Tableau Consulting Services by Cognitive Convergence

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Cognitive Convergence is Subject Matter Expert in Office 365, Dynamics 365, SharePoint, Project Server, Power Platform: Power Apps-Power BI-Power Automate-Power Virtual Agents.

We offer Tableau consulting services covering solution architecture refinement, customization, integration, transformation, visualization and analytics to uncover insights hidden within data and enhance data exploration.

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COGNITICE CONVERGENCE

Cognitive Convergence is Subject Matter Expert in Office 365, Dynamics 365, SharePoint, Project Server, SAAS, Power Platform: Power Apps-Power BI-Power Automate-Power Virtual Agents, Data Science, Business Intelligence: Power BI, Tableau

Cognitive Convergence is a recognized expert that provides consulting services that help in designing, deploying, managing, enhancing or troubleshooting on-premises, cloud-based or hybrid Power BI environment. Cognitive Convergence helps to start fresh with Tableau to modernize current business analytics solution or revamp existing Tableau deployment by incorporating new data sources or adding new services.

Our Core Consultancy include following:

- User Friendly Dashboards
- Hybrid deployment support
- Business Insights
- APIs integration
- Self-service data preparation
- Powerful Analysis
- Proof of Project
- Strategic Analysis

WHAT IS TABLEAU

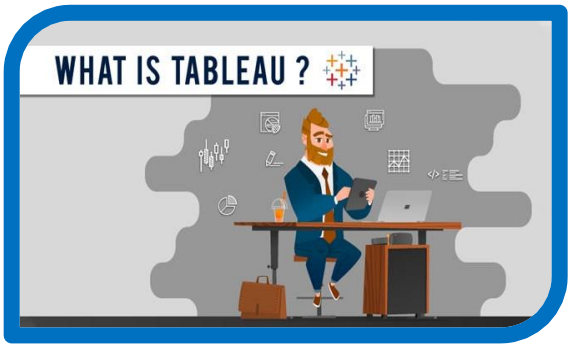


Tableau is a data visualization tool that lets us analyze virtually any type of structured data and produce highly interactive and attractive graphs, dashboards, and reports in minutes. Tableau is a powerful and fastest growing data visualization tool used in the Business Intelligence Industry. It helps in simplifying raw data in a very easily understandable format. Tableau helps create the data that can be understood by professionals at any level in an organization.

Data analysis is very fast with Tableau tool and the visualizations created are in the form of dashboards and worksheets. Tableau has plenty of easily accessible functions that can create highly simplified graphs or charts for any set of complex data. A business analyst can investigate any pattern, insight, flow, or trends from visually available data and hence predict or conclude for any business problem.

Tableau Uses:

- Business Intelligence
- Data Visualization
- Data Blending
- Data Collaboration
- Query translation into visualization
- To create no-code data queries
- Real-time data analysis
- To manage large size metadata
- To import large size of data

Tableau Product Suite

Tableau Product Suite includes:

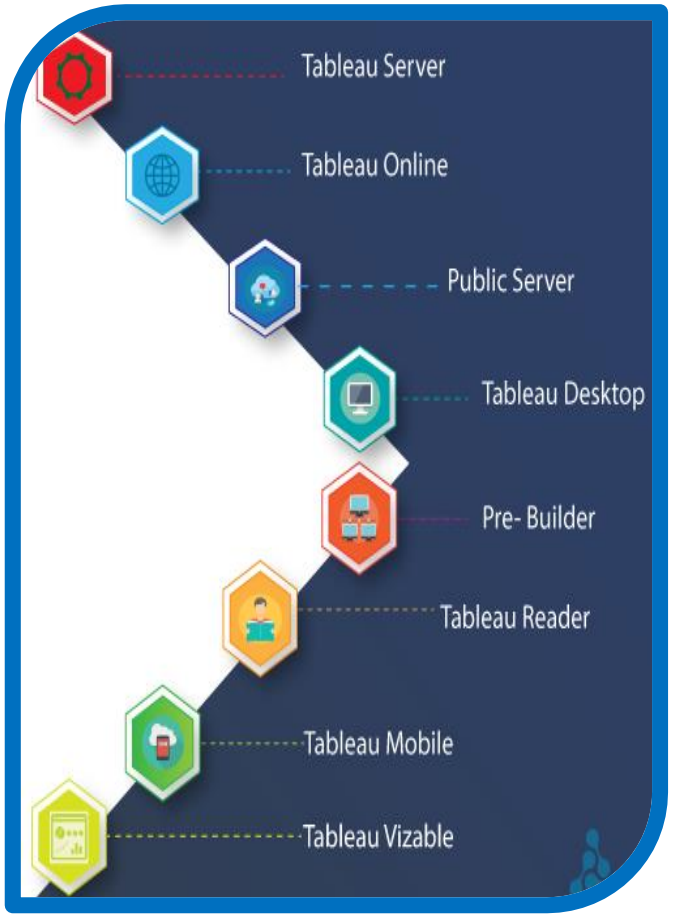


Tableau Server

This is mainly used to share visualizations and workbooks which get generated in the Tableau Desktop application throughout the organization. The work will become accessible once it is uploaded to the respective servers.

Tableau Online

Tableau Online is a sharing tool. It has a similar usage as Tableau Server, but the data is saved on servers which are provided in the cloud maintained by the Tableau group.

Tableau Public

Tableau Public is specially built for money-saving users. As the word 'public' suggests, the created workbooks can't be locally saved, rather it is sent to Tableau's public cloud which can be accessed by the general public.

Tableau Desktop

This product allows to code and modify the reports. Starting from creating reports and charts to combining them to form a dashboard, all this work is done in Tableau Desktop.

Pre-Builder

Tableau Prep Builder is a tool in the Tableau product suite designed to make preparing data easy and intuitive. Use Tableau Prep Builder to combine, shape, and clean data for analysis in Tableau.

Tableau Reader

It is a tool that allows to view visualizations and workbooks generated using Tableau Public or Tableau Desktop. This data can easily be filtered. Since anyone getting the workbook can view it using Tableau Reader, there is no security.

Tableau Mobile

Easily create dashboards that can view from their phones. Tableau automatically creates dashboard layouts optimized for mobile devices.

Tableau Vizable

Vizable paints pictures of information trends and relationships, much like the multiplatform Tableau Mobile, but this app was specifically designed for touch gestures.

WHY USE TABLEAU

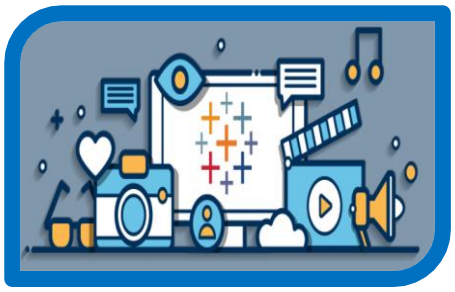


Tableau is greatly used because data can be analyzed very quickly with it. Also, visualizations are generated as dashboards and worksheets. Tableau allows one to create dashboards that provide actionable insights and drive the business forward. Tableau products always operate in virtualized environments when they are configured with the proper underlying operating system and hardware. Tableau is used by data scientists to explore data with limitless visual analytics.

Remarkable Visualization Capabilities

It converts unstructured statistical information into comprehensive logical results, which are fully functional, interactive and appealing dashboards. They are available in several types of graphics and are easy to use in business affairs.

Ease of Use

The tool's intuitive manner of creating graphics and a user-friendly interface allow user to arrange raw data into catchy diagrams, which facilitates information analyzing.

High Performance

Apart from its high visualization functionality, it overall provide robust and reliable performance. The tool also operates fast even on big data, which makes its powerful performance an important point in the list of the advantages of Tableau.

Multiple Data Source Connections

The software supports establishing connections with many data sources, such as HADOOP, SAP and DB Technologies, which improves data analytics quality and enables the creating of a unified, informative dashboard. Such a dashboard grants access to the required information for any user.

Robust Security

Tableau takes special care of data and user security. It has a fool-proof security system based on authentication and permission systems for data connections and user access. Tableau also gives you the freedom to integrate with other security protocols such as Active Directory, Kerberos, etc. Tableau practices row-level filtering which helps in keeping the data secure.

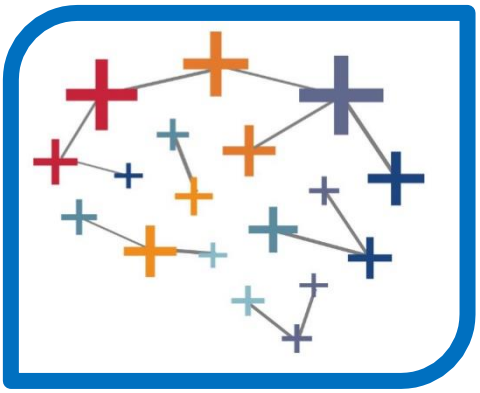
Mobile View

Tableau acknowledges the importance of mobile phones in today's world and provides a mobile version of the Tableau app. One can create their dashboards and reports in such a manner that it is also compatible with mobile. Tableau has the option of creating customized mobile layouts for your dashboard specific to your mobile device. The customization option gives the option for adding new phone layouts, interactive offline previews, etc. Hence, the mobile view gives Tableau users a lot of flexibility and convenience in handling their data on the go.

Trend Lines and Predictive Analysis

Another extremely useful feature of Tableau is the use of time series and forecasting. Easy creation of trend line and forecasting is possible due to Tableau's powerful backend and dynamic front end. You can easily get data predictions such as a forecast or a trend line by simply selecting some options and drag-and-drop operations using your concerned fields.

COGNITIVE CONVERGENCE CONSULTING SERVICES



Cognitive Convergence combines precision, extensive experience, expertise, and in-depth industry knowledge. Our strengths offer an unprecedented Tableau solution, as well as a smooth implementation of Tableau that allows to create a road map that helps to optimize data, processes and business goals. Tableau is one of the most famous BI solution which provide a large range of services it provides its own unique and some common functionalities and our consulting services combine with these functionalities and enhance the range of functionalities that Tableau provide. Cognitive Convergence team

- Leverage the potential of data with deep expertise in Tableau deployment, modification, integration, and management for your specific business requirements.
- Develop a clear, tailored plan with a roadmap that outlines needs and outcomes, aligns teams and requirements to best facilitate with Tableau services.
- Provide service to amplify profits and sales, assist retailers with accomplishing a more profound comprehension of estimating, POS, channels, and clients.
- Improved management, accomplish consistency, and secure information while giving individuals admittance to experiences.
- Rejuvenate your applications with data. Effectively embed intuitive visuals and convey convincing reports on any gadget.

