White Paper

Migrating An Oracle® ERP Database to an SGI® Altix® Platform

Table of Contents

1.0 Executive Summary

With a relatively small staff, the SGI IT group was able to successfully migrate the company's ERP databases from an outsourced data center to an in-house SGI Altix server platform. This IT white paper explains how the team was able to avoid the pitfalls that could have severely impacted business continuity, and minimize the time required to go live on the new platform. The migration process included excellent documentation and support provided by Oracle, a detailed proof of concept phase, multiple testing cycles, and rehearsal phases. The costs of the new hardware were recovered within the first year, making the SGI Altix platform an excellent choice for eliminating the rising maintenance and operating costs for the outsourced legacy servers. Additionally, the successful migration has put SGI in a position to introduce many other cost and operational efficiencies, and it is expected that the new deployment will continue to enable effective cost controls over the next decade.

2.0 Background

Through the years, the SGI information technology (IT) team has evolved the company's infrastructure to take advantage of the latest network and data center models for its global operations. Several years ago, the company reduced costs by adopting an outsourced platform for its central enterprise resource planning (ERP) database and Oracle® business applications. More recently, the company introduced an initiative to consolidate in-house databases and take advantage of the latest performance of the SGI® Altix® platforms to improve performance while gaining the operational efficiencies of a centralized data architecture.

The centralization project migrated more than 50 databases onto eight SGI Altix 350 systems. The project also introduced a storage area network (SAN) to consolidate storage. The benefits of the project include:

- Reduced IT staff requirements – Fewer people are required to support the SGI Altix servers and SAN in the data center, compared to the more than 100 departmentalized servers that were previously deployed.
- Better backup and disaster recovery – The centralized data model allows IT to carry out consistent backups and introduce disaster recovery resources and procedures.
- Elimination of unused storage – Consolidation enabled resource sharing across functional areas and projects, allowing less overall storage to be dynamically shared among teams.
- Efficient updates – Servers and software can more easily be updated, providing the company with a superior platform and constantly improving functionality.

The success of this project, combined with rising costs for the company's outsourced ERP platform, inspired a follow-on initiative to bring the company's ERP databases back in house onto SGI Altix platforms. The existing servers, now out of date, could not support the newest application solutions and were expensive to support. Instead of paying for new outsourced solutions, the IT team investigated the potential for an in-house Altix-based solution. The incentives, in addition to cost savings, were improved performance, increased reliability, and the ability to move to the latest software releases.

"With the move of our ERP database, we were essentially betting our business on the capabilities of the SGI Altix platform," said Grant Gouldon, senior IT manager at SGI. "The previous database consolidation project gave us the confidence we needed to make this move. The results we obtained from that project created a lot of excitement about the cost savings, performance increases, and a more reliable data architecture that we could gain by moving our ERP system onto Altix. We also felt much more comfortable with our business based on Linux, rather than a proprietary UNIX system. The move would give us the ability to leverage more industry solutions and more easily hire IT professionals familiar with the platform."

3.0 The Challenge

The SGI ERP system impacts every employee, with the human resources applications and data tied into the system. For strictly ERP functions, there are more than 100 power users that rely on the system literally every minute of the day. In addition, all manufacturing and finance employees have access to the system, adding up to several hundred active users at any point in time. All revenue-generating and business-planning functions are dependent on the availability and optimal operation of the Oracle database and applications.

The business-essential nature of the system makes any ERP migration a high-priority task. "Any time you consider a major change to the ERP platform, the potential benefits have to outweigh all the risks," explained David Fairbanks, CIO at SGI. "When we analyzed the move, we saw that the SGI Altix platform could do that. Not only would we gain immediate cost savings, but also we knew that we could get a five-year lifespan out of the Altix. This would extend the cost advantage over a longer-than-average pay-back period."

