Flash Memory SUMMIT

# Making Sense of the SSD Jungle

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# About Me


- Joined STEC  about 6 months ago
- Prior: worked for a large storage company for 10+ years
- Started DBA career at a telephone company long time ago
  - 1st time I worked on relational database I used: QUEL
  - (SQL was not a standard at that time)
- **Your input is very valuable as this is work in progress**
- I will not be pitching any products

# Agenda

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- Quotes from experts and links to technical information (lots of great stuff)
- Why is it so confusing ?
- Examples of Apples to Oranges Comparisons
- What is missing for DBA's?
- What do we need from Vendors?


# Quote:

## George Crump

President and Founder of Storage Switzerland


"The fog around solid-state storage is lifting. Most storage and database administrators are convinced that solid-state technology is the most viable next step in storage performance.

The challenge is that solid-state performs so well that there's concern if databases placed on the platform can take full advantage of their performance."


# Blog Post: De-Confusing SSD (for Oracle Databases)

## Gwen Shapira


"SSD is magic…if you have money and an IO problem, just go SSD.

When I tried to share my excitement with other DBAs, I found out that SSD is actually kind of scary."


# Blog Post: De-Confusing SSD (for Oracle Databases)

## Gwen Shapira

"Soon I became extremely confused by everything I've seen and heard:

- SSD is fast for reads, but not for writes.
- It's fast for random writes, but not for sequential writes.
- You shouldn't use it for redo, except that Oracle does on their appliances.
- SSD's get slow over time, have a limited lifespan and are unreliable…
- http://www.pythian.com/news/28797/de-confusing-ssd-for-oracle-databases/


# StorageSearch.com tracks over 300 manufacturers of SSDs


**about the top SSD companies list**

StorageSearch.com tracks over **300** manufacturers of SSDs.

That's **30x** more than when we started publishing daily updated SSD guides in 1998 and **6x** as many as when we started this quarterly top SSD companies series in 2007.

Our search volume based rankings give you an idea of which SSD companies **other readers like you** have been following in the most recent quarter.

People don't buy products (or companies) they don't know about.

StorageSearch.com has been the leading publication in the SSD market since the 1990s. Our readers have been making SSD history and not just reading about it.

http://www.storagesearch.com/ssd-top10.html

# The Jungle…

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2012 - Year of the Enterprise SSD Goldrush
Can you tell me the best way to SSD Street?
the Fastest SSDs
the SSD Heresies
the SSD Buyers Guide
SSD Jargon Explained
SSD Reliability Papers
After SSDs... What Next?
Flash SSDs / RAM SSDs
Increasing Flash SSD Reliability
animal brands in the SSD market
Why I Tire of "Tier Zero Storage"
Data Recovery from Flash SSDs?
RAM Cache Ratios in flash SSDs
Can you trust your flash SSD specs?
Branding Strategies in the SSD Market
Are MLC SSDs Safe in Enterprise Apps?

the Problem with Write IOPS - in flash SSDs
SSD Myths and Legends - "write endurance"
Market Trends in the Rackmount SSD Market
Data Integrity Challenges in flash SSD Design
RAM SSDs versus Flash SSDs - which is Best?
How Bad is - Choosing the Wrong SSD Supplier?
Using SSDs to Boost Legacy RAID Performance
Hybrid Storage Drives - winners, losers and maybes
SSDs Pushing the Envelope in Blade Server Design
Z's Laws - Predicting Future Flash SSD Performance
Clarifying SSD Pricing - where does all the money go?
Fast Purge flash SSDs - when "Rugged SSDs" won't do the job
Calling for an End to Unrealistic SSD vs HDD IOPS Comparisons
Legacy versus New Dynasty - a new way of looking at Enterprise SSDs




- Entire database can be deployed on SSD – good for smaller databases but impractical for large databases.
- Selected data files, tables, indexes, or partitions can be located on SSD.
- Temporary table space can be relocated to SSD - accelerating performance of temporary segment IO
- Redo logs (inherently write-intensive) – possible candidates for SSD



"For databases that are of a compatible version and operating system type, Oracle database flash cache could be used. This option is simple to implement and can be very effective for read-intensive, index-based workloads."

http://guyharrison.squarespace.com/ssdguide/04-evaluating-the-options-for-exploiting-ssd.html

# Tires: Speed Ratings, Size, Tire Wear

## Consider similar criteria when choosing SSD's

- Plus Size Tire Sizing
- Making Sense of Speed Ratings
- Tire Sizes Explained
- What Numbers Are Important?

