Example(s) of Energy Star Qualified Product Family -- a class exercise

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SNIA Emerald™ Training

SNIA Emerald Power Efficiency Measurement Specification, for use in EPA ENERGY STAR®

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SNIA™ Green Storage Initiative

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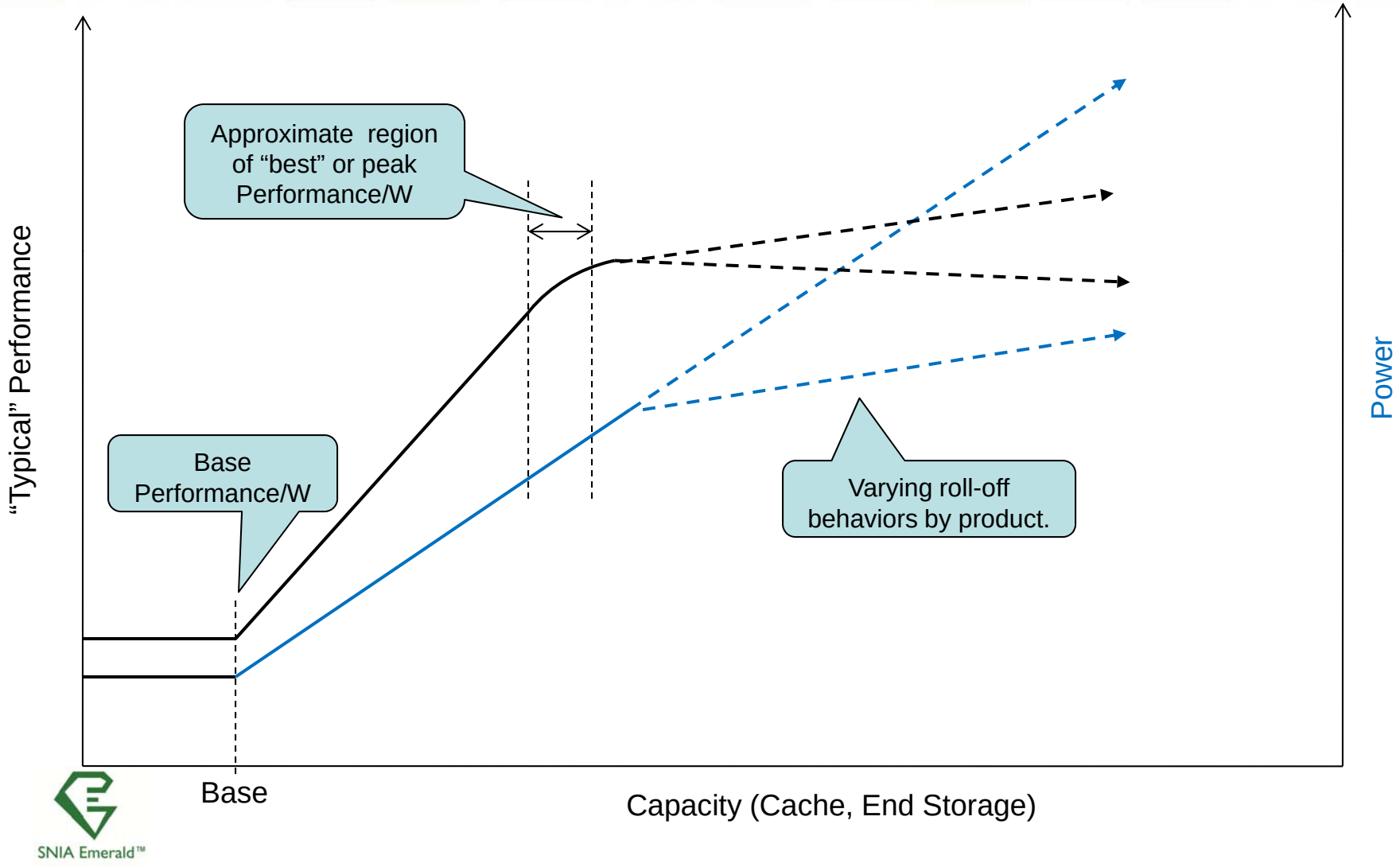
Discussion Framework

- This is a class exercise
- Pick up from the Tuesday topic: "Product/Family, Best Foot Forward (BFF), Test Points and Qualification Ranges"
- Start with test point(s) from just completed SUT testing
- Run through the Energy Star qualification rules to identify product family / range / SKUs

