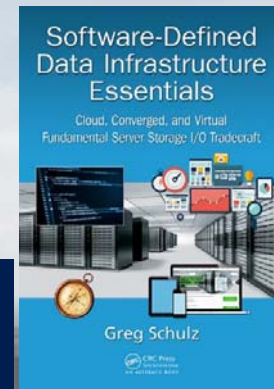# Data Infrastructure and Storage Industry Trends

Everything Is Not The Same

Navigating The Trends

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January 25, 2018

vmware vEXPERT VSAN 2016

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Software-Defined Data Infrastructure Essentials
Cloud, Converged, and Virtual Fundamental Server Storage I/O Tradecraft

Greg Schulz

SNIA / EPA Session
Presented by Greg Schulz Server StorageIO™
Greg@storageio.com | StorageIOblog.com | Facebook.com/StorageIO | @storageio

Agenda For Todays Discussion
What Will Be Covered Among Other Topics

- Opening Remarks and Introductions

- Industry and Customer Trends

  o Big Picture Perspectives

- Discussion Topics

  o Topic #1 – Storage Technologies

  o Topic #2 – Workloads, Metrics

  o Topic #3 – Putting IT all together

- Closing comments

  Follow-up, where to learn more
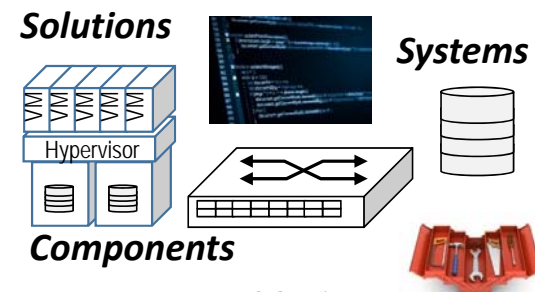
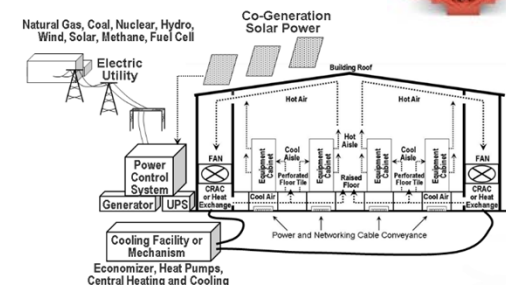 Download presentation: https://storageio.com/sniaepa218

Applications
Various Services
Workloads
(What use resources)

Data Infrastructure
Resources support workloads
Server, Storage, Network
Hardware, Software, Policies
Data Protection, Tools

Solutions

Systems

Components

Data Centers
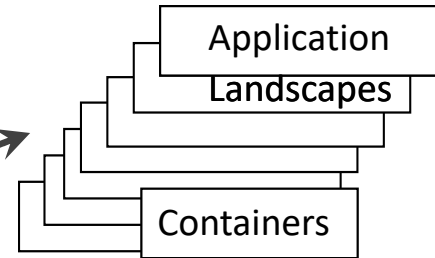Habitats for technology
On-site, Cloud, MSP

Source: Software Defined Data Infrastructure Essentials (CRC)

Industry Trends Perspectives – Data Infrastructure and Services Layers
From high level services & applications, to solutions & systems & low level components

Layers of functionality and resiliency
Data Services
Management
Abstraction

Application
Landscapes

Containers

Operating Systems — AIX, Centos, CoreOS, Nano, RHEL SUSE, Ubuntu, Windows

Hypervisors — AzureStack, Hyper-V, KVM, VMware, OpenStack, Xen

Software Defined Storage
Software Defined Networks — Ceph, ECS, Swift, vSAN S2D, NSX and others

