

Low Level Design

Customer Lifetime Value Prediction

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DOCUMENT CONTROL

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Contents

1.	Introduction	04
1.1	What is a Low-Level Design Document?	04
1.2	Scope	04
2.	Architecture	05
3.	Architecture Description	08
3.1	Data Description	08
3.4	Data insertion into database	10
3.5	Connection with SQL server	10
3.5	Export Data from database	13
3.6	Deployment	13
4.	Unit test cases	15

1. Introduction

1.1 What is a Low-Level design document?

The goal of the LDD or Low-level design document (LLDD) is to give the internal logic design of the actual program code for the Customer Lifetime Value Prediction dashboard. LDD describes the class diagrams with the methods and relations between classes and programs specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 Scope

Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. The process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data design work.

2. Architecture

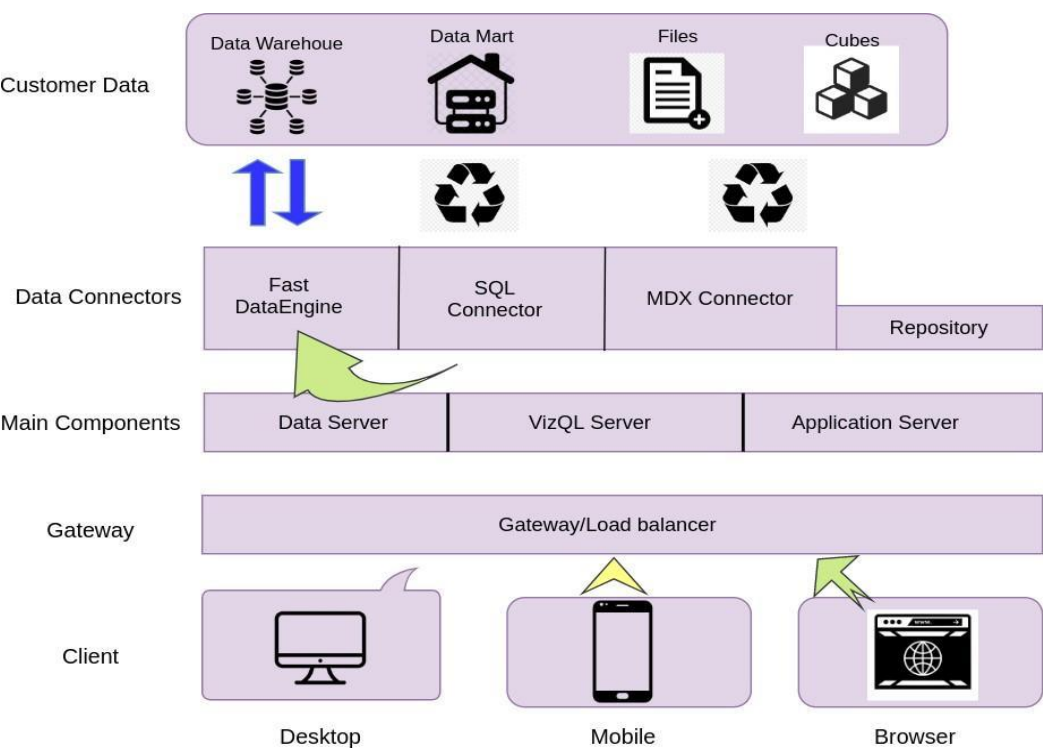


Tableau Server Architecture

Tableau has a highly scalable, n-tier client-server architecture that serves mobile clients, web clients and desktop-installed software. Tableau Server architecture supports fast and flexible deployments.

