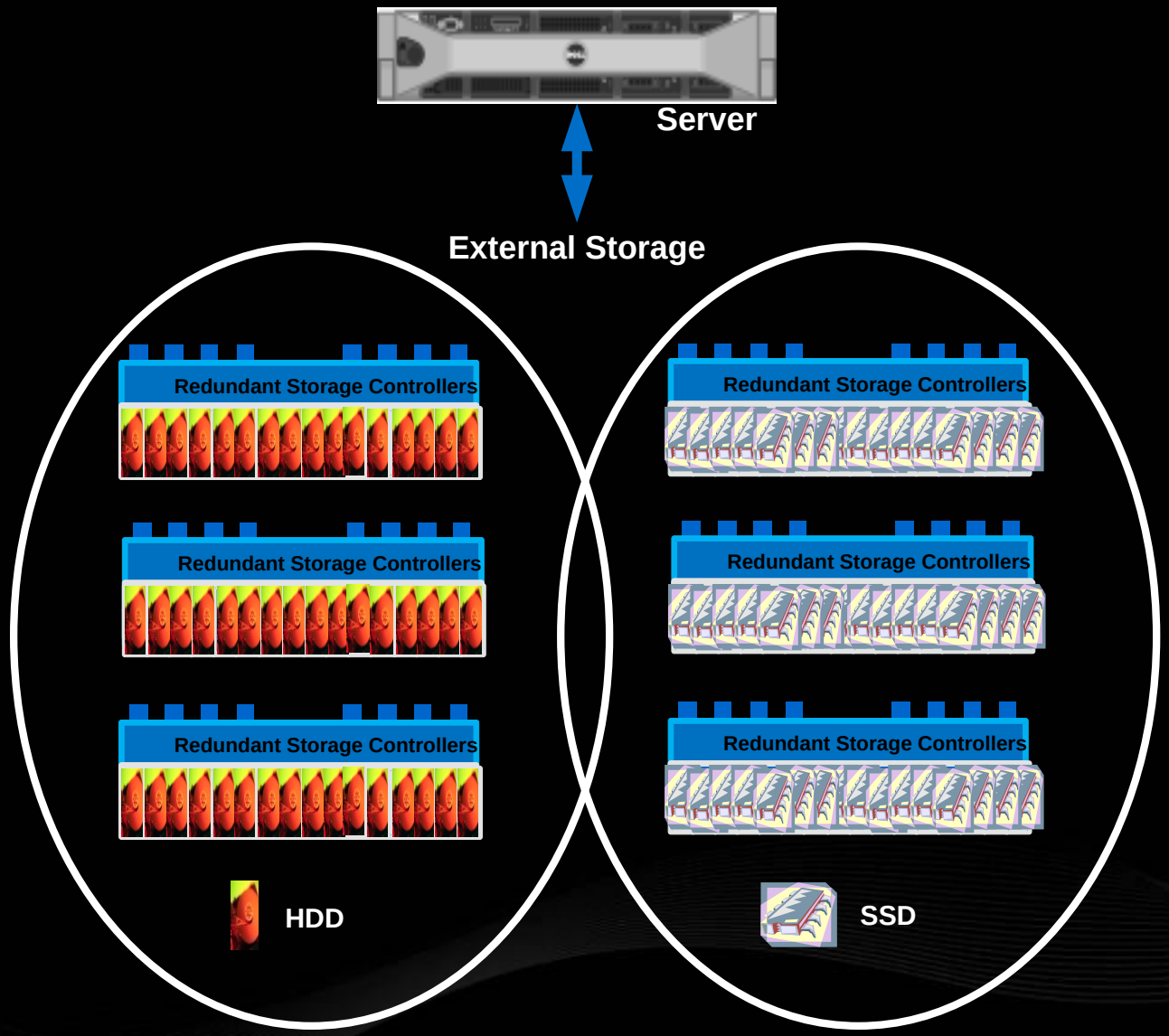
DEPLOYING ORACLE USING SSD WITH DELL / EQUALLOGIC ARRAYS

ORACLE OPEN WORLD 2009

INTRODUCING DELL EQUALLOGIC PS6000S SOLID STATE DISK (SSD) ARRAY

- Ideal for “SSD Friendly” Workloads
  - Latency-sensitive, with high small block random I/Os
    - SSD has no seek and no rotational delays
    - Deploying more SAS disks for the same workload doesn’t reduce rotational delays!
- For “SSD Friendly” Oracle Workloads deploying PS6000S in place of PS6000XV
  - Increases Transaction Throughput
