

Business Insights On-the-fly

How Splunk Software Helped a Newly Merged Airline Take Off

CUSTOMER PROFILE

Splunk customer profiles are a collection of innovative, in-depth use cases that highlight the value that Splunk customers gain from collecting, analyzing and visualizing the massive streams of machine data generated by their IT systems and technology infrastructures.

Each “real world” customer profile introduces a unique business challenge and shows how leveraging machine data and Splunk software in new and interesting ways has helped drive powerful business and operational outcomes.

splunk®

Executive Summary

Imagine that your company's revenue depends on a complex, ever-changing network of variable prices, discounts, fees, regulatory requirements, taxes and international politics. There is a finite amount of product that you can sell, and the price of this product changes daily due to competitive pressure. Imagine forces beyond your control affecting the demand and supply of your product. A volcano, a tornado, a hurricane, a snowstorm—literally anywhere on the planet—and everything can change at once. You have entered the world of the airline industry.

One Splunk customer, a major international airline, had recently merged with another, forming a new airline with over \$5 billion in annual revenue. The newly formed airline did not have visibility into which of its flights were earning money and which were losing money. It had routes around the globe, with no insight into the best path to profits. Worse yet, customer satisfaction was rapidly plunging. The airline's website, one of the most heavily trafficked in the world, was losing customers—pages took a long time to load and bookings would disappear right before a potential passenger could confirm a purchase. As a result, would-be passengers were taking flight—as in, fleeing the site before booking—and the airline's analytics team could not determine why. Revenue was decreasing. Market share was falling. The number of calls to customer support—and the time it took staff to resolve problems—were steadily increasing. All too often, the support team could not mitigate a problem in time to save the booking. Seats were sitting empty that could have been filled, unrecoverable profit flying away forever. The airline needed real-time, actionable visibility across multiple systems in order to intercept problems before customers disembarked from the website, as well as insight into customer behavior to maximize the value of each passenger trip.

Business Benefits at a Glance

Splunk Value	How Value Is Measured	Business Impact
Quick insight into website issues that halt sales	Improving look-to-book ratio for website	60 percent improvement in converting site visitors to ticket purchasers, increasing revenue \$1.3M/year
Detailed user and usage analysis of customer sessions	<ul style="list-style-type: none"> Customer retention and adoption rate More effective website design 	Improved site experience and availability; improved customer retention and adoption rates, increasing revenue \$2.9M/year
Rapid incident investigation and root-cause determination	Customer support call escalations	Reduced escalations by 80 percent saving \$800K/year
Sophisticated real-time correlation of clickstream and other data	<ul style="list-style-type: none"> IT costs for problem resolutions Customer support calls and research time for disputed and fraudulent transactions 	<ul style="list-style-type: none"> Problem resolution costs were reduced by 50 percent, saving more than \$1.2M/year Eliminated 50 percent of inbound phone calls regarding disputed or fraudulent transactions

Once the airline deployed Splunk software, it gained the visibility into patterns of activity across airline-specific logs and other homegrown machine data needed to diagnose and repair the issues that were leading potential passengers to leave the site. Because Splunk software can follow transactions across virtually disconnected systems, it is now possible for the airline to answer questions that impact customer satisfaction such as "Why did this potential passenger drop off while a flight was in the shopping cart, ready to be purchased?" and questions that can lead to higher revenue such as "Which flights are making the most profit, and how can we target potential offers to passengers most likely to choose them?" As a result, the airline received the operational visibility it needed to resolve its website issues; moreover, it developed the tools to determine the most profitable flight paths, and also to shape customer behavior toward the most profitable choices. Splunk software enabled insights to materialize from data that had been impossible to understand, insights so critical to the airline that its initial investment was recouped in the first four months. The return on investment reached 300 percent by the end of the first year.

Splunk software helped the customer gain:

- Digital customer experience insight.** Because Splunk dashboards provide visibility to see website performance and troubleshoot issues in real time, the airline analytics team continually improves the site. Improved uptime and response time result in increased user engagement. The airline has a pilot's view of its website infrastructure, improving the monitoring of applications and critical processes, and determining the fastest flight path to profits.