The following diagram shows Tableau Server’s architecture:

Tableau Communication Flow

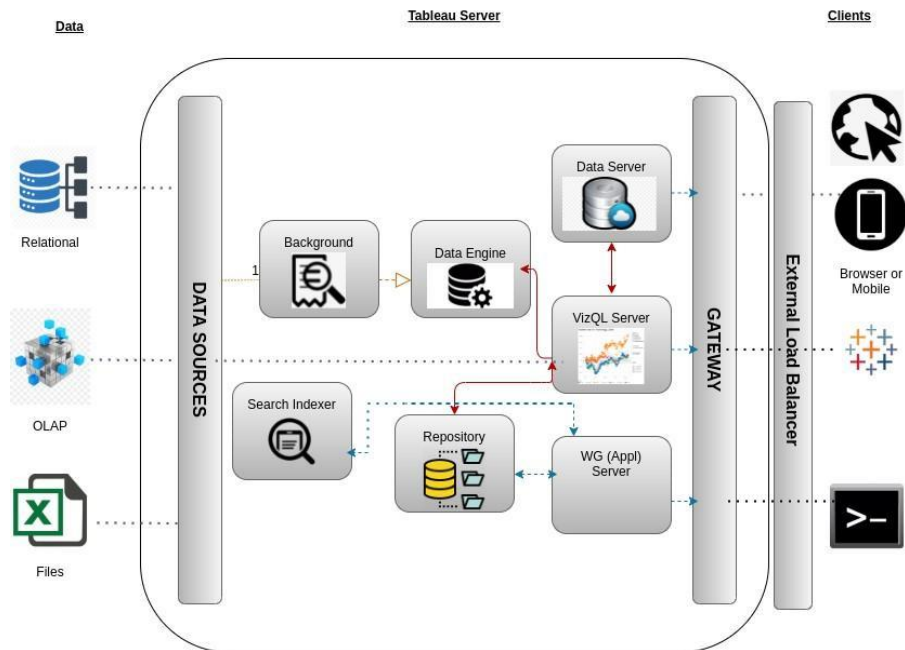


Tableau Server is internally managed by the multiple server processes.

1. 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.

2) 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.

- **Repository:-**

Tableau Server Repository is a PostgreSQL database that stores server data. This data includes information about Tableau Server users, groups and group assignments, permissions, projects, data sources, and extract metadata and refresh information.

- **VIZQL Server:-**

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 Engine:-**

It Stores data extracts and answers queries.

- **Backgrounder:-**

The backgrounder Executes server tasks which includes refreshes scheduled extracts, tasks initiated from tabcmd and manages other background tasks.

- **Data Server:-**

Data Server Manages connections to Tableau Server data sources

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

3. Architecture Description

3.1. Data Description

The Dataset contains house price of cities that fall under the categories A,B and C based on the availability of parking, rainfall, its built-up area etc

'Education'= Education levels of customers

'Effective To Date'= **the day your insurance company will begin helping to pay for**

'Location Code'= segmentation of customers as per location

'Marital Status'= Divorced, Married, Single

'Monthly Premium Auto'= premium monthly basis

'Months Since Last Claim' = Months Since Last Claim

'Months Since Policy Inception'= the date at **which the insurance policy goes into effect**.

'Number of Open Complaints'= complaints not solved

'Number of Policies'= no of policies by customers

'Policy Type'= personal/ corporate/ special

'Policy'= L1, L2, L3 policy under (personal/ corporate/ special)policy type

'Renew Offer Type'= offer1, offer2, offer3, offer4

'Sales Channel'= the way in which B-2-C worked.

'Total Claim Amount'= **the amount of money which is to be paid at the maturity of an insurance policy**

'Vehicle Class'= class of vehicles owned by customers

'Vehicle Size = Medium, Large and small

'Coverage' = **insurance coverage** refers to the amount of risk or liability that is **covered** for an individual or entity by way of **insurance** services. Here Basic, Extended, Premium.

'Response = Customers response to marketing call or not

3.2. Data Insertion into Database

- a. Database Creation and connection - Create a database with name passed. If the database is already created, open the connection to the database.
- b. Table creation in the database.
- c. Insertion of files in the table

3.5 Make the SQL connection and set up the data source

Step 1: Configuring Tableau

Launch Tableau on your workstation and select SQL Server from the connect column on the left. This will open a dialogue box where you need to provide the connection details for SQL Server.

