

The Japan Association for the 2005 World Exposition successfully fielded a large-scale management and admission-ticketing system featuring the IC chip. Hitachi's open middleware and overall capabilities supported the registration and admission for over 22 million visitors.

Admission-ticketing and visitor reservation system Japan Association for the 2005 World Exposition

Case study

The 21st century's first full-scale World Exposition, EXPO 2005 AICHI, JAPAN (Official Name: The 2005 World Exposition, Aichi, JAPAN), hosted more than 22 million people and provided favorable reviews over its six month (from March 25 to September 25, 2005) run. During EXPO 2005 AICHI, JAPAN, middleware systems presented by Hitachi, such as HiRDB, OpenTP1, Job Management Partner 1, and Cosminexus, were adopted to create robust and reliable systems. The most notable of them was the admission ticketing/visitor registration system, which applied the admission ticket embedded with " μ -Chip", an ultra-micro RFID IC chip. The system provided unique services including visitor reservation for pavilion entrance and events, heralding the arrival of a ubiquitous information society.

Admission tickets embedded with IC chip herald the arrival of a ubiquitous information society

Mr. Sugito said, "The significance of our exposition was to bring the greatest knowledge of humanity and our most advanced technologies together to show the direction of the next era".

EXPO 2005 AICHI, JAPAN, with the theme of "Nature's Wisdom", exhibited human-friendly robots and Bio Lung implemented air conditioning systems, which demonstrated the under-going technology infrastructure development crucial to the 21st century.

Using the admission-ticketing system, a revolutionary attempt was made toward realization of a ubiquitous information society. The 0.4x0.4mm size " μ -Chip" developed by Hitachi, was embedded into each admission ticket that enabled admission management using Radio Frequency-Identification (RFID) technology.

The μ -Chip ID numbers used for the ticket were printed on the chip in the manufacturing process to prevent counterfeiting and tampering of the tickets during the distribution process. Additionally, since each ticket had a unique number, it allowed a wide range of possibilities for other services.

Mr. Katayama said, "The interesting characteristics of the μ -Chip ticket are its low-cost, high-level counterfeit-prevention system, and ability to extend services into new areas. Even though this technology was unproven prior to the Expo, we decided to give it a try to make things easier for our visitors."

Without the capabilities of the μ -Chip admission tickets, reservation for pavilion

visits and events could not have been made. Visitors were able to make pre-reservation via the Internet and mobile phones, or even make same-day reservation on-site. This enabled visitors to access the most popular pavilions without having to wait in queues.

The tickets also enabled the organizers to control the number of visitors. When venues became crowded, the organizers were able to limit the number of entries on a real-time base, to the number of people who exited the venue. As a result, there was no major confusion, even at the peak of the entry number hit 280,000 in one day.

The μ -Chip admission tickets were also useful in providing services such as the "EXPO Eco-Money" and for the "Stamp Rally". Venues such as the Hitachi group pavilion attracted attention by providing services that made the most of the personal authentication offered by the μ -Chip admission tickets, such as enabling visitors to download photos taken at the venue from the Internet.

Hitachi's overall IT skill enabled high reliability and high performance systems

Requirements for the ticketing system and same-day reservation system included reliability, the ability for real-time processing, and the ability to handle a large number of reservations. For example, the ticketing system controlled the entrance gates handling 280,000 people daily. Any problems with the system could have lead to major confusion at the venues.

To meet this challenge, Hitachi had

developed hardware devices such as same-day reservation terminals that were placed at the venues, system servers, and storage areas, along with the software to build a robust and high reliability system. In particular, the middleware such as the non-stop database HiRDB, and the Distributed Transaction Processing Facility "OpenTP1" were used in conjunction with the ticketing system and same-day reservation system to improve real-time processing ability and handle large numbers of reservations.

Prior to admitting the entrance of the visitor, the ticketing machine reads a μ -Chip ticket, which is accessed the HiRDB, located on the management server, to check against the 25 million ticket information database to determine the validity of the ticket. The communication cycle between the systems took less than 0.1 seconds, allowing the gate to open and close within 2 seconds.

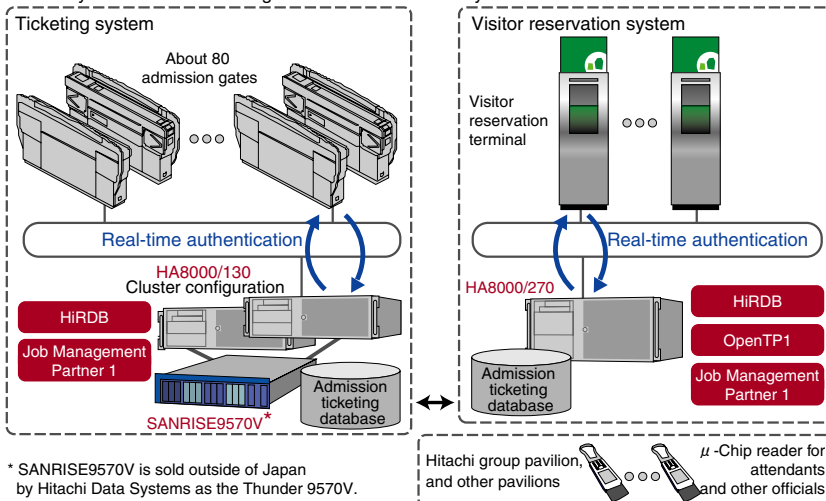
Similarly, the same-day reservation system was also extensively designed to avoid congestion.

