

E3's Virtual Ticket to Ride: KAAZING Powers E3Insider.com

Kaazing Powers E3's Virtual Ticket to Ride

The Electronic Entertainment Expo, better known as E3, is the ultimate video game conference. Journalists, critics, celebrities, and industry heavyweights from around the globe flock to Southern California in early summer to be on hand as developers unveil their new game titles and hardware products for the upcoming year. Of course, no one is more passionate about what happens at E3 than gamers themselves. But E3 is an industry-only conference. So Expo owner ESA engaged GamePro Content Works to build a new Web experience (E3insider.com) that would give every member of the gaming public a virtual ticket to attend.

Recognizing that the Expo's virtual visitors – many of them sophisticated, hardcore gamers – would constitute one of the most discerning online audiences imaginable, GamePro knew it was crucial to build a genuinely live, interactive experience. In this respect, GamePro was no different from the multitude of other businesses that face a pressing need to address increasingly non-negotiable customer demands for real-time, dynamic delivery of information. As the static legacy Web morphs into the *living Web*, a business's success in building customer loyalty and competitive advantage will depend more and more on how effectively it meets this core challenge.

The specific requirements underlying the project would have seemed familiar to any game developer:

- Compelling and relevant content
- Real-time, full duplex data delivery
- Open, transparent access from anywhere, on any device, running any browser
- Instant scalability
- Robust functionality
- Low cost
- Fast and easy to develop (the expo was only a few weeks away)
- Some sort of “wow factor” to grab the attention of even the most cynical gamer

Decisions, Decisions

The heart of the experience that GamePro built was a simple yet powerful *decision support tool* to help virtual ticketholders budget their time on the show floor. The show's 200+ exhibitors could be counted on to issue a flood of live information – product announcements, press releases, videos, trailers, screenshots, artwork, and more. Much of this torrent reached the booths on the actual show floor, but all of it hit the virtual booths on E3insider.com in real time, including major announcements made before the expo had even opened. The goal for every attendee, physical or virtual, was to be among the first to hear blockbuster news by being in the right place at the right time, and in general, to spend more time on what was hot

and less on what was not. On the physical show floor, that meant *pinpointing the crowds* and *catching the live buzz*. And on the virtual show floor, it meant.... exactly the same thing.

While virtual visitors would have to decide where to spend their time, GamePro had to decide which technologies to use in building this new interactive experience. The prime consideration was that gamers, a hard-to-please bunch under the best of circumstances, would set a particularly high bar for any experience related to the premier gaming event of the year, E3. To clear that bar, GamePro would have to deliver a site that was lightening fast, interactive, chock full of live information, and accessible from anywhere on any device.

While existing Web application architectures could be used to simulate or approximate such an experience, the complexity would make delivery time-consuming, expensive, resource-intensive, and ultimately unattainable by a small team with a short runway. GamePro needed to create a living Web experience with minimal development effort so it could focus what little time it had on building the best user experience possible. Taking no chances, GamePro turned to Kaazing WebSocket Gateway, a high-performance Web communication platform based on the HTML5 WebSocket standard, to power the E3 application.

Feeling the Heat

The homepage that GamePro built let users pinpoint the virtual crowds using a real-time heat map driven by the activity of the online visitors themselves. “Heat,” a measure of traffic to each virtual booth, was visually represented by a circle overlaid on the show floor map. The larger the crowd, the larger the circle. Online visitors could even pull up a bird’s-eye view heat map of the entire Expo. Anyone stuck on the show floor had to chase the crowds on foot through three separate exhibit halls – unless, of course, they had E3Insider dialed into their mobile device.

E3Insider.com also let users catch the buzz around specific game titles by giving them a live picture of the feedback flowing from the entire online audience. Virtual booth visitors could click on a game title to view detailed information about it, and they could also rank each game (“good, better, best”). By tracking these page visits and votes, GamePro’s system was able to populate leaderboards on the E3insider homepage showing which games had the highest ranking, most current viewers, and most total viewers – all live and in real time. Precise, actionable buzz.