“Qual Table” on the fly

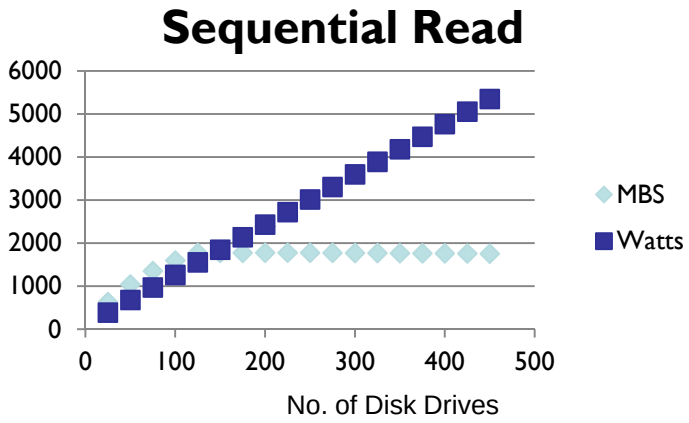
P6500	Test points	Qualified	
1st Test point(s) Sequential	SUT BFF data		
		Fixed / Flexible	
		Other allowances	
2nd Test points Transactional	Use predicted		
		Fixed / Flexible	
		Other Allowances	
3rd Test points Capacity	Use predicted		

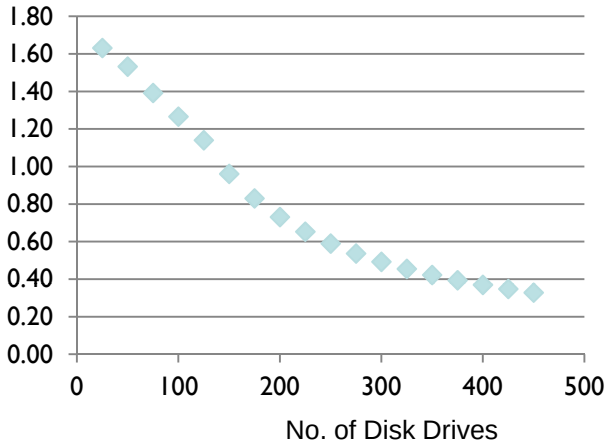
Best Foot Forward Approach
Scale-Up System



