

## Sun and SunGard

Delivering an enhanced customer experience across multiple channels



### Highlights

- Differentiate products and services with a comprehensive customer service management solution from SunGard
- Integrate SunGard's customer service management solution with back-end core banking systems and databases, and serve as a front-end for other hosts and applications
- Leverage a service-oriented architecture combined with business process management to extend functionality and cut costs
- Gain a complete view of each customer across applications and financial products to help deliver an enhanced customer experience
- Deploy Sun Fire™ servers with CoolThreads™ technology for outstanding performance, scalability, and reliability
- Reduce operating costs by taking advantage of the dramatic space and power efficiency of Sun servers



Banks today face rising competition and greater challenges than ever before. Customers increasingly expect attractive rates, compelling financial products, and a variety of channels through which to conduct banking transactions. No longer loyal to just one institution, a perceived lack of service can force customers to switch to a competing bank. Sun and SunGard offer a joint solution to help firms meet the demands of greater competition by differentiating products and services, integrating corporate applications and data, and delivering more effective customer service.

### The need for better customer service

Competition in the banking industry is on the rise due to globalization, mergers and acquisitions, and market saturation. As banks vie for customers, financial products are becoming commoditized, and customers feel free to be more demanding. In this climate, it is more important than ever for banking firms to be able to demonstrate differentiated products and services that stand apart from the competition.

With so many similar products available, customer service becomes a distinguishing factor, and just one bad experience can compel a customer to switch to a competitor.

To deliver successful customer service, banks need a single view of customers that leverages data across departments. Solutions typically run on separate platforms and maintain customer data on different databases. Mergers and acquisitions add complexity with additional systems, more siloed information, and non-integrated business processes. The disparate systems and data hinder a complete picture of customer relationships, preventing effective customer service delivery. Indeed, without that knowledge of each customer touchpoint, organizations can also miss up-sell and cross-sell opportunities.

### The SunGard Ambit System Access Customer Service Manager software suite

The SunGard Ambit System Access Customer Service Manager software is an end-to-end enterprise banking solution that provides an enhanced customer experience across all delivery channels. The SunGard software is designed to support hundreds of concurrent users performing a complex mix of financial transactions and other business processes. These transactions include customer and account opening, case management, withdrawals, deposits, foreign exchange (FX) buy and sell, and payments.

The SunGard Web-based customer interface fosters integration of the SunGard software with back-end core banking applications and databases, helping to eliminate siloed information and support end-to-end banking functionality. The solution's service-oriented architecture also facilitates the extension of the SunGard Ambit System Access Customer Service Manager software as a front-end and mid-office integration point for other host and product applications. This results in additional value for banks by integrating existing applications with the software and providing improved interaction and customer service at the point of sale.

The SunGard Ambit System Access Customer Service Manager application helps banks to differentiate services through a single, complete view of each customer across applications and financial products. This unified view empowers and transforms bank staff into sales people by fostering greater understanding of the client and products that are best suited to the client's needs. The result is an enhanced experience that helps banks to improve customer loyalty and retention and increase wallet share.

### SunGard software excels on Sun servers

System performance is a critical factor in providing exemplary customer service. To ascertain the speed, scalability, consistency, and integrity of the SunGard software running on Sun platforms, Sun and SunGard engineers ran tests under varying conditions. With a series of load test use cases, Sun and SunGard engineers grouped transactions according to typical business scenarios. The transactions included customer and account opening, case management, withdrawals, deposits, FX buy and sell, and payments processes that create and maintain customer information in the bank.

### Test configuration

Several types of systems were used to create a three-tiered architecture for the testing effort. Figure 1 shows the topology of the test configuration.

### Application tier

A Sun SPARC® Enterprise T5120 server ran the Solaris™ 10 Operating System (OS) and application server software. Based on the industry's first system on a chip — Sun's UltraSPARC® T2 processor — the Sun SPARC Enterprise T5120 server delivers up to eight cores and 64 threads in a single socket. The UltraSPARC T2 processor integrates all the key functions of a server — computing, security, networking, and input/output (I/O), plus tight integration with the Solaris OS. The Sun SPARC Enterprise T5120 server design combines extreme functionality with very low power consumption, delivering record-breaking performance, maximum energy efficiency, and the industry's best performance per watt.

### Database tier

Three Sun Fire™ T2000 servers ran the Solaris 10 OS and provided access to the Oracle 9i, SunGard Ambit System Access Customer Service Management, core banking system, and workflow business project management databases.

