Smart Array Competitive Analysis

Lonnie Pope
Systems Manager, Product Development
ISS Server Storage

Part 1 of 3

HP WORLD 2003
Solutions and Technology Conference & Expo

Performance and beyond…

- Observations from the ISS Server Storage Competitive Analysis Lab.
- How these observations can translate into lower costs of ownership and ease of use for your customers…provide some sales leverage.

Topics – competitive comparisons

- Storage Performance
  - 3 examples of current HP Ultra3 RAID controllers
  - HP U320 vs competition
- Firmware features and Storage software
  - Controller upgrade
  - Configuration utilities
  - RAID 5 distinctions
  - Cache ratio
  - Drive roaming
  - Management software
  - Hard drive considerations

Performance tests Ultra 160, U320

Ultra160 competition

- Server Embedded Controllers
  - Dell PERC 3D/i — ***SA-5i, SA-5i Plus***
- Low End Controllers
  - IBM ServeRAID-4Lx — ***SA-532***
- Mid-Level Controllers
  - Dell PERC 3/DC
  - IBM ServeRAID—4Mx — ***SA-5302, SA-5312***
- High End Controllers
  - Adaptec 2200S, 3410S, 5400S
  - Dell PERC 3/QC — ***SA-5304***
  - IBM ServeRAID-4H
  - Mylex ExtremeRAID 2000

Three U160 storage performance examples

- PCI card based controllers –
  - SA-5304 vs Dell and IBM
    - Dell PERC/QC
    - IBM ServeRAID-4H
- Embedded server controllers
  - HP 5i Plus vs Dell 3D/i
- Cluster Solutions
  - HP Smart Array Cluster vs Dell's solution

A word about these storage system performance results

- Performance comparisons
  - Use complete manufacturers storage systems (when feasible) and all testing is done in house
  - All results are RAID 5 (most common RAID level) and using 64KB stripe size, 15k drives (all tests)

How performance testing was done

- Iometer test tool within Windows 2000
  - http://developer.intel.com/design/servers/devtools/iometer/index.htm
- Simulated workloads
  - Presenting the results of 6 workloads
  - Workloads determined by block sizes *and* % reads/writes; sequential/random
  - Independent of the file system – so storage sub-system being tested not O/S

Performance measurement workloads
6 simulated workloads tested

- **Max I/O**
  - 100% Sequential; 100% Read
  - 512 byte request size

OLTP 8K – SQL/exchange server approximation

- 100% Random, 67% Read

64KB Random Read

- 100% Random; 100% Read

64KB Sequential Read

- 100% Sequential; 100% Read

64KB Sequential Write

- 100% Sequential; 100% Write

Max MB

- 100% Sequential; 100% Read
- 1024 KB request size

Performance metrics

- Bandwidth
  - The amount of data moved in one second.
- CPU Utilization
  - The amount of work done by the host CPU. This becomes a factor with small block I/O's.

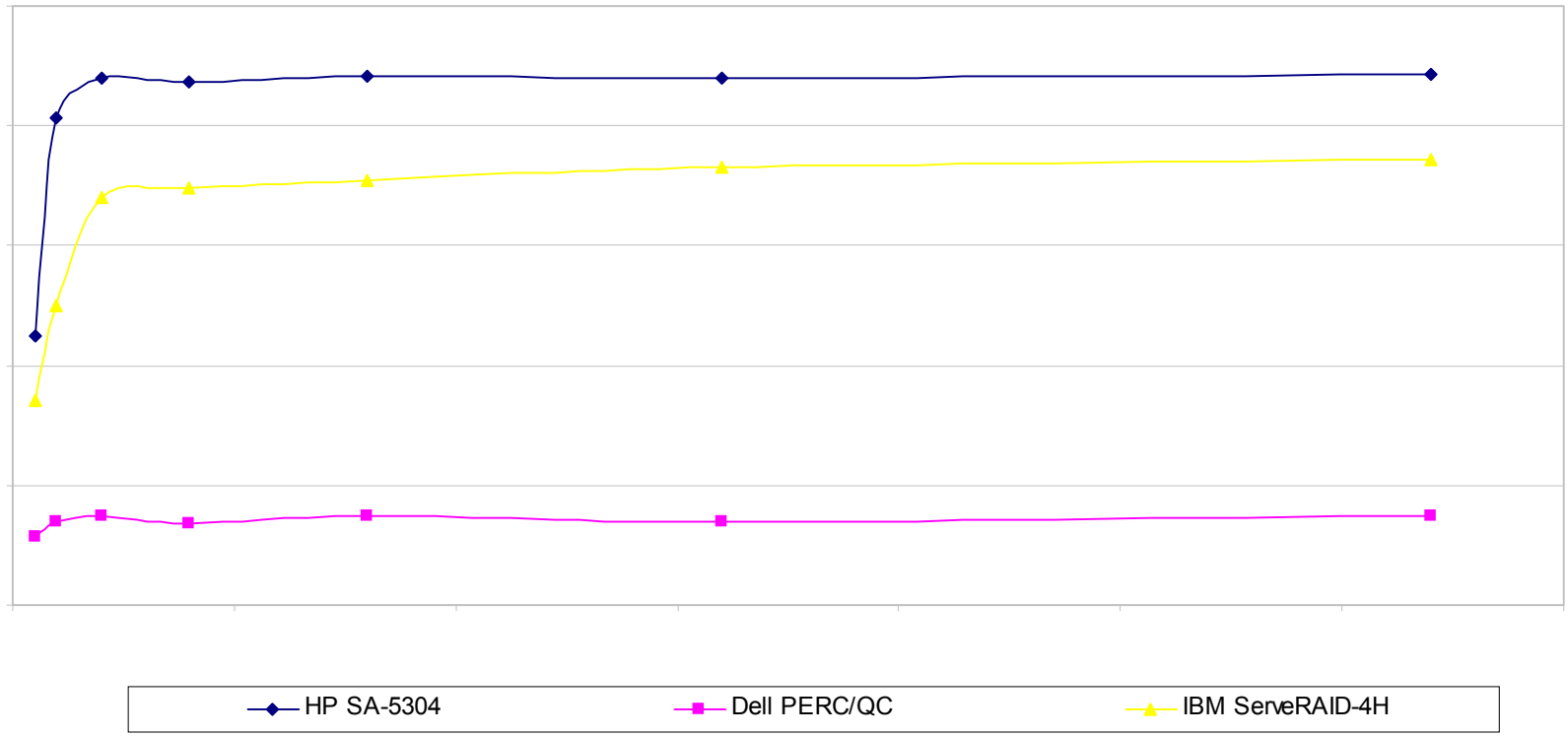
SA-5304 performance – case 1

Ultra 160, PCI 64-bit/66MHz, 32/64/128/256 MB cache optional fibre channel daughter card