To connect with tableau, you will need to provide information about the server which hosts your database. If you want to connect to a contained database, you can also specify the name of the database.

To connect with a port other than the default port, you need to specify the port and server as follows:

```
<server_name><port_number>
```

Example query: my_server 8051

There are two ways in which you can sign-in to the server, either by using Windows authentication or by using the username and password. Using the username and password becomes a must if you’re working with a password-protected server in a non-Kerberos environment.

Click on Sign in to establish a connection. This will enable a connection without SSL. To establish an SSL enabled connection, click the Require SSL checkbox before you sign in.

SQL Server provides an option to let the user queries access the modified rows even before they have been committed. This option is called Read Uncommitted data. It saves time by preventing complex queries such as extract refreshes from locking the database and causing a delay. If this option is unchecked, Tableau makes use of default isolation levels.

MySQL

General

Initial SQL

Server

localhost

Port

3306

Database

CLV data

Username

root

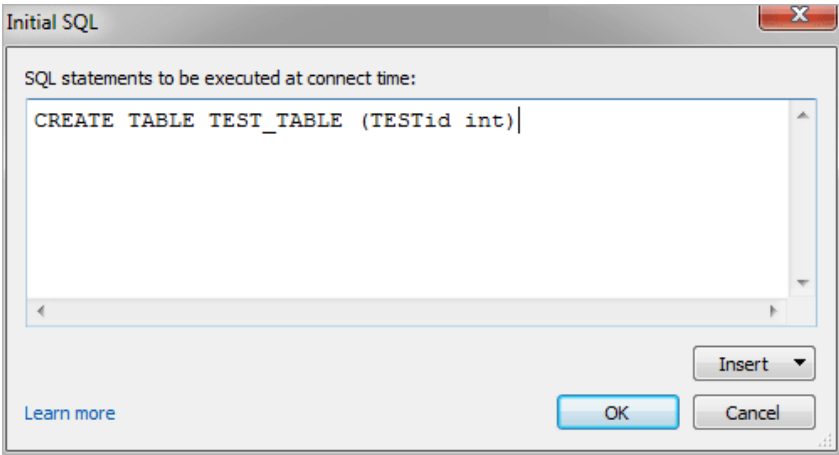
Password

Optional

☐ Require SSL

Sign In

If you want to run a specific SQL command every-time a new connection is established, you can use the Initial SQL option. This will open a dialogue box, where you can specify your desired SQL query.



Step 2: Configuring Data Source

The data source page loads up after configuring the Tableau connector and successfully signing in. This is how the page looks like:



Select the data source name option and give a unique name to the database you are using. It's considered a good practice to have a unique name as it makes it much easier for users to identify the database from which data is being fetched.

To select the desired schema, you can use the schema drop-down list from the column on the left. You can also perform a text-based search to find the desired option. Now similarly find and select the desired table and drag it onto the canvas.

The screenshot shows the Tableau interface for a project titled "Customer Value Analysis in Auto Insurance". The main view displays a table of data with columns: Customer, State, CLV, Response, Coverage, Education, Effective To Date, Employment Status, Gender, Income, Location Code, Marital Status, and Monthly Premium. The data is filtered by "New Union".