Rounding out the homepage were live newsfeeds highlighting the latest content releases from exhibitors and show organizer exclusives.

The screenshot displays the E3 Insider website interface. At the top left, there's a navigation menu with 'E3 Insider' branding and a search bar. The main content area is divided into several sections:

- E3 Insider 2011 Exclusives:** Lists items like 'E3 2011 Closing', 'E3 Insider First Looks', 'Konami Interview', 'Nexon Interview', 'Trion Worlds Interview', and 'See All E3 Insider Exclusives'.
- LIVE FEED: LATEST CONTENT:** Features video and image thumbnails for 'Payday: The Heist', 'Rage: Making of Arsenal', 'Batman: Arkham City', 'Deus Ex: Human Revolution', 'Final Fantasy XIII-2', and 'Dark Souls'.
- THE 2011 FIESTA:** A Ford advertisement with a 'Check It out' button and fuel economy information.
- REAL TIME VIRTUAL CROWDS:** A map of the South and West Halls showing activity levels with red circles of varying sizes. A legend on the left indicates activity levels from 1 to 5.
- Game Lists:** Sections for 'MOST VIEWED GAMES', 'CURRENTLY BEING VIEWED', and 'MOST ANTICIPATED GAMES' featuring titles like Call of Duty: Modern Warfare 3, Assassin's Creed: Revelations, Halo 4, Battlefield 3, Dark Souls, and Batman: Arkham City.
- E3 SHOW FLOOR PHOTOS:** A gallery of photos from the event.
- Navigation and Tools:** Includes a search bar, 'DOWNLOAD E3 SHOW DAILY', and 'VIDEO_GAME_VOTERS NETWORK'.