SA-5304 vs competitors

Max IO's

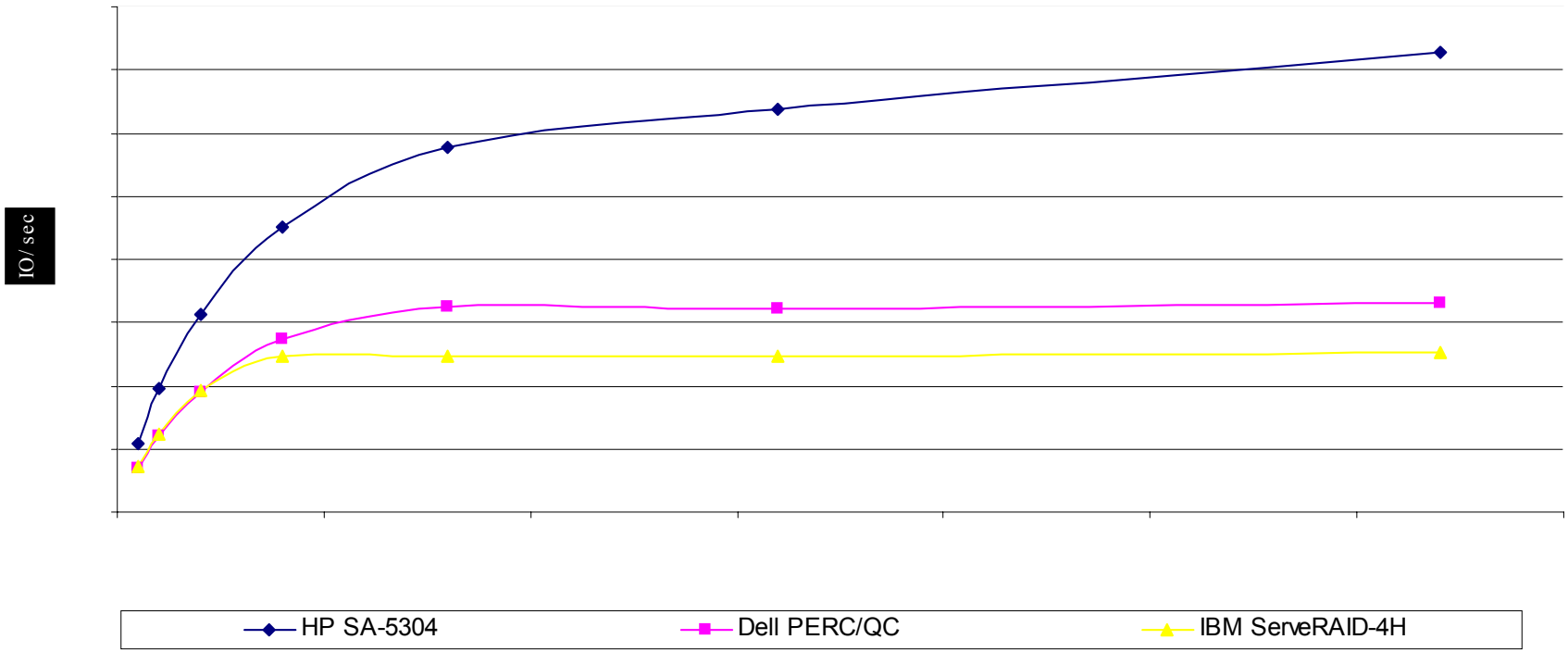
1 channel, RAID 5



SA-5304 vs competitors

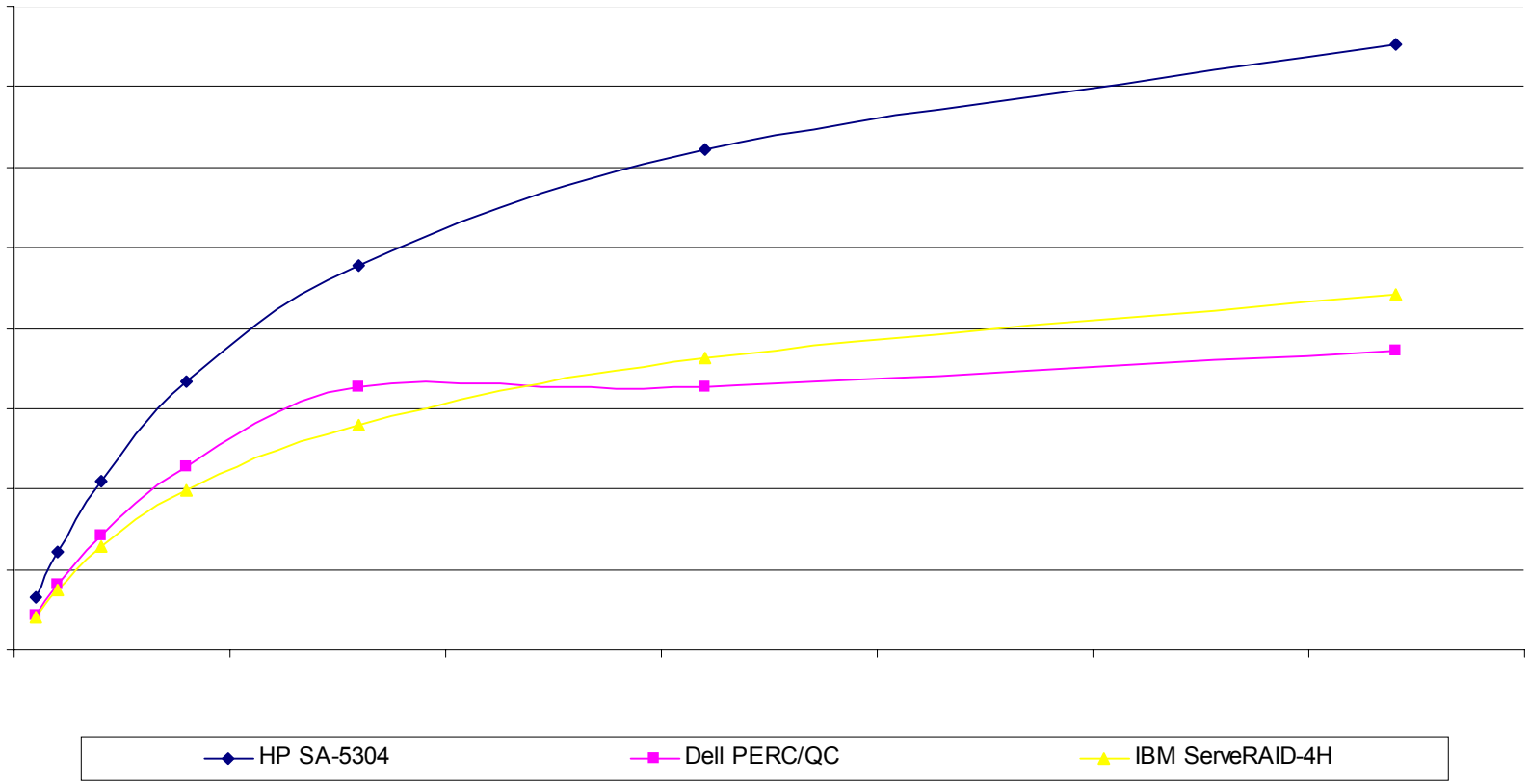
OLTP8k

1 Channel, RAID 5



SA-5304 vs competitors

64k random reads
1 channel, RAID 5



SA-5304 vs competitors

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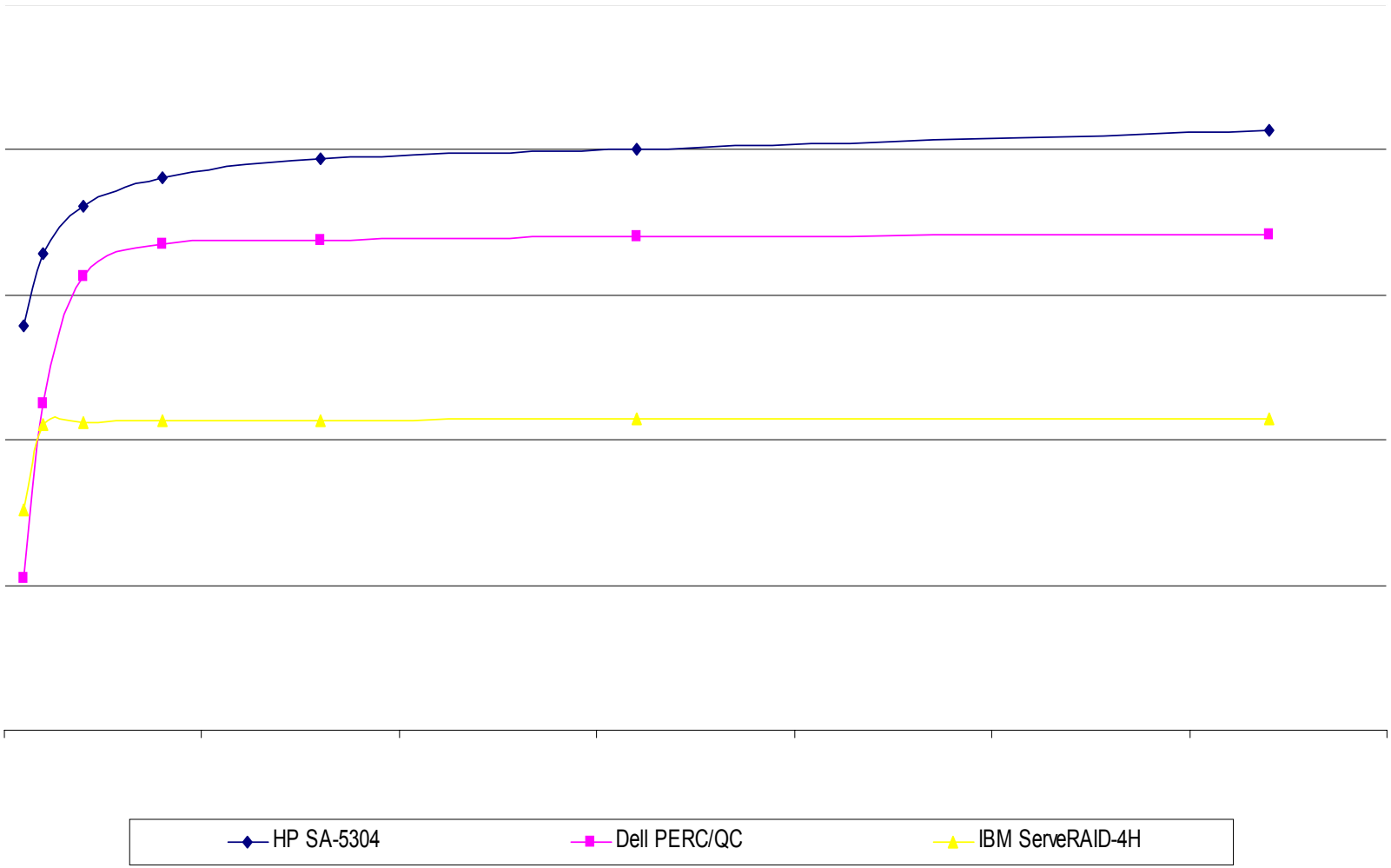