PREPARRING AND STRUCTURING DATA

There are certain concepts that are fundamental to understanding data prep and how to structure data for analysis. Data can be generated, captured, and stored in a dizzying variety of formats, but when it comes to analysis, not all data formats are created equal. Tableau Desktop works best with data that is in tables formatted like a spreadsheet. That is, data stored in rows and columns, with column headers in the first row and prepping a data set for analysis is often much more time consuming than actually analyzing the data.

Data preparation is the process of getting well formatted data into a single table or multiple related tables so it can be analyzed in Tableau. This includes both the structure, i.e. rows and columns, as well as aspects of data cleanliness, such correct data types and correct data values. Data preparation is the process of cleaning dirty data, restructuring ill-formed data, and combining multiple sets of data for analysis. It involves transforming the data structure, like rows and columns, and cleaning up things like data types and values. The speed and efficiency of your data prep process directly impacts the time it takes to discover insights. Understanding the scope of data you're analyzing and seeing the changes you make to the data can accelerate the entire process.

Cognitive Convergence speedup data preparation by its expertise

- Use Tableau Prep and extensions to make the ETL process more adaptable, fluid and efficient in terms of getting data into usable formats.
- Use Tableau's Data Engine to evaluate millions of rows of data in seconds.
- To build effective reports, smoothly merge data from numerous data sources.
- Provide immediate solutions to any of your pressing business issues.

- Changes the way traditional data prep is performed in an organization. By providing a visual and directly combine, shape and clean data.

DATA VISUALIZATION

Tableau is a Data Visualization tool that is widely used for Business Intelligence but is not limited to it. It helps create interactive graphs and charts in the form of dashboards and worksheets to gain business insights. Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Tableau is a data analytics and visualization tool used widely in the industry today. Many businesses even consider it indispensable for data-science-related work. Tableau's ease of use comes from the fact that it has a drag and drop interface. This feature helps to perform tasks like sorting, comparing and analyzing, very easily and fast. Tableau is also compatible with multiple sources, including Excel, SQL Server, and cloud-based data repositories which makes it an excellent choice for Data Scientists.

Good visualizations allow people to gain insight from complex data at a glance. They highlight the relationships between measures. They explain concepts and tell stories. They engage the mind in ways looking at the raw data will not.

Experts at Cognitive Convergence produce beautiful visuals.

- Employ creativity and innovation to create dashboards and reports that are actionable, insightful and compelling.
- Dashboards are detailed, easy to understand, and simple to utilize.
- Queries and scripts are built in such a way that back-end calculations are made easier, resulting in improved performance.
- Provide multi-level drill-down for specific data and perform specialized computations to address more difficult challenges.
- Use design and visual cognition best practices to guarantee our dashboards are developed with the proper audience in mind.
- Use visual science precepts like alignment, containment, position, color, closeness, and enclosure to their full potential.

Our experts can make visualizations as basic as a:

Bar chart: A bar chart or graph is used to represent category wise data of a dataset. This gives instant insight into the data pictorially.

Pie chart: A pie chart is a circular chart that is divided into multiple sections and each of which represents a proportion of the whole. In Tableau, filters can apply on the pie chart to view only a section of the entire chart.

and as advanced as a

Histogram: Histograms are used to represent value distribution along an axis on a graph. A histogram gives statistical information about the probability distribution of values occurring in successive intervals of equal size. Thus, an insightful and informative analysis can perform using histograms.

Gantt chart: A Gantt chart is a horizontal bar chart that shows the duration of an event for multiple values. It provides a detailed yearly, quarterly, monthly, weekly or even daily representation of data values using a Gantt chart.

Bullet chart: A bullet chart is an advanced sort of bar chart where we can compare two measures on a single bar. In a bullet chart, the primary measure is shown by the main dark bar on the front and the secondary measure is shown beneath the main bar as a reference line.

Motion chart: A motion chart, is a moving or a mobile chart which gives us an idea of the trail or the path that data points follow and make a trend.

Treemap: Treemaps represent part-to-whole and hierarchical relationships using a series of rectangles. The sizes and colors of rectangles will vary based on the values they represent.

Boxplot: Tableau Box and whisker plot, also called box plots, are charts that divide their data points into quartiles. It is great at comparing distributions of data for different groups or categories side by side.

and many more.

TABLEAU PREP

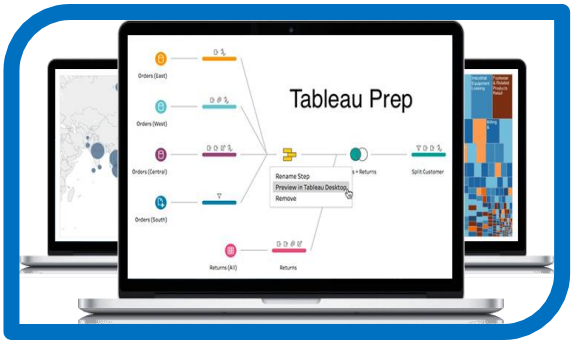


Tableau Prep Builder is a tool in the Tableau product suite designed to make preparing data easy and intuitive. Use Tableau Prep Builder to combine, shape, and clean data for analysis in Tableau. Tableau Prep makes it easier to combine, clean, shape, and share data. With a visual interface giving a complete picture of the data and smart features to make cleaning, automating and administering easier than ever, Tableau Prep will help organization role out a complete, self-service data preparation solution.
Tableau Prep is comprised of two products:

Prep Builder

Combine, shape, and clean data for analysis with Prep Builder.

Prep Conductor

Share your data flows and manage them at scale with Prep Conductor. Tableau Prep Conductor is part of the Tableau Data Management Add-on.

Tableau Prep is used for

Data needs advanced reshaping and integrating

Tableau prep is used for more complicated ETL tools, but Tableau Prep will help to transform this mess into an analysis-ready data source with just a few drag-and-drop steps.

Data has multiple audiences

Tableau Prep, producing customized data sources will be significantly easier. With Tableau Prep, leverage the cleaning and exploratory work on the sales data for both outputs, while still creating a unique data source for each audience.

Connect and Shape data

Get the data need, in the right shape with Prep Builder.

- Join or Union
- Pivot
- Clean
  - Change data role
  - Filter
  - Aggregate
  - Group & replace
- Run Flow
- Publish
  - Publish extract
  - Publish flow
- Monitoring and Alerting

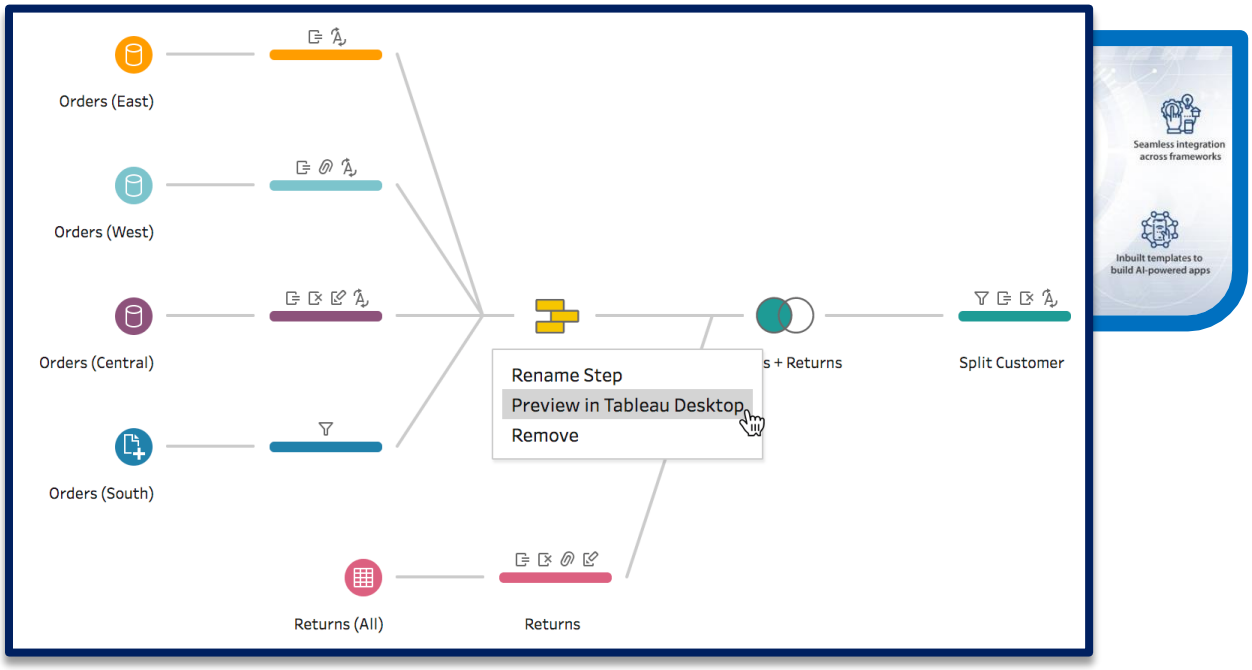


TABLEAU CRM

Tableau CRM is an end-to-end analytics solution with powerful data management, data visualization, and predictive analytics capabilities. Built on top of Salesforce, Tableau CRM enables end users to take action from within their work environment.

Tableau CRM Features

The rest key features of Tableau CRM, separated by three core capabilities: Data Management, Data Visualization, and Predictive Analytics.

Data Management

Data Integration

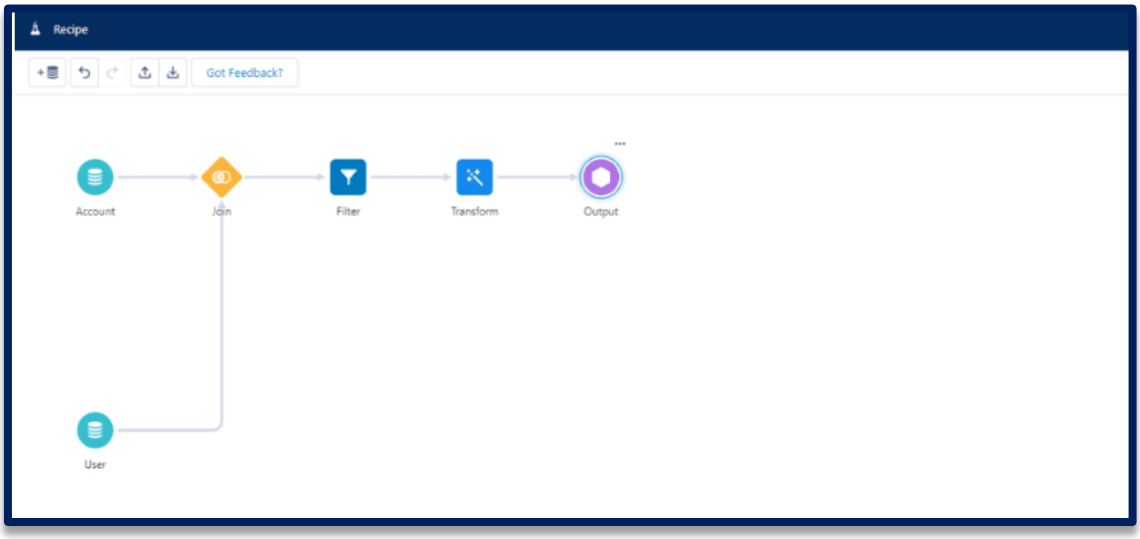
In Tableau CRM, connectors give an easy way to connect to data inside and outside of Salesforce org Connectors that let bring data into Tableau CRM from Salesforce, external applications, databases, and data warehouses.