    - By up to 75%
  - Improves Customer Satisfaction
    - Lower transaction Response Time by up to 60%
  - Reduces Energy Costs by > 95%
    - Active Power usage in 50 GB SSD = O.4 Watts
    - Typical Power Usage in 15K RPM 450 GB HDD = 17.3 Watts

DELL EQUALLOGIC PS6000S SOLID STATE DISK STORAGE ARCHITECTURE



ORACLE I/O NUMBERS (ORION) OLTP WORKLOAD RESULTS

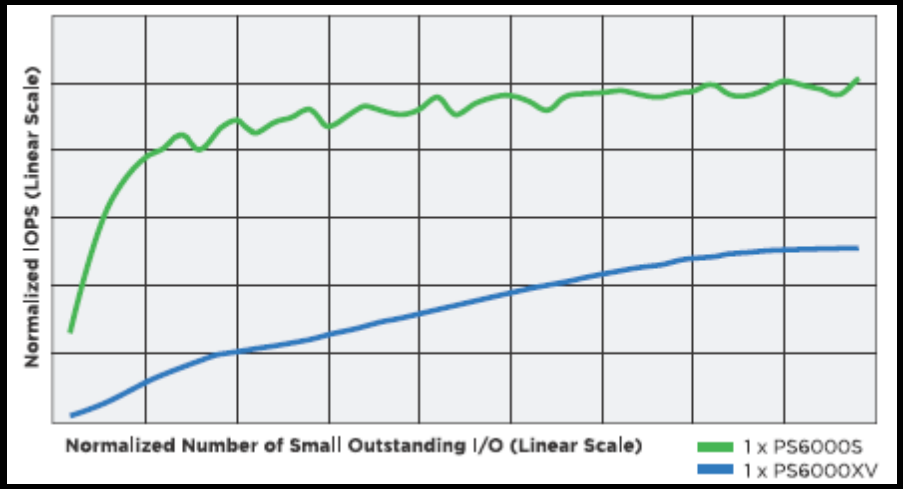


Figure 1 – IOPS vs. Load for OLTP workload

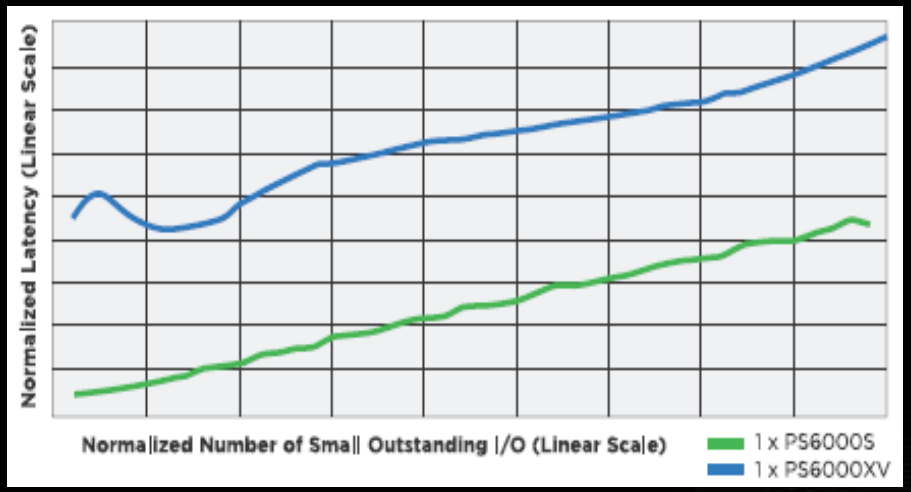
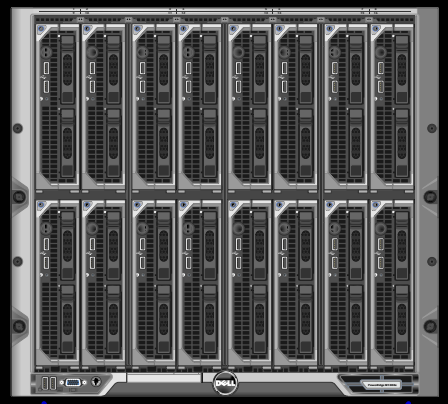


