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ascend

Taking your airline to new heights

A man in a dark pinstriped suit and tie is smiling and holding a small white model airplane. He is standing in front of a window with horizontal blinds. The background is slightly out of focus.

World's Happiest Airline

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Moving from a mainframe environment to a service-oriented architecture on open systems represented a major technology jump for *Sabre Holdings*[®] and its air transportation customers. But it doesn't stop there. Next steps include the application of cloud concepts to take SOA to the next level.

Through the early 1990s, life in technical operations at *Sabre Holdings* was relatively straightforward. In a world dominated by mainframe computing, there were few systems with which to worry. And, when a production issue occurred, one only had to search in a handful of places to identify a root cause.

The tools available to manage the mainframe environment were mature and robust, enabling rapid response time for troubleshooting and resolution. In addition, because all of the system resources in a mainframe environment are managed at an extremely granular level, the fix or removal of an offending piece of code could take place within minutes. On top of that, with 100 percent of capacity in a mainframe environment being shared, scale was easy to predict, and planning for additional capacity was a straightforward exercise.

Even with all the benefits of a mainframe environment, the reasons for our move to a service-oriented architecture, or SOA, on open systems were obvious. Certainly cost and the commoditization of the midrange hardware space were critical considerations, but it wasn't just a matter of compute cost. In reality, for simple, high-volume, critical transactions in steady state, a mainframe environment cost when fully loaded with the cost of operations was not outrageously more expensive than those in a midrange environment (which will continue to be challenged by Moore's Law). But, as more and more of the travel market moved online, look-to-book ratios skyrocketed — consumers demanded much richer content and many more options within seconds of entering their search criteria. Further, the desire for personalized content required the ability to inspect and dynamically alter the information based on the needs of the consumer.

For decision-support applications such as revenue management, flight scheduling, crew scheduling and movement control, open systems opened up a new world of options to support the need for flexibility and the importance of usability and the user interface. Combined with the introduction of extensible markup language, or XML, and rich open-systems development tools, building services on commodity hardware provided answers to both consumer demands and rising costs.

Today, we process more than 700 million requests per day, peaking at over 32,000 transactions per second. Every one of these transactions is either entirely or partially processed on open systems. More than 20 percent of our requests enter through our Web services environment, and traffic in this environment has more than doubled within a year and includes nearly 300 available services. Our largest open-systems environment, by number of servers, is our air shopping environment, consisting of hundreds of midrange servers, managing more



As chief information officer of *Sabre Holdings*, Barry Vandevier oversees the corporation's varied and complex technology functions across three business units (*Sabre Airline Solutions*®, *Sabre Travel Network*® and *Travelocity*®). Since assuming this role in 2006, *Sabre Holdings* has been recognized for three consecutive years by *InformationWeek* as one of the "Top 100 Most Innovative Users of Technology."

HIGHLIGHT

During the last several years, we have moved all our teams to an Agile development methodology, enabling us to build our solutions in smaller iterations and incorporate high-quality practices early in the lifecycle before a line of code is ever written.

than 8,000 messages per second and responding with hundreds of real-time flight options in a few seconds.

Our Software as a Service, or SaaS, environment, *Sabre*® *eMergo*® *Web Access*, has been under development for more than nine years and hosts 119 airline customers across 23 open-system applications.

On behalf of our air transportation customers, we leverage the latest and greatest in development tools. During the last several years, we have moved all our teams to an Agile development methodology, enabling us to build our solutions in smaller iterations and incorporate high-quality practices early in the lifecycle before a line of code is ever written. This focus has been for the sole purpose of improving the reliability of our delivery and product quality.

In addition, by building our products as small, discrete services, we are able to greatly increase service reuse and leverage our global development resources more effectively, building more of our components in parallel while reducing development bottlenecks. This approach has also enabled us to use our solutions for broader purposes by providing better separation of user interfaces and business functionality as well as enabling more flexibility with the use of rules engines, standard middleware components and service orchestration.