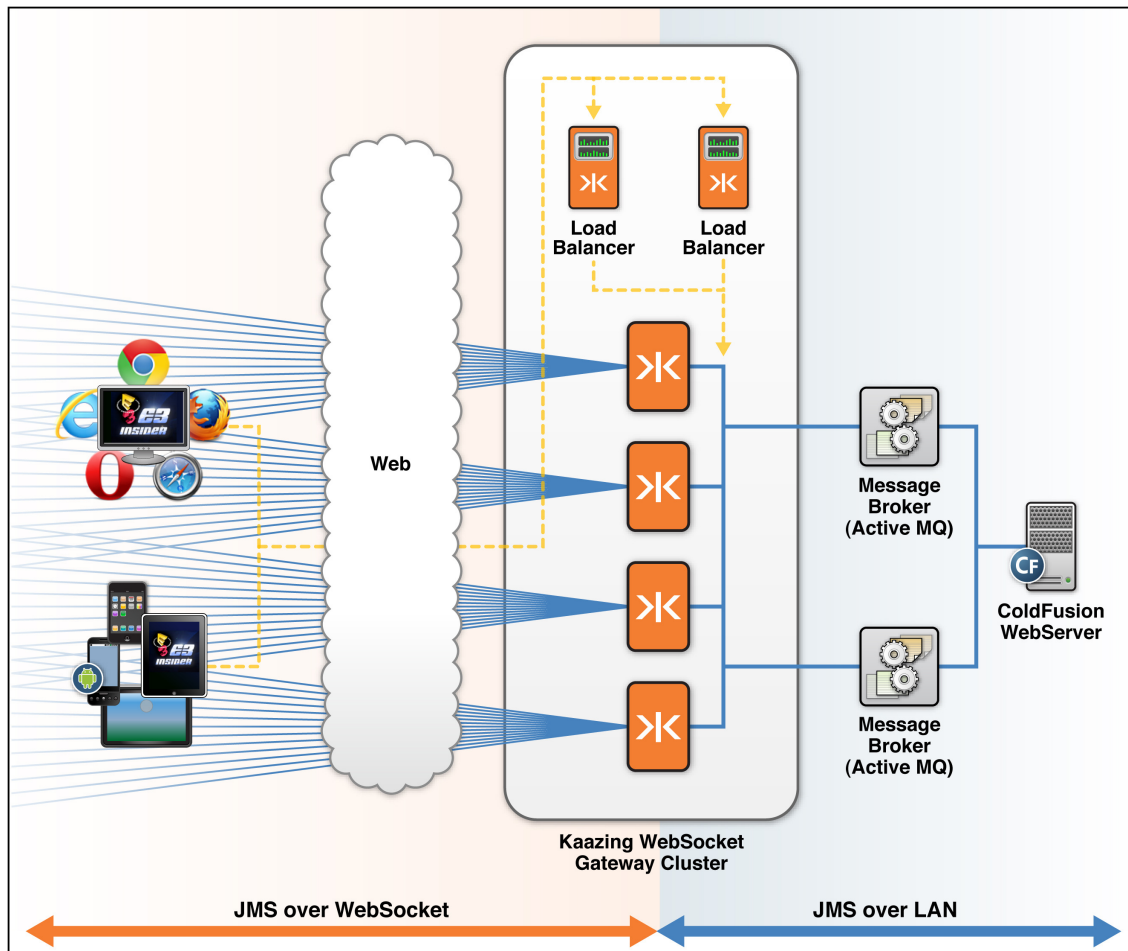
Game On

The decision support system that GamePro built for the Expo website delivered relevant content in a compelling way. Kaazing WebSocket Gateway (KWG), a high-performance Web communication platform, addressed the remaining project requirements by making the experience live, universally accessible, instantly scalable, robust, low cost, and easy to develop. In short, Kaazing enabled GamePro to deliver a living Web experience in the most efficient way possible, within a short timeframe.

Despite the loftiness of the objective, the architecture Kaazing deployed was simple and straightforward:

- On the back end, data on virtual crowd movements and rankings were continuously extracted from the business logic of the E3insider application and pushed/published to two (redundant) ActiveMQ message brokers using a standard JMS client. Four KWGs then pulled the messages from the ActiveMQ message brokers by subscribing to the same topic, again using the standard JMS client.
- In the client browser or mobile device, JavaScript running in the GamePro UI would open a persistent, full duplex WebSocket connection to one of the KWGs. Two (redundant) load balancers, components of KWG and implemented in software, would

distribute the client load. Once connected and subscribed to a channel, the client UI and KWG would communicate entirely via JMS API over WebSocket. Note that each browser had a connection to a KWG, which in turn had only one connection to the two message brokers. Thus, the KWG fanned out the load, keeping the overall number of connections to the message broker very low.



The results spoke for themselves.

Real time. KWG is based on the HTML5 WebSocket standard, which enables full-duplex, high-performance communication over the Web. So virtual visitors received live updates without the use of complex, cumbersome and costly legacy-Web workarounds such as Comet or Reverse Ajax that traditionally must be employed to simulate real-time responsiveness.

Universal accessibility. Access to websites can be impeded by plug-in requirements; a site's functionality can be limited by the type or version of browser being used; and native WebSocket communication can be stopped dead in its tracks by firewalls or proxies and is not supported by older browsers. None of these factors interfered here. GamePro used Kaazing's

WebSocket Gateway, which provides additional support for emulated WebSocket functionality with near-native performance on browsers that don't yet support native HTML5 WebSocket communication. GamePro used a standard JMS message broker, Apache ActiveMQ, for its event and message distribution, and Kaazing's JMS JavaScript library, which sits on top of WebSocket, to communicate with the message broker and access the data directly from the browser client. KWG seamlessly traverses proxies and firewalls and is certified on all major browsers, including Internet Explorer 6, without any plug-in requirements.

Instantly scalable. Message brokers are designed to be back-end infrastructure, not to connect to the Web. They don't understand HTTP and aren't designed to get through proxies and firewalls, and browsers don't "speak" JMS. KWG builds a direct bridge from the messaging world to the Web world that enables massive scale out. In this case, demands on each message broker were kept comfortably low, with only one connection coming in the front and four going out the back, all in a trusted network environment. With very low load on the message brokers, all the heavy lifting (i.e., all the scaling) was done by the KWGs, which fanned the messages out to thousands of end-user clients.