Data Preparation

There are two data preparation tools in Tableau CRM: Recipes and Dataflows. Both tools have an intuitive visual interface and can be used to design datasets from connected data.

Data Synchronization

Prevent inconsistencies between source systems and Tableau CRM by scheduling data refreshes. Recipes and Dataflows can also execute on a time-based or event-based schedule.



Business Intelligence

Data exploration using lenses

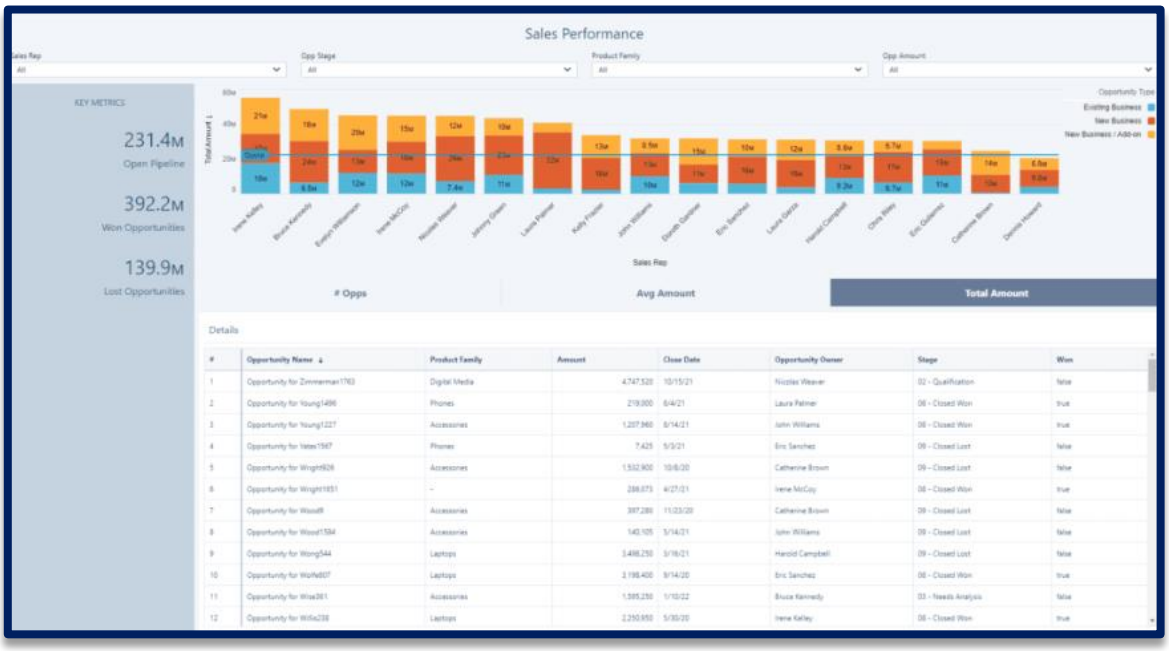
Lenses let you visually explore data within a dataset. Lenses can be shared independently, or clipped and added to dashboards.

Dashboards

Tableau CRM dashboards consist of interactive widgets that visualize query results from datasets.

Embed Visualizations in Salesforce

Add Tableau CRM dashboards to Lightning home pages, record pages, and app home pages to provide interactive visualizations to end users.



Predictive Analytics

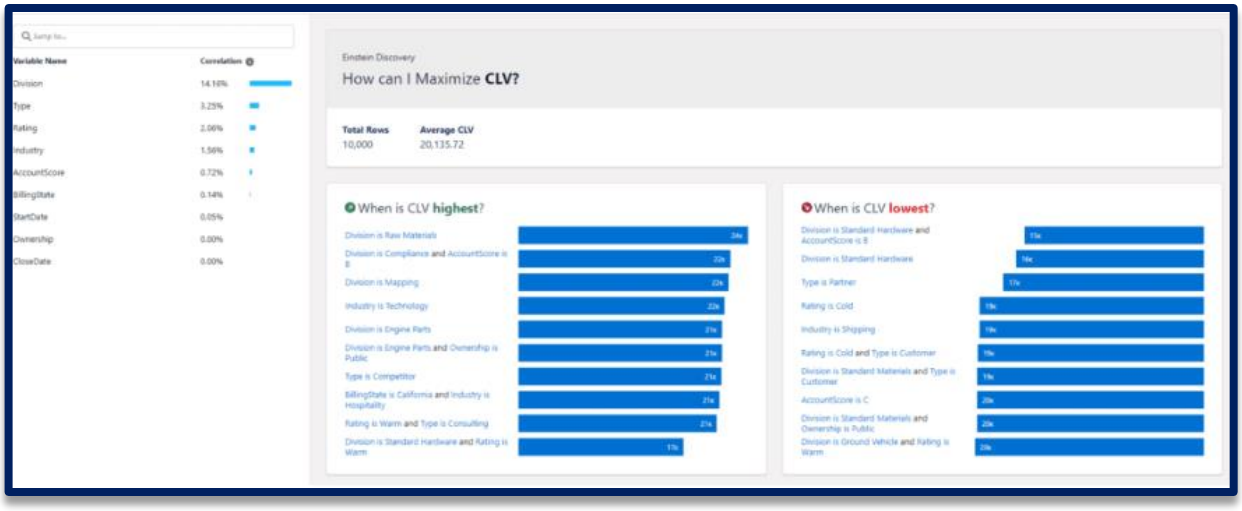
Einstein Discovery is Salesforce's data science toolkit. It connects directly to Tableau CRM datasets to generate descriptive, predictive, and prescriptive insights.

Einstein Discovery Stories

To explore relationships between input variables and a chosen outcome variable, create an Einstein Discovery Story. An example of an Einstein Discovery Story can be, the input variables, and their correlation to the outcome variable CLV, are shown on the left. The bar charts list which variables positively or negatively impact CLV in order of statistical significance.

Einstein Discovery Models

Building and deploying Einstein Discovery Models helps in making prediction from data. Predictive models are automatically generated upon creation of a story in Einstein Discovery. Therefore, the model uses the same input variables to produce a predicted outcome. Not only do Einstein Discovery models predict outcomes, they also provide suggestions to improve predicted outcomes.



Embed predictions in Salesforce

Embed Einstein predictions throughout Salesforce, giving users real-time predictions and recommendations based on record-level details.

Tableau CRM implementation provides

an innovative platform for customer and business analytics. This platform has been optimized for mobile use and provides customer analytics to your CRM. It has the flexibility to work with any data. Tableau CRM allows to connect with data in meaningful ways as it helps to:

- Connect to CRM data directly
- Take actions based upon insights quickly
- Analyze a huge amount of data and get predictive analytics

- Automate actions with inbuilt applications

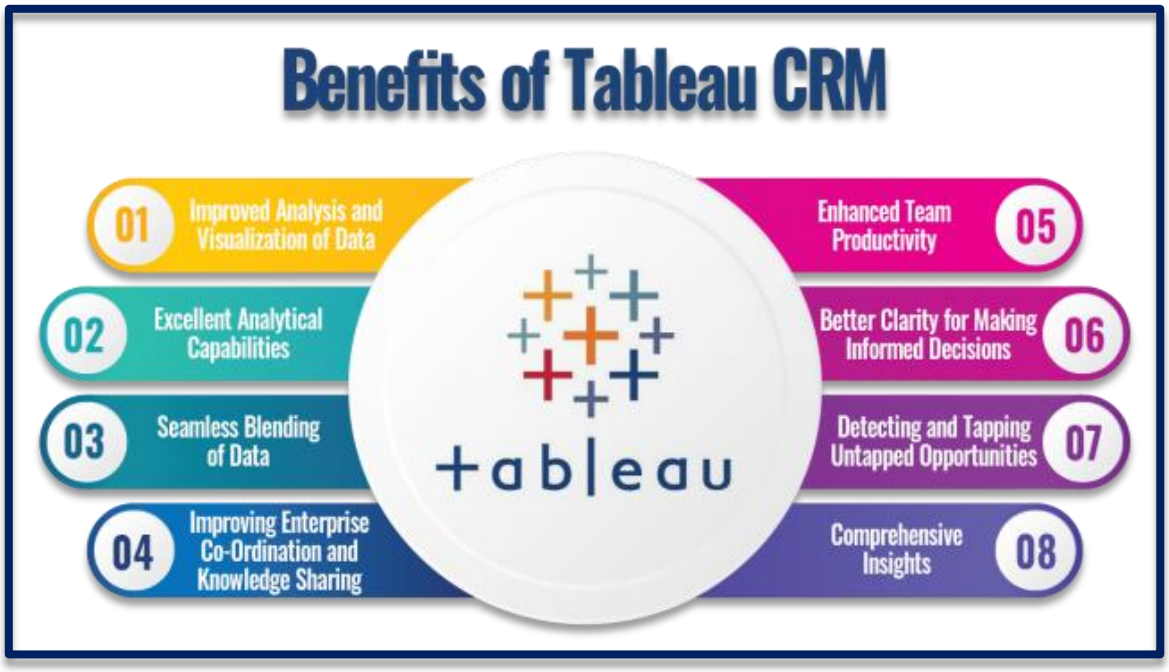
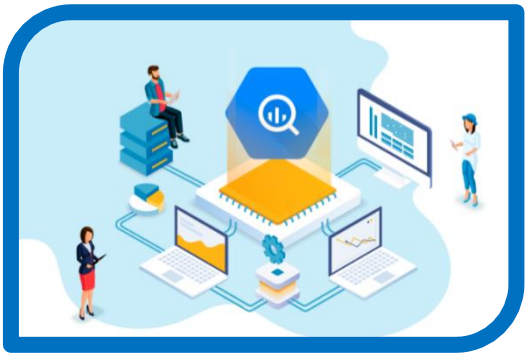


TABLEAU INTEGRATION



Most companies today leverage Business Intelligence and Data Analysis tools to analyze their customer and business data with the aim of making smarter & informed business decisions and ensuring effective cross-vertical operations. Business Intelligence tools allow organizations to visualize their data in the form of dashboards, enabling them to derive meaningful insights and maximize revenue outcomes. One of the most well-known Business Intelligence tools is Tableau. Using Tableau Integration with other platforms or data sources such as Data Warehouses, CRMs, Ads Platforms, etc. helps companies get useful insights from the data and easily generate reports.