- **Accelerated troubleshooting.** Splunk dashboards cut the cost of avoiding and resolving problems in half, improving customer satisfaction and retention, and leading to repeat sales. The airline's analytics team now receives real-time alerts for problems so that they can intercept them before the client ever sees the issues. In a business where customers can change providers with the click of a mouse, real-time corrections prevent millions in lost fares.
- **Business analytics across the board.** Splunk software helped the airlines on both sides of the merger get insights into critical aspects of the newly joined entity. Splunk dashboards reveal which flights make the most profit, which promotions work and strategies that can increase revenue.

Unnecessary Losses

In most industries, if you miss an opportunity to sell your widgets, you can recoup some of those losses. Perhaps you can sell them at a discount or you can give them away in a promotion. But there is no way to recoup the value of an empty airline seat on a flight that has already flown. And, a customer lost because of one frustrating web experience could become a competitor's customer forever.

The newly merged airline had many customer issues related to the merger: escalating support phone calls, dropping revenue, rampant negative comments in social media. But the airline had no way to diagnose what was causing all of these problems.

The airline's two major challenges revolved around selling every seat. First, the airline didn't want to lose a sale that was sitting in a shopping cart because a technical or user experience issue caused the purchaser to give up. And secondly, the airline wanted to send passengers to their destination along the path that was the most profitable. But the airline had two problems:

- **There were multiple front-ends, silos and systems behind the ordering process.** The airline had multiple websites that were customized to language preference. There were dozens of systems recording web clicks and determining user path, working with airline-specific data—too many places to look to find out why customers were dropping off the website.
- **Lack of insight into flight profitability.** When a passenger enters "origin" and "destination" during a booking process, the most profitable approach for the airline is to offer fares that combine the best revenue for the airline (good for profit margins) with the best value for the passenger (good for passenger retention and adoption). But fuel prices, local tariffs, competitor prices and allowable fees shift daily in this industry. The airline had no real-time visibility into which flights were most profitable at a given point in time.

It was clear that visitors were being successfully attracted to the website, but leaving without purchasing flights. The airline suspected that speed or stalled processes might be the culprits, but the only way to understand exactly what was happening was to analyze log files from many different systems, including Sabre, an airline industry system. The first goal was to identify which process or step consumed most of the time of the stalled transactions. But to do this, the airline would have to see patterns

from all of the different logs. This was not only a technical issue, it was an organizational issue. Systems that interacted on the website had totally unrelated purposes and totally unrelated log file structures—and they were managed by different organizations within the airline. If one team needed the logs of a system managed by another, it could take days to get access to the appropriate logs. Even knowing how to frame the question was difficult—how could you be sure to get the logs you needed? And diagnosing anything in real time—in time to prevent unsold passenger seats? Impossible.

Enter Splunk

When the team discovered that Splunk software could ingest log file data from different systems, they realized that the platform was the answer to their two biggest challenges—optimizing the website to improve customer retention and enhancing per-trip revenue. They immediately signed up to explore a trial version and realized that it was the answer to every merger's dilemma—how to make sense of disparate systems with intersecting processes but disconnected log files. After seeing what Splunk software could do, the airline decided to move forward. Suddenly, due to Splunk's schema-on-the-fly, patterns were visible that had been invisible before. No one had to wait days to see what was happening in another part of a process.

Stopping the Flight of Website Visitors

Splunk software ingests log files from Sabre, log4j, apache, and other homegrown application and business systems, and correlates similar fields between different systems. With Splunk Enterprise, the airline's analytics team ties together all of the pieces of a transaction in a way that makes them visible. Now they can measure total end-to-end transaction times as well as times for a given segment.

Figures 1 and 2 show snippets of log files. The Sabre log file (Figure 1) records one part of a customer session, while a homegrown log file records another part. Without Splunk software, making a connection between the two files would be time consuming and labor-intensive. Making a connection between thousands of such files at once, in real time, would be impossible.

