



# GULF AIR'S BIG DATA INNOVATION DELIVERS DEEPER CUSTOMER INSIGHT



## SOFTWARE AND SERVICES

Red Hat® Enterprise Linux®

Red Hat Storage

Red Hat Satellite

Red Hat JBoss® Enterprise  
Application Platform

## HARDWARE

HP x86 servers

At Gulf Air, an internally developed big data solution is helping the airline understand how passengers feel about its products and services, as well as enhancing more customer loyalty by delivering offers and promotions. The solution – called Arabic Sentiment Analysis – is built on open source technologies and runs in the airline's private cloud. This cloud is using Red Hat products to achieve unprecedented levels of reliability, availability, and scalability in a highly virtualized environment that encompasses more than 200 servers and more than 100 different enterprise applications. The combination of open source technologies and its own internal skills has enabled Gulf Air to deliver big data innovation – extremely cost-effectively.



## AVIATION

**3,000** EMPLOYEES

*"As an airline, it is crucial to know what our customers are thinking. We want to know who is satisfied with Gulf Air's service, who is not, if not then why, and what Gulf Air can do to improve its offering."*

DR. JASSIM HAJI  
DIRECTOR OF INFORMATION TECHNOLOGY,  
GULF AIR

## BENEFITS

- New insight into customer sentiment
- Increased competitive advantage
- Effective utilization of existing infrastructure resources
- Faster responses to changing market conditions



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*“Analyzing social media can help us gain more insight into potential customer demands for everything from onboard services to new destinations, information which can be incorporated into decision-making to enhance the airline’s offering.”*

DR. JASSIM HAJI  
DIRECTOR OF INFORMATION  
TECHNOLOGY, GULF AIR

## THE VOICE OF THE CUSTOMER

Gulf Air, the national carrier of the Kingdom of Bahrain, was established in 1950 as one of the Middle East’s first commercial airlines. Today, it is a major international carrier, with a fleet of 28 modern aircraft, serving 45 cities in 24 countries across 3 continents.

The company prides itself on offering traditional Arabian hospitality and is committed to being an industry leader in developing products and services that reflect the evolving needs and aspirations of its passengers. In the age of social media, that also means paying close attention to what they say about the airline on social sites.

“As an airline, it is crucial to know what our customers are thinking. We want to know who is satisfied with Gulf Air’s service, who is not, if not then why, and what Gulf Air can do to improve its offering,” said Dr. Jassim Haji, Director of Information Technology, Gulf Air.

The challenge is that monitoring social media manually (analyzing the content of hundreds of thousands of posts and reporting on the insights they offer) is a daunting and time-consuming task – not to mention highly prone to human error.

Gulf Air needed a way automate much of that work, tapping into the power of big data to identify relevant posts, to interpret their meaning, and to spot emerging market trends.

The airline also knew it needed a robust infrastructure to host any social media monitoring solution it decided to adopt – one that could offer maximum agility across geographical boundaries with around-the-clock availability.

## SENTIMENT ANALYSIS FOR SOCIAL MEDIA

Gulf Air is the first organization in the world to develop a sentiment analysis solution based on big data technologies that is capable of addressing social media posts in both Arabic and English languages. Called Arabic Sentiment Analysis, the solution was developed entirely in-house by Gulf Air.

Arabic Sentiment Analysis is based on Cloudera’s distribution of the open source Hadoop big data framework, running across a cluster of servers based in Gulf Air’s private cloud IT environment. This, in turn, uses a number of Red Hat products, including Red Hat Enterprise Linux, Red Hat JBoss Enterprise Application Platform, and Red Hat Storage. The private cloud encompasses 200 servers running more than 100 core applications and holds more than 50 terabytes of data. The scalability achieved using virtualization meant there was plenty of capacity to host the big data solution.

The private cloud is based on a dedicated, state-of-the-art “green” datacenter and has been in place since 2012. During its planning, Gulf Air’s IT team made the strategic decision to migrate all the airline’s UNIX platforms to Red Hat Enterprise Linux. Red Hat’s technologies fully integrate with all other major infrastructure components that Gulf Air uses, from companies such as EMC, Cisco, and F5 Networks.

Having this private cloud in place has made it easier to support new projects and systems – such as Arabic Sentiment Analysis – as they’ve come online.

Today, Arabic Sentiment Analysis sits on this private cloud infrastructure and processes hundreds of thousands of social media posts, providing sentiment results in minutes that indicate what passengers are talking about and how they feel about particular routes, products, or services. The solution also uses social media posts as the basis of wider analysis of the state of the market and actions taken by Gulf Air competitors.

## **NEW APPROACH, NEW UNDERSTANDING**

### **AN IN-HOUSE INITIATIVE**

Gulf Air achieved substantial cost savings by relying on its own internal infrastructure and skills to deliver this project.