A significant advantage of using Tableau Integration for most businesses lies in its support for a vast number of connectors. Tableau, to some extent, also provides users the ability to integrate with data sources that are not supported directly by it. Tableau houses numerous connectors that are built and optimized for a vast number of files and databases. The list of supported Tableau Data Connectors ranges from PDFs and Spreadsheet applications such as Microsoft Excel to various Big Data, and Relational On-premise or Cloud Databases such as Google BigQuery, MySQL, etc to various Web Data Connectors that allow developers to integrate user's Tableau Data with complex and dynamic data on the web.

Tableau Data Source connectors allow users to connect with a variety of data sources which are as follows:

- Tableau Data Connectivity to a File
- Tableau Data Connectivity to a Server

Tableau supports integration with almost all the data sources. One can use Tableau to extract data from any platform and analyze it. Pulling data from simple CSV files, PDFs, spreadsheets to complex Databases such as Oracle and Cloud Databases and Data Warehouses can easily be accomplished with the help of Tableau.

Tableau keeps developing new data connectors to provide more data accessibility and flexibility to users. Depending on the version of Tableau that you have, the number of supported data connectors varies. All the data extracted by Tableau can be connected live or extracted to Tableau's data engine to a Tableau Desktop. After receiving the information, Data Analysts, Data Scientists, Business Analysts can pull this data and generate visualizations from it to get insights from the data.

One can easily establish a secure connection to any of the data sources from Tableau and use that data along with data from other sources to create a combinatorial view of data in the form of visualizations. Tableau also supports different kinds of data connectors such as Presto, MemSQL, Google Analytics, Google Sheets, Cloudera, Hadoop, Amazon Athena, Salesforce, SQL Server, Dropbox and many more.

Data science integrations

Analytics Extensions help make your statistical and predictive models accessible to more people. Extend Tableau calculations to dynamically leverage popular data science programming languages, tools, and platforms—including R, Python, MATLAB, and more

Dashboard application integrations

With our Extensions API, developers can create dashboard objects that enable customers to integrate and interact with data from other applications directly in Tableau.

Embedded Analytics

Put interactive analytics directly in people's workflows by embedding Tableau into custom web portals, applications, and customer-facing products.

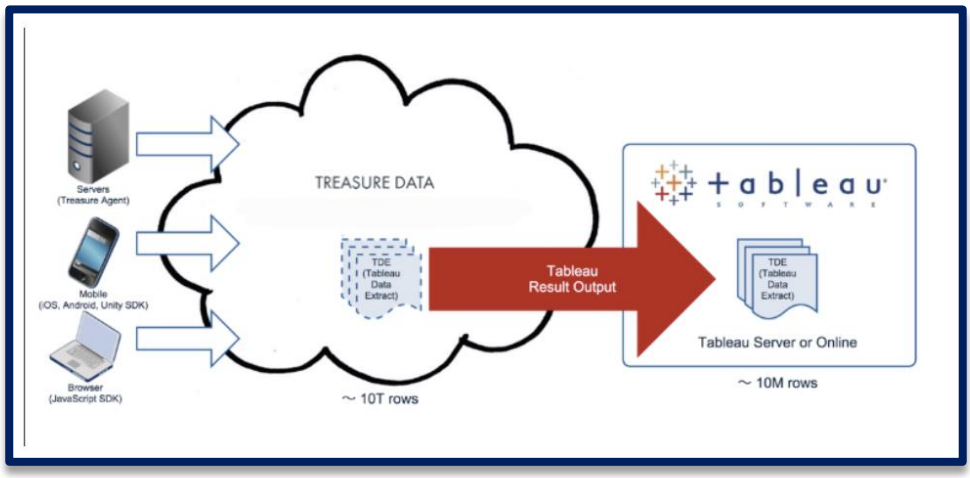


Tableau Server can store extracted data sources and data connections in Tableau. Our experts leverages there expertise to

- Allows to effortlessly connect and leverage data from all data from different sources to Tableau for visualization and analysis.
- Connect and import data from a variety of data sources, including files, feeds, databases, cloud storage, API/connectors, major business applications, and even in-house apps, with confidence.
- Equipped with powerful data harmonization capabilities, Cognitive Convergence experts ensures that any data loaded into Tableau will be provided in a consistent format that's ready for analysis.

- Manipulate a variety of kinds of data in a variety of ways. Analyze, simplify or create new information to add to datasets before using Tableau to ensure to always have immaculate graphics to present. Whether need to do spatial analysis, organize spreadsheets or move data into and out of databases, our experts are here to help make tasks as efficient as possible.
- Provide support to connect to a wide variety of data sources that are not directly supported by Tableau to help users establish connections with unsupported Tableau Data Sources seamlessly using Web Data Connector, ODBC Connector, Extract API, Hyper API.

CONNECTOR SDK

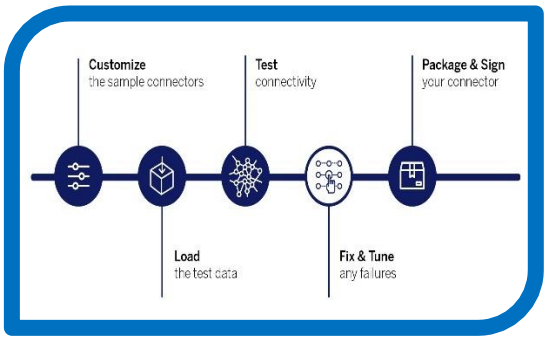


Tableau has great connectivity that allows to visualize data from virtually anywhere. Tableau includes dozens of connectors already, and also gives the tools to build a new connector with the Tableau Connector SDK.

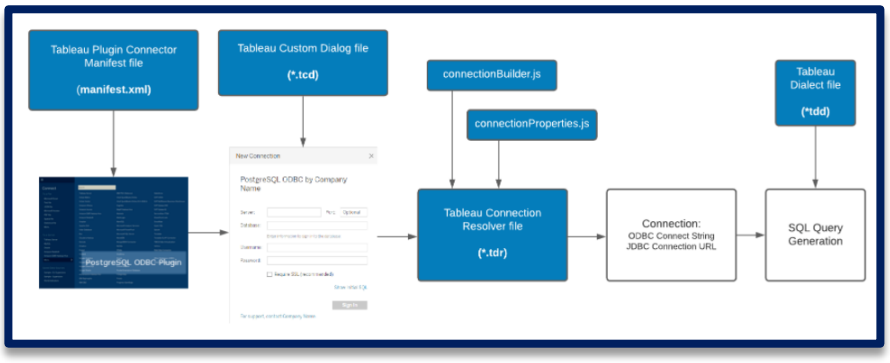
With this SDK, create a connector that use to visualize data from any database through an ODBC or JDBC driver. It allows to customize connector behavior, fine-tune SQL generation, use the connectivity test harness to validate the connector behavior during the development process, and then package and distribute the connector to users.

Tableau connector

A connector is a set of files that describe:

- UI elements needed to collect user input for creating a connection to a data source
- Any dialect or customizations needed for the connection
- How to connect using the ODBC or JDBC driver

A connector can have most of the same features that any built-in Tableau connector supports, including publishing to a server if the server has the connector, creating extracts, data sources, visuals, and so on.
A connector developed using this SDK is appropriate for connecting to an ODBC or JDBC driver that interfaces using SQL. The underlying technology works well with relation databases.



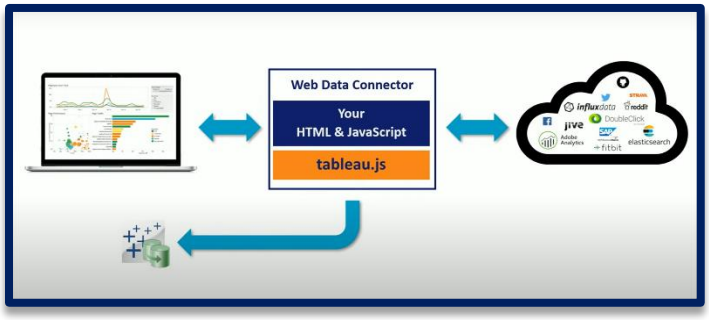
- Better live query support. Allow to customize the dialect used to generate SQL queries so they are compatible and optimized for database. The Other Database connectors rely on higher-level standard SQL that may not always be appropriate.

- Simpler connection experience. An SDK connector can provide its own customized dialect and do not need to rely on using DSNs. Users will not need to enter in obscure JDBC URL strings or create a DSN or configure odbc.ini files. Connector can provide a simple customized connection dialog.
- Runs in Tableau Desktop and Tableau Server. No configuration is required after install the connector.

WEB DATA CONNECTOR (WDC)

Web data connectors (WDCs) are web pages that provide a data connection that is accessible over HTTP for data sources that don't already have a connector in Tableau. WDCs allow users to connect to almost any data that is accessible over the web and to create extracts for their workbooks. Data sources for a WDC can include internal web services, JSON data, REST APIs, and other sources that are available over HTTP or HTTPS. Users can create their own WDC or use connectors that were created by others.

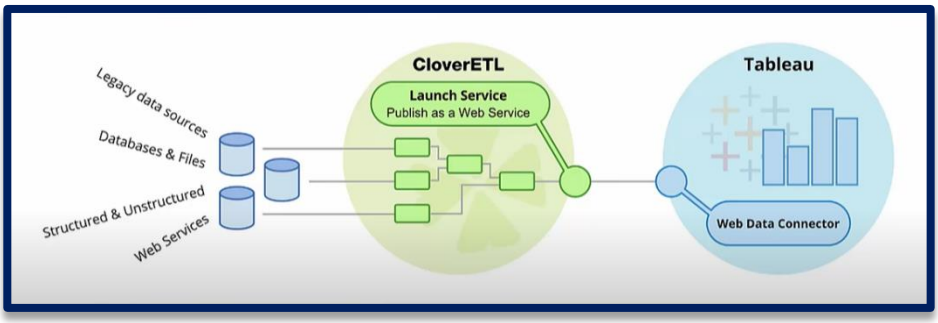
A web data connector connect to data that is accessible over HTTP and that doesn't already have a connector. A web data connector is an HTML file that includes JavaScript code. Cognitive Convergence experts can create own web data connector. The web data connector must be hosted on a web server running locally on computer, on a web server in domain, or on a third-party web server.