Adapters

Adapters, I/O Networks

Clouds

Storage
(NVMe, SSD, HDD, Tape)
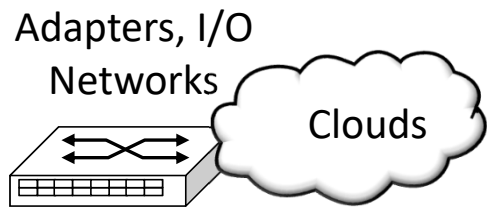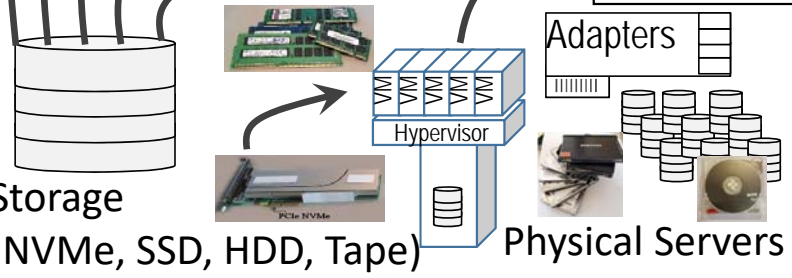
Hypervisor

Physical Servers

Value Increases

Software Stacks
Layers (Altitude)

Defining Hardware, Software
Services into Data Infrastructures

Source: Software Defined Data Infrastructure Essentials (CRC)

Server StorageIO Datadog Dashboard

All Hypervisors

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Industry Trends Perspectives – Common Sense Reminders
Common Themes, Different Focus Areas, Stacks, Layers, Altitudes

- ✓ You cant have hardware without software

- ✓ Software (even serverless) still needs hardware

- ✓ Software exists in different formats at various layers

- ✓ Small percentage changes at high-volume have big impacts

- ✓ Hardware requires electrical power for cooling and productivity

- ✓ Clouds / managed service providers need software & hardware

- ✓ Software can make or break a solution (create / solve bottlenecks)

- ✓ Expanding focus from just efficiency to effectiveness / productivity

- ✓ Servers, storage, networks need each other (each thinks most important;)

- ✓ There are difference between industry adoption & customer deployment
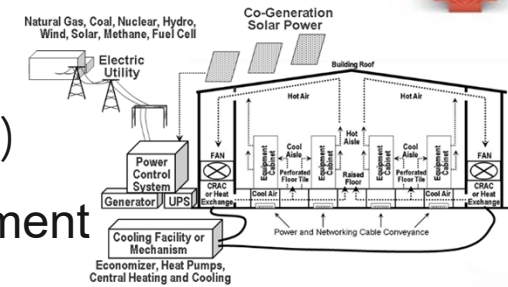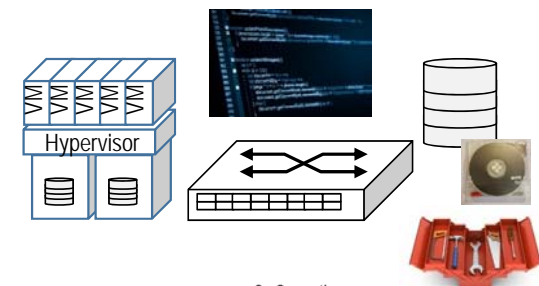
Source: Software Defined Data Infrastructure Essentials (CRC)

Industry Trends Perspective – Data and Storage Growth

How and where Storage being packaged, deployed and consumed

Workloads

Demand, Data Growth

Public Cloud Services

Performance (IO or Bandwidth)
Availability & Protection
Capacity & Bulk
Economics

Hybrid

Data Storage
Local, Remote
On/Near/Off-line
Block, File, Object
Queue, Tables, Services

CI, HCI, CiB

All Solid State and AFA

Solution and Systems
CI = Converged Infrastructure
HCI = Hyper-Converged Infrastructure
CiB = Cluster / Cloud in Box
Plex, Pod, Stamps, AZs

Legacy and Hybrid Arrays, Storage Systems and Appliances

Source: Software Defined Data Infrastructure Essentials (CRC)

Purpose Built Backup Appliances (PBBA) and Data Protection Appliances **Time**

Components

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Discussion Topic #1 – Different Storage Technologies
Everything is not the same: Various Tiers, Types, Categories of Storage Solutions

Lower cost per active I/O
Active data (reads/writes)