Because Arabic Sentiment Analysis is based in Gulf Air's existing private cloud environment, the organization was able to avoid additional infrastructure investment when it came to deploying its big data solution.

Should Gulf Air ever begin to run low on hardware resources, for Arabic Sentiment Analysis or any other system, the private cloud can be quickly and cost-effectively scaled up with the addition of low-cost commodity hardware.

"Because Red Hat products are flexible, dynamic, and compatible with any x86 technologies, it made it easy to accommodate these, as and when they are needed," said Dr. Haji. The reliability of the private cloud means that the time the Gulf Air IT team spends on day-to-day systems management tasks is minimized, so they can focus more on the design and delivery of new, strategic IT offerings.

Arabic Sentiment Analysis was developed internally by just six staff members, with no reliance on vendors or external implementation partners.

"Big data, analytics, and text mining all require unique and specialized skills – but even though we did not have those skills initially, the assigned resources educated themselves through the available documentation, technical guides, research papers, and trial and error to develop them. This approach was extremely challenging, but also very rewarding for those involved, who are now sharing their acquired knowledge internally to expand the availability of those skills," said Dr. Haji.

### **NEW INSIGHT INTO CUSTOMER SATISFACTION**

Arabic Sentiment Analysis demonstrates a particularly sophisticated use of sheer computational power to analyze and understand human language.

"Language can be very subjective, often interpretable by the context in which particular words are used, and all of that is even more complicated with a rich language like Arabic, where there exist formal and colloquial forms," said Dr. Haji.

But the accuracy achieved by Arabic Sentiment Analysis, said Dr. Haji, tends to average around 84%. "This is – according to literature and research – very high in terms of quality," he said. It enables the airline to identify dissatisfied customers and proactively resolve any issues, leading to service improvements and increased customer satisfaction.

### **INCREASED COMPETITIVE ADVANTAGE**

At the same time, Arabic Sentiment Analysis lets Gulf Air provide passengers with offers and promotions on a timely basis, often in response to competitor actions. Real-time reports, for example, alert Gulf Air marketing executives when a competing airline launches a particular promotion or offer involving a destination that Gulf Air flies to.

"The airline industry is very price-sensitive, and the majority of travelers look for the cheapest fares available. During peak travel times like summer, quick action is crucial, because any delay in responding to the competition could mean the loss of passengers and revenue. Such real-time



CUSTOMER CASE STUDY Gulf Air's big data innovation delivers deeper customer insight

## ABOUT RED HAT

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.

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reports have helped Gulf Air to respond very quickly to its competitors," said Dr. Haji. Using Arabic Sentiment Analysis has meant improved time to market for new offers and promotions, as well as improved sales cycles.

## BIG DATA MADE RELIABLE

Gulf Air has been able to tackle a reliability issue inherent to many big data implementations: The single point of failure represented by the HDFS [Hadoop Distributed File Server] Name Node Server, or master server, which controls all the other node servers that perform the processing work necessary for analysis. Because Gulf Air's big data solution is based in its Red Hat private cloud, it was easy for IT staff to create "ghost images" of the master server, which can be deployed in minutes if the original master server fails.

## FASTER RESPONSE TIMES

Social media monitoring and analysis, when performed manually, can be slow and resource-intensive, but with Arabic Sentiment Analysis, it is "automatic, quick and efficient," says Dr. Haji. New posts and changes in social media trends are periodically captured and stored locally, and then transformed into reports that make it easy for Gulf Air employees to act on their findings. This gives them a good, up-to-date view of any changes in sentiment, shifts in demand, or emerging market trends, enabling them to respond quickly.

## THE JOURNEY AHEAD

Many big data projects come with a hefty bill for the companies concerned. But at Gulf Air, Arabic Sentiment Analysis has been delivered very cost-effectively, thanks in part to the company's enthusiasm for open source solutions.

"The big data solution deployed is an open source one, which meant no special license fees to pay, while the infrastructure where it runs is based on an existing open source-based private cloud environment and virtual servers, which meant no hardware investment was required," said Dr. Haji.

"Open source technologies have many other advantages," he said, "including wide community support and quick and frequent fixes and new releases."

Gulf Air's decision to build a flexible and scalable private cloud infrastructure that can accommodate new IT initiatives is paying off in many ways.

Gulf Air anticipates that Arabic Sentiment Analysis will continue to deliver benefits over years to come. For any airline, planning for future products, services, network additions and so on are key strategic decisions that can include and take into consideration unpredictable factors.

"Analyzing social media helps in gaining more insight into potential demand for new passenger needs and requirements, which can be incorporated into decision-making," said Dr. Haji.

But already, the insights that come from this big data solution have a positive impact on the work performed by nearly every member of Gulf Air's 3,000-strong workforce. And not only that, it benefits the millions of passengers the airline carries each year.

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