

A Survey on Business Intelligence Tools for Marketing, Financial, and Transportation Services



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Abstract The main moto behind this paper is to present an elaborated survey on Business Intelligence (BI) tools for Marketing, Transportation, and Financial Services. As a survey, our objective should present much known BI tools like Tableau, Power BI, Pentaho, QlikView, and Micro Strategy Analytical Express. These tools are well known for the ease of organizational use. Comparisons are made from these tools to test their performance and try to figure out best of all. From the available data gathered from different sources, one can thoroughly conclude that Pentaho is the best in terms of data processing to services among other BI tools available in the services specified.

1 Introduction

In day-to-day with innovative technologies, enormous amount of data is exponentially generated from immense data sources. The data collected from distinct sources lead to an emergence of structured, semi-structured and unstructured types. For instance, collected data from RDBMS is structural, log files data were in semi-structured and other files such as text files, audio and video files are un-structured. Analysis and predictions of this huge amount of data is typically a difficult task. For example, it is quite difficult to launch a product into market. First one has to analyze previous similar products sales in area-wise, region-wise, and country-wise. The marketing areas of our product should be analyzed and predicted based on previous data. Nowadays, analysis of the growing data is a very difficult task and requires unpredictable period for decision making to the business executives [1].

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Business Intelligence (BI) is the most vital for abnormal state administration of any association for break down, envision, revealing, and virtual-making arrangements including plans. BI is the most innovative approach for exploring information and introducing significant data to assist corporate administrators, business supervisors and various closure clients settled on more educated business choices.

BI as the way towards taking a lot of information and showing an effective state set of reports that pave information into the premise of business activities, empowering administration to settle on crucial day by day business choices. As an efficient service, our motive is to have a reasonable BI tools available open or closed access. The main challenging parameters in IT industry are scalability, financial commitment, usability, fault tolerance, other issues. The reliable tool should be selected in view of the above issues for organization [2, 3].

This paper explores about the suitable tools in open source or non-open source for creating the data dashboards/visualization, with low cost for developing marketing and financial organizations, and Transportation Service projects [4]. The rest of the paper is organized as follows: Sect. 2 describes Micro Strategy Analytics Express. Section 3 describes QlikView. Section 4 describes Tableau. Section 5 describes Pentaho. Section 6 describes Power BI. Finally, we draw conclusion in Sect. 7.

2 Micro Strategy Analytics Express

M. Michel, J. Saylor and Sanju Bansal founded Small-scale Strategy, Inc established in 1989. The main purpose of the company is to develop tools for the analysis of internal and external information so as to settle on better choices. The Micro Strategy is a provider of BI to Mobile and cloud-based services. Microsoft Strategy Analytics Desktop is a BI tool for business analysis developed by Micro Strategy Company. In a BI market, Micro Strategy was one of the independent, publicly trade BI Software providers. Micro Strategy products are Micro Strategy Analytics, Micro Strategy Mobile and Usher.

Micro Strategy Analytics Express permits to create interactive dashboards for visual striking to explore business data with high speed. Once making done, we can share dashboards among the team. One can view dashboards by using Analytics Express app in iPad and on windows platform users can use Internet Explorer, Firefox 13+, Chrome 20+, and on Apple platform users can use Safari 5+, Firefox 13+, and Chrome 20+.

Our objective is to exploit different types of data sources to create Dashboards for PC or Systems. The data sources such as Drop Box, URL, Google Drive, Salesforce.com, database connections (OLAP and OLTP), and CSV files, Excel Sheet, Google Spread Sheets, Oracle, SQL Server, PostgreSQL and Sybase ASE are some of the examples.

