



BI for Performance Management

- A Case Study in Java and Pentaho

Executive Summary:

The Telecom industry is one of the most data intensive industries in the world and probably one of the first industries to make large scale use of Data Mining and Business Intelligence to improve upon their marketing techniques, manage their networks smoothly, include favorable data plans and prevent customer fraud to a great extent. As the Telecom operators engage in cut throat competition, huge volume of data is generated from various operational systems and these are used for solving many business problems that demand handling on a priority basis.

Our client, a leading telecom operator, based out of UK wanted us to build a reporting application to present the end users with real time reports after doing a performance evaluation analysis on the data collected. Mindfire Solutions was able to develop a robust reporting system well within the desired deadlines.

The application developed by Mindfire Solutions shows near to real time reports to end users. Analytical data is collected from several end SQL users. The raw data is processed by Pentaho data Integration (Kettle) to carry out the ETL process to persist the aggregated data in a data warehouse. It is the aggregated data that is used in the reports. The final Reports are prepared using Pentaho Report designer and integrated in a LifeRay portlet using Pentaho Report Engine.



The client appreciated Mindfire's efforts and expertise in the project and have contracted with Mindfire Solutions to be their primary software services provider for all the new versions of the product, maintenance and further customizations to the existing products.

About the Client:

Client: Telecom Services Provider

Location: United Kingdom

Industry: Management Consulting

Technologies used:

Java, Pentaho Report Engine, Pentaho Kettle, LifeRay



Business Situation:

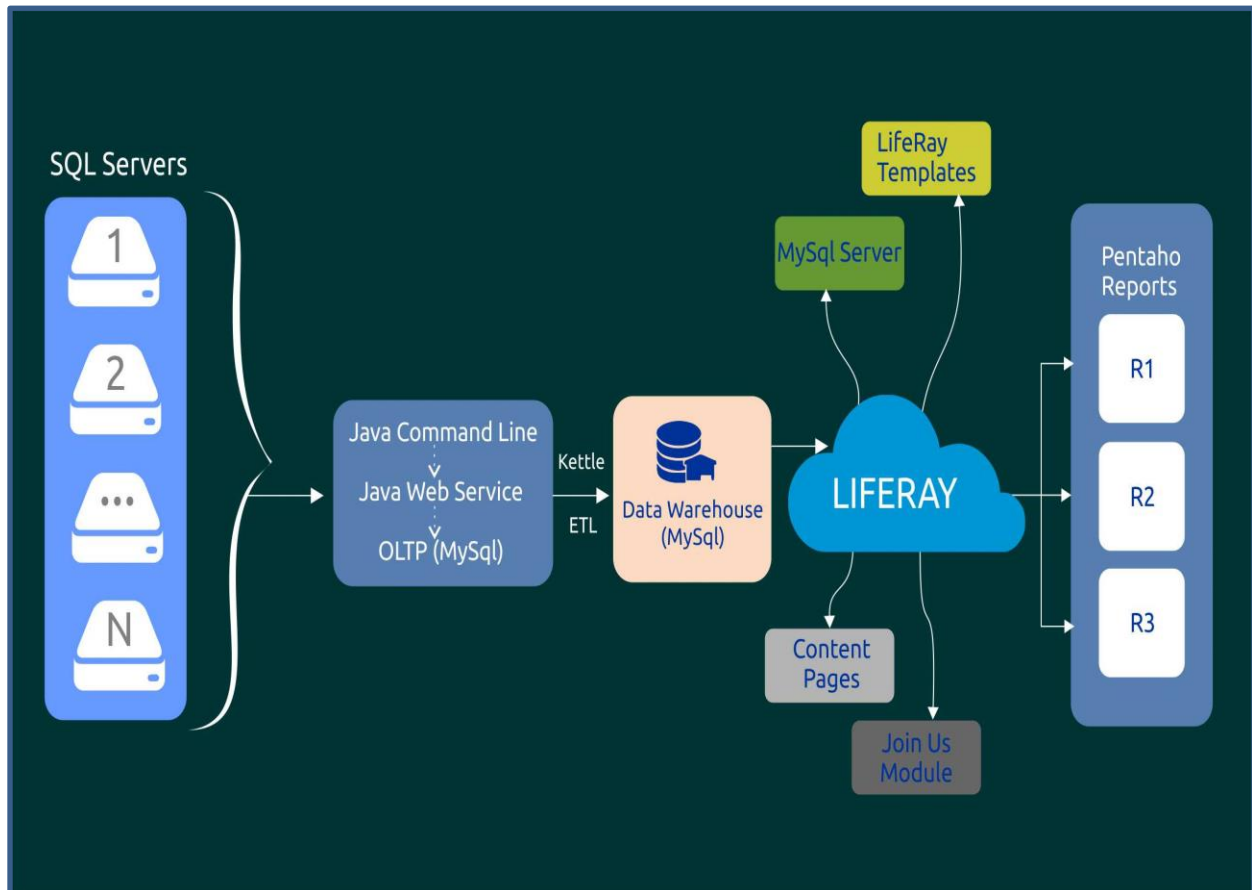
Business Intelligence technology coupled with data mining methods is a potent mix to handle complex business problems that the Telecom Industry constantly faces. Fraud detection, network fault isolation and improving market effectiveness are some of the areas where Business Intelligence finds a regular use.

Our Client, a leading telecom player approached us with the need to develop an application that would provide real time reports, based on the performance evaluation analysis on the data collected, to its end users.

