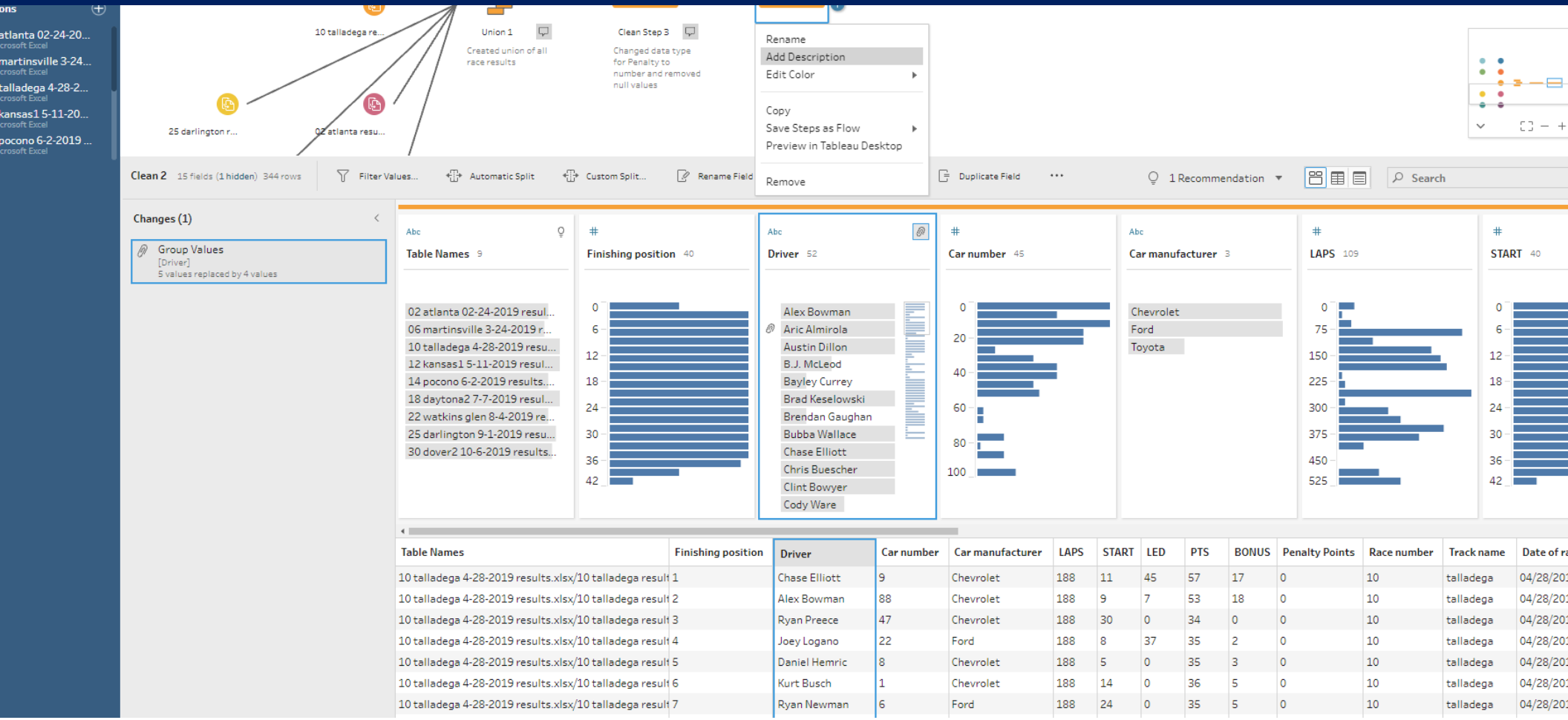
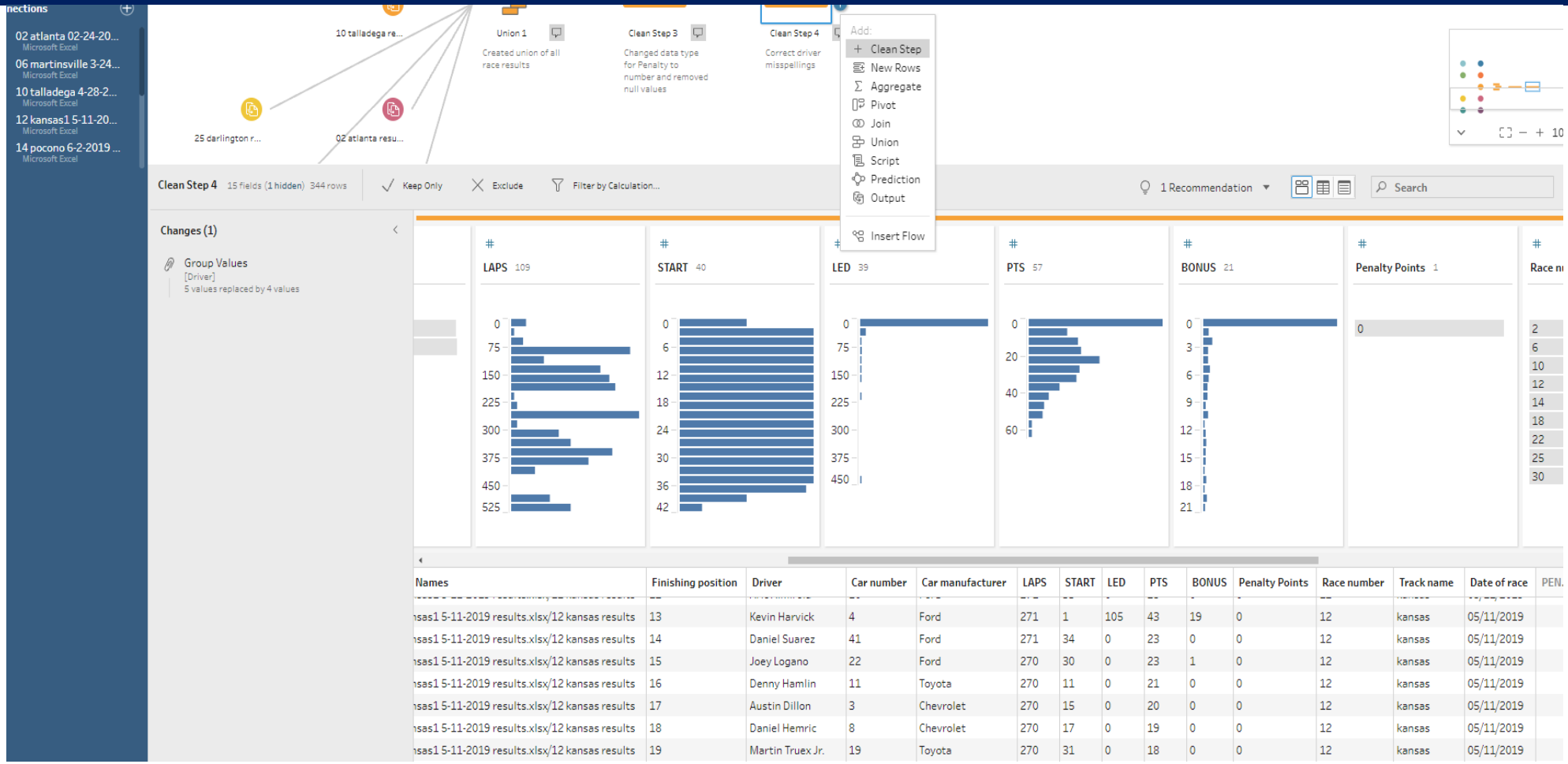


Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of ra
10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	0	10	talladega	04/28/201
10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/28/201

