
Six Continents Hotels Looks to Sun Consultants to Help Deliver Wireless B-to-C and B-to-B J2EE Technology-Based Reservation System

Executive Summary

Six Continents™ Hotels was planning two innovative channel initiatives designed to expand access to its hotel information and reservation systems. The company wanted to provide Priority Club® Rewards members with mobile access to the systems and, at the same time, prepare for a business-to-business (B-to-B) Internet channel. However, the company required greater scalability and availability with its consumer Web site, which threatened to delay the new initiatives.

Faced with time-to-market pressures and complex technical issues, Six Continents Hotels sought the assistance of Sun Professional Services to help achieve its performance and availability objectives, with the long-term goal of helping to formulate a technology strategy for carrying forward the new channel initiatives. After addressing the performance and availability issues, Sun architects worked with the IT (Information Technology) team from Six Continents Hotels to perform a thorough assessment of the existing online system in the context of the new initiatives. Rather than overhaul the existing system, including rewriting code and business logic, the consultants helped determine that they could rearchitect the platform infrastructure with a new application framework based on Java 2 Platform, Enterprise Edition (J2EE) technology.

Six Continents Hotels was able to develop and roll out its wireless services and begin its B-to-B initiative without impacting the current environment. Using the SunTone Architecture Methodology, including significant components of the Sun Open Net Environment (Sun ONE), Sun Professional Services helped Six Continents Hotels design and build an open, extensible application architecture for the first phase of its wireless initiatives that will allow the company to further integrate its entire online environment. Six Continents Hotels now can offer end-to-end Web services for customers and various third parties, extending from hand-held mobile devices to back-end legacy systems, as well as add new functionality with minimal impact to the basic application framework.

Company Profile

With more than 3,260 hotels in nearly 100 countries, Six Continents Hotels includes such well-known registered brand names as Inter-Continental® Hotels and Resorts, Crowne Plaza® Hotels and Resorts, Holiday Inn®, Holiday Inn Express®, and Staybridge Suites® by Holiday Inn. The company has been a leader in the use of technology to support its internal operations and provide innovative services to its guests, business partners, and the traveling public. Six Continents Hotels is also a prime mover behind efforts to develop and promote the use of technology standards in the hospitality and lodging industry.

The Priority Club Rewards business-to-consumer (B-to-C) Web site is indicative of how Six Continents Hotels uses technology to serve its customers. Linked to the company's worldwide reservation system, it provides users with up-to-date information on individual hotels around the globe and access to Priority Club Rewards news; special offers; and account, benefits, and award information. It is also part of Six Continents

Six Continents Hotels Solution Overview

The Strategy

Six Continents Hotels sought to provide B-to-C and B-to-B wire-line and wireless Web services to its customers and potential third parties

The Objectives

- Identify causes of Web site performance degradation and availability problems
- Design application architecture to support both wire-line and wireless Web services to hotel information and reservation systems
- Meet aggressive time-to-market in the deployment of wireless initiatives
- Create an open, extensible application framework for integrating with legacy, back-end systems and adding new services and applications
- Inculcate best practices to speed time-to-market, improve productivity, and help reduce risks

The Infrastructure

- Sun Enterprise 3500 and 280R servers running the Solaris Operating Environment
- Sun Open Net Environment (Sun ONE)
- J2EE technology
- Sun ONE Web Server
- BEA WebLogic Server
- Air2Web Mobile Internet Platform

The Solution

- SunTone Architecture Methodology used to develop services-driven architecture, with n-tier infrastructure supporting B-To-C Web services for Priority Club Rewards members and B-to-B Web services for third parties
- Open, extensible J2EE technology platform based on Sun ONE framework helps enable integration with legacy systems and deployment of new Web services and applications
- Wire-line and wireless connectivity through Service Provider Air2Web using XML (eXtensible Markup Language) technology
- SunSpectrum Gold support agreement and skills assessments and training from Sun Educational Services for sustaining high availability and reliability

Hotels' B-to-C Web site that enables both members and non-members to locate hotels based on city, state/province, country, or ZIP code; find the best available rates; obtain directions; and learn about promotions and hotel activities. Seeing an opportunity to serve Priority Club Rewards members and promote customer loyalty better, Six Continents Hotels' executives decided to add a new channel by providing interactive access for users equipped with a range of wireless devices. The company also wanted to prepare for a B-to-B channel to enable third parties to access up-to-date information and reservation services.

