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## **Southwest Airlines' Router Grounds 2,300 Flights**

August 2016

Southwest Airlines, headquartered in Dallas, Texas, U.S.A., is the world's largest low-



cost air carrier. It was established in 1967 and operates about 3,900 flights daily. It carries the most domestic passengers of any U.S. airline.

In July, 2016, a router failure grounded Southwest Airlines for four days. The airline had to cancel 2,300 flights, and thousands of other flights from San Francisco to Boston were delayed.

### **The Router Failure**

A router in Southwest's network failed in a very unusual way. It was only a partial failure, so the backup router did not detect the failure and consequently did not take over the routing functions. The router outage took down Southwest's websites and numerous applications for several hours.

During this time, Southwest was unable to operate. This was the worst data-processing outage in the company's history. Southwest's CEO issued an apology, saying that the way the router failed was so rare the company could not have prepared for it.

We have stressed the importance of failover testing in the Availability Digest many times, and this is an excellent example of why failover testing is so important. Any imaginable outage should be simulated and tested to ensure that failover will work. Most companies do not do this because such testing is disruptive and expensive. However, in Southwest's case, this could have saved it about \$10 million dollars in lost bookings.

### **Wednesday, July 20<sup>th</sup>**

On Wednesday afternoon, July 20, 2016, the router failure described above occurred. Southwest's technical team tried for hours to restore the router or its backup, but was unable to do so. In frustration, the team finally had to reboot the routers and many of the servers in the Southwest network, a process that took additional hours. During this time, Southwest's websites and many applications were down.

Southwest was unable to schedule any flights. Its operations were basically shut down. The airline's customer service phone lines, social media outlets, and airport agents were all swamped with high volume.

On this day, up to 700 flights were cancelled nationwide due to the outage, and thousands of others were delayed.

By the end of the day, Southwest announced that it had finally fixed its data processing problems. However, one of the applications that had been down was the crew-scheduling system. Between the outage of this application and the cancellation of so many flights, crews and aircraft were not in the correct locations to resume normal service. This caused additional cancellations and delays of flights over the coming days as the airline worked to get its planes and crews back in the right places to operate its normal schedule

## **Thursday, July 21<sup>st</sup>**

Most of Southwest's systems were back online as of the beginning of the operational day on Thursday, July 21<sup>st</sup>. However, disruptions continued as the airline repositioned its aircraft and crews to meet its normal schedules.

Southwest cancelled an additional 900 flights on Thursday. Delays continued to affect hundreds of other flights. 375 flights had been delayed as of noontime, Thursday.

## **Friday, July 22<sup>nd</sup>**

Wednesday's technical glitch extended into its third day due to positioning of crew and aircraft. Southwest had to cancel 250 additional flights, and hundreds of others suffered delays.

The rush of customers to rebook put a strain on Southwest's reservation lines, with long holding delays for most customers trying to reach a Southwest reservation agent.

## **Saturday, July 23<sup>rd</sup>**

Southwest had to cancel hundreds of additional flights. Flight delays continued as positioning of crew and aircraft continued.

## **Sunday, July 24<sup>th</sup>**

Southwest was able to announce on Sunday, July 24<sup>th</sup>, that its operations were back on track. Overall, the airline had cancelled 2,300 flights over a four-day period, and thousands of other flights had been delayed.

## **Return to Normal Operations**

Southwest's flight cancellations and delays were caused not only by its technology issues, but also by the fact that crews and aircraft were improperly located due to the processing outage. Crew scheduling was one of the applications that was taken down by the failure. Cancellations and delays occurred nationwide, from San Francisco to Boston, including Chicago, Atlanta, Baltimore/Washington, and Oklahoma City.

According to Southwest's CEO, Gary Kelly, the outage cost the airline \$10 million in lost bookings in addition to overtime costs, meals and lodging for stranded crew, technology fixes, and other costs.

## **Special Accommodations for Affected Passengers**

Southwest bent over backwards to accommodate affected passengers. Customers who had booked travel from Wednesday, July 20<sup>th</sup>, through Tuesday, July 26<sup>th</sup>, were given two weeks from their original date of departure to rebook and begin travel at their original fare at no additional cost. If they preferred, they could get a full fare refund even if they had booked with a non-refundable fare.

In addition, the airline extended by a week its major sale on fares that was supposed to have ended on Thursday, July 21<sup>st</sup>.

Furthermore, Southwest gave customers who were affected by the glitch a virtually unrestricted 50%-off voucher for flights taken through the end of January.

## Postscript

Southwest's glitch affected flights for four straight days, led to 2,300 cancellations, and delayed thousands of flights. According to most reports, Southwest made the right moves to compensate its customers for the inconvenience it had caused by this outage.

CEO Gary Kelly quickly came out with a public statement acknowledging the problem and apologizing to fliers. A Southwest spokesperson said:

"We know it's a long journey to re-earning your trust, but it's our mission to do it. We've done a lot of apologizing to our customers and have thanked our employees for their hard work, but what we haven't done is thanked both for having respect for one another. The last four days have tested patience and heightened emotions. Make no mistake, Southwest created this problem. We own that, and there is no victory lap to be had for a situation that has bred disappointment and shaken the trust customers have in Southwest Airlines."

Even so, it was estimated that the lost bookings alone caused by this outage could cost the airline upwards of \$10 million. The airline now plans to replace its legacy reservation system next year and is entering a three- to five-year plan to update its other legacy systems.

As is the case with many other airlines, Southwest has been operating with legacy systems that were deployed decades ago when the airline was much smaller. Its growth has been phenomenal, and it is beyond scaling these systems for its size today. Programming for these systems has become much more complex, and fixing issues quickly has become a major chore for the airline's IT team.

With today's modern data-processing capability, new systems can be tested with agile test management tools. Organizations can write and execute manual and automated tests. This allows the evaluation of new features, testing of system resilience, and verifying that resources can be restored easily in the event of an outage. Developers and testers can work together across the nation, delivering quality updates and receiving real-time progress updates showing what still needs to be completed and what defects have been identified.

As Southwest Airlines moves into the modern world of data processing technology, catastrophic outages such as the one that took it down in July should be a thing of the past. Perhaps in the future, it will be more attentive to failover testing to avoid catastrophic outages when its backups fail to work.

## Acknowledgements

Material for this article was taken from the following sources:

[Southwest Getting Flights In The Air Again Today After Cancelling 700; Expect Big Backlog](#), *Consumerist*, July 21, 2016.

[Router at root of Southwest Airlines' computer systems outage; delays, cancellations persist](#), *Dallas Business Journal*, July 21, 2016.

[Southwest extends fare sale because of glitch, warns of long lines](#), *USA Today*, July 22, 2016.

[Southwest Airlines' flight woes cascade into Friday](#), *USA Today*, July 22, 2016.

[Final Update and Apology on Systemwide Outages](#), *Southwest Airlines*, July 24, 2016.

[Information Regarding Operational Impact of Technology Issue](#), *Southwest Airlines*, July 24, 2016.

[Southwest Airlines says it's back to a normal schedule](#), *USA Today*, July 25, 2016.

[Southwest Airlines Software Testing Glitch that Left Thousands Stranded](#), *DZone*, July 30, 2016.

[Southwest CEO Compares Major Outage To "Once-In A-Thousand-Year" Flood](#), *Consumerist*, August 1, 2016.