

HyperKernel Reliability Keeps Bellagio Fountains Flowing

Like Las Vegas itself, the fountains at the city's Bellagio Hotel never stop. The most ambitious water feature ever conceived in terms of choreography, complexity and scale, the fountains are precisely timed to present a magical, beautifully choreographed show synchronized to music - all controlled by a system that runs 24 hours a day, 365 days a year.



The system behind the splashy show is intricately designed to ensure real-time deterministic control and zero downtime. The fountains require over 6,000 analog and digital devices spanning 12 acres to be controlled simultaneously while being choreographed and precisely synchronized to music. Each device has specific requirements for deterministic performance, and time skews between device data updates cannot be tolerated.

RA Gray, a division of Communications Company, Inc., was given the challenge of developing the control system to keep the Bellagio fountains continuously flowing. Hired by WET Design out of Universal City, CA - the company that conceived, designed and built the fountains - RA Gray provides hardware, control devices and technical services for the entertainment industry. They have provided Show and Animation Control Systems for animatronic characters, interactive displays and much more for such well-known clients as Walt Disney Company, Universal Studios, Tussaud's Group Studios and Knott's Berry Farm.

“Robust, reliable, and repeatable”

“The real-time operating system for the Bellagio job had to be robust, reliable and repeatable,” RA Gray's senior software engineer Lark Herrick said. “It had to have fast and consistent hardware interrupt processing that could run on a standard PC in conjunction with a Windows NT™ user interface.” The high-profile fountains required a dependable, flexible system that could be operated around the clock, often unattended. Other needs included reasonable start-up costs, predictable interrupt response time, and priority-based context switching.

RA Gray designed special hardware and software for their System i production and playback product lines, but for the real-time operating system they turned to Nematron's HyperKernel product. Herrick explains that HyperKernel was chosen for operating features including multitasking, priority-based tasks, fast context switch time, and fast interrupt response times. Other deciding factors were HyperKernel's Windows NT interface, reasonably priced development software, low cost run-time licenses, and product stability.

Proven reliability

“The Bellagio project has been up and running since the hotel's opening in October of 1998,” Herrick noted. “The system actually went up in August of 1998, so it has run 24 hours a day, 365 days a year for over two years with absolutely no loss of shows or downtime related to the HyperKernel product.”

“All our installations and products that integrate HyperKernel have run very smoothly and we have not had any failure or downtime.”

RA Gray found that it was quick and easy to incorporate HyperKernel into their systems. “It was extremely fast to implement HyperKernel into our products,” Herrick stated. “Support from Nematron was excellent, and it was easy to integrate the Windows NT GUI with the real-time code.” RA Gray now uses Nematron's HyperKernel product in their large playback systems as well as their real-time production products. Herrick noted, “all our installations and products that integrate HyperKernel have run very smoothly and we have not had any failure or downtime.”

The initial challenge was to ensure that the choreographed fountains of the Bellagio Hotel kept running seamlessly. After two years without a single second lost due to HyperKernel, everyone involved can now relax and enjoy the show.