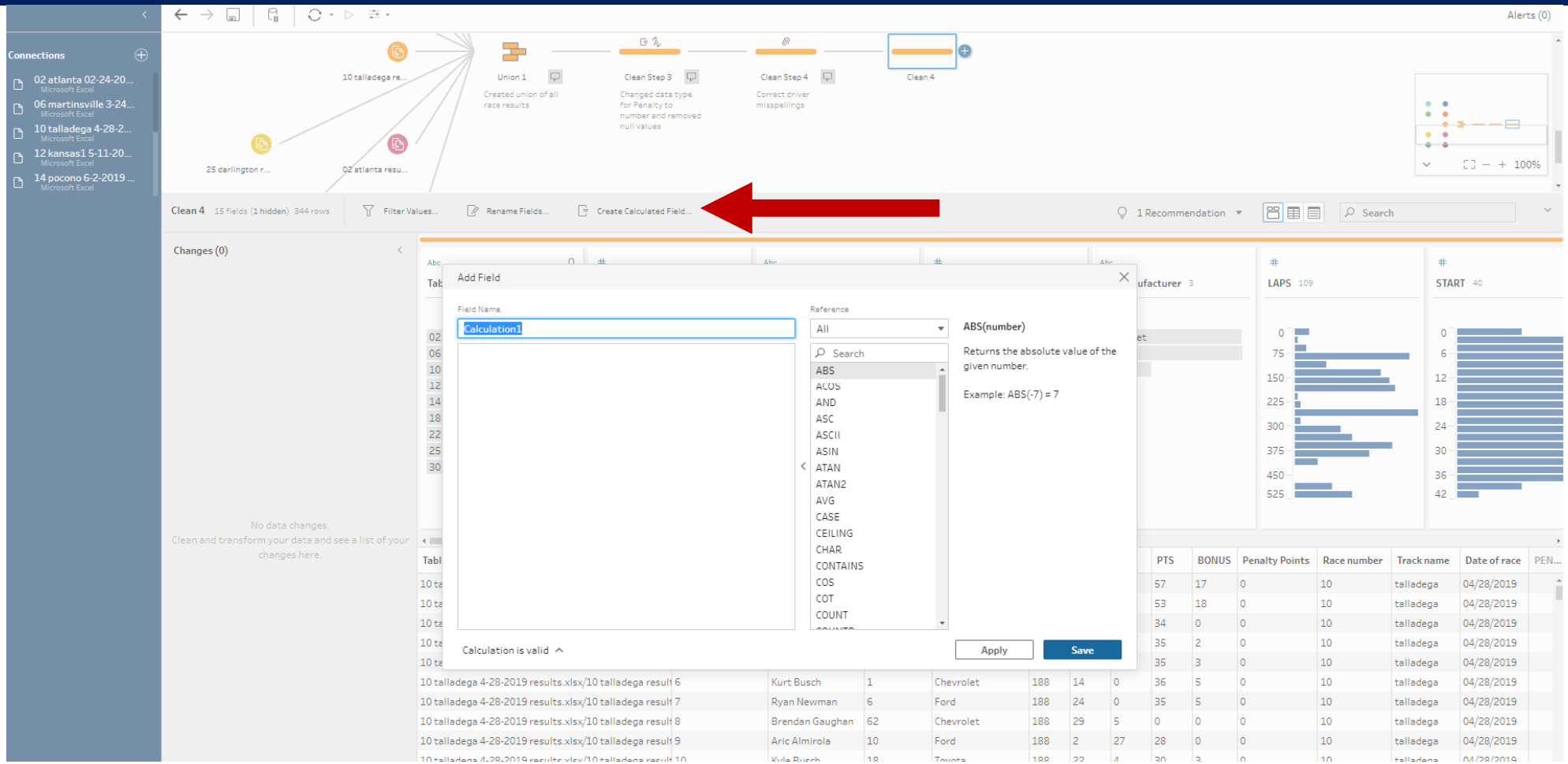
Step 05

Create Calculated Field

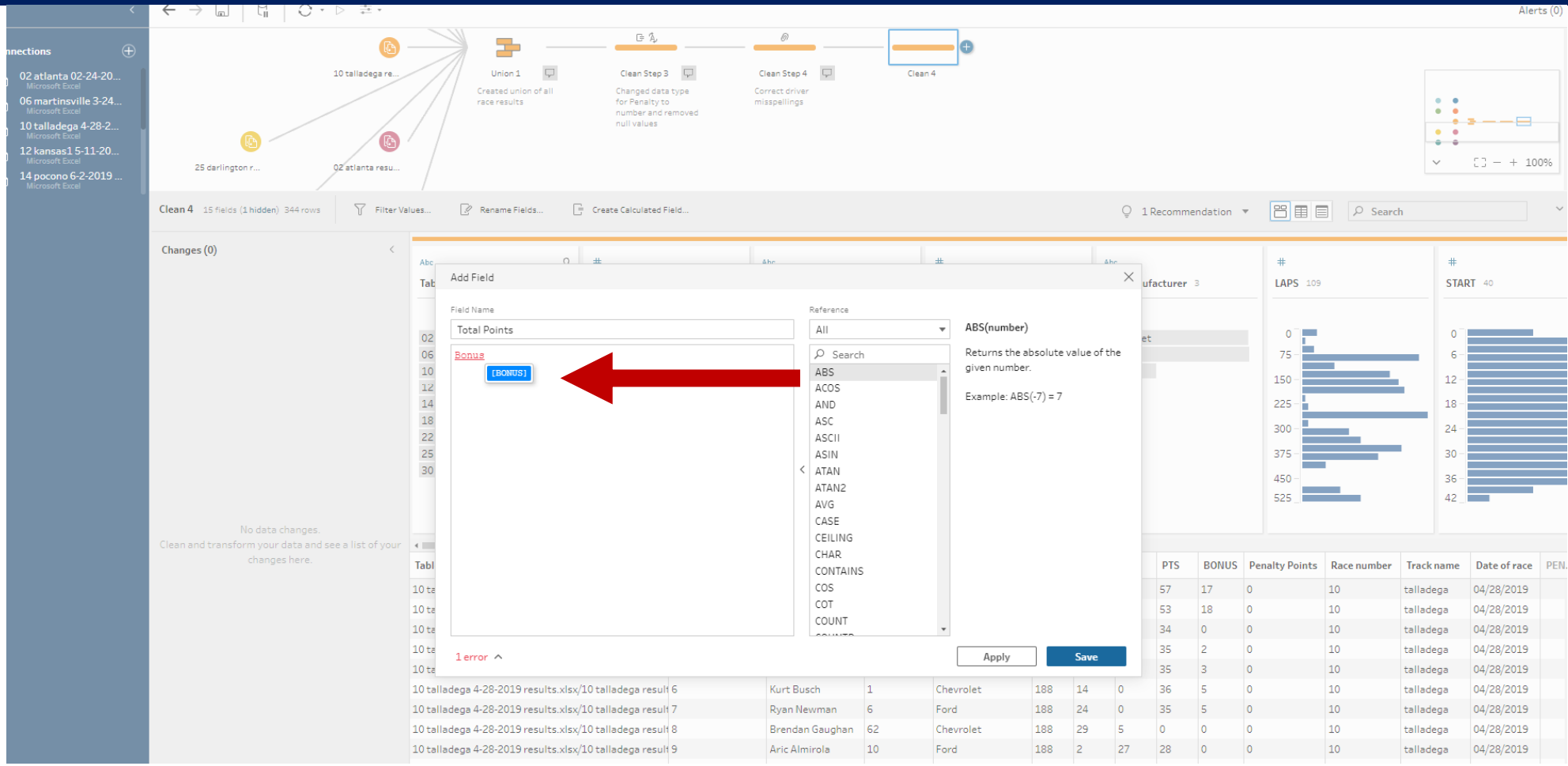
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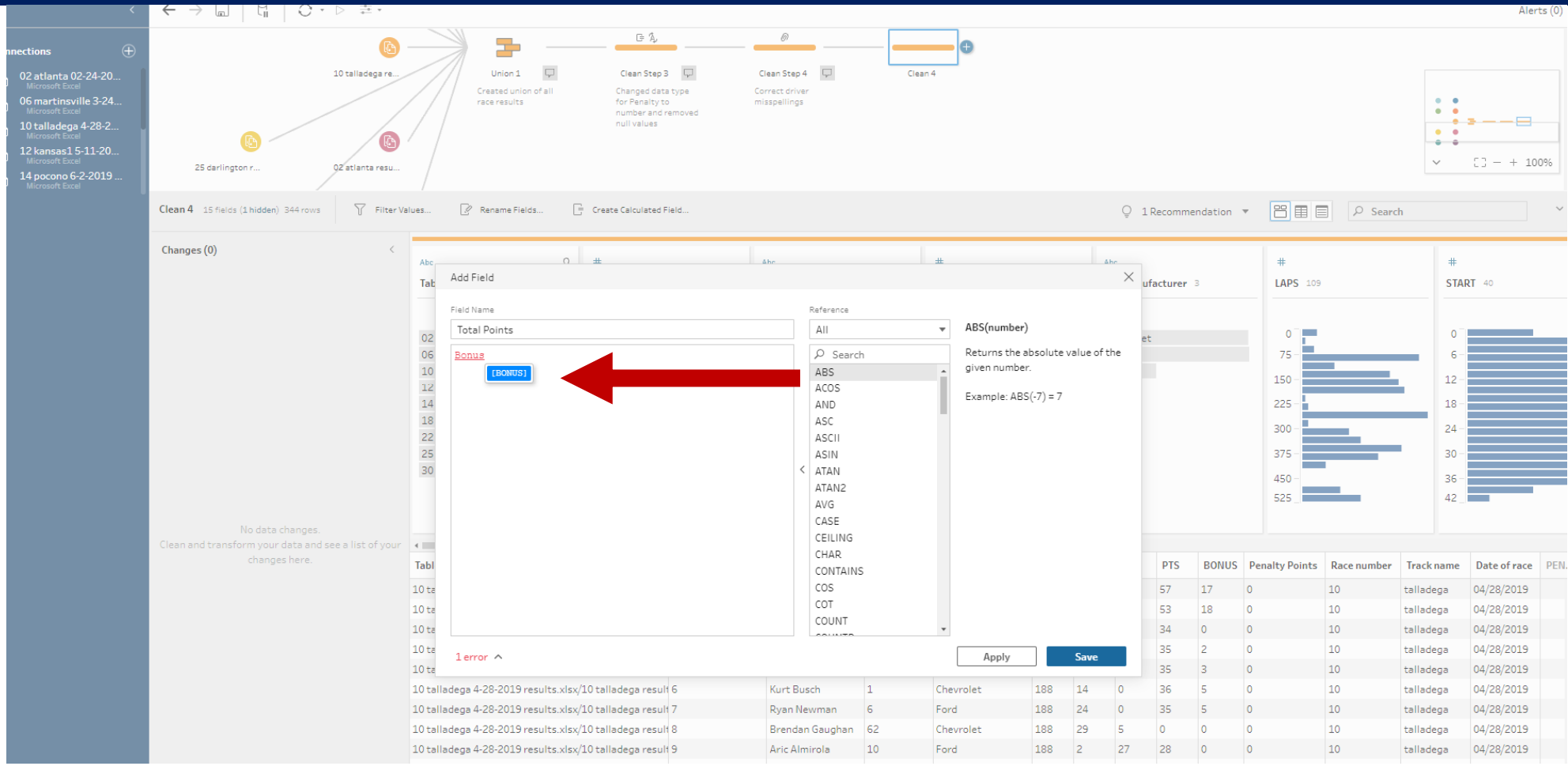
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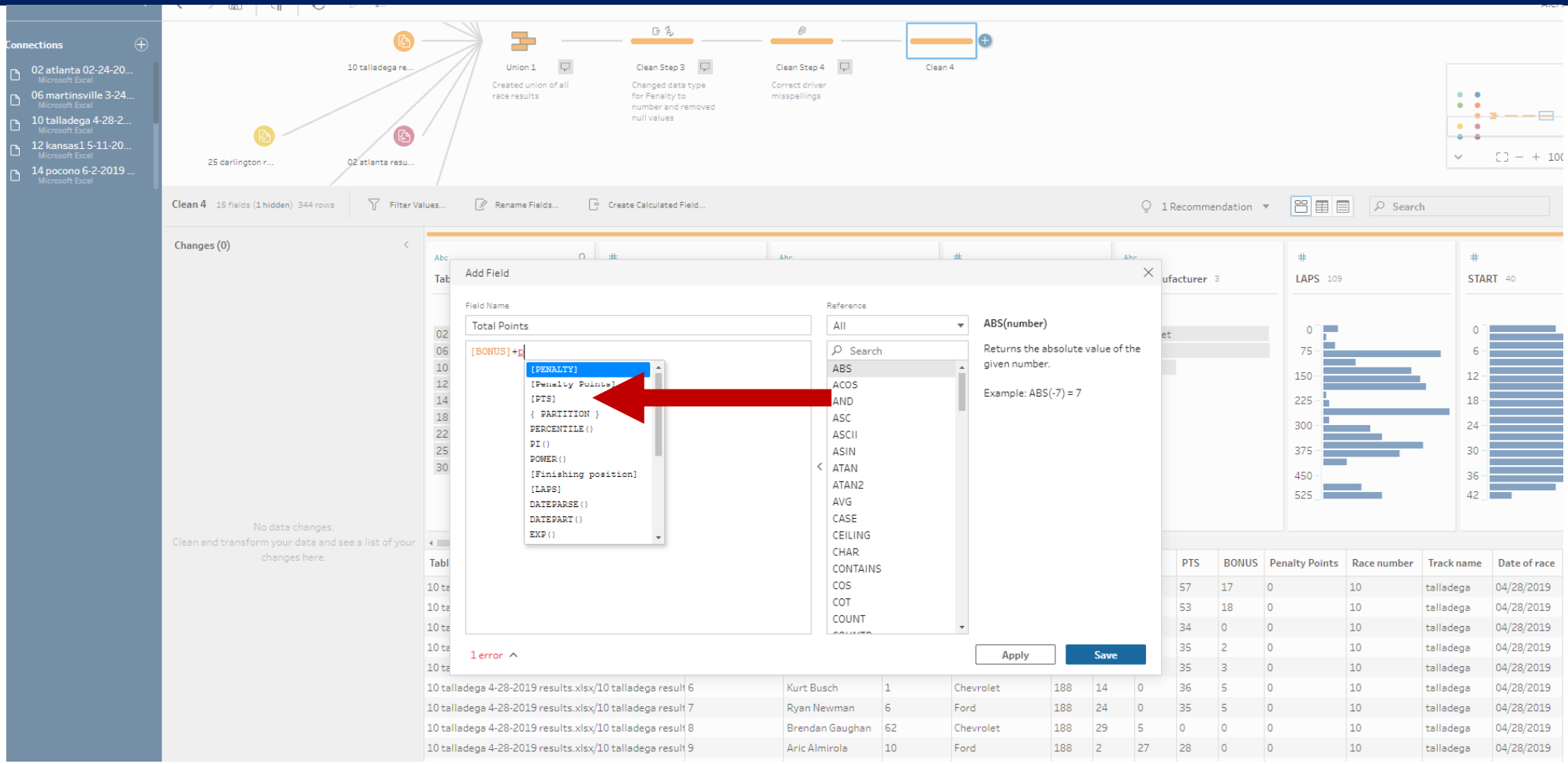
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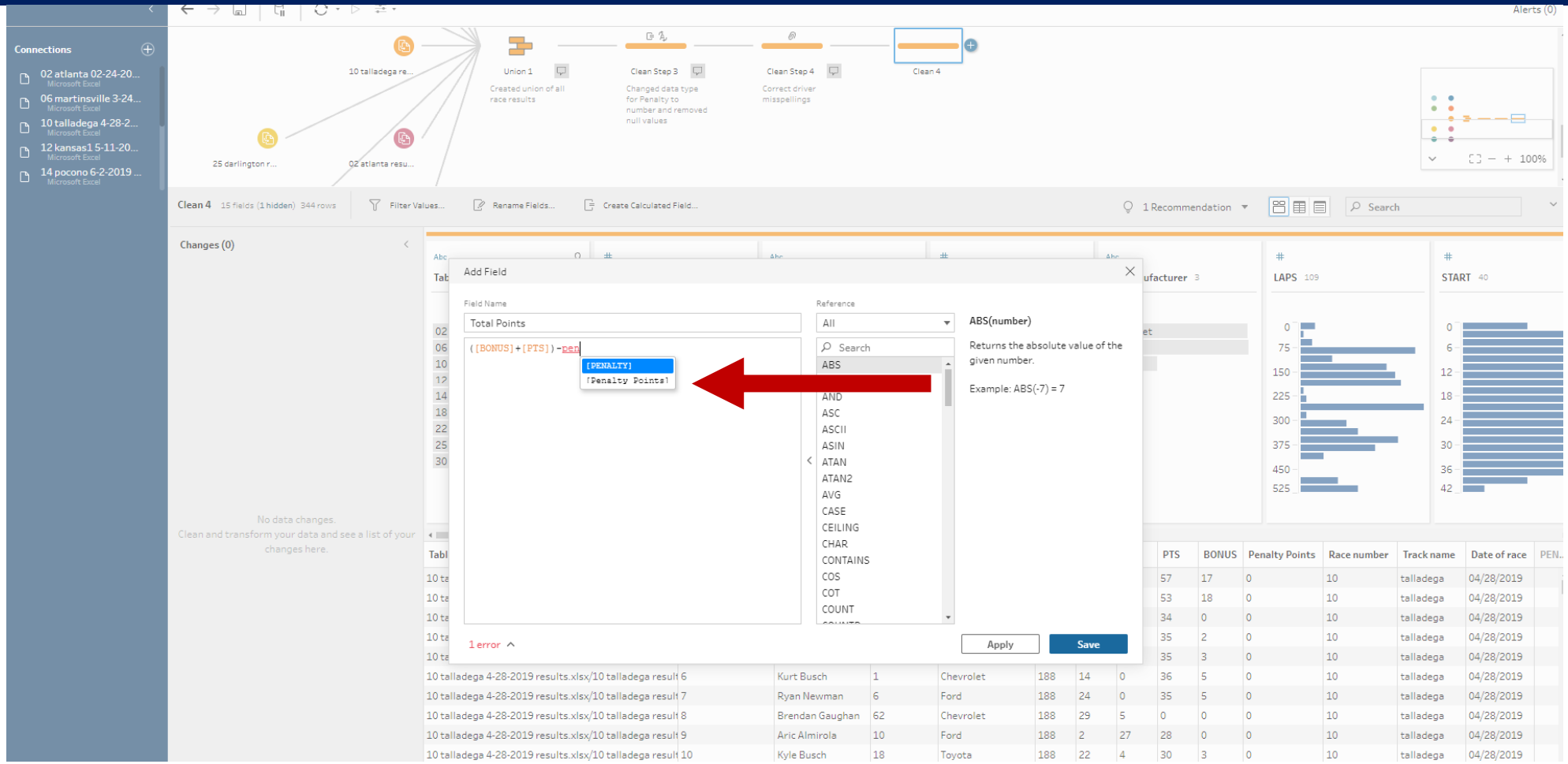
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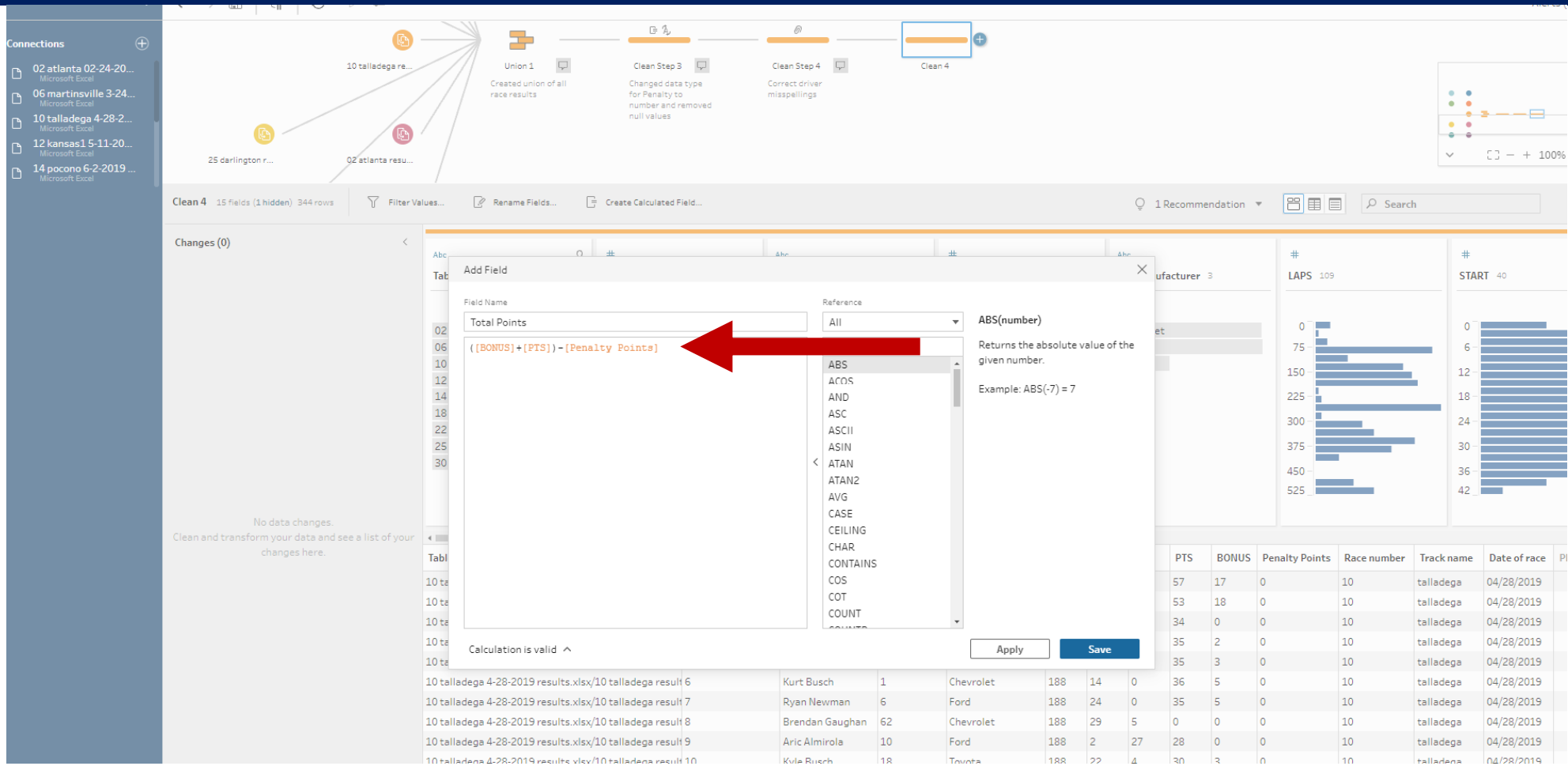
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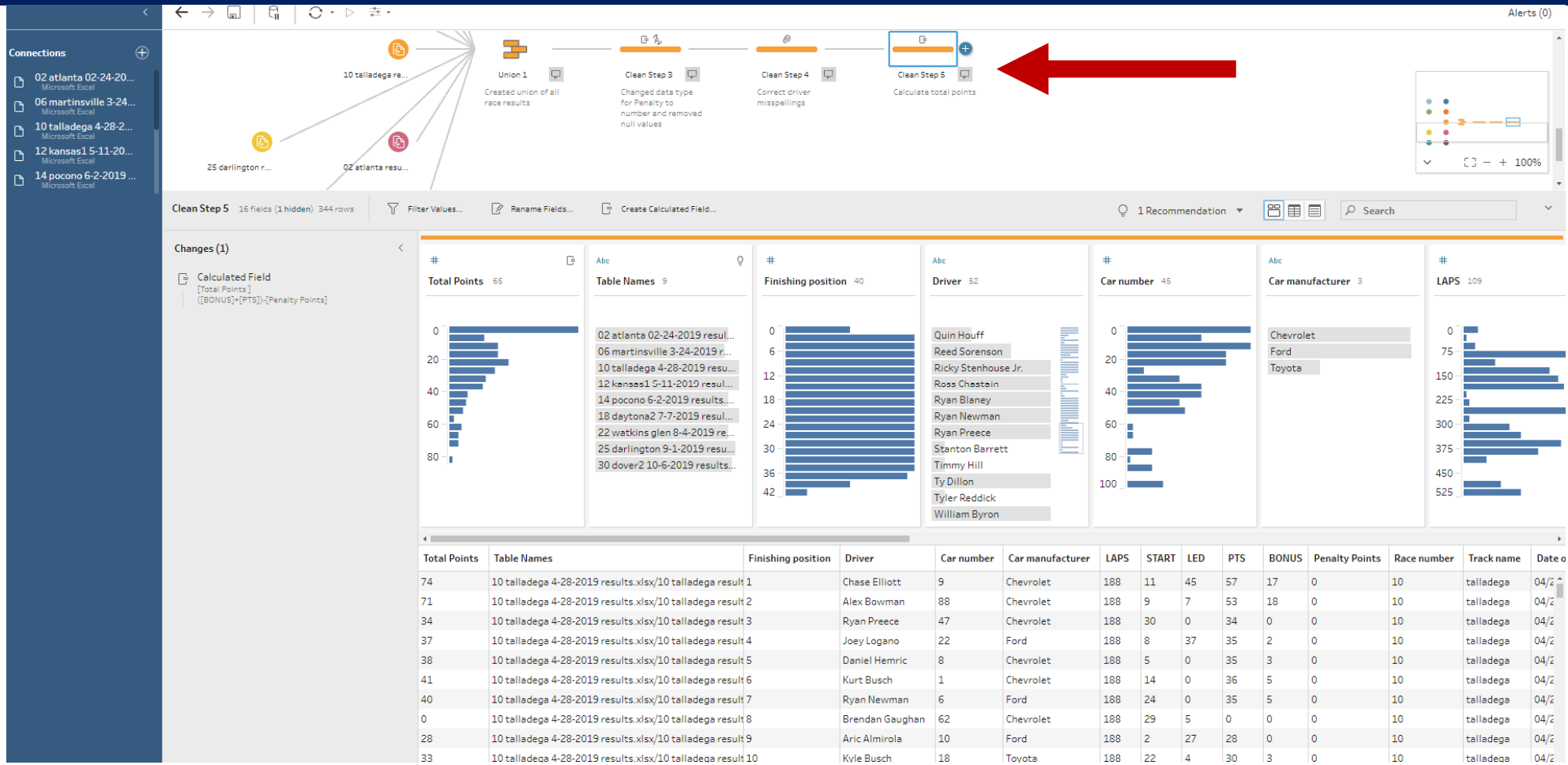
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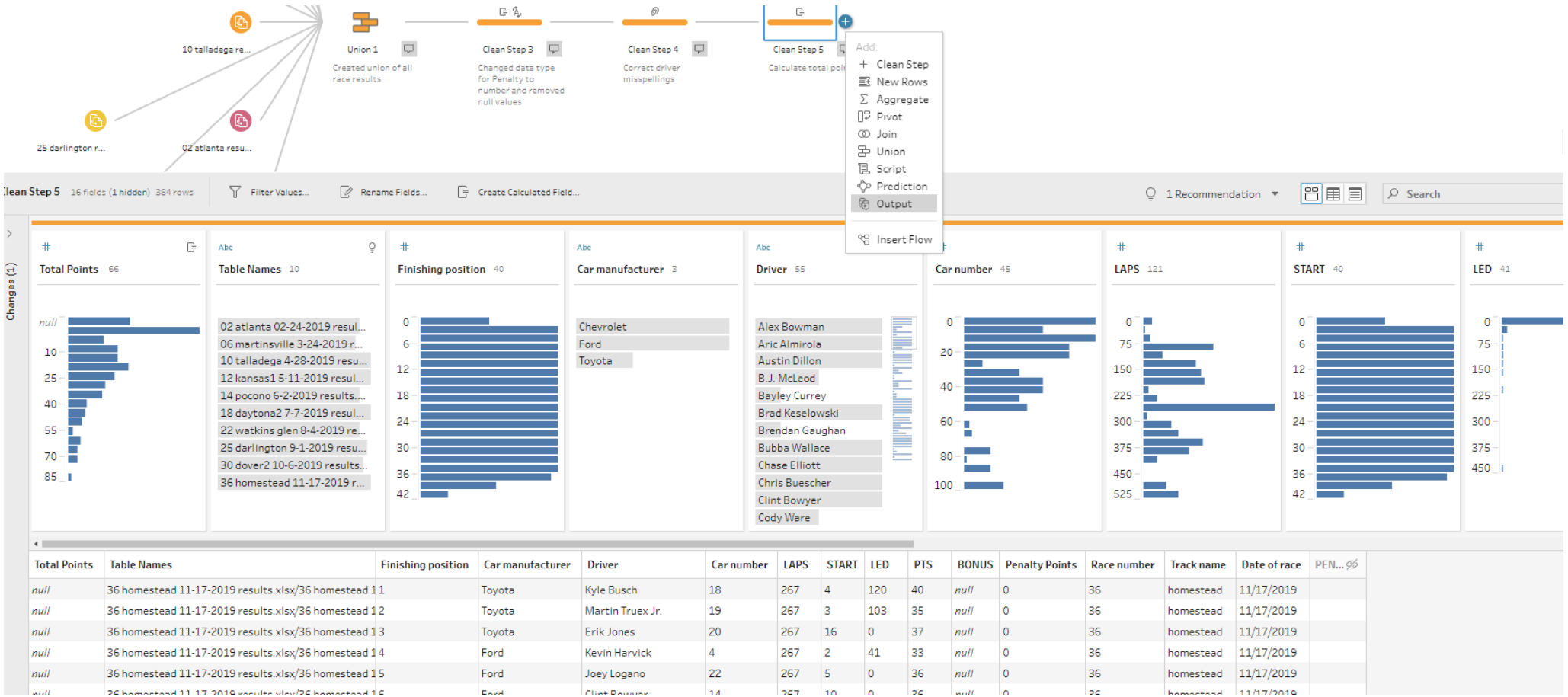


Total Points	Table Names	Finishing position	Driver	Car number	Car manufacturer	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date o
74	10 talladega 4-28-2019 results.xlsx/10 talladega result	1	Chase Elliott	9	Chevrolet	188	11	45	57	17	0	10	talladega	04/2
71	10 talladega 4-28-2019 results.xlsx/10 talladega result	2	Alex Bowman	88	Chevrolet	188	9	7	53	18	0	10	talladega	04/2
34	10 talladega 4-28-2019 results.xlsx/10 talladega result	3	Ryan Preece	47	Chevrolet	188	30	0	34	0	0	10	talladega	04/2
37	10 talladega 4-28-2019 results.xlsx/10 talladega result	4	Joey Logano	22	Ford	188	8	37	35	2	0	10	talladega	04/2
38	10 talladega 4-28-2019 results.xlsx/10 talladega result	5	Daniel Hemric	8	Chevrolet	188	5	0	35	3	0	10	talladega	04/2
41	10 talladega 4-28-2019 results.xlsx/10 talladega result	6	Kurt Busch	1	Chevrolet	188	14	0	36	5	0	10	talladega	04/2
40	10 talladega 4-28-2019 results.xlsx/10 talladega result	7	Ryan Newman	6	Ford	188	24	0	35	5	0	10	talladega	04/2
0	10 talladega 4-28-2019 results.xlsx/10 talladega result	8	Brendan Gaughan	62	Chevrolet	188	29	5	0	0	0	10	talladega	04/2
28	10 talladega 4-28-2019 results.xlsx/10 talladega result	9	Aric Almirola	10	Ford	188	2	27	28	0	0	10	talladega	04/2
33	10 talladega 4-28-2019 results.xlsx/10 talladega result	10	Kyle Busch	18	Toyota	188	22	4	30	3	0	10	talladega	04/2