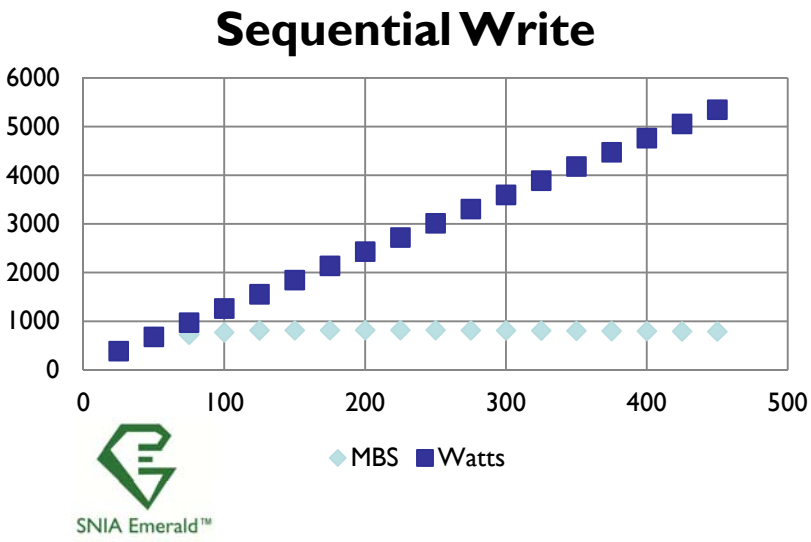
Exercise 3: 128K Sequential Read, Write

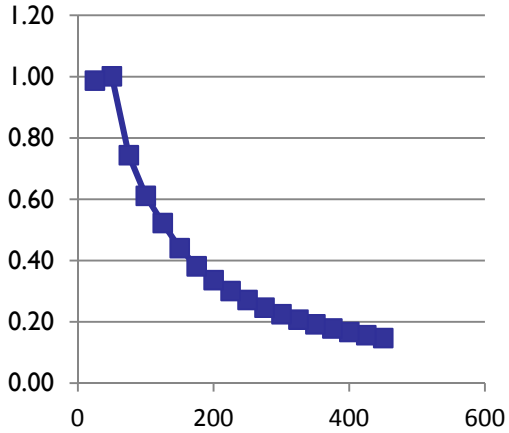
SFF 15K rpm, RAID 5





Peak Metric:
1.63 MB/S/Watt
and 25 drives





Peak Metric:
1.0 MB/S/Watt
and 50 drives

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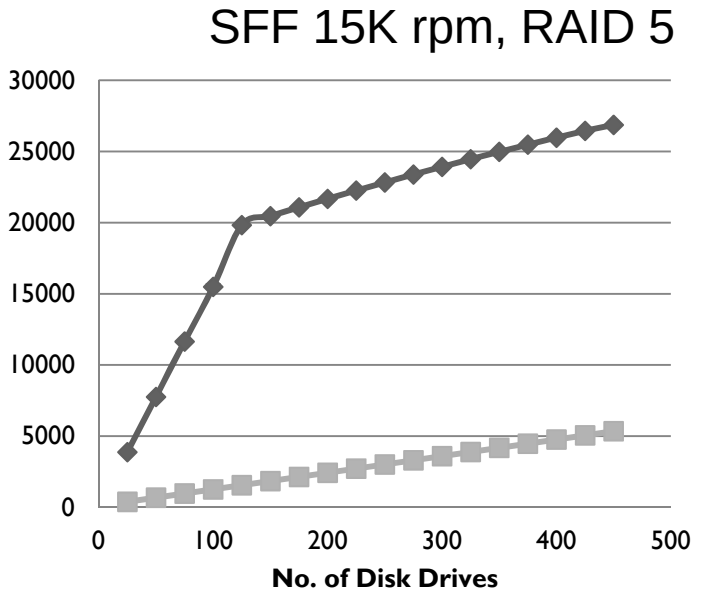
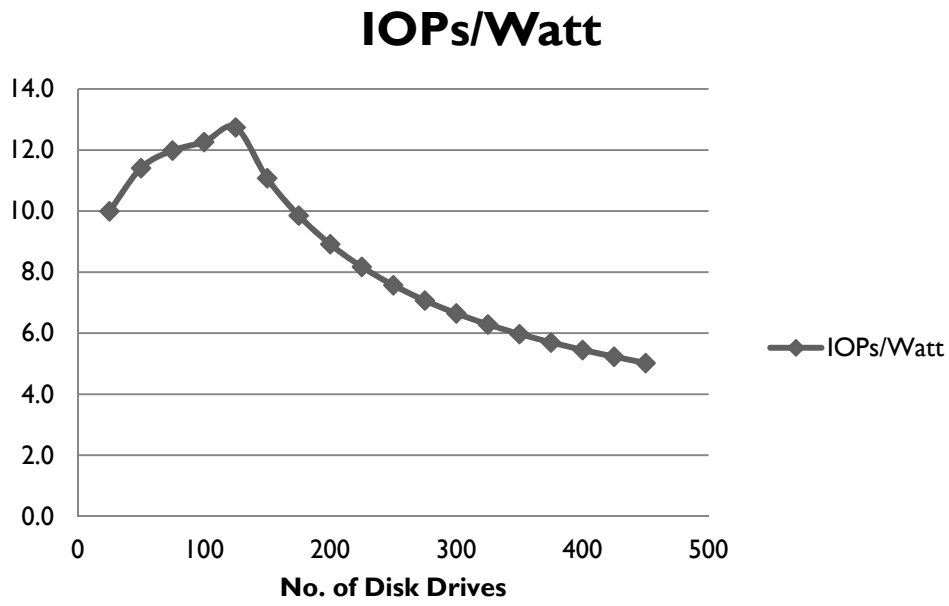
Exercise 1: Mixed Workload
8K Random 70/30 R/W



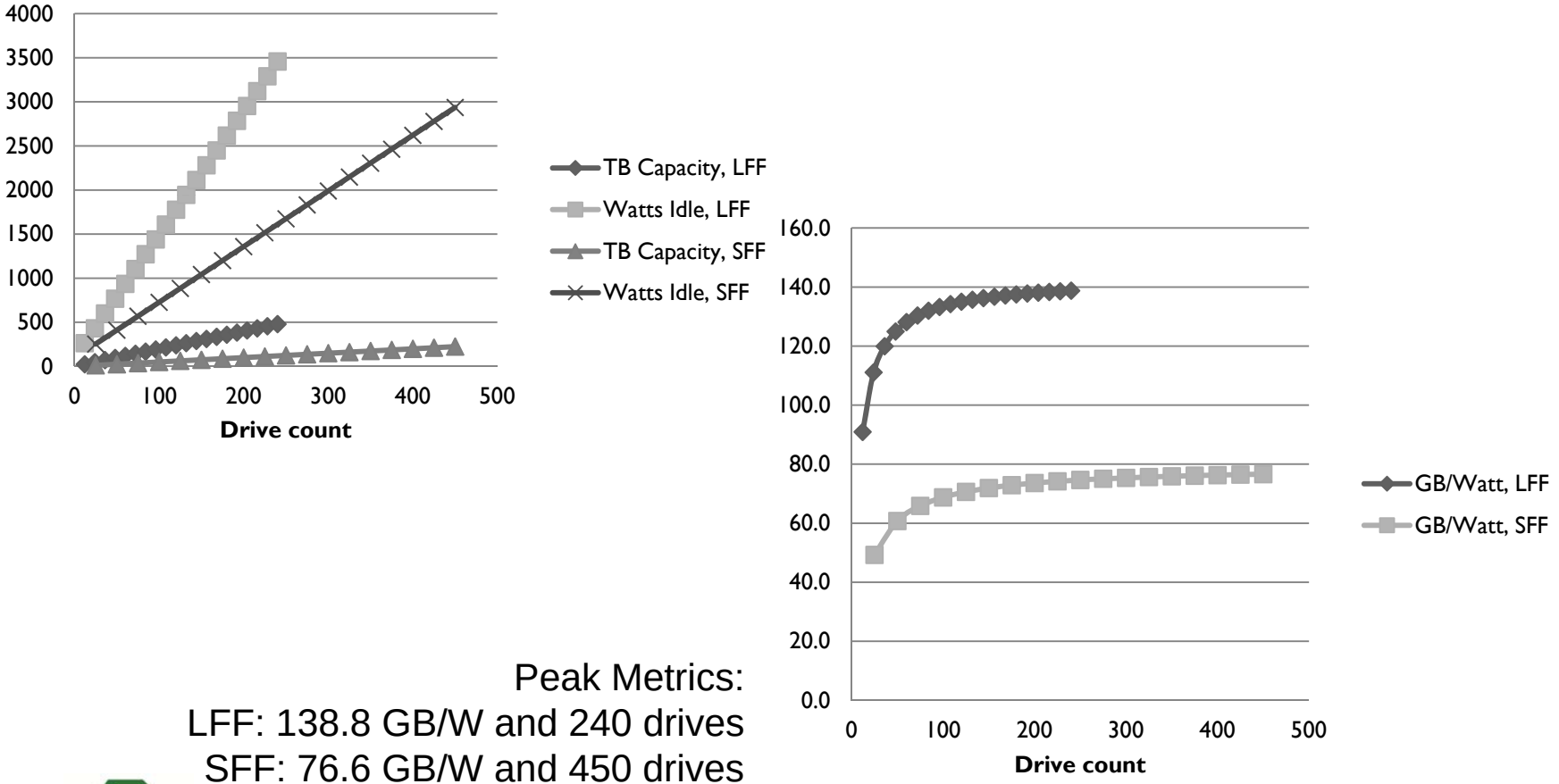


- Peak metric = 12.7 IOP/S/Watt at 125 drives

- Changing the read/write mix changed the metric but not the drive count
  60/40 r/w = 11.5 IOP/S/W; 80/20 r/w = 14.9 IOP/S/W

Exercise 4: Ready-Idle

LFF 2TB 7.2K rpm and SFF 500GB 7.2K rpm drives at Ready-Idle



Peak Metrics:
LFF: 138.8 GB/W and 240 drives
SFF: 76.6 GB/W and 450 drives

Candidate SUT:
A shipping Online-3 SAN

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- Two controller performance points, with variable cache and front-end interfaces
- The lower product class can support 120xLFF or 250xSFF and the higher product class can support 240xLFF or 450xSFF (6Gb SAS)
  - SFF
    - 146GB, 15K
    - 300GB, 10K
    - 450GB, 10K
    - 600GB, 10K
    - 500GB, 7.2K midline
    - 200GB SSD*
    - 400GB SSD*
  - LFF
    - 300GB, 15K
    - 450GB, 15K
    - 600GB, 15K
    - 2TB, 7.2K midline

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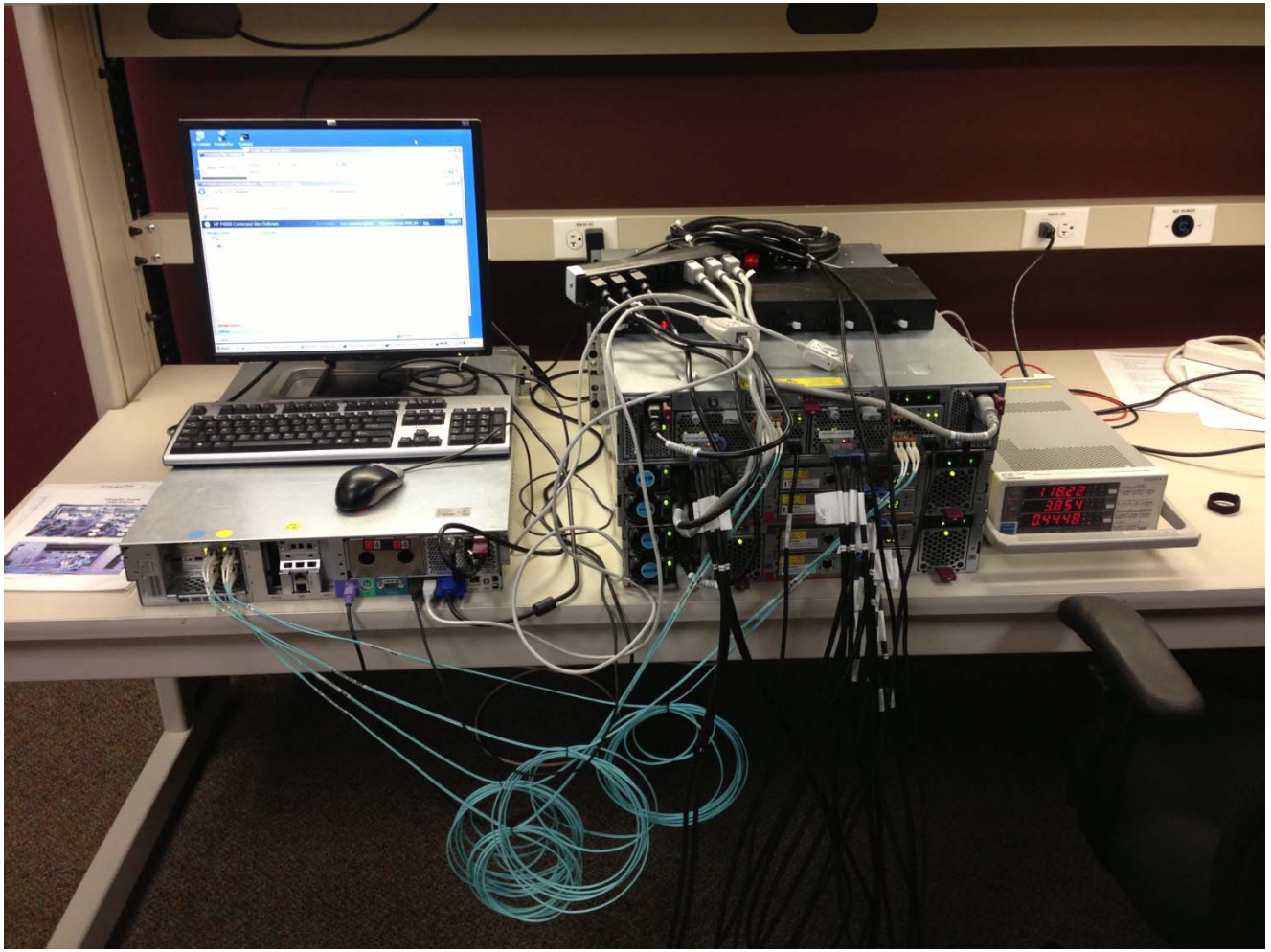
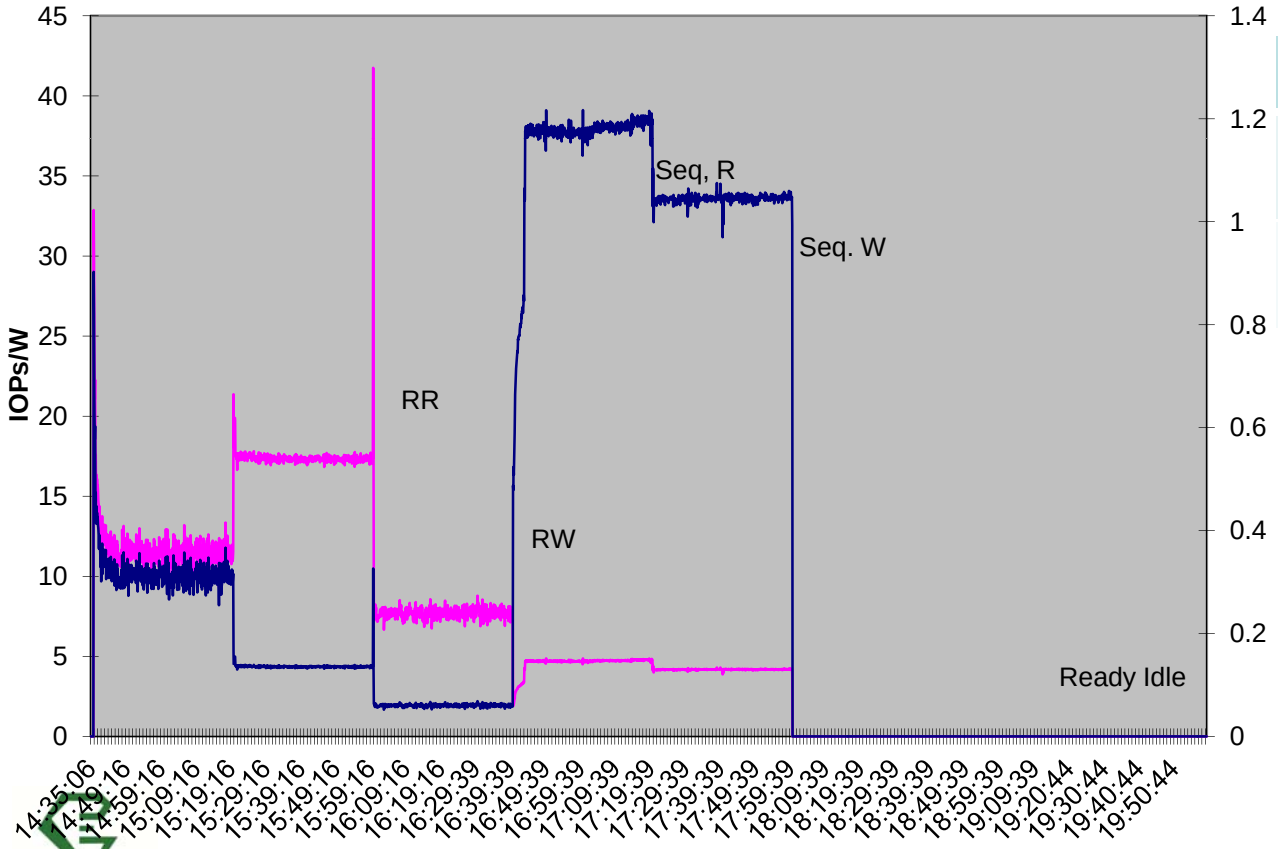
HP P6500 SUT setup



