The USTA's US Open Site:
An on demand Solution Serves Up Realtime Scores and High Satisfaction

An IBM on demand Business Case Study

on demand Business Driver
To maximize the financial return from its main event, the USTA needed to deliver a "virtual US Open" whose experience would differentiate it from competing sites.

Business Process Adaptations
The heavily automated US Open Web site now delivers point-by-point scores and related content in realtime, blurring the line between online and courtside.

Key Solution Elements
The solution employs publish-and-subscribe technology for content distribution; caching and sophisticated load balancing which enable unparalleled resiliency.

Why IBM
"The inherent resiliency of the IBM e-business Hosting infrastructure helps ensure that fans would not be left out in the cold."

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BUSINESS DRIVERS	**Customer Business Challenge**	To fulfill its mission of promoting tennis in the U.S. by supporting local tennis programs, the USTA needed to fully leverage the media value of its signature event—the US Open. In order to satisfy and grow the base of fans visiting the US Open site—in the face of increasing competition from year round sports-oriented Web sites—the USTA needed to provide online fans with a truly differentiated Web experience. Equally important, the USTA needed to align its cost structure with its highly seasonal business model.
	on demand Business Rationale	With few sports as dynamic as tennis, the US Open Web solution needed to be very responsive to matches on the court—most notably scoring. Overall, the USTA needed to provide online fans with a "high-fidelity" experience. To meet growing volume with no compromise in performance, the USTA needed a highly responsive and resilient solution, while at the same time ensuring that it could keep its costs controllable and predictable.
BECOMING ON DEMAND	**Business Process Adaptations**	By automatically delivering updated point-by-point scores to online fans, the US Open site provides a truly "virtual seat" that is linked in realtime to matches on the court. Behind the scenes, streamlined content publishing processes deliver game-related information to fans, the press and other key groups faster and—as a result—fresher. Increased resilience allows the site to better manage volume surges and to provide strong performance across the globe. Adopting a variable hosting model allowed the USTA to better match its resources with its needs and to lower its cost structure—leaving more funding available for local programs and tennis promotion.
	on demand Operating Environment	Designed and developed by IBM Global Services, the USTA solution is comprised of: • **Software**: IBM WebSphere Business Integration Event Broker, IBM DB2 Universal Database for Linux, IBM WebSphere Application Server, IBM WebSphere Edge Server, IBM WebSphere Portal Content Publisher and Tivoli products. • **Servers**: IBM eServer xSeries (running Linux) and IBM RISC-based processors (running AIX) • **Services**: IBM Global Services: Application Management Services, e-business Hosting, and IBM SurfAid Analytics
ON DEMAND BENEFITS		• The ability to deliver point-by-point scores in realtime which differentiate the US Open site from competing sites. • The site's advanced features, including realtime scoring and personalized data, have led to a 19% increase in site traffic, as well as high levels of fan satisfaction. • The USTA has expanded its ROI on the US Open as a media property, supported by a 250% increase in online sponsorship revenue and a 19% increase in online merchandise sales. • The solution, which provides the ability to scale infrastructure 50x, has a record of 100 percent availability. • The solution's publish-and-subscribe technology delivers content more efficiently, sending only the changed score thus reducing bandwidth requirements and controlling cost.

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Background

As the governing body for tennis in the U.S., the United States Tennis Association (USTA) is a non-profit organization dedicated to promoting the sport to an ever-widening audience. To achieve this broad mandate, the USTA follows a two-tiered approach. At the grassroots level, the USTA, through its 17 Regional Sections, seeks to boost interest in the game through locally staffed and administered programs. But for these programs—which run the gamut from organizing tournaments to maintaining regional rankings—to be successful, local USTA chapters require funding support from the national organization. That's where the USTA's more global promotional strategy comes in.