Step 06

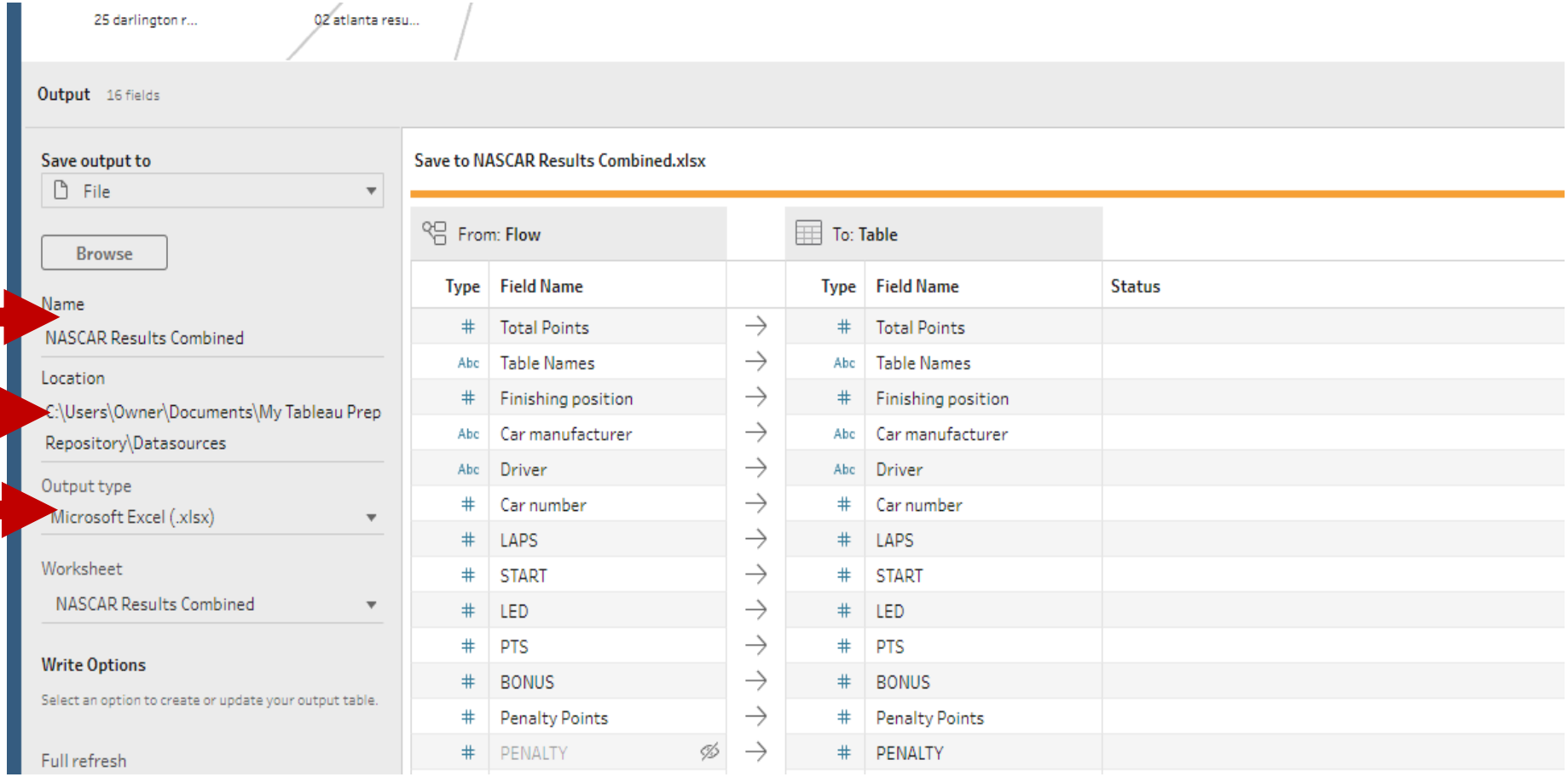
Create an Output File

Create an Output File

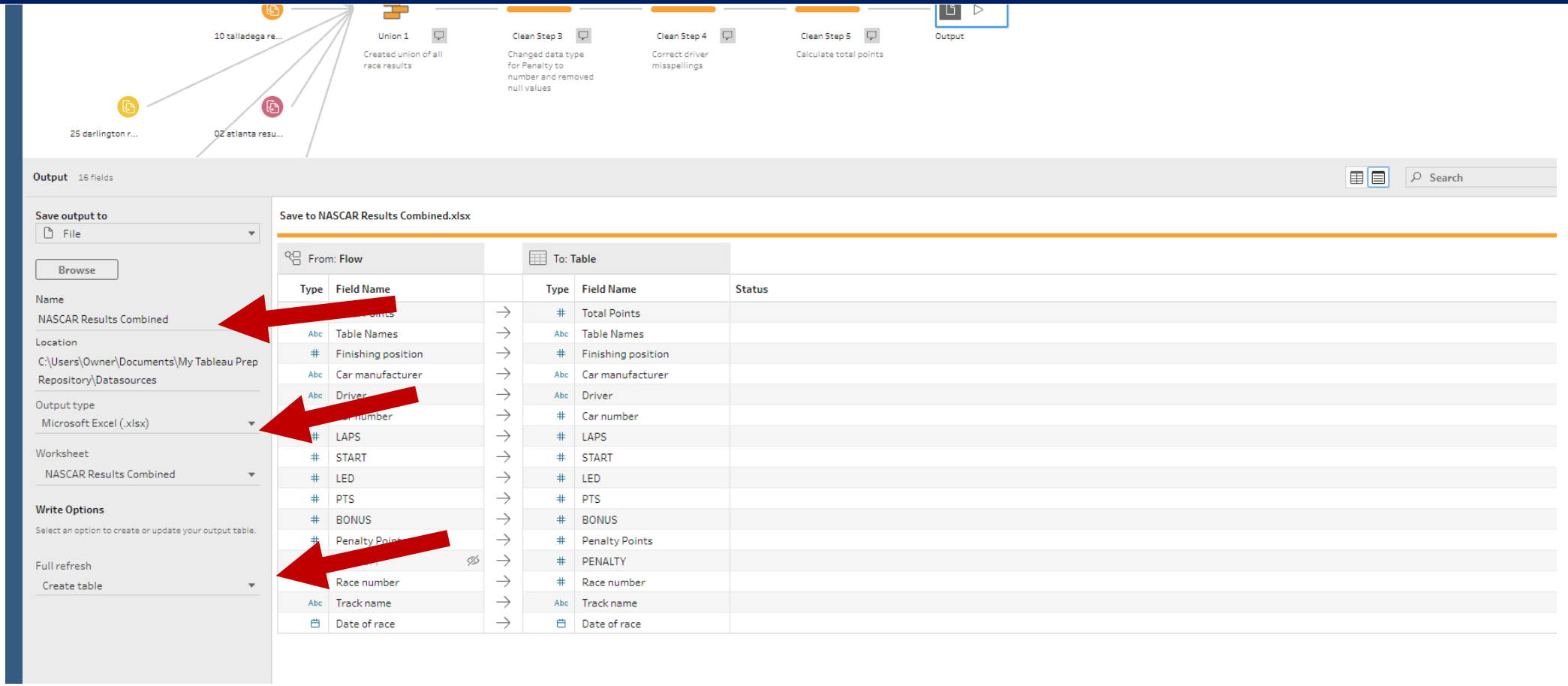


Total Points	Table Names	Finishing position	Car manufacturer	Driver	Car number	LAPS	START	LED	PTS	BONUS	Penalty Points	Race number	Track name	Date of race	PEN...
null	36 homestead 11-17-2019 results.xlsx/36 homestead 1	1	Toyota	Kyle Busch	18	267	4	120	40	null	0	36	homestead	11/17/2019	
null	36 homestead 11-17-2019 results.xlsx/36 homestead 1	2	Toyota	Martin Truex Jr.	19	267	3	103	35	null	0	36	homestead	11/17/2019	
null	36 homestead 11-17-2019 results.xlsx/36 homestead 1	3	Toyota	Erik Jones	20	267	16	0	37	null	0	36	homestead	11/17/2019	
null	36 homestead 11-17-2019 results.xlsx/36 homestead 1	4	Ford	Kevin Harvick	4	267	2	41	33	null	0	36	homestead	11/17/2019	
null	36 homestead 11-17-2019 results.xlsx/36 homestead 1	5	Ford	Joey Logano	22	267	5	0	36	null	0	36	homestead	11/17/2019	

Create an Output File



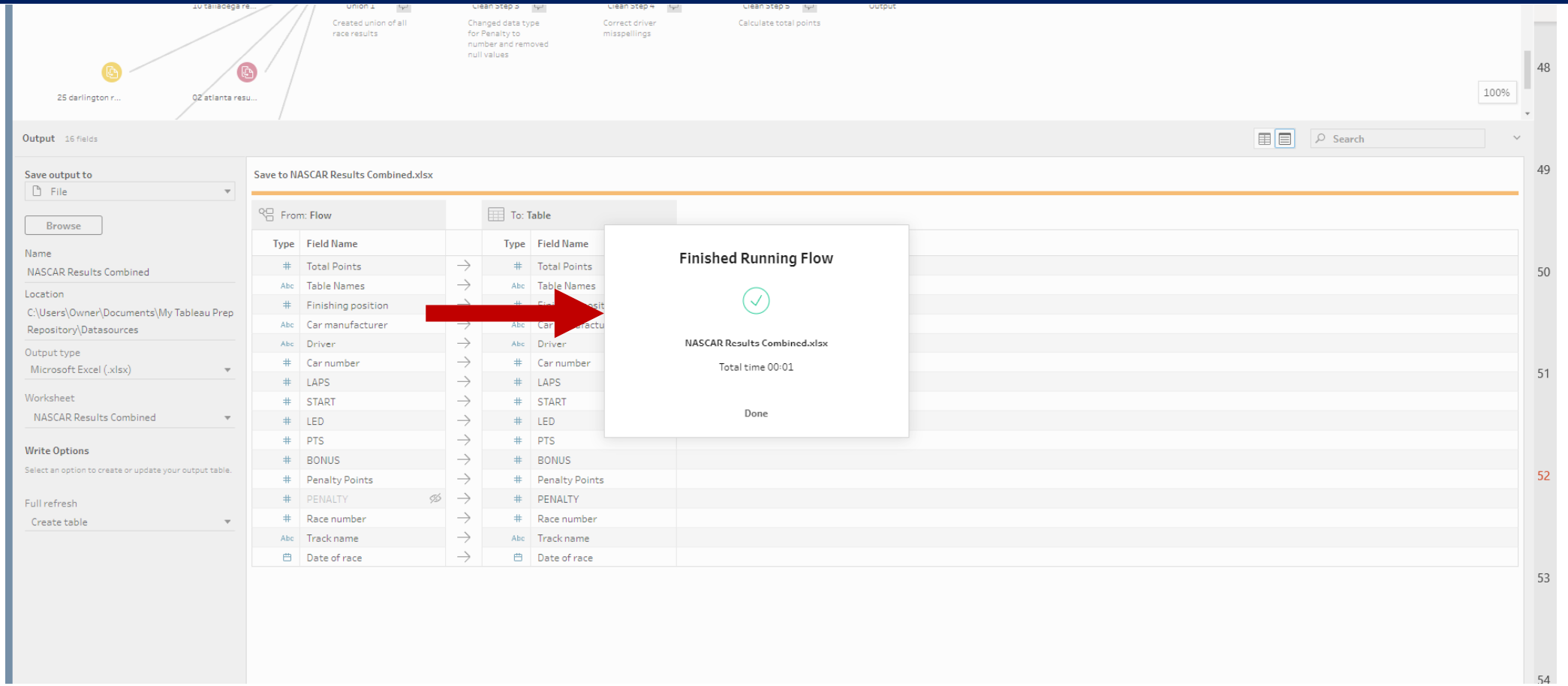
Create an Output File



Create an Output File

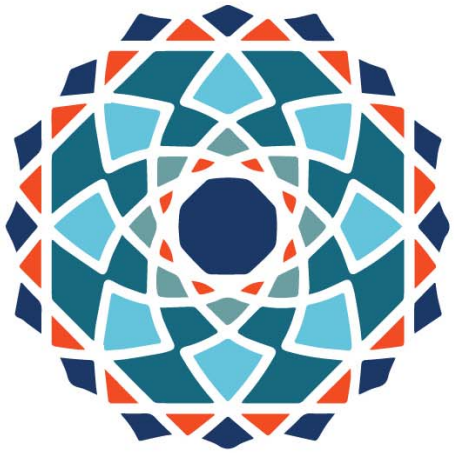


Create an Output File



Data set has been cleaned!





Accounting is Analytics

For additional data analytics resources, see ***AccountingIsAnalytics.com***

Prepared by:
Jennifer Cainas

© 2022

Data Analytics Case

NASCAR AND LEAN

Featuring Tableau Prep and Tableau

Version 2022.1

Part 2: Using Visualizations to Create A Story



General Instructions

- You will import the Excel output files you created in Tableau prep and use this data to create visualizations to display the data.
- This assignment will give you a broad overview of how to create visualizations and build a story in Tableau. There are many videos at Tableau.com to assist you in preparation for this assignment if you need additional help, but this will help you get started.

Tableau case learning objectives

After completing this case, students will be able to:

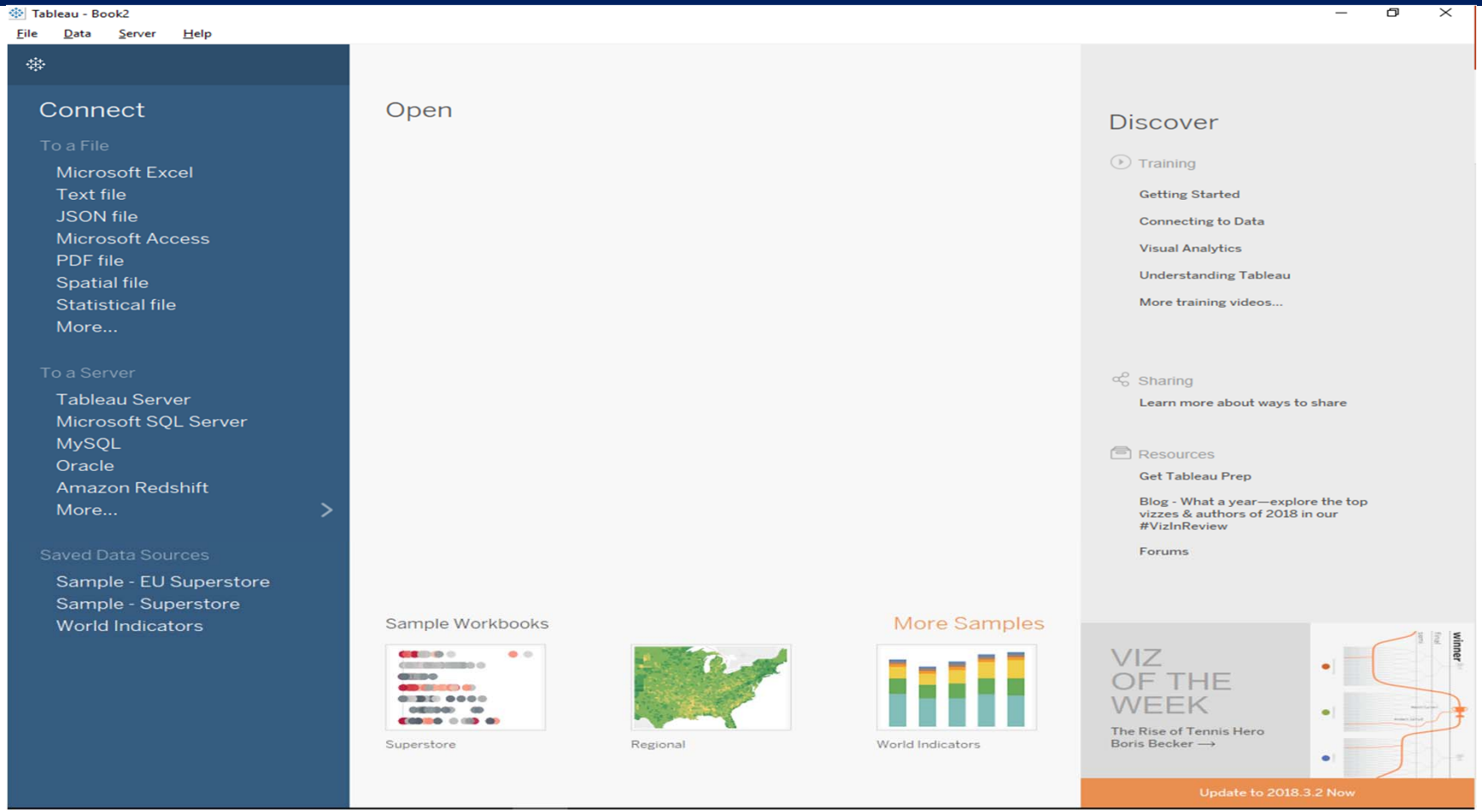
1. Import data and create a relationship between tables
2. Build and sort visualizations in the view
3. Utilize the marks card to add color and format the visualizations
4. Build and format a story to communicate information