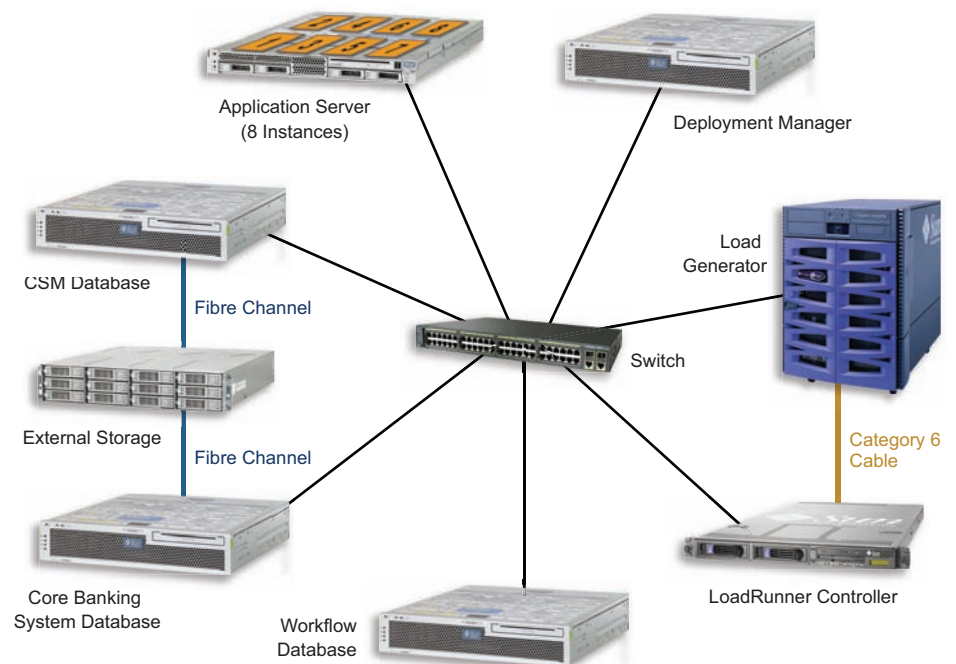


Figure 1. SunGard Ambit System Access Customer Service Manager testing configuration topology

Based on the UltraSPARC T1 processor, Sun Fire T2000 servers with CoolThreads™ technology incorporate an innovative chip multithreading (CMT) design that provides eight cores and 32 execution threads for massive thread-level parallelism and increased application throughput. The result is breakthrough performance with dramatic space and power efficiency.

#### Web and client tier

A fourth Sun Fire T2000 server, the deployment manager system, ran Web server and application server software. The Web tier ran with data compression enabled. A Sun Fire V890 server running the Solaris 10 OS served as the load generator. Midrange Sun Fire V890 servers utilize up to eight 1.5 GHz or 2.1 GHz UltraSPARC IV+ processors with 16 cores. Sun Fire V890 servers can be configured with up to 128 GB of memory, making them well-suited for compute-intensive applications. A Sun Fire V20z server ran the Windows environment and served as the control system, running HP LoadRunner software.

A Sun StorageTek™ 2540 array provided primary storage capacity for the testing effort. Boasting reliable RAID functionality, enterprise-class features and functionality, and some of the highest availability in its class, the Sun StorageTek 2540 array is extremely easy to deploy and is optimized for rack-intensive environments.

#### Testing the SunGard application

Using an iterative testing methodology, test use cases were executed individually for different numbers of users. Once satisfactory results were obtained, the test use cases were grouped into different typical transaction mixes and run as transaction groups. Three separate testing cycles subsequently assessed group business processes for 250, 500, and 1,000 virtual users.

In this way, engineers could analyze and fix performance bottlenecks as they arose for each individual use case, group, or cycle execution, and determine application scalability at each level.

The third and final cycle tested 1,000 virtual users and performed an end-to-end test of the SunGard Ambit System Access Customer Service Manager application from the Web-based customer interface to an integrated back-end core banking application and database.

#### Performance analysis and monitoring

The Solaris OS contains several built-in performance monitoring tools that can be used to assess various system events and identify performance bottlenecks. These tools and utilities were used to monitor system elements and functions during the SunGard Ambit System Access Customer Service Manager software testing. The utilities measured active processes (prstat), input/output (iostat), and virtual memory statistics (vmstat).

#### Software changes

During the testing effort, engineers discovered several modifications that improved the performance of the SunGard software.

Enabling data compression on the Web server tier helped achieve higher throughput. To improve I/O throughput, the application server node transaction logs were spread across four partitions. Engineers created another partition for storing resource data during runtime.

During the second testing cycle, the CPU utilization of the SunGard Ambit System Access Customer Service Manager database system climbed to nearly 100 percent. This was caused by latch contention in one of the commonly used database tables. In order to be able to scale the application to support 1,000 virtual users in the third cycle, a few changes were made to the software.

- The block storage parameter that indicates how much of a block to reserve for future updates to the database, PCTFREE, was increased to 40. The indexes were changed to 8K blocks. These changes helped to avoid row data migration and chaining.
- To address latch contention in the database, the LoadRunner scripts were modified to minimize the possibility that more than one process would attempt to access a customer record at the same time.

Table 1. SunGard Ambit System Access Customer Service Manager on Sun test results

Test Characteristics	Cycle 1	Cycle 2	Cycle 3
Duration (Hr:Min:Sec)	1:14:06	1:22:46	1:50:50
Maximum Running Virtual Users	250	499	1,000
Total Throughput (Bytes)	1,353,541,652	2,692,085,569	5,186,183,137
Average Throughput (Bytes/Second)	304,372	541,994	779,760
Total Hits	95,098	180,898	302,048
Average Hits per Second	21.385	36.42	45.414
Average 90th Percentile Response Time	1.5809	3.3811	3.0234

### Test results

The load test results shown in Table 1 illustrate the performance and scalability of the SunGard software utilizing servers incorporating UltraSPARC T1 and UltraSPARC T2 processors with chip multithreading technology running the Solaris 10 OS. The bottlenecks that were apparent in the first two cycles were removed in the third cycle through software changes. Indeed, once the software modifications were implemented, the system utilization in the third cycle left ample room for further scaling.

During the third cycle, the test execution load was more than 1.5 million customers and 1.5 million accounts on front-end and host database systems. The load test performing all four group transactions together executed for an elapsed time of 1:50:50. For 90 percent of the test cycle, the response time for processing requests for all transactions averaged 3.0234 seconds. The solution averaged 45.4 Web hits per second with an average throughput of 779,760 bytes per second.

As shown in Table 1, each successive cycle doubled the number of virtual users. While the workload doubled for each new cycle, the elapsed time increased by a fractional amount.

The testing demonstrates that deploying the SunGard Ambit System Access Customer Service Manager software on UltraSPARC T1 and UltraSPARC T2 processor-based servers can help banks achieve an integrated solution that leverages existing corporate data and extends the usefulness of legacy applications. The SPARC Enterprise T5120 can be vertically scaled to support increasing numbers of users, making these servers an excellent platform for running the SunGard software. Table 2 provides configuration details for some of the servers used to test the SunGard Ambit System Access Customer Service Manager software.

### About Sun and SunGard

With annual revenue of \$5 billion, SunGard is a global leader in software and processing solutions for financial services, higher education, and the public sector. SunGard also helps information-dependent enterprises of all types to ensure the continuity of their business.

Learn More  
For more information, visit [sun.com](http://sun.com), [sungard.com](http://sungard.com), or contact your local Sun sales representative.

SunGard serves more than 25,000 customers in more than 50 countries, including the world's 50 largest financial services companies. With years of experience in financial services, Sun's advanced technologies and solutions are designed to help IT departments adapt swiftly, deliver extreme performance, and scale with growing business needs.

Together, Sun and SunGard offer an end-to-end enterprise banking solution that helps banks to know what customers need and quickly fulfill those needs at the point of sale. This knowledge helps banks to attract and retain customers by delivering a consistent, cost-effective, and superior customer experience across the organization, at all touchpoints. In addition, this positive customer interaction can help to foster trust and loyalty and strengthen existing relationships.

Table 2. Sun system configurations for testing SunGard software

Servers	Model	Processor	Cores	Memory
SunGard Ambit System Access Customer Service Manager Application Server	Sun SPARC Enterprise T5120 Server	One 1.16 GHz UltraSPARC T2 Processor	8	32 GB
SunGard Ambit System Access Customer Service Manager Database Server	Sun Fire T2000 Server	One 1.2 GHz UltraSPARC T1 Processor	8	32 GB
Storage	Disks	Controller	RAID Level	
Sun StorageTek 2540 Array	146 GB, 15K RPM, 3 Gb/sec SAS (12)	Dual 4 Gb/sec Fibre Channel	1+0	

## SUNGARD®

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