While local programs strengthen and promote tennis at the grassroots, the USTA's marquis event—the US Open—represents its most visible and strategically important asset. Watched on TV in 165 countries, the US Open represents the USTA's most valuable property. For the USTA, leveraging the full economic value of the US Open Web site through sponsorships, advertising and merchandise revenue is the key strategic imperative. Put simply, the more effective the USTA is at leveraging the US Open, the better it will be able to support its affiliates at the local level.

While revenue-related goals are key, so is the more general goal of promoting both tennis in general and the US Open as a branded product at the "macro" level. This underscores how the USTA needs to effectively communicate the "message" to its audience—the global base of tennis fans. The key measure of this effectiveness is the depth, accuracy and speed with which match-related information is delivered to a global audience.

Business Drivers: Differentiation through Information Delivery

The USTA's central business problem can be viewed on two levels. First, as discussed above, the USTA needed to improve its ability to leverage the rich content that the US Open represents. This meant providing relevant and timely data in a highly reliable fashion across a wide range of media, including the Web. The USTA was also looking to differentiate itself from other, competing content sources (such as sports-related Web sites) in its coverage of the US Open, and—in doing so—make itself the destination of choice for tennis fans around the world. Because more viewers tend to mean more advertising and merchandising revenue, the USTA's ability to achieve "preferred site" status for the US Open had a direct bearing on its ability to support its local affiliates.

As the number of competing sports media outlets has grown and audience expectations have risen, differentiation has become more important and more of a challenge across the board. For the USTA, one of the key ways of establishing and maintaining differentiation is in taking advantage of its exclusive access to various elements of information—most importantly the scores of US Open games in progress—notes Ezra Kucharz, Managing Director of Advanced Media. "One

For the USTA, leveraging the full economic value of the US Open Web site through sponsorships, advertising and merchandise revenue is the key strategic imperative. To achieve this, the USTA needed to provide a truly differentiated experience to online fans.

of the ways we sought to differentiate the US Open site was the speed at which we delivered scores—by changing the *way* we delivered scores," says Kucharz. "Our goal was to provide our fans who were not able to attend the US Open with a truly virtual seat by providing them with a Web experienced that rivaled being there at the event." In addition to online fans, speedy delivery of scoring data is also critical to broadcasters, coaches, players and the USTA. While these groups use the scoring data and match statistics in a variety of ways, they share a common need for timely information.

In addition to ensuring that the US Open site had a high level of functional differentiation over competing Web sites, the USTA also needed to ensure that the site's performance would not fall victim to its success. That is, as the site's popularity and usage grew, fans would still be able to access the information they wanted when they wanted it. For the US Open solution, this meant the internal resiliency needed to meet the demands of highly unpredictable spikes in traffic. At the same time, the solution needed to be dynamically responsive to changes in the geographic patterns of its site usage, which can be triggered by—among other things—the nationality of a match participant. By adding the ability to dynamically reallocate server resources to meet these changes, the solution could meet geographically localized volume surges with no compromise in performance or availability—or the fans' Web experience.

While the USTA needed the resiliency and responsiveness of an industrial-strength infrastructure, it also needed one that fit within its business model, which is heavily shaped by the seasonal nature of the US Open. Indeed, the USTA needed a solution that could provide on demand access to server resources when it was most needed—during the US Open event—and would allow it to pay only for what it uses. Citing the intense level of activity at tournament time, Kucharz sees the USTA as a small business with a big-business problem. "During the US Open we need to rally the resources of a fully implemented large solution, but without the investment in a fixed infrastructure and skills that go along with it," says Kucharz. "We needed a model that would allow us to leverage resources in a very cost effective manner, which allows us to focus our resources on our core mission—supporting the US Open event and the USTA local programs."

Yet another challenge was the need to efficiently publish a high volume of rapidly changing content from a wide range of sources—and to do so affordably. In addition to scores, examples of content published on the site range from match results and statistics to feature stories (text, audio and video) and player bios. To keep this information up-to-date, the USTA needed a set of seamless processes that would streamline the pipeline from content creators to the Web.

