Cloud Storage and Big Data, A Marriage Made in the Clouds

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Today’s Presenters

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SNIA-at-a-Glance

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Educate vendors and users on cloud storage, data services and orchestration

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Understand Hyperscaler requirements. Incorporate them into standards and programs

Collaborate with other industry associations
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Agenda

- History of Big Data
- Current state
- Modernization challenges
- Evolving workloads, processing outside of data center
- Look towards the future
History of Big Data
## History of Big Data

Enterprise Big Data Framework (https://www.bigdataframework.org/short-history-of-big-data/)

<table>
<thead>
<tr>
<th>BIG DATA PHASE 1</th>
<th>BIG DATA PHASE 2</th>
<th>BIG DATA PHASE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Period:</strong> 1970-2000</td>
<td><strong>Period:</strong> 2000-2010</td>
<td><strong>Period:</strong> 2010-present</td>
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| DBMS-based, structured content:  
  - RDBMS & data warehousing  
  - Extract Transfer Load  
  - Online Analytical Processing  
  - Dashboards & scorecards  
  - Data mining & statistical analysis | Web-based, unstructured content  
  - Information retrieval and extraction  
  - Opinion mining  
  - Question answering  
  - Web analytics and web intelligence  
  - Social media analytics  
  - Social network analysis  
  - Spatial-temporal analysis | Mobile and sensor-based content  
  - Location-aware analysis  
  - Person-centered analysis  
  - Context-relevant analysis  
  - Mobile visualization  
  - Human-Computer-Interaction |

| Block, NFS, POSIX | HDFS | Unified storage (Object and File) |
Current State
Evolution of Data Platforms

- Everything from Enterprise Data Warehouses to Hadoop based Data Lakes
- No one size fits all
- Emergence of cloud services
- Picking the right system for the right workload
  - Structured vs Unstructured
  - Batch vs Real-time
  - On-premises vs Cloud
The Five Vs of Big Data

- **Started as 3 Vs**
  - Volume: the huge amount of data that is produced every day
  - Variety: diversity of data, both types and sources
  - Velocity: the speed with which the data is generated

- **Additional Vs**
  - Veracity: is the authenticity and credibility of data
  - Value: transforming data into value for the business
Is Hadoop Dead?

For
- Cost: running on commodity hardware
- Batch analytics
- Availability through fault tolerance
- Spark on Hadoop

Against
- Inefficient for small datasets
- Real-time analytics
- Cloud alternatives
- Lack of integration with cloud services such as S3

- Merge of Hortonworks and Cloudera
- Cloudera Enterprise 6.2 & 6.3 EOL March 2022
- Hortonworks Data Platform 3.1 EOL December 2021
Modernization Challenges
Evolution of Data Platforms

The era of EDWH

Data lake Hadoop-based

Volume
Variety
Velocity
Veracity
Value

Enabled and empowered data scientists
Data democratization
Consumption based infrastructures
Support for all Data types
Infinite scalability
Fast new data sources onboarding
Traditional and Advanced Analytics use cases

Modern Data platform
Challenges – Questions Need to be Answered

- What workloads do we need to support?
  - Batch vs Streaming
  - AI vs Traditional analytics

- What protocols need to be supported?
  - HDFS vs S3 vs …

- Where best to run your data platform?
  - On-premises vs Cloud vs Hybrid

- Data considerations
  - Gravity
  - Sovereignty
  - Compliance
  - Security
The Skills Challenge

- Bringing in new technologies
  - Selecting the right tools for the right workload out of the huge number of choices
  - Containerization
- How to get support for new tools and technologies?
  - Fast moving ecosystem
  - Many open source projects
- Where do we find the people for these platforms and workloads?
  - In demand skills
  - Upskilling existing teams
Building for the Future

- Can we futureproof your data platform?
- How to not make the same mistakes again?
- Does everything need to move to the cloud?

What's NEXT
Modernization Challenges

**Data sprawl**
- Data is spread across multiple on premises and public cloud locations
- Data is accessible via multiple protocols (NFS, HDFS, S3)
- Finding relevant data
- Managing multiple copies of data

**Data governance and data gravity**
- Data classification
- Data sovereignty
- Regulatory compliance
- Not all data can move to public cloud—leverage data catalog to ensure compliant data movement and data placement
- Expensive lift and shift

**Performance, scalability, and durability**
- Bring data closer to compute -- long latencies when accessing data from data lake storage
- Cost prohibitive to keep all data in high performance storage tier
- With non-persistent cache, all data must be reloaded in the event of failure
- Elasticity and cloud bursting
- Computational storage

**Data security**
- Encryption of data in flight and at rest
- Hybrid key management
- Role based access control
Evolving Workloads
Machine Learning with Data from All Edge Sites

What usually happens today...

**TRAINING**
- Machine Learning model is trained at the core

**INFEERENCE**
- Inference occurs on new data with new model
- Push new model to edges
- Copy data from all edge sites

Copy data from all edge sites

Push new model to edges

Inference occurs on new data with new model
Federated Learning

Models are retrained on the edge

Inference occurs on new data with new model

Machine Learning model is trained on the core

Aggregator collects models from each edge site, retracts, and redistributes new models

TRAINDING and INFEERENCE

push new model to edges

request retrain

pull models from edge

(not raw data)
Value of Federated Learning

• Improve model training across locations
• Address data privacy, locality and security
• Adhere to regulatory compliance
• Tackle data volumes at lower cost and risk (e.g., minimize egress charges)
Looking Towards the Future
Look Towards the Future – Storage for the New Big Data

- True hybrid cloud data fabric
- Acceleration technology: FPGA, GPU, DPU, IPU,…
- Computational storage

![Diagram showing true hybrid cloud data fabric with sites A, B, and C connected to computational storage and apps.]
Looking Towards the Future

- Data and Analytics as a Core Business Function
- Data and Analytics at the Edge
- Operationalization of AI
  - DevOps, AI Ops, ML Ops
- The Data Lakehouse
  - Bringing together the best of the data warehouse and data lakes
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Questions?