Sun Storage 7000 For
ORACLE® DATABASE CONSOLIDATION

INCREDIBLE OPERATIONAL
EFFICIENCIES

KEY FEATURES
- Database consolidation-S7000 supports multiple Databases

- Increase application performance

- Automatic data placement on storage tiers

- Advanced Analytics

KEY BENEFITS
- Increase operational efficiency

- Improve resource utilization

- 60% less cost than traditional storage

- Increase DBA productivity

Databases, the backbone of business operations, are not all alike. Transactional databases are different than analytical databases and test databases are different than production databases. Each type of database requires a different level of storage resources and administrator attention to meet service level agreements (SLAs) and other business needs. Invariably, as new applications are deployed, mergers and acquisitions occur, or the business evolves and grows, so the number and types of databases proliferate throughout the organization. This typically results in escalating inefficiencies and costs which in turn drive database consolidation initiatives.

Unlike traditional solutions, the flexible architecture of the Sun Storage 7000 series is uniquely well-suited for database consolidation. The architecture easily supports multiple databases while accommodating specific and changing performance and capacity requirements — now and into the future. The platform can also gracefully co-exist with traditional architectures in the datacenter and can easily be installed in minutes. No special training to configure or administer the Sun Storage 7000 System is required. Consolidations using the Sun Storage 7000 platform can result in greatly improved resource utilization and operational efficiencies, the increased ability to meet SLAs, a reduction in complexity, and a significant cost savings

Breakthrough Simplicity, Performance, and Savings

Oracle's Sun Storage 7000 Systems deliver superior performance and simplicity at up to 60% less cost than traditional solutions. The storage architecture of the Sun Storage 7000 System is based on cost efficient industry standard components and a robust software stack While many other vendors charge license fees for protocols and data services — such as CIFS, NFS, iSCSI, Thin Provisioning and Replication, Deduplication and Compression — these and other software features are included in the base price of Sun Storage 7000 Systems. No additional software licenses are required. Sun Storage 7000 Systems deliver further economic value by reducing energy consumption and datacenter space requirements.

Breakthrough Data Placement: Hybrid Storage Pools (HSP)

Determining and controlling what type of media the consolidated database's data should be stored upon presents significant challenges to users of traditional storage systems. These challenges are further complicated as data value changes over time. Traditional solutions that rely on static RAID configurations based on different sizes and speeds of disk drives may work well for a single database — as controlling data placement in a simple system can be fairly straightforward. However, when multiple and independent systems need to share storage resources — as in the case of database consolidation — keeping the right data on the right media at the right time becomes a significant and complex management task. Plus, changes in business processing rapidly drive variations in system usage that can result in sub-optimal data storage. As it is difficult to manually balance system resources to reflect changing business needs, it is not uncommon for nearly idle data to be inefficiently stored on relatively fast and

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UNIQUE HYBRID STORAGE POOLS

Dramatically optimize database and application performance and reduce I/O bottlenecks with no administrator intervention via automatic and intelligent data placement across the storage hierarchy (DRAM, SSD, and HDD)

ADVANCED ANALYTICS

Improves operational efficiencies by providing powerful insights into data storage workload requirements for proactive system troubleshooting, improved resource provisioning, and accurate capacity planning

FULLY INTEGRATED HARDWARE AND SOFTWARE STACK

Includes a full suite of data services that are normally sold separate are included and reduces license key management complexity Product Support Services

expensive storage resources while critical data is referenced from much slower high capacity storage media.

In such cases, resolving the problem — if it is identified — may require intervention or even system outages to migrate the various data to the appropriate media. As business patterns and application needs

Figure 1 Hybrid Storage Pools automatically placing data on storage tiers depending on business value

invariably change, the situation could reverse — requiring a migration of the data back to its original location. The unique Hybrid Storage Pool (HSP) capabilities of Sun Storage 7000 Systems provide an effective solution for efficiently optimizing data placement — and customer satisfaction. HSPs dynamically and intelligently cache active data over multiple tiers of storage media — without the need for administrator intervention. Since the HSP provides around-the-clock automatic caching, changing business needs are easily — and efficiently — processed by the storage system. The most active applications can reference their data from the higher performance, lower capacity storage resources, while data from idle applications is safely protected on slower, higher capacity storage. As once-critical data becomes idle over time, the HSP automatically moves it out of cache so that newly important data can quickly replace it to meet the performance needs of the now active application.

