

HP virtualizes Continental.com's ongoing infrastructure for meeting changing business needs



"HP has always been there for us when we've needed it, helping us architect optimized solutions that are closely aligned with our business needs and cost structures. It consistently supports our refinements of the infrastructure that hosts Continental.com to enable us to continue delivering peak performance and availability to our customers."

– Janet Wejman
Senior Vice President of Technology and CIO
Continental Airlines



Over the past few years, the volume of Internet-based flight inquiries and bookings has increased dramatically, almost on a daily basis.

Continental Airlines is the world's seventh-largest airline with more than 2,300 daily departures to 126 domestic and 101 international destinations throughout the Americas, Europe and Asia. With 42,000 mainline employees, the airline has hubs serving New York, Houston, Cleveland and Guam, and carries approximately 51 million passengers per year. FORTUNE ranks Continental one of the "100 Best Companies to Work For in America", an honor it has earned for six consecutive years. FORTUNE ranked the company highest among major U.S. carriers in the quality of its service and products, and No. 2 on its list of "Most Admired Global Airlines" in 2003.

Over the past few years, the volume of Internet-based flight inquiries and bookings has increased dramatically, almost on a daily basis. This has necessitated Continental Airlines to demand more capacity from its legacy web site than it could deliver in a timely manner.

Bob Edwards, Staff Vice President of Systems Technology for Continental Airlines, explained, "The web is by far the lowest-cost distribution channel for the company, consequently we have a goal to increase the proportion of business booked through it. We must have the ability to rapidly scale the site to meet the required traffic and volumes whenever needed."

Supporting marketing and sales

Ron Anderson-Lehman, Staff Vice President of Systems Development, concurred, "Continental.com provides a very strategic capability for our company generating over \$1 billion in sales in 2003, and our marketing department continually explores new ways to drive traffic to it. During a successful advertising campaign, the site can see double the normal number of fare searches and actual sales can increase by 30-50 percent. We need to continually provide a flexible and scalable infrastructure to support marketing during these promotions and as it tests to see which campaigns are most effective. With our old infrastructure, if a lot of traffic was driven to the site and we couldn't support the load, we ran the risk of turning sales away."

The legacy web site was initially operated as a private labeled version of a popular online travel booking engine. In 2001, the web site was successfully in-sourced. The reborn site was developed on a Microsoft® Windows NT-based architecture, interfaced to legacy mainframes, with front- and back-end tasks hosted by HP ProLiant servers – Continental Airline's standard data center server, selected to minimize maintenance and support costs.

"While the initial transfer of the web site in-house was crucial, it is even more critical for Continental to continually keep the underlying infrastructure fully optimized – architected to consistently deliver peak performance for the best user experience – and mitigating the risk of problems when implementing new software. We had a forecast from marketing concerning an upcoming fare sale and the goals for the online transactions. Based on results from previous fare sales, we did not believe that the existing site could handle the volume or deliver reasonable performance to the users. So that's when we decided to pull-back and re-architect the environment using a highly scalable infrastructure," reflected Edwards.

Anderson-Lehman added, "The pace of business dictates that we create a reliable mechanism to rapidly provide ongoing and low-risk deployment of new components."

The infrastructure flexibly evolves to meet business needs

From 2001 to present, HP has helped Continental refine the web site infrastructure to continue to service the company's dynamic business requirements in the highly volatile airline travel marketplace. By leveraging new technologies and utilizing the HP Solution Center, Continental has been able to efficiently load-test proposed configuration enhancements prior to moving into production, thereby avoiding any risk of unpredictable performance under peak conditions.

"Working with HP and its Solution Center experts has helped us maintain a short time to market for our web site environment changes. Together we can accurately model the response to heavy Internet traffic of any proposed site

modification prior to actual deployment. When we do release the changes into production we have the confidence that a new version of the software or a new hardware implementation will positively impact our customers – the risks have been mitigated,” commented Anderson-Lehman.

The open systems philosophy embraced by HP gives Continental the flexibility to run UNIX®, Linux and Microsoft Windows® NT as needed by its business applications. Edwards elaborated, “Our distributed

“HP is always extremely cooperative and proactive about working with us on our projects, enabling us to deliver on our commitments.” Bob Edwards, Continental Airlines

systems are mainly on NT, however, we have an HP-UX-based HP Superdome configuration supporting several applications including a customer database, and a financial application. HP-UX environments also host our flight operations system and human resources applications. Being able to work with one vendor is convenient – there’s a cost savings from an operations perspective.”

Today, Continental.com is hosted on 24 HP ProLiant BL40P blade servers. Once in place, the integrated blade design facilitated the pooling and virtualization of resources to allow for more advanced features like automated, policy-based provisioning and workload management.

