Enterprise Storage

SPC-1C Case Study

Consistent Performance

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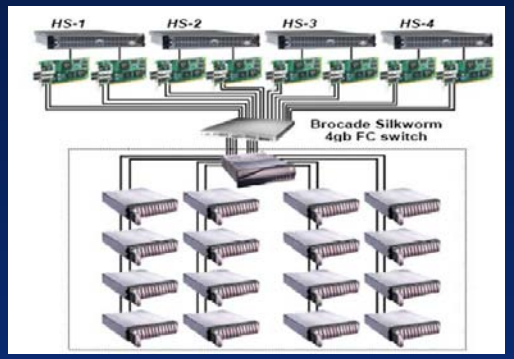
Storage Performance Council (SPC) is a non-profit corporation founded to define, standardize, and promote storage subsystem benchmarks .
The goal of the SPC is to serve as a catalyst for performance improvement in storage subsystems.

founded in 1998, to: Define, standardize and promote industry standard storage benchmarks.

Many Storage Industry Companies are Members

SPC Benchmark Spectrum

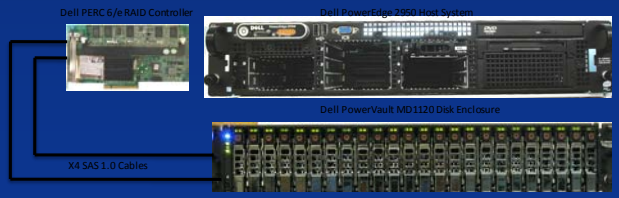


Complete system subsystem benchmarks

SPC Benchmark 1 *(SPC-1)*
SPC Benchmark 1/Energy *(SPC-1/E)*
SPC Benchmark 2 *(SPC-2)*

Component focused benchmarks single enclosure and below

SPC Benchmark 1C *(SPC-1C)*
SPC Benchmark 1C/Energy *(SPC-1C/E)*
SPC Benchmark 2C *(SPC-2C)*:



