



Tableau Data Visualization



Introduction

Tableau is a Business Intelligence tool for visually analyzing the data. Users can create and distribute an interactive and shareable dashboard, which depict the trends, variations, and density of the data in the form of graphs and charts. Tableau can connect to files, relational and Big Data sources to acquire and process data. The software allows data blending and real-time collaboration, which makes it very unique. It is used by businesses, academic researchers, and many government organizations for visual data analysis. It is also positioned as a leader Business Intelligence and Analytics Platform in Gartner Magic Quadrant.

Tableau Features

Tableau provides solutions for all kinds of industries, departments, and data environments. Following are some unique features which enable Tableau to handle diverse scenarios.

- Speed of Analysis
- Self-Reliant
- Visual Discovery
- Blend Diverse Data Sets
- Architecture Agnostic
- Real-Time Collaboration
- Centralized Data

Data Visualization

Data visualisation is, quite simply, the process of describing information through visual rendering. Humans have used visualisations to explain the world around them for millions of years. Data visualisation allows for universal and immediate insight by tapping into our mind's powerful visual processing system.

Why is Data Visualisation important ?

Technological advances have made data visualisation more prevalent and powerful than ever before, increasing the importance of business intelligence. Tableau leads the world in making the data visualisation process available to business users of every background and industry. Businesses around the globe realize that the ability to visualise data effectively leads directly to better understanding, insight and better business decisions.

Tableau Software enables businesses to keep pace with the evolving technology landscape and outperform competitors through an adaptive and intuitive means of visualising their data.

The Tableau Data Engine

Tableau's Data Engine provides the ability to do ad-hoc analysis in-memory of millions of rows of data in seconds. The Data Engine is a high-performing analytics database on our PC. It has the speed benefits of traditional in-memory solutions without the limitations of traditional solutions that your data must fit in memory. There's no custom scripting needed to use the Data Engine. And of course, we can choose to use the Data Engine, or don't—we can always connect live to our data.

[Data Engine to live connection and back](#)

The Data Engine is designed to directly integrate with Tableau's existing live connection technology, allowing users to toggle with a single click between a direct connection to a database and querying an extract of that data loaded into the Data Engine (and back).

Architecture-aware design

The core Data Engine structure is a column-based representation using compression that supports execution of queries without decompression. Leveraging novel approaches from computer graphics, algorithms were carefully designed to allow full utilization of modern processors. The Tableau Data Engine also has been built to take advantage of all the different kinds of memory on a PC, so we can avoid the common limitation that data sets must fit into our computer's RAM memory. This means we can work with larger data sets.

True ad-hoc queries

The Data Engine was designed with a query language and query optimizer designed to support typical on-the-fly business analytics. When working with data at the speed of thought, it is common to need to run complex queries such as very large multi-dimensional filters or complex co-occurrence queries. Existing databases generally perform poorly on these types of queries, but the Data Engine processes them instantly.

Robin Bloor, Ph.D. and founder of technology research firm the Bloor Group, writes: Because Tableau can now do analytics so swiftly and gives people the choice to connect directly to fast databases or use Tableau's in-memory data engine, it has become much more powerful in respect of data exploration and data discovery. This leads to analytical insights that would most likely have been missed before.

Flexible data model

One of the key differences of the Tableau Data Engine compared to other in-memory solutions is that it can operate on the data directly as it's represented in the database on disc. So there's no required data modeling and no scripting that needs to be done to use the Data Engine. One of the things that's so powerful about the Data Engine is we can define, just as with any other relational database, new calculated columns or we might think of it as sort of ad hoc data modeling at anytime.

Instance load and connection time

The Data Engine is unique in that once our data is loaded into the Data Engine, it has very fast start-up time. It only needs to read in that portion of the data which our queries actually touch. We might have a lot of data in the database that's not relevant to a particular analysis, but we are never going to wait for the Tableau Data Engine to read that data.

Tableau Online

Tableau Online, a hosted version of Tableau Server in the cloud. It's the fastest way to get up and running with a complete business intelligence platform. you can share any view with anyone on your site.

You want to show a coworker a certain visualization within your published workbook. In times like these, it's easy to share links with others by pasting them into an email. Simply click the share icon in the toolbar, copy the URL in the Link field, and past it into your email.