The Mindfire Solution:

We got the application developed and delivered to client as per their requirements. Mindfire developed an application that shows near to real time reports to end users. Analytical data is collected from several end SQL users. The raw data is then processed by Pentaho data Integration (Kettle) to carry out the ETL process to persist the aggregated data in a data warehouse. The aggregated data is used in the reports. Reports are prepared using Pentaho Report designer and integrated in a LifeRay portlet using Pentaho Report Engine.

A diagrammatic flow would help understand the whole process more easily.





Application Components

The following are some of the key components of the application:

- 1. Command line utility at Legacy On-Site solution:** A command line utility developed in JAVA to push data to web-service at CMRT server. It runs at each site. This utility fetches reporting related data from SQL Server database and pushes it to the web-service in JSON format. Only the required data for reporting gets sent. The data also contains a 32-bit key* along with the original data. This utility gets scheduled using OS schedulers and runs in the background.
***The key is site specific and it gets generated and distributed by the administrator.**
- 2. Web-service at CMRT server to publish data:** JAVA Servlet / RESTful web-services (depending on the performance) receive the post data in JSON format, and store it temporarily in a database. The response is sent after storing the data so that the command line utility does not wait for too long and server is not kept busy. The stored JSON data can be later processed asynchronously. The web-service also checks for the validity of key before saving data. In addition to key it also checks the IP. The lists of IPs are registered by the administrator for each site. If the IP is not found in the list of registered IP the data will be rejected.
- 3. OLTP database to persist call record transactions:** A MySQL database to store the call record transactions from the processed JSON data.
- 4. Data Warehouse component for aggregation and reporting:** A MySQL database is used for aggregation and reporting. Following methodologies were followed to bring this functionality, depending on performance:
 - **Kettle** - used to synchronize data in between OLTP database and Data Warehouse.
 - Direct MySQL synchronization with aggregation procedures.
- 5. Reporting platform to create reports:** Pentaho report designer was used to create parameterized static reports. The reports use the data from the data warehouse.
- 6. Portal to view client-specific reports:** A web-portal was developed using LIFERAY/JSP for clients to view report. The portal has two kinds of users; administrators and client users.

User Functionalities:

The following are the various users using the system and the functionalities available to them.

Administrator

- 1. Register a site:** The administrator generates the key for the site and provides it to the site administrator to register the command line utility.
- 2. Register IP:** The administrator registers the list of IPs, which post data, for each site.
- 3. Register clients:** The administrator registers clients for each site. Clients are provided (via email) with site id, client id and password; all these information are required to be logged in the portal.
- 4. Role based access:** The administrator provides permission for each client to view reports

User

User sees a menu showing the list of reports he is entitled to view. On choosing the reports he has to enter the parameters (if required) to view reports.



Screenshots:

Following are some of the screenshots showing various important metrics:



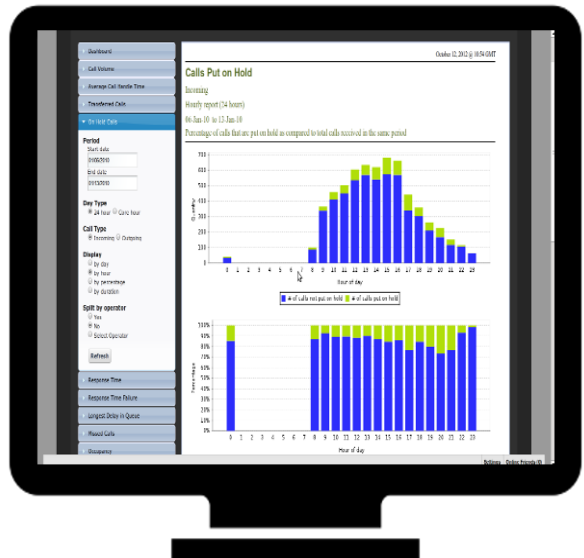
Screenshot 1: Report showing overall call volume over a period of 24 hours



Screenshot 2: Dashboard showing summarized view of all the metrics



Screenshot 3: Line graph showing the longest time taken to answer a call in a 24 hour period



Screenshot 4: Charts showing the calls that have been put on hold



Future Relationship:

The client was pleased with Mindfire's effort and reckoned that they were happy to have discovered a professional offshore IT unit. We shall continue to be the service provider for the next versions of the client's product. They have not only allocated the support and maintenance work of the current system to Mindfire but have also chosen us for future customization work.

Developer Speak

Kaushik, senior software developer at Mindfire Solutions, has been associated with the project right from the very beginning. Here's what he has got to say:

"This project was a great learning experience. It involved data aggregation from many sources for analysis, and being able to aggregate, analyze and generate reports in near to real time was challenging as well as exciting."

-Kaushik



Founded in 1999, Mindfire Solutions is an award-winning provider of software development and testing services to the global market with 650+ talented software engineers at 3 centers in India. For its people and its work, Mindfire has won coveted international awards such as Deloitte Technology Fast50 India Award 2013 and 2014, Dun & Bradstreet Fastest Growing SME 2013 Award, Red Herring Top 100 Asia Award and Zinnov GSPR 2014. Mindfire has been recognized with ISO 9001:2008 and ISO 27001:2005 certification, is a continuous member of NASSCOM, and has established a strong track record of 2000+ projects successfully delivered for 500+ technology clients.

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