ACTION PLAN AND DECISION PROCESS

The Need: A Virtual Seat through Realtime Scoring

With differentiation its key goal, the USTA sought to create a Web experience that would take fullest advantage of the US Open's core informational assets—most notably scores. While other Web outlets are also in a position to post game-by-game scores, it is in the *timeliness* of scoring data where the USTA, as

host of the event, has a natural advantage. To fully capitalize on this advantage, the USTA sought to create a Web experience that—by providing realtime point-by-point scoring data and up-to-the-minute related Web content—would provide fans with an experience whose fidelity rivaled those of onsite fans. The key to this vision was the ability to build in a high level of responsiveness between the matches at the US Open and the user's Web browser. This meant redefining—indeed, pushing the envelope on—the meaning of "fresh" score data for a sport as dynamic as tennis.

Decision Process

Having articulated the USTA's technology vision in late 2001, Kucharz and his team needed a provider that had the expertise and technology resources to help make it a reality. As he considered his options, Kucharz was guided by the fundamental understanding that while the USTA may do a great job organizing and running one the world's highest profile sporting events, building and managing a technology solution lies outside its core competency. "I have a great team of journalists, editors and producers whose skills are a big part of the success of our media strategy," says Kucharz. "I wanted a solution that would allow us to stay focused on what we're good at."

The USTA's goal of focusing on core skills translated into the need for a provider that could handle each facet of the project. This meant not only providing the technology and expertise to build the solution, but also the secure, scalable infrastructure to run it. While technology-based factors were a critical part of the USTA's decision process, so too were its unique business-level requirements. Foremost among these was the need for a flexible cost structure that could be closely calibrated to its needs. Kucharz explains: "By going with an outsourced solution, we could get the capacity we needed without the huge infrastructure investment. By going with on demand pricing, we could further optimize our IT cost structure."

From the start, IBM Global Services was considered the top candidate to develop the solution. While the success of IBM's broad-based relationship with the USTA (dating back to 1995) played a part in his decision, Kucharz saw the breadth of IBM's offerings as an ideal fit with the USTA's needs. Specific examples cited by Kucharz include:

- *on demand Infrastructure*—"We saw IBM's e-business on demand solutions as a great fit for us on a number of levels. In terms of performance, the inherent resiliency of the IBM's e-business Hosting infrastructure ensured that no fans would be left out in the cold—even during peak periods. On top of that, the fact that we could have the flexibility to reduce our costs outside our peak period makes so much sense for us on a business level—which in the end is an essential requirement."

- *Technology*—"For us to achieve our vision of realtime, point-by-point scoring, we needed core technology that would allow us to gather an incredible amount of information from match-related events as they unfolded, and distribute it on the Web in an automated, efficient, realtime way. The importance of this capability can't be overstated because it was our way of creating a truly differentiated fan experience. When IBM proposed its WebSphere Business Integration Event Broker

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platform to deliver this capability, we were delighted because it gives us the perfect mix of lightning speed and bullet-proof reliability."

- *Open Standards Support*—"As a leading-edge site, we're always seeking to maintain the flexibility to leverage new technologies that come along to gain either a performance or cost advantage. A good example of this is the use of Linux-based servers in the infrastructure, which gives us major cost advantages, not to mention the kind of remote manageability we needed to build an autonomic, self-optimizing solution. The choice of WebSphere Portal Content Publisher [WPCP], which employs XML extensively, is another example of the appeal of open standards since it uses open standards to integrate different forms of content. Under the previous publishing system, we were required to publish from the [US Open] venue. In the future, WPCP will allow our writers to publish from anywhere, as well as import content from third-party providers. In this way, WPCP allows us to be more flexible in the way we deploy editorial resources."