Micro Strategy Analytics permits big organizations to study large amount of data and securely obtain actionable business insights through-out an enterprise. Micro Strategy generates dashboards and reports along with conducting ad hoc analysis

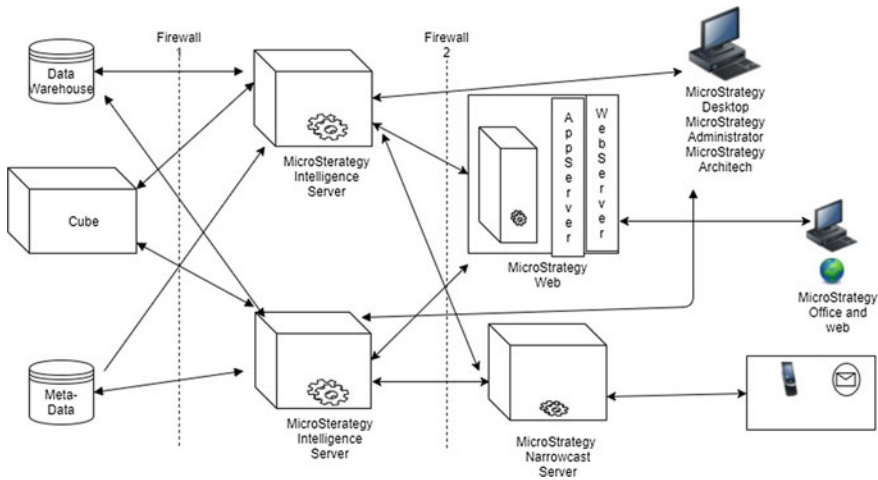


Fig. 1 Architecture of Micro Strategy Analytics Express

that allows sharing the results among mobile devices or webbing. It also has data discovery with the security, scalability and governance features of enterprise-grade BI [5].

A simple architecture of Micro Strategy Analytics Express is expressed in Fig. 1 with three stage demonstrations. The first stage depicts about data gathering from different data warehouses and databases. The second stage specifies about optimized analytical sever called Micro Strategy Intelligence used for querying, reporting and OLAP analysis. It has important functions such as sharing data including objects and metadata information protection collecting from stage one. The final stage is about creating dashboard, administration and share dashboards among the users.

Pros:

1. It is cost-effective administration tool.
2. It accesses cloud data.
3. Easy to use and maintain.
4. It accesses Big Data solutions.
5. Real-time reporting design.
6. Integrated solution for delivering different types of reports through multiple mediums like web, mobile or distribution services.
7. Advanced and predictive analytics.

Cons:

1. Version control and parallel development limitation.
2. If an employee is familiar with SQL then only one can understand how to use this Micro Strategy.
3. Merging data from different sources has been improved a lot but it is not an easy to create a query manually.

3 QlikView

Qlik is a software company in Sweden started in 1993, provides QlikView and QlikSense tools for BI. Basically, it is a PC-based tool which stands for Quality, Understanding, Interaction and Knowledge named as Quik, later it is named as Qlik.

Nowadays QlikView is leading to business discovery. These are in-memory based tools, which mean all data are loaded into the RAM. QlikView is an intuitive self-benefit representation and disclosure device to break down, translate and envision enormous information sources. The main advantages in QlikView are drags and drops feature for building dashboards, reports and visualizations. QlikView is available in three versions- Desktop, Enterprise and Cloud. QlikView is used for guided analytics and QlikSense is used for Self-Service visualization [6].

QlikView support many data formats and sources such as EXCEL, CSV files, XML files, databases, Web files, QVD (QlikView Document) files, data access from OLE DB and ODBC data sources, DIF, HTML and QVX. QlikView and QlikSense are free of cost for one personnel user. One of main advantage is current selections are saved in the form of bookmarks for later usage and users can easily access bookmarks.

In QlikView, the data visualization is in the form of charts. The different types of charts are Bar charts, Line chart, combo chart, Radar chart, Scatter chart, Grid chart, Pie chart, Funnel chart, Block chart, Gauge chart, Mekko chart, Pivot chart, Straight table. Qlik View can easily adopt immense datasets, its interface can easily lay a ladder to data sources pointing ongoing data visualization at real time. One can incorporate data from various sources and the data can rapidly be made accessible through Source specific API's. End executives can visualize data in browser by using Add-on's. Applications of QlikView are human resource administration, production control, financial systems, project administration, market analysis, customer support, stock inventories and purchasing [7].

A simple architecture of QlikView is expressed in Fig. 2. The working procedure is explained as follows. The initial step is to extract data from specific sources and integrating into QlikView. In the second stage, pre-processing is done by cleaning spurious data fields and identifying outliers. In stage three, users are facilitated with drag and drop visualization modules for dash boards. In final stage, dashboards can be shared to other customers and higher level department peoples.