Test Results for Candidate SUT (50SFF, 148GB 15K)

P6500 Power Performance Plot

Combined Vdbench /Power Analyzer Plot



	SeqR	SeqW
Predict	1.63 25 HDDs	1.02 50 HDDs
Data	1.2 50 HDDs	1.05 50 HDDs

“Qual Table” on the fly

P6500	Test points	Qualified	
1st Test point(s) Sequential	BFF data, (no +/- data) 50 x SFF 148GB 15K 70/30 workload weigh	Fixed/Flexible/Mixed	Fixed (drive count) -40% +15% data -20% +5% qual 40 – 53 drives
		Drawer rounding	25 – 75 drives
		Add’nl drives , same workload	(BFF data only)
		Variation / replace allowances	
2nd Test point(s) Transactional	Use BFF prediction as proxy test points		
3rd Test point(s) Capacity	Use BFF prediction as proxy test points		

White board exercise

ENERGY STAR – further extensions to the Qualification Range

- Test points exist for up to five Active + one Idle conditions
- Rounding to full drawers
- Combinations of single device type optimal configurations, based on percentage allocation of devices
- Storage device replacement (if similar or better)
- Multiple device type optimal configurations (must have auto-tiering technology)
  - Auto-tiering BFF or optimal configuration is not yet fully understood, but it is suggested that initial submissions are representative of actual selling systems.
  - Maintain ratios of device types for –X% / +Y% test points