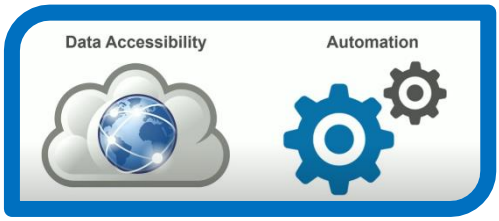
Solution Architecture

Web data connector written in HTML and JavaScript to pull web end point data to Tableau. JavaScript pull data from Web and translate it to Tableau understandable format because Tableau builds an extract with web data connector, like other extracts that can be refreshed both full and incrementally, and can be published to Tableau server.

The HTML part is the user interface, what the user sees when he/she uses it. The JavaScript code connects to web data, reads the JSON response, and then passes the information on to Tableau.



Why use Web Data Connector



Web Data Connector provide Data Accessibility (allow connection of data from any source from internet, scripts can be written that use APIs to extract data) and Automation (provide automation of data downloading).

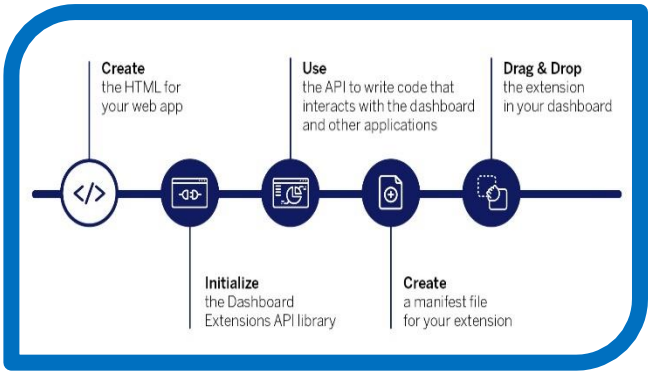
DOCUMENT API

The Document API provides a supported way to programmatically make updates to the database connection strings inside Tableau workbooks and data sources, provides developers with tools to programmatically make updates to Tableau workbooks and data source files. It allows for modifications without having to hack the XML. Some features include: Getting connection information, updating connection information, and getting field information from data sources and workbooks. Tableau works to help people see and understand their data, and strives to make products and tools that change the way people use their data.

- Create and deploy templates or migrate workbooks from test to production data sources.
- Provides a support way to programmatically make updates to Tableau workbook and data source files
- Duplicate workbook
- Modify data source settings
- Extract a list of fields from a data-source
- Getting information from workbook
- No more manual update of XML
- Update data connections in a published workbook.

EXTENSION API

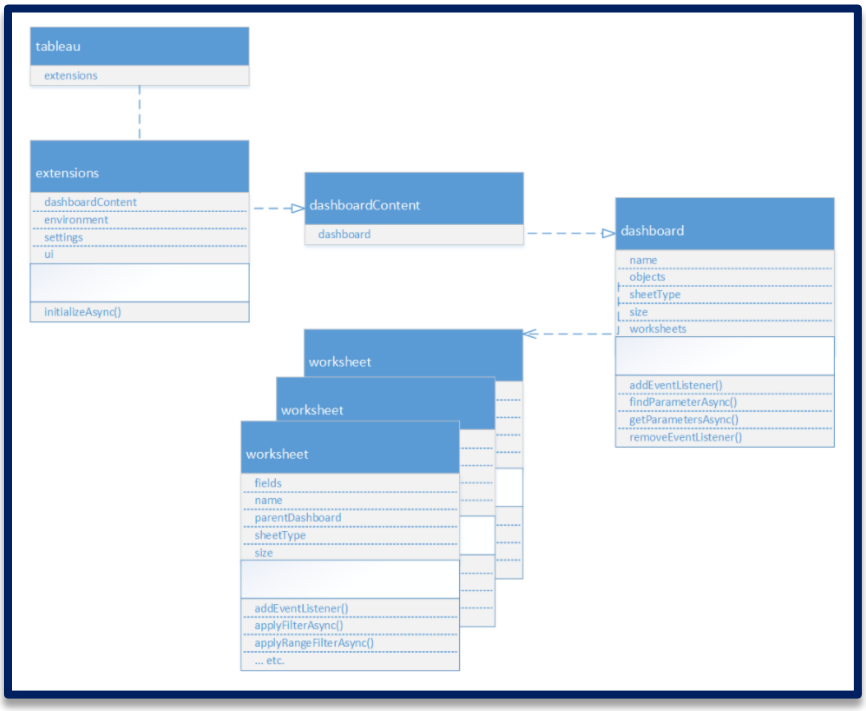
The Tableau Extensions API is a JavaScript library that is organized into namespaces that contain the classes and methods for communicating with Tableau components and allows developers to create extensions for Tableau. Tableau extensions are web applications that can interact and communicate with Tableau. A dashboard extension can be placed in the dashboard like any other dashboard object. A dashboard extension is a web app that controls



and interacts with the Tableau dashboard objects. The web app consists of one or more HTML files and is hosted on a web server.

Cognitive Convergence developers use Extensions API to create dashboard extensions that enable customers to integrate and interact with data from other applications directly in Tableau. Our experts

- Create an extension that has write-back functionality, to modify data in a viz and have that change
- Automatically update the source data in the data base or web application
- Build custom viz and interactivity types such as a filter replacement with a custom interface and network diagram
- Integrate 3rd party functionality inside the dashboard
- Interact with data from other business applications directly in Tableau
- Customize Tableau's Desktop environment for a specific team's workflow



Tableau

The top-level or global namespace is the tableau namespace, which has no constructs, but contains the extensions namespace. You use the tableau namespace to access the extensions. For example, you call tableau.extensions.initializeAsync() to initialize the API.

Extensions

The extensions namespace is the namespace for Tableau extensions. A dashboard extension is one type of extension. A dashboard extension has access to the dashboardContent namespace, and all of the objects and classes of the dashboard. Some namespaces, like the settings, environment, and ui are available to all extensions.

DashboardContent

The DashboardContent provides access to the dashboard object. When you have the dashboard object, you have access to all elements in the dashboard, including the worksheets, marks, filters, parameters, and data sources. For example, to access the worksheets in a dashboard (after initialization), you might have a line of code that looks like the following: worksheets = tableau.extensions.dashboardContent.dashboard.worksheets

Settings

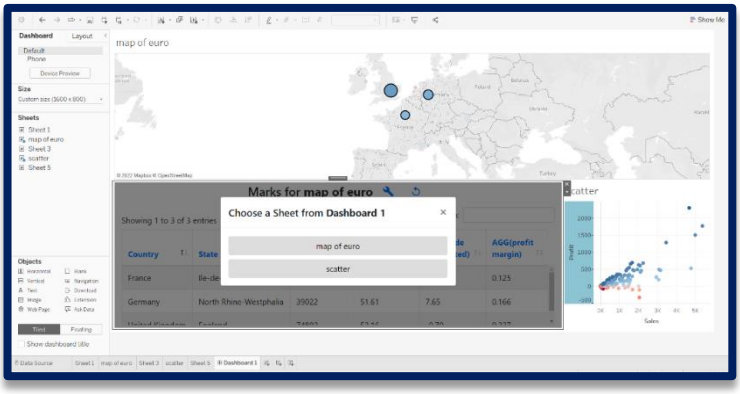
The settings namespace provides methods to get and set values which will be persisted in a workbook. You can use the settings to configure an extension.

Environment

The environment namespace provides methods to programmatically gather information about the environment in which the extension is running.

UI

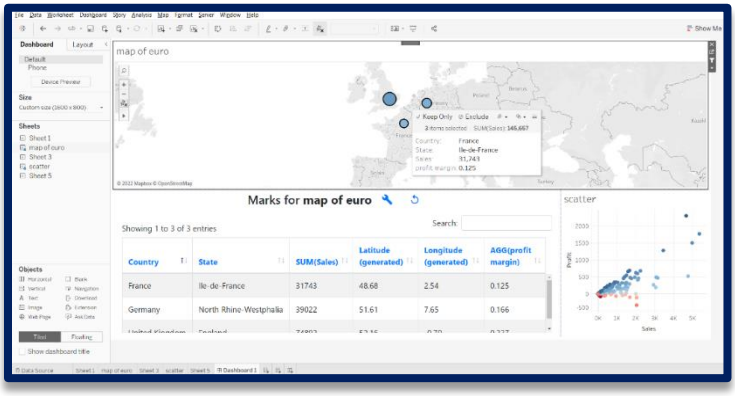
The UI namespace provides methods for an extension to display a popup dialog window.



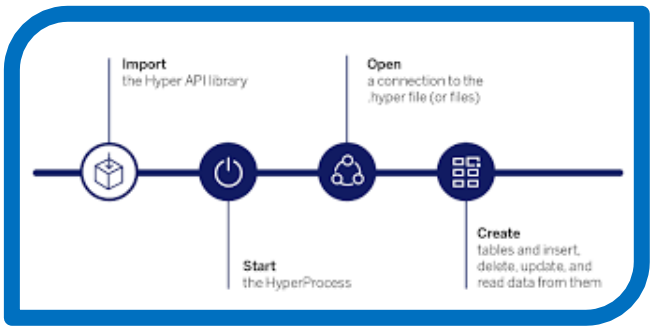
This is working on the basis of the data that is selected in the sheet map of Europe. Details are added in the tooltip which consist of country, state, sales and profit margin. The table that is been shown is coming from the code that is done visual studio because of it the details of that particular sheet can be seen.

Here a model which shows the number of sheet that dashboard have is displayed, i.e. map of euro and scatter.

By selecting a sheet data of that sheet will be displayed in form of a table in that area.



HYPER API



Hyper API is library for working with local .hyper files (aka extracts) in all conceivable ways: create them, insert data into them, update, delete, or read that data. Hyper is Tableau's SQL-based relational database engine and .hyper files are in fact relational databases. Hyper API harnesses Hyper to grant direct SQL access to .hyper files!

The Hyper API contains a set of functions that can use to automate interactions with Tableau extract (.hyper) files. It can use the API to create new extract files, or to open existing files, and then insert, delete, update, or read data from those files. Using the Hyper API developers and administrators can:

- Create extract files for data sources not currently supported by Tableau.
- Automate custom extract, transform and load (ETL) processes (for example, implement rolling window updates or custom incremental updates).
- Retrieve data from an extract file.

The Hyper API gives the tools for interacting with local .hyper extract files. For information about how to programmatically publish the extracts to Tableau Server, see the Tableau Server REST API and the Tableau Server Client (Python) library.
While it is expected that the Hyper API will work on newer versions of these languages, it may not be fully tested. Cognitive Convergence experts use Hyper API to

- Create, read, update, and delete data in .hyper files (also known as CRUD operations).
- Leverage the full speed of Hyper for creating and updating extract files.
- Load data directly from CSV files, much faster, and without having to write special code to do so.
- Use the power of SQL to interact with data in .hyper files. The Hyper API provides methods for executing SQL on .hyper files.