The efficiencies made possible by HSPs enable significant cost savings. HSPs remove operational expenses associated with manually shuffling data, and they reduce revenue losses related to poorly performing business applications. HSPs also reduce capital expenses by greatly improving storage capacity utilization. As the HSP dynamically adapts to changes in data usage activities, there is a lower probability that idle data will be stored on expensive, high speed media — thus freeing that media to serve more critical active application data needs. This results in less need to procure and provision expensive, high performance storage to maintain a given quality of service. Similarly, the traditional costs of protecting active data by providing duplicate media in the cache is also unnecessary because the HSP will continue to store complete copies of application data on the less expensive, high capacity media. Finally, relative to traditional mirrored storage systems with the same amount of physical storage media, HSPs enable additional savings by delivering up to twice the effective capacity of the available media — a 100% increase in storage utilization efficiency. Meanwhile, HSPs automatically increase application performance by making the entire infrastructure appear as fast as solid state flash storage.

Breakthrough System Monitoring: Analytics

System planners and administrators tasked with consolidating databases to a central storage resource can quickly lose expected financial gains if risk mitigation leads to over-provisioning system hardware, or if a complex, performance-related escalation consumes IT staff time or cuts into top-line revenue. With traditional storage systems lacking comprehensive performance monitoring and accounting tools, planners often use very rough estimates to make critical architecture decisions or to mitigate the risk of a mistake or problem. This often results in the significant over designing of the
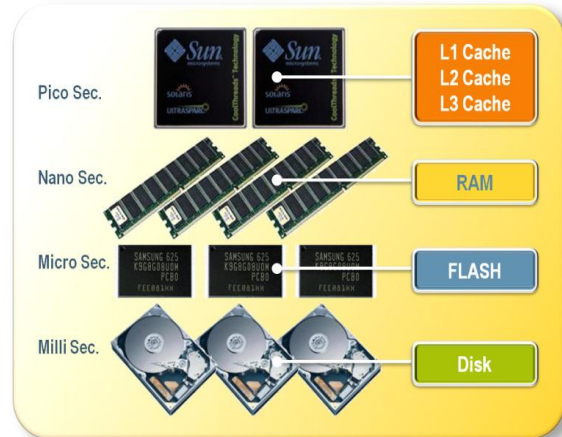
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DATA SERVICES

Included data services such as Snapshot and clone enable creation of a nearly unlimited number of databases to support production, test, and development, and Q&A requirements, while Thin Provisioning provides improved storage utilization by allocating physical space to the share of LUN as needed

SCALABILITY

Simultaneous scaling in multiple dimensions - including capacity scaling from 4 TB to 576 TB – enables optimization of database working sets with flexible provisioning of compute power, storage capacity, and performance resources

ECO EFFICIENT

ECO-Efficient design reduces power consumption and space

system. Likewise, a lack of clear and concise historical and real-time system behavior information can make it difficult to determine what caused a performance problem. For example, was the problem caused by a change in how the business was using data, a failure outside of the storage system, or a failure in the storage system itself? Typically, when available information does not clearly and accurately show the root cause of the problem, escalation resolution time — and operational cost — increases.
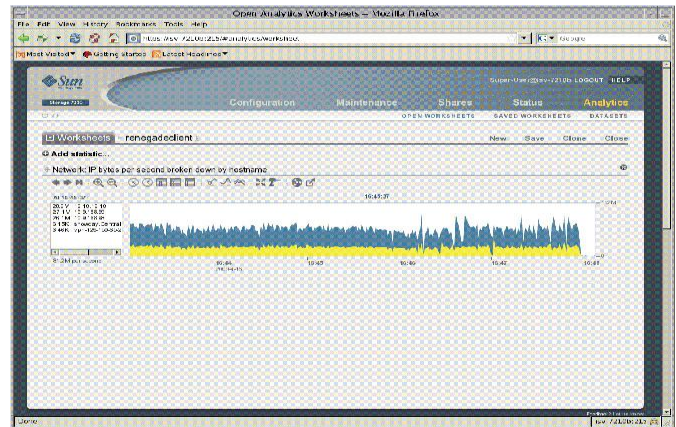
The unique Analytics capability of the Sun Storage 7000 solves these problems by changing the instrumentation paradigm for storage systems. Building on the comprehensive health monitoring features common in the Sun product portfolio, Sun S7000 Analytics offers the industry's most advanced system performance monitoring environment. Beyond showing administrators a list of failed components, Sun S7000 Analytics, as depicted in Illustration 2 and Illustration 3, provides unique real time views of the performance of vital system parameters. Illustration 2 shows a record of