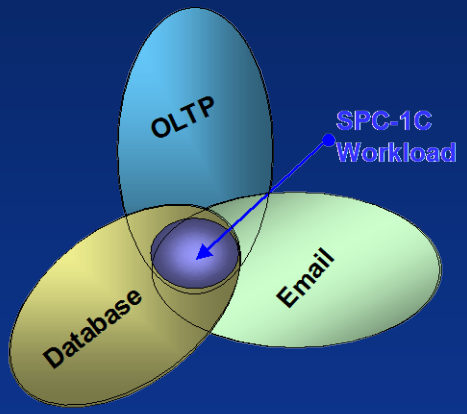
SPC-1C Benchmarks

Synthesized Real-world workloads

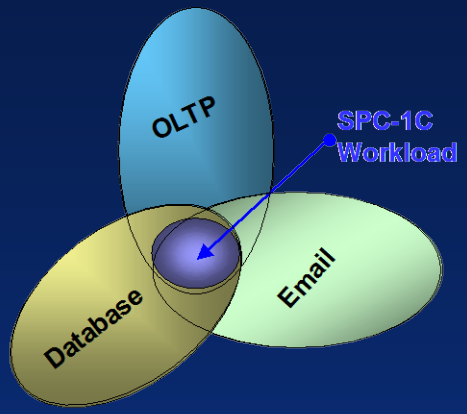
Platform independent

- ✓Win200x x32/x64
- ✓ Solaris
- ✓ Linux

Interface independent SAS/FC/SATA



SPC-1C Benchmark

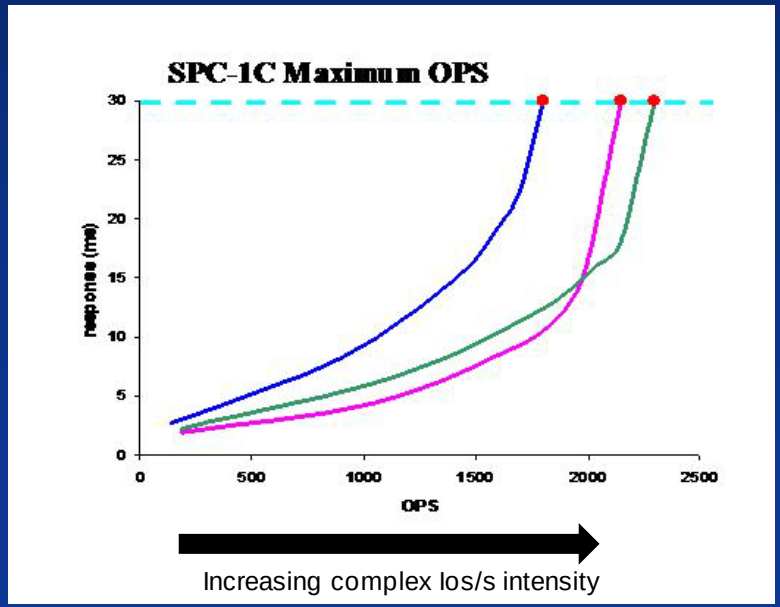


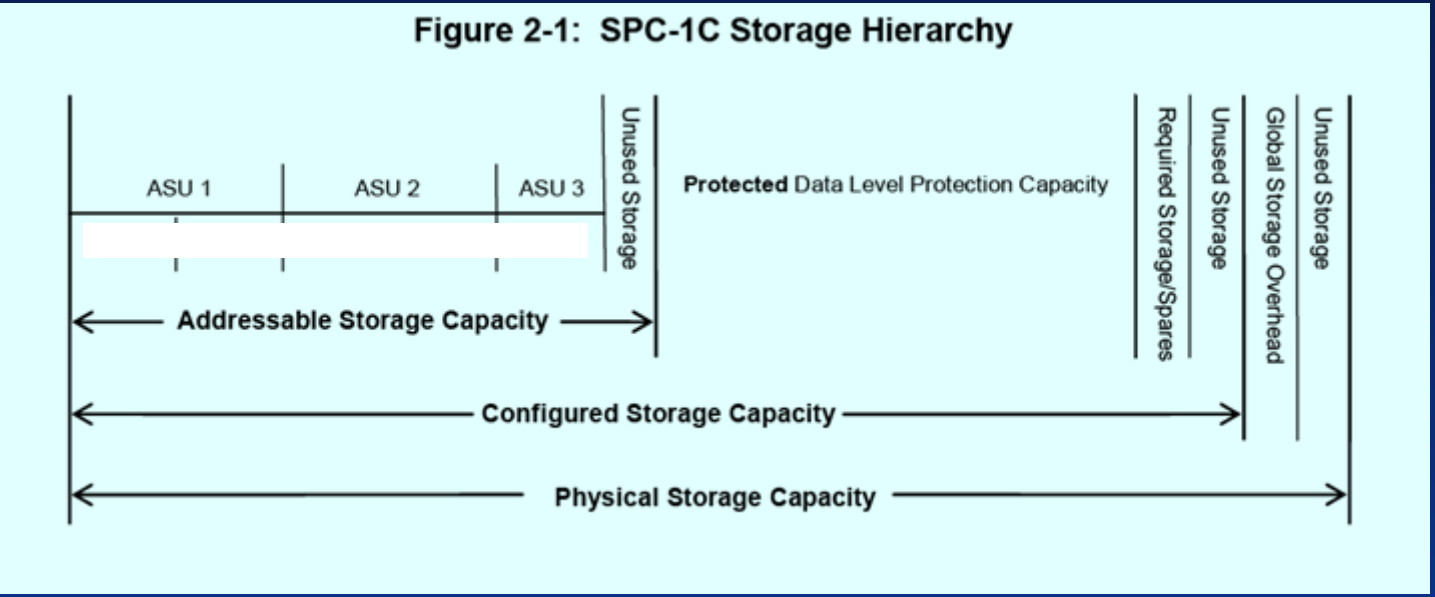
SPC-1C is comprised of a set of I/O operations designed to demonstrate the performance of both storage components and small storage subsystem and while performing the typical functions of a business critical application.

SPC-1C represents a segment of applications characterized by predominately random I/O operations and requiring both queries as well as update operations (for example: OLTP systems, Database systems, or Mail Server applications).