If you know how to decipher them, you'll be empowered to make a real decision about what tire is right for you

# Another company's 5-year limited warranty

- Who provides the warranty?
- Boxed SSD Products (SSD purchased from a retailer)
- OEM SSD Products (SSD purchased as part of a computer system)
- What is the length of the warranty period?
- Who do I contact to obtain warranty service?
- What is "Media Wear-out Indicator" and where can I monitor its value?
- The media wear-out indicator reports a normalized value of 100 (when the SSD is brand new out of the factory) and declines to a minimum value of 1. When the value reads 1, this indicates that the SSD is reaching the wear-out limit, and Intel recommends that the SSD be replaced or a backup performed to help prevent the loss of data.
- For OEM SSD Products, the warranty period ends on the SHORTER OF the specified warranty term or the date when the media wear-out Indicator value for the drive reads 1. For warranty details on OEM SSD Products please go to OEM SSD warranty.


http://ssd-life.com

# Questions to Ask About PCIe SSDs

- How much power does PCIe SSD take away from your server?
- What is the impact on CPU cycles?

http://www.vikingtechnology.com/documents/products/SATADIMM_PCIe.pdf

# Performance Considerations

- **Performance Bottlenecks**—Storage controllers and software, in particular – are not designed to harness the power of SSDs, leaving much of their performance potential unrealized.
- **Inconsistent Performance**—When a user first purchases an SSD drive, read and write speed can be blazingly fast. However, SSD performance for writes typically drops over time.
- **Endurance/Reliability**

http://www.ctoedge.com/content/six-steps-making-mlc-ssds-work-enterprise


# Inability to Compare Solutions

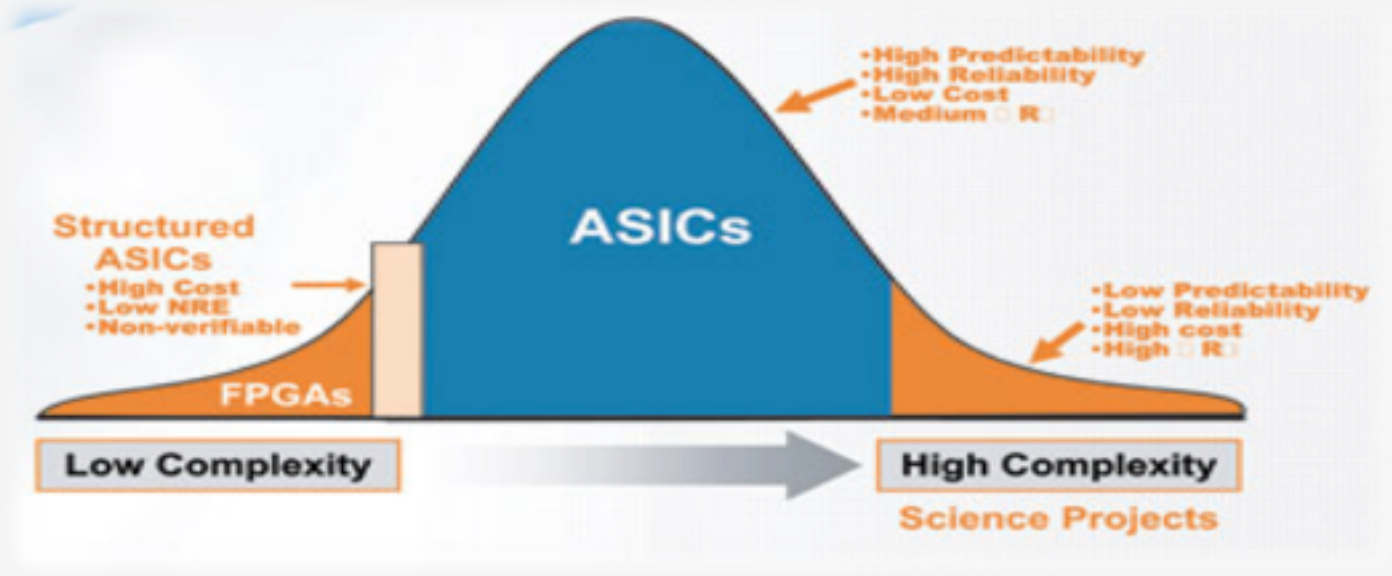

- Heavily populated "Wild West" of SSD vendors, some making extravagant claims
- This has turned data centers into unwitting test labs, with many finding products that don't meet their requirements.
- With few standards in place, customers soon discover that comparing products and claims is formidable work.


# FPGAs vs. ASICs


- Cost – the real story
- Time-to-market
- Why choose ASIC's?
- Where are FPGA's going?

https://www.doc.ic.ac.uk/~wl/teachlocal/arch2/killasic.pdf

# Market Confusion over ASIC




http://chipdesignmag.com/display.php?articleId=115&issueId=11

# PCI-e vs SAS

- Databases need both
- PCI-e slots at premium

  -Slots are also needed for Ethernet and other adapters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Thank you
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