Figure 2 – I/O Latency vs. Load from OLTP workload

Dell EqualLogic PS6000S (SSD) delivered approximately 2.5 to 3 times better IOPS as compared to PS6000XV (SAS) at higher load levels, and up to 12 times better IOPS at lower load levels, with lower disk latency.

ORACLE 11G R1 RAC DATABASE FOR BENCHMARK FACTORY TPC-C TESTING



Dell PowerEdge
Blade servers

Switched
Gb Ethernet

Dell EqualLogic iSCSI Storage SAN

Storage Group

Oracle Clusterware File Volume*
Data Volume
FRA Volume
SAS Storage Pool

SSD Volume 1
SSD Volume 2
SSD Storage Pool

PS6000XV (SAS)

PS6000S (SSD)

*Oracle Cluster Registry (OCR) and Cluster Synchronization Services (CSS) Voting Disk

IDENTIFYING CANDIDATES FOR SSD DEPLOYMENT

- Oracle database has high elements with high I/O demands
  - Online redo log files
  - Undo tablespaces
  - Temporary tablespace
- Read-intensive database objects are primary candidates to be moved to SSDs.
- Read-intensive objects can be identified by AWR reports

Owner	Tablespace Name	Object Name	Object Type	Physical Reads	%Total
QUEST	QUESTDATA	C_ORDER_LINE_I1	INDEX	32,623,712	57%
QUEST	QUESTDATA	C_ORDER_I1	INDEX	11,026,784	19%
QUEST	QUESTDATA	C_STOCK_I1	INDEX	6,391,040	11%
QUEST	QUESTDATA	C_STOCK	TABLE	1,804,912	3%
QUEST	QUESTDATA	C_ITEM_I1	INDEX	970,832	1%

Table 1 – Segments by Logical Reads

Owner	Tablespace Name	Object Name	Object Type	Physical Reads	%Total
QUEST	QUESTDATA	C_ORDER_I1	INDEX	2,758,009	45%
QUEST	QUESTDATA	C_STOCK_I1	INDEX	1,635,640	27%
QUEST	QUESTDATA	C_STOCK	TABLE	787,727	13%
QUEST	QUESTDATA	C_CUSTOMER	TABLE	142,056	2%
QUEST	QUESTDATA	C_ORDER	TABLE	123,568	2%