When moving to the cloud, server admins often worry about losing control. They worry they won't be able to manage and configure their environment. Tableau Online handles the behind-the-scenes work so admins can focus on what matters most: getting your data in front of the right people.

- Server hardware
- Hardware configuration
- Network configuration
- Upgrades

But that doesn't mean you won't be able to configure your Tableau Online environment as an admin. In fact, you'll have many vital capabilities such as:

- Custom logos
- Embedded views
- Integrated authentication
- Developer tools
- Administrative views
- Content organization
- Permission management

Getting started is just a matter of clicks. You can start with one user or one hundred. Scale up as fast as you want and never worry about infrastructure. When you add users, they get an email, create a username & password, and then simply go to a web page to sign in.

Since Tableau Online lives in the cloud, your customers and partners need not get inside your firewall to collaborate. Many of Tableau Online's early customers take advantage of this.

Tableau Mobile

Mobile business intelligence is fundamentally different than traditional business intelligence. The devices are different (tablets instead of desktops), the needs are different (get details for this customer standing here, not all customers) and the attention span of your audience is different (on the go, probably distracted.) But the potential benefits are huge. For one, we can stop making decisions without the benefit of data. Mobile business intelligence can be woven much more closely into where work is getting done: hallway conversations, stand-up meetings, executive briefings, and discussions with customers and partners. To assume that everyone is at their desk or with their PC when they need data is to limit the potential of business intelligence.

Another major benefit is to spread business intelligence more widely throughout your organization. This can help we create a culture of data-driven decision making. Some figures show that only 8% of the people in most organizations are using business intelligence . That's a huge failure for business intelligence initiatives with a mandate to push information out to the entire organization. Mobile applications are naturally social. They are used in meetings, at customer sites and in operations centers. Tablets are particularly social: they are convenient to carry around, they start up instantly and they are easy to hand back and forth.

Take advantage of this with your mobile business intelligence applications. Provide interactive filtering, sorting, panning, and zooming so that users can walk through data live over the course of a meeting. Allow commenting on views so that questions and observations aren't lost. Make sure your solution is fast enough that it can keep up with the pace of a discussion. People will move ahead without the necessary information if the dashboard fails to load quickly. Finally, make sure that your mobile business intelligence supports all of your data security and authentication. While mobile business intelligence provides great opportunities for collaboration, it also has the potential for security breaches if we do not make sure the right protocols are in place.

Tableau Mobile app is faster. This includes searching for the views or dashboards that matter to we to viewing and interacting with your content, to answering your questions.

Tableau Mobile improved all the seemingly little things that add up and slow we down. With the new app, your data is the star of the experience; the user interface gets out of the way. Quickly page through your favorite vizzes with a swipe. Tap once to go full-screen. Switch between Tableau Server sites with a couple of taps. Favorite (and unfavorite) content with a tap. Connect to recently -visited Tableau servers with a tap—the list goes on and on!

Tableau Mobile now provides offline access to high-resolution images of your favorite views and dashboards. Snapshots will be available even when we're not connected to a network. So whether we're in between meetings at work or in between stops out on the road, snapshots of your favorite vizzes are always at the ready.

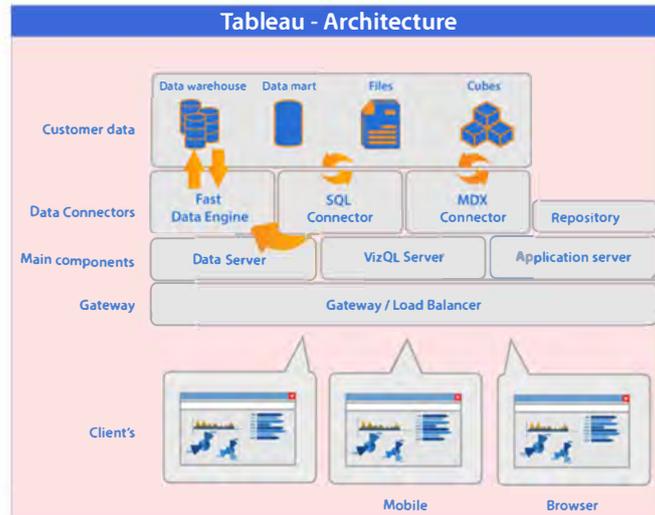
Tableau Architecture

Tableau has a highly scalable, n-tier client-server architecture that serves mobile clients, web clients and desktop-installed software. Tableau Desktop is the authoring and publishing tool that is used to create shared views on Tableau Server.