Step 01

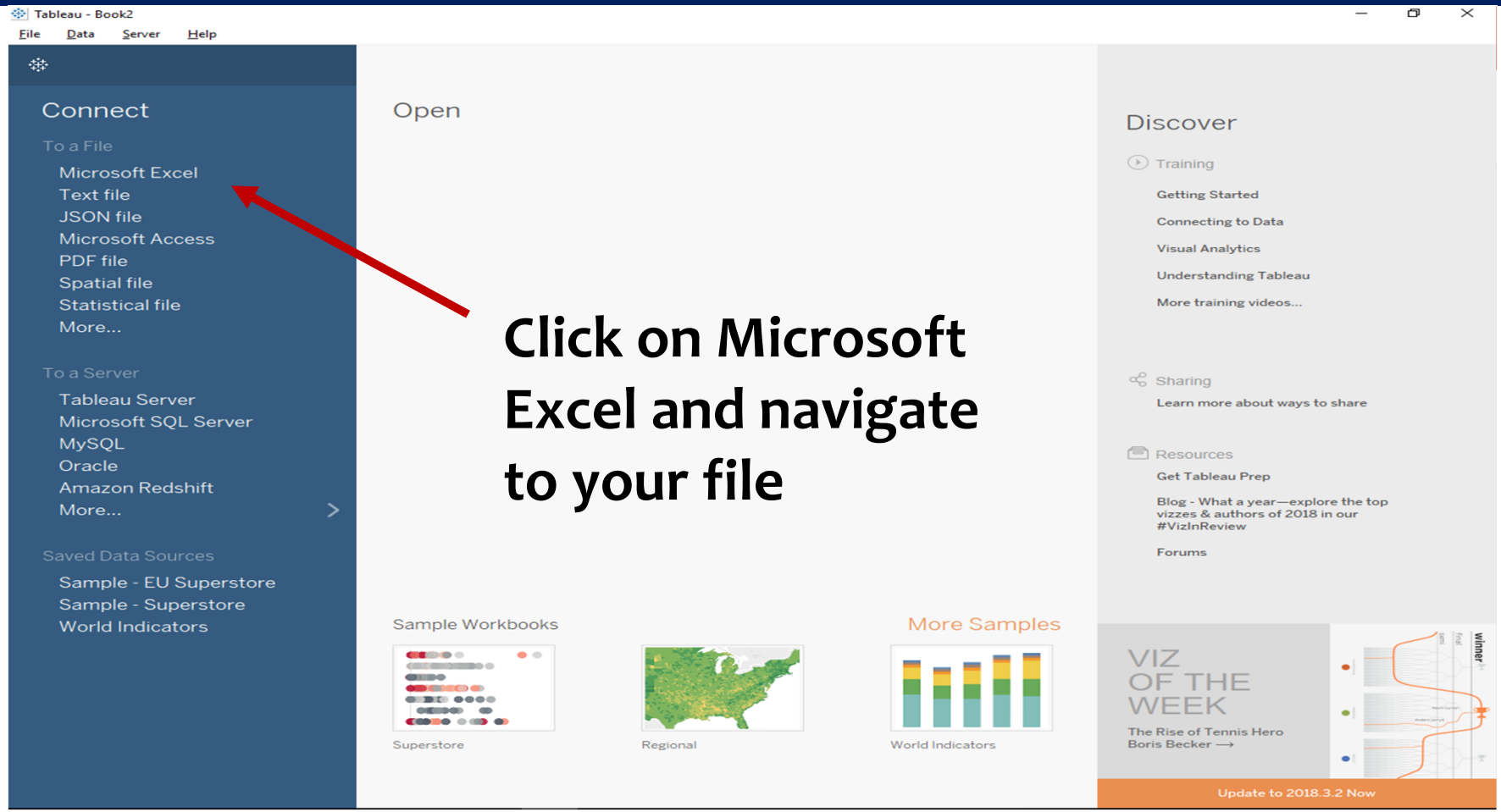
Input and view data

Getting Started

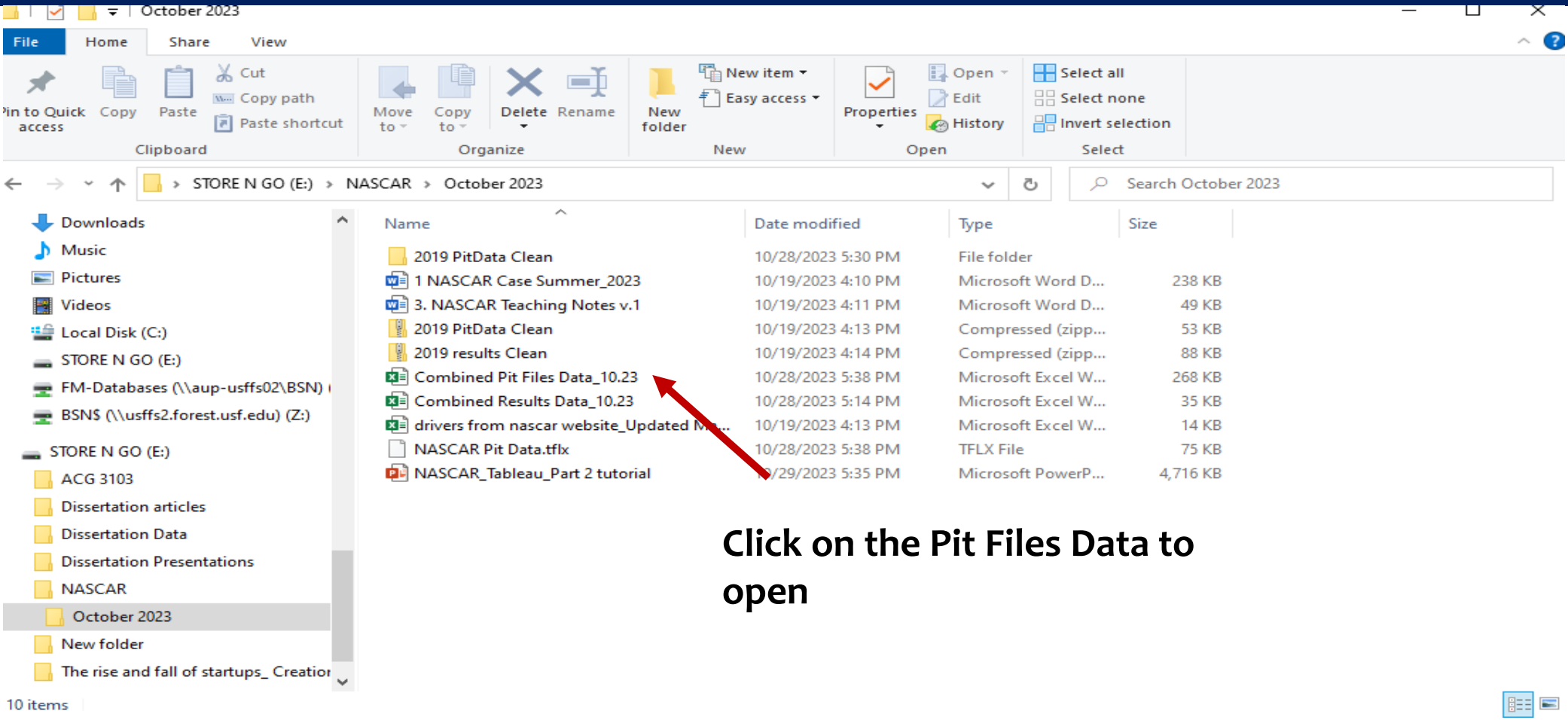
Start by opening Tableau



Getting Started

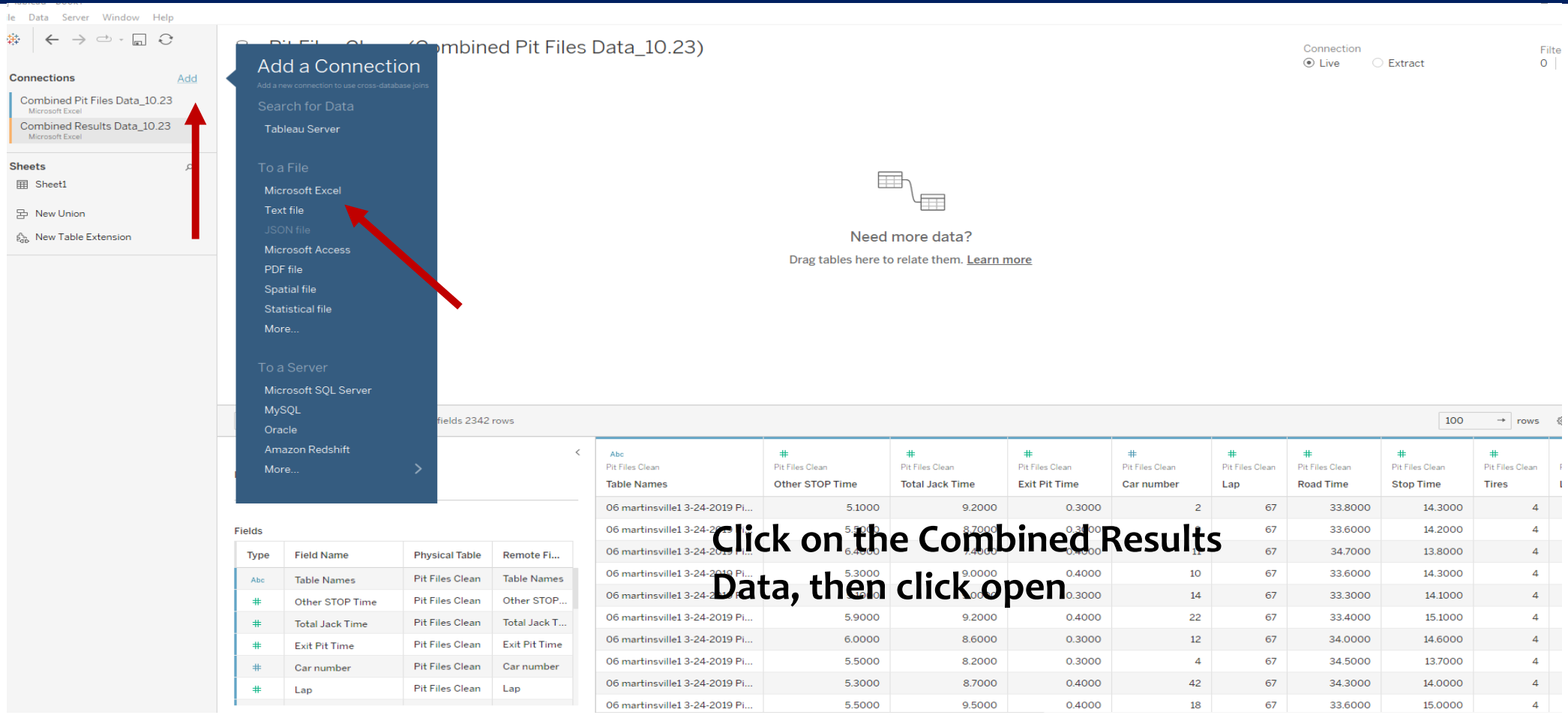


Open Excel Data File in Tableau

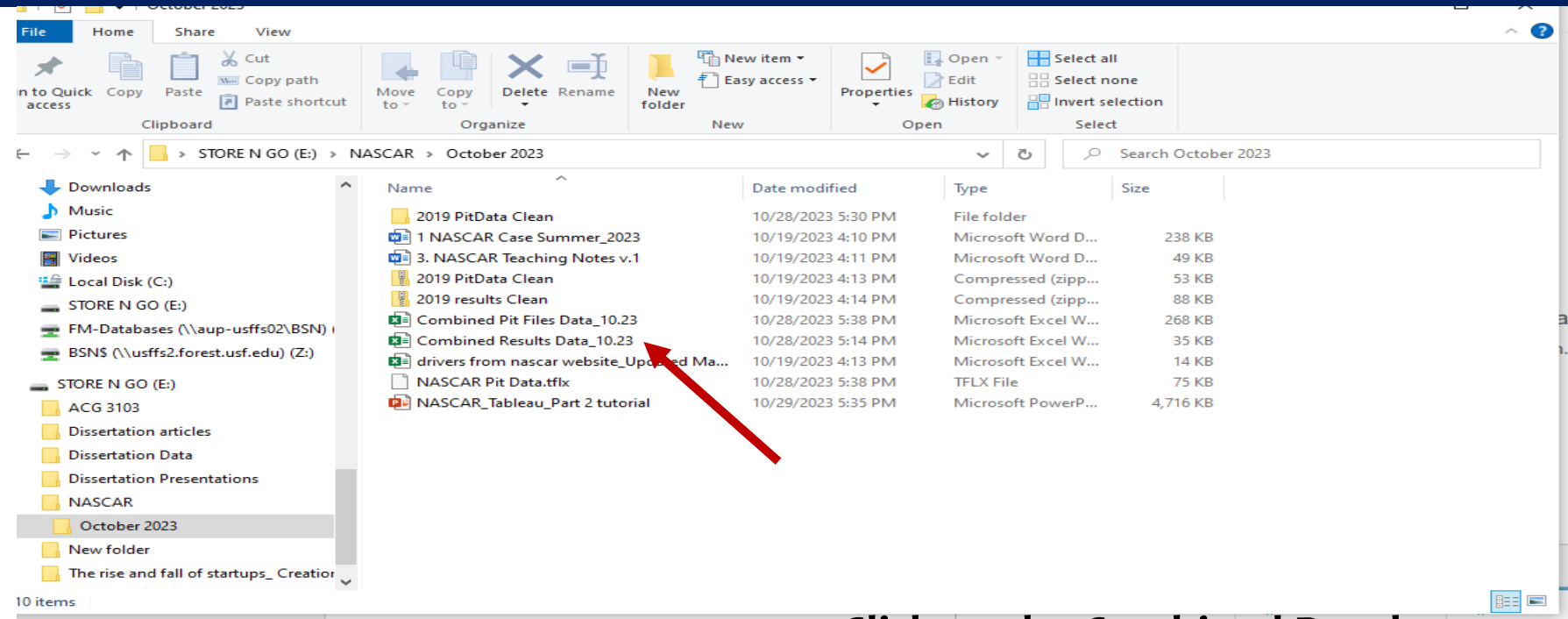


Click on the Pit Files Data to open

Open Excel Data File in Tableau

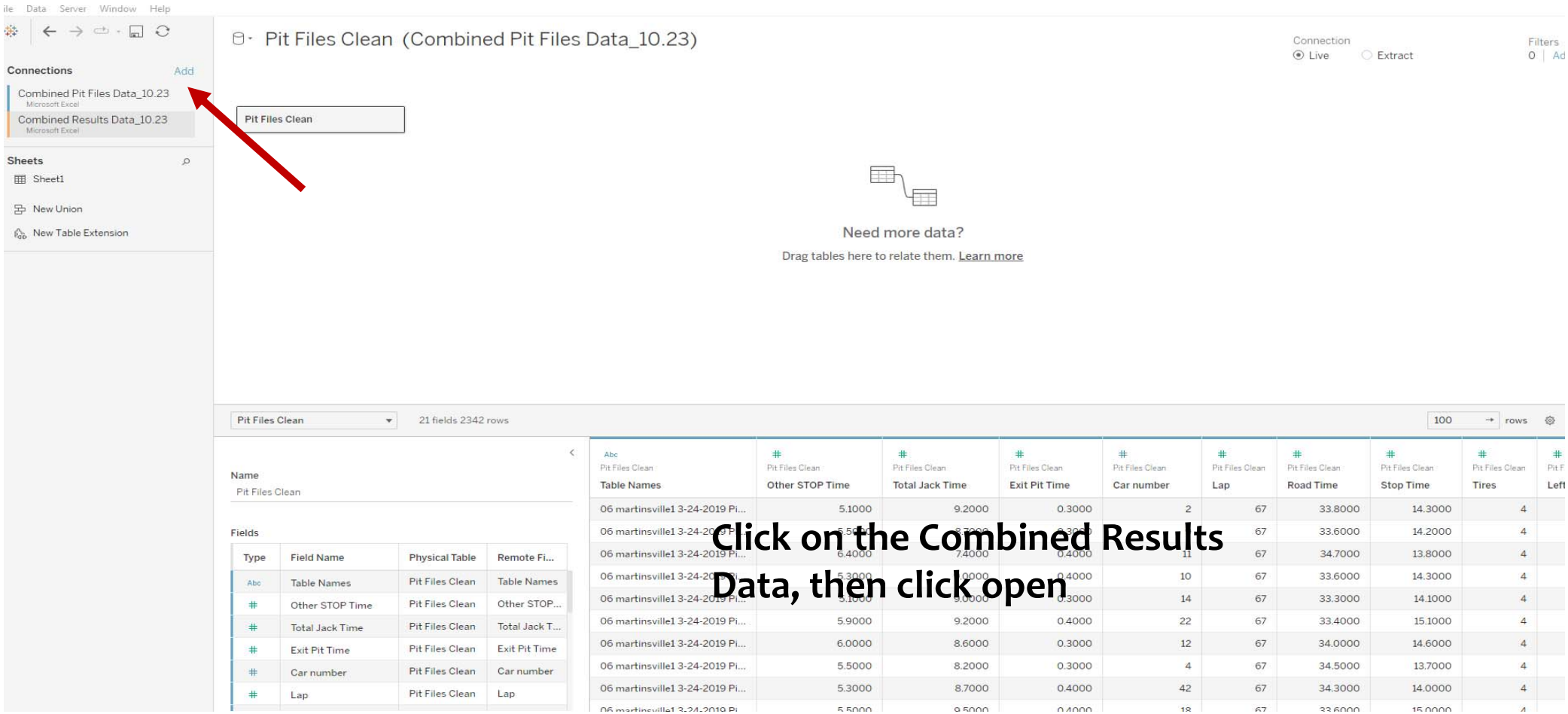


Open Excel Data File in Tableau

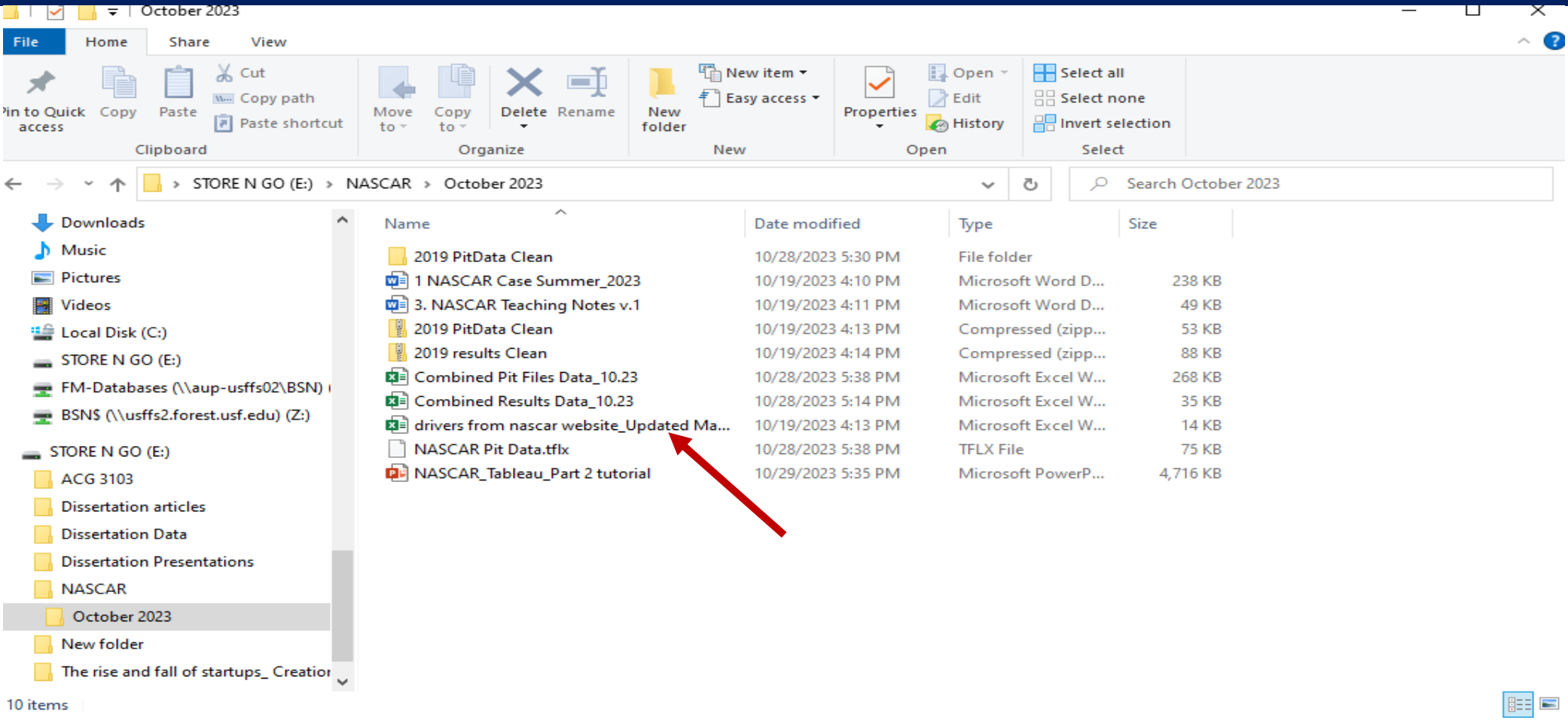