SA-5304 vs competitors

64k sequential writes
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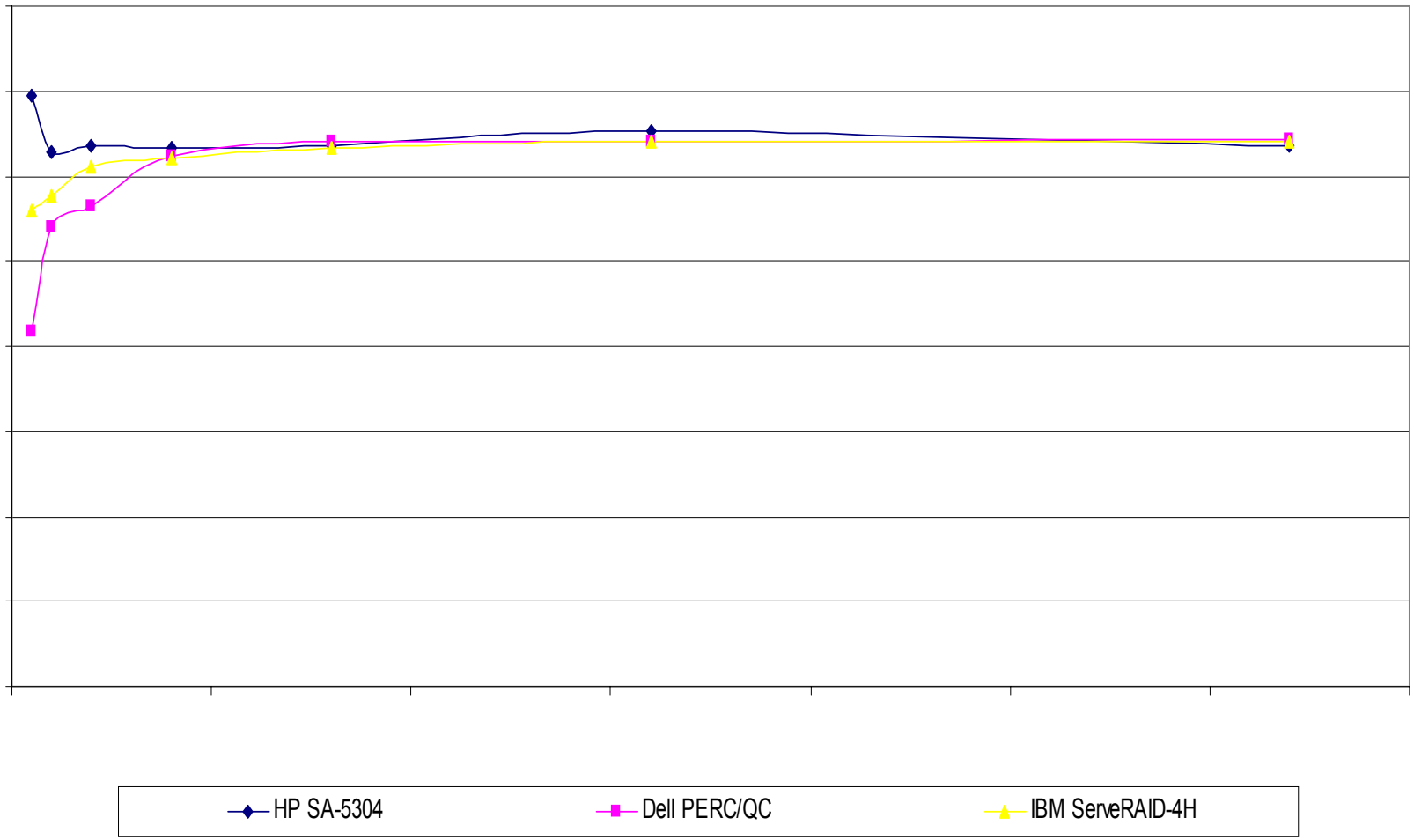
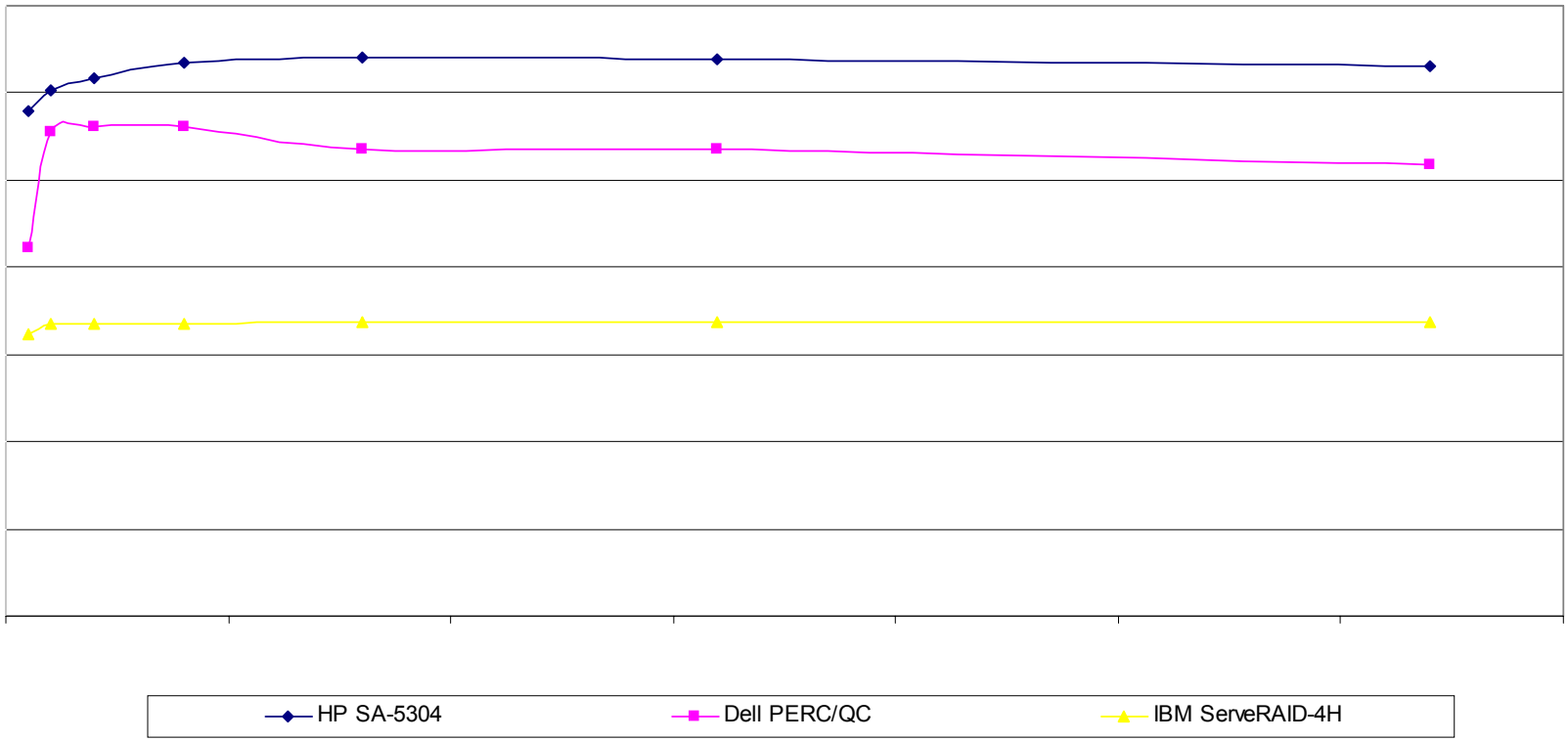