Tableau Server is an enterprise class business analytics platform to level up thousands of clients. Tableau Server presents powerful mobile and browser -based analytics and workings among a company's presented data strategy and security protocols.

Tableau Server:

- Scales up: Is multi-threaded
- Scales out: Is multi-process enabled
- Provides integrated clustering
- Supports High Availability
- Is secure
- Runs on both physical and Virtual Machines



Version Compatibility Between Tableau Desktop and Tableau Server

A workbook created with any version of Tableau Desktop can connect to any supported version of Tableau Server. But once we are connected, compatibility can be an issue depending on the action we're performing.

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Publishing from Tableau Desktop to Tableau Server

We can publish workbooks and data sources to Tableau Server if the version of Tableau Server is the same or newer than the version of Tableau Desktop. For example, we can publish workbooks and data sources from Tableau Desktop 10.0 to Tableau Server 10.0, to Tableau Server 10.1, or to Tableau Server 10.2. But we can't publish workbooks and data sources from Tableau Desktop 10.2 to Tableau Server 9.3 or to Tableau Server 10.1.

Connecting to published extracts

Published extracts are not automatically upgraded when we refresh them on Tableau Server. Any published workbook or data source with an extract created in Tableau Desktop retains its original version when it's refreshed or appended to on Tableau Server.

Connecting to Tableau Server-based data sources

Workbooks in Tableau Desktop can use data sources that have been published to later versions of Tableau Server. However, if we connect to a data source that uses features that aren't in that earlier version of Tableau Desktop, those fields are unavailable. For example, suppose we create a workbook in version 8.2 of Tableau Desktop, and then connect to a data source on Tableau Server version 9.0 that contains fields that include level of detail expressions. In that case, those data fields are unavailable in the Tableau Desktop 8.2 workbook, because level of detail expressions were not available until Tableau 9.0.

Workbooks created in Tableau Desktop can always use data sources from an earlier version of Tableau Server. For example, a Tableau Desktop 10.1 workbook can use data sources from Tableau Server 10.0.

Data Connectors

It consists of a amount of optimized data connectors for databases .There are also common ODBC connectors designed for any systems without a native connector. It offers two modes in support of interacting with data: Live connection or In-memory. Clients can switch among a live and in-memory connection as they desire.

Application Server

Application Server processes (wgserver.exe) handle browsing and permissions for the Tableau Server web and mobile interfaces. When a user opens a view in a client device, that user starts a session on Tableau Server. This means that an Application Server thread starts and checks the permissions for that user and that view.

Once a view is opened, the client sends a request to the VizQL process (vizqlserver.exe). The VizQL process then sends queries directly to the data source, returning a result set that is rendered as images and presented to the user. Each VizQL Server has its own cache that can be shared across multiple users.

Data Server

Data Server Manages connections to Tableau Server data sources.

It also maintains metadata from Tableau Desktop, such as calculations, definitions, and groups.

Gateway/Load Balancer

It acts as an Entry gate to the Tableau Server and also balances the load to the Server if multiple Processes are configured.

Connecting to a custom SQL query

For most relational data sources we can connect to a specific query rather than the entire data source. Often this can be useful when we know exactly the information we need and understand how to write SQL queries.

Select Custom SQL in the connection dialog box.

Type or paste the query into the text box.

Most common scenarios of using Custom SQL in Tableau are (and there are a lot of them):

Scenario 1. Union of data

If we need to append data to each other, we can use the union option directly in Tableau. In some cases your database does not support this option, so we can use custom SQL instead.

```
SELECT * FROM Sheet1 UNION (ALL) SELECT * FROM Sheet2
```

Sheet 1		Sheet 2		UNION	
ID	Value	ID	Value	ID	Value
1	100	6	600	1	100
2	200	7	601	2	200
3	300	8	602	3	300
4	400	9	603	4	400
5	500	10	604	5	500
				6	600
				7	601
				8	602
				9	603
				10	604

Scenario 2. Combine (join) and aggregate your data

If we need to combine tables and aggregate your data, we can use both a join and default aggregation type options directly in Tableau. In some cases we might need to use custom SQL instead.

For example, suppose we have the following two tables: Orders and Vendors.

