

## Development Bank of Singapore

Headquartered in Singapore, the Development Bank of Singapore (DBS) is one of the three largest banks in Singapore, with assets of US\$65 billion. DBS is active in corporate and consumer banking, investment banking and treasury services. The bank has 43 local branches and 18 offices worldwide.

In March, 1997, the bank began to examine Internet banking solutions for a variety of reasons:

- The bank was interested in strengthening its regional, and international presence beyond Singapore in South East Asia. It was felt that an Internet banking solution would benefit this initiative;
- A significant number of DBS' customers reside outside of Singapore and Internet banking would be an added convenience for them; and
- The Singapore government is very supportive of the Internet and electronic commerce as a general policy and encourages all industries to participate in the new medium.

DBS looked at several vendor-provided Internet banking solutions, including FICS Group, IBM, and BroadVision. FICS was discarded early on because the bank felt that the solution was not ready at that time. In addition, the staff was not considered to be responsive to the bank's needs. DBS also considered IBM's Interactive Financial Services (IFS) solution, but the bank thought it was not modular enough, and that maintenance would be tedious and adding services would require significant effort. In June, 1997, the bank selected BroadVision's One-to-One solution. The bank preferred BroadVision's modular architecture and the One-to-One concept of personalizing each customer's Internet banking experience. (See Meridien Research Report "Internet-Based Financial Services: Moving Beyond Transactions to Active Selling," November, 1997) The bank also preferred BroadVision's approach to software engineering and quality control, and the vendor's responsiveness. DBS felt that BroadVision had both the technology and the vision to help the bank stand out in the Internet banking space.

Development of the solution began in July, 1997 and was completed in a remarkably short time frame in October, 1997. DBS was one of the first local banks to go live on the Internet with transactional services. The bank's Internet banking delivery platform consists of a three tier architecture. This three tier architecture does not simply consist of virtual servers running on the same machine, but relies on physically separate machines. All three servers run under Sun Solaris, which divide the processing:

1. **Database Function Server.** This server is responsible for handling communication between the Oracle database and the mainframe legacy systems.
2. **Financial Server.** This server holds the application and business logic and handles the processing of transactions.
3. **Web Interaction Manager.** This is the web server and is responsible for serving HTML to clients, checking the browsers and caching pages in memory. DBS uses Netscape's Commerce Server.

The bank uses a CORBA-compliant object request broker to handle communications between the database server and the application server and uses SNA middleware for

communications between the database server and the IBM MVS mainframe legacy systems.

The current functionality of the Internet banking solution allows customers to do the following:

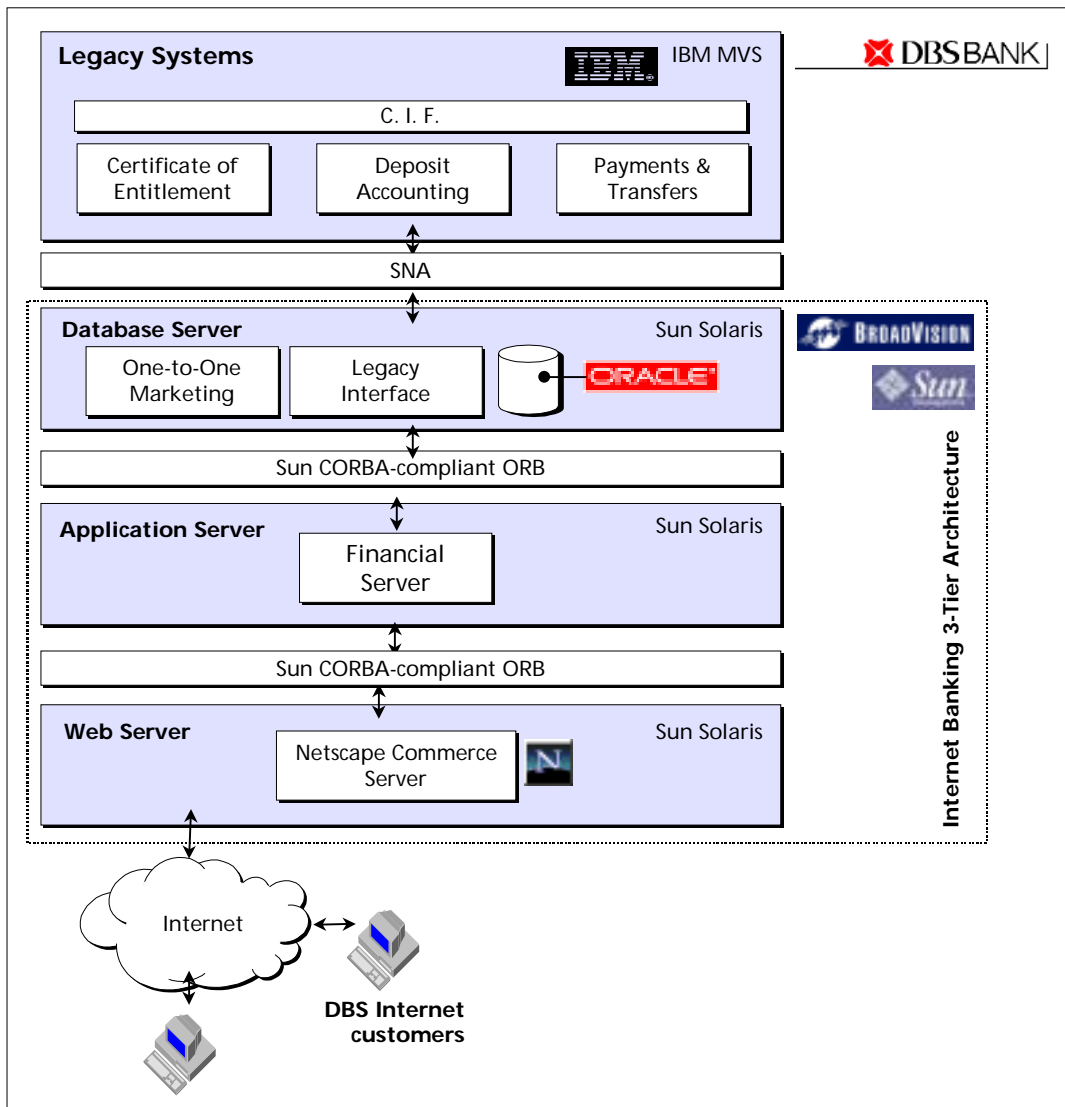
- Check account balances;
- View transaction histories;
- Transfer funds between accounts;
- Pay bills;
- Convey instructions to the bank (i.e., change of address);
- Inquire about status of checks; and
- Apply for a certificate of entitlement. (In Singapore, in order to control the car population, a certificate must first be obtained through a lottery system by anyone interested in purchasing a car. This service, in conjunction with the transport authority, allows the customer to simply apply for the certificate, which may cost around S\$45,000.)

Within the next two months, the bank plans to extend the range of bill payment options, add credit card payment information and billing information, and allow customers to subscribe to initial public offerings online. For regulatory reasons, the bank cannot allow customers to buy and sell stocks and bonds over the Internet in the secondary market.

The bank has not yet made full use of the One-to-One marketing capabilities of the BroadVision system, but plans to make greater use of them in the future. For now, the bank defines its customers according to where they are located in the customer life cycle, from student to working adult to retiree. The bank further targets customers by identifying their gender, occupation, etc. The bank makes these segregations and targets these customers appropriately. DBS plans to make use of the “observation” feature in the future which tracks the transactions that each customer makes and builds a more precise profile of his/her activities which then allows the bank to offer an investment product with a certain amount of risk, for example, to that customer. Once this data has been collected, DBS will use it to show advertisements for additional products. These ads will be tailored depending on the particular profile of the customer.

DBS also supports other electronic channels, including a call center, ATM network, phone banking, and a kiosk network. The call center is a separate system from the Internet banking solution which runs IBM’s CallPath for computer telephony integration (CTI) and EasyPhone’s desktop agent software. The call center has 12 agents. The bank also has a phone banking application which allows customers to call in to perform transactions and check balances. The bank’s kiosk network has 24 kiosks, which are based on the character-based IBM LAN DP operating system. Volume is low due in part to the fact that most kiosks are located in bank lobbies. The bank intends to replace the current system, and add a browser interface similar to the Internet banking front-end.

Figure A: DBS' Internet Banking Architecture



Source: DBS, Meridien Research