SOLUTION PROFILE AND IMPLEMENTATION STRATEGY

The Solution: Deployment Strategy and Overview

The roots of the current solution extend back to 2001, when Kucharz and his team began discussing the move to a realtime, on demand environment with consultants from IBM Global Services. While the USTA and IBM had conducted ongoing discussions on how to improve the solution since the first Web-based "virtual seat" was rolled out, notes Kucharz, these latest discussions sought to elevate the solution to an even higher plane of performance. "Our volume had begun to really ramp up by this time and fans expectations were rising," explains Kucharz. "The combination of these demand-side factors and the availability of new technology was the trigger that made us look more closely at a realtime, on demand environment." One such technology was IBM WebSphere Business Integration Event Broker, which, through publish-and-subscribe technology, "pushes" realtime information like scores to fans via formats tailored to user preferences. On the infrastructure side, the rapid maturation of Linux into a highly stable platform made its incorporation into the hosting architecture a viable and cost-effective option.

The move to incorporate Linux servers into the solution began in mid-2001, so that by the time the 2001 US Open began (in late summer), several of the solution's IBM servers were running Linux. While ostensibly deployed for testing purposes, these servers performed flawlessly as site volume reached a record-setting two million unique visitors. By the 2002 US Open, the IBM scoring system was fully implemented on Linux servers. During the same period, IBM WebSphere Business Integration Event Broker was also deployed to power the delivery of realtime scores to the site's Java-based IBM Real-Time Scoreboard application.

The architecture of the USTA solution is comprised of two major parts: the onsite portion (physically located at the USTA National Tennis Center in Flushing Meadows-Corona Park, N.Y., where the US Open is played) and the offsite portion (i.e., the IBM on demand hosting infrastructure). The onsite segment of the
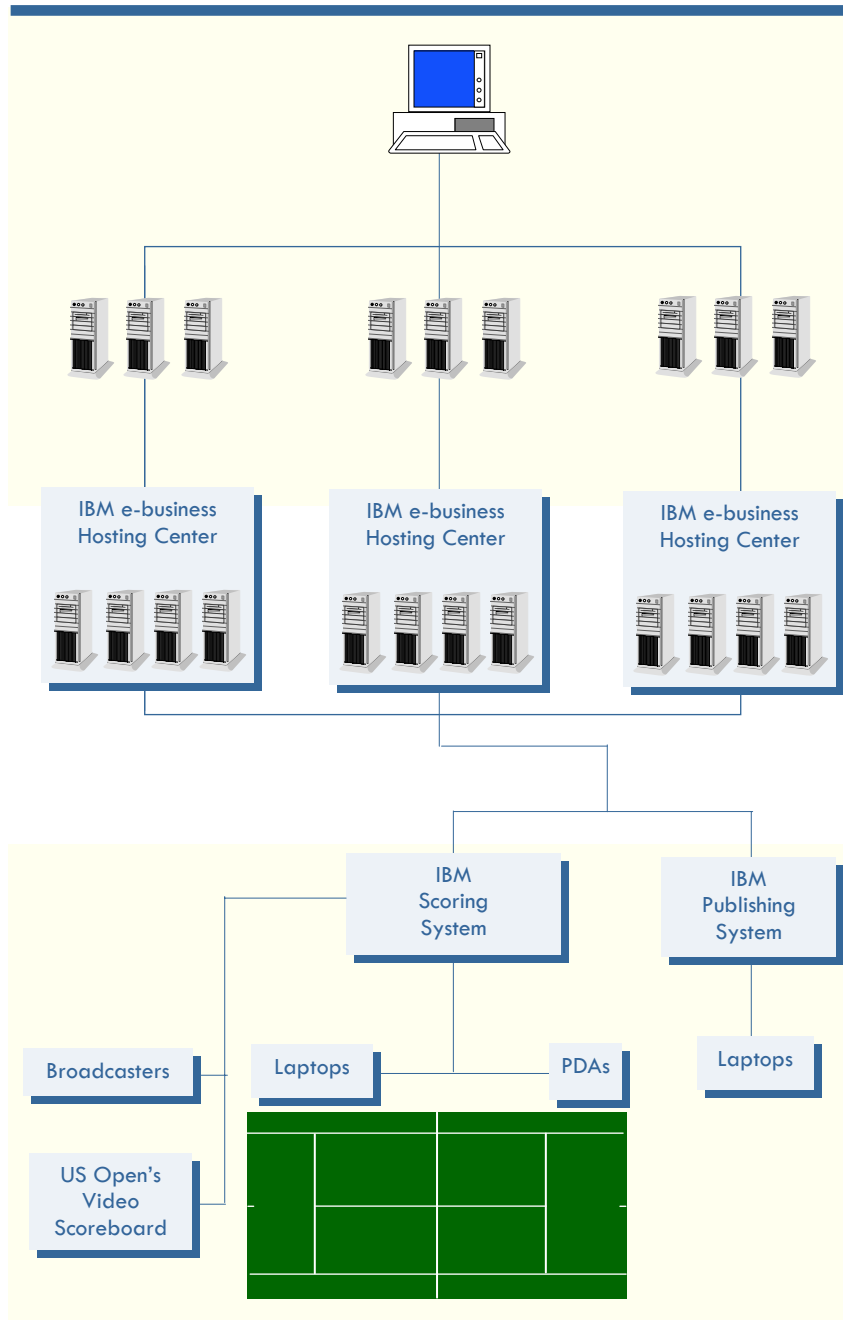
Milestones	2001				2002				2003			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
IBM deploys business rules and policies within the on demand infrastructure to improve resiliency.	▮	▮		◄								
IBM successfully pilots Linux on a limited number of servers to test live traffic serving in a Linux environment.		▮	▮									
Gryphon messaging technology, developed by IBM Research, supports realtime scoring to the IBM RealTime Scoreboard.			▮									
Gryphon technology is incorporated into IBM's WebSphere Business Integration Event Broker which supports realtime scoring to the IBM Real-Time Scoreboard.							▮					
The 2002 US Open successfully serves fans using the IBM eServer xSeries platform running Linux.						▮	▮					
WebSphere Business Integration Event Broker is deployed to support the sites HTML scoring pages and the IBM Real-Time Scoreboard.										▮	▮	
Primary Teams Involved	IBM Global Services e-business Hosting/ IBM Global Services Application Management Services											
Implementation Challenges	"Capacity planning is a particular challenge in the event space because it's very hard to predict demand surges. We define preparedness as having intelligence and processes in place that are the result of planning—as well as an advanced provisioning capability."											