To deliver these services, the Six Continents Hotels' Internet development group had to meet an aggressive time-to-market schedule and create an application framework to support the planned services. The new environment also had to support a range of client devices and meet demanding performance and availability requirements. Six Continents Hotels also required an open, extensible platform infrastructure, one that would allow the integration with legacy and third-party systems as well as the addition of new services and applications.

Sun Professional Services — From Problem Solving to Planning

Six Continents Hotels rolled out its Priority Club Rewards Web site and online reservations system in early 1999. It was based on a custom-developed application server running on two Sun Enterprise 3500 servers and was linked to the company's mainframe Holidex[®] reservation system through proprietary application programming interfaces (APIs). In many respects, the initial release was typical of many early enterprise Web initiatives. It was limited in the number of concurrent users that it could support. Further, it was based on a single, monolithic application, thus making it difficult to isolate and fix problems or add new functionality.

To help solve these problems, Six Continents Hotels called in a team from Sun Professional Services to perform an architectural assessment, which helped rectify what was originally thought to be deficiencies with the server infrastructure. Tests indicated that the infrastructure, including the Solaris Operating Environment, was not being used to its full capacity and thus not the source of the performance problems. Rather, the issues stemmed from the monolithic design of the application framework and its inadequate use of system resources.

In less than one week, the Sun team identified the most severe issues and helped the Six Continents Hotels' IT group develop system code for managing resources and legacy system interfaces in a more efficient manner. As a result of the initial project, Six Continents Hotels was able to retain its existing server and storage infrastructure while scaling to meet growing traffic and transaction volumes. Sun consultants also made a series of recommendations that ranged from other minor performance fixes to suggestions on how to rearchitect the entire platform infrastructure based on a modular, n-tier design.

New Services Drive New Requirements

With the objective of continuously striving to expand its customer services and extend its sales and marketing channels through the innovative use of technology, Six Continents Hotels set forth two initiatives in late 2000. The first was to provide Priority Club Rewards members with wireless access to its information and reservation systems. For this project, Six Continents Hotels selected a hosted wireless application platform environment supplied by Air2Web, a company that was already quite familiar with Sun technology and services.

Based on J2EE technology powered by Sun Enterprise and Netra servers and sustained with skills assessments and training from Sun Educational Services and a SunSpectrum Platinum support agreement, the Air2Web platform provided an ideal environment for developing an application framework capable of supporting a range of mobile devices and protocols. The second initiative was to develop a flexible interface based on the same application framework that would deliver B-to-B multi-channel access services.

In both cases, the IT strategy was to create an environment that incorporated XML APIs to separate customer service and reservation systems from the specific details of client devices and portal services. For the initial wireless services rollout, Six Continents Hotels targeted Palm VII personal digital assistants (PDAs), Web-enabled mobile phones, and digital text messaging short messaging service (SMS) mobile phones. Because the company planned to support additional devices in the future, the plan was to use a set of standard lodging industry transaction XML APIs developed under the auspices of the Hospitality Industry Technology Integration Standards (HITIS) project.

Maintained by the American Hotel and Motel Association and sponsored by several leading lodging and technology companies, the project's goal is to develop and promote standard interfaces between hospitality-related information systems. The HITIS standards define static data elements and message formats that take advantage of XML to break out transactions that occur with central reservation systems. These transactions include availability, rate, and inventory requests and responses.

The standards also make it possible for hotels to publish descriptive information that can be accessed by business partners or third-party agents. Six Continents Hotels and Sun are Prime Sponsors of the HITIS project. PricewaterhouseCoopers, an Air2Web alliance partner and a HITIS Principal Sponsor, was selected by Six Continents Hotels to help develop the front-end wireless applications. Further, HITIS is now a subset of the Open Travel Alliance, of which Six Continents Hotels, PricewaterhouseCoopers, and Sun are members. The B-to-B environment, on the other hand, supports a mix of Hypertext Markup Language (HTML) and XML interfaces. This meant that the application framework and supporting infrastructure had to support different flavors of XML, in addition to a wide range of client de-

vices and APIs. The system also had to be secure to allow the use of personal identifiers and confirmation information.

Six Continents Hotels also had to contend with legacy systems and databases that made up the company's reservation, hotel information, and Priority Club Rewards systems. These legacy systems had to be separated from the details of the online environment, yet integrated with the business rules of the online applications. Further, the company needed an environment that would support the addition of personalization, multilingual support, and other features in the future. Given the ambitious goals that Six Continents Hotels' business planners had set forth, the company's Internet development group decided that it needed a complete assessment of the current online environment.

As a result of the responsiveness and collaborative approach of the Sun team during the availability and performance project, Six Continents Hotels again called on its consultants to perform a requirements and planning assessment and provide recommendations for adding the new services. Victoria Rubin, Director of Internet Development at Six Continents Hotels, notes that "the previous success of the Sun consultants on addressing performance and availability issues gave us a lot of confidence to continue with them. We had some very aggressive challenges surrounding the rollout of our wireless initiative and knew that the Sun consultants would provide valuable direction in terms of architecture and the development of best practices. We also found that Sun's wireless strategy, based on an open, extensible architecture for providing multi-channel access to end-users using any number of wire-line and wireless devices, closely mirrored many of our objectives."

Creating an Open, Extensible Application Framework

In order to roll out the first of its new wireless services, Six Continents Hotels had to initiate two separate, but interdependent, projects. The first was to create an XML front-end application environment that could support mobile devices using different protocols and user interfaces. The second was to design and deploy a "service-technology-enabled" back-end platform infrastructure to manage the transactions between the new applications and the legacy systems and databases.

A team made up of representatives from the Six Continents Hotels' e-Commerce and IT organizations, PricewaterhouseCoopers, and Air2Web was responsible for developing the front-end client applications. "The multichannel access solution of Six Continents Hotels is at the forefront of the hospitality industry in terms of delivering sophisticated functionality to both B-to-C and B-to-B end-users on a number of wireless devices," comments Sanjoy Malik, Air2Web's President and CEO. "Sun's wireless strategy obviously played a role in helping to shape not only our technology initiatives but those of Six Continents Hotels. Both Air2Web and Six Continents Hotels are thus in a solid position to succeed in this market space."

This group from Air2Web and PricewaterhouseCoopers worked in collaboration with another team made up of Six Continents Hotels architects and developers and consultants from the Sun Professional Services' Java Center, who were responsible for designing and implementing the overall framework that would support not only the mobile applications but other initiatives as well. Working in partnership with the Six Continents Hotels' Internet development team, the Sun consultants conducted a complete assessment of Six Continents Hotels' B-to-C Web site.

The process consisted of interviews with Six Continents Hotels' business and technology stakeholders. The team also studied code, documentation, and other artifacts of the current system. It also developed a project blueprint that defined iterative phases for design, development, testing, and deployment activities using the Unified Process — part of the SunTone Architecture Methodology. Sun also worked with Six Continents Hotels to identify J2EE patterns as reusable architecture components.

According to Six Continents Hotels, an important element of this phase — one that remained consistent throughout the project — was Sun's collaboration and mentoring approaches. "Sun was truly integrated into our team, and that was very important to us," notes Gary Chase, Manager of Internet Development at Six Continents Hotels. Victoria Rubin adds, "We essentially formed a new team to tackle the performance issues and then deploy our wireless initiatives. The Sun consultants did a wonderful job of working and integrating with our team. Soon we began to see marked improvement in the site's availability, scalability, and reliability."

After an initial assessment and planning effort, the team concluded that time-to-market pressures, coupled with the tightly integrated nature of Six Continents Hotels' Web site, precluded redesigning and reconstructing the existing online system to support the two new services. Instead, the team elected to design and deploy a new architecture for the proposed Web services and integrate them with the legacy environment. Team members also decided to retrofit the online reservation system and associated services and integrate them with the wireless and B-to-B environment after the new services were deployed. According to Rubin, of key importance were the recommendations of the Sun consultants: "The Sun consultants weren't biased toward one technology or another. Their focus was on solving the technical problems at hand and using whatever best fit the requirements."

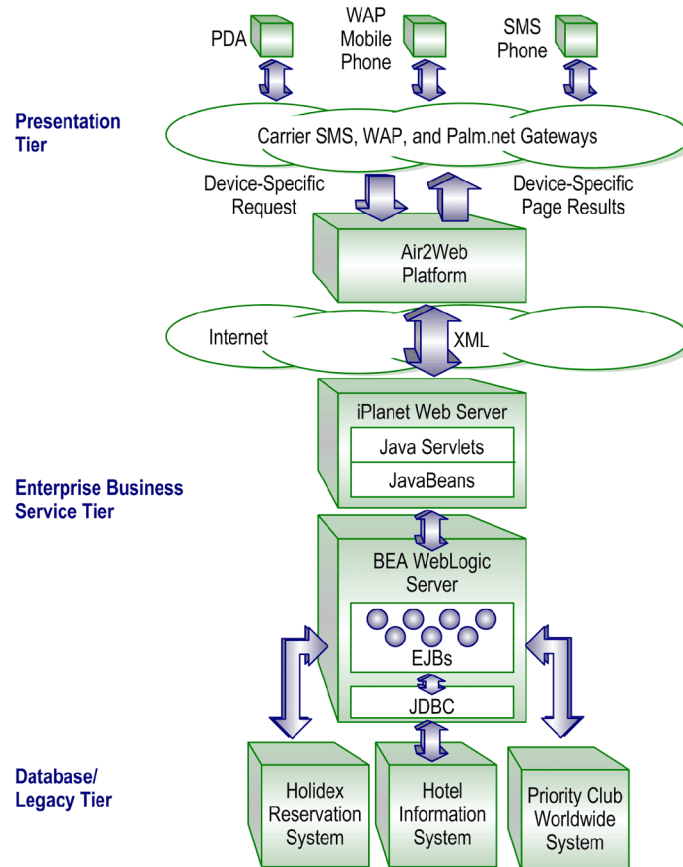
This approach enabled the Six Continents Hotels' team to focus on designing and deploying the new services independently of the current system and, at the same time, to integrate the two environments. Sun consultants drew on the SunTone Architecture Methodology to develop a services-driven architecture. The architecture formed the basis of an n-tier application architecture, making it possible to

simultaneously work on the two services independently by separating the system into functional tiers and by using shared services supported by standard APIs.

Sun architects also worked with the Six Continents Hotels' IT team on identifying and reusing J2EE patterns as well as tapping the J2EE Patterns Catalog. Rubin estimates that the configuration of this modular platform infrastructure helped to speed time to market by as much as 40%. Gary Chase adds, "The SunTone Architecture Methodology was an integral factor in our success, providing us with a means for designing an architecture and developing an application framework based on open, extensible components."

The first application to be developed using the new framework was the B-to-C wireless reservation services system that is designed to deliver multichannel access to end-users (Figure 1). The platform infrastructure provides a channel-neutral content delivery system that uses J2EE technology components, HITIS messages and XML APIs, and Internet standards. The n-tier infrastructure consists of presentation, enterprise business services, and database/legacy tiers.

Figure 1: Six Continents Hotels' Wireless Access Service Framework



Source: Aberdeen Group, April 2002

Presentation Tier

An Air2Web Mobile Internet Platform — powered by J2EE technology residing on Sun Enterprise 420R servers running the Solaris 8 Operating Environment — acts as a wireless device portal, converting Wireless Application Protocol (WAP), HTML, SMS, and other message streams into HITIS-standard XML data formats. It delivers device-specific content to the clients. The Air2Web platform also provides interface adapters and processors that manage the specific functionality of wireless devices, shielding application developers from the network complexity and specific device characteristics. eXtensible Stylesheet Language (XSL) templates residing on the platform create page replies specific to each device's interface.

Enterprise Business Service Tier

Sun ONE Web Server, running on a Sun Enterprise 3500 server, takes XML streams from the Air2Web platform, interprets the type of query, and uses Java servlets and JavaBeans to interface with the appropriate Enterprise JavaBeans (EJB) components. The appropriate response in XML technology is delivered to the Air2Web platform, which then creates appropriate page replies to each device's interface. The business logic in the enterprise business services tier is handled by BEA WebLogic Server running on a Sun Enterprise 3500 server.

More than 10 EJBs are aligned with HITIS transaction objects such as rate, availability, and booking requests. These interact with another set of session EJB components that manage queries and responses to the Holidex reservation system. Additional EJB components interact with the frequency marketing system, which supplies member information. The interactions are encrypted to ensure the privacy of member requests and application responses. Finally, EJB components go through Java Database Connectivity (JDBC) technology that manages queries and responses to and from the database tier containing hotel information powered by an Oracle8i database.

Database/Legacy Tier

The database tier consists of an Oracle8i database, storing Hotel Information Systems, residing on a Sun Enterprise 6500 server running the Solaris Operating Environment. The Holidex reservation system and Priority Club Rewards information systems reside on an IBM mainframe.

Isolated from the details of network protocols, client form factors, and application processes, Six Continents Hotels' legacy reservation, inventory, and member information systems remained largely untouched throughout the entire application project. And, by using EJB components to manage sessions, developers were able to implement APIs for each type of transaction without changing the underlying code or structure of the legacy environment.

A Once and Future Application Framework

In designing an application architecture that separates client characteristics, presentation specifics, and business logic functions, as well as data and legacy systems, the Six Continents Hotels and Sun team did more than deliver multi-channel access to the hotel's information and reservation systems. They created an open, extensible application framework that provides a foundation for other B-to-B initiatives, which are being developed on top of the platform infrastructure that supports the Six Continents Hotels' B-to-C reservation services. With this new infrastructure, Six Continents Hotels is able to enhance the efficiency of its development efforts.

Rubin notes, "By building the initiative infrastructure on J2EE technology and using significant components from the Sun ONE framework, we continue to shorten future development cycles, in the case of some by as much as 40%."

Further, with its new platform infrastructure in place, Six Continents Hotels intends not only to add to the B-to-B channel, but it also has other enhancements in the queue and eventually plans to migrate its entire B-to-C Web site to the new environment. "We continue to enhance an application architecture that draws on various components of Sun ONE, delivering services on demand that not only integrate with legacy back-end systems and allow the addition of new applications but utilize services outside our network," notes Rubin.

And the new infrastructure architecture is expected to scale rapidly as Six Continents Hotels adds both wire-line and wireless users. "We are in a position to scale linearly to accommodate rapid growth in traffic and transaction volume, with the ability to scale more than 200%. With the right architecture in place, the Sun Enterprise servers running the Solaris Operating Environment are at the forefront in terms of scalability, reliability, and availability." In order to sustain high availability and reliability, Six Continents Hotels is using a SunSpectrum Gold support agreement as well as skills assessments and training from Sun Educational Services.

Key Results Index

Scalability, Reliability: Performance and availability increased significantly, with the ability to double traffic and transaction growth.

Open, Extensible Framework: Near seamless integration with back-end legacy and third-party systems, as well as addition of new services and applications.

Time to Market: Up to 40% reduction in development cycles; six-month deployment (four-month architecture design and two-month build).

Customer Loyalty, New Revenues: Multi-channel access to Web services for customers and third parties enhances customer experience and expands sales opportunities; enabling connectivity to multiple wireless devices is an industry first; legacy systems are made available to a larger number of channels.

Aberdeen Conclusions

Aberdeen research indicates that distributed computing solutions such as those represented by J2EE technology enable rapid application development and deployment, support multiple business processes, provide ease of interoperability with legacy environments, and support the high-volume and availability requirements of today's enterprise business environments. The example provided by Six Continents Hotels, working in conjunction with Air2Web, illustrates these benefits.

As a driving force behind the development and use of distributed computing and a supplier of core components and shared application services, Sun Microsystems has a vested interest in ensuring that enterprises adopting J2EE technology achieve successful results. It is primarily for this reason that the company has created the Sun Java Center. Contributing to its success is the SunTone Architecture Methodology as well as development of best practices such as use of J2EE patterns and the J2EE Patterns Catalog. However, as the Six Continents Hotels example indicates, Sun also has an even stronger interest in making its customers successful — regardless of what technology is being used.

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*Aberdeen Group, Inc.
One Boston Place
Boston, Massachusetts
02108
USA*

*Telephone: 617 723 7890
Fax: 617 723 7897
www.aberdeen.com*

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