SA-5304 vs competitors

MB's/sec

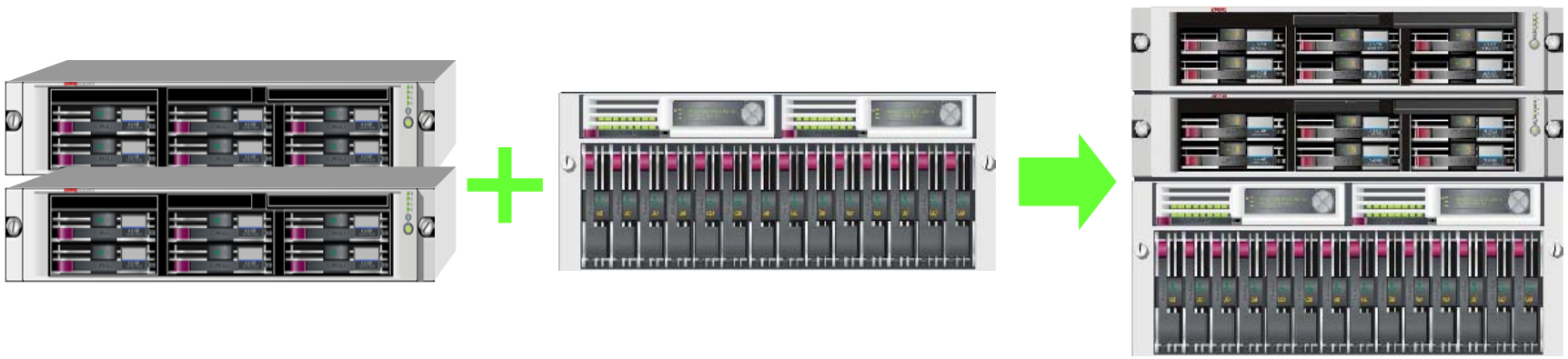
1 channel, RAID 5



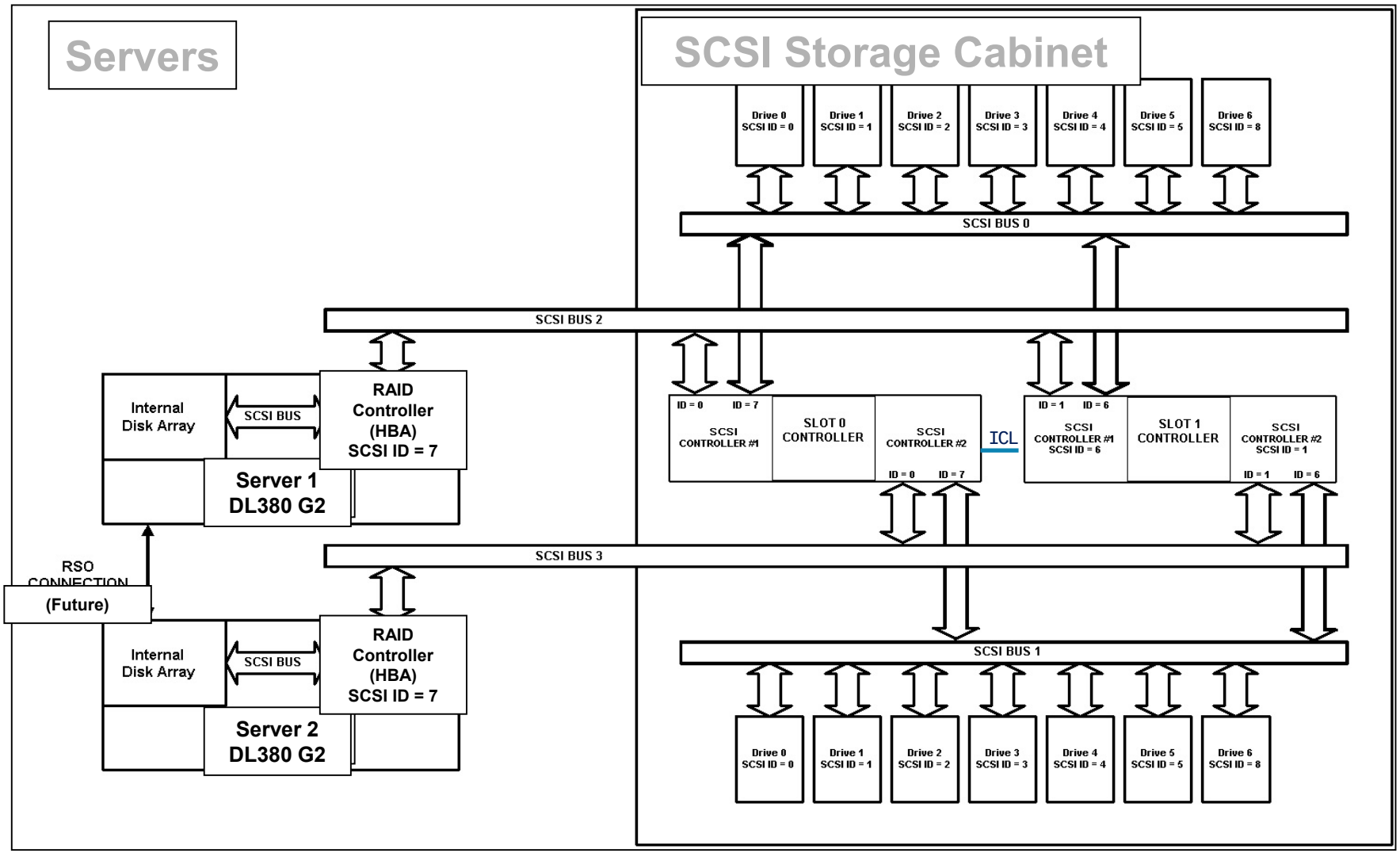
DL380 cluster performance Microsoft failover cluster – case 2

Physical view:

- (2) DL380G2's (each with SA-5i plus in pass thru mode) +
- SA-Cluster Array(Fail-over Controlled by 5i+ or 532 firmware)
- (2) DL380G2 (with SA-5i+ Pass thru) + SA-Cluster Array



