Data Science Day
Edición Sur

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Microsoft

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POWER PLATFORM CHILE

BI EXPERT

BIG DATA NEWS WITH AZURE HD INSIGHT

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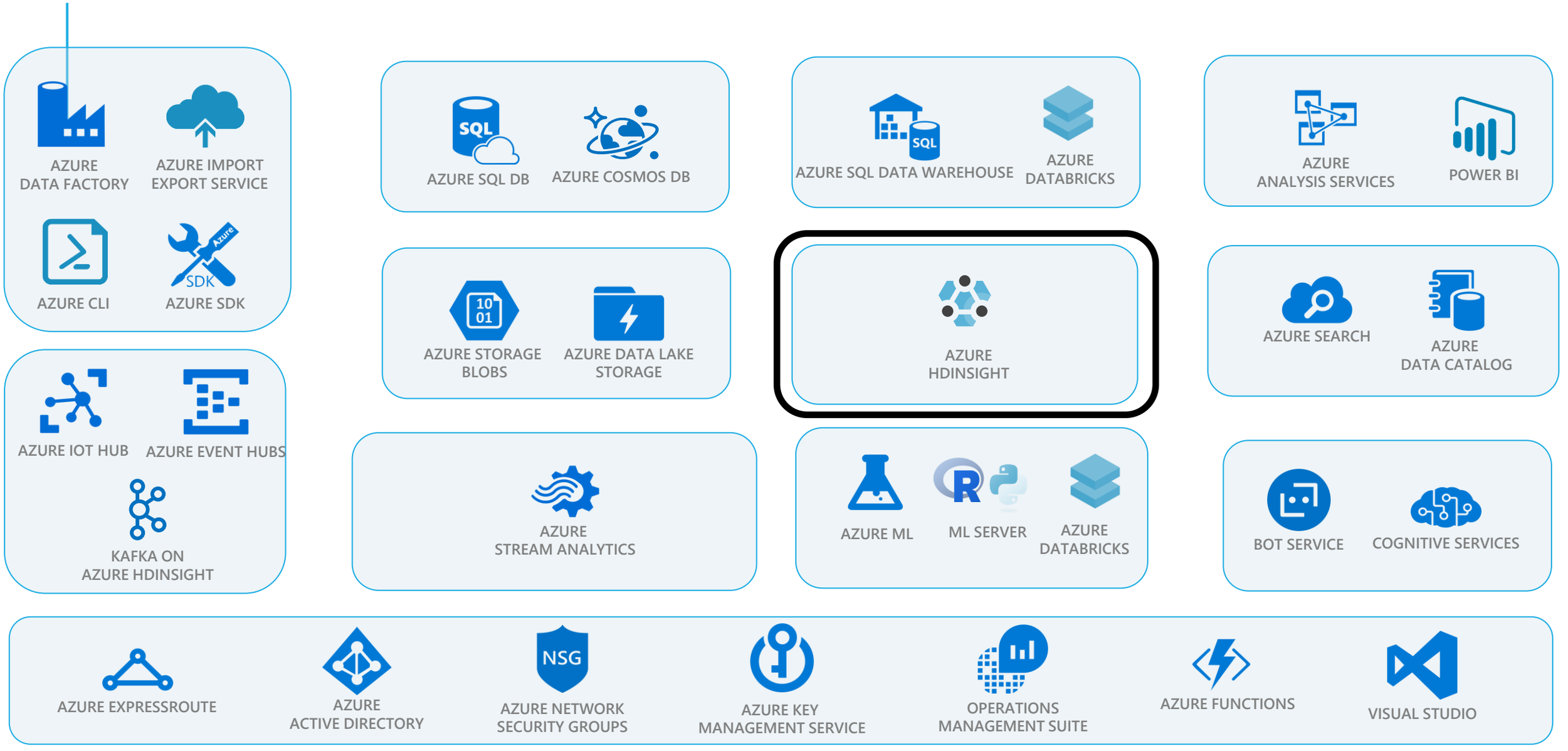
THE AZURE DATA LANDSCAPE



WHY HDINSIGHT?

Preserve existing investments in Hive, Pig, Storm & HBase

Preference towards managed offering

Multiple workloads (Realtime, Batch, ML etc.)