The customer can ingest dozens of logs like those shown in Figures 1 and 2 into Splunk Enterprise to be indexed. By correlating related fields so that all relevant information about each customer session is available, the airline could see the entire picture of what happened to customers from the moment they first clicked on the site through the time they purchased a flight—or left to visit a competitor. Splunk dashboards also revealed big-picture information, cutting through the details to reveal which issues were causing the most customer frustrations.

For example, like most global companies, the airline personalizes web experience based on language preference or point of origin. Until Splunk software arrived at the airline, this factor was just another variable that the airline suspected impacted customer experience, but could not know for sure. For example, certain marketing promotions seemed to work wonderfully on one site, but not at all on another, even though other research had revealed sufficient demand. After deploying Splunk software, the airline found that the

```

user=
apid=
reqid=hg03b201933367988741.LL7008
sid=xyd4b4b1367985b31_J17IUKPUAR
Executing query: INSERT INTO booking_engine_var.sabre_vcr5_info
(id_cashier, holding_client, pnr)

level=WARNING
domain=SplunkAirlineCustomer.com
log_order=159
script_name=cashier_notification.cgi
url=/cgi-bin/cashier/notification.cgi
user=
apid=
reqid=hg03b201971367988741.LL7008
sid=xyd4b4b1367985b31_J17IUKPUAR
Ticketer - getVcr5List - Missing holdingClient for the cashier [28874b923]

```

Figure 1. Example Sabre log displays an error that prevents a successful purchase.

```

1.55 0.00 (1333745259 893359): $VAR1 = {
    'GAConfigAndVar' => {
        'Config' => {
            'hide_component' => 1,
            'step' => 'step2',
            'application' => 'buy',
            'debug' => 1,
            'class' => 'Purchase',
            'mx_content_cap' => 'Rd_1',
            'Description' => 'Google_Analytics::Collector->should_hide_component',
            'Var' => {}
        }
    }
};

1.55 0.00 (1353745A59 A949A9): clicktale_start component
1.55 0.00 (1353745A59 A950D2): clicktale_start component draw_to_buffer
1.56 0.00 (1353745A59 895b64): Application::Session - Session Manager user starts
1.56 0.00 (1353744859 897818): Application::Session - Loading Parameters...

```

Figure 2. Example custom log reveals the time it takes to complete a process.

high unsold seat rate could not be fixed by tweaking the marketing campaign; they found out that there was a remarkably different purchasing experience for customers around the globe. Figure 3 illustrates that customers in the process of purchasing a ticket spent many minutes more on the transaction depending on the website interface they accessed.

The color of the bars indicates trips with the same origin-destination (OD). The dashboard illustrates that passengers who purchased a ticket using the German-based website spent six minutes on the purchase, while passengers using the Spanish-based interface to the website spent 17 minutes for the same purchase. This helped the business understand a key reason why certain websites were selling more tickets than others, something that had seemed inexplicably unrelated to marketing campaigns. The airline put resources toward fixing the underperforming sites immediately. Customer support calls began to drop quickly and the customer experience between globally customized websites improved.

It's helpful to know where you have problems in your customer's experience, but what if you need more information about why the problems are happening in order to fix them? Figure 4, an "Unsold Passenger Seats" dashboard, breaks down the reasons for delays and unsold seats in even more detail. Now the airline can understand the scope and causes of the problem of unsold seats, organized by OD. This dashboard, designed for the operations group, reveals reasons that seats were left unsold in a way that makes it possible to correct the problems systematically and strategically. Here are some of the issues that Splunk dashboards revealed were causing customers to leave the site:

Total Minutes to Book Flight per Web Site by OD

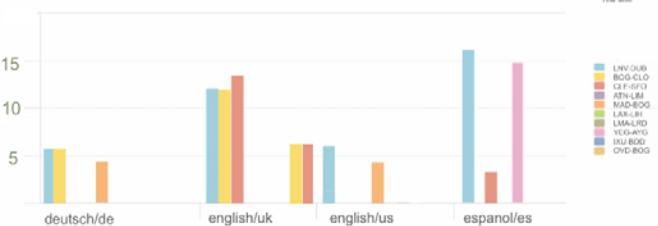


Figure 3. Time differences for similar trips based on geographic front-end.