Having a sizable SOA environment doesn't come without challenges. All of the system management benefits described in the mainframe environment do not inherently exist in the world of SOA. Proper monitoring, scale, redundancy and resiliency must all be engineered proactively into the environment. Failure to do so before a product is launched will only result in missed expectations. The amount of investment required to incorporate these engineering principles should not be underestimated.

In our effort called "Design for Failure," an initiative intended to identify potential points of failure so they can be avoided, we have invested millions of dollars building engineering capabilities required to operate a resilient SOA environment. In addition to dedicated technical operations, we have engineering, capacity and performance teams focused almost exclusively on our open-systems environments. We have built test environments to support both individual product testing as well as end-to-end integration and performance testing. We have incorporated standard monitoring tools and developed minimum operating standards, or MOS, that include policy, training and audits to ensure products are built to meet operational expectations before they are ever released to our production environment. Any products that do not demonstrate compliance with MOS specifications will not be released. These best practices were built over time through many years of experience with open-systems and SOA architecture.

How does this relate to some of the latest “buzz words” in the technology industry? One of today’s most popular phrases is “cloud computing.” There are several definitions of this term, including the traditional application service provider, or ASP, and SaaS models where customers make use of product functionality hosted in a vendor’s environment. Cloud computing has also been used to reference the use of Web services from another provider’s products or services. I believe Larry Ellison, chief executive officer of Oracle, probably has the best definition of cloud. In his words, it is simply: “... databases and operating systems and memory and microprocessors and the Internet.”

When looking at these more traditional definitions of cloud, it would be fair to say we have been in the cloud business for quite some time, primarily focused in solutions supported as SaaS or through Web services. However, there are new, more leading-edge definitions of cloud that go further, advocating the use of a complete virtual instance of an environment where customers load their own applications on a virtual service without any knowledge of the underlying infrastructure (Infrastructure as a Service or IaaS). While there is no doubt that

IaaS will evolve into a mature capability in the future, it is difficult at this stage to consider an infrastructure service environment for highly scalable, complex solutions that process data updated thousands of times a second requiring huge amounts of interconnectivity with other external services.

One benefit of all this hype is that investment in cloud computing has already resulted in innovations by leading technology providers that will assist in dramatically improving the creation and manageability of SOA environments. It will drive increased operational maturity and additional cost advantages through better automation, monitoring and resiliency that are available “out of the box” in an open-systems world. We expect that the ability to interoperate across potentially heterogeneous cloud environments will become much easier and more manageable. And, with better automation, we will have the ability to seamlessly bring capacity online to support new load demands within a matter of seconds, or even shut down hundreds of servers to conserve power during off-peak hours, which we call “organic server management.” The expectation is that in the not-too-distant future, the operational resiliency we have taken for granted in a mainframe world

will also exist out of the box in an open-systems environment.

We have made a very thoughtful and deliberate transition over many years from a mainframe environment to an open-systems, service-oriented architecture environment. We are aware of the value the mainframe provides but also recognize the advantages and flexibility we get with open systems that enable us to more quickly deliver products as services that better match your expectations. With our scale and your operational demands, we have learned many lessons along the way and have continuously reapplied those lessons to our standards and new releases of our solutions.

Our research team is partnering with major technology providers to apply cloud concepts to our environment in a way that we truly believe will take our SOA capability to the next level. As we continue this journey, we welcome your active participation, as there are many things that we can learn from each other along the way. 

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+count it up

40 billion

The number in freight ton kilometers managed by *Sabre® AirVision™ Cargo* every year, two-and-a-half times the amount FedEx ships worldwide annually.

1978

The year in which the United States removed government control over commercial aviation. Since then, fare prices have fallen by half, while passengers traveling have almost tripled.

31.9 million

The number of jobs worldwide supported by the air transport industry, about the population of Dallas, Texas, and Tokyo, Japan, combined.

44+ million

The amount in tons of freight aviation carries annually, about 35 percent of world trade by value.

1,762

The number of airlines operating 20,806 jets and 6,153 turbo props in 2008.

29

The percentage of global aviation impacted by the Iceland volcano. According to IATA, the volcano affected 1.2 million passengers a day.