

Consolidation on Flash :: SQL Server 2016 Always On AGs

Overview & Breakthrough Perf Enhancements

Flipping the /faster Bit

Jimmy May, MCM
SQL Server Solutions Architect

jimmy.may@sandisk.com
[@aspiringgeek](#)



SanDisk®

```
C:\>sqlservr.exe /faster
```



SQL Server 2016 Always On Availability Groups Enhancements



Speaker: [Jimmy May](#)

Duration: 60 minutes

Track: Enterprise Database Administration & Deployment

Date: Wednesday May, 25, 2016

Time: 10am EDT :: 7am PDT :: 2:00pm UTC

Register: <http://bit.ly/PASS24HOP> AlwaysOn

Content: More than just perf!



EVOLUTION OF THE
DATA PLATFORM

May's I/O Mantra:

Requesting & Monitoring Storage

X capacity (GB)

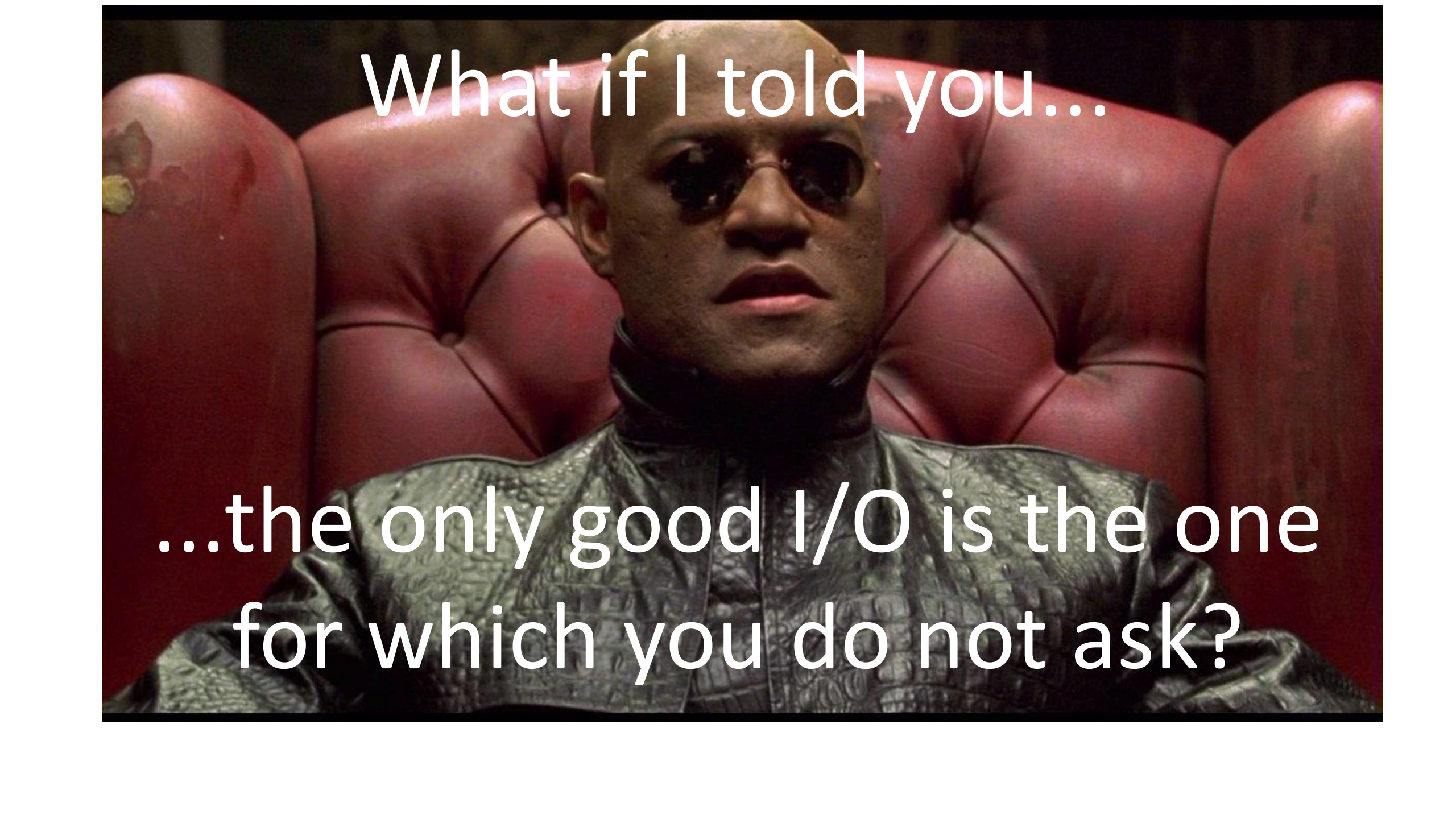
at $\mathcal{Y}$ IOPs (transfers/sec)