Customer	State	CLV	Response	Coverage	Education	Effective To Date	Employment Status	Gender	Income	Location Code	Marital Status	Monthly Premium
BUT9796	Washington	2,763.52	No	Basic	Bachelor	24-02-2011	Employed	Female	56,274	Suburban	Married	69
QZ44256	Arizona	6,379.54	No	Extended	Bachelor	31-01-2011	Unemployed	Female	0	Suburban	Single	94
AI49188	Nevada	12,827.43	No	Premium	Bachelor	19-02-2011	Employed	Female	48,767	Suburban	Married	108
WW63253	California	7,645.86	No	Basic	Bachelor	20-01-2011	Unemployed	Male	0	Suburban	Married	106
HB64268	Washington	2,813.69	No	Basic	Bachelor	03-02-2011	Employed	Male	43,836	Rural	Single	73
OC83172	Oregon	8,256.30	Yes	Basic	Bachelor	25-01-2011	Employed	Female	62,902	Rural	Married	69
XZ87318	Oregon	5,380.90	Yes	Basic	College	24-02-2011	Employed	Female	55,350	Suburban	Married	67
CF85061	Arizona	7,216.10	No	Premium	Master	18-01-2011	Unemployed	Male	0	Urban	Single	101
DY87989	Oregon	24,127.50	Yes	Basic	Bachelor	26-01-2011	Medical Leave	Male	14,072	Suburban	Divorced	71
BQ94931	Oregon	7,388.18	No	Extended	College	17-02-2011	Employed	Female	28,812	Urban	Married	93
CV41566	California	4,759.00	No	Basic	College	24-02-2011	Unemployed	Male	0	Suburban	Divorced	67

This is how to connect SQL Server with Tableau. Now click on the sheets tab to begin the analysis.

Custom SQL features can be used to focus on specific SQL statements, rather than querying the entire database. Click on the Custom SQL option from the panel on the left. A new dialogue box will now open up, where you can provide the query you want to execute.

3.3. Export Data from Database

Data Export from Database - The data in a stored database is exported as a CSV file to be used for Data Pre-processing.

3.6 Deployment.

Once you've completed your dashboard, follow these steps:- **Server, Tableau Public, Save to Tableau Public As**

You may be prompted to log into your Tableau Public profile first if this is your first time publishing.

Next, fill out the title you want your viz to have and click "save".

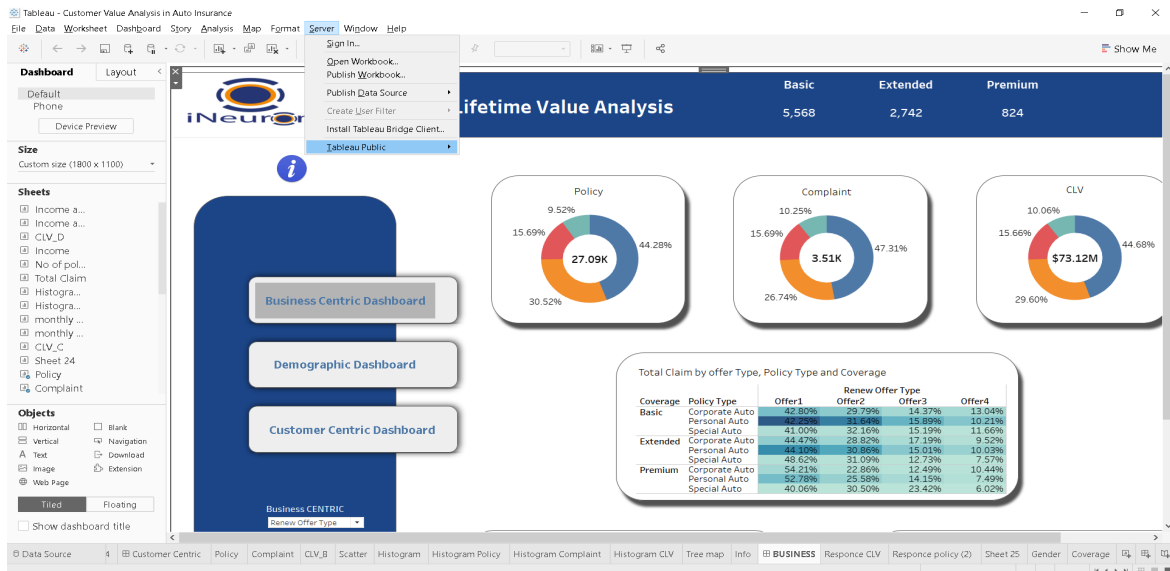


Tableau Server



An error occurred while attempting to save the workbook.