CPU Cores and Cache

Name / Address Space

Performance

Capacity

DRAM
NVM / PM

NVM / SSD / SCM / PM / Flash

HDDs

Tape

Lower cost per
Capacity unit

Bulk Storage
Cooler Data
Fewer Writes
Fewer Access

Stored Procedures
Policies, Scripts
Automation, Data Services

thessdplace.com
thenvmeplace.com
objectstoragecenter.com
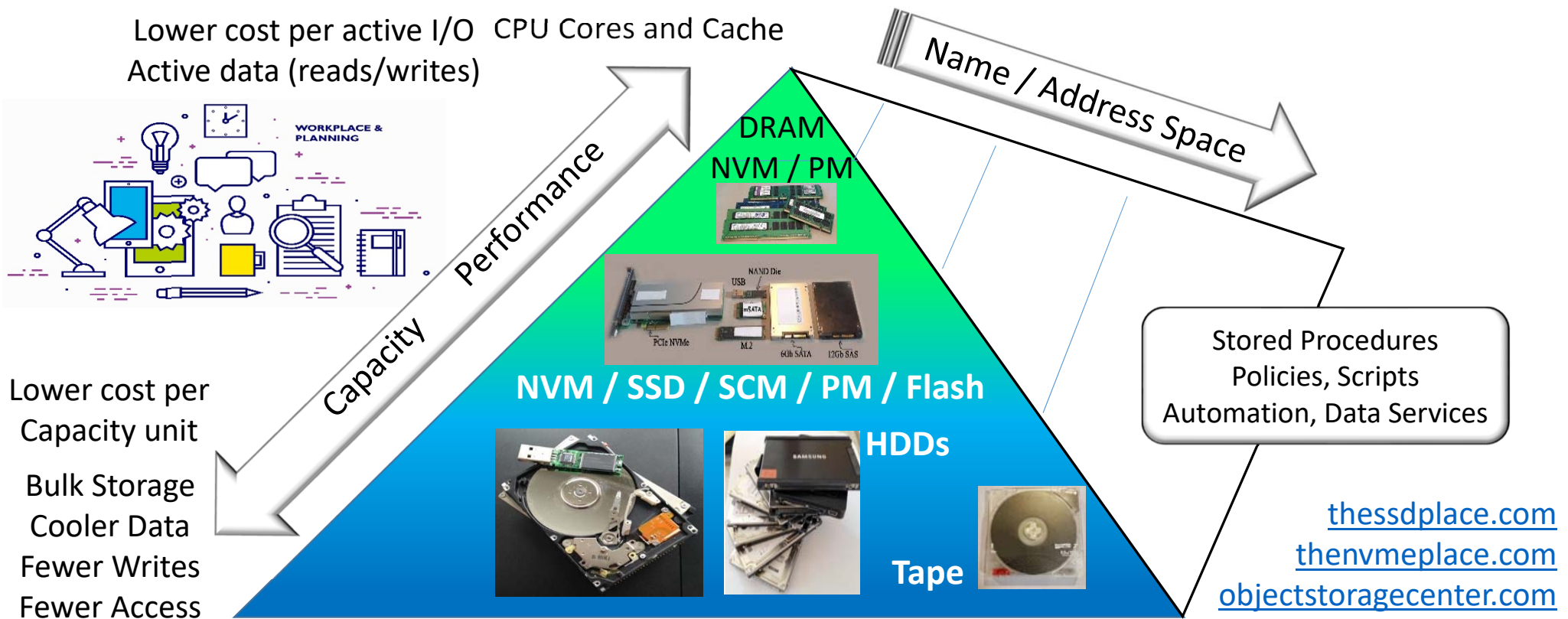
Source: Software Defined Data Infrastructure Essentials (CRC)