Pros:

1. The main advantage of QlikView and QlikSense is in-memory based tools.
2. We can generate reports in the form of EXCEL, PDF.
3. Offers associative search capabilities.
4. Large partner and consultant base.
5. Robust mobile apps.
6. Sound dashboard technologies.
7. Easier to develop cycle than traditional and legacy BI platforms.
8. Solid integration.

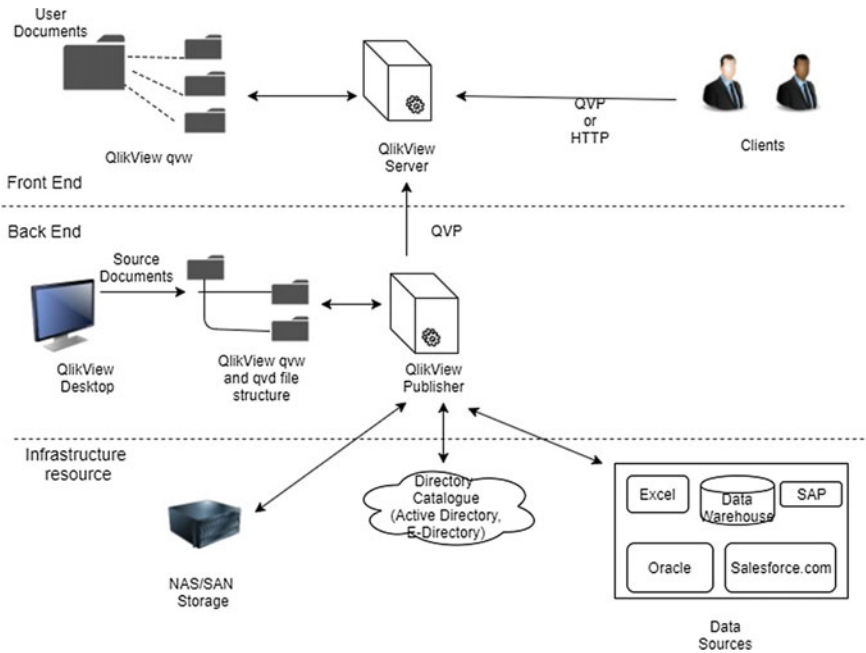


Fig. 2 Architecture of QlikView

Cons:

1. You can access large datasets depending on configuration of system.
2. Require trained developer.
3. No centralized security.
4. Challenging to embed analytics.
5. Outdated interface.

4 Tableau

Tableau is another important tool for BI software to make data analytics and visualization. Reporting can be easily done by drag-and-drop feature. Tableau is user-friendly tool and one can learn easily without a prior programming experience. Tableau was founded by Christian Chabot, Chris Stolte and Pat Hanrahan in 2003.

Tableau can perform in-memory processing like QlikView. Data analysis is done without connecting to any data sources. The amount of data analyzed in Tableau is based on availability of memory. Tableau can get connected with different data sources and access data before going to analysis. Some data sources are CSV, EXCEL,