Click on the Combined Results Data, then click open

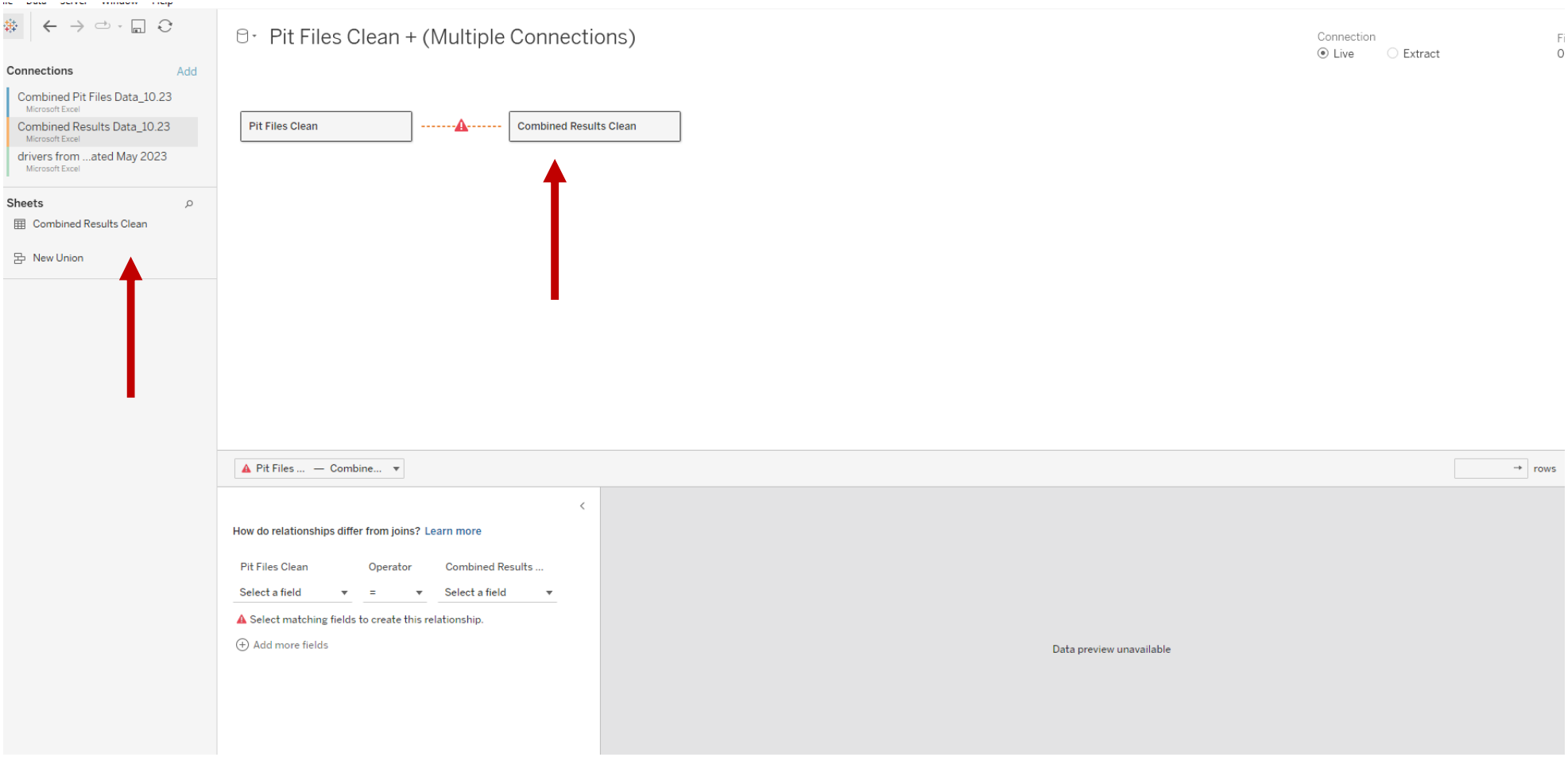
Open Excel Data File in Tableau



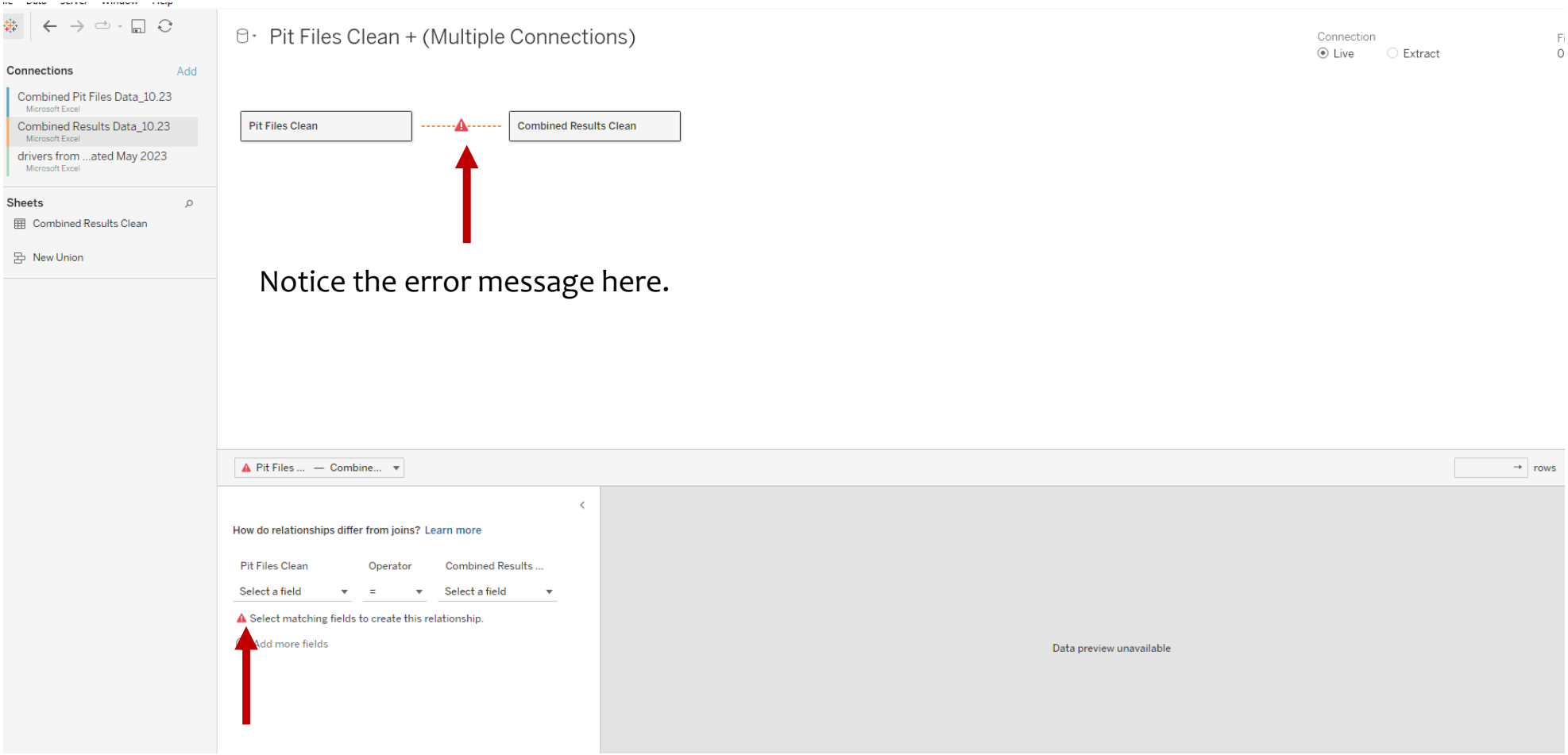
Open Excel Data File in Tableau



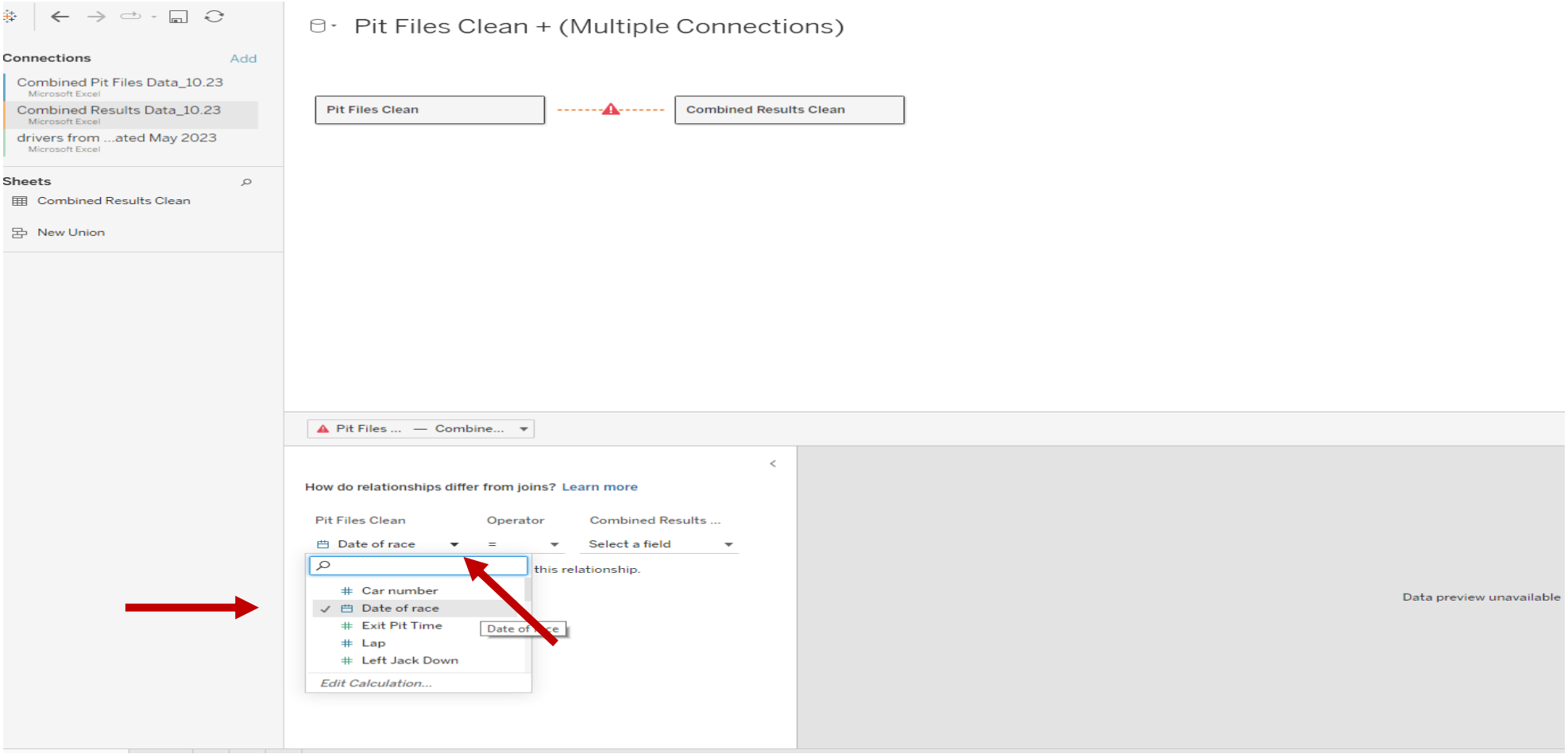
Drag tables into the View



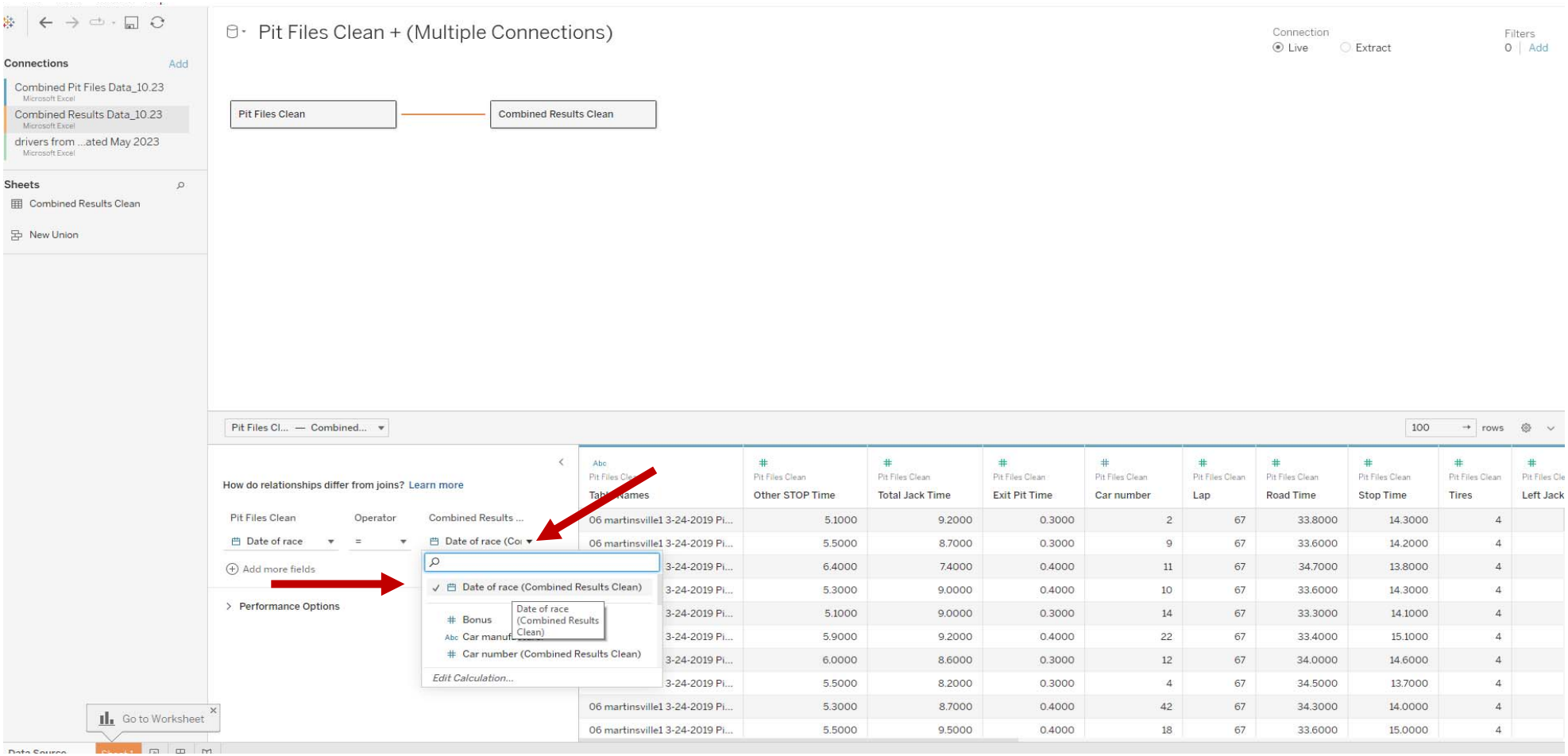
Create a Relationship between Tables



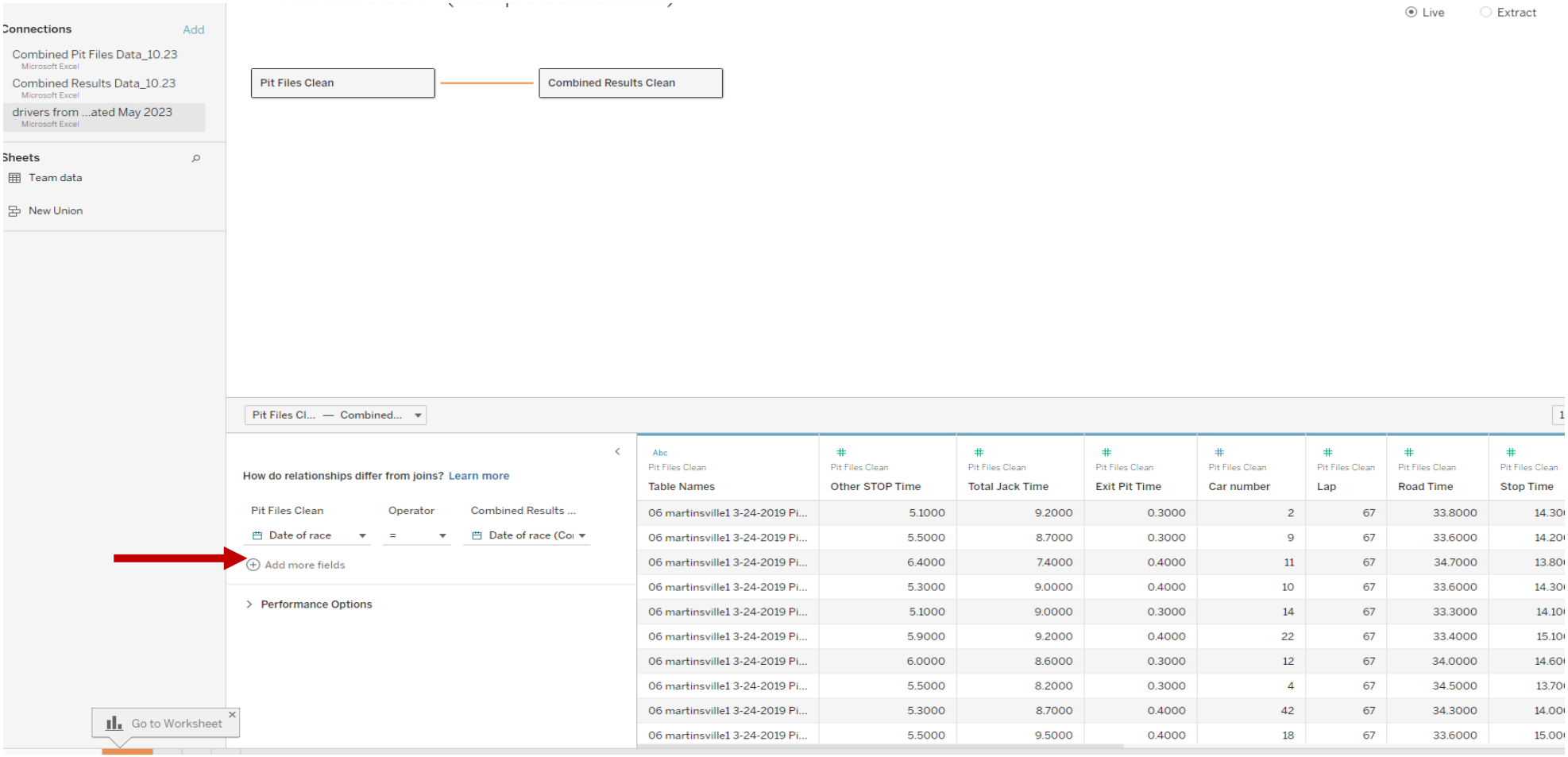
Create a Relationship between Tables



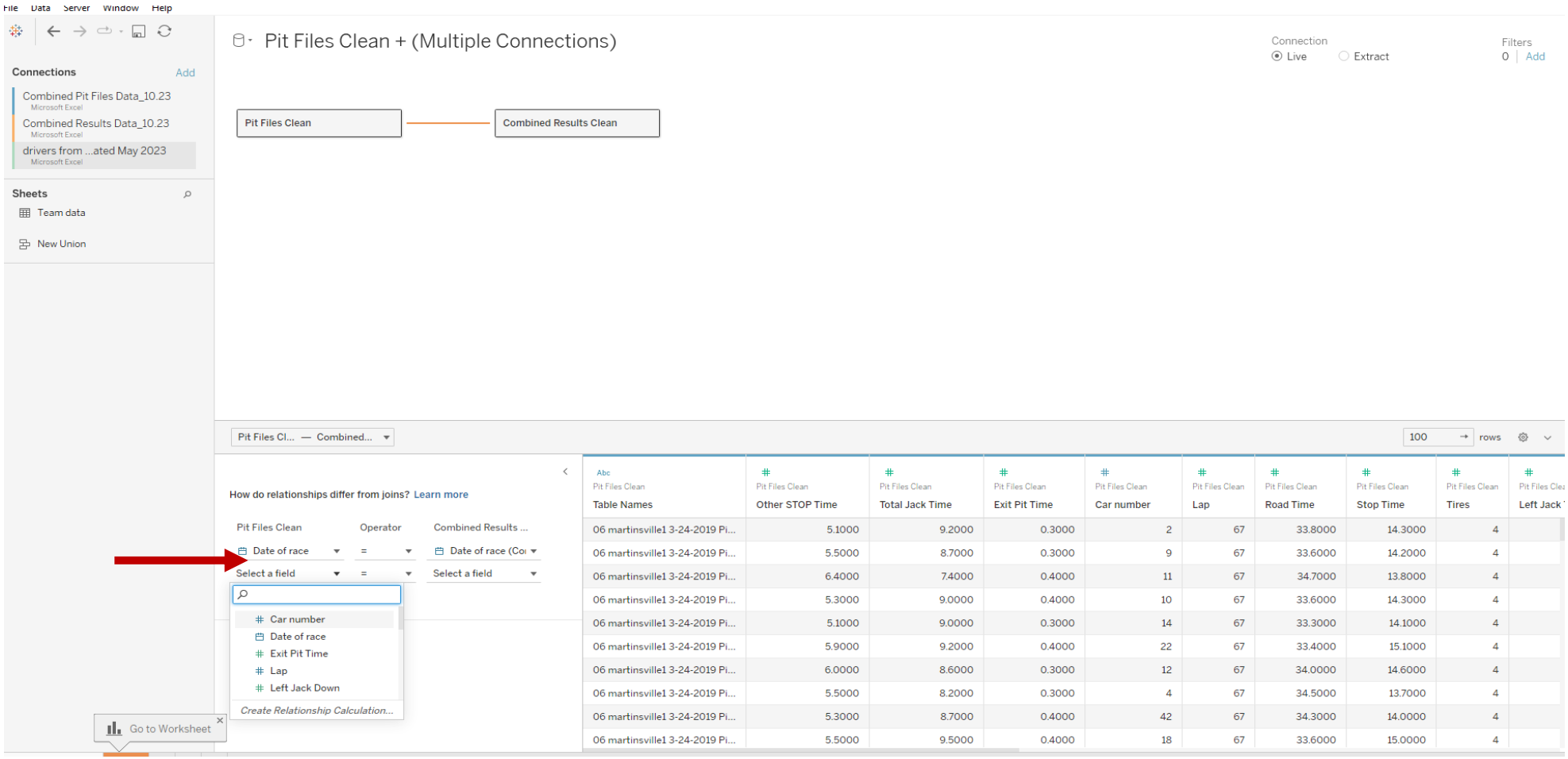
Create a Relationship between Tables