The Tableau server you are publishing to requires extracts to be enabled for data sources. Use the Data menu to enable the extracts for the following data sources:

Data Extract Required

Fn-UseC_Marketing-Customer-Value-Analysis

[Learn More](#)

OK

This message means that your connection to the Sample-Superstore data set is a live connection. Tableau Public cannot host live connections, so you'll need to convert your connection to an extract (like a frozen screenshot of your data).

Here in the below screenshot, we can see that our workbook has been published to Tableau Public.



Business Centric Dashboard

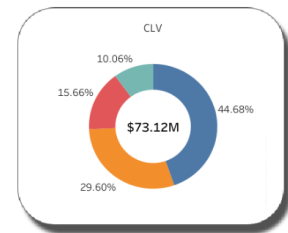
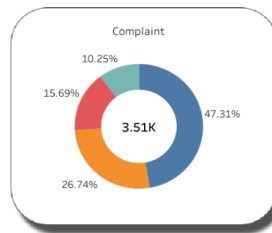
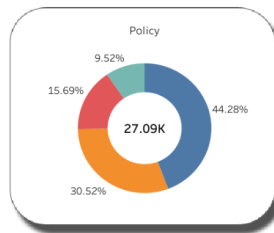
Demographic Dashboard

Customer Centric Dashboard

Business CENTRIC
Renew Offer Type

Select Business Centric
All

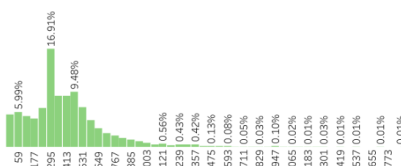
Response
All



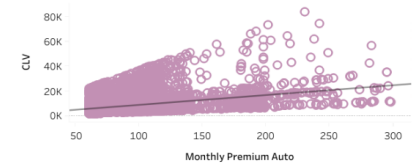
Total Claim by offer Type, Policy Type and Coverage

Coverage	Policy Type	Renew Offer Type			
		Offer1	Offer2	Offer3	Offer4
Basic	Corporate Auto	42.80%	29.79%	14.37%	13.04%
	Personal Auto	42.25%	31.64%	15.89%	10.21%
	Special Auto	41.00%	32.16%	15.19%	11.66%
Extended	Corporate Auto	44.47%	28.82%	17.19%	9.52%
	Personal Auto	44.10%	30.86%	15.01%	10.03%
	Special Auto	48.62%	31.09%	12.73%	7.57%
Premium	Corporate Auto	54.21%	22.86%	12.49%	10.44%
	Personal Auto	52.78%	25.58%	14.15%	7.49%
	Special Auto	40.06%	30.50%	23.42%	6.02%

Claim Count Histogram



Monthly CLV Scatter Plot



4. Unit Test Cases

TEST CASE DESCRIPTION	EXPECTED RESULTS
Business centric parameter	When clicked on the slicer, a drop down should occur which has various parameters of the business centric factors.
Customer centric Parameter	When clicked on the slicer, a drop down should occur which describes the parameters of the customer engagement factors.
Demographic Parameter	When clicked on the slicer, a drop down should occur which describes the parameters of the demographic factors.
CLV and Monthly Premium Auto	Scatter plot which shows the CLV and Monthly Premium Auto relation
Histogram of variables	The visual should show histograms of all variables when hover in the tooltip.
information and navigation button	The information button shows the insights and the navigation button navigates to the dashboards.
Min, Max & Avg. CLV Comparison by categories	This is an important visual in bar-graph which shows the category of Max, Mini and Avg. CLV across Built-up parameters and categories.