For SGI, however, the challenge of bringing the ERP database back in-house was made more complicated by several factors. The project involved managing multiple changes simultaneously:

- Physical location – the outsourced ERP server was located in Sacramento, and the corporate data center was in Mountain View.
- New hardware platform – The SGI Altix 64-bit environment was configured to optimize performance for the concurrent processes.
- Multi-node platform – Instead of a single monolithic server (the outsourced system was a 20-processor system); IT set out to employ a multi-node configuration to gain the performance advantages of load balancing and to introduce disaster recovery capabilities. It was decided to use five SGI Altix systems to host the 12 Oracle ERP databases. The Oracle business applications that access these databases are hosted on 32-bit Linux® systems.
- Host operating system – SGI as a company had committed to the Linux platform. The migration would require moving from Oracle on a proprietary version of UNIX to an open Linux system.
- Oracle release level – Upgrading to Oracle 10g (the current release at the time of the migration) was also a goal for the project, enabling the adoption of real application cluster (RAC) and other new Oracle capabilities.

The migration of any mission-critical application involves risk mitigation. Migrating the foundation for the main business applications—the ERP system—made it essential that the IT team carefully map out every part of the migration plan. The project team was given the additional challenge of managing the migration without increasing staff.

4.0 The Deployment

4.1 Proof of Concept Phase

The first phase for the deployment centered on a proof of concept (POC) exercise. Using the already-in-place SGI Altix database-hosting systems, the IT team set up a test environment and deployed the target Oracle 10g database engine. For a standard migration of Oracle to a Linux platform, Oracle provides very clear migration documentation. Since the SGI migration also involved upgrading to a newer release level and changing to a multi-node target platform, the POC was more complicated and required additional time to design and test the environment. Even so, the IT team accomplished this phase in six weeks—three weeks for designing the environment and three weeks for testing. This was the first migration of this scale for the IT team.

After the POC phase, the team was able to accurately prepare the user base for the migration process. By realistically setting expectations for down time and the changes in features, the IT team was able to minimize the pain of the migration. All global process owners for each of the revenue models were included in planning efforts and kept apprised of status.

4.2 Preparing the Source System

To migrate to Linux, Oracle provides detailed patch instructions for adjusting the source system. Since the SGI migration involved changing multiple simultaneous changes, the IT team made the decision to update the source system prior to the actual migration. Three months before beginning the move, the patches were applied to the outsourced system.

For this phase, the source system was kept in place as the corporate ERP platform. A test environment was defined on the source, and patches were installed following the well-defined Oracle upgrade process. This phase also employed a well-established SGI upgrade process. As with any update, the SGI IT team first tested the update and then followed procedures for user acceptance testing within the test environment. After sign off from both IT testing and user acceptance testing, the first system cutover took place and the source system upgrade was complete. The team was ready to move forward on the migration to the SGI Altix target.

4.3 Preparing the Target System

In parallel with the source system testing, the IT team set up a test environment on the target system and initiated user acceptance testing for the new Oracle-on-Linux system. This was obviously the more involved test phase and ran longer—users had six weeks to exercise the new system.

The test phases served two purposes. First, they validated the design and gave the IT team and management confidence in the overall migration plan. Second, they met the requirements for Sarbanes-Oxley (SOX) compliance in terms of carrying out appropriate due diligence for a project of this magnitude.

The target system was configured based on standard Oracle best practices and configuration recommendations. No customizations were introduced, ensuring simplified support and the ability to certify the kernel. Since the project yielded such positive results, there was essentially no reason to introduce customizations.

4.4 Rehearsals

During test phases, the IT team also carried out three rehearsals for the follow-on cutover and go-live for the new target system. These rehearsals allowed teams to fine-tune the plan and to rehearse resolutions of potential problem scenarios.