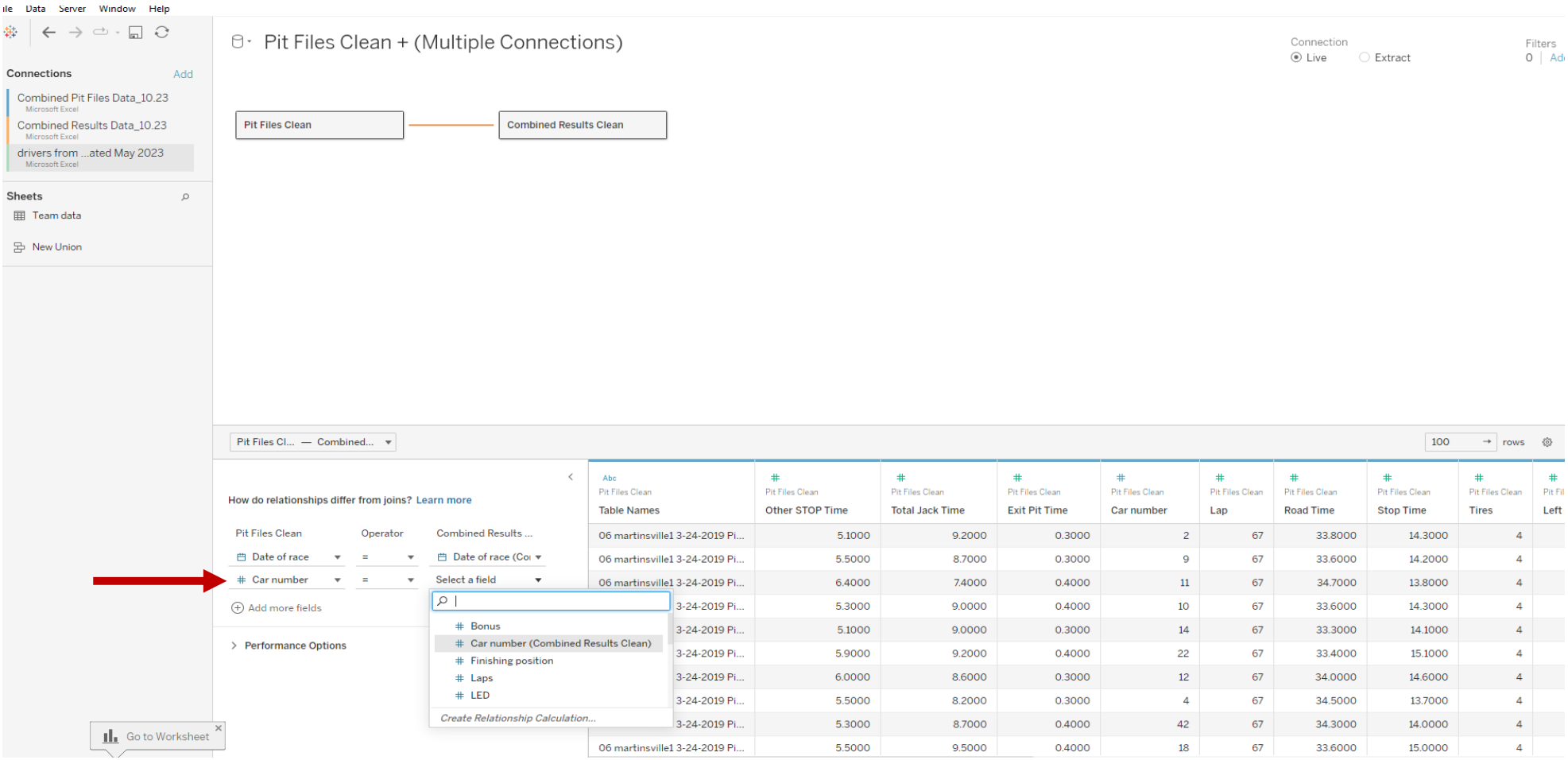
Create a Relationship between Tables



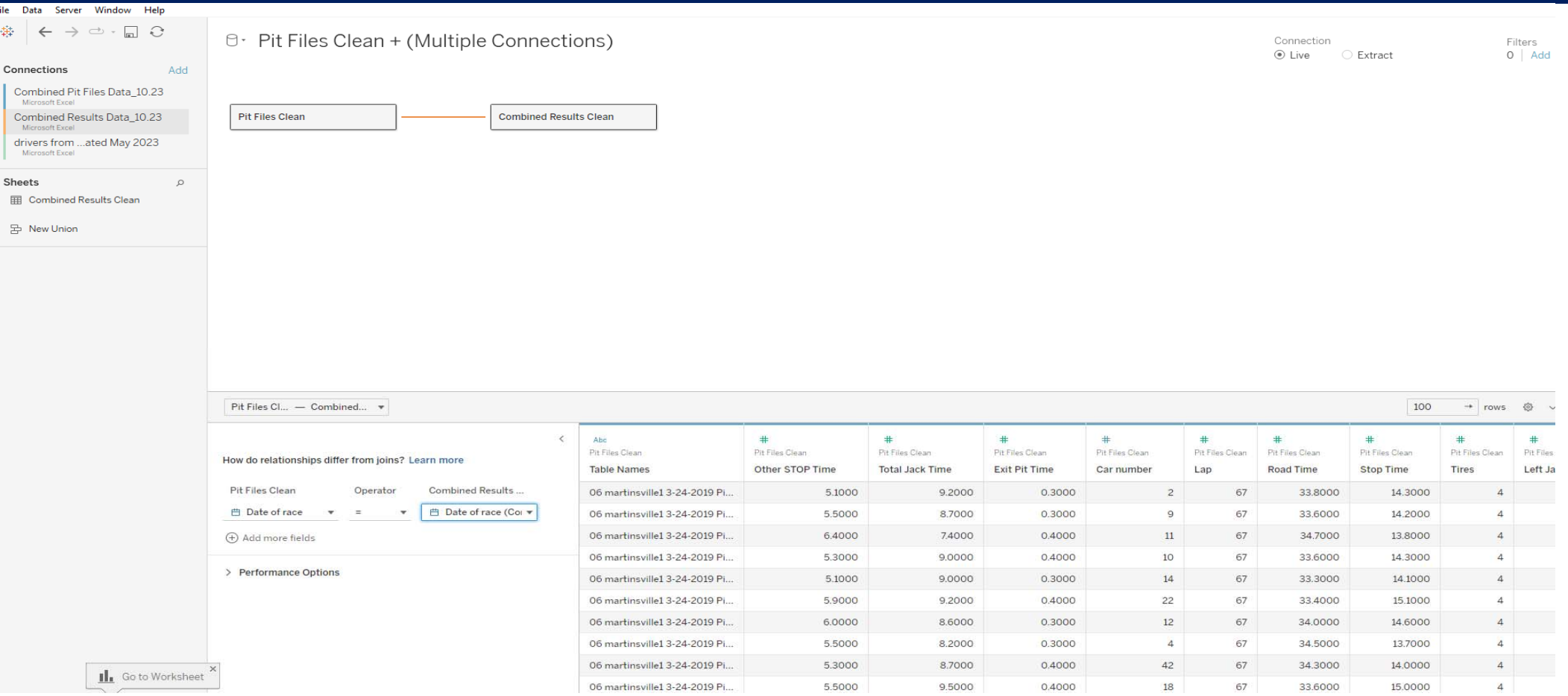
Create a Relationship between Tables



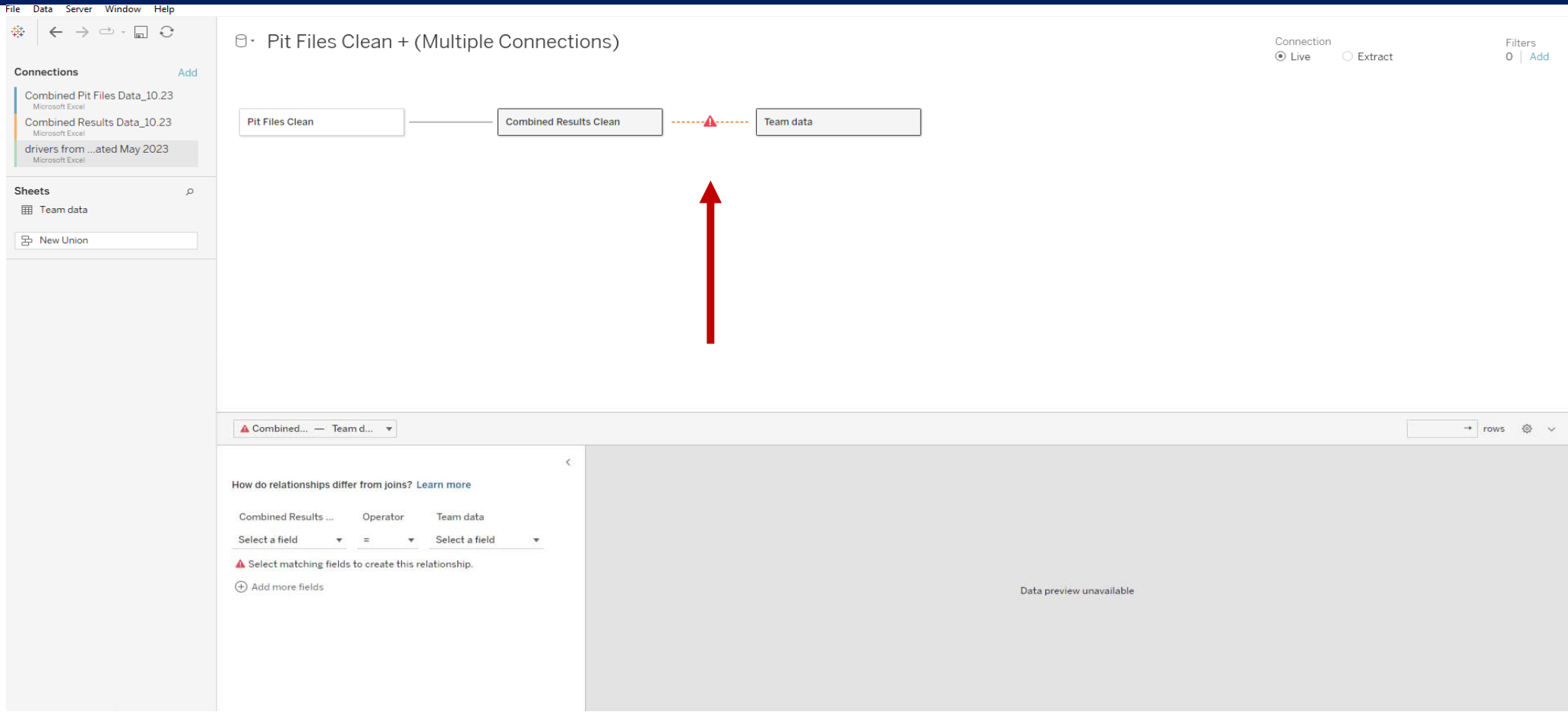
Create a Relationship between Tables



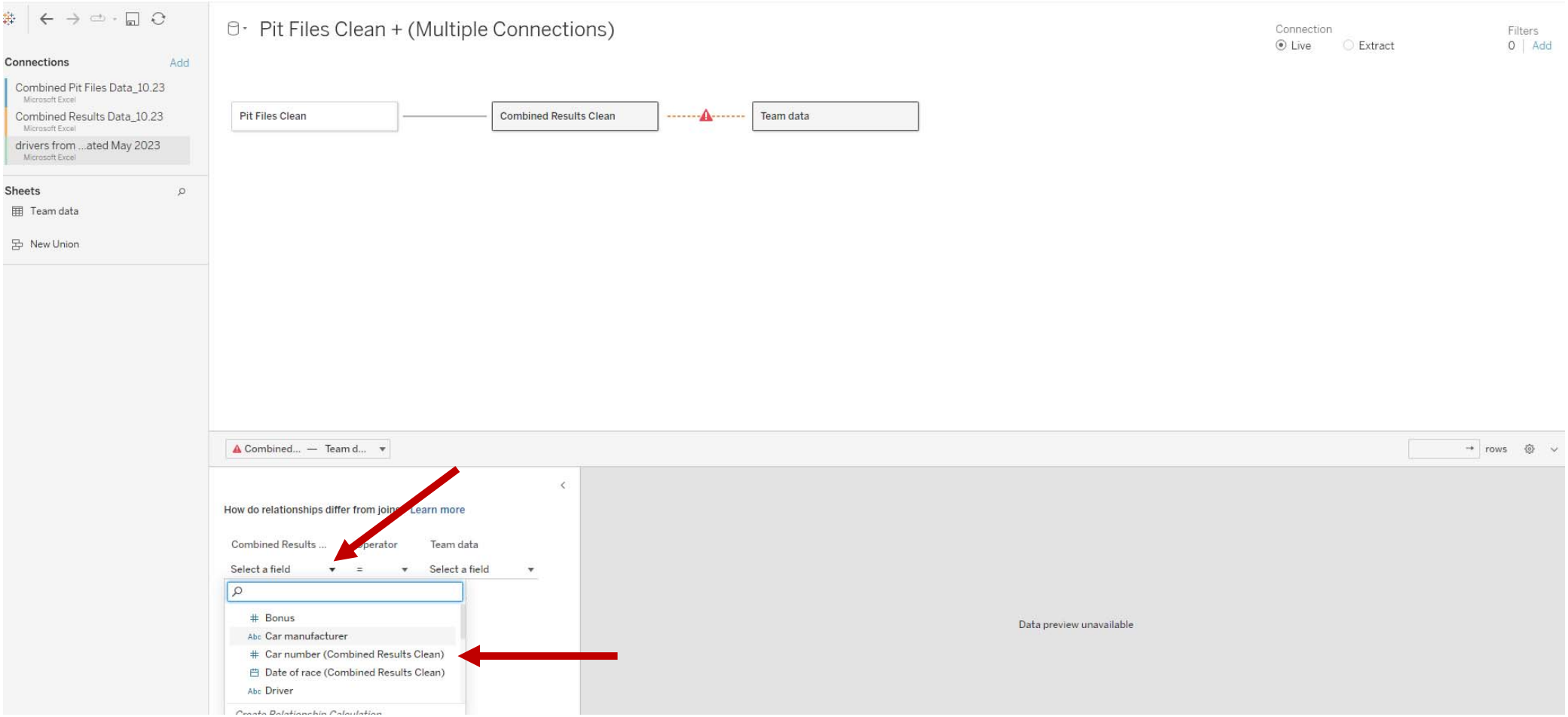
Relationships



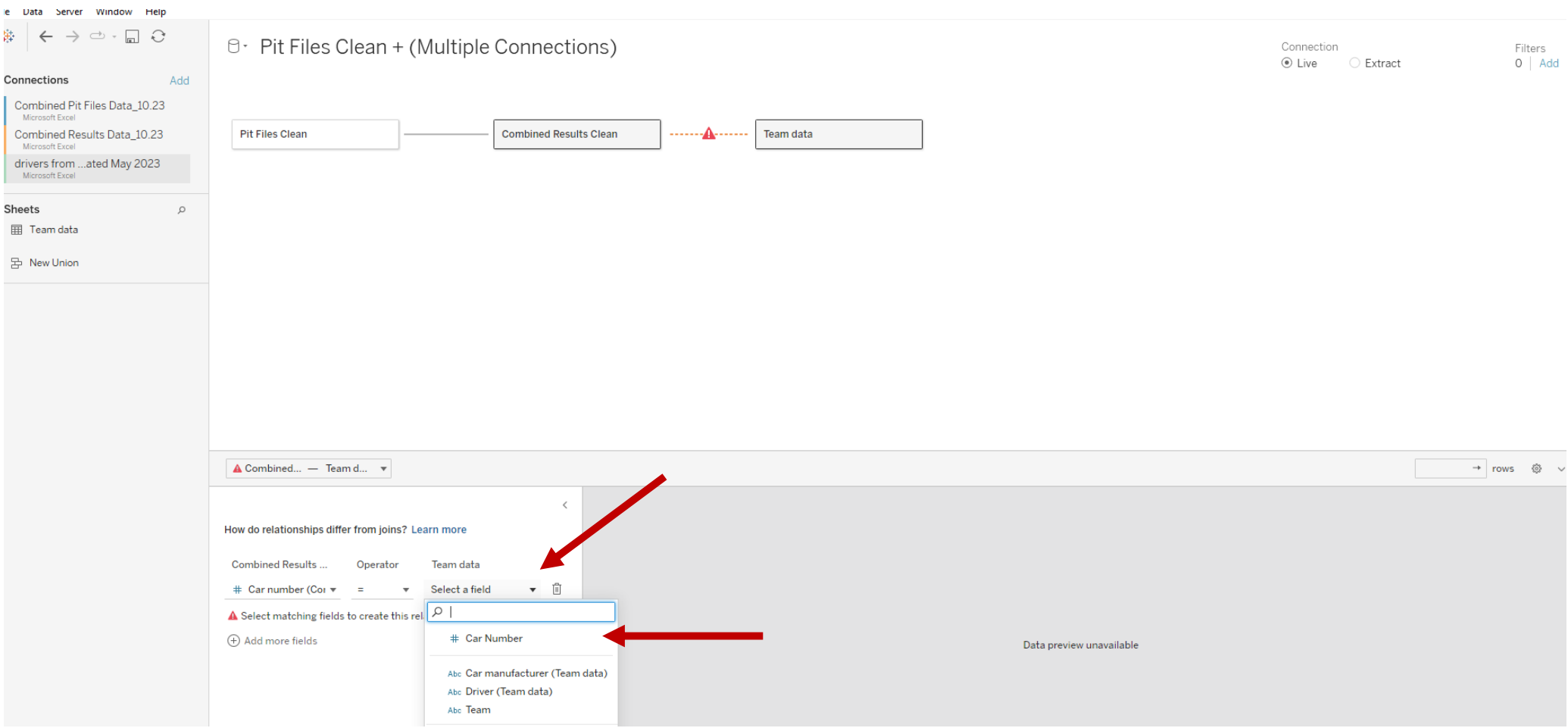
Relationships



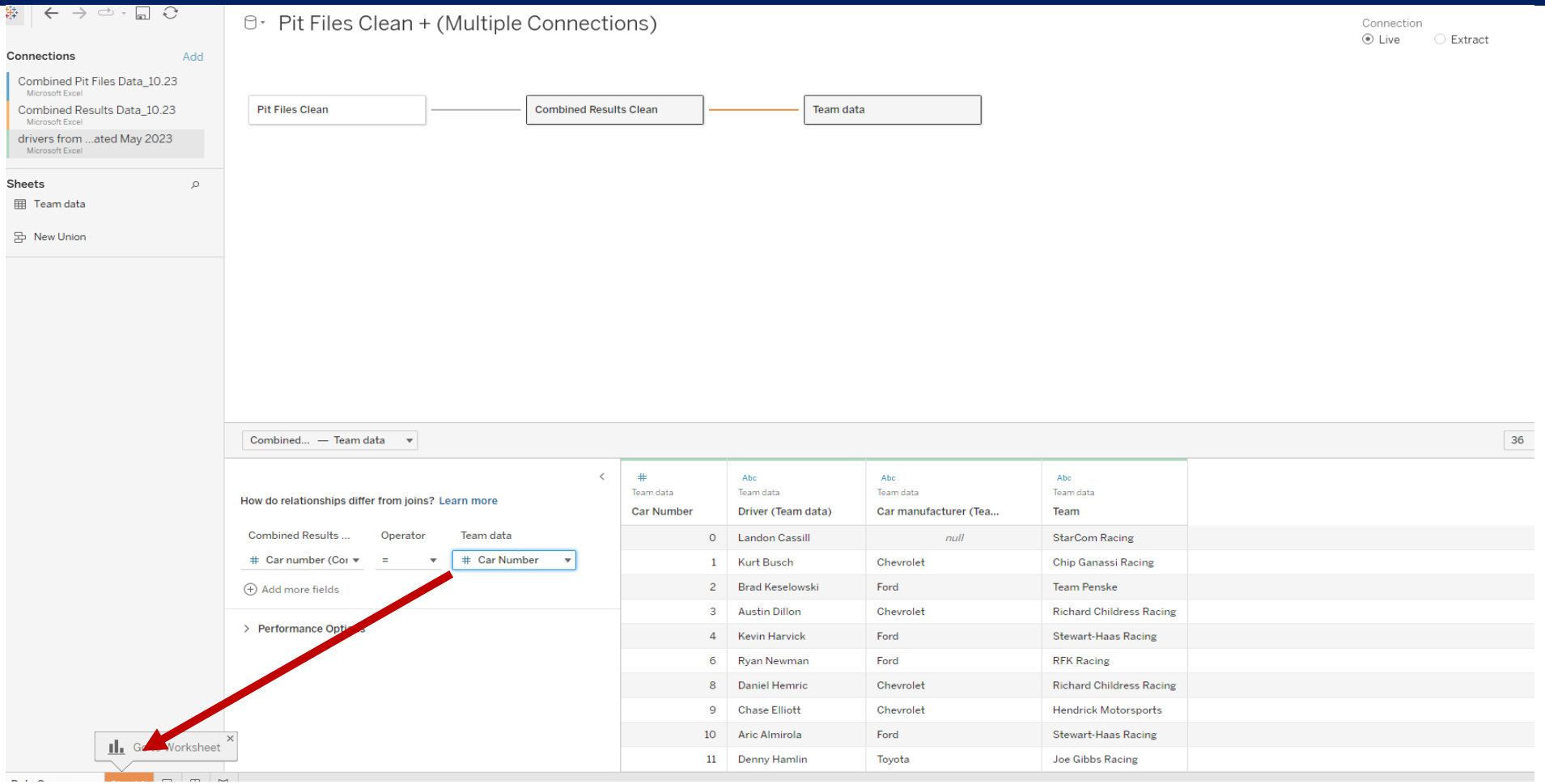
Relationships



Relationships



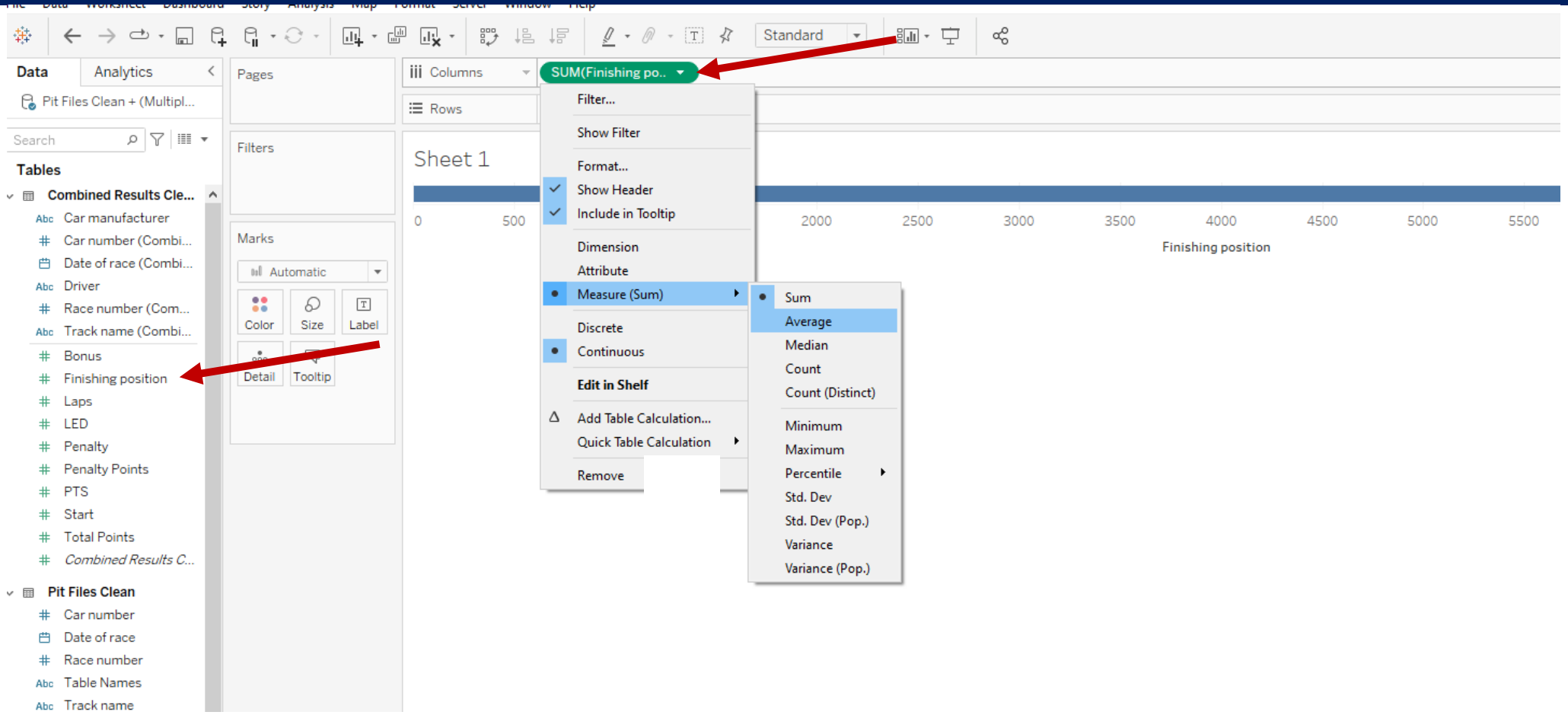
Let’s get started!



