

Industry:

Travel & Transportation

Organization:

InterContinental Hotels Group PLC

Company URL:<http://www.ichotelsgroup.com>**Description:**

As the world's most global hotel group, InterContinental Hotels Group PLC (IHG) owns a portfolio of well-recognized and respected brands, including InterContinental, Crowne Plaza, Staybridge Suites, Holiday Inn and Express by Holiday Inn. The second largest hotel group in the world by number of rooms, IHG has more than 3,300 owned, leased, managed and franchised hotels and approximately 515,000 guest rooms across nearly 100 countries and territories.

Business Problem:

IHG's online reservation was reaching its scalability limits. It needed to upgrade and integrate its enterprise business systems to support and acquire more customers.

Solution:

Rational ClearCase LT
Rational Unified Process
Rational SoDA
Rational Rose

Key Benefits:

Using open technologies, proven processes, and effective development tools, the IHG team rapidly completed a highly reliable services-based infrastructure that integrates multiple legacy systems. This platform is driving helping to drive the growth of IHG's Internet channel today, and provides a foundation for direct transactions with its business partners.

The new software infrastructure contributed to significant growth of its Internet channel by facilitating scalability, enabling new customer interaction features, and improving IHG's responsiveness to customer needs. At the same time, the infrastructure is reducing the IHG's cost for each reservation made on the Web site.

Usability enhancements made possible by the new system resulted in an increase in incremental revenue in the millions of dollars per year. In the last year, IHG's Web sites have hit a major milestone of booking more than \$3 million in a single day.



InterContinental Hotels Group Maintains Competitive Advantage With Improved Responsiveness To Customer Needs

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IHG has long been an innovator in the hotel industry. The company's innovations – such as being the first company in the industry to offer its customers the ability to book reservations online – have spurred tremendous growth and provided the company with many competitive advantages. In addition, the global nature and scale of IHG's hotels business affords significant advantages in the areas of marketing, technology and infrastructure.

To maintain those advantages and expand its reach, IHG needed to address two central issues that were beginning to affect its ability to further drive growth and profitability. IHG's online reservation system was reaching its scalability limits. The growth of IHG's customer base was starting to outpace the system's ability to handle the load. Also, the system lacked personalization capabilities that competitors were offering, and it lacked an easy way for IHG's international customers to book hotels in their native languages. To continue to draw customers and better meet their needs, IHG began major initiative to upgrade and integrate its enterprise business systems.

Michael Shea, Vice President of Business Intelligence and e-Business, explains, "Our Internet channel is the most cost-efficient direct booking channel for us. When one of our customers books a reservation on our Web site, it costs roughly one third of what it

would cost on any other direct channel. We found there were two issues that we needed to address. First, competition from major aggregators and other hotel chains in the Internet channel is increasing. Competitors were drawing users to their sites, and we wanted to retain a competitive edge online. Second, we were seeing an 80 to 100 percent year-over-year increase in traffic and have experienced an 80 percent increase in revenue over the past year. We began to reach the technical limits of our Web site. We were scaling it horizontally – by adding more servers – but we recognized that the current architecture would not be able to keep up with the continued growth over the long term."

Driving Forces

IHG recognized the need to create a more resilient online system that would provide the flexibility and resources to address the competitive threat. In addition, IHG saw that it was imperative to become even more responsive to its customers by providing them with attractive, new business capabilities. IHG wanted an online hotel reservation system that would make booking hotels easier for their customers worldwide, and do it better than the competition in every way possible.

The company decided to re-design its online reservation system to facilitate new business processes. The new system allows customers to book reservations in multiple languages for all of its hotels and provides personalization with instant access to IHG's rewards program. The service-based architecture is also based on open standards making it easier to integrate with existing business processes and scale without lockstep addition of server hardware. The system can not only handle normal spikes in traffic, but is set to handle the projected growth of IHG's customer base in the upcoming



years. In addition, by streamlining the system architecture and reservation process, IHG is better able to support and maintain the overall health of the system and ensure sustained uptime. The end result is a system that has increased customer satisfaction, driven further expansion of IHG's customer base, and improved IHG's position in the marketplace.