“From an infrastructure support perspective, we chose the blade server technology because it scales easily and we can manage the project much more effectively than when we were running individual servers. From an engineering perspective we looked at the difference in processor performance and re-architected the site around the strengths and virtualization capabilities of the blade systems, which include being able to distribute the software and security changes much more efficiently across all the servers with less manpower. Plus, the performance difference is substantial,” said Edwards.

The storage environment for the web site has evolved too. Continental.com is currently using two HP StorageWorks Enterprise Virtual Array (EVA) 5000s hosting over three terabytes of raw storage. Edwards noted, “We are using HP ProLiant 580’s directly connected to the EVA SAN to support the session state requirements of the 24 web servers. Because of the complexity of the way we had to maintain session state, we needed a solution that delivered extremely fast, shared file I/O. We upgraded the drives for improved throughput and streamlined the database architecture to capitalize on the EVA5000s.”

HP delivers...

With the deployment of the blade servers Continental has been able to establish a standard software image, which can be reviewed, certified once, and then leveraged when deploying new servers – removing any errors arising from manual loading of software. Key to the flexibility of ProLiant BL solutions is the Virtual LAN (VLAN) technology built in to the blade network and switch architecture. VLANs enable network virtualization by dividing available bandwidth and allowing dynamic allocation and reallocation to specific devices. The wire-once VLAN architecture reduces time-intensive tasks – for actions such as adding and re-configuring of servers, network ports, and disk capacity – from days to minutes.

“We’re experiencing huge operational efficiencies with these servers. We can simply launch the installation scripts and install a new server with an identical image, including the application software. This has dramatically reduced the time it takes us to build and load a server – it’s gone from as much as two days to as little as a couple of hours, and several servers can be loaded in parallel,” described Edwards.

Anderson-Lehman agreed, “We can much more easily keep all of the servers in synchronization with the latest software, thereby avoiding problems. The fact that we’re managing 24 servers as a blade center and not as individual systems makes the management and administration more effective and efficient.”

In conjunction with HP experts – and leveraging the HP Solution Center – Continental has been able to deploy the latest server environment within 45 days, from placing the order to the day the revised site was up and running.

Reflecting on the latest successes, Edwards said, “We have a very strong relationship with HP and find it to be very responsive. We had a very tight project plan – one on which we could not afford to miss a single deadline – HP delivered on the products, and local experts worked with us to install and configure the environment. HP is always extremely cooperative and proactive about working with us on our projects, enabling us to deliver on our commitments.”

Anderson-Lehman observed, “Our latest web site infrastructure is handling the Internet traffic very nicely. The performance during the most recent fare-sale was very good and able to process a large increase in traffic. The whole operation was a huge success in terms of us achieving the scalability that we were looking for.”

Janet Wejman, Continental’s Senior Vice President of Technology and CIO, concluded, “HP has always been there for us when we’ve needed it, helping us architect optimized solutions that are closely aligned with our business needs and cost structures. It consistently supports our refinements of the infrastructure that hosts Continental.com to enable us to continue delivering peak performance and availability to our customers.”

At a glance

- **Company:** Continental Airlines
- **Headquarters:** Houston, Texas
- **Founded:** 1934
- **Employees:** 42,000
- **2002 revenues:** \$8,870M
- **Telephone:** 713 324 5000
- **URL:** www.continental.com
- **Primary products:** Continental Airlines operates a fleet of 355 jets and Continental Express flies 224 regional jets. Operating major hubs serving New York, Houston, Cleveland, and Guam, Continental has extensive service throughout the Americas, and to Europe and Asia. Additionally, the company has a strategic global alliance with Northwest Airlines and Delta Air Lines.

Challenges

- Continuously scale Continental.com to handle increasing web traffic.
- Deliver infrastructure flexibility to support new sales initiatives.
- Partner with vendor to consistently keep environment optimized.
- Need to accurately forecast the performance impact of proposed site changes prior to deployment.

Solution

- Replacement of legacy environment with re-architected infrastructure.
- Leverage new HP technologies including:
 - HP ProLiant BL40P servers; and
 - HP StorageWorks Enterprise Virtual Array 5000.
- Utilize the HP Solution Center to emulate heavy Internet traffic against proposed web site changes.
- Creation of streamlined hardware and application deployment process.

Results

- Mitigated majority of risks typically associated with web site changes.
- Simplified operations.
- Increased speed and consistency for delivering new servers to dynamically support business operations.

For more information on how working with HP can benefit you, contact your local HP sales representative, or visit us through the Internet at our world wide web address: <http://www.hp.com>