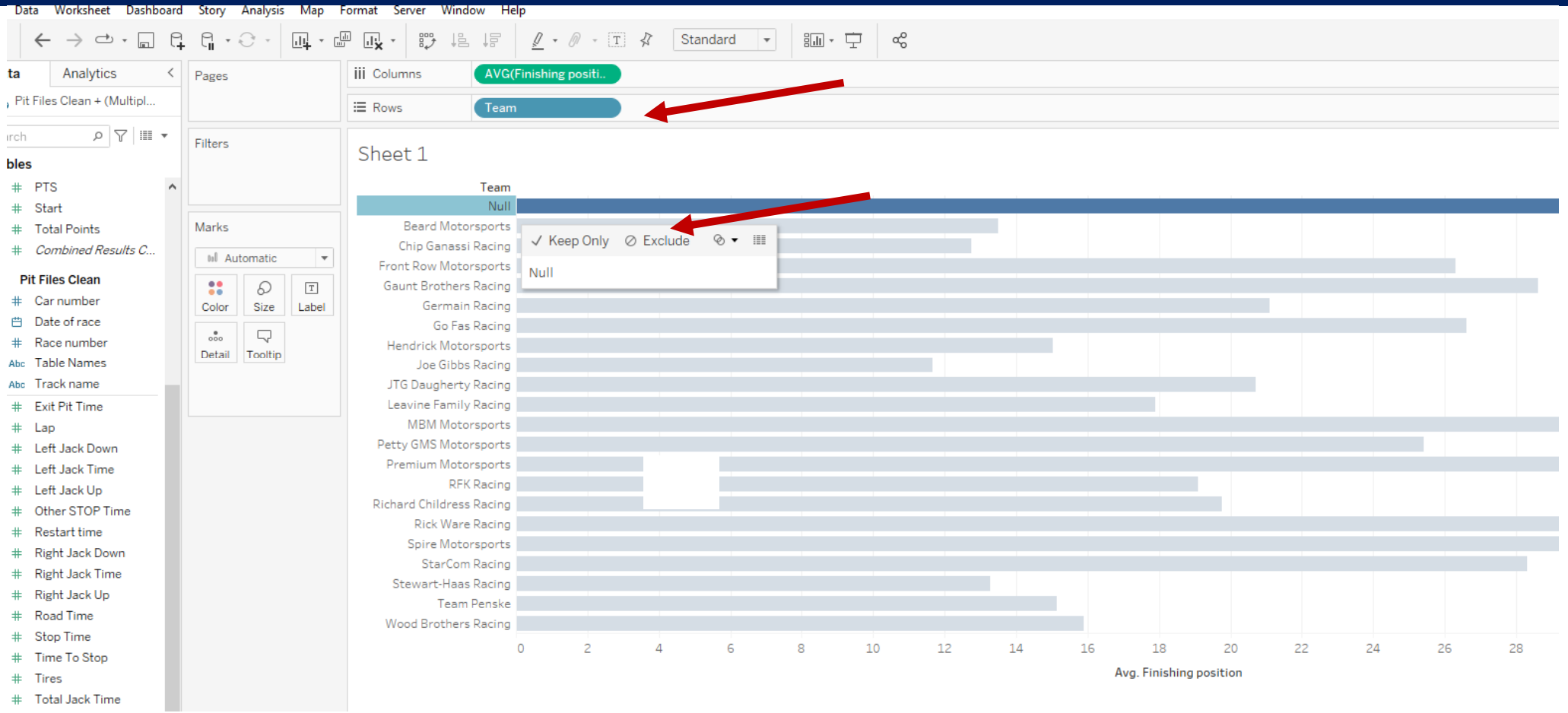
Step 02

Create Viz 1

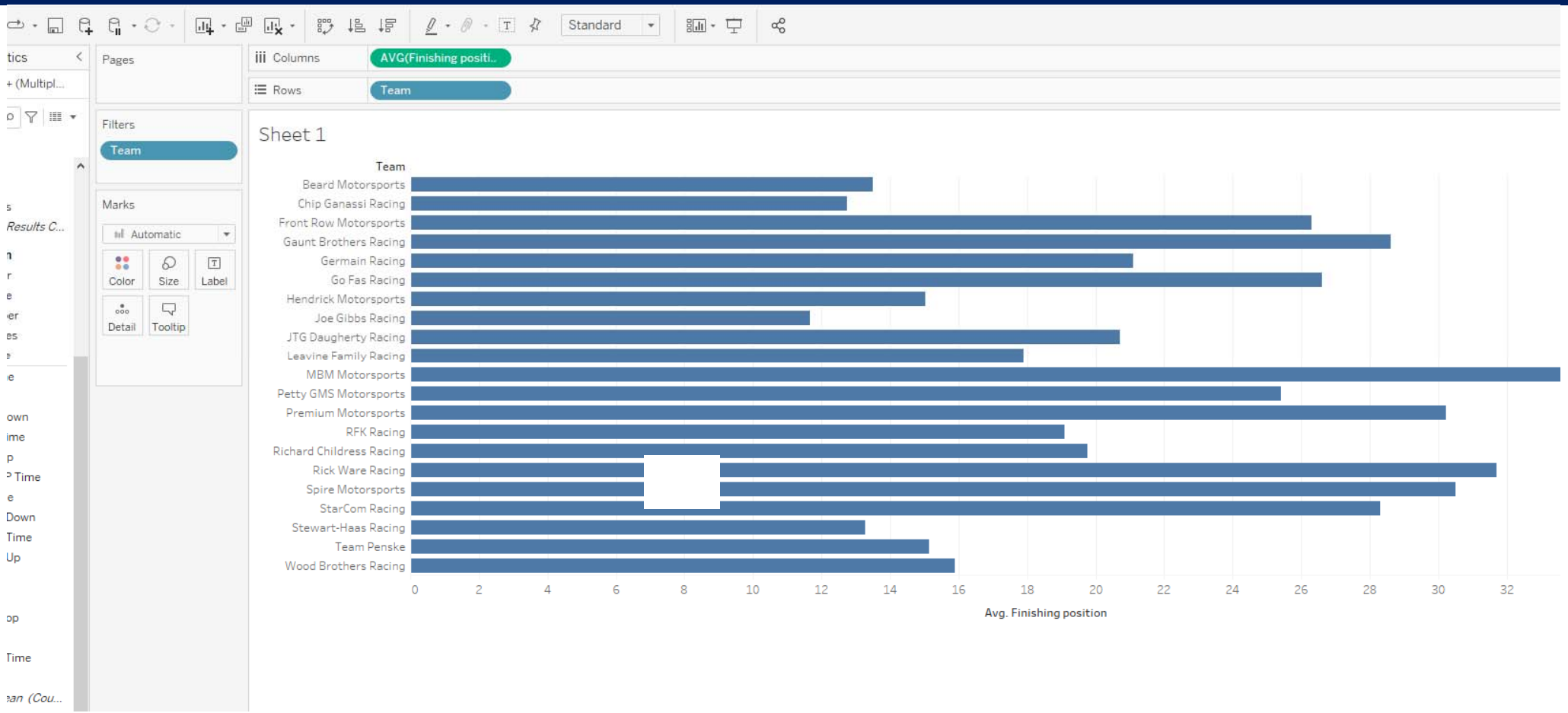
Average Finishing Position by Team



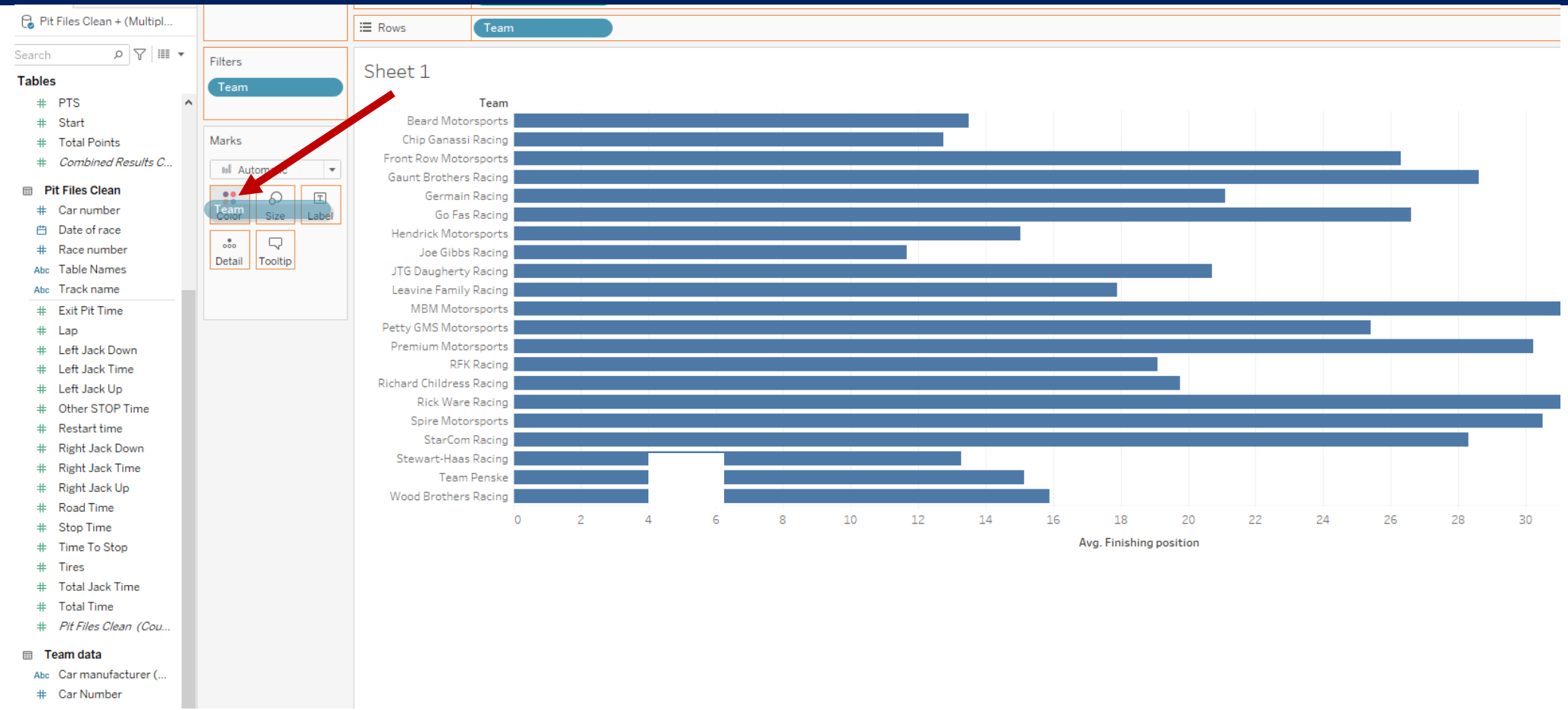
Average Finishing Position by Team



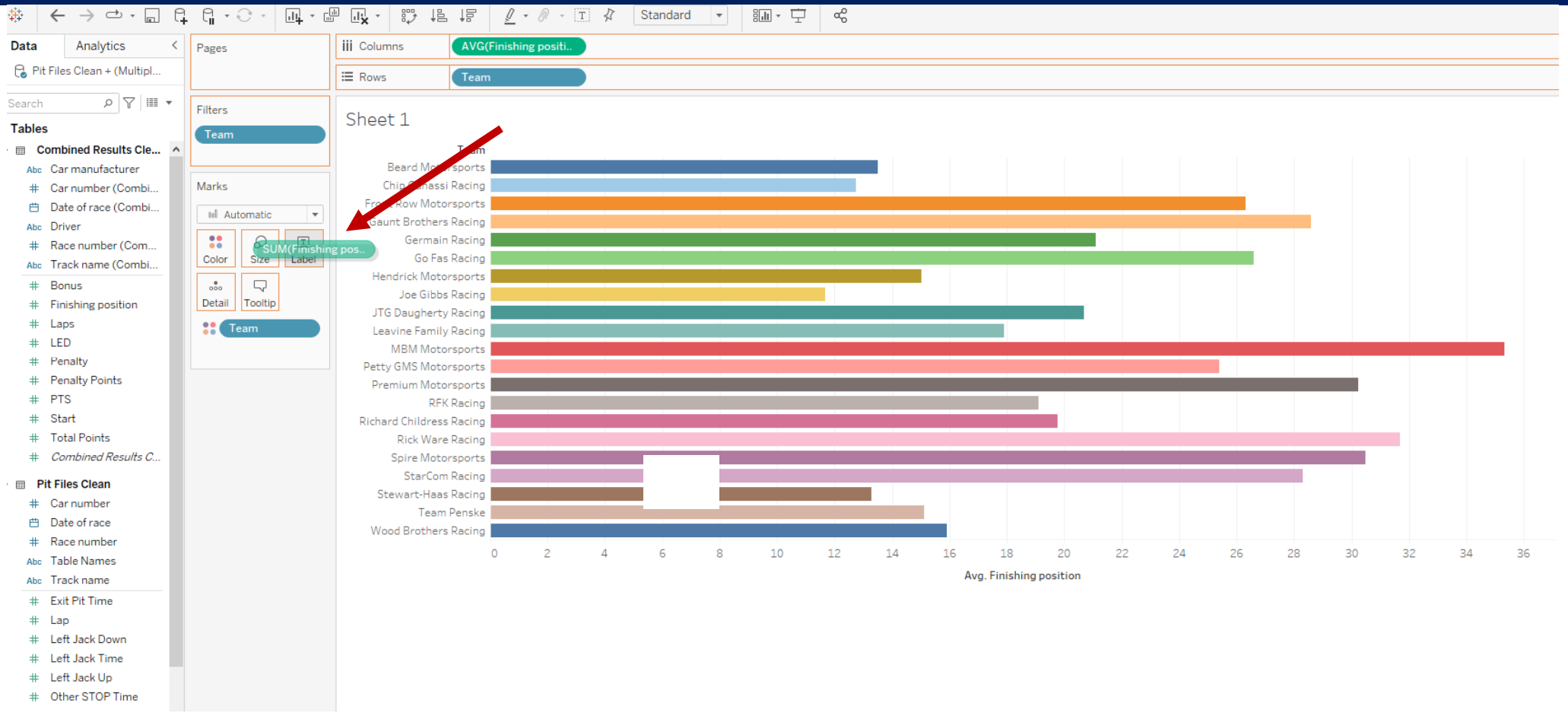
Average Finishing Position by Team



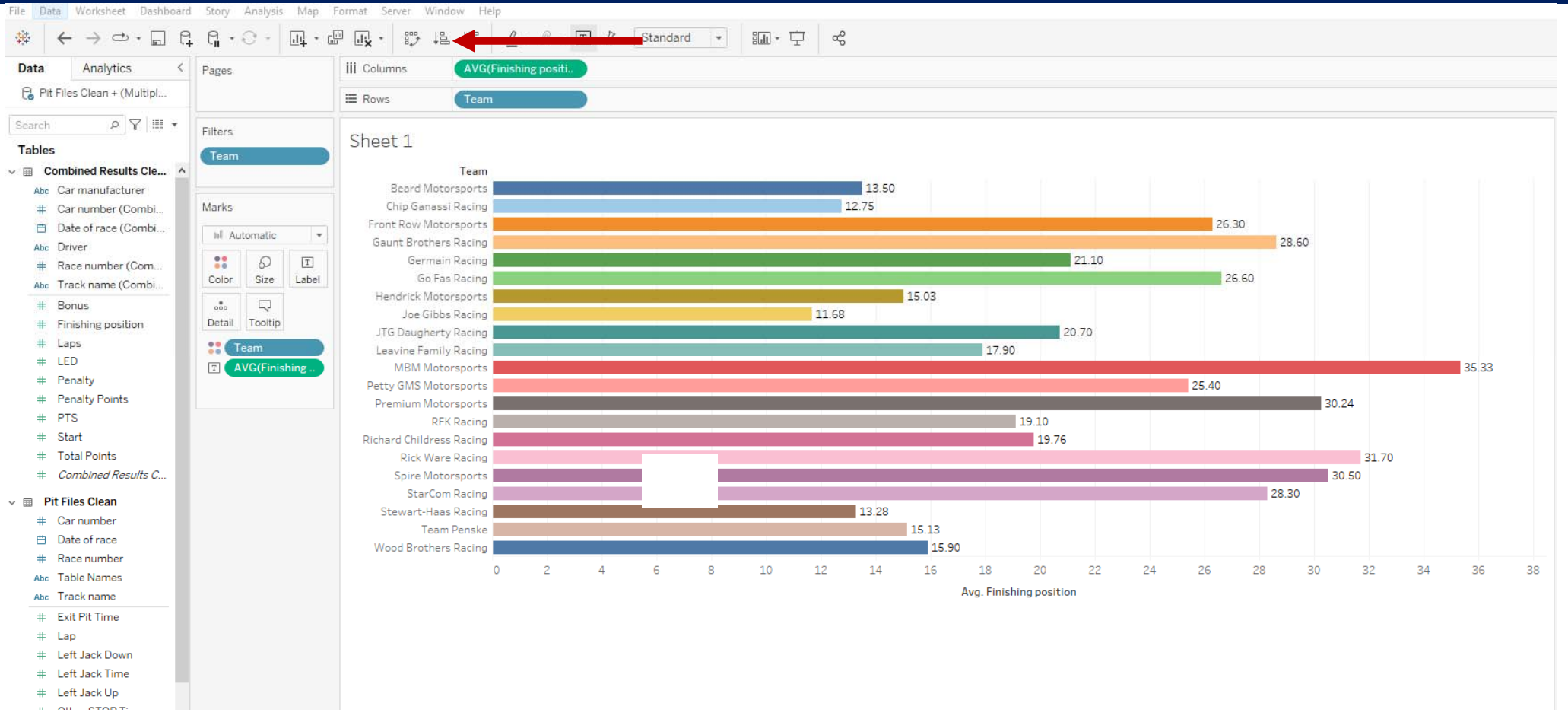
Average Finishing Position by Team



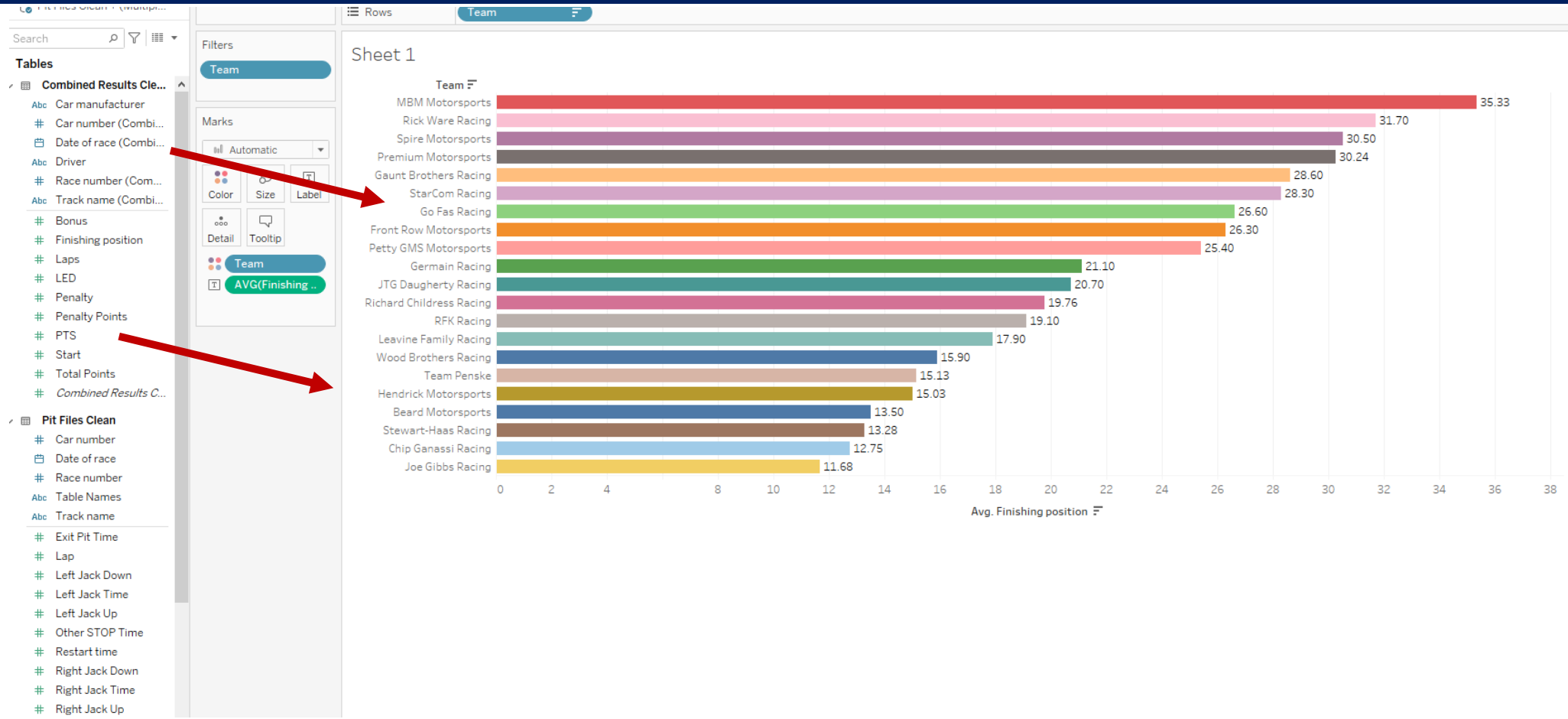
Average Finishing Position by Team



Average Finishing Position by Team



Average Finishing Position by Team



Step 03

Create your own visualizations!