Similar on-prem and cloud codebase [Apache Open Source]

Row and Column level security

Low cost

AZURE HDINSIGHT

A SECURE AND MANAGED APACHE HADOOP AND SPARK PLATFORM FOR BUILDING DATA LAKES IN THE CLOUD

Open Source

- 100% Apache Open Source
- The most popular open source frameworks
- Part of the Hortonworks HDP distribution

Managed

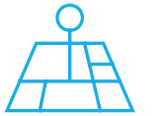
- 99.9% availability SLA
- Cluster Health Monitoring
- Integration with Azure Log Analytics
- Highly optimized for Azure

Secure & Compliant

- Role based access control
- Azure AD & Kerberos based authentication
- Strong VNET and service endpoint support
- The most trusted and compliant platform

Productive

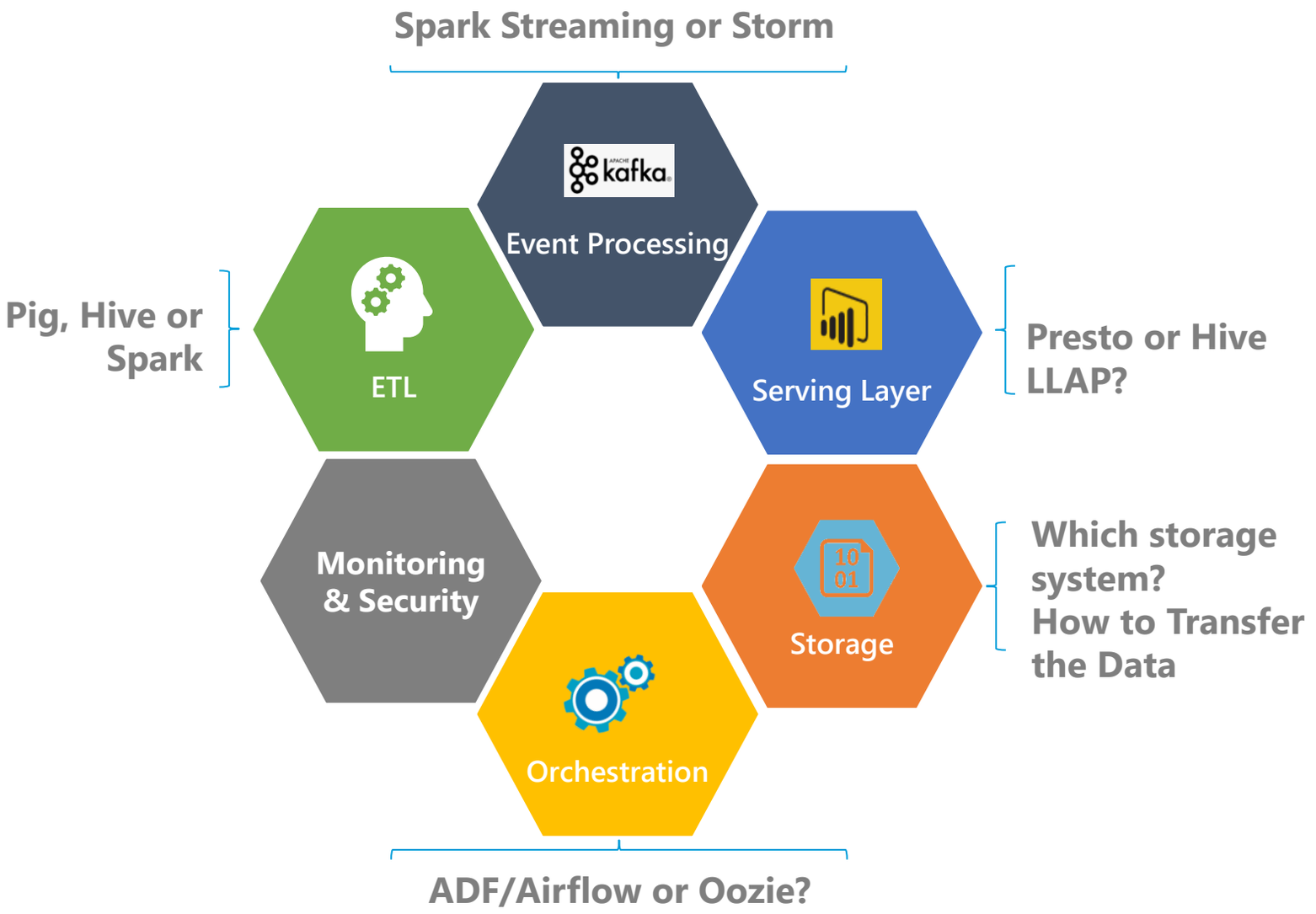
- Works with the tools developers already have
- Special extensions for advanced debugging and diagnostics