at $\leq 10\text{ms}$ latency for OLTP data files

at Z throughput (MB/sec)

at $\leq 30\text{ms}$ latency for DW data files

at 0ms-2ms latency for log files

A close-up shot of Morpheus from the movie The Matrix. He is a Black man with a shaved head, wearing dark sunglasses and a black high-collared jacket. He is sitting in a large, tufted red leather chair. The background is dark and out of focus.

What if I told you...

...the only good I/O is the one
for which you do not ask?

The best I/O is the one you don't have to do.

—Gene Amdahl, author of [Amdahl's Law](#)

Caching Algorithms: Your Experience May Vary...



SQL Server Licensing Labyrinth



Licensing Variables

- Cores & Sockets
- SQL Server Edition
- Virtualized vs. Bare Metal
- Host vs. Guest
- Software Assurance (SA) or not
- Active or Passive
- Legacy Licensing
- Is your sales rep under quota & is it near end-of-quarter or better yet near end-of-fiscal year?
- Which highly-trained professional sales rep you talk to
 - Ask 2, get 3 opinions

Consolidation on Flash

SQL 2005 EoS—*last month!*

www.microsoft.com/en-us/server-cloud/products/sql-server-2005

<http://bit.ly/1PI8GRN>

Licensing is complex—and expensive

3x performance on flash vs. spinning media

Consolidation on flash:

Hardware for Nothing, Flash for Free

Customer Case Studies <http://bit.ly/1RChgDK>

I/O Blender Effect

Imagine SQL Server log files or data warehouse workloads with sequential reads

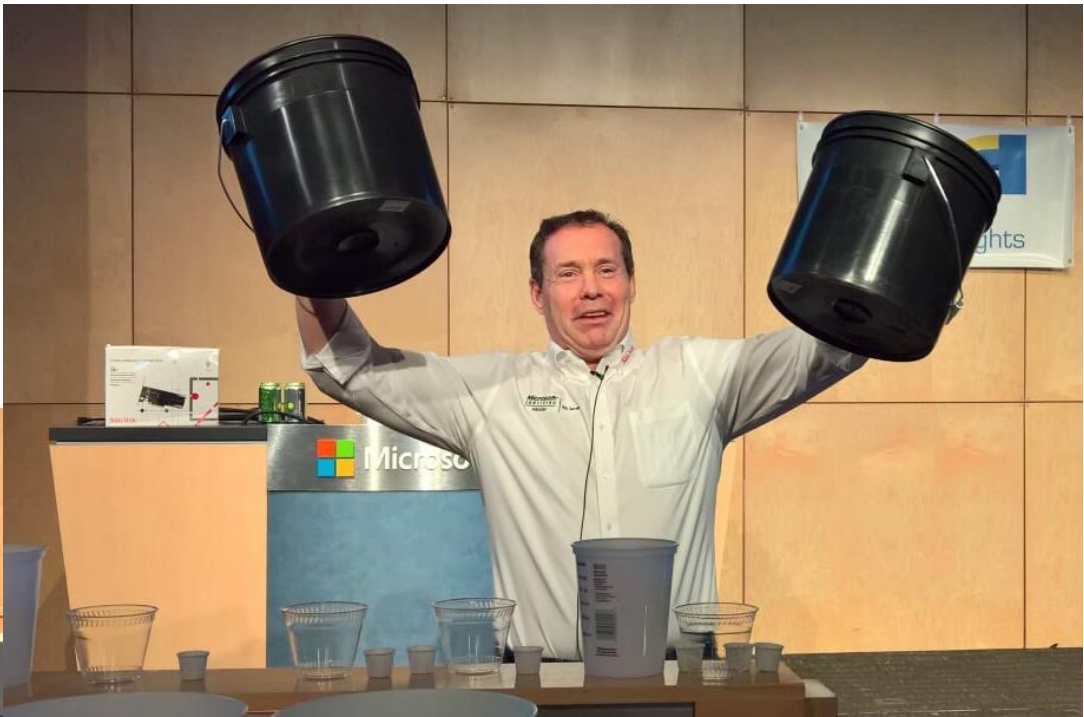
Now run several of these in VMs on a host