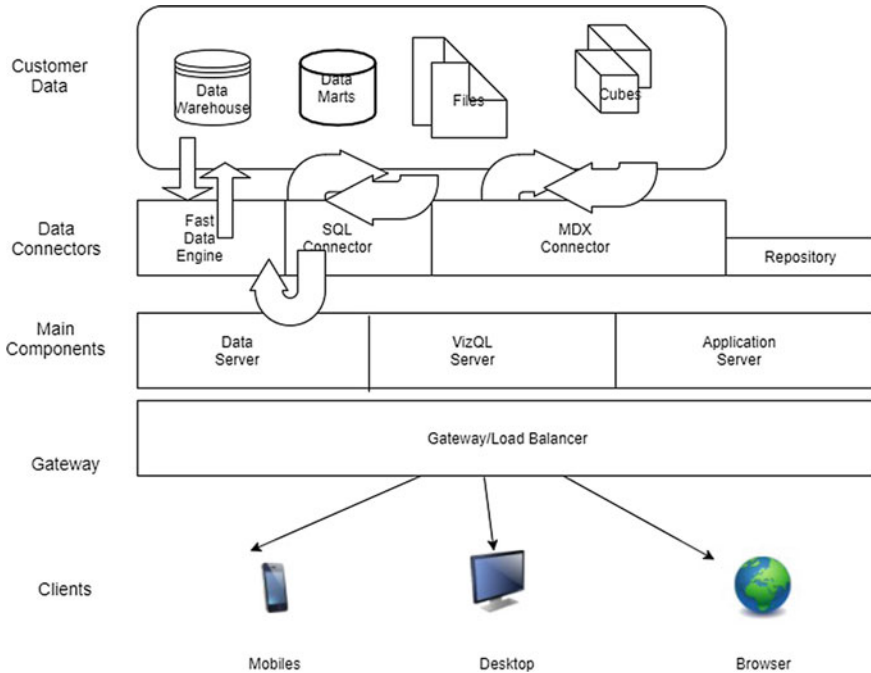


Fig. 3 Architecture of Tableau

Oracle, SQL Server, IBM DB2 and ODBC. The data can also access from cloud systems such as Windows Azure, Google Big Query, and Big Data.

Tableau can visualize data in different charts like Bar chart, Line chart, Pie chart, Cross tab, Scatter plot, Babble chart, Bullet graph, Box plot, Tree map, Bump chart, Gantt chart, Histogram, Motion charts and Waterfall charts [8].

It is not an open source product. The simple architecture of Tableau is expressed in Fig. 3. The functionality is explained as follows. The first stage is about collecting data from different sources. Second stage is about establishing connections between data sources and Application server. In stage three, the creation of dashboard with Gateway/Load balancer is done. Finally, dashboards can be shared among clients.

Pros:

1. Very user-friendly interface.
2. Easily integrated with third party.
3. Mobile support for dashboard reports.
4. User forums and customer services.
5. Low-cost development.

Cons:

1. Initial data preparation.
2. Tableau not provides all statistical features.
3. Tableau cannot replace Financial Reporting Applications.

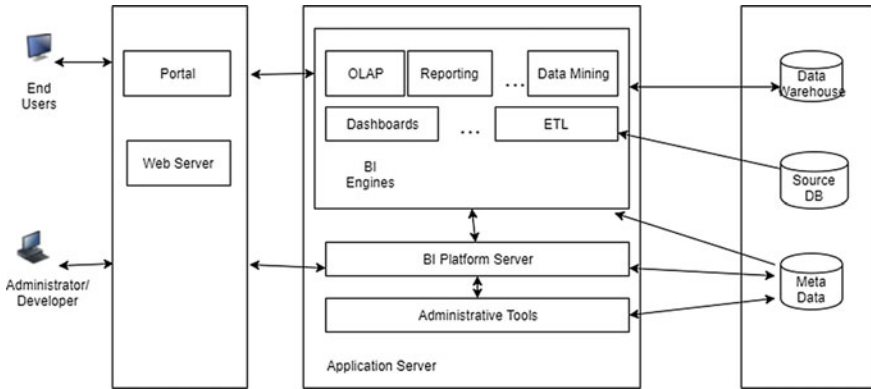


Fig. 4 Architecture of Pentaho

5 Pentaho

Pentaho is another BI software company that offers, open sources products which provide OLAP services, Information dashboards, data integration, reporting, ETL and Data mining capabilities. Pentaho was founded by five peoples in 2004 at Orland, Florida. Pentaho have an enterprise edition and community edition. Pentaho offers two types of application

- Server Application
- Desktop/Client Applications

Pentaho application products are Pentaho BA Platform, Pentaho analysis service. Pentaho have some server Plug in such as Pentaho Dashboard Designers, Pentaho analysis, Pentaho interactive Reporting, Pentaho Data Access Wizard, Pentaho desktop application products are Pentaho Data Integration (PDI), Pentaho Report Designer, Pentaho Data mining, Pentaho Metadata Editor, Pentaho Aggregate Designer, Pentaho Schema Workbench and Pentaho Design studio. Pentaho access various data sources. Pentaho by default has ODBC drivers to communicate with databases. The databases supports for Pentaho are MySQL, HypersonicSQL and Hive, etc. Pentaho generates reports in the form of HTML, XML, Excel, CSV, PDF and Text [9].

