



Customer Name

Project Reference

Software Gems Pty Ltd

V1.1
05 Mar 01

Customer Name Withheld



The bank is the largest of the 'Big Four' in Australia. The Division cannot be named. The bank Auditors are available as referees.

1 Existing Status

This is a Front Office system, planned as an Online Transaction Processing system (200 users), including substantial reporting (additional 200 users outside the Division); no web access. Five business units (Equity, Fixed Interest, FX, Cash, Property) had written five systems, essentially closed, each with its own "database", which had grown and expanded over time. Although each system had partial Compliance (legal and mandate), the Divisional Compliance was not being met. The five databases were hosted on a single Sun E5500 running Sybase. Further, the data transfers between the systems, which were adequate initially, were no longer acceptable. Data integrity problems which were small had grown to unacceptable levels. Overnight jobs were running into the next morning. The labour required for Reconciliation with the Back Office (Settlements) had doubled, and month-ends were delayed up to three days. The business was requesting a second server onto to which they planned to off-load the reports; reporting for external customers (web) was planned.

At that point a Technical Audit was performed. The Auditors found the system unworthy of further extension, and gave the Division one year to fix or replace the five systems, and to implement Divisional Compliance for the \$42 billion Funds under Management. Funds were made available for the remediation purposes, but no hardware purchase or upgrade was permitted.

2 Project

We provided the following services in a 15 month project:

- full data architecture and *Sybase* DBA service for the duration
- full *Solaris* system administration for the duration
- reconfiguration of the *Sybase* server and disk resources (for changed usage, not performance)
- a single Divisional database, Normalised to 5NF
- 100% rewrite of the five applications (client- and server-side components)
- using the same project team of five developers plus testers, data admin staff, etc.
- education for project team re Transactions, Standards, Concurrency
- *PowerBuilder* and Java Class Library
- full Release Control
- historic monitoring (*Sybase* and *Solaris*)
- elimination of all data transfers and application batch jobs (maintenance jobs remained)
- resolution of all issues (data integrity as well as performance) related to 12 external electronic feeds

Due to the success, toward the end of the project, a single extension under our supervision was approved:

- web reporting (a small Intel Linux server was permitted for the additional functionality) for unlimited (unknown) external users via *BusinessObjects*

The Back Office, with whom we worked closely to ensure data sharing and Compliance, provided Settlement services for another division that had \$70 billion Funds under Management. They moved their entire system to onto ours:

- we moved the Reference tables and incoming data feeds onto a shared database (to avoid maintaining two copies of such; this provided full sharing of the common and non-confidential resources; avoided increased licence fees; etc)
- we copied our database schema and migrated all their data from the legacy system: this provided two separate, secured databases, one each for the Front Office and the Back Office/Client Services, plus the shared Reference database
- their data maintenance staff was eliminated (moved to other positions)
- the additional load was 5 OLTP user and 30 report users
- they purchased 1GB RAM, and their own disks



3 Manifest

This summarises the inventory of items changed or replaced, before after the project, in terms of audited components. The Manifest was made before the Back Office was migration was commissioned, and thus excludes their database, and the additional hardware purchased for them. For further detail refer to the *sysmon* statistics.

	Before	After
Application	5	5
PowerBuilder	50%	45%
Java	0%	5%
SQL	50%	50%
Report (various)	100%	
Report <i>BusinessObjects</i>		100%
Database	5	1
Table	1,010	
Consolidated ¹	~500	702
Index	4,050	
Consolidated ²	~2,000	1,214
Foreign Key	440	1,200
Stored Proc	550	1,150
Uncompiled SQL ³	~200	0
Average Tables per <i>SELECT</i>	2	9
Cursor	~120	0
Background Process	0	4
Capacity Allocated	500GB	200GB
Capacity Used	100%	90%
Fragmentation	Not Known	2%
<i>Sybase</i> Server	11.5	11.9.2
Capacity (RAM)	3.0GB	3.0GB
Parallelism	4	8
Device	70	32
Listener	2	4

This summarises the change in the utilisation of the hardware resources.

Load - Business Day		
CPU Usage	35%	19%
<i>Sybase</i> Server	82%	54%
Locks (Peak)	3,000	50
Transaction (Average)	12ms	2ms
Transaction (Peak)	180s	323ms
Highest Wait ⁴	Lock	Disk
I/O	800B	360B
Context Switch	1.2T	665B
Deadlocks	~10	0
Deadlocks (Month End)	~40	0
Load - Day End		
CPU Usage	55%	19%
<i>Sybase</i> Server	85%	31%
Locks (Peak)	5,000	720
Overall Duration	13h	45m
Highest Wait ⁴	Lock	Disk

1 The tables were Unnormalised, with partial duplication within each database; partial duplication across databases was present. Therefore the figure for actual tables is not readily comparable with the single Normalised database. The indicative figure, if the tables had been placed in the same database and consolidated, while remaining Unnormalised, is 500.