Orders

Orders	Customer ID	Vendor ID
10248	32	1
10249	90	3
10250	81	2

Vendors

Vendor ID	Name
1	Tminus Shipping
2	Packing You
3	ShipWise Express

We can use the following custom SQL query to find a count on the number of orders and do a left join on the Orders and Vendors tables:

```
SELECT Vendors.Name,COUNT(Orders.Order) AS Number Of Orders
FROM Orders
LEFT JOIN Vendors
ON Orders.VendorID=Vendors.VendorID
GROUP BY Name;
```

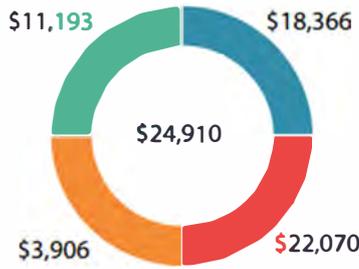
The result of the query looks like this:

Abc Custom SQL Query Name	# Custom SQL Query Number of Orders
Tminus Shipping	1
Packing You	1
ShipWise Express	1

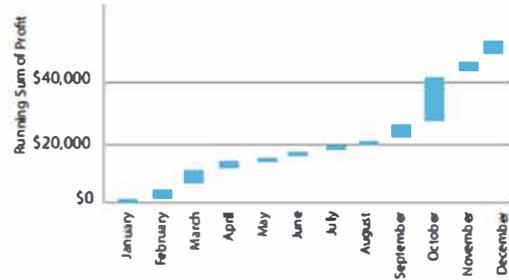
Scenario 3. Tableau + Stored Procedures

Tableau has nice calculation syntax which work very nice on large dataset, but 6 sometimes we have to apply complex logic using Table Calculations, which are prone to give bad performance on large number of records, because they are calculating in Tableau in-memory engine and not in database. So, sometimes it is better to write optimized stored procedure in database and call it inside Tableau, than writing complex calculations and making complex join logic inside Tableau. Example Snapshots:

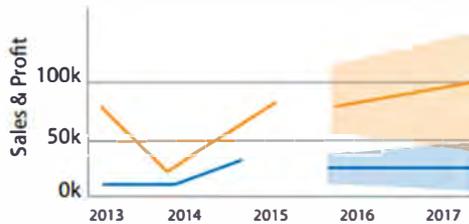
Profit,Sales by Region



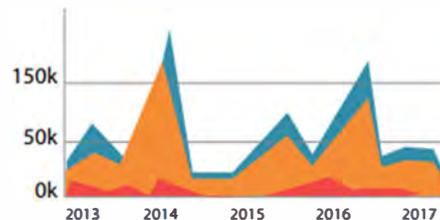
Profit Growth



Forecasting



Quantity By Category

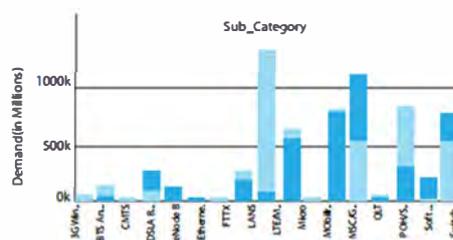


Telecom Equipment Market in India

Demand By Equipment



Sub_Category by Year



Telecom Equipment Demand List

Product	Year	Sub Category	Demand(in Millions)
Backhaul and Transmission	2016	DWDM	19,730
		DXC	3,300
		Ethernet Microwave	25,880
		Mierowave Backhaul	27,240
		Optical	58,110
		PDH/SDH/Mirowave	1,360
		POTP(Incl within SDH,DWDM/DX)	27,460
		SDH	31,800
Submarine systems	3,200		

Conclusion

At Redeem Systems, our main focus verticals are Communications, Aerospace and Medical Electronics. We are Pure-play engineering analytics company providing a complete end-to-end solution with specialization in :

- Product Realization
- IOT Analytics
- Enterprise Enablement

Our Analytics Portfolio Product Engineering Solution for our international customers include:

- Kompass – Data Analytics
- Kadence – Text Analytics
- Keysights – Image/Video Analytics
- Krackle – Speech Analytics
- Kaleidoscope – Visualization

These have advanced analytics capabilities:

- Descriptive
- Diagnostic
- Predictive
- Prescriptive

Our End to end Solution spans from Requirements gathering, Data Acquisition and Assessment, Data preparation, Data Modelling and Data Rendering with appropriate Visualization