- Flight unavailable after clicking through all the choices
- Dates selected early on in the process were in fact not valid
- Website dropping customer mid-order
- Frequent stalls and hangs

Splunk dashboards revealed the impact, in unsold seats, of website errors and issues. Once the team could see where the issues were, they were able to triage on the websites with the most expensive problems, turning around the losses quickly in time to sell the empty seats. Also because they had real-time insight to problems, they could alert the business to tie a particularly empty route to a web-based promotion after fixing issues that had stalled purchases of that flight. This way, if a flight was undersold due to a web issue, the business learned about it in time to quickly devise a web-based promotion to sell the seats that would have otherwise flown empty.

Learning the exact nature and location of the website issues allowed the teams to drill down through Splunk dashboards and events to discover root causes. Within the first three months of deploying Splunk Enterprise, dropped sessions had drastically decreased, and customer satisfaction and retention had already improved. By the end of the airline's first year using Splunk software, calls to support and expensive escalations had dropped off by 80 percent. Airline business analysts attributed over \$3M in additional revenue to Splunk software, just in the first year of use.



Figure 4. A comprehensive look at causes and impact of unsold passenger seats.

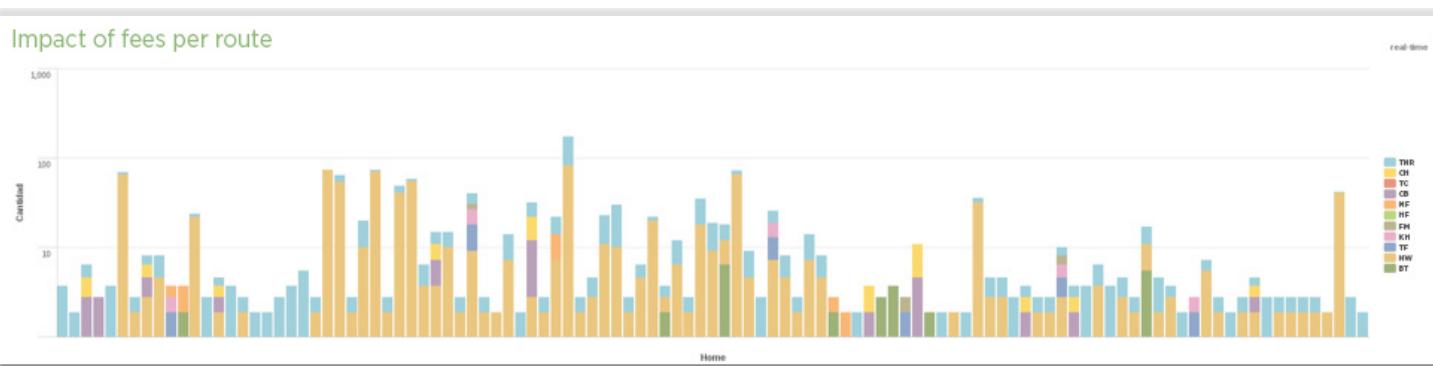


Figure 5. Splunk dashboard illustrating impact of fees and taxes on revenue per route.

Solving the customer retention problem was the first challenge that the customer addressed with Splunk software. Now that the airline had made a significant difference to this challenge, it wanted to address the other challenge: discovering the most profitable routes to promote.

Calculating Profit Margins Was Taxing

For international flights and even some domestic ones, each time an airliner lands or takes off, it is subject to taxes and fees. Some of the fees are charged directly to the passenger based on class of service, but others are assessed to the airline directly. Some fees are based on the airspace through which a flight passes; other fees are assessed based on airports where the plane lands and the time it stays at the airport. Rerouting connecting flights through alternative airports can make the difference between profit and loss.

The airline realized that it could not figure out the actual profit or cost from flights because the information was not easy to see across a widely dispersed and disparate infrastructure. The relevant information changed frequently and came from different parts of the organization. The airline's executive staff didn't know which flights to promote and which flights to consider rerouting or canceling. It was becoming impossible to figure out how profits worked out per flight segment, per consumer, per flight.