At the hypervisor and storage level:

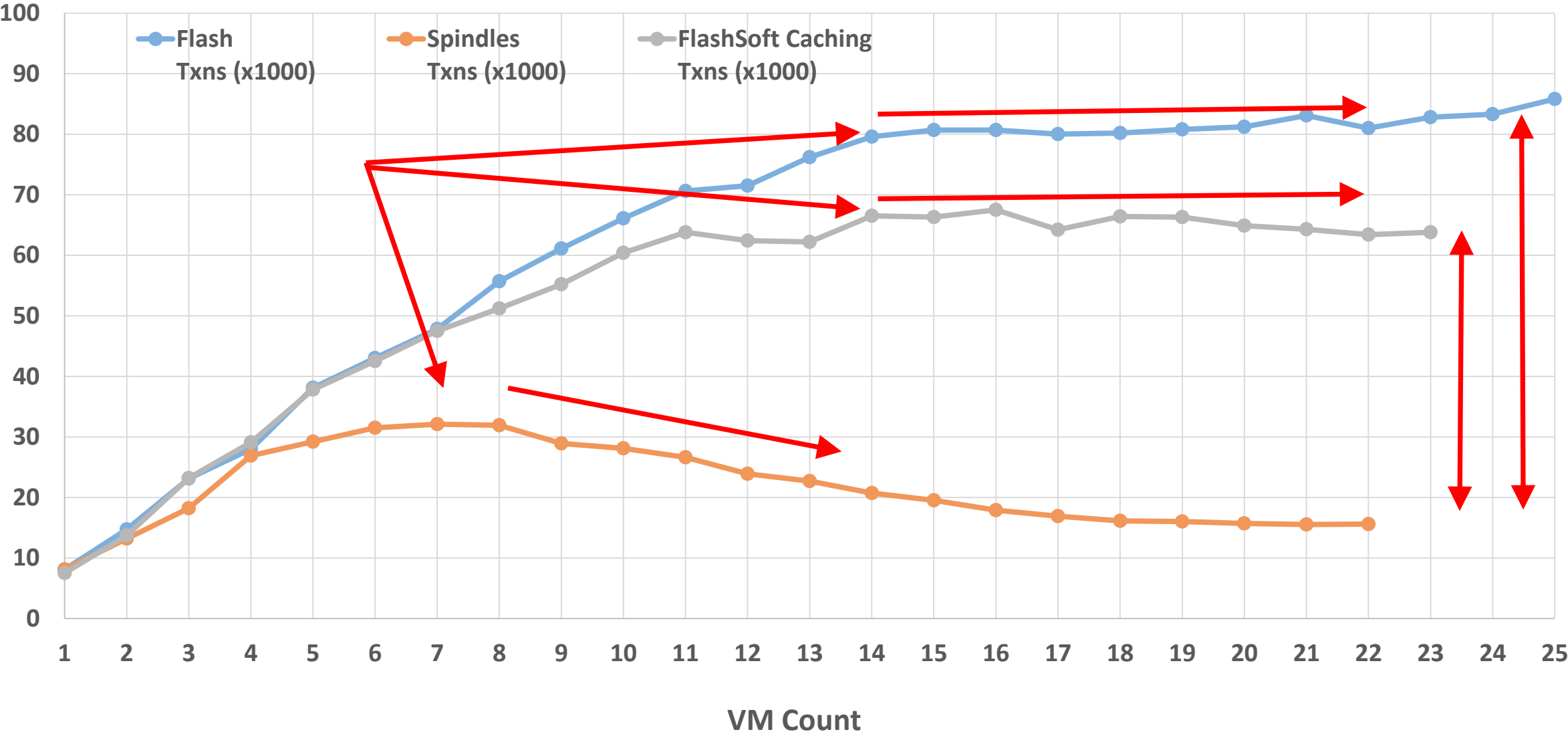
- The I/O from those VMs gets mixed up – like it was run through a blender
- It looks like random I/O, not like the sequential I/O it started as

Storage performance vs. I/O blender limits workload density

SQL Server Common I/O Sizes: I/O Blender Demo



SQL Workload Consolidation: Do More—Reliably and Consistently



SQL Workload Consolidation: Save More

Assume consolidating 21 workloads (just as we tested)

If one host can support all 21 workloads:

- Repurpose/retire two hosts, or don't buy them in the first place.
- You don't need SQL Server licenses for those two hosts.