Shea continues, "Keeping our competitive advantage and addressing scalability issues were key factors driving the need for re-architecting our Web site. At the same time, we wanted a system that would help us be more responsive by giving our customers what they need to interact with us in the most efficient manner. Making their lives easier and getting users what they want results in higher conversion – converting a visitor into a customer. So, while we had to update the technology to handle the growing number of transactions through our systems every day, our ultimate goal was to make sure that we implemented the new technology in a way that enabled us to provide our users with the functionality that they needed – such as internationalization, personalization, and full exposure to our core transaction and rewards systems."

IHG customers benefit from rewards programs such as IHG's Priority Club Rewards. Priority Club Rewards is one of the largest loyalty programs in the hotel industry, with millions of members and alliances with 45 airlines. Personalizing the Web site experience for these customers was another way to drive the growth of the Internet channel. "In addition to booking reservations, the site has to support other transactions such as signing Priority Club® users up or interacting with the rewards system. So in addition to reservations, there are other activities and transactions that we provide on the site that can drive revenue," Shea adds.

A New Foundation For Sustained Growth

IHG's re-architected Web site combines a redesigned presentation and transaction tier, including new features and functionality, with a reengineered technical infrastructure. This transaction infrastructure, called Enterprise Business Services (EBS), is implemented as a services tier. It not only enables the enhanced features of the presentation tier, but it will also

facilitate business-to-business transactions in the future. According to Shea, IHG has already realized substantial benefits from the new site and enhancements to the way users perform transactions with the site. "When we look at where the potential is, we see many untapped markets especially in the EMEA and Pacifica regions. This technology is an enabler for us to generate significantly more revenue in those areas, and that's just from an internationalization perspective. When we rolled our many usability enhancements – including the ability to communicate more information about hotels, rooms, amenities and so on – it resulted in significant jumps in conversion. We recently deployed new front-end usability enhancements — enabled through an EBS transaction — that resulted in an increase of many basis points — resulting in millions of dollars of incremental revenue per year. In the last year, IHG's Web sites have hit a major milestone of booking more than \$3 million in a single day. It's all based on being more responsive and giving more information to the customer and allowing them to interact more easily with us. And the development efforts have built a platform on which the cost basis for a reservation on the Internet channel is actually decreasing."

Technical Requirements — Open, Reliable, Integrated, and Delivered Fast

In addition to business requirements, the EBS team also needed to deliver a solution that met several high-level technical requirements as well, including using open technologies, integrating with legacy systems, and maintaining exceptional uptime, all on a tight schedule. The initial system was implemented in Java, and the new system includes a full J2EE framework integrated with legacy systems through standards-based interfaces. Shea notes, "One of the goals from a technology perspective is to minimize costs over time. To do that you have to become extremely efficient in how you use your resources. In shared services architectures you can take the same piece of code and expose it to multiple consumers of that code and share it across different platforms and business function or channels. And that's what we have built. Using open standards is a part of that strategy."

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—Michael Shea
Vice President of
Business Intelligence
and e-Business

The new EBS platform was also designed to integrate more effectively with IHG's existing systems. A single reservation involves four to five tiers of technology by the time it gets to the mainframe and back through routing networks, transaction servers, application servers, Web servers, and firewalls. By re-architecting the system, the IHG team has been able to streamline that process, as well as lay the groundwork for direct transactions with business partners, using another open standard – XML.

Time was also a critical factor in development. IHG wanted to implement the new system quickly to capitalize on the increased revenue; but it also wanted to the system to be exceptionally reliable with virtually no outages. "The need for uptime is a given — you need that to compete in the marketplace. If your site is not up, the store is closed. We look at downtime as revenue minutes, and with our continued growth each revenue minute is getting more valuable over time."

Managing Complexity and Speeding Development

The EBS development team used IBM Rational tools to accelerate development and meet the technical and business requirements of the project. One part of the redesign effort involved decoupling the presentation tier — separating it from the Enterprise Business Services functionality. This enables IHG to leverage EBS not only through the Web site, but throughout other channels as well. By separating those two functions into separate tiers, IHG has effectively sped up what it can deliver to market. The EBS team is starting to work with IHG's reservation call centers to incorporate the same EBS services used for e-commerce. The team is using IBM Rational tools to centralize its technology, update it so that it can handle more transactions, and ensure that it is clearly documented.