Cluster block diagram



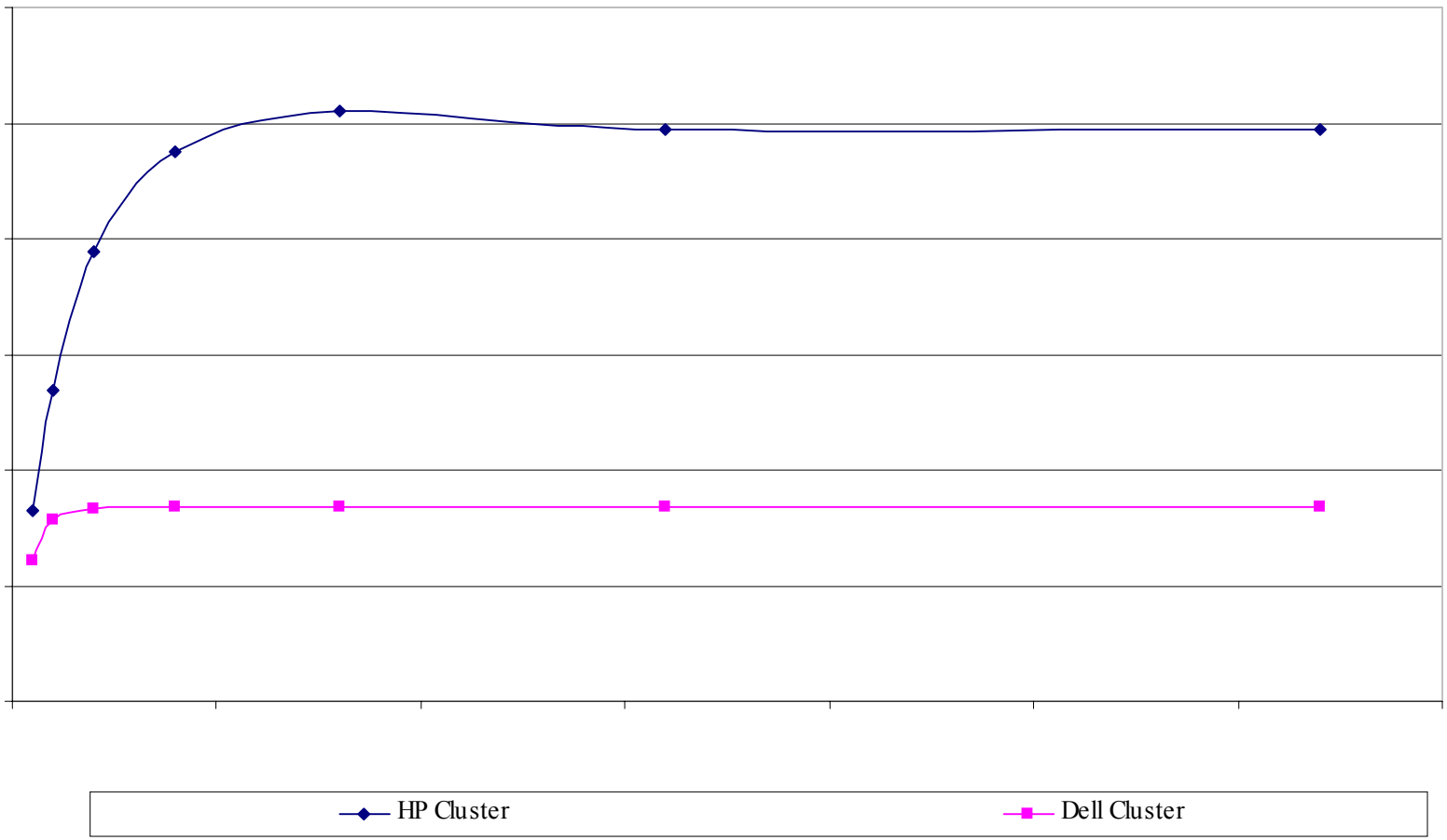
Dell's cluster solution

- (1) Disk 220S Enclosure – (14) Drives
- (2) 2550 Servers
- (2) PCI Ultra-3 PERC/DC RAID Controllers, one installed in each server
- Not an integrated solution like the HP Cluster Controller.
- RAID controllers in this solution do not maintain cache coherency, so cache is disabled. Result is poor write performance.

HP SA-cluster vs competition

Max IO's

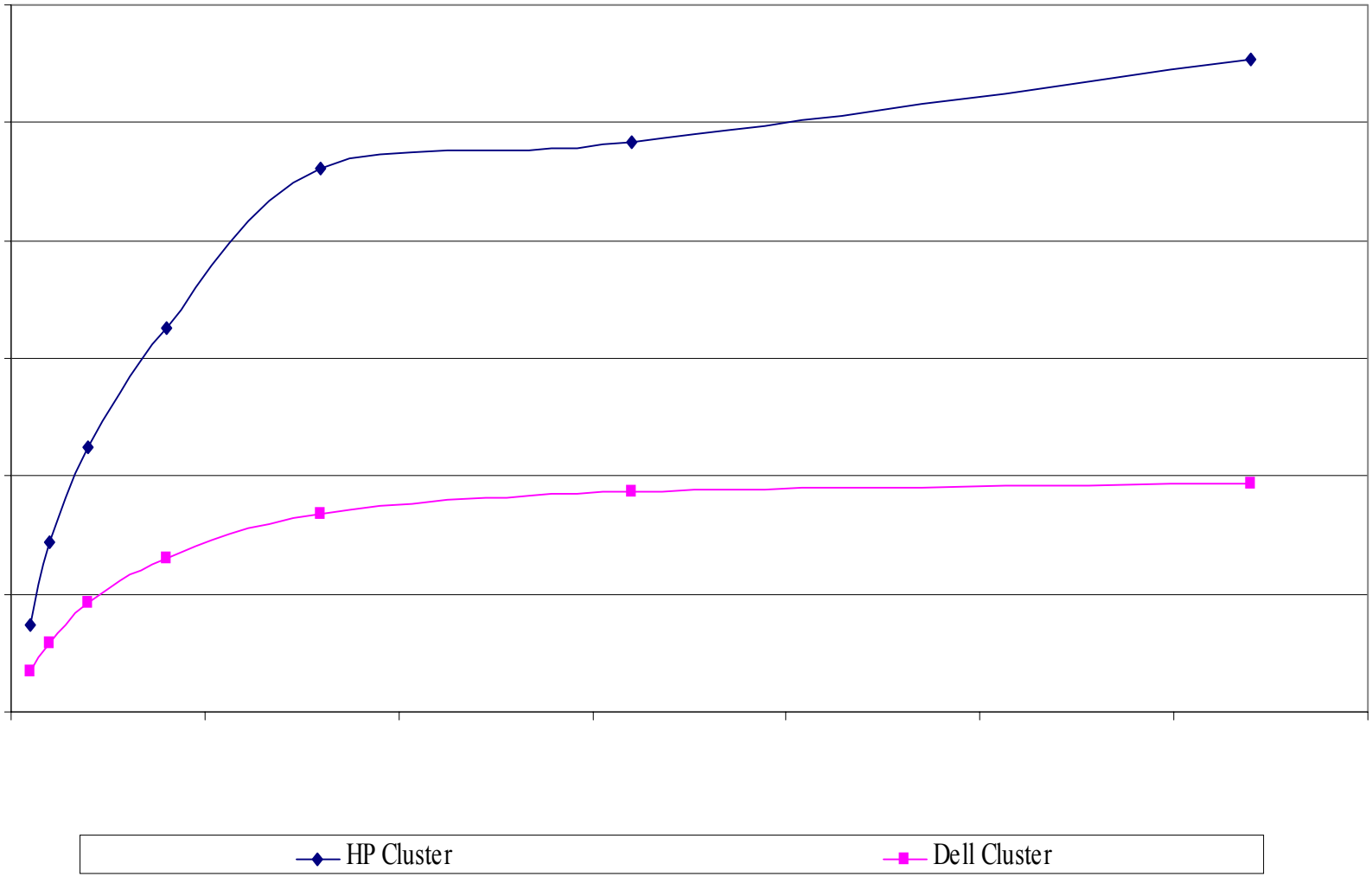
1 channel, RAID 5



HP SA-cluster vs Dell

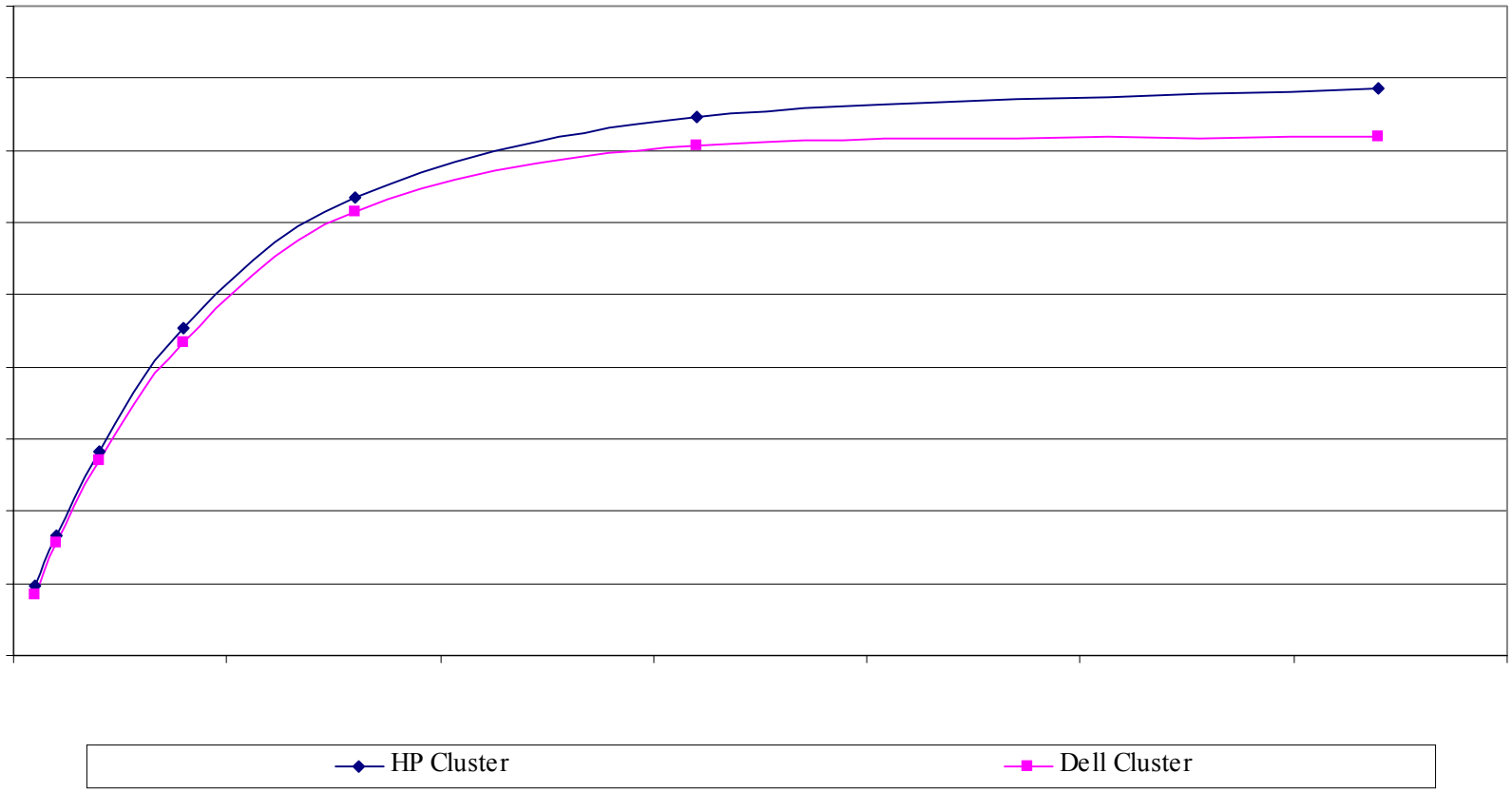
OLTP8k

1 channel, RAID 5



HP SA-cluster vs Dell

64k random reads
1 channel, RAID 5



HP SA-cluster vs Dell

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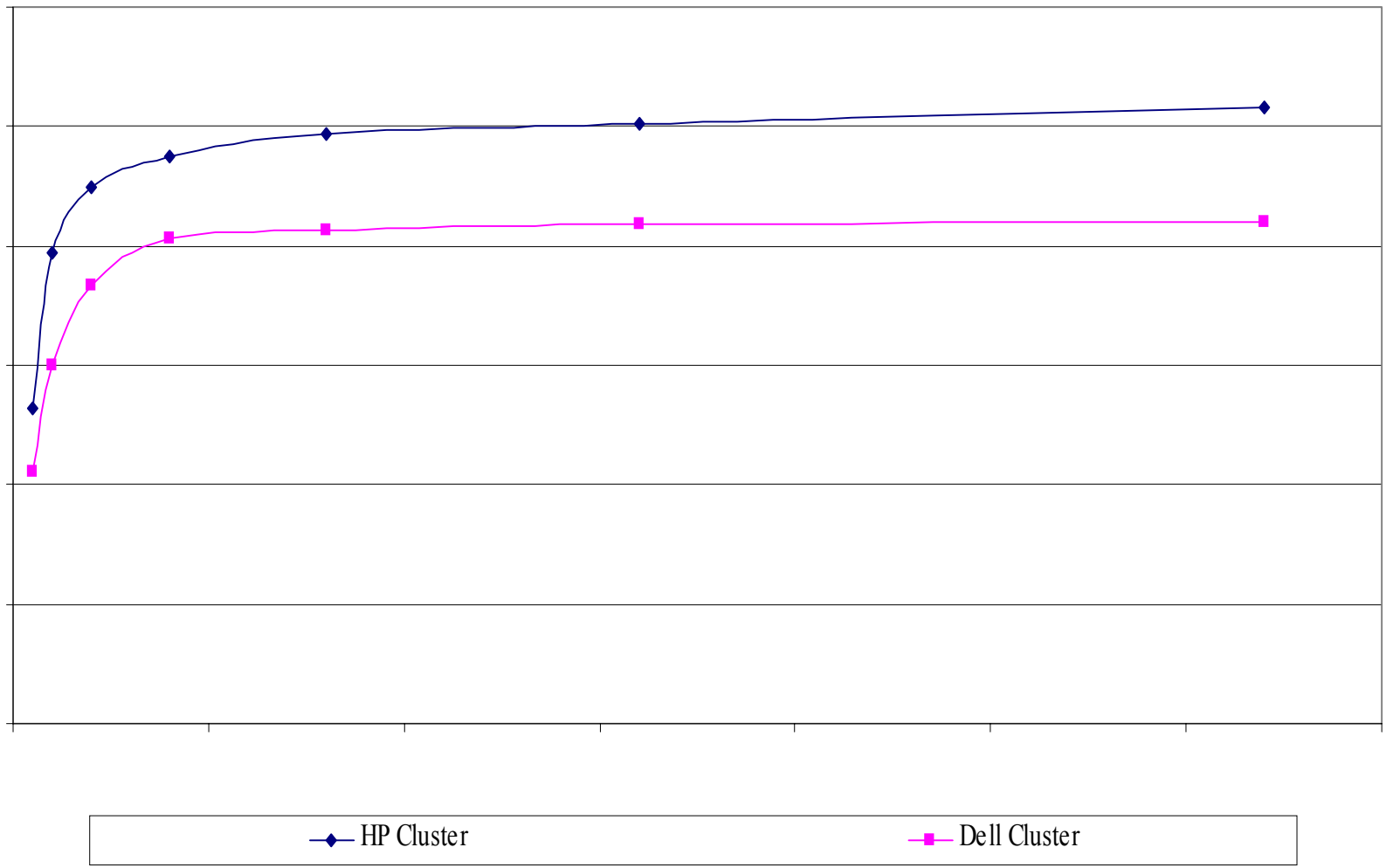