SPC-1C focuses on both storage components and small storage configurations

The Average Response Time, for the IOPS/S cannot exceed 30ms

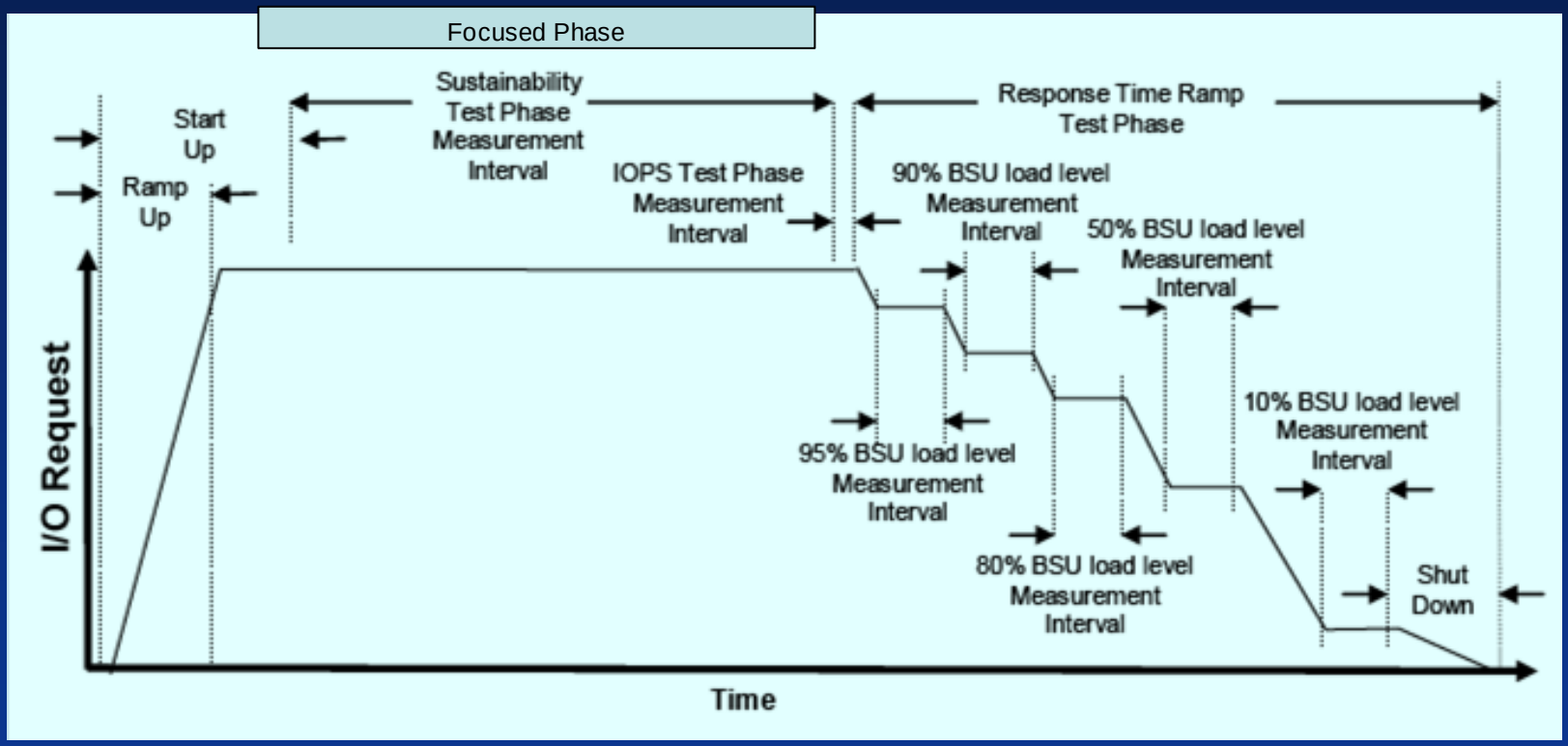




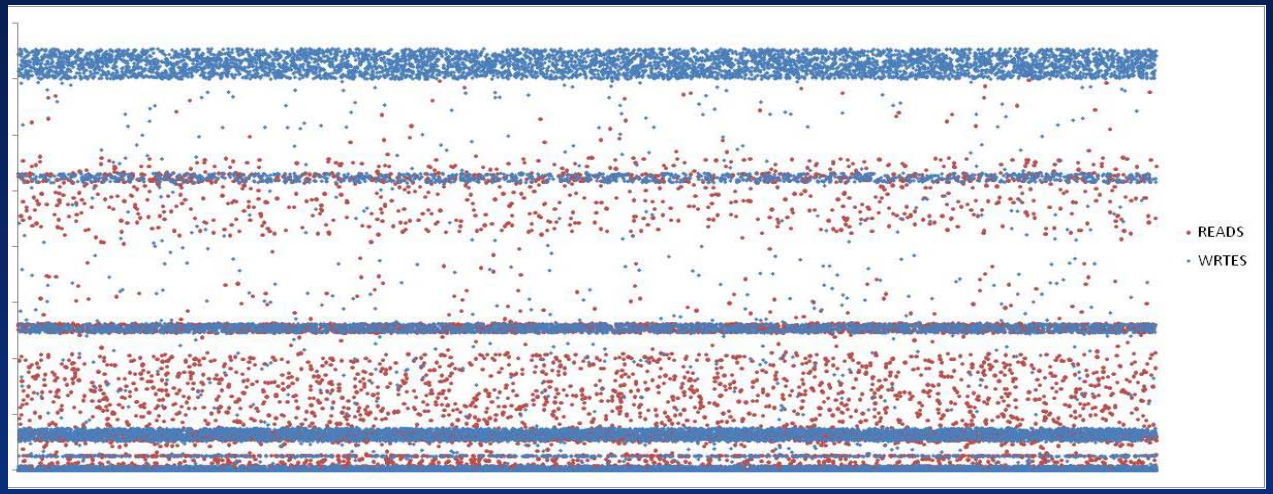
Seagate currently benchmarks
HDD with 50% of available physical capacity
SSD with 100% of available physical capacity

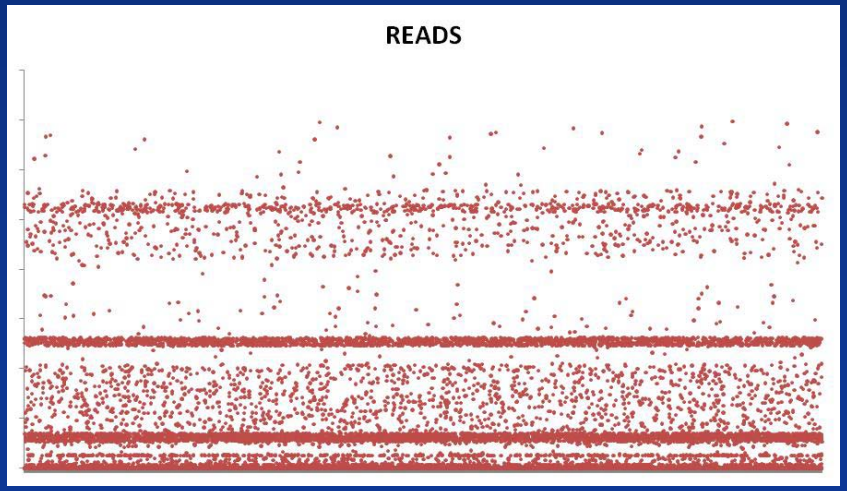
ASU1= 45% of capacity
ASU2= 45% of capacity
ASU3=10% of capacity