Source: USTA and IDC

solution architecture is built around a series of IBM eServer xSeries servers running Linux, which run local applications and serve as staging areas for data and content uploaded to the hosted, offsite infrastructure. Data, statistics, player biographical information and player information are first stored in IBM DB2 for Linux and then automatically published to WebSphere Business Integration Event Broker. Publishing content (including text, audio and video files) is stored in WebSphere Portal Content Publisher onsite before being uploaded to the IBM hosting infrastructure. Devices are also a critical part of the onsite solution; they include IBM ThinkPads and PDAs (discussed in the following section).

EXHIBIT 2: BASIC ARCHITECTURE OF THE US OPEN SOLUTION

Solution Topology

IBM e-business Hosting Center

IBM e-business Hosting Center

IBM e-business Hosting Center

IBM Scoring System

IBM Publishing System

Broadcasters

Laptops

PDAs

Laptops

US Open's Video Scoreboard

About Solution Elements

End User Profile

Users of the US Open Web site are fans that are unable to attend the event. During the 2002 US Open, the site logged 12.9 million visits by over 2.4 million visitors.

Caching Infrastructure

To support peak demand, the distributed caching servers further optimize the system by efficiently distributing processing requests.

Hosting Infrastructure

The solution's hosting infrastructure employs a mix of IBM eServer xSeries (running Linux) and RISC-based processors (running AIX) . To provide faster, more efficient processing and improved responsiveness, the solution uses global load balancing to divert traffic between geographically dispersed e-business Hosting Centers.

Data Distribution

Scoring data stored in the central scoring system is distributed in realtime to TV Broadcasters, the US Open's video scoreboard and to the IBM e-business Hosting infrastructure (via WebSphere Business Integrator Event Broker) for Web serving.