Do the math:

- Each host: 2-sockets, 14 cores/CPU = 28 cores (same as what we tested)
- \$6,874/core for SQL 2014 EE (full price, no discounts, no SA)
- $28 * \$6,874 = \$192,472$ per host (for SQL EE licenses)
- ~\$400,000 savings by eliminating the need to license 2 hosts

Better performance (free lunch!)

Why Is This Good?

Saving \$400k is obviously good for your organization. Your org/team/customers are looking for the best solution.

- You win raving fans.

Redirect budgeted savings to:

- Higher-margin products and services
- Additional projects and equipment (such as more SanDisk flash products)

Be the hero – Help yourself and your company, customers, & users invest their savings

SQL Server 2012 & 2014 AlwaysOn AG Perf Bottlenecks

AlwaysOn Availability Groups (AGs) functionality is based on Database Mirroring (DBM)

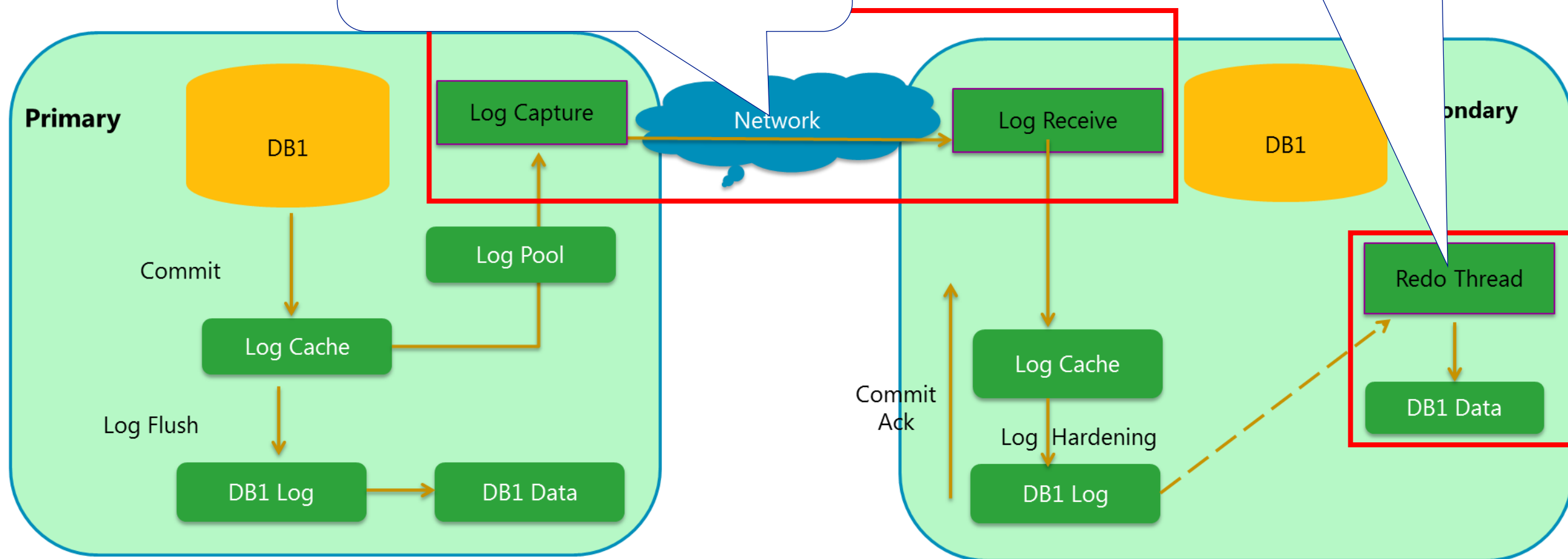
DBM legacy code had two built-in performance bottlenecks inherited by AGs:

1. Log transport: This is a process that encrypts and compresses log traffic to secondary replica(s)
2. Redo thread: Think about it as a continuous restore thread, applying changes made on the primary replica to secondary replica(s)

AlwaysOn Log Synchronization Perf Bottlenecks

Log transport: Process that encrypts and compresses log traffic to secondary replica(s)

Redo applies changes to primary replica to secondary replica(s)



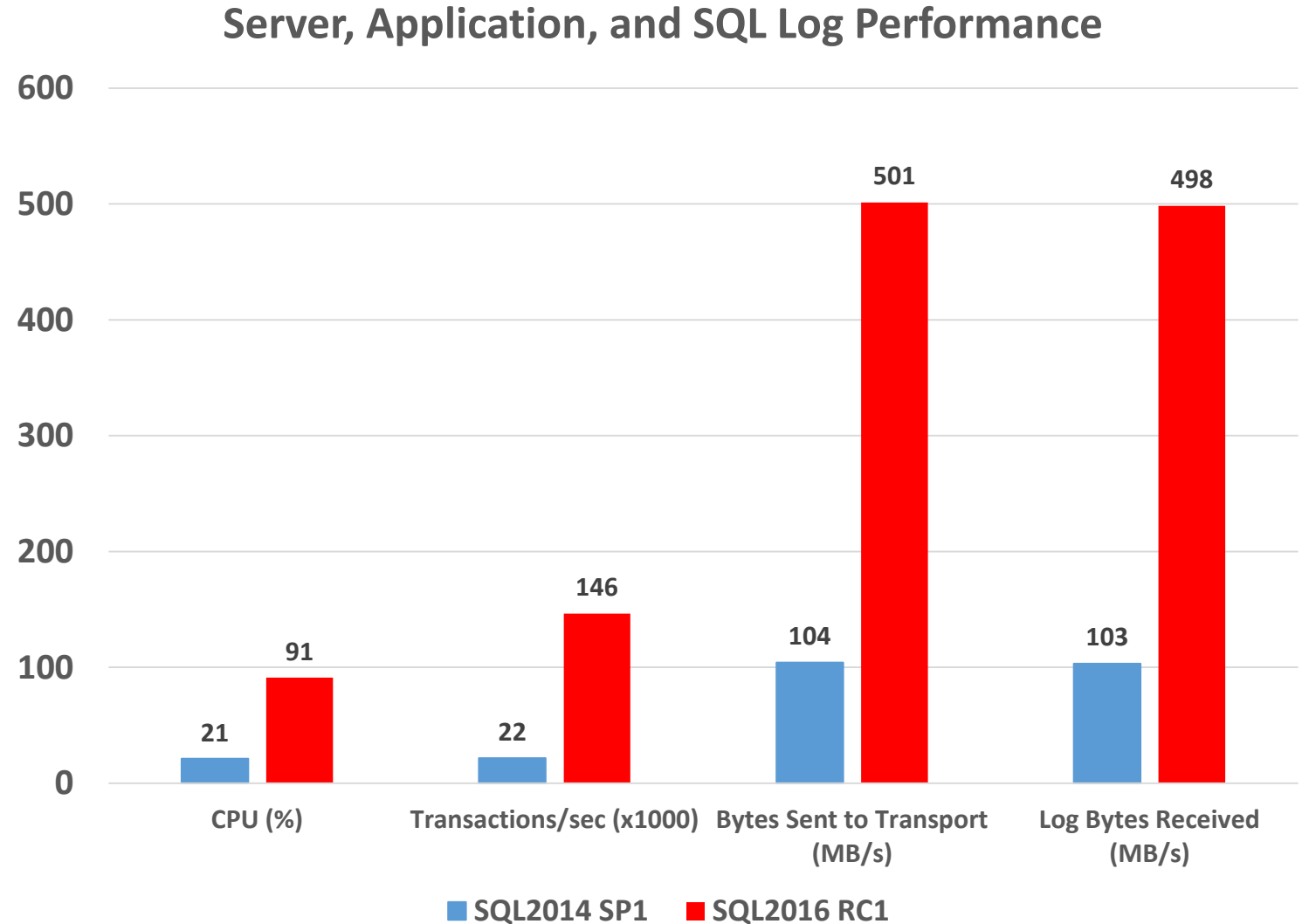
AlwaysOn AGs: SQL 2016 vs. SQL 2014

~5x log transfer to secondary

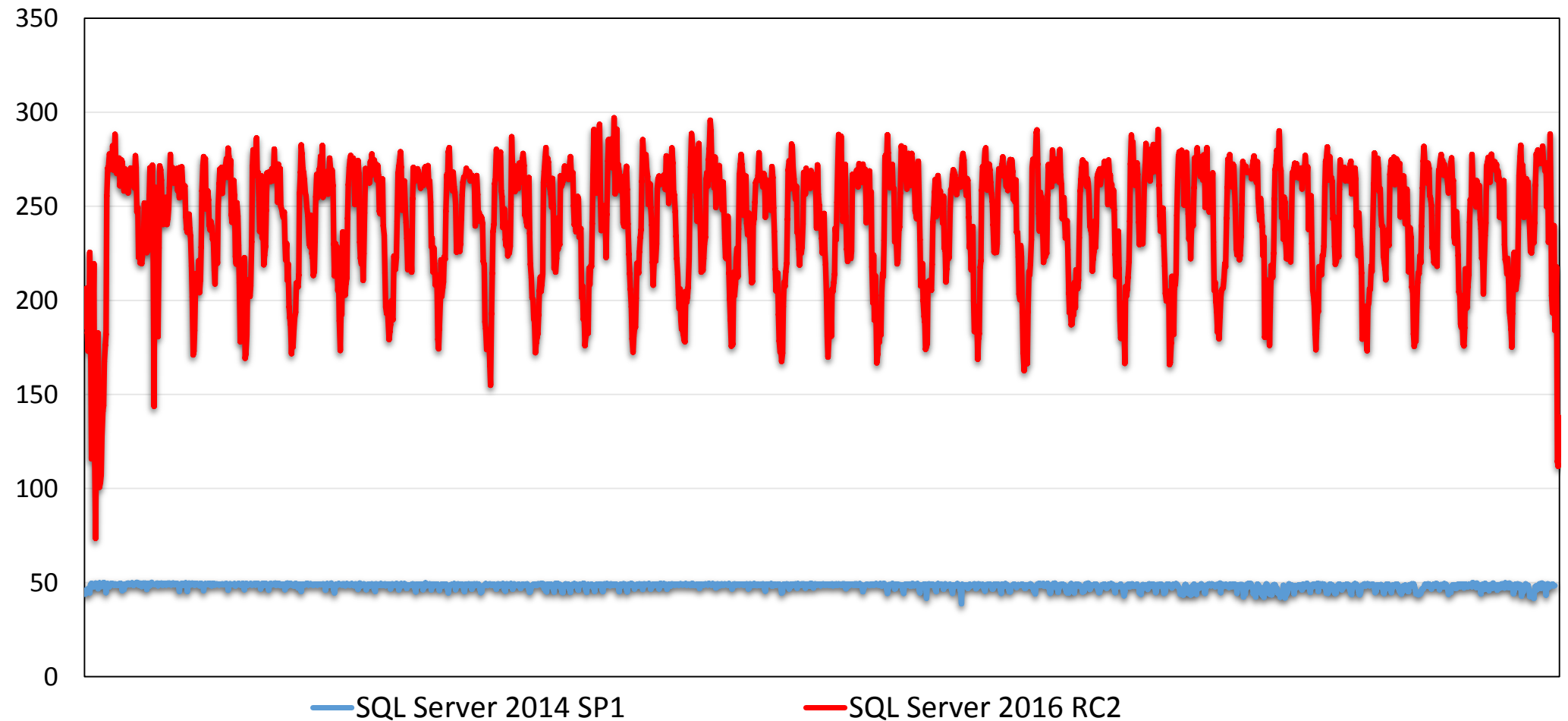
- Enhanced RPO
- Data on primary hardened on secondary immediately