4.5 The Cutover to the New Target System

The new production environment was successfully deployed during a time that minimized risk to the company—the middle of a month in mid-quarter. Once it was up and running, but before it was made the production platform, the team invited a

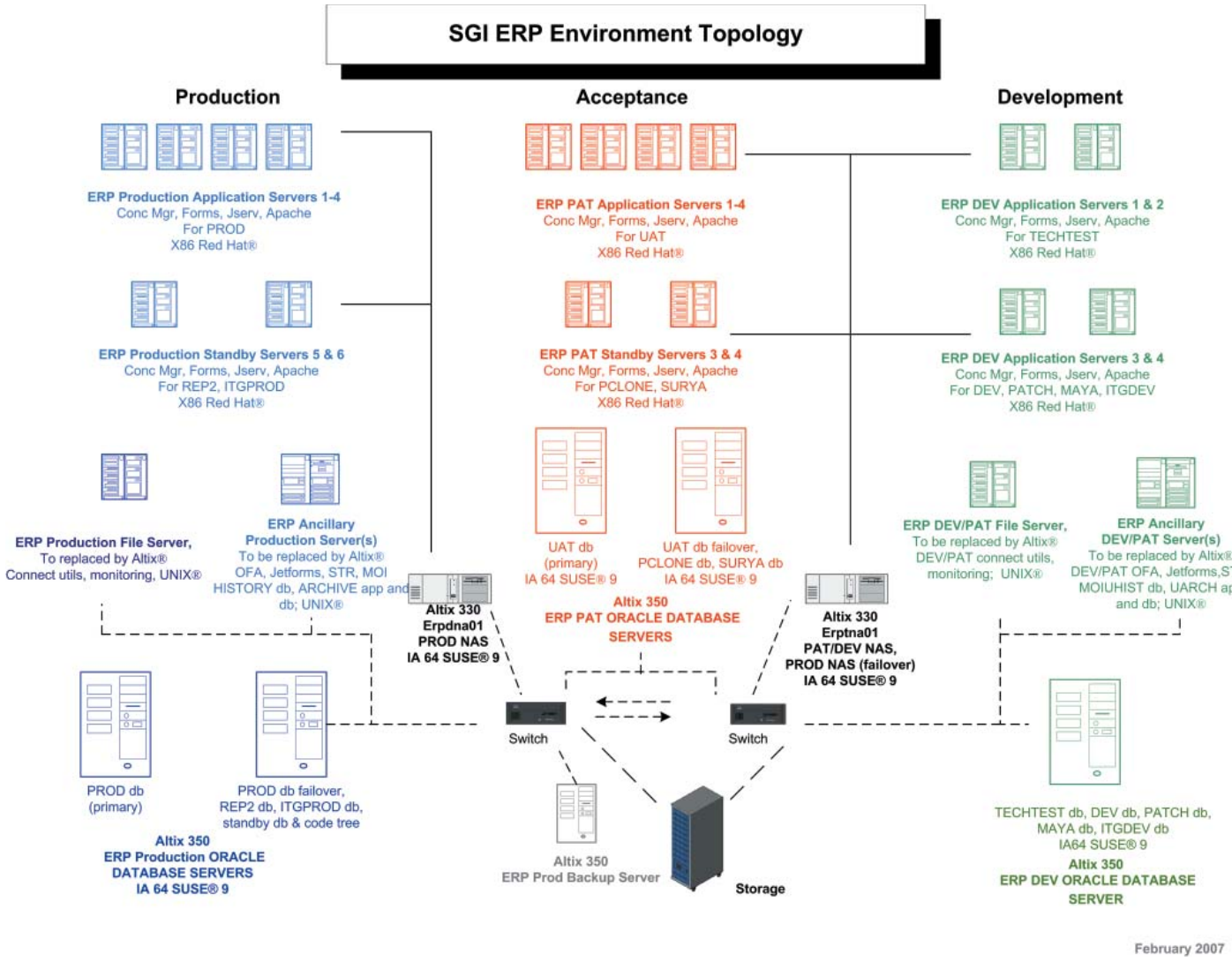

Figure 1. The SGI Oracle database servers.

broad base of users and analysts to exercise the system. This validation cycle allowed the final adjustments to be made to the new design.