Figure 2 Analytics example displaying when specific Oracle database files were accessed
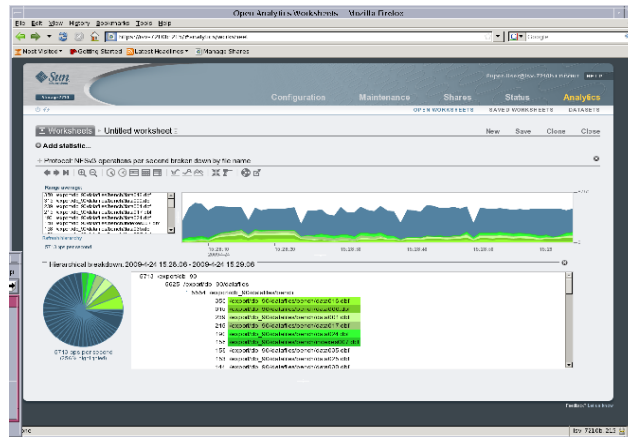
when specific Oracle database files are accessed and how often they are accessed, and Illustration 3 shows a summary of IP traffic to the Unified Storage System broken down by client. Analytics also maintains comprehensive historical records of how the system previously behaved as application data flowed through it, including how the storage system was used and how the components within the system responded. Readily available Analytics information includes who accessed the storage, what parts of the storage they accessed, and how those access patterns changed over time as well as how the individual components of the storage system behaved while supporting the workload. An intuitive graphical user interface makes this data obvious and accessible to staff throughout the IT organization. This feature allows database, storage, and

Figure 3 Analytics showing I/O throughput performance by individual host

system, network administrators to work together smoothly, efficiently, and accurately. With the insights made available by Analytics, system planners and administrators are better informed to design, build, maintain, and optimize consolidated storage systems, and as a result, can

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deliver increased value to the businesses they support.

Breakthrough Data Protection: Self Healing Storage

Traditional RAID technology effectively protects business data from the loss of a physical component, however, it fails to address subtle issues related to bit-level failures — known as bit rot — on storage media. In cases where data retention requirements are short and capacity requirements are minimal, the odds of a bit-error condition are small, and traditional RAID can be an effective architecture. However, when data retention requirements are long and extensive storage capacity is needed, protection from bit-error rate on the storage media becomes important.

With traditional systems, a solution to bit rot is to have backup administrators generate and store multiple copies of information to allow reconstruction of the information from copies on alternate media. While technically feasible, using administrative staff to maintain multiple copies of data on multiple media devices is inefficient and time-consuming.

The self-healing architecture of the Sun S7000 provides a better solution by protecting data from bit rot using advanced data checksumming technologies. The Sun S7000 augments and improves traditional checksumming approaches with automatic detection and repair of bit rot before the application — or administrator — ever knows a bit error has occurred. As a result, recovery from bit rot is immediate and transparent. This frees system administrators to spend more time optimizing the business and less time recovering from bit errors on storage media.

A Paradigm Shift in Scalability: Scale Any Aspect of the System

The physical architecture of the Sun S7000 is designed to ensure that customers have the right amount of hardware to meet their performance and capacity needs today, and that they can gracefully perform incremental upgrades as their business grows. Scalable from 4 TB to 576 TB, the system is available in a wide range of configurations that ensure accurate matching of physical resources to customer-specific protection, performance, and capacity requirements. Illustration 4 highlights the design heuristics for each member of the Sun Storage 7000 Unified Storage Family.

4 Sun Storage 7000 for Oracle® Database Consolidation

Oracle Real Application Clusters for up to four CPUs is included with Oracle Database 10g Standard Edition license.
See details at: oracle.com/database/rac_home.html (o. chart note)

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