E3 needed an initial configuration that could hit projected traffic levels and also scale beyond them at a moment's notice. Before the conference became an industry-only event in 2007, total attendance had peaked at about 70,000. Pre-conference tests showed that the configuration pictured above could scale to at least 70,000 concurrent users with no degradation in performance. As it turned out, actual concurrent connections peaked at about 7,000, and CPU utilization never topped 5%. Had usage surged or gone completely viral, more KWG nodes could have been added seamlessly with simple configuration entries in the Amazon EC2 cloud environment.

Robust. KWG provided E3 and its visitors with enterprise-grade load balancing, high availability, automatic reconnect, and security, including various levels at which the system could be locked down (authentication in the client, validation on server, or authorization / entitlement on the server). These are standard features of the KWG, not expensive or complex add-ons.

Low cost. The total cost to develop, test, and run the system was under \$3,000, and most of that amount was spent during the test phase on servers needed to support the tens of thousands of Java clients used as proxies for browser clients. **The production system cost less than \$1,300.** Although standard Amazon EC2 instances were used in test and production, additional savings could have been realized by configuring servers with very little memory and almost no disk because KWG was designed and optimized to deliver a small memory footprint, low disk usage, and extreme overall efficiency.

Fast and easy to develop. This was GamePro's first WebSocket-based application, but they were able to build it in a few weeks with no outside help. By using KWG's JavaScript client for

JMS, GamePro built the UI and enabled WebSocket connectivity with the same familiar, industry standard libraries they used to move data from the webserver into the message brokers. **“We wrote the UI in less than 100 lines of JavaScript code. That included automatic reconnect, fail-over, everything,”** said Marci Yamaguchi Hughes, President of GamePro Content Works. “Kaazing’s solution is powerful, elegant and incredibly easy to learn and implement.”

Wowing the Crowd

The solution developed by GamePro and powered by Kaazing gave the public a virtual ticket to attend E3 in style. Virtual visitors could share in the moment-by-moment excitement of the show by tracking the crowds and catching the buzz, all in real-time. They could out-scoop their onsite counterparts by locating breaking news faster and not waste time on content that turned out to be underwhelming. Combined with the self-contained, crowd-sourced concept – where users’ page visits and votes within the site were reflected instantaneously on the site itself – this added up to a “wow factor” for many virtual ticketholders.

If technically-minded users had known what was under the hood, they might have perceived a second “wow factor” in the choice of the protocol API. The legacy Web is all about HTTP, a one-size-fits-all protocol. Yet GamePro’s E3Insider Web application was built using JMS APIs directly in the browser instead of HTTP GET and POST. JMS is an enterprise standard typically used in highly efficient enterprise back-end applications and back-office solutions. But applications for online gaming, news, media, and many other verticals can require the same kind of topic-based publish/subscribe model as enterprise applications. Until KWG came along, creating topic channels meant having to buy into HTTP-based proprietary APIs and having to learn proprietary systems. WebSocket alone doesn’t solve the problem, since it merely provides an empty pipe (a socket) in need of structure. Only KWG extends the reach of publish/subscribe topic channel services that are based on standard protocols and APIs such as AMQP, JMS, and STOMP by allowing them to run to and from any Web-enabled end-point on top of a high performance Web standard (WebSocket).

The Heart of the Living Web

A third “wow factor” may have gone almost unnoticed but was the most far-reaching. Virtual visitors to the E3 site were among the first people to experience the next quantum leap in the evolution of the Web itself: the living Web. Over time, the entirety of Web infrastructure will have to change to support this vision. For now, visitors to E3Insider.com were among the first to experience the next generation in Web communication, thanks to Kaazing, *the heart of the living Web*.

Game on.