

HOSPITAL AUTHORITY, Hong Kong, P.R.C.

- ▶ Tool — Entera
 - ▶ Industry — Health Care
 - ▶ Applications — Administrative and Pharmaceutical
 - ▶ Database Server — Multiple
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OVERVIEW

- The Hong Kong Hospital Authority wanted to switch from client/server to multi-tier distributed computing architecture in order to better accommodate planned use of network computers.
 - The Authority determined that its needs would be best served by establishing the multi-tier architecture in an open environment instead of adopting the proprietary DCE standard.
 - IS managers chose Entera because of its open standard and outstanding performance and functionality.
 - The Authority used Entera to build two successful distributed system modules: a Leave Administration System for HR and a Pharmaceutical Management System that seamlessly interconnects 54 pharmacies to manage the timely and cost-effective distribution of drugs.
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RETURN ON INVESTMENT

- The Pharmaceutical Management System helps improve patient care and provides greater cost-effectiveness in controlling an annual pharmaceuticals budget of almost HK\$960 million.
 - Entera enables future network-centric operation with thin clients, supporting Hospital Authority plans for increasing public access to information over the Internet.
 - Entera-based systems achieve improved reliability, availability, and scalability with a middle layer that runs on multiple application servers.
 - Entera dynamically load balances servers and provides fail-over capacity across the entire 44-hospital network, assuring critical continuity of patient care under any circumstance.
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AGENCY BACKGROUND

Serving a population of 6.3 million, the Hospital Authority is of enormous importance to Hong Kong. Since 1991, when it assumed management of all public hospitals, the Authority has deployed many vital computer systems, from mainframe installations to personal computer networks. The Hospital

Authority's IS division has a non-operating budget of HK\$200 million and employs 260 highly trained professionals. Most of the hospital's systems run on local area networks linking over 8,000 personal computers; the authority's 44 hospitals are linked through a wide area network (WAN). Multiple large information systems cover all aspects of hospital management including patient care and pharmaceuticals and supplies management, as well as vital administrative functions such as human resources (HR).

SITUATION

The Hospital Authority is considered to be an information technology pace-setter in Hong Kong, especially in the public sector. It uses the latest technology including network-centric computing, three-tier client/server, Internet, and intranet. As the Authority's requirements evolved, IS managers considered migrating to DCE, but since the Internet is the most revolutionary platform, they decided to focus instead on the thin client and on multi-tier architecture with a long term goal of implementing network computing. Believing in the long-term viability and flexibility of three-tier architecture in an open environment, the Hospital Authority in 1996 decided to implement multi-tier architecture and looked for tools that could support its plan. Based on performance, implementation services, and functionality, IS managers selected Entera. They were especially attracted to its openness.

The Authority's mainframe human resources package has excellent centralized functions like payroll, but staff found that client services were not very easy to use. The adoption of Entera gave the Hospital Authority an ideal development environment in which to build a user-friendly Leave Administration (LA) module for deployment to all 44 hospitals and 48,000 staff members. In addition to the LA module for the human resources division, the Authority also used Entera to develop a completely new Pharmaceutical Management System (PMS).

SOLUTION

The PMS is the Hospital Authority's first major system to be architected for a multi-tier operating environment. Since part of the PMS is available on the Web, thin clients are necessary. Patients are able to find out about any of the 54 pharmacies and arrange to have drug prescriptions filled via the Internet. Authorized staff will be able to access and retrieve information about drug expenditures on an intranet so that the authority can achieve more cost-effective drug management. Pharmaceuticals represent seven per cent of the Authority's entire operating budget, so it is easy to see why the new PMS is a key administrative tool. PMS tracks patient medication profiles to improve immediate and future care. It also provides decision support to 54 pharmacies and records corporate-dispensed drug history to support centralized management and purchasing.

HR Leave Administration went live in March 1997 and HR staff report that the new module is much easier to use. All 48,000 Hospital Authority staff now benefit from simpler administration with up-to-date leave records. The system-maintenance advantages of

three-tier architecture are immediately evident. Whenever the Hospital Authority has to implement new leave rules, the changes are implemented just once on the application server, greatly simplifying the costly task of updating distributed systems at the client level. The systems administrator is relieved of the need to track which clients are connected to which servers, because revised modules are loaded once, and Entera ensures that all relevant application servers are updated automatically.

After successful implementation of the Leave Administration system, the ambitious next phase of HR system development will include training, manpower planning, recruitment, and staff development review. The Hospital Authority already has a comprehensive site on the Internet and plans to add recruitment and training information to allow 24-hour public access.

Entera also provides The Hospital Authority with critical backup for vital resources. Load balancing lets staff add more application servers when an application is busy. Systems managers initially doubted they could add and remove servers while the system continued to run, but Entera convinced them. They tried it, and users simply couldn't detect what was happening as the new server took over. This is a tremendous advantage for resources backup across the WAN. Should one of the hospital's servers go down, Entera dynamically reconfigures the servers across hospitals without users being aware of any interruption. This is key in a hospital environment where systems availability is vital to patient care. The department can even upgrade servers without stopping applications.

TECHNOLOGY

<i>Database Server</i>	Multiple (Sybase, Oracle, SQL Server)
<i>Platforms</i>	Windows NT, UNIX
<i>Networks</i>	44-hospital WAN including 54 pharmacies, Internet
<i>Size of database</i>	22 major databases
<i>Number of users</i>	8000 computers

DEVELOPMENT

<i>Tools Used</i>	Entera
<i>Deployment Date</i>	March 1997

CUSTOMER COMMENTS

"Modularity speeds up development over the long term. With Entera, the gain is not in development but in future maintenance, operation, and system availability and sharing of code. With Entera, you can get a more robust long-term architecture without a significant additional investment. By using a better tool up front, you gain in the future in the areas of operations and maintenance."

—John S. Y. Tse, Deputy Directory, Information Systems

Hong Kong Hospital Authority

"The difficult part is not using Entera, but rather system design using three-tier architecture. Since it is a new approach, we want to maximize performance by putting functionality in the right tier. The Entera tool is transparent in terms of effort."

—Michael Fung, Senior Systems Manager

Hong Kong Hospital Authority