More work done

- 4x CPU %
- 6x trans/sec

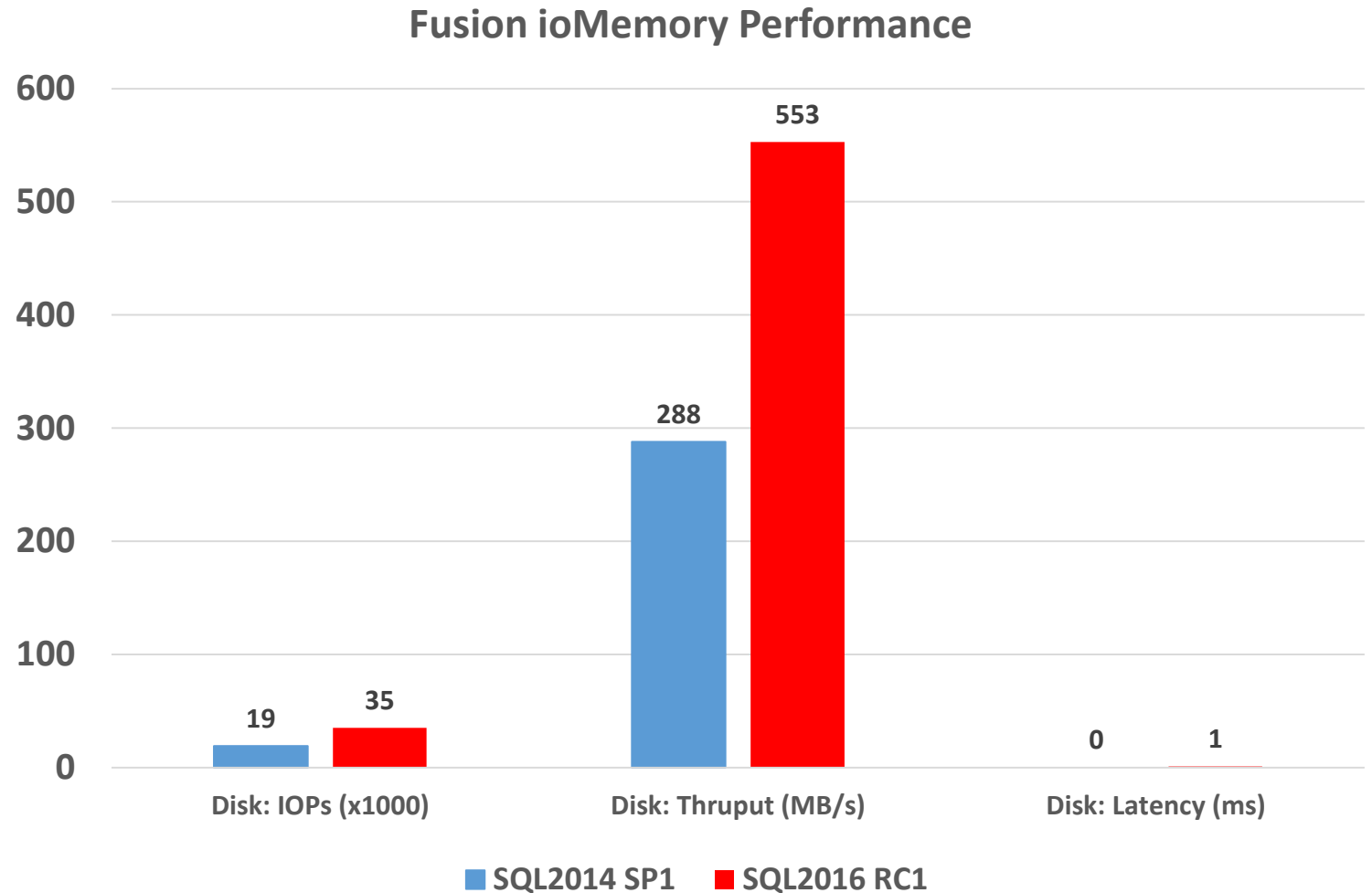


SQL 2014 vs. 2016: Log Transport Performance



Unleashing the Power of SQL Server 2016

~3x IOPs
>4x throughput
<1ms latency
(~300-700μs)



Key Customer Messages: SQL 2016 AlwaysOn AG

Minimizes risk of data loss

- Changed data is received on secondaries without delay
- If the primary fails, the secondary has already received the log of the change

Improves data consistency, for better decisions and DR

- Reports from secondaries work with up-to-date data
- Backups from secondaries capture up-to-date data

Only if your storage system can keep up

- Use SanDisk flash products

Register Now! SQL Server 2016 Always On Availability Groups Enhancements



Speaker: [Jimmy May](#)