A simple architecture of Pentaho is expressed in Fig. 4. The architecture of this tool is explained as follows. In first stage, data is collected from different sources. In stage two, Extraction, Transforming and Loading are performed on the data and save into repository. In stage three, dashboards are created for reporting and analysis of data. In final stage, sharing dashboards to clients within web browsers, web portals are done.

Pros:

1. Pentaho solves complex business solutions with its cool feature.
2. Pentaho has good features including data mining and integration and ETL capabilities.
3. Pentaho provides good insight of the business.
4. User-defined code is very flexible; it is possible and very easy to plug in user-defined java code.

Cons:

1. Periodically, Pentaho Spoon (GUI) crashes, and a restart is required.

6 Power BI

Power BI provided by Microsoft for business analytical services has self-service BI capabilities that create reports and dashboards by end-users without depending on any database administration and information technology staff. Power BI provides cloud-based BI services known as Power BI administrations along with desktop-based interface called Power BI desktop. It has variety of capabilities like data warehouse, data preparation, data discovery and interactive dashboards. The main advantage of this product is the ability to load custom visualization.

Power BI data sources are SQL Server Database, SQL Server Analysis Services Database, Access Database, Oracle Database, IBM DB2 Database, Sybase Database, PostgreSQL Database, MYSQL Database, Teradata Database, SAP HANA Database, SAP Business Warehouse Server, Amazon Redshift, Impala, Snow flake, Excel, Text/CSV, Folder, JSON, XML, SharePoint Folder, Azure databases, Azure Enterprise, Sales force Objects, Sales force Reports, Google Analytics, Face book, GitHub and so on [10].

A simple architecture of Power BI is expressed in Fig. 5 and explained in three stages. In first stage, gathering data from different sources. In stage two, Business Analytics Tools like Excel and Power BI Designer to design and development of dashboards based on requirements. The final stage, sharing dashboards to clients within web browsers and mobile apps.

Pros:

1. It is affordable.
2. It is connected to a noteworthy brand.
3. Microsoft is putting assets into it.
4. It has great report perception capabilities.
5. It has broad database availability capabilities.

Cons:

1. It is best for Microsoft Excel control clients.
2. It does not deal with vast information sources well.
3. It does not take into account granularity.

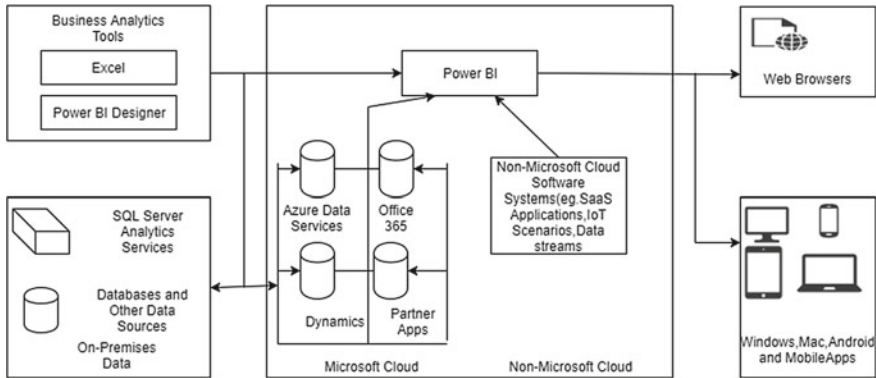


Fig. 5 Architecture of Power BI

Table 1 Comparison of BI tools

Name of BI tool	Marketing services	Transportation services	Financial services
Pentaho	Good	Moderate	Good
Power BI	Good	Moderate	Moderate
Tableau	Good	Moderate	Low
Micro Strategy	Good	Low	Moderate
QlikView	Moderate	Good	Low

Finally, the performance metrics of all the BI tools are summarized in Table 1. As it is evident from Table 1 the Pentaho BI tool is more suitable for marketing and financial services.

7 Conclusion

In this paper, some of potential BI tools are discussed. These tools considered for marketing, transportation, and financial services. Pentaho tool is best for marketing, transportation, and financial services. These BI tools are very effectively, efficiently analyzing data and make decisions.

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