Data Acquisition

At courtside, scoring data is gathered, input into devices and posted in realtime to the IBM scoring system. Content creators use laptops to input content (text, video, photos) into IBM WebSphere Portal Content Publisher.

Databases

The solution's database engine, IBM DB2 for Linux, stores scoring data as well as other "fact-related" content such as player bios and statistics.

Middleware

The solution employs IBM WebSphere Business Integration Event Broker to move information from the DB2 Linux-based scoring system to the e-business Hosting infrastructure and then to the online fan, in realtime.

Key Standards

For the onsite portion of the solution, all data is stored in XML format. The solution is based on Linux, an open platform.

Source: USTA and IDC

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The offsite portion of the solution, running on IBM's e-business Hosting infrastructure, employs a multi-tiered architecture made up of Web, application and caching servers running on IBM xSeries (running Linux) and IBM RISC-based processors (running AIX). At a high level, the hosting architecture includes:

- *"Origin" servers*—Located in IBM e-business Hosting Centers, they include HTTP Web content servers, WebSphere Business Integration Event Broker servers and WebSphere Application Servers.
- *Caching servers*—Located in several geographically dispersed IBM e-business Hosting Centers, the caching servers deliver the frequently requested Web page elements that have not "expired." Once they have expired, the caching servers request the "current" Web page elements from the origin servers.

Because of the on demand nature of the solution, there is no fixed number of servers in the architecture. Instead, servers are provisioned according to the projected level of need, based on an extensive capacity planning process that takes advantage of the strong virtualization capabilities within IBM's infrastructure. As Laurie Courage, director of Internet strategy and Web events for IBM's worldwide sponsorship marketing programs, points out, being prepared for huge swings in Web traffic from different parts of the globe means more than simply doing advanced server provisioning. "Capacity planning is a particular challenge in the event space because it's very hard to predict demand surges," says Courage. "We define preparedness as having intelligence and processes in place that are the result of planning—as well as an advanced provisioning capability." To improve the responsiveness of the solution to changes in Web traffic, IBM put in place a number of automated procedures designed to optimize the performance of the solution. This included an exhaustive review of the performance of specific USTA applications under various conditions, with the goal of developing actions to be taken to support high-volume periods—thus making the solution more responsive and resilient at the same time.

The US Open Solution in Action

The most essential benefit of the US Open solution is its ability to keep Web-based fans absolutely current with ongoing matches through realtime score updates. With this in mind, the best place to begin an overview of the solution at work is directly at courtside, in the heat of the action. In the course of a match, each point and other match related information (ace, backhand, forehand etc.) is recorded by a staff member using either a handheld device or a laptop. After being input into the courtside device, the realtime scoring data is then automatically routed to the central scoring system (known as the IBM Scoring System) where it is stored in an IBM DB2 for Linux database. Once in the system, the scoring data is then automatically tabulated, processed and published out to a wide range of recipients, including:

- *Web-based fans*—Score updates are automatically "pushed" to users devices as they happen on the court. Under the older system, fans were required to manually refresh their Web pages to receive score updates. In addition to being more responsive to match developments, the solution's more granular updating approach provides for more efficient use of bandwidth—thus aiding performance and managing costs.
- *TV Networks*—The system automatically feeds scoring data to CBS and USA Networks, which operate remote truck-based studios at the venue, as

well as to international broadcasters. Broadcasters then use this realtime data feed to display the score on TV, or, using a Chiron machine, use the realtime data to automatically create graphics related to the match, such as number of aces, double faults, breakpoints, etc.

- *US Open's Video Scoreboard*—The centralized scoring system is also the source for scores posted on the US Open's giant scoreboard, the main source of match information for fans at the venue.