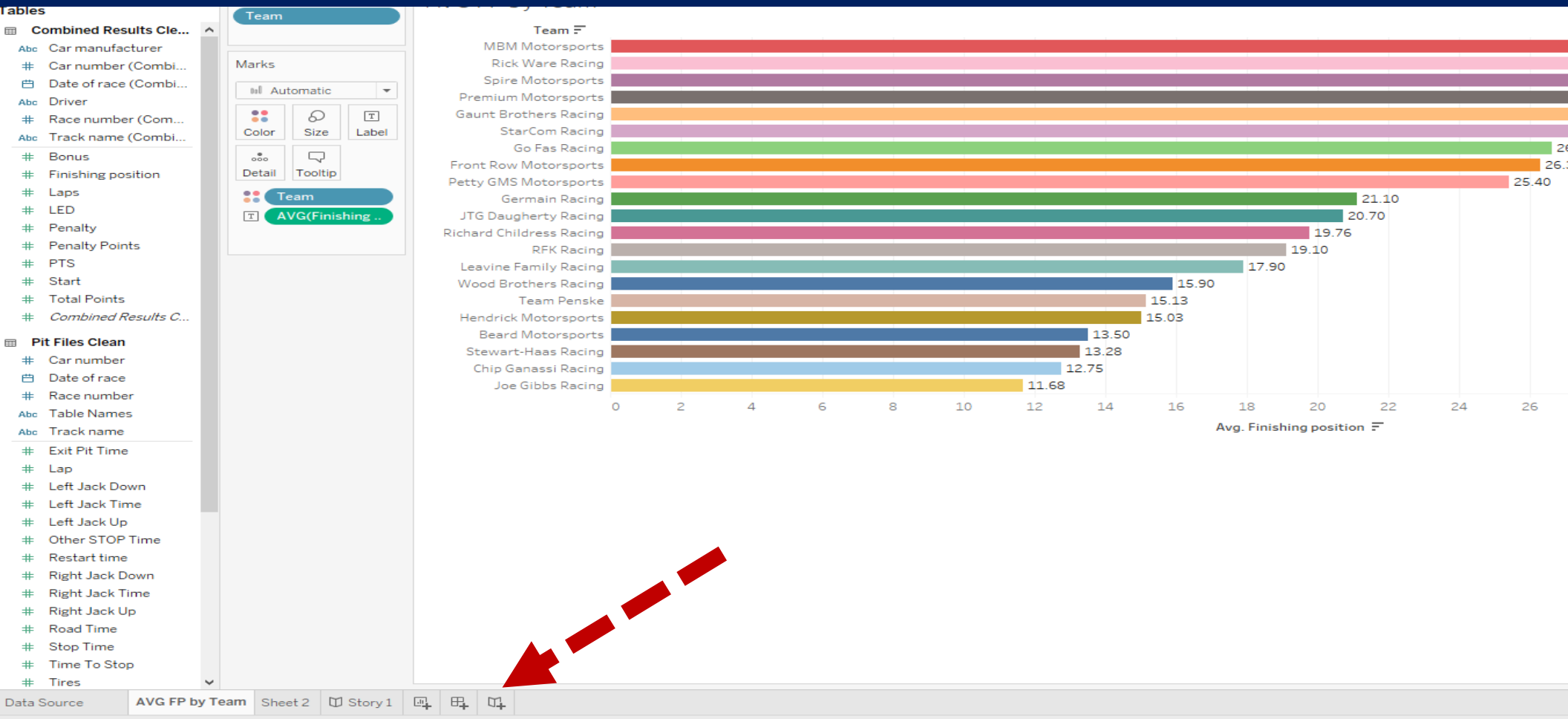
Step 04

Creating a Story In Tableau

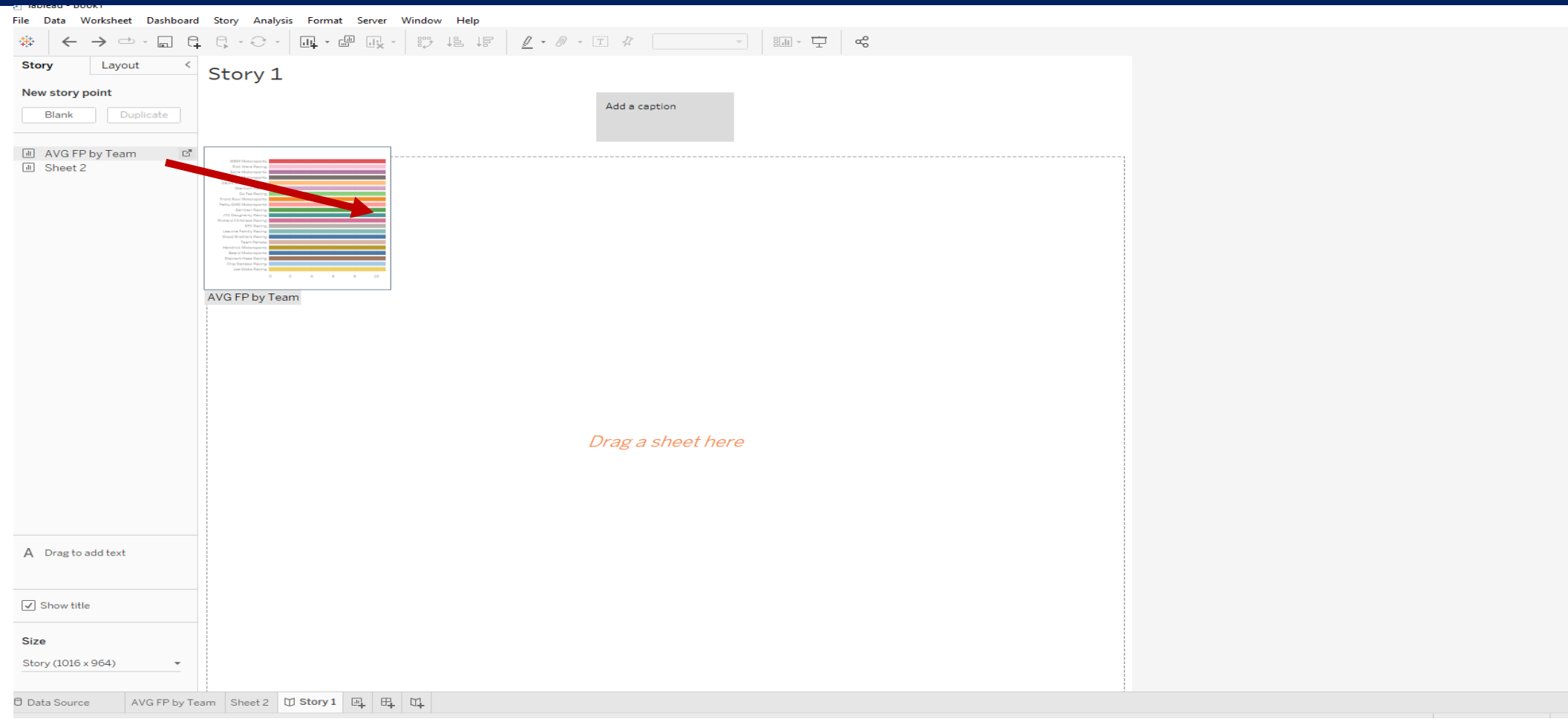
Step 04

https://help.tableau.com/current/pro/desktop/en-us/story_create.htm

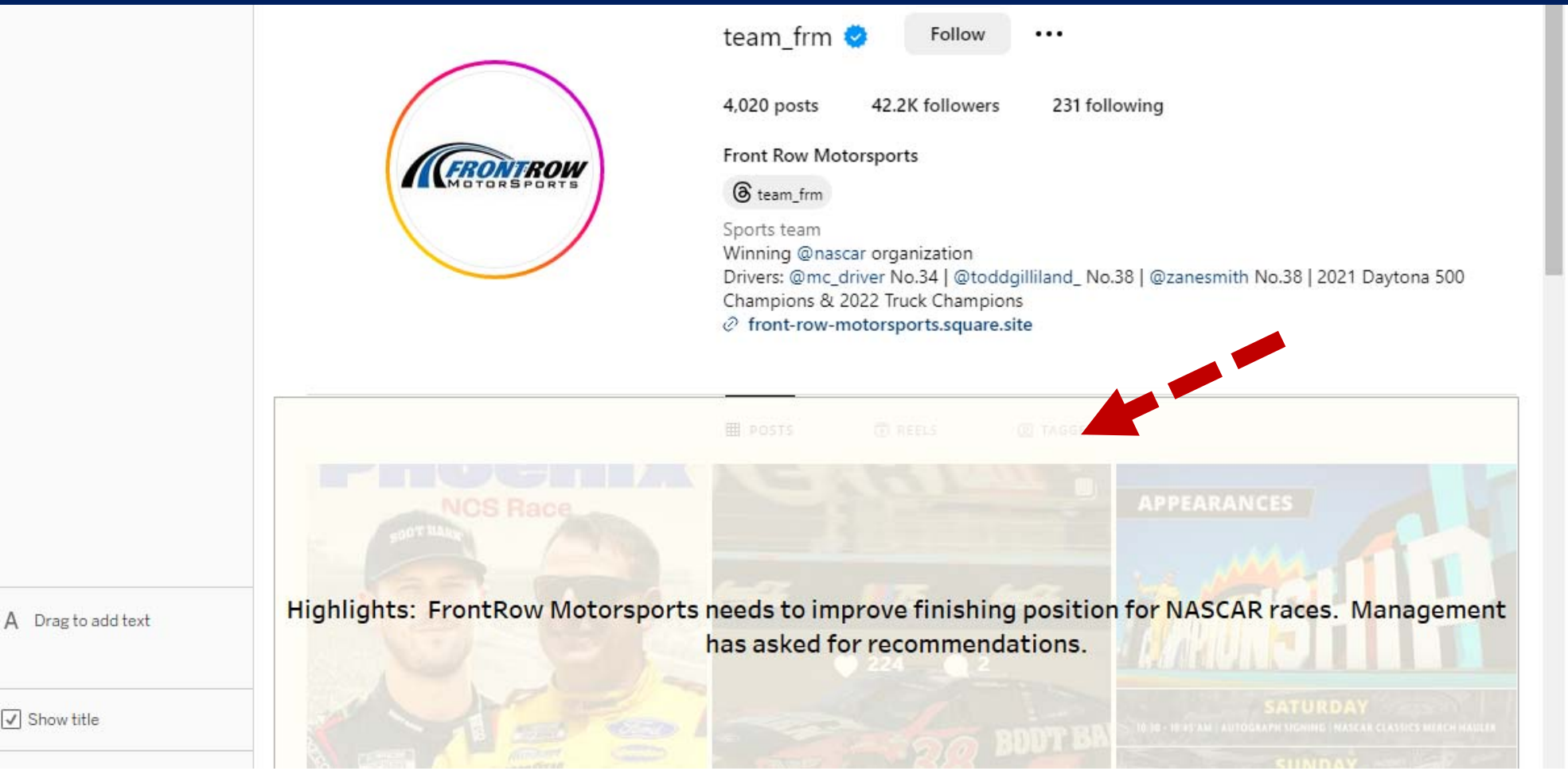
Create a Story



Create a Story

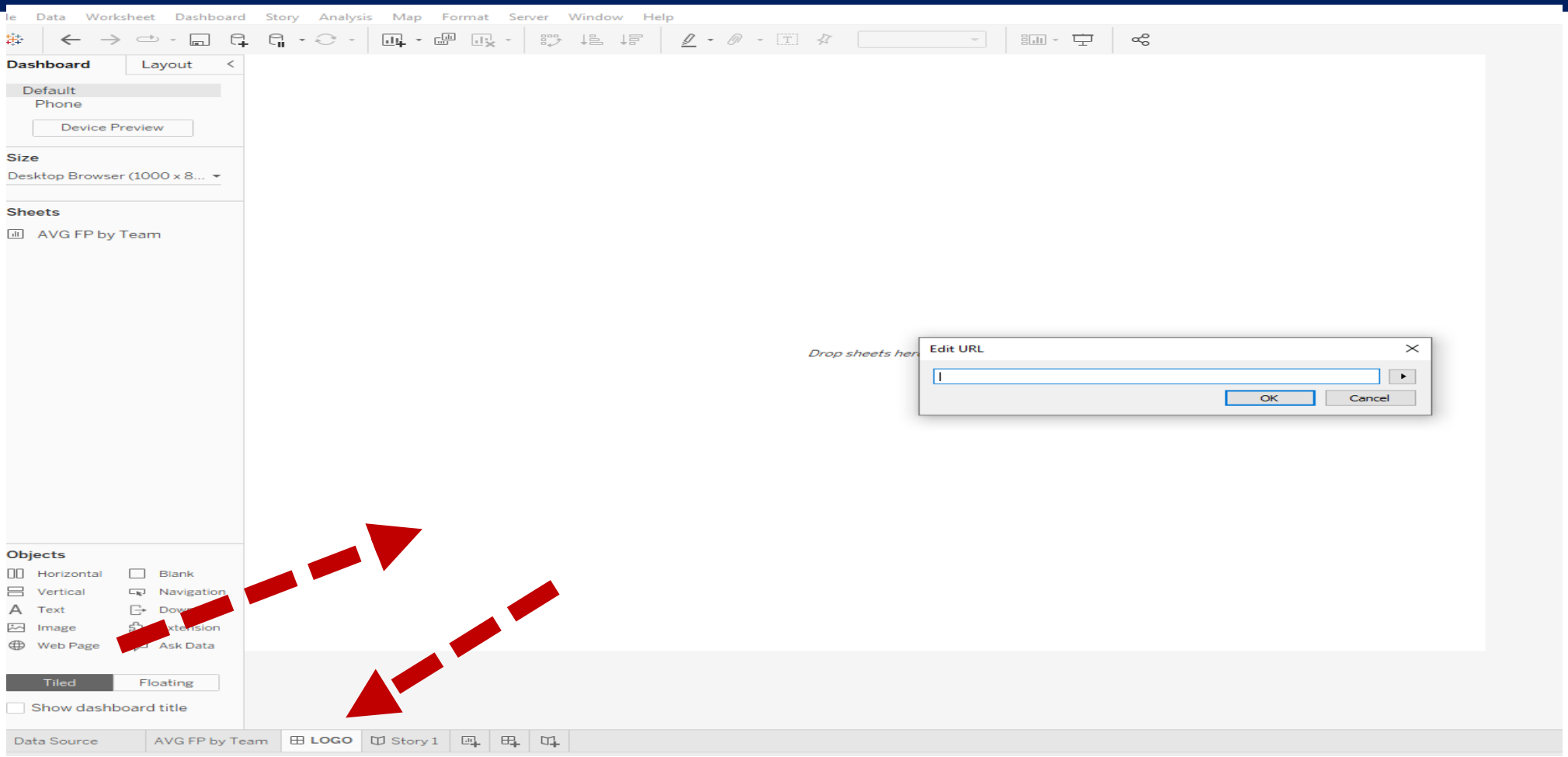


Introduction

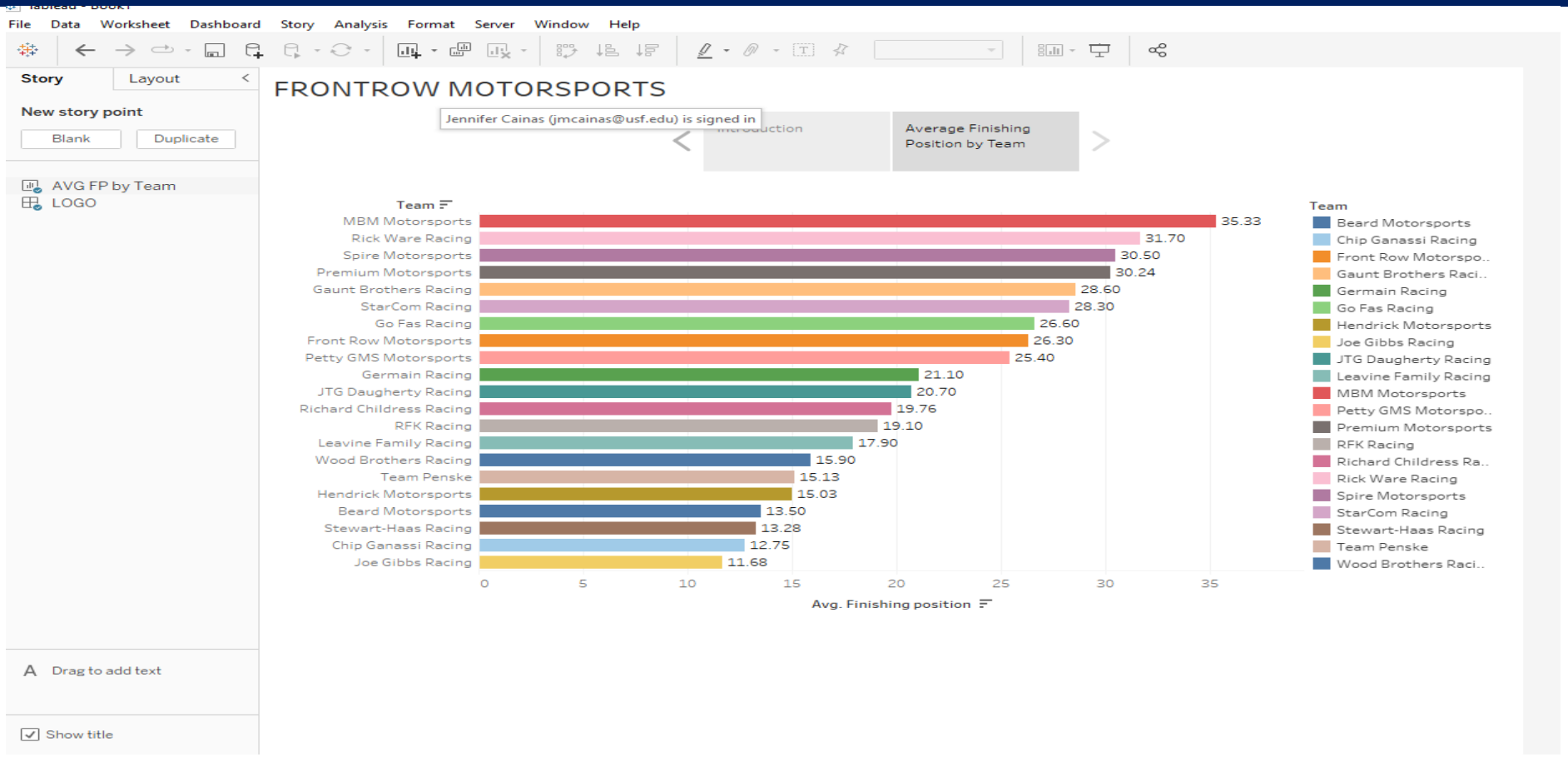


Highlights: FrontRow Motorsports needs to improve finishing position for NASCAR races. Management has asked for recommendations.

Introduction



Adding to the Story



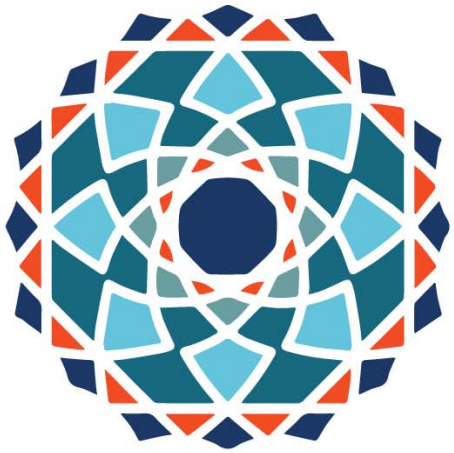
Conclusion

FRONT ROW SPORTS STORY

INTRO | MANUFACTURER | TEAM | DRIVER OVERALL | DRIVER TOP 10 | CONCLUSION | Add a caption



RECOMMENDATIONS:



Accounting is Analytics

For additional data analytics resources, see ***AccountingIsAnalytics.com***

Prepared by:
Jennifer Cainas

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Car Number	Driver	Car manufacturer	Team
0	Landon Cassill	Chevrolet	StarCom Racing
1	Kurt Busch	Chevrolet	Chip Ganassi Racing
2	Brad Keselowski	Ford	Team Penske
3	Austin Dillon	Chevrolet	Richard Childress Racing
4	Kevin Harvick	Ford	Stewart-Haas Racing
6	Ryan Newman	Ford	RFK Racing
8	Daniel Hemric	Chevrolet	Richard Childress Racing
9	Chase Elliott	Chevrolet	Hendrick Motorsports
10	Aric Almirola	Ford	Stewart-Haas Racing
11	Denny Hamlin	Toyota	Joe Gibbs Racing
12	Ryan Blaney	Ford	Team Penske
13	Ty Dillon	Chevrolet	Germain Racing
14	Clint Bowyer	Ford	Stewart-Haas Racing
15	Garrett Smithley	Ford	Premium Motorsports
17	Ricky Stenhouse Jr.	Ford	RFK Racing
18	Kyle Busch	Toyota	Joe Gibbs Racing
19	Martin Truex Jr.	Toyota	Joe Gibbs Racing
20	Erik Jones	Toyota	Joe Gibbs Racing
21	Paul Menard	Ford	Wood Brothers Racing
22	Joe Lagano	Ford	Team Penske
24	William Byron	Chevrolet	Hendrick Motorsports
27	Joe Nemecheck	Chevrolet	Premium Motorsports
31	Tyler Reddick	Chevrolet	Richard Childress Racing
32	Corey LaJoie	Chevrolet	Go Fas Racing
34	Michael McDowell	Ford	Front Row Motorsports
36	Matt Tifft	Ford	Front Row Motorsports
37	Chris Buescher	Chevrolet	JTG Daugherty Racing
38	David Ragan	Ford	Front Row Motorsports
41	Cole Custer	Ford	Stewart-Haas Racing
42	Kyle Larson	Chevrolet	Chip Ganassi Racing
43	Bubba Wallace	Chevrolet	Petty GMS Motorsports
47	Ryan Preece	Chevrolet	JTG Daugherty Racing
48	Jimmie Johnson	Chevrolet	Hendrick Motorsports
51	Cody Ware	Ford	Rick Ware Racing
52	Mike Wallace	Ford	Rick Ware Racing
62	Brendan Gaughan	Chevrolet	Beard Motorsports
66	Timmy Hill	Toyota	MBM Motorsports
77	Jamie McMurray	Chevrolet	Spire Motorsports
88	Alex Bowman	Chevrolet	Hendrick Motorsports
95	Matt DiBenedetto	Toyota	Leavine Family Racing
96	Parker Kligerman	Toyota	Gaunt Brothers Racing