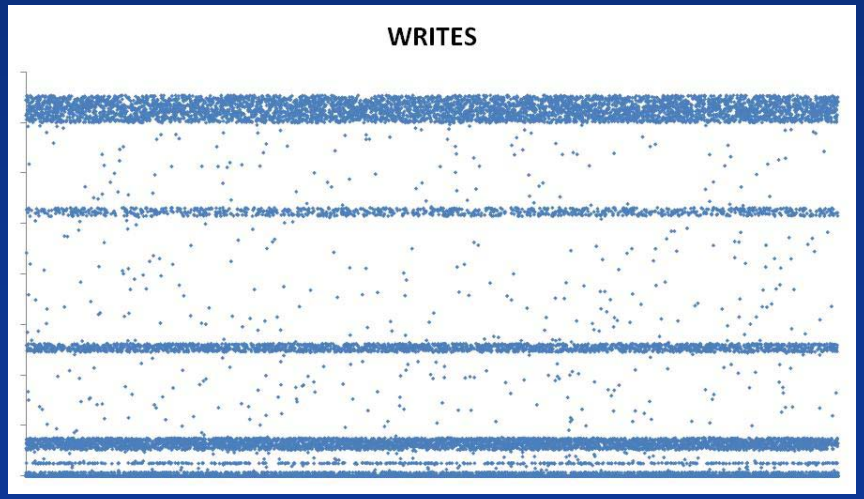
ASU (Application Storage Unit) is a abstraction for the data repository accessed by the storage subsystem and is implemented as a raw partition


Focused Phase
Start Up
Ramp Up
Sustainability Test Phase Measurement Interval
IOPS Test Phase Measurement Interval
Response Time Ramp Test Phase
90% BSU load level Measurement Interval
50% BSU load level Measurement Interval
10% BSU load level Measurement Interval
95% BSU load level Measurement Interval
80% BSU load level Measurement Interval
Shut Down
I/O Request
Time

