Storage Device Optimizations for Systems and Applications

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Systems and Applications Challenges

Are systems and applications optimized?

• Applications, systems, and deployments are complex today
  – Applications are integrating/automating different and complex pieces together
    • Databases, transactions, business intelligence, predictive analytics (including AI/ML), content delivery etc.
    • Running virtual machines, containers, microservices etc.
  – Public cloud
    • Leveraging ubiquitous, distributed, commodity x86, scale out infrastructure
  – On Premise infrastructure
    • Scale up systems, data services, hyperconverged/converged infrastructure
  – Hosted, Co-location cloud
    • IaaS, PaaS, SaaS services

• Applications and systems may not be storage devices optimized

• In this presentation, we will look at storage device optimization in the era of complex system/application architecture
System, Application Architecture*

System architectural choices have proliferated but may not completely leveraged

- Online ticket aggregator system- airlines, trains, movie ticket booking system
  - Highly available and concurrent, Fault tolerant, Geo dispersed, Digital payments, User comments/reviews/ratings, Confirmations, Content delivery, UI/UX

*For Illustration Purposes
System Architectural Choices*

System architectural choices have proliferated but not completely leveraged

*For Illustration Purposes
System, App. and Device Optimization*

Are systems optimized to take advantage various storage devices?

- WORM Applications, VRI/RI endurance, PCIe SSDs
- NL HDDs for low velocity data

- Performance/Value PCIe SSDs (case by case)

- In-memory
- Performance PCIe SSD

- Value PCIe, SATA SSDs
- SAS SSDs in some cases

- Performance PCIe
- Value PCIe/ SATA SSDs

- All Flash Arrays, High Cap, Low Endurance SAS, may be PCIe SSDs for high velocity data
- NL HDD Systems for low velocity data

- Value PCIe, SATA SSDs
- NL HDDs for low velocity data

- Performance PCIe
- Value PCIe/
- SATA SSDs

- NL HDDs

- Performance PCIe SSDs (case by case)

- High speed data ingestion, processing -> Performance/Value PCIe (Training Module)
- Value PCIe for inference logic

*For Illustration Purposes
Conclusion

Systems, Applications should embrace emerging architectural choices i.e. public / on-prem/hybrid cloud and optimize underlying storage devices as well

- Applications, systems and deployments are complex today, architectural choices have proliferated in the last few years
- A lot of focus has been given to compute, memory, network and cloud options (public, private, hybrid)
- Choice of storage devices not fully leveraged; performance, media, form factors options have increased in the past few years and they will continue to expand
- Users should embrace cloud choices as well as optimize systems and applications with various storage devices- performance, media, persistency, and emerging form factors
Architecting Data Infrastructure for the Zettabyte Age