JAVASCRIPT API

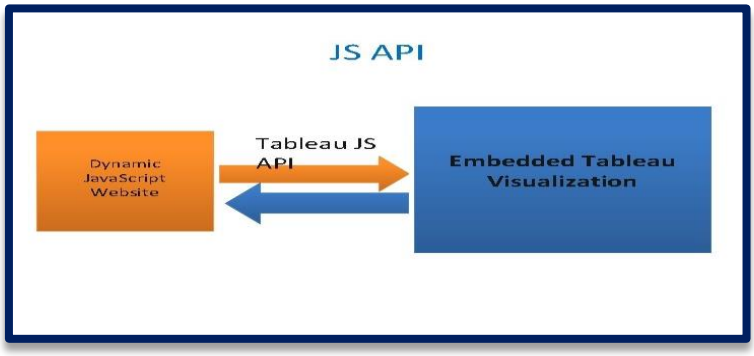
JavaScript is a text-based programming language used both on the client-side and server-side that allows making web pages interactive. Where HTML and CSS are languages that give structure and style to web pages, JavaScript gives web pages interactive elements that engage a user. JavaScript examples include the search box on Amazon, a news recap video embedded on The New York Times, or a refreshing Twitter feed.

Use the Tableau JavaScript API to integrate Tableau visualizations according to the requirement of web applications. Our experts use JavaScript API to

- Display visualizations from Tableau Server, Tableau Public, and Tableau Online on web pages.
- Dynamically load and resize visualizations.
- Filter the data displayed in visualizations with HTML controls on the page.
- Select marks in visualizations.
- Respond to events in visualizations.
- Export visualizations to an image or PDF file.

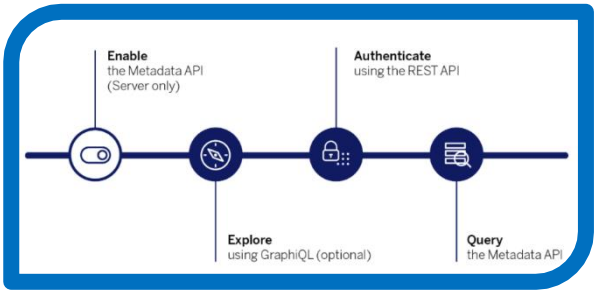
Tableau JavaScript API can be used to embed and integrate Tableau visualizations into web applications. It can display visualizations from Tableau Server, Tableau Public, and Tableau Online and programmatically interact with individual views. Using the Tableau JavaScript library, It helps to:

- Filter and set parameters on load - This is useful for loading the viz with the correct context given where the user is in the application or choices they have made.
- Create custom interfaces for interacting with the view – It can add dashboard controls that have the look and feel of your embedding application. Add HTML controls to filter the data displayed, select marks, or export images or data in various file formats.
- Create custom interactions - Combine calls to the Tableau JavaScript API methods to create interactions that would not be possible in Tableau alone. Use the API to respond to events in visualizations, to dynamically load and resize visualizations, to filter the data displayed, select marks that drive parameter changes on other sheets.
- Integrate Tableau with other systems - When it embed a visualization inside another system, it gives users an opportunity to find insight from that visualization, and ideally, the user will want to take action on that insight elsewhere in the application. With the JavaScript API, queries can be made on data on the visualization, listen to user events, and execute code that drives the appropriate action in system.



METADATA API

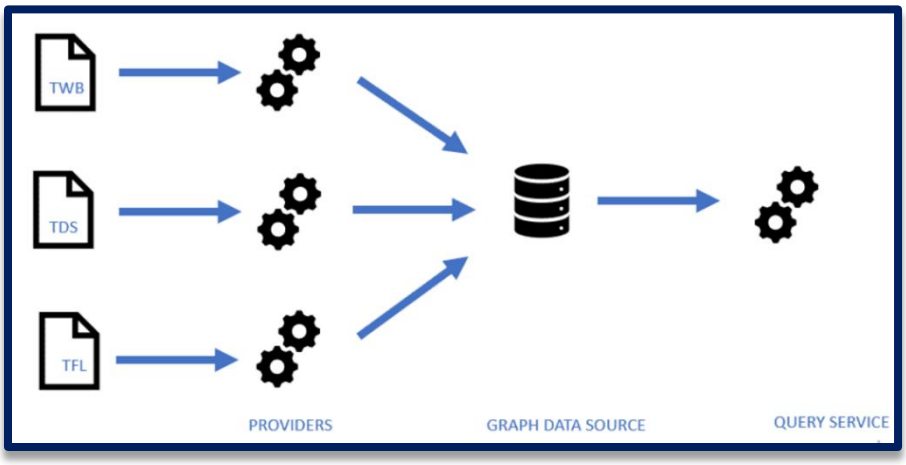
The metadata services discovers and indexes all of the content - data sources, workbooks, and dashboards - on Tableau Online site or Tableau Server to gather metadata about the content and their associated databases. The Metadata API enables to discover and query content and their external assets, using GraphQL, to better understand relationships and lineage, and perform impact analysis.



Tableau's Metadata API enables a user to explore data assets and content on Tableau Server or Tableau Online, and query the corresponding metadata that have been indexed by Tableau Catalogue (part of the Data Management Add-on). Tableau Server has always stored metadata about its workbooks, data sources, and other assets, but starting from Tableau 2019.3 end users are able to query the stored metadata directly to:

- Discover data associated with the content published on Tableau Online site or Tableau Server (tables, databases, and data sources)
- Track lineage, i.e. the relationships between assets, like data sources and workbooks
- Perform impact analysis. Using upstream and downstream lineage information
- Allows to evaluate the impact of changes to content.
- Creating an internal data dictionary or catalogue of data sources
- Ensuring that calculations are named properly and no duplicated calculations are created

- Preparing handover documentation for a consulting project, or analyzing existing content when starting a project.



MOBILE APP BOOTSTRAP

The MAB is a sample open-source mobile app that demonstrates how to connect and stay signed in to Tableau Servers, embed Tableau content, and utilize the Tableau JavaScript API to embed the Tableau content to have right at fingertips. Tableau provides a hybrid mobile solution that serves as a companion to Tableau Server and Tableau Online.

- One-stop shop: make easy for users to go to one place to get exactly the information and tools needed to do their job rather than having to go to multiple places or apps.
- Customization: fully customize the experience for users, including the branding, app icon, colors, navigation, and content available.
- Flexible security: owning the source code, can more easily embed custom security so it can be deployed to users securely within enterprise.

Cognitive Convergence provide

- Delightful native mobile apps and support for web browsers, and allow Tableau content to be embedded in other apps.
- For connecting to and embedding interactive Tableau content in their app.
- Helps developers implement features like “keep me signed in” and leverage the JavaScript API to build additional interactivity with dashboards.

- Helps to Browse visuals, interact with data, view offline snapshots

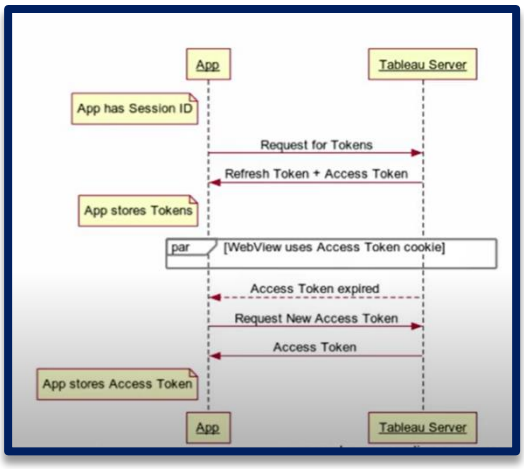
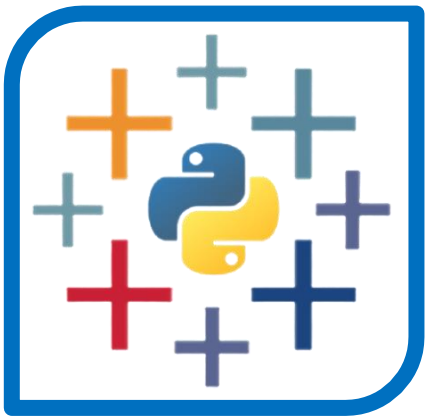


TABLEAU SERVER CLIENT



The Tableau Server includes an application programming interface (API) that allows programmers to perform any task that is managed by tabcmd. Users can use the API to manage server resources such as users, workbooks, data connections, and other resources. We can also create new users or import them from Active Directory, publish workbooks, create, view, and delete data sources, and perform other server-side operations. Tableau Server Client is a library offering a basis to develop scripts for Tableau Server. It is written in Python, one of the most commonly used scripting languages. Tasks which consist of many REST calls are integrated into simple methods and applied to the typical Tableau Server objects. Tableau Server Client (TSC) and Python Pandas connecting with a local Tableau Server admin user and using Personal Access Token (PAT). This library helps to interact with the Tableau Rest API.

Items

Items are the specific objects on the server. For each item the *init* statement provides the list of properties to query.

Endpoints

Endpoints are the methods to interact with Items. These endpoints include:

- Users
- Datasources
- Workbooks
- Views

Filters

For the above endpoints, following fields can filter or sort:

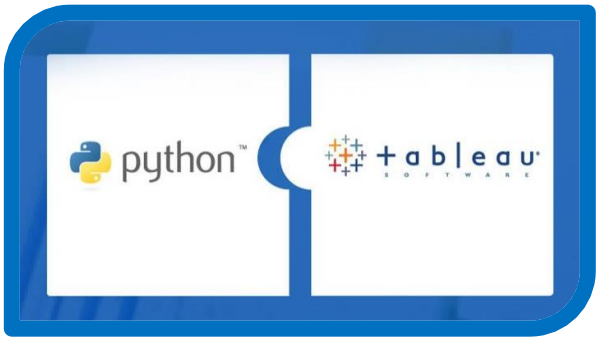
- CreatedAt

- LastLogin
- Name
- OwnerName
- SiteRole
- Tags
- UpdatedAt

As a Tableau developer, having full understanding and control of the Tableau server is of extreme importance. Cognitive Convergence developers use Tableau server client to create dashboards that enable customers to interact with data.

- Use TSC library and increase productivity of Tableau solutions.
- Manage and change Tableau server resources.
- Allow having custom applications and scripts.
- Allow to publishing workbooks and data sources, creating users and groups, query projects, sites.
- Using tableau server client our experts help to administer tableau server.
- Our experts enable to send instructions to server from local computer, publish data sources and workbooks to the server from local machine.
- Cognitive Convergence team use its expertise with Tableau server client to provide server organization, content management, server analytics and routine exports.