In addition to the scoring system, the onsite portion of the infrastructure also includes the solution's content publishing system, which is based on WebSphere Portal Content Publisher running on Linux servers. In the course of the US Open, a group of content professionals is constantly feeding content—text-based stories, video footage, radio pieces and interactive features—into the system. Once content is loaded into the system, it follows a built in workflow that allows for the automation of the content review and approval process. By streamlining the content management process, the USTA is able to keep site content fresh and relevant.

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On the backend, the solution's sophisticated approach to balancing high volumes of information requests—using flexible, autonomic routing methods—is arguably its most noteworthy feature. IBM designed the USTA solution with two levels of load balancing. The first level, "classic" server load balancing, governs how traffic is routed to particular nodes within a data center depending upon levels of existing utilization. This level also directs requests based on the nature of the request (Web serving requests go to Web serving nodes, application requests go to application serving nodes, etc.). Under the more sophisticated and challenging scheme, global load balancing is employed to manage workload between multiple remote hosting locations. By setting performance parameters, such as response time and round-trip time to the end user, the caching subsystem (which includes a variety of switches and caches) responds to the request with the IP address of the site best able to meet the desired performance parameters—regardless of location. As Kucharz explains, the beauty of this approach is its ability to optimize traffic based on geography-specific traffic patterns. "Our experience has shown that large spikes in traffic tend to be *focused* spikes in traffic, often accompanying a particular player or match of interest," says Kucharz. "By optimizing traffic based on geographic patterns, we're able to deliver world-class levels of service to fans around the world."

BUSINESS RESULTS

Business-Level Benefits

For the USTA, the most important benefit of its on demand solution ties directly back to its core mission: promoting the sport of tennis. To achieve this broadly defined goal, the USTA needs to successfully execute a series of supporting strategies, all of which involve leveraging the USTA's signature event—the US Open. These goals include:

- effectively communicating and strengthening the US Open "brand";

Business-Level Benefit(s)	Enabling Process Changes	Linkage to Solution
Maximized Financial Leverage—The site's advanced features, including realtime scoring and personalized data, have led to a 19% increase in site traffic, as well as high levels of fan satisfaction. The USTA has also been able to expand its ROI on the US Open as a media property, supported by a 250% increase in online sponsorship revenue and a 19% increase in online merchandise sales.	Fans receive realtime scores automatically instead of having to refresh their Web pages to keep up with a match's progress. This provides a point of differentiation from competing Web sites.	The solution now employs publish-and-subscribe technology (via WebSphere Business Integration Event Broker).
Variable Cost Structure—The solution's on demand pricing structure allows the USTA to pay only for what it needs, allowing the organization to optimize its cost structure, further strengthening the ROI of the US Open event.	The solution's use of advanced traffic forecasting and flexible server procurement policies enable the USTA to closely tailor its leased capacity to its near-term needs.	The solution runs on IBM's e-business Hosting infrastructure.

Technology Benefit(s)	Underlying Product or Technology	Key Product Attribute(s)
Ease of Management—The solution's high degree of process automation, remote management and self-optimization makes managing and tuning the solution faster and less costly—and makes the solution more responsive overall.	IBM e-business Hosting infrastructure IBM eServer xSeries	The high degree of remote manageability and ease of new server deployment.
Bandwidth Efficiency—Through publish and subscribe technology, the infrastructure only serves information that changes (instead of refreshing an entire page). This substantially reduces bandwidth requirements, reducing infrastructure load and improving performance	IBM WebSphere Business Integration Event Broker	The high efficiency of publish-and-subscribe technology.
Virtualization—The solution's heavy reliance on virtualized backend resources—through its seamlessly integrated grid of caching and Web servers—adds to the resiliency of the solution by making it easy to divert traffic with no impact on performance or availability. The solution, which provides the ability to scale infrastructure 50x, has a record of 100 percent availability.	IBM e-business Hosting Infrastructure	Tight backend integration, ease of automation and high degree of remote manageability.
Flexibility—The solution's reliance on open platform technology—exemplified by its use of Linux-based servers in the infrastructure—gives the USTA flexibility to leverage new technologies to gain either a performance or cost advantage	IBM e-business Hosting Infrastructure IBM eServer xSeries	Overall reliance on open standards across the architecture. Support for Linux and ease of remote management.