Mr. Harasawa from KDDI said, "We repeatedly examined the applications for the same-day reservation terminals to ensure they could be operated easily by everyone. Of course, we also worked on increasing the system response time. Because of this, we received favorable comments from many visitors including such statements as "I am happy that I did not have to line up in a queue to see popular pavilions", and "I was able to go view the entire event effectively, making the most use of my time". I think the reservation system also contributed to the increase in the

Admission tickets with an embedded 0.4x0.4mm size μ -Chip and external antenna



Summary of admission-ticketing and visitor reservation system



* SANRISE9570V is sold outside of Japan by Hitachi Data Systems as the Thunder 9570V.

number of repeat visitors to the Expo. KDDI, as one of the collaborative companies, committed to build the infrastructure for EXPO 2005 AICHI, JAPAN. They have built the "Visitor Reservation System", which was the first attempt at handling an exhibition of more than 10 million visitors.

When a ticket is placed at the same-day reservation terminal, the system accepts only the people who went through the gate on the same day, allowing only one booking per day for each authenticated ticket. On the backend system, the same-day reservation database was running in-sync with the ticketing system database. This database, working on the collaborated system using Hitachi's HiRDB, OpenTP1, and COBOL systems provided response times of less than a second. This also contributed to the impression that our same-day reservation system did not waste customer time.

HiRDB reliability and support that enabled the handling of the rapid increase in visitors

Hitachi has introduced HiRDB to enable stable, continuous operation for the ticketing system and the same-day reservation system which required handling of a large number of real time access. Reliability, performance and scalability are among the merits of HiRDB.

Furthermore, HiRDB is a domestic Hitachi database that allowed immediate support from developers familiar with the database from the source level.

Mr. Harasawa noted, "There were no system technicians who had experienced the Osaka Expo held 35 years ago. While tackling the increase in size using trial and error, we were at ease because we could meet with the database developers who were working with us in person. Furthermore, because Hitachi also internally developed the middleware, we were always able to correspond to the trouble-shootings as system as a whole. This was a major advantage".

Furthermore, the number of visitors that reached 15 million, exceeding the initial estimate, and the number increased explosively in the latter half of the exhibition period. The reliability of Hitachi's middleware, including HiRDB, was proved conclusively by the fact that we were able to keep in control the larger than expected increase in visitor numbers.

Mr. Sugito enthusiastically said, "The ticketing system and the reservation system based on μ -Chip admission tickets provided continuous and convenient services to over 22 million visitors throughout the period. This success, which can be viewed as a huge demonstration trial, allows us to enter a new era".

* μ -Chip is either registered Trademark or Trademark of Hitachi, Ltd. in Japan and in other countries.
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USER PROFILE

The 2005 World Exposition, Aichi, JAPAN (EXPO 2005 AICHI, JAPAN)

URL: <http://www.expo2005.or.jp/>
 Location: Nagoya Eastern Hills(Nagakute Town, Toyota City and Seto City)
 Duration: 25 March - 25 September, 2005 (total of 185 days)
 Number of visitors: 22,049,544
 This was the 21st century's first world exposition whose theme was Nature's Wisdom. The Expo used environment-friendly technology, such as recycling garbage from the Expo venues to generate power, and fuel-cell hybrid buses that do not emit harmful substances, to send a message that people can co-exist with nature.



Japan Association for the 2005 World Exposition
 Director-General
 Commercial Activities Office
 Mr. Masanori Sugito



Japan Association for the 2005 World Exposition
 Associate Director
 Commercial Activities Office
 Mr. Kiyotaka Katayama



KDDI CORPORATION
 Manager
 AICHI Project Department
 Mr. Hiroshi Harasawa

HiRDB

INFORMATION

Hitachi Ltd., Software Division

5030 Totsuka-cho, Totsuka-ku, Yokohama-shi, Kanagawa-ken, 244-8555
 Japan
 E-mail: WWW-mdc@itg.hitachi.co.jp

- This article appeared in the January 2006 edition of "Nikkei Information Strategy".
- For details about HiRDB, OpenTP1, Job Management Partner 1, Cosminexus, see our website.
- For detail about μ -Chip, see the μ -Chip website: <http://www.hitachi.co.jp/Prod/mu-chip/>

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