Lift & Shift

- Move workloads from on-prem or other clouds without code changes
- Curated application platform for wide variety of use cases

Many things to figure out



ETL TECHNOLOGY CHOICES

	Spark	Pig	
Designed for	ETL	ETL	Data warehousing
Adoption	High, increasing	Low, decreasing	Stable
Number of connectors	Highest	High	High
Languages	Python, R, Scala, Java, SQL	Pig	SQL
Performance	High	Medium	Medium

STREAMING ENGINE TECHNOLOGY CHOICES

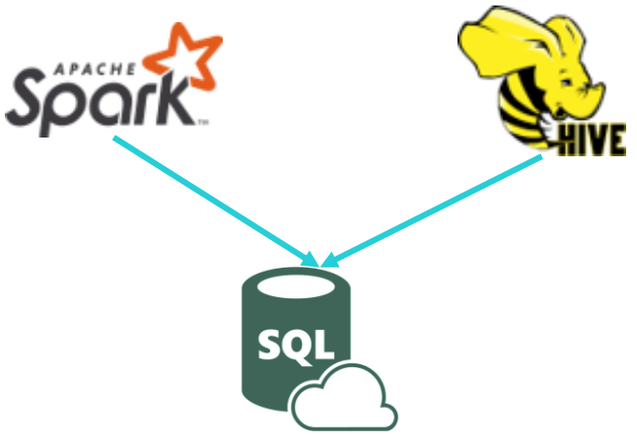
	Spark Structured Streaming	Storm
Adoption	High, increasing	Decreasing
Event processing guarantee	Exactly once	At least once
Throughput	High	Low
Processing Model	Micro Batch	Real-Time
Latency	High	Low
Event time support	Yes	Yes
Languages	Python, R, Scala, Java, SQL	Java

3. INTERACTIVE QUERY TECHNOLOGY CHOICES

Capability	Hive LLAP	Apache Spark	presto
Interactive Query Speed	High	High	Medium
Scale	High	High	Low
Caching	Yes	Yes	Early Support
Result Caching	Yes	No	No
Intelligent Cache Eviction	Yes	No	No
Materialized Views	Yes	No	No
Complex Fact to Fact Joins	Yes	Yes	No
Transactions	Yes	No	No
Query Concurrency	High	Low	Low
Row , Column level security	Yes [Apache Ranger+ AAD]	Medium	Medium
Rich end user Tools	Yes	Yes	Yes
Language Support	SQL, UDF	SQL, Scala, Python	SQL
Data Source Connector Support	Storage Handlers	Data Sources	connectors

Spark & Hive Metastore

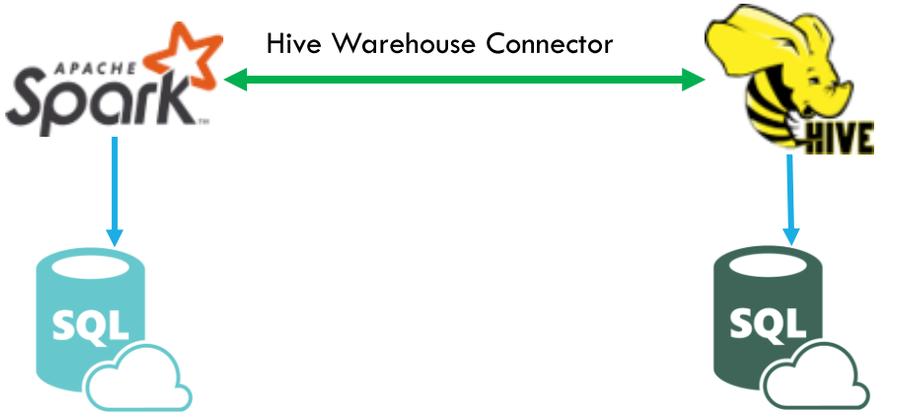
Azure HDInsight 3.6 with Hadoop 2.6



Hive Metadata

- Spark executors talk directly to Hive Metastore
- Reliability and compatibility issues
- Cannot take advantage of the native query engine