Once key IT staff was freed from endlessly fighting support issues, they had the time to look at the problem of taxes and regulations. To find out more about how taxes and regulations impacted flights, web analytics staff asked IT staff to ingest data into Splunk Enterprise that would give them specific details about the fees that might apply to travel for the airline's numerous routes. In partnership, the two teams designed meaningful dashboards that explained where revenue was coming in at every level of drilldown that the business needed. Figure 5 shows one Splunk dashboard that the airline created to show the effects of taxes based on route traveled.

Business staff and business executives can now find out the value of each trip, or see the big picture about the true costs of channeling traffic through a specific hub. This has helped them refine pricing and promotions, so that the flights that appear first to a consumer searching for fares on the website are the ones that are the best value for both the airline and the consumer. The airline can be more competitive and build loyalty by offering better pricing to its customers.

Based on the most profitable route, the business now designs promotions to persuade customers to select routes that pay off for everyone—in real time, on the fly! It is often a win-win, as customers may have no preference about the location of a stopover, but causing a fuller flight to go to the stopover with fewer fees can increase profits for the airline or make the price more competitive for the passenger. The airline now has the insight to set different fares, manage promotions that maximize profits and increase revenues to the airline. This also gives business executives at the highest level the opportunity to add critical new variables to big picture decisions. They can use insights from machine data to optimize flight plans, determine new markets to enter, new alliances to forge, and which offerings to drop, refine or promote. This visibility has replaced uncertainty with a clear competitive advantage.

With Splunk, the Acquisition Took Off

In this use case, we explored how Splunk software brought clarity to the disparate systems that resulted when two major airlines merged. When executives first proposed the airline merger, they saw great promise because it vastly, and literally, expanded the reach of both airlines. The merger held the promise of simplifying complex trips, for both domestic and international travelers. But at first, before Splunk software entered the picture, the merger only led to plunging customer retention, rising support costs and lack of visibility into the true cost of passenger trips. When Splunk software was deployed to address these issues, the synergy that the executives had originally envisioned began to be a reality.

The airline realized that the value it obtained from Splunk only increased the more data was ingested—the amount of ingested data doubled after the first year. Payback for the Splunk investment was calculated at three months. Return on investment has already reached \$5 million in the first year of deployment, and is projected to be over \$15 million by the third year.

This use case demonstrated:

- **Elimination of data silos.** Because Splunk software could index so many types of data without the need to alter it, there was no need to phase out systems just to get clarity. This made merging the information technology departments much easier.
- **Correlations drive analytics.** Because Splunk Enterprise correlates so many types of machine data, the customer could follow transactions across different systems to get a true understanding of customer experience.

- **Flexible analytics powered by a read-time schema.** When the website logs were designed, they were focused on capturing the information it took to obtain a ticket and close a sale. But when the analysts looked at the data through Splunk dashboards, they could search it in novel ways that revealed insights.
- **Value generation across multiple use cases.** In addition to significantly improving MTTR and customer website experience, Splunk Enterprise allowed the airline to determine the best route to increased profits.

One Splunk. Many Uses.

While the business problems discussed in this case were specific to this customer and its industry, and the solution made creative use of Splunk software's features to solve these particular problems, the underlying theories apply to many business use cases.

With the right data, Splunk software can quickly find why website visitors are encountering difficulties, historically or as they happen. Once staff is alerted to these difficulties, Splunk dashboards lead to their source, exposing issues and leading to solutions. Finding and resolving these issues leads to increased customer retention and increased profits. While the possibilities are endless, the process is simple.

Next Steps

To learn more about Splunk customer success, customer snapshots, ROI stories, customer profiles and more, please visit: <http://www.splunk.com/view/customer-case-studies/SP-CAAABB2>

Splunk software is also available as a free download. Download Splunk Enterprise and get started today: <http://www.splunk.com/download>

If you would like to speak to a salesperson, please use our online form: http://www.splunk.com/index.php/ask_expert/2468/3117