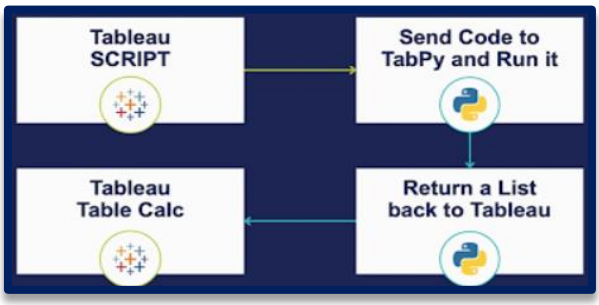
TABPY



TabPy is a Python package that allows to execute Python code on the fly and display results in Tableau visualizations, so quickly deploy advanced analytics applications. The split approach granted by TabPy allows for the best of two worlds—class-leading data visualization capabilities, backed by powerful data science algorithms. One huge benefit of surfacing Python algorithms in Tableau is that users can tune parameters and evaluate their impact on the analysis in real time as the dashboard updates.

When Tabpy is used with Tableau, calculated fields can be defined in Python which enables us to use the power of many machine-learning libraries right from Tableau visualizations. It enables many new features like Machine learning predictions, sentimental analysis, and time series forecasting using various models by customizing calculated fields.

When deployed together, Python integrated with Tableau can help in delivering scalable, flexible and advanced analytics platform. To make this possible, TabPy mainly leverages an input/output approach where the data is aggregated according to the current



visualization and tuning parameters are both transferred to Python. The data is processed and an output is sent back to Tableau to update the current visualization.

Real-time interaction

For real-time user interface, minimizing the processing time and delay between a parameter change and updated visualization.

Multiple levels of aggregation

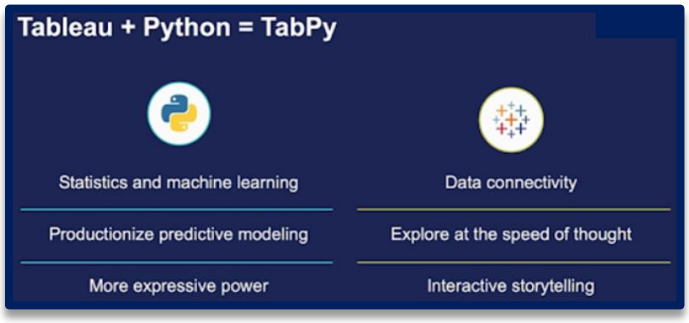
To show (several different) aggregation levels on the same Tableau dashboards, but to perform all the calculations using the finest and most granular level, containing all information.

Various data sources

The backend calculation is relying on more than a single data source and/or database

Data transferred between Tableau and Python

Need significant amount of data for each optimization step, so a lot of data must be transferred between Tableau and the Python backend.



Cognitive Convergence team use tabpy to

- Help in building better dashboards and advanced analytics to draw insights out of it.
- Handle the data exploration and visualization along with data science logic to better handle business use cases.
- Understand, analyze and visualize to takes a major part before modelling the data, proper data cleaning and preparation is needed.

REST API

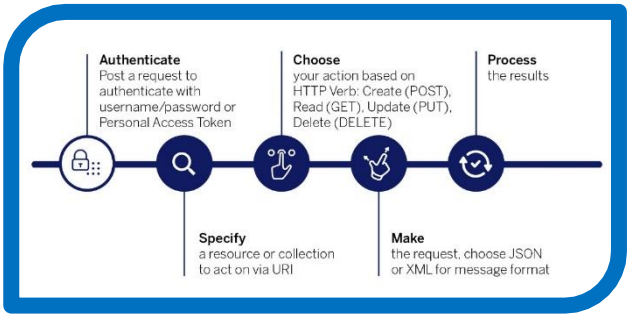


Tableau Server provides an application programming interface (API) that lets programmatically manage users, workbooks, data connections, and other resources on the server. By using the API, create users or import them from Active Directory, publish workbooks, create, view, and delete data sources, and perform other actions on the server.

Using the API, it allows to perform many of the tasks that can do using tabcmd. However, the REST API methods provide more granular control over interaction with the server. They can be considered as a set of programmatic blocks that can be used to put together complex operations that chain the output of one operation to the input of the next one, and that might involve conditions and other scenarios that are best addressed in programming logic.

Tableau Server REST API allows to manage and change Tableau Server, Tableau Online site, and Prep Conductor resources programmatically, using HTTP. The API gives simple access to the functionality behind Tableau data sources, projects, workbooks,

site users, sites, flows, and more. This access can be used to create your own custom applications or to script interactions with Tableau resources.

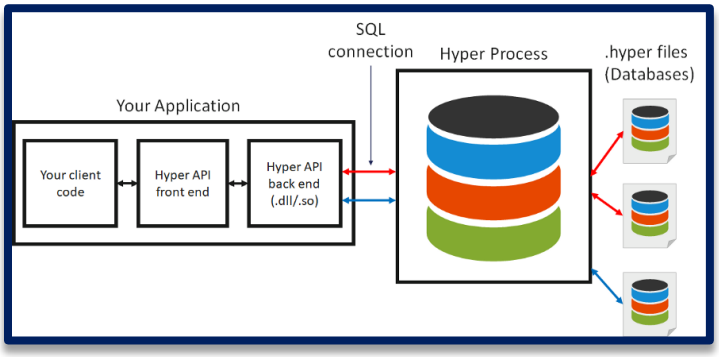
The Tableau Server REST API is based on the principles of REST (representational state transfer) protocol for client-server communication. In Tableau Server, the client-server communication occurs over HTTP, using standard web requests. The Tableau Server REST API enables you to create a script or program that performs the same actions you can take through the server UI. That means you can automate repetitive tasks, create automated workflows that behave differently based on the condition of your Tableau resources, integrate Tableau management tasks into your existing workflows, and more.

REST is a common pattern for making requests to and getting responses from an API (a server's or app's programming interface) over the web.

- Resource: The component of the API to query or manage, represented by a URI that contains the location of server plus the resource want.
- Request: A message to a server describing the action to take relating to a resource
    - GET (read information)
    - POST (create new resources)
    - PUT (update existing resources)
    - DELETE (remove resources or configurations)

- Response: A server's response to a request that contains information about the state of the resource after the request.

- Response code: Tableau server returns a response code that reports
- Header: All requests and responses have headers that contain information about them, for instance, the format (XML or JSON) of the response or request.



R INTEGRATION

R is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. The R language is widely used among statisticians and data miners for developing statistical software and data analysis. This manual details and defines the R language. The required R model can be built from inside the Tableau Report and the results can be analyzed.

It is through the Calculated fields. Tableau provides 4 scripting functions to pass R scripts and parameters to the R server, which then runs the scripts and returns the result. The 4 scripting functions are:

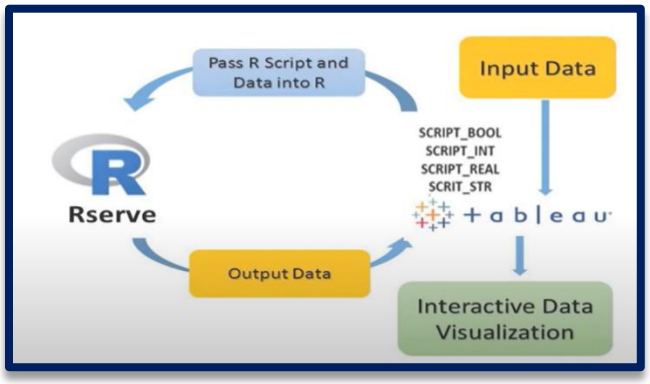
- **script_real**: if the values to be returned are numeric
- **script_boolean**: if the values to be returned are True/False

- **script_int**: if the values to be returned are integers
- **script_str**: if the values to be returned are strings

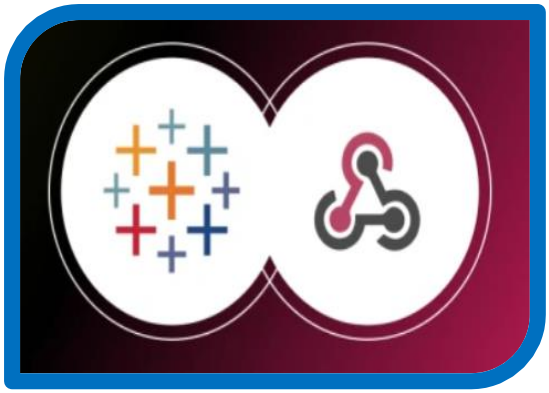
These 4 functions differ in terms of the values they return. As evident in their names, they return real number, string, integer, and Boolean value respectively. Using these functions opens up the entire set of R packages to Tableau, as long as they are installed on the local machine/server. The functions are table calculations, meaning that the arguments used must be aggregated – sum(), min(), max(), attr()

Integrating R Notebooks and R shiny with Tableau enables us to take advantage of the various statistical analysis and machine learning packages in R. This h helps to have descriptive, inferential and predictive analytics in our Tableau story/dashboard by combining them we bring together the visualization flexibility of Tableau and the statistical power of R.

- Logic is contained within the API, preventing arbitrary code execution on the server.
- RStudio Connect is a commercially-supported platform that provides access management, dials for tuning performance to meet the expected demand, and the ability to manage dependencies for multiple versions of R and Python on a per-project basis.
- RStudio Connect also allows a single Tableau workbook to use R extensions simultaneously



WEBHOOKS API



Webhooks are automated messages sent from Apps when any event/thing happens. They deliver a Message or Payload to a certain URL, which is the App's phone number or location. Webhooks are almost always faster than polling and require less effort on your part.

Webhooks allow to build custom applications or workflows that react to event that happen in Tableau. It allows to configure each webhook to subscribe to an event in Tableau. Then, when the event occurs, an HTTP POST request will be sent to the public URL. This POST request includes a JSON payload that includes information about the event The payload includes the ID of the object in question so that the Tableau REST API can be used to get additional information or take further action.