PACE = Performance Availability Capacity Economics

6

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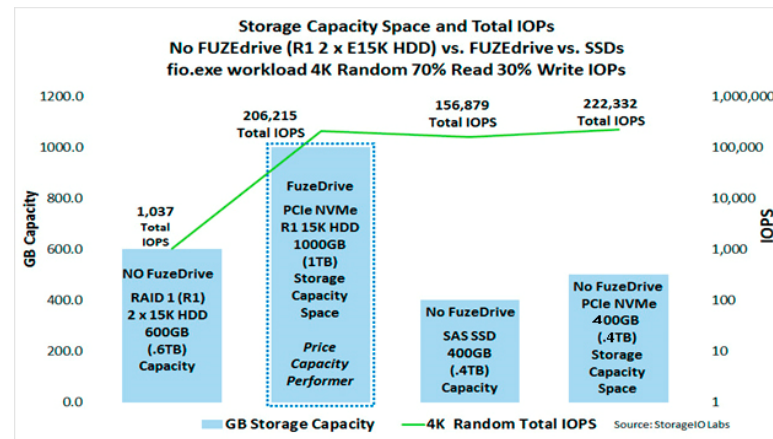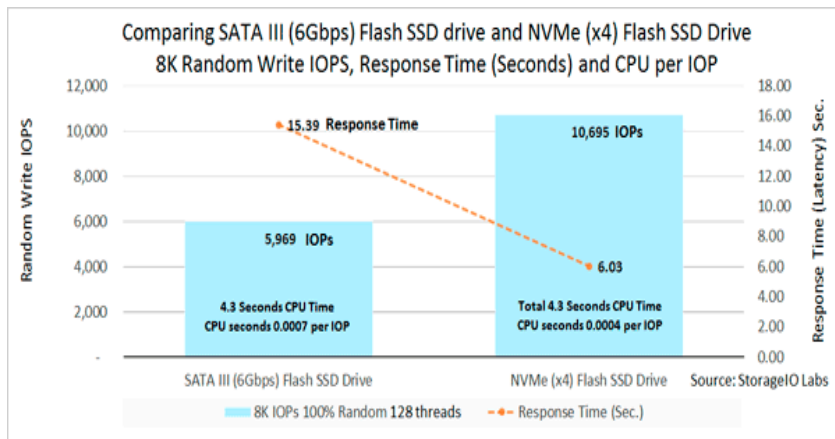# Discussion Topic #2 – Storage, Application Workloads and Metrics
From Component to System, Appliance and Solution Focus – Metrics that Matter

Comparing SATA III (6Gbps) Flash SSD drive and NVMe (x4) Flash SSD Drive
8K Random Write IOPS, Response Time (Seconds) and CPU per IOP
Source: StorageIO Labs

Storage Capacity Space and Total IOPs
No FUZEdrive (R1 2 x E15K HDD) vs. FUZEdrive vs. SSDs
fio.exe workload 4K Random 70% Read 30% Write IOPs
Source: StorageIO Labs

https://storageioblog.com/server-and-storage-io-benchmark-resources/

TPC-C TPS vs. Total Raw and Used Storage Capacity
Database Size 472GB (Scale Factor 6000) with 1, 20, 50 and 100 Users

https://storageioblog.com/enterprise-hdd-content-servers/

Comparing generations of 10K and 15K Enterprise HDDs

Source: Software Defined Data Infrastructure Essentials (CRC)

Discussion Topic #3 – Putting IT all together

Data Infrastructures (server, storage, network) combine to support information services

Applications
Workloads

Data Infrastructures
Resources, Solutions
Systems, Components

Data Centers
Habitats for technology

Costs

Service Catalog

Service-A Service-1
Service-B Service-2
Service-C Service-3
Service-D Service-4
Service-E Service-5
Service-F Service-6

Agile, Flexible
Scalable, Resilient

IoT / IoD

Services and
Resources used

WORKPLACE & PLANNING

Services
"Recipe"
Bill of Material (BOM)
Templates and Policies
PACE and SLOs

Resources

Automation

Software
Policies

Tools

Hypervisor

Regions/AZs

Compute

Natural Gas, Coal, Nuclear, Hydro, Wind, Solar, Methane, Fuel Cell

Co-Generation Solar Power

HDD, NVMe / SSD, Tape Storage

Staff

Facilities

I/O and Networking

Source: Software Defined Data Infrastructure Essentials (CRC)

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Closing comments, for now…

Everything is not the same across environments, however there are similarities

General Trends Perspectives

- No such thing as a information or data recession
- New value being found in old and new data
- Continued growth from various application workloads
- Server, storage and networks need each other
- Expanding solution focus (HW, SW, server, storage, network)
- Best metrics, workload simulation are those that matter
- Expand your tradecraft knowledge into adjacent areas

www.storageio.com/books.html

Where to learn more

- https://www.snia.org/forums/green
- https://storageio.com and https://storageioblog.com
  Articles, commentary, reports, white papers, videos & webcasts
- Feel free to call, IM, tweet, or email greg@storageio.com

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Thank You…

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