Azure HDInsight 4.0 with Hadoop 3.x



Spark Metadata

Hive Metadata

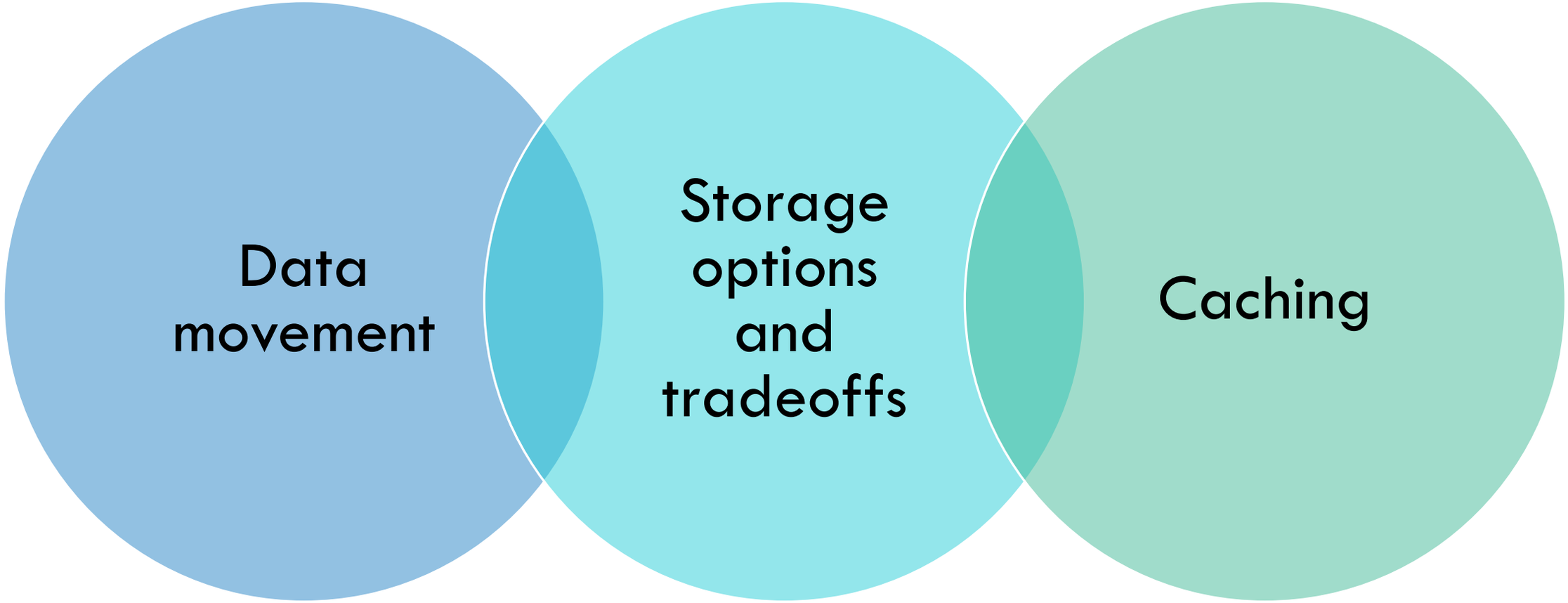
- **New Hive Warehouse Connector**
- Apache Arrow based communication between Spark executors and Hive LLAP
- Smart predicate pushdown
- Transactional access to Hive tables from Spark

Hive Metastore migration tool: https://azure.microsoft.com/en-us/blog/hdinsight-metastore-migration-tool-open-source-release-now-available/

DATA PIPELINE ORCHESTRATION TECHNOLOGY

	ADF	Airflow	Oozie
Service management	Azure PaaS	IaaS VM	HDInsight
Code	JSON	Python	Java
GUI	ADF V2 has great UX	Good UX	Below Average UX
Community	Microsoft	Growing (12,133 Stars)	Declining (483 Stars)
On-demand clusters	Yes	No, but extensible	No
Extensibility	Custom action-only	Full, graph + actions	Custom action-only
Pipeline definition	JSON/UX	Python/ UX	XML/JAVA/UX
Devops-first design	Yes	Yes	Yes
Pipeline monitoring	Yes	Yes	Yes
Scheduling	Event, Time	Event	Event, Time