Shea continues, "There are three areas in which IBM Rational products were an enormous help in building a solid architecture that is really an enabling technology for us. IBM Rational Rose has been central to our architecture and the design of all of our code. Our process incorporates many of the principles of the IBM Rational Unified Process, including iterative development, using component base architectures, visual modeling and addressing

risk. As part of that methodology, we require that the team produce artifacts and design documents. For consistency, these must be developed in Rational Rose. We also use IBM Rational SoDA to automatically generate a great deal of our documentation. And the last piece is IBM Rational ClearCase LT for version management and release management. Rational ClearCase LT is a tremendous advantage for our teams. We have a pretty complex development environment, and we release builds to production sometimes at a rate of one a week. We're also starting to use it for managing the shared set of source code across multiple code branches and projects for all of our channels, so our situation is becoming more complex over time. We're finding that Rational ClearCase LT is helping us manage it very well. We have a development life cycle that is rapid and very structured. We have short timeframes in which to develop and test. And we have strict regression testing guidelines that the code must pass through before it goes to production because we cannot afford to have even a minute of downtime."

Using IBM Rational tools and a structured development approach that includes the best practices of the IBM Rational Unified Process, the IHG team completed the EBS application in just six months. In the first seven months after deployment, the EBS software provided 24x7 availability to the consumer Web site, with only one minor interruption in service the first week. Shea concludes, "The system rarely, rarely ever goes down. And if it is down it is typically for a matter of seconds."

Jumpstarting The Project

The EBS development team got a running start on the project by using IBM Rational Rose Data Modeler to reverse engineer existing IHG databases. This provided the team with a visual model of the database, including attributes, tables and relationships. David Raal, Software Architect for The North Highland Company, helped spearhead the EBS development effort. Raal remembers, "When the project began, we immediately started with Rational Rose. We reverse engineered our existing database and generated a base object model from that as a starting point. With Rational Rose Data Modeler we can represent the database in the model so that everyone can see it. I think it provides a better graphical annotation than ERwin for

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understanding primary keys, foreign keys and relationships. We then wrote a script that created Java classes from those database classes and altered the database naming conventions to be Java conventions. That was the starting point for the main object model. We saved an enormous amount of typing — days and days, if not weeks, of typing in hundreds of attributes and so on for the classes and relationships. The data was all there in the database. Although the existing tables were not exactly what we wanted for the new system, they were pretty close to where we knew we needed to end up. So from there we did some forward design to create what we thought would be the right object model."

Bert Eaton, Technical Lead on the EBS project for IHG, adds that Rational Rose helps the team integrate relational databases and object-oriented development in a more seamless way. He reports that Rational Rose provides the team with a starting point, brings the relational database into the object-oriented world using UML (Unified Modeling Language), and helps them identify required changes that they work through with the DBAs (database administrators). "Because our domain model resembled the database table structure and relationships, reverse engineering the database and creating the object model from it worked very well for us." Eaton also notes that IHG uses both Rational Rose and Erwin successfully. "We have a very good DBA team, and they have their data model in ERwin. They use that to make whatever changes we need, and then we simply reverse engineer using Rational Rose to update our model once they're done. That's one of the beauties of the reverse engineering – the DBA can make changes elsewhere and once we reverse engineer them and our model is up to date. The two tools coexist, and we're all working off the same schema," says Eaton.

Delivering Quality, Fast

As key contributors to the EBS project with hands-on experience using IBM Rational Rose and IBM Rational ClearCase LT, Raal and Eaton both agree with Shea – the tools were central to the teams' ability to manage the complexity of the project and complete it quickly. Eaton notes, "We rely on our Rational Rose models as accurate pictures of our

software. Rational Rose is part of our development environment and practice. Every developer uses the tool, and ensures that the model stays up to date. Initially we did quite a bit of forward engineering – working in the model and then generating code. Rational Rose is a real time saver for us. It will generate get/set methods on domain classes when you have 1500 attributes to do. Who has time to code that?" He continues, "Once we really started changing things in development, then we switched and began doing more reverse engineering to keep the model up to date with our code edits. At the end of the day, all of it had to end up in Rational Rose. Our models are a living document of the application. When we do design reviews, a picture is worth a thousand words. We lay out the classes and the sequence diagrams, and that is how we review how a component or set of classes is going to work."

Raal adds, "As an architect, the most important benefit is the ability to manage complexity. We have a product that has over 700 classes in 91 packages. Knowing what belongs where, where it is, and how to navigate to it – and doing that on a pure code basis is not easy. We have a developer guidebook that includes all of our frameworks, patterns and design approaches. It is populated with code snippets, textual descriptions, and various Rational Rose class and sequence diagrams that show how the code works, and how to use various components. I know anyone can go to our developer guidebook, look at our model and code, and understand how things are put together and how it works. Rational Rose makes it much easier to do maintenance and enhancements, and bring new people on and get them up to speed fast."

Not only is the EBS team able to work faster, but Raal gives Rational Rose credit for helping the team improve the quality of the software as well. "Using Rational Rose to properly model and design the applications has enabled us to deliver much higher quality in our software. We have very few defects. We had one defect per 1000 lines of code, and development teams in other organizations often see four or five times that. And many of those defects were just misunderstandings, not something that was actually broken," says Raal.

Managing Change

Rational ClearCase LT was not a part of the EBS project from the start. Instead, the team used another tool for source code management. The tool worked for a while, but eventually it became apparent that it could handle neither the complexity nor the scope of the project. Raal recalls, "The version management tool we used at first had poor branching and merging facilities. Once we got into production and maintenance it really became a problem to manage all the changes. At that point we brought in IBM Rational ClearCase LT. In three weeks, everyone was up and running on Rational ClearCase LT – and it was a big improvement over the other system. The Windows-level integration of the user interface makes it much easier to use. It is also much faster. We have more than 1,500 files in our source stream, and when we refreshed our view with our old system it would take anywhere from 20 to 30 minutes. Rational ClearCase LT does it in about 15 seconds. In addition, it allows us to version directories, which is very important to us. We always had a problem when we would move a source file from one directory to another. That would end up breaking the build, and we could never go back and recreate a build."

Shea agrees, "Once we started branching and merging our code, we found our old system to be grossly inadequate. It just did not have the scalability and features that we needed in our environment. And tools that aren't adequate don't last long around here. I don't know how many other environments would have eight active branches of code at the same time. To me, that's pretty aggressive, but we do it successfully here with Rational ClearCase LT."

Rational ClearCase LT is proving to be a tremendous help to the presentation tier team as well, putting an end to what Raal refers to euphemistically as "three-week merge parties". He reports, "The presentation tier team runs even more parallel branches than we do. Prior to Rational ClearCase LT, the 20-person team had to suspend development for three weeks while they merged on projects they had been working on for two months. Who has time for that? Now everyone is using Rational ClearCase LT, and we're all more efficient."

Transforming The Operating Environment

Eaton notes that the team's success using IBM Rational tools on the EBS project has changed the way many people at IHG think about their technical infrastructure and business model. "A year and a half ago Enterprise Business Services was just a concept. Now it is a proven concept that is really taking hold. It is becoming a much more important part of the core enterprise architecture within the company. We are going to serve more than just the Internet channel through these services. We're looking at hooking up our reservations centers, as well as additional B2B transactions. Because of the quality, the uptime, and the overall success we've had, it is becoming a common part of the language here now. You'll hear people say, 'EBS should do that', or 'We should plug EBS in here to connect up'."

The Right Tools and The Right People

For other organizations starting a similar development effort, Raal recommends getting the right people and the right tools in place. He explains, "It is important to get some good people up front. Put together a team that can really come up with a variety of ideas. We put together a very powerful development team, based on a confluence of expertise, knowledge of existing systems, and some new team members. It's also important to have good tools and to allow yourself time to design and develop. Rational Rose helps us put a large emphasis on architecture and design." Shea concludes, "Getting back to the basics of software development is the key to success. That includes making sure that there is a clear definition of roles in your process, that you have product managers who understand how to write requirements. It also includes ensuring that as you move into the actual software development, you really do start with design, and you build in quality at the beginning of your software development process so that the team can appropriately execute the end. And, of course, you need to have change management processes established. Then you can determine what are the best tools to support that process. The best tools for our process and our team were clearly Rational Rose and Rational ClearCase LT."

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—David Raal
Software Architect
The North Highland
Company

About Rational

Rational provides a software development platform that improves the speed, quality, and predictability of software projects. This integrated, full life-cycle solution combines software engineering best practices, market-leading tools, and professional services. Ninety-six of the Fortune 100 rely on Rational tools and services to build better software, faster. This open platform is extended by partners who provide more than 500 complementary products and services.

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