The go-live of the new environment—making it the production environment for the company—was carried out over four and a half days of downtime. Figure 1 illustrates the new configuration for in-house hosting of the ERP database.

5.0 Results

The hardware performed flawlessly during all phases of the deployment, with the only hitch involving an Oracle issue that was quickly resolved by cycling the database. Today, the new database engine is giving users a significant boost in performance. The resulting productivity improvements impact all of the major business processes throughout SGI. As shown in Table 1, many database transactions have been accelerated by a factor of 3 or 4. Since SGI typically executes 40,000 concurrent programs each day, performance measurements were an important part of the test phases, with measurements carried out on both source and target systems. Although the performance improvements were a result of many factors—the move to the Altix platform, the introduction of an efficient SAN, a new database structure, and fresh data compressions—it is important to note that the SGI Altix platform delivered stable performance from the start. No instabilities were introduced as a result of the change in platform.

Concurrent Program Name - Data 3 mo. before and after cut over; Sampling of 700 typical process jobs	**No. of Runs**	**Average Run-time per Run**	**No. of Runs**	**Average Run-time per Run**	**Improvement on Altix (Factor)**
Order Reschedule Report	4	5.5	3	27.33	4.969
Holds Summary Report	287	11.09	301	55.02	4.961
HR Reporting Tables Refresh: Employees	68	102.68	68	507.82	4.946
INV Item RoHS Import Load Program	134	1.6	128	7.77	4.856
Sales Comp AR/OM Exception Report	45	4.09	45	19.47	4.76
Receipt Accruals - Period-End	6	21.67	6	102	4.707
Receiving Value Report by Destination Account	133	43.21	126	198.65	4.597
Gather Schema Statistics	540	180.57	516	810.21	4.487
Maintain Person Security List information(Internal)	1609	90.21	1610	403.32	4.471
Sales Comp Error Checking for Consolidation	388	0.62	284	2.76	4.452
Chart of Accounts - Account Hierarchy	2	2.5	2	11	4.4
Invoice Validation	323	17.16	340	75.16	4.38
HR Reporting Tables Refresh: Assignments	68	242.57	68	1039.68	4.286
Multiple Languages	32	2.06	34	8.53	4.141
SGI Accept Consolidated Invoice	12	8.33	13	33.92	4.072
Reprint Consolidated Invoice	11	127.82	11	518	4.053
Billing and Receipt History	32	7.28	29	29.45	4.045
Accrual Rebuild Reconciliation Report	3	682.67	3	2691	3.942
Mass Additions Create	12	307.17	12	1202.67	3.915
Recurring Journal Entry	20	1.1	20	4.25	3.864
Aging - 7 Buckets - By Account Report	18	22.72	22	85.23	3.751
Sales Comp BBB By Product Report	275	17.23	272	59.42	3.449
QP Delete Pricing Attributes	3	168.67	3	567.67	3.366
Launch Planning Processes	19	0.58	14	1.93	3.328
SGI EDI INO 810 Invoice Outbound Program	68	95.47	68	143.78	1.506
Depreciation Run	116	72.57	117	91.03	1.254
Transaction Batch Processor	7	1084.86	8	1125.88	1.038
Open Purchase Orders Report(by Buyer)	1	34	3	33	0.971
SGI INV Item RoHS Import Program	68	155.25	67	134.54	0.867
Purge Concurrent Request and/or Manager Data	390	587.66	389	507.03	0.863