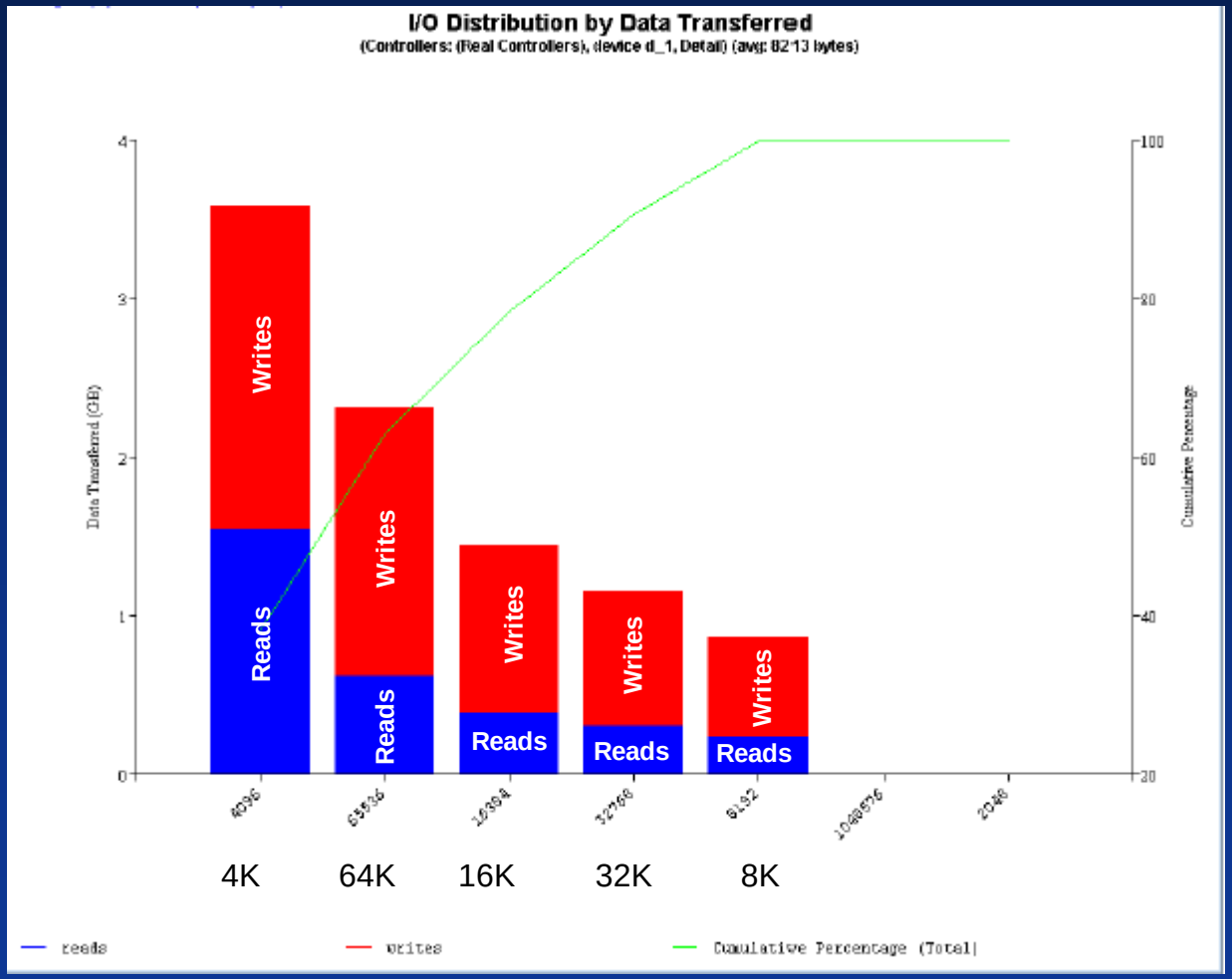
SPC-1C Accessed LBA locations



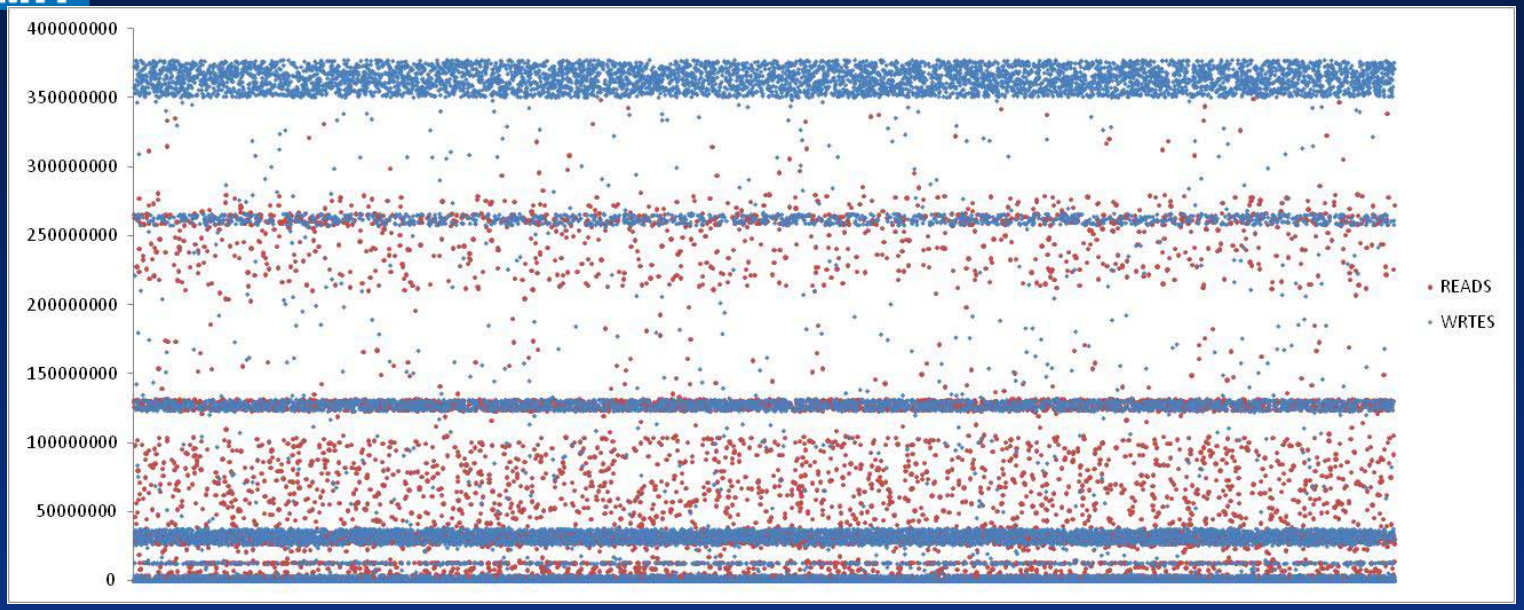


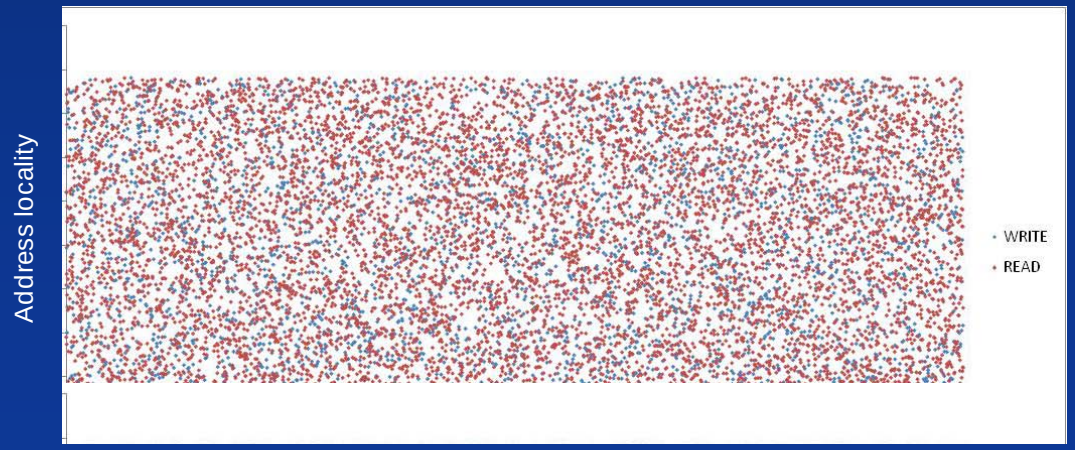


Summary of workload transfer sizes



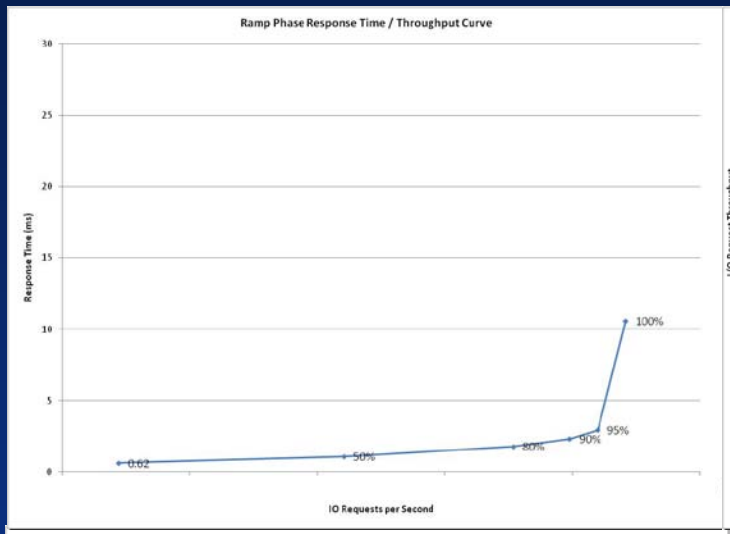