Source: USTA and IDC

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- promoting and developing the growth of tennis;

- enhancing the fan experience; and

- maximizing revenues.

What these goals have in common is the need to provide the US Open's Web-based audience with the best possible "virtual seat." This means providing a no-compromises Web experience where fans are just as plugged into the action as they would be at courtside. The USTA's solution, by delivering realtime point-by-point scoring and rich content to Web-based fans, does just that. By automatically updating scores as they happen, the solution removes the burden of refreshing scores from Web-based fans—allowing them, like venue-based fans, to focus on the action. In addition to this heightened level of responsiveness, the solution also allows fans to tailor the information they receive.

But while the ability to provide realtime point-by-point scoring is a strong differentiator for the US Open site, notes Kucharz, it's equally important that the solution deliver consistently high levels of performance. "Realtime scoring won't do much for fan satisfaction if high demand keeps them locked out of particular matches," says Kucharz. "By implementing an on demand solution, capable of responding automatically to traffic surges, we've been able to maintain a record of 100 percent availability even as we've experienced record volume." During the 2002 US Open, the site logged 12.9 million visits by over 2.4 million visitors, representing an increase of more than 19 percent over the prior year.

In addition to strengthening the fan experience, the USTA's on demand solution also provides powerful financial and strategic benefits—enabling it to focus its attention and resources on its local affiliates. Through the flexibility afforded by IBM's on demand solutions, for example, the USTA is able to procure technology resources how and when they need them. Optimizing its resource procurement enables the USTA to channel its financial resources where they do the most good—supporting grassroots-level programs. Just as important, an outsourced on demand solution has allowed the USTA to focus on tennis, not technology.

Technology Benefits

Of the solution's many technology-related benefits that emanate from its on demand architecture, the high degree of process automation and self-optimization stands at the forefront. Under the previous solution, managing and tuning the solution to enhance performance required a considerable amount of resources and expertise, making the solution less responsive and more costly to run. As IBM's Courage points out, the current solution's highly autonomic nature made onerous management requirements a thing of the past. "By having an environment that allows us to adapt and automate, IBM has been able to collapse some of the traditional costs associated with managing this environment," says Courage. "This efficiency has enabled the USTA to expand its capacity while keeping costs in check."

Increased capacity through efficiency is also an important benefit of the publish-and-subscribe technology that lies at the heart of USTA's realtime scoring capability. The reason: because the infrastructure only serves information that changes (instead of refreshing an entire page), bandwidth requirements are

reduced substantially, thus reducing infrastructure load and improving performance. Courage also sees the architecture's heavy reliance on virtualized backend resources—through its seamlessly integrated grid of caching and Web servers—as adding to the resiliency of the solution by making it easy to divert traffic with no impact on performance or availability. "In the event we need to perform maintenance, we can simply shift traffic over to other sites as needed," says Courage. "This gives us an enormous amount of operational flexibility."

CASE EPILOGUE

"We consider the IBM on demand solutions a perfect fit for our own unique model because it adapts to our business requirements."

—Ezra Kucharz, USTA

Going forward, Kucharz expects the USTA to continue reaping the benefits of its flexible, on demand solution, with IBM playing a major role. "In the future, we will continue to do things online that enhance the overall fan experience, with the ultimate goal of keeping our status as the premier site for coverage of the US Open," explains Kucharz. "We consider the IBM on demand solutions a perfect fit for our own unique model because it adapts to our business requirements and has the flexibility to make just about any idea we have possible." On the IBM side of the partnership, the evolution of the US Open solution is a continuous work-in-progress, an "evergreen" process geared toward putting the experiences of the past to work in the future, says Courage. "Our collaboration with the USTA has been about expanding the knowledge base and using that to build new applications like realtime scoring," says Courage. "We're always looking at using new technology to make the infrastructure more resilient and more responsive to the customer's needs.