Table 1. Sample of Performance Measurements From Multiple Runs of All Programs

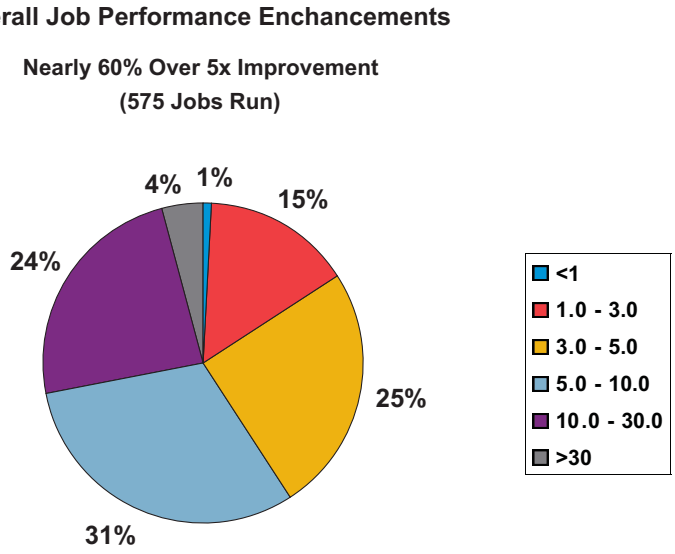

Table 2. Improvement on Altix (Performance Enhancements; Percentage of 575 Jobs)

"The performance improvement was dramatic for our users and we've had great response from all of the business process owners," said Fairbanks. "Since the upgrade we've had not a single performance report—we used to routinely get reports of problems with slow-downs, especially during critical peak periods. Now, IT is no longer in the critical path for solving performance problems. This is really impressive when you consider that we moved to a system with a smaller footprint, lower TCO, and overall improved operation."

At the time of the go-live, the user base was so impressed with the performance that IT received some calls expressing disbelief. For example, some jobs that used to take three hours were running in only 20 minutes—employees thought that the program must not be executing and had to be reassured that everything was working.

Other benefits achieved by the migration to the SGI Altix platform include:

- Cost reduction – More than $2-million per year in maintenance costs have been eliminated, by eliminating the legacy system. The Linux platform is easy to support, with many system administrators already familiar with the environment. Other costs have been avoided since the outsourced system was in need of a major hardware upgrade or replacement. The existing IT staff is able to support the new platform, without adding any headcount.

- Increased reliability – The load-balanced solution and proven reliability of the SGI Altix platforms eliminate the single point of failure that characterized the previous monolithic server platform.

- Flexibility and upgradeability – "With the Altix platform, we can add horsepower and introduce new modules as we require," said Gouldon. "We can increase capacity more easily than we could on the previous monolithic server. We can even split the servers themselves—we have total flexibility for adjusting the platform to our changing business requirements."

- Ability to complement Oracle RAC – By upgrading to Oracle 10g, SGI is now ready to take advantage of Oracle RAC. The modular architecture of Altix is an excellent fit with the Oracle RAC design. Processors or memory can be easily added or the SAN expanded to keep pace with Oracle modules. In the future, the database can even be deployed as memory-resident data, boosting performance further.

- Expanded life expectancy for ERP platform – A lifespan of three years is the norm within the IT industry. By moving to the SGI Altix blade-based architecture, the team projects a lifespan of at least five years for the new system with the potential to stretch it to seven. In addition, they can incorporate many upgrades and enhancements during that time, due to the ability to easily introduce new hardware transparently.

6.0 Lessons Learned

With a relatively small staff, the SGI IT group was able to carry out this migration process without experiencing any setbacks or pitfalls. With the excellent documentation and support provided by Oracle, many risks can be mitigated during POC, testing, and rehearsal phases. The costs of the new hardware are recovered within the first year, making the SGI Altix platform an excellent choice for any business that is experiencing rising maintenance and operating costs for legacy servers. The added advantages of the performance improvements, increased reliability, and other benefits just listed make the choice of the SGI Altix both a short-term and long-term win.

"We are now in a position to introduce many other cost and operational efficiencies," summarized Fairbanks. "We plan to migrate other business applications onto the SGI Altix platform, and we know we'll continue to improve overall productivity for our organizations while we effectively control costs over the next decade."

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