SPC-1C Accessed address space

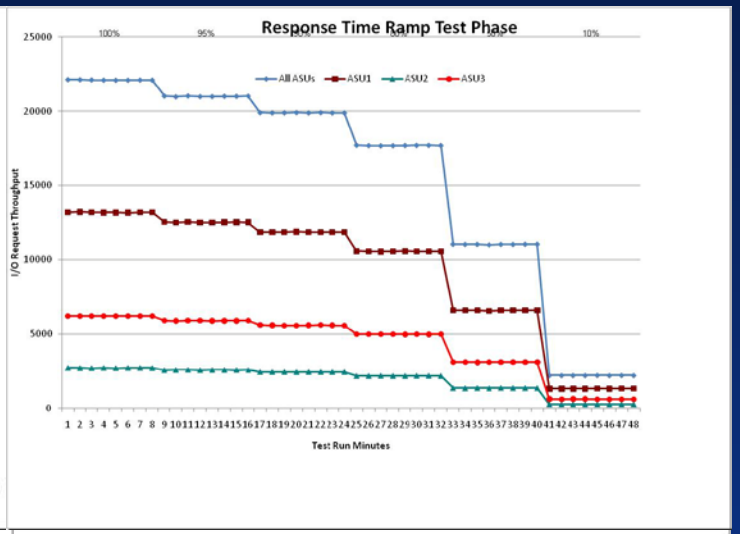


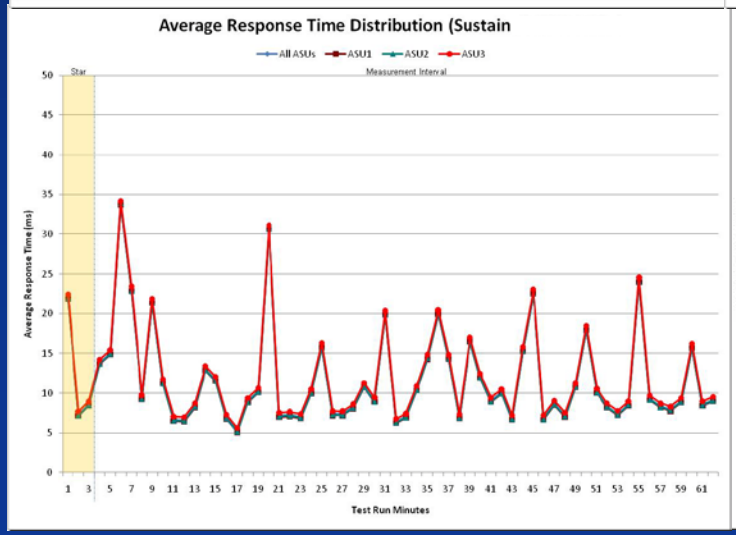


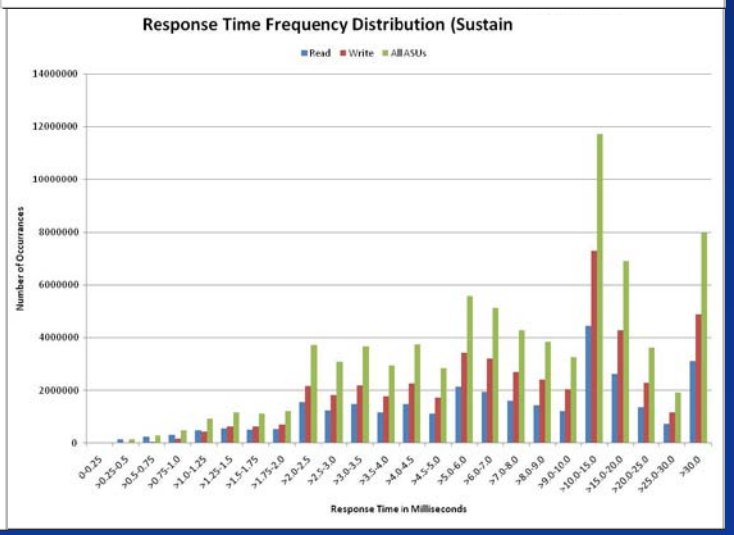
OLTP type 30/70 workload
Using Iometer or Vdbench
Over random address space

SPC-1C Example Results Snapshot

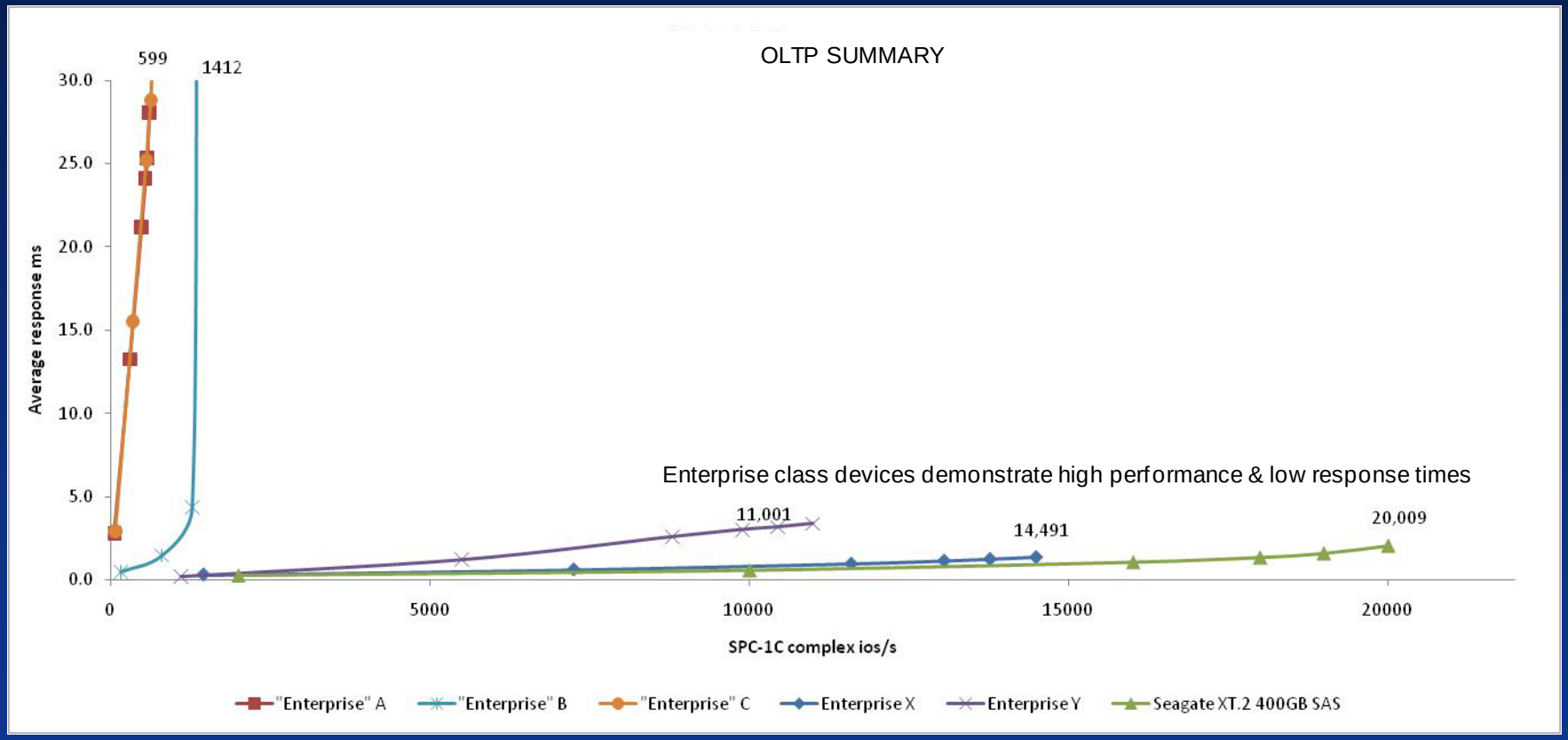






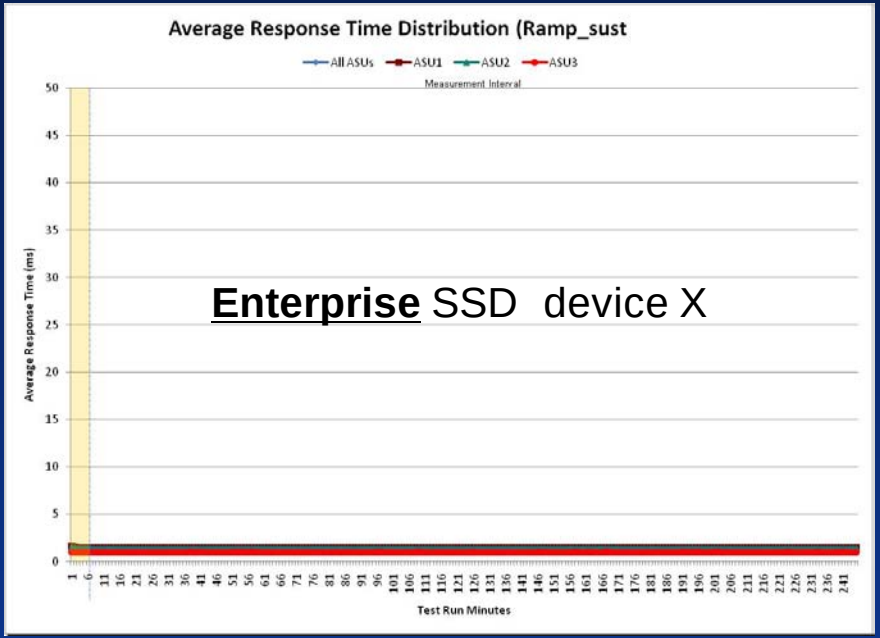


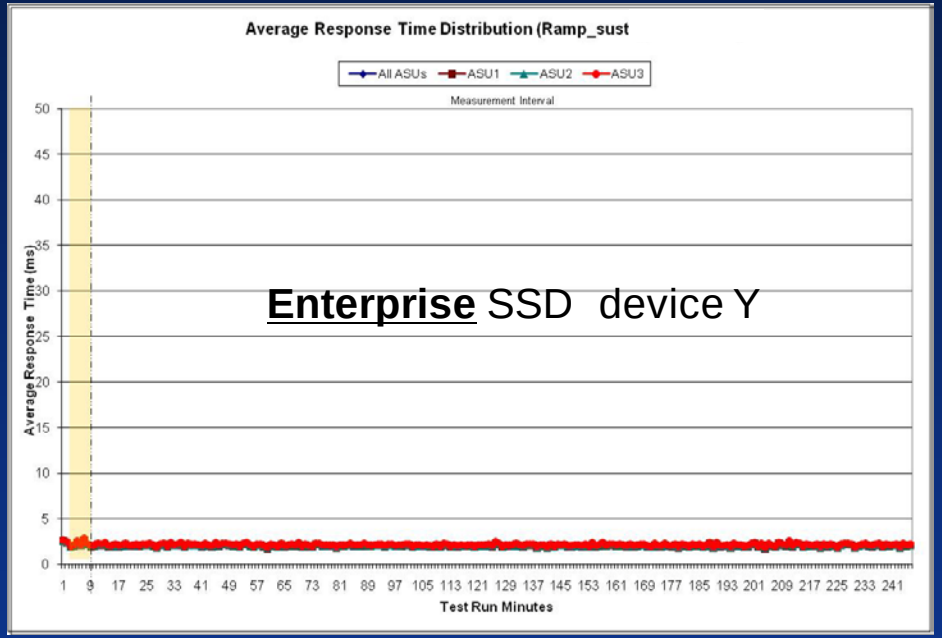
Summary Enterprise Class SSD



Complex workload increased to maximum device sustained capability

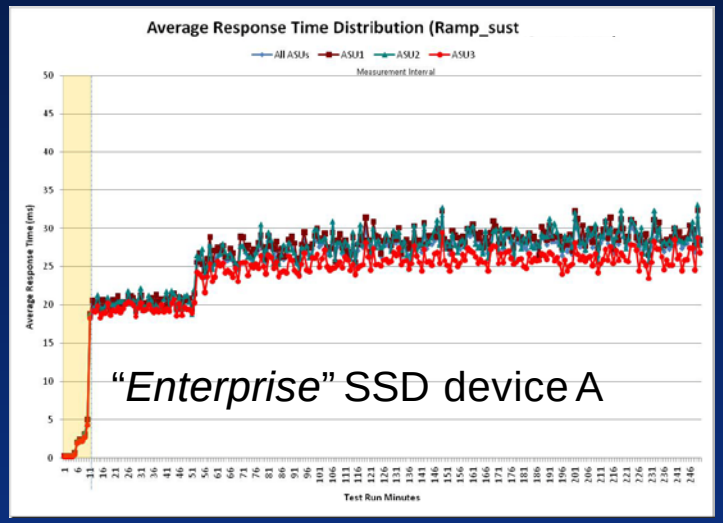
Sustained average response time characteristics "matter"

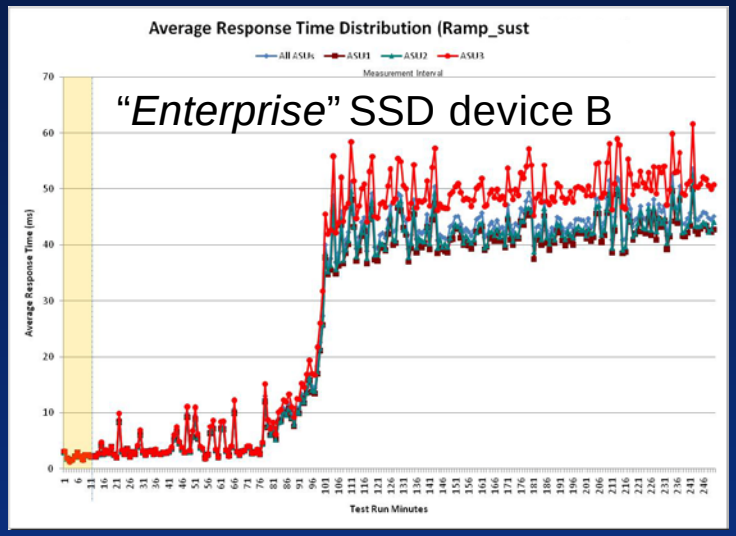


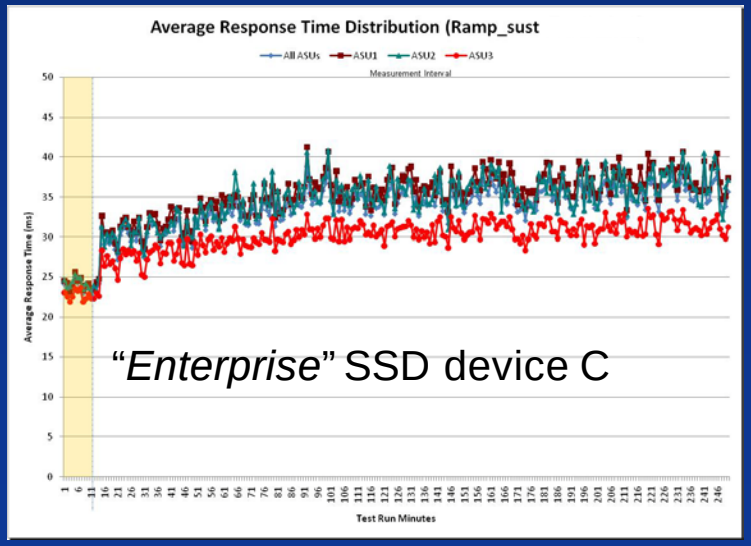


Flash Memory SUMMIT

Sustained response time characteristics do matter in Enterprise







SPC tools can be used internally for product development and externally for verified demonstration of performance

Please reference the below link for further information about SPC

http://www.storageperformance.org

* Details of the Seagate Pulsar XT.2 SSD SPC-1C Result can be found at: http://www.storageperformance.org/results/benchmark_results_spc1c/#c00012