Table 2 – Segments by Physical Reads

BENCHMARK FACTORY OLTP WORKLOAD RESULTS

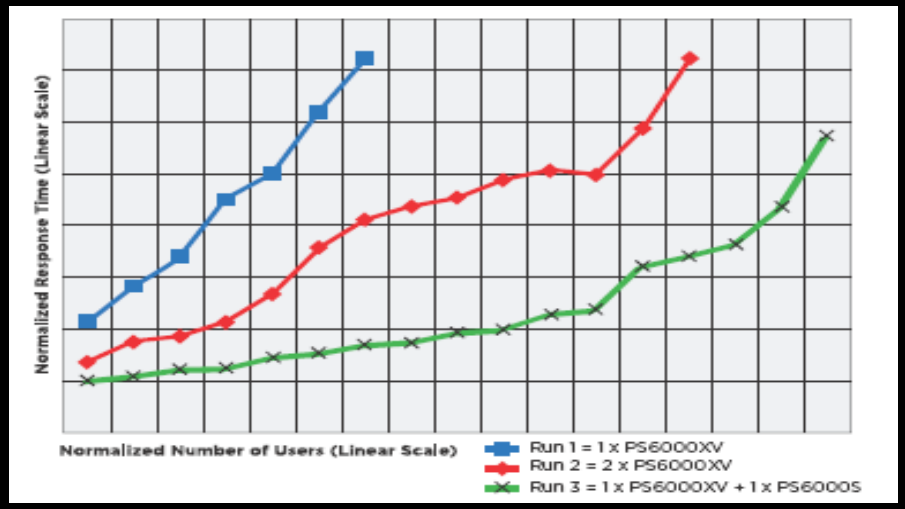


Figure 3 – Transaction Response Time vs. User Load

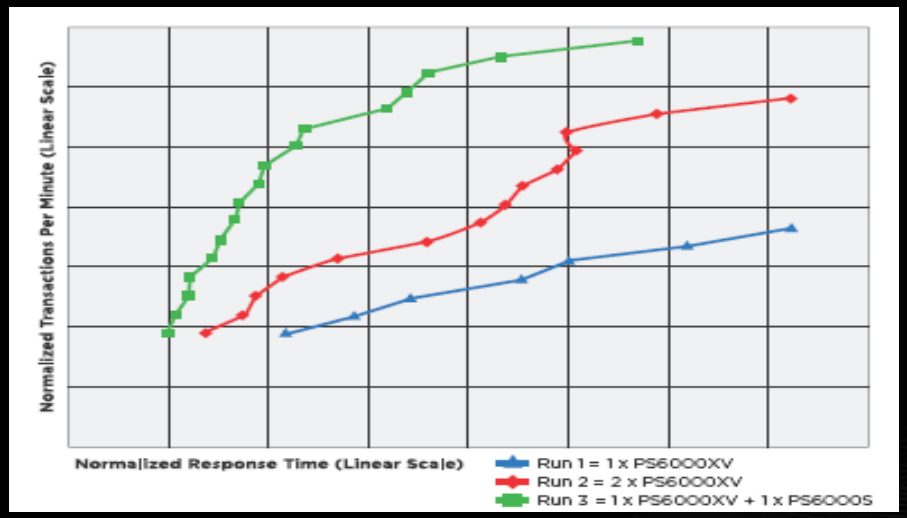


Figure 4 – Transaction Per Minute vs. Response Time

Isolating and moving read-intensive datasets in Oracle OLTP applications from SAS disks in a PS6000XV to SSD disks in an additional PS6000S, as compared to SAS disks in an additional PS6000XV, can improve application transaction response time by up to 60%, and can increase application transaction throughput by up to 75%.

RESOURCES

- Dell Oracle solutions web site - http://www.dell.com/oracle
- Dell Oracle 11g / 10g Tested and Validated configurations http://www.dell.com/content/topics/global.aspx//alliances/en/oracle_deployment?c=us&cs=555&l=en&s=biz&~tab=1
- Dell Oracle database advisor tool - http://advisors.dell.com/advisorweb/Advisor.aspx?advisor=0bf89fb8-d488-4779-97ee-6d2918825773&c=us&cs=555&l=en&s=biz
- Dell whitepaper: Best Practices for implementing SSDs with Dell EqualLogic PS6000S storage running an OLTP workload http://www.dell.com/downloads/global/solutions/best_practices_EqualLogic_PS6000_storage.pdf?c=us&cs=555&l=en&s=biz