2 Likewise the indicative figure for indices is 2,000.

3 Client programs in the old system sometimes sent batches of uncompiled SQL to the server; this was replaced with stored procedures.

4 A tuned system is disk bound, because that is the slowest component; the old system was processor bound for the most part, and lock bound during heavy concurrent processing.



4 Hardware

Two changes were made to the hardware:

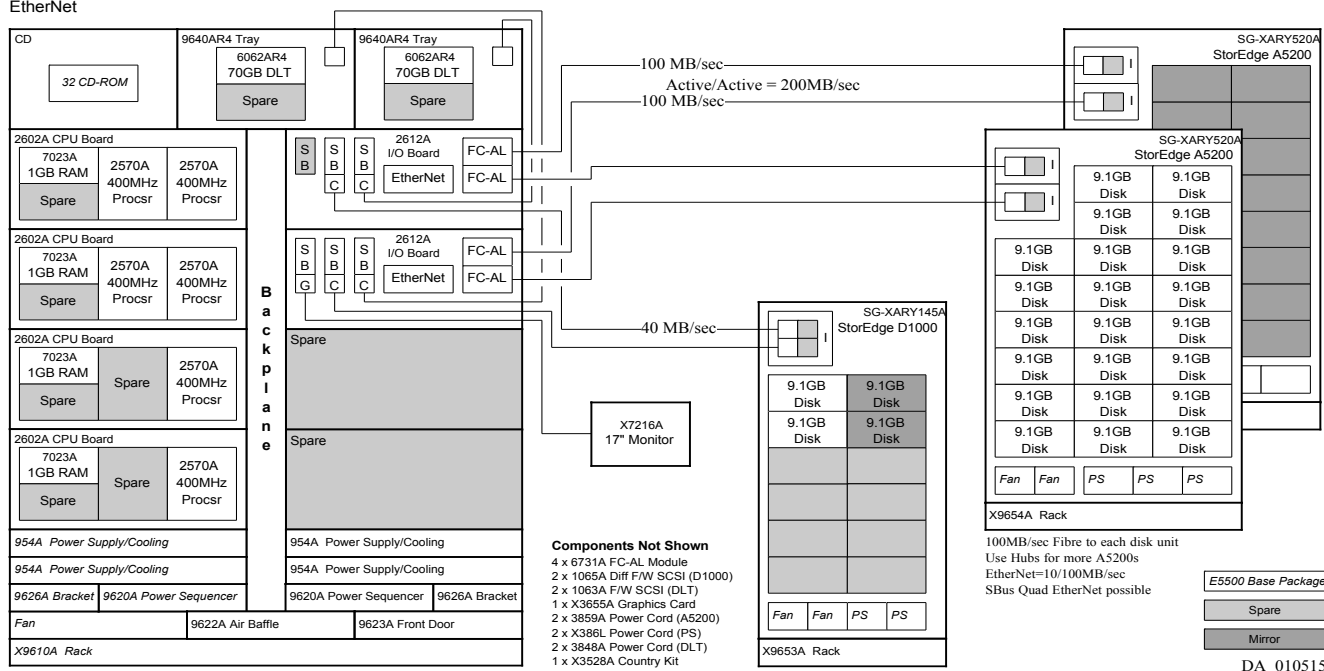
- the disk capacity was reduced from 3 x A5200 (600GB) to 2 x A5200 (400GB)
 - the disk configuration was changed from striped RAID0 to mirrored and striped RAID1+0, yielding 200GB
- minor version changes to the network cards, to enable spare capacity to be used

The *Solaris* resources were re-organised slightly to improve performance (2 mans days). All *Solaris* patches and upgrades for the project duration were performed.

Production System

Sun Enterprise 5500

6 x 400MHz UltraSPARC II Processor
 4 x 1GB Memory
 2 x A5200 (22) Disk
 1 x D1000 (4) Disk
 EtherNet



The Disaster Recovery/UAT system is identical to Production, at the *Solaris* and *Sybase* configuration levels, with the only difference being, it has twice the disk capacity (3 x A5200 changed to 4 x A5200).

Log Shipping (instead of Replication) is used to migrate transactions to the DR server, every 15 seconds. The external Data Feeds and channels supporting same remain unchanged.