Duration: 60 minutes

Track: Enterprise Database Administration & Deployment

Date: Wednesday May, 25, 2016

Time: 10am EDT :: 7am PDT :: 2:00pm UTC

Register: <http://bit.ly/PASS24HOP> *AlwaysOn*



EVOLUTION OF THE
DATA PLATFORM

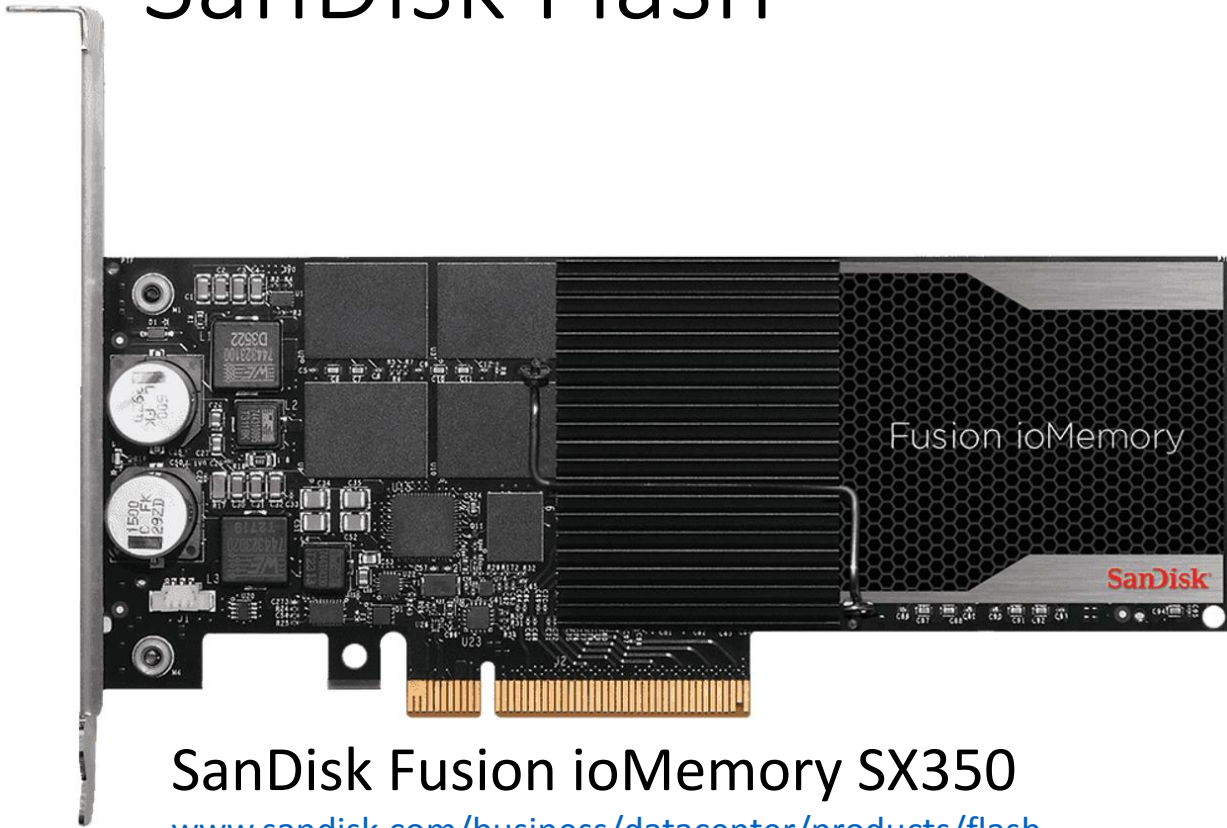
Flash: Don't be this guy. Don't be in this org.



Hat tip to Bob Pusateri ([@SQLBob](https://twitter.com/SQLBob))

via Jason Horner ([@jasonhorner](https://twitter.com/jasonhorner)) & Argenis Fernandez ([@DBArgenis](https://twitter.com/DBArgenis))

SanDisk Flash



SanDisk Fusion ioMemory SX350

www.sandisk.com/business/datacenter/products/flash-devices/pcie-flash/sx350



SanDisk Optimus MAX

www.sandisk.com/business/datacenter/products/flash-devices/ssds/sas-ssd/optimus

See for yourself...

Visit

www.sandisk.com/45daytrial

to see if you qualify for a
FREE 45-day *SQL Server Acceleration*
***with Fusion ioMemory* Trial** today.

SanDisk®



SanDisk®

Thank You!