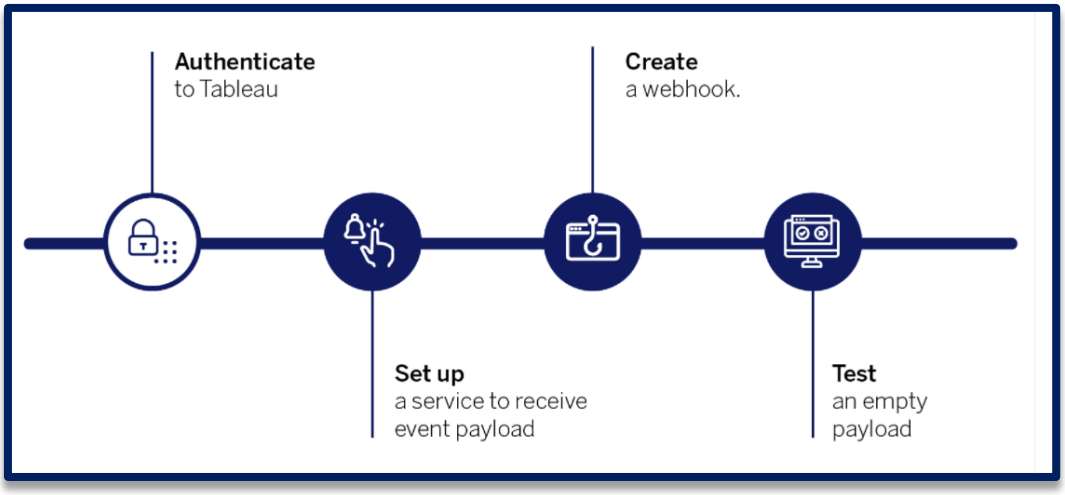
Webhooks are a common method whereby one computer system can notify another that an event has occurred using standard web technologies such as HTTP and JSON. Tableau Webhooks enables to build custom applications or workflows based on the tableau outcomes. With Tableau Webhooks send text messages or Slack notifications whenever a data source refresh fails, or when a new workbook is created. Receive a notification when workbook is updated. Tableau Webhooks can also be used when a data source is published, email a data steward asking them to review and certify it

With Tableau Webhooks, have the ability to automatically trigger these workflows. When events happen in Tableau, a notification can be sent wherever you want, triggering a workflow.

- When an extract refresh fails, file a ticket in ServiceNow automatically.
- When a workbook is updated, notify your team via their Slack channel.
- When a data source is published, email a data steward asking them to review and certify it.
- When a workbook refresh completes successfully, generate a PDF and post it to SharePoint.
- Get automatic notifications of Tableau events to your external application or workflow.

System and Site Admins have the ability to create and manage Webhooks within a Site using the Webhooks REST API. You can write your own code to do this or use Postman API Client tool with our pre-built Webhooks REST API collection.

- In some cases, a Tableau event may cause more than one webhook request to be sent to the destination URL server.
- When a server that has been sent a webhook request does not reply with a HTTP success code, the webhook will retry the request three times with diminishing frequency.
- If it still fails after a total of four attempts (fist attempt and 3 retries), the webhook will no longer retry. This is counted as 1 delivery attempt failure. If the same HTTP Post is made again and has a total of 4 such delivery attempt failures, the webhook is automatically disabled and the Webhook owner will be notified using the email address of the account owner on Tableau Server. Any successful attempts will automatically reset the delivery count. A disabled webhook can be manually re-enabled using the Update a Webhook REST Endpoint.



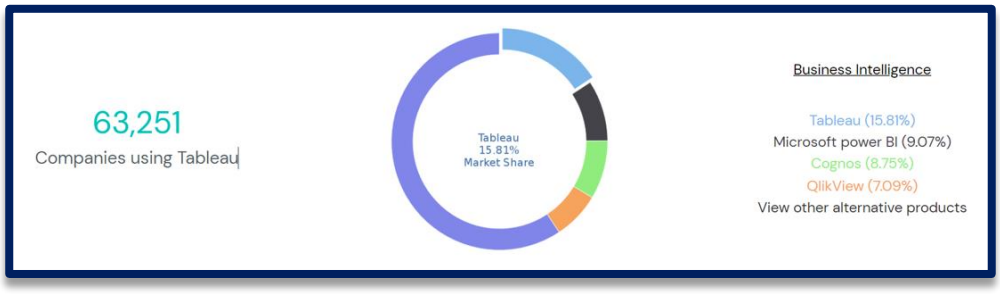
INDUSTRIAL USE CASE

The high-tech industry is a numbers game, with the potential to generate vast amounts of data. Tableau makes that information useful, helping speed up time-to-market, improve user experiences, and build on success. With fast performance and intuitive visualizations, it helps to explore and understand high volumes of data in minutes—whether it's a website clickstream or an infrastructure event log. Explore patterns that emerge from thousands or millions of users, understand product trends, and even embed Tableau inside applications to differentiate offerings.

Tableau is focused on one thing - helping people see and understand data. Organizations across all industries are empowering their people with data. With Tableau they are finding opportunities in their business that they have never seen before. The companies using Tableau are most often found in United States and in the Computer Software industry. Tableau is most often used by companies with 10-50 employees and 1M-10M dollars in revenue.

Tableau Market Share and Competitors in Business Intelligence

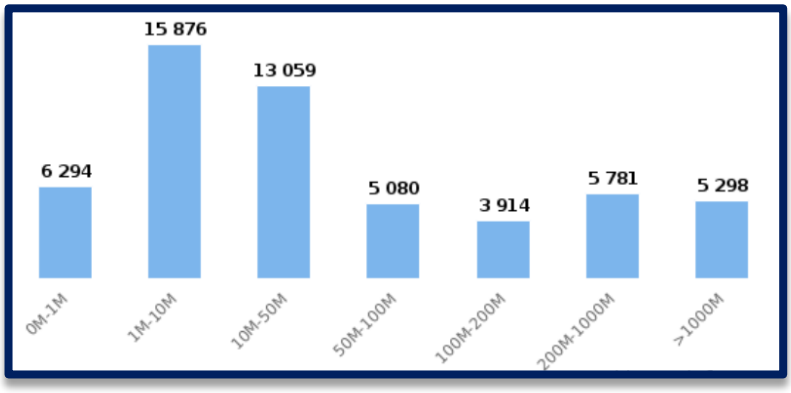
Tableau Software competes with other products in the Analytics Dashboard Data Analysis Data Analytics Data Discovery Data Management Heatmaps Predictive Analytics categories. It has a market share in the Business Intelligence (BI) category, and Tableau Software has 63408 customers in 188 countries. In the Business Intelligence category, Tableau has a market share of about



15.8%. Other major and competing products in this category include:

Distribution of companies that use Tableau based on company size (Revenue)

Of all the customers that are using Tableau, a majority (61%) are small (<$50M), 21% are large (>$1000M) and 10% are medium-sized.



No matter industry, business, or role, Tableau can bring data to life through powerful, interactive analytics. Organizations all over the world use Tableau to make data-driven decisions quickly and confidently.

Healthcare

Organizations in healthcare and life sciences bring together public health and patient data to evaluate and better allocate resources to programs that improve patient care and save lives.

Education

Schools at all levels can bring sophisticated analytics to education, using data to identify metrics that indicate student and program success.

Finance

From banking and wealth management to insurance, Tableau helps replace static and manual reports with interactive dashboards, whether data is on-premises or in the cloud.

Public Sector

Government agencies, associations, and non-profits use Tableau to track the impact of their programs and increase transparency with interactive visualizations that make data easier for everyone to understand.

ENTERPRISES USING TABLEAU WITH GREAT SUCCESS!

Ever since Tableau was introduced, this data visualization tool is used for the Business Intelligence industry. Organizations like Amazon, Walmart, Accenture, Lenovo, and so on widely use Tableau. There are a plethora of companies including Nike, Coca-Cola, Skype, The World Bank, Wells Fargo, Citigroup, Amica, *The New York Times*, etc. that use Tableau heavily and effectively. Tableau Software offer products that are mostly used by small, medium, and large size businesses in the Tech and SaaS industries. Below are some examples of the companies that help their businesses grow and be more efficient by utilizing Tableau Software's product offerings.

Google		Google is a multinational corporation that is specialized in internet-related services and products. With Tableau, any user can visually explore that data in real-time. Tableau captures the entire spectrum by connecting natively to Google Analytics, Google Adwords, Google BigQuery, and Cloud SQL to analyze billions of rows in seconds without writing a single line of code.
Spotify		Spotify is the world's most popular audio streaming subscription service with 345m users, including 155m subscribers, across 178 markets. With Tableau, you can visualize the insights you have designed about the favorite artists and brands. Go through the process given below to find out how to get the most recent Spotify chart data and use Tableau to analyze it.
LinkedIn		Tableau Server is accessed on a weekly basis by 90 percent of LinkedIn's sales force. Sales Analytics can measure performance and gauge the churn using Tableau dashboards.
Amazon		There is a Tableau's connector to Amazon Aurora. Other connectors are Amazon EMR and Amazon Redshift. Amazon Relational Database Service (Amazon RDS) can be connected to Tableau.
Ferrari		Ferrari use Tableau desktop as business Intelligent tool.
Adobe		Adobe also added components to their data warehouse that empower clients to make a Tableau Extract specifically from inside the Adobe Marketing Cloud.
Cisco		Cisco uses Tableau software to work with 14,000 items to evaluate product demand variability, match distribution centers with customers, depict the flow of goods through the supply-chain network, assess the location, and spend within the supply chain
Deloitte		Deloitte uses Tableau to help customers implement a self-reliant data-driven culture which is also agile and can garner high business value from enterprise data.
Walmart		Over 5,000 systems in Walmart have Tableau Desktop installed in them, and it is doing great with this BI tool. Over 5,000 systems in Walmart have Tableau Desktop installed in them, and it is doing great with this BI tool.

WHY COGNITIVE CONVERGENCE

Our Tableau experts help enterprises gain in depth business insights from data. We access, analyze and read unstructured data to develop a clear strategy for success. Our Tableau data visualization company increases company's ability to gather data and turn into visually interactive dashboard designs.

- We help businesses understand their operations in numbers and data sets by quickly interpreting data from various sources to make critical boardroom decisions.
- Our skilled Tableau developers employ the agile methodology to promote seamless communication and project transparency.
- We are committed to providing the best possible service to our clients, and we have a staff of full-time in-house Tableau developers to help us do so. Any project will be delivered on time thanks to our skilled hand-picked team of Tableau developers.
- The development team consists of the greatest Tableau professionals that are ready to start working on your projects right away. They work as if they were your own staff, and they go above and above to create error-free code.
- Our Tableau developers have extensive experience with cutting-edge technologies for all the phases of dashboard development and publishing.
- To review the codes, our Tableau engineers employ automated technologies. In addition, we use the most up-to-date tools to ensure a quick and painless deployment.
- Our business managers thoroughly analyze your project requirements and understand your vision, then quote the price. You won't have to worry about added cost during or while the project is completed.
- Leaving customers with the best digital experience is the priority for all businesses. Our Tableau developers will help do that with the best-in-class dashboard and report development services.

CONTACT US

Cognitive Convergence is Subject Matter Expert in Office 365, Dynamics 365, SharePoint, Project Server, Power Platform: Power Apps-Power BI-Power Automate-Power Virtual Agents.

We offer Tableau consulting services covering solution architecture refinement, customization, integration, transformation, visualization and analytics to uncover insights hidden within data and enhance data exploration.

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