FLASH Projects at Optum Technology

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About the Presenter, Context

- IT 20 years, lots of storage and performance in those years.
- In CMG since the mid 90’s.
- Specific interest in simple and functional no-nonsense solutions that solve problems
- Not necessarily HPC as a use case in my domain.
- User West Publishing, vendor at Xiotech, user at Optum
- We may jump abound a bit.
- We are a user group – this might end up in a roundtable discussion.

- Ask questions as we go.
FLASH Filter

Do you need FLASH at all?

- Adds cost.
- May add complexity.
- Maybe spinning + array cache is sufficient?
Use Case: Kick the Can, aka Old Junk

- Single threaded (Facets), 2003 era Sybase, addresses 3GB of RAM, AIX had 64GB.
- Server was using array cache as a server cache extension.
- Performance degraded when normal work was added to the shared array.
- Daily war rooms and many people unable to work.
- Problem we solved with FLASH. Server cache as a proxy for server RAM. $ couple hundred in SSD saved $1,000,000 Oracle upgrade. War rooms stopped and we have not heard form them since.
Use Case: Enabling Bad Behavior

- 6 TB DB runs 1000 MB/sec 20h a day - it drags 7.2TB of data through our array and fabric every day.
- We have not fallen for this yet, but it is a risk.
- Would AFA mask bad behavior? This one maxed out 2 x 8Gb FC ports
- It Don’t Fix Stupid. “Flash can't fix poorly designed applications, improperly deployed databases or server hypervisors that slow down the I/O of guest machines by funneling their data through some sort of poorly implemented storage controller emulation” – SearchStorage
Use Case: VDI

- 5,000 laptops replaced had 5000 x HD's x 150 IOPS per drive, or a pool of 750,000 IOPS.
- Linked clones can cut down on IO requirements. - But you have to be there.
- Advanced functionality with AFA – dedupe and compression is a great fit for VDI.
- What is the maintenance window? Can spinning handle it? What if the app follows the sun?
- Scheduling and batching can spread the load - but this needs management and maintenance too.
- What if you didn't worry about maintenance windows any more?
Use Case: Application that Needs It

Performance may need to move to the next level for some apps.

Optum likely has some of these but not in the domain I work in.

We have played with a few AFA’s and with the exception of the VDI people wanting AFA we don’t have a long list of candidates now.
  • What does the data show?
  • Can we justify?
  • There is a primary DB2EEE environment that went to direct attached SSD to AIX boxes; not on SAN anymore so off our radar.

Anybody with an inefficient app would love the Storage team to migrate them to FLASH.
Use Case: Top Tier in Multi Tiered Array

We see usually 20% to 30% increase in performance when we add a FLASH tier to a storage pool. The busiest blocks of data are well served in FLASH.
Thoughts

FLASH + CPU cycles solidly enables primary storage dedupe and compression. It’s about time.

Our NetApp VDI dedupes from 4:1 to 9:1. PURE came out with this two or three years ago. Other vendors have these now or almost have them now or these are roadmap items.

Big servers are ahead of storage in some cases; AFA might give catch storage up. There is always a bottleneck somewhere.

The dedupe and compression make benchmarking harder.

Deeper data reduction routines can change the %reduction over time. The test data pattern matters more. Dedupe and compression make certain IO tools less useful. Prepping and conditioning tests takes longer.

AFA Processors / controllers can be a bottleneck. Cores per node or cluster vary widely. For example a 6-way XtremIO array has CPU 192 cores.
AFA Testing Bullets

1. Trust but verify
2. Best case rt
3. Upper IOPS
4. Upper MB/sec
5. Mixed R/W RT
6. Error Injection (drive, cable, interconnect, controller)
7. Max IOPS at 1ms cross
8. Empty vs Full
9. Data reduction rates
10. Repeatability/consistency
11. Control load / side load
12. QOS
13. Alerts
14. Quality of performance and reporting data.
15. Phone home/call back time
16. Code upgrade impact
17. Integration with ??
18. Unique features ??
Summary
Thank You

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