HP SA-cluster vs Dell

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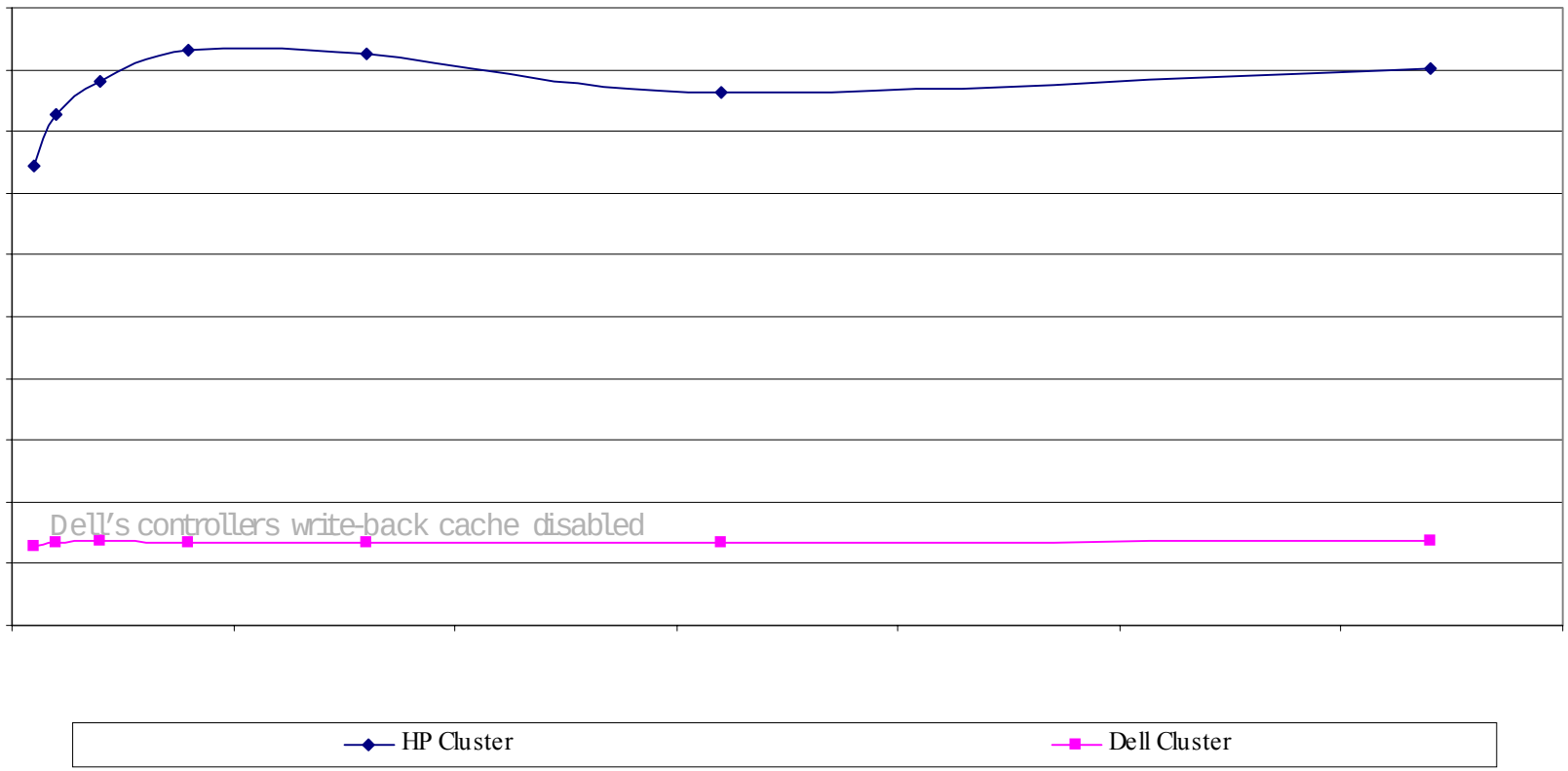
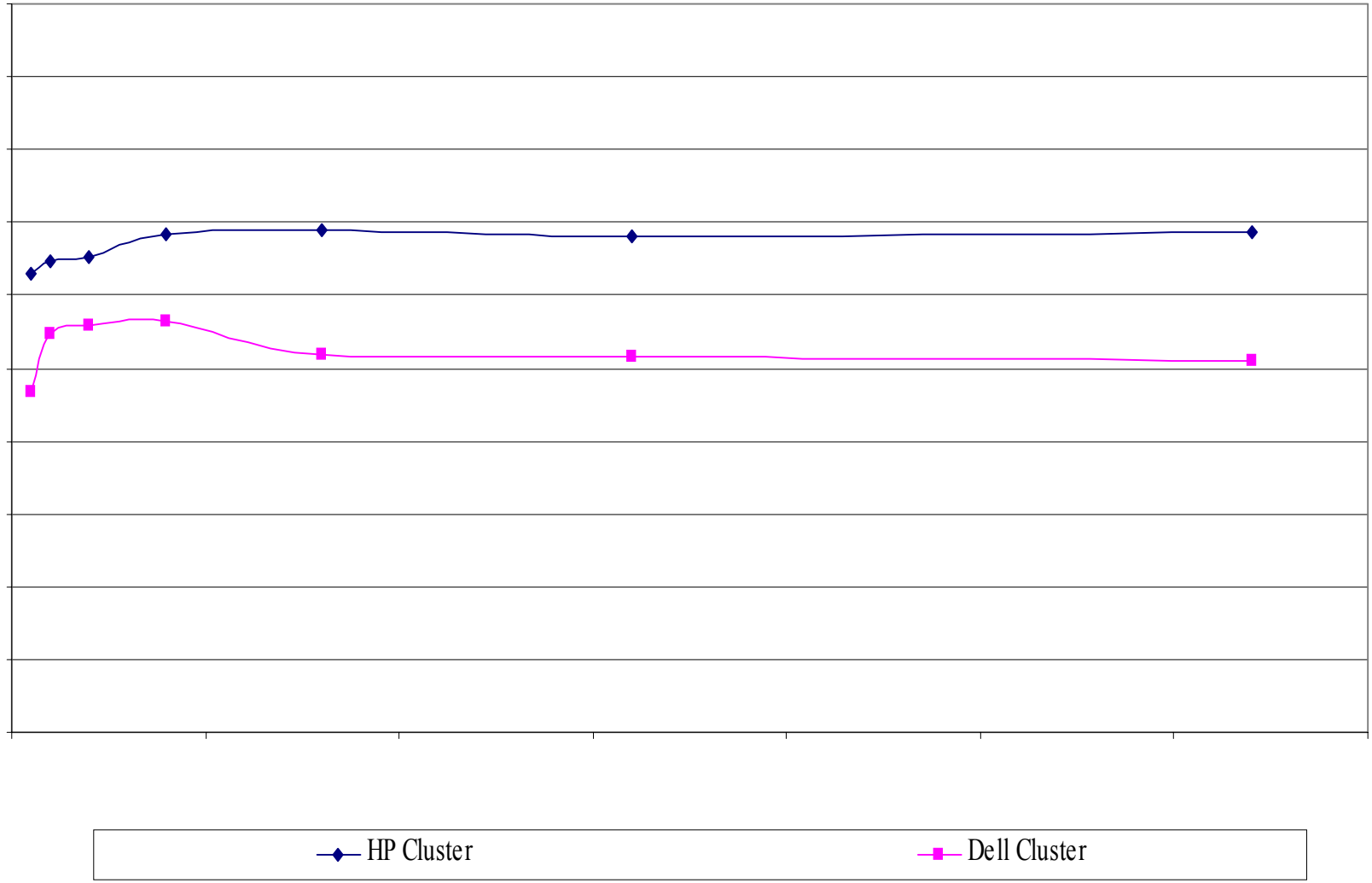


HP SA-cluster vs Dell

MB's/sec
1 channel, RAID 5

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