STORAGE: 3 KEY TOPICS



Data Qty	Network Bandwidth		
	45 Mbps (T3)	100 Mbps	1 Gbps
1 TB	2 days	1 day	2 hours
10 TB	22 days	10 days	1 day
35 TB	76 days	34 days	3 days
80 TB	173 days	78 days	8 days
100 TB	216 days	97 days	10 days
200 TB	1 year	194 days	19 days
500 TB	3 years	1 year	49 days
1 PB	6 years	3 years	97 days
2 PB	12 years	5 years	194 days

STORAGE TRANSFER OPTIONS

Network Transfer with TLS

- Over Internet
- Express Route
- Data Box online Transfer

Shipping data offline

- Data Box offline data transfer

AZURE DATA BOX: OFFLINE TRANSFER OPTIONS

Available for small, medium, or large migrations

PRODUCTS	CAPACITY	DESCRIPTION
 Data Box Disk	8 TB, up to 40 TB	USB 3.1 SSD disks Order up to 5 in each pack
 Data Box	100 TB	Ruggedized, self-contained appliances
 Data Box Heavy	1 PB	

Use Azure Data Box to migrate data from an on-premises HDFS store to Azure Storage

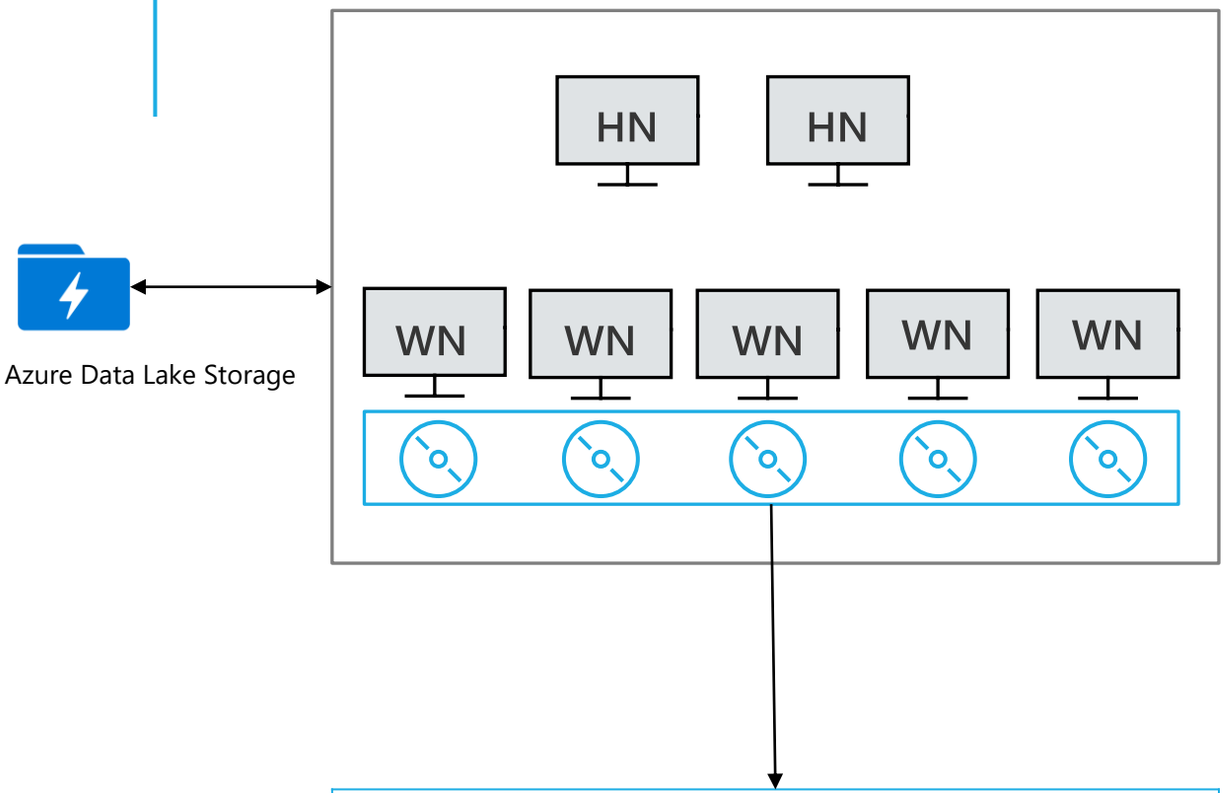
STORAGE OPTIONS WITH HDINSIGHT

	Type	Latency (Consistency of latency)	Workloads	Bandwidth	Key Benefits
ADLS Gen 2	Hierarchical	10-50ms (Medium)	HDInsight 3.6 & 4.0	Unconstrained	Atomic Rename, File Folder level ACL's
Standard BLOB	Object Store	10-50ms (Medium)	HDInsight 3.6 & 4.0	Unconstrained	Mature
Premium BLOB	Object Store	~5ms (High)	HBase in Preview	Unconstrained	Fast
Premium Managed Disks	Hierarchical	~5ms (High)	Kafka, HBase in preview	Based on disk	Consistent latency
ADLS Gen 1	Hierarchical	10-100ms (Low)	HDInsight 3.6(No HBase)	High	Atomic Rename, File Folder level ACL's

REMOTE STORAGE: CACHING OPTIONS

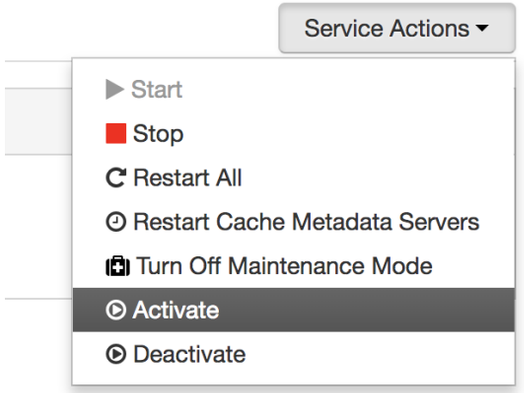
Workload	Caching Options	Key benefits
Spark	Spark IO Cache	Up to ~8 to 10x perf improvements
HBase & Phoenix	Bucket cache	Up 5-10x perf gains on recently read or written data
Hive + LLAP	LLAP Intelligent cache/Result Cache	Up to ~4-100X gain on cached data

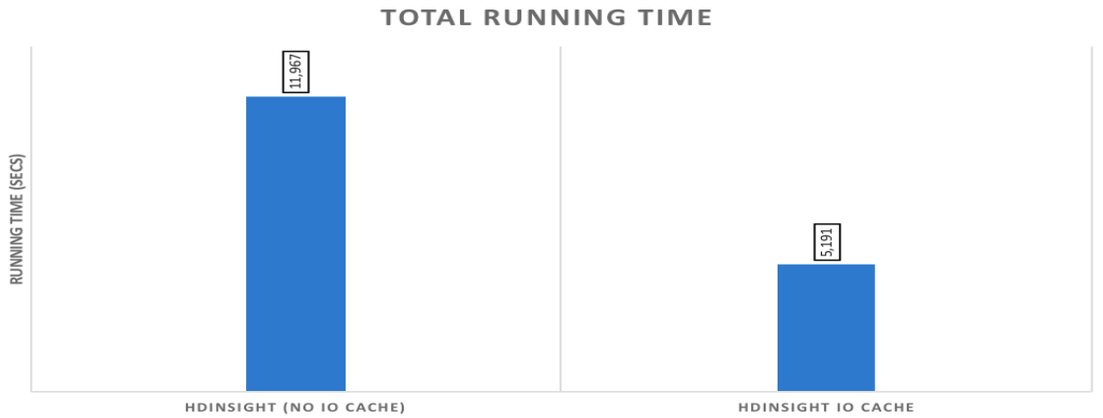
HDInsight IO cache



INSTANCE	CORE	RAM	TEMP SSD
D1 v2	1	3.50 GiB	**50 GiB**
D2 v2	2	7.00 GiB	**100 GiB**
D3 v2	4	14.00 GiB	**200 GiB**
D4 v2	8	28.00 GiB	**400 GiB**
D5 v2	16	56.00 GiB	**800 GiB**

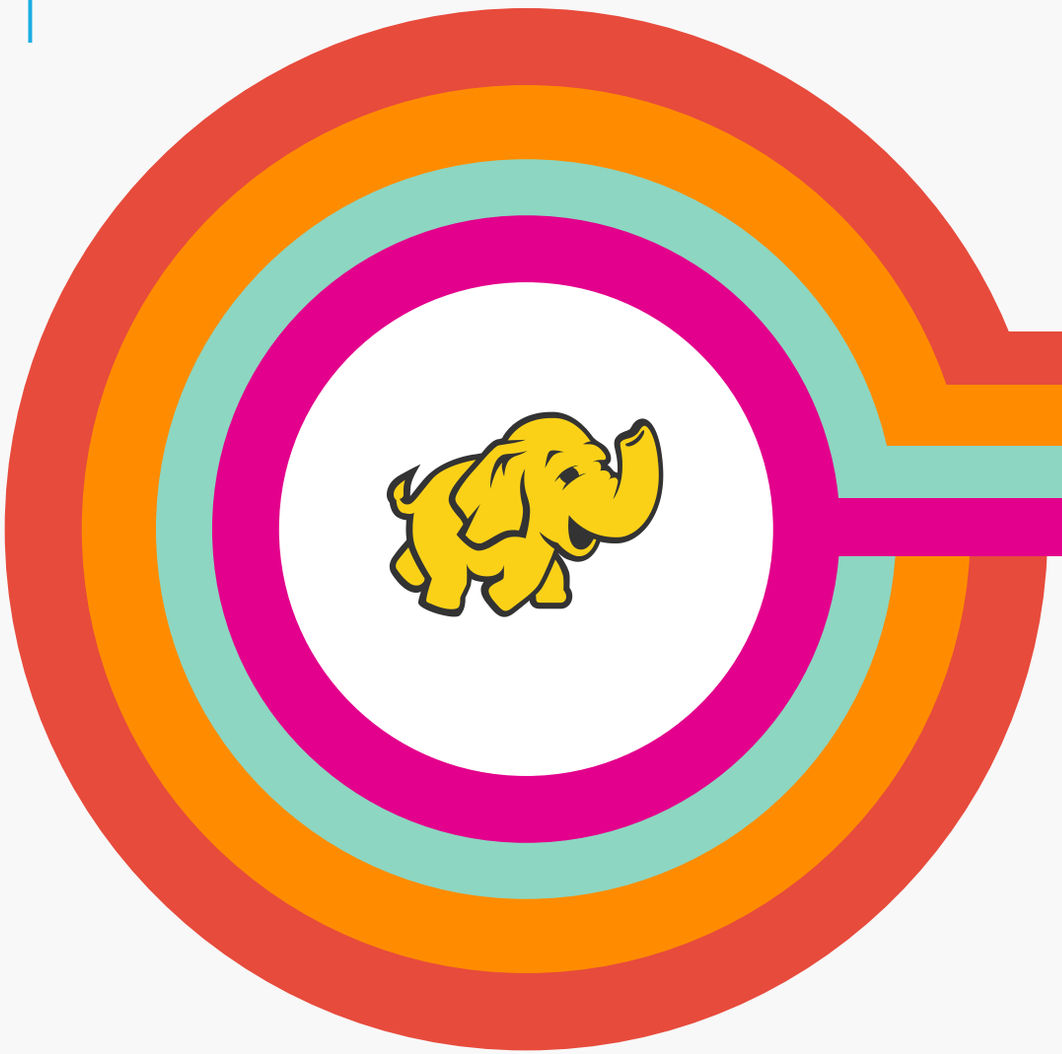
- Significant Spark performance speed up with IO cache (up to 9X perf gains)
- Automatic cache resource management
- DRAM + Temp SSD makes large cache





AZURE HDINSIGHT: ENTERPRISE GRADE SECURITY

DEFENSE IN DEPTH



PERIMETER
Isolate clusters within VNETs
Service Endpoint support for WASB, Azure DB, Cosmos DB
Restrict outbound traffic using NVAs*

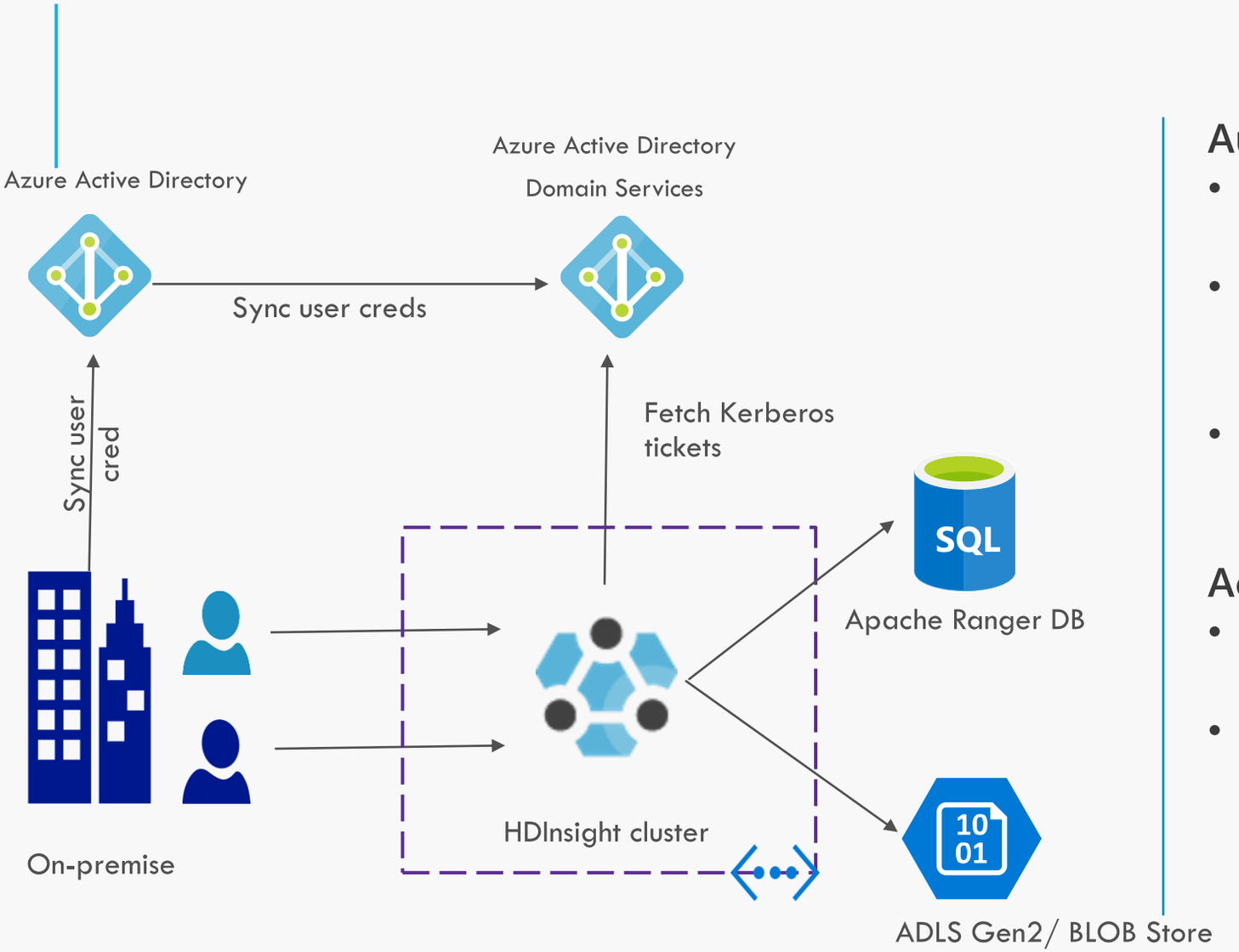
AUTHENTICATION
Azure Active Directory
Kerberos with Active Directory

AUTHORIZATION
Role-Based Access Control
Apache Ranger based Access Control

DATA PROTECTION
Encryption on-the-wire with HTTPS enforced
Encryption at Rest using Azure Key Vault

Auditing of all data operations and configuration changes

AZURE HDINSIGHT: AUTHENTICATION & ACCESS CONTROL



Authentication:

- Supports identities managed in **Azure Active Directory (AAD)**
- Clusters are joined to **Active Directory Domain Services (ADDS**) based Kerberos Domain Controllers.
- On-premise corporate identities are synced to AAD and ADDS via AD Federation Services.

Access Control:

- Apache Ranger based access control and auditing
- Ranger plugins for Hive, Spark, Kafka and HBase.

Scenario	Authorizing component
Yarn: Submit-App	Apache Ranger: Yarn Plugin
Hive Operations: Select , Drop, index, Lock, Read, Write, Masking, Row level filter on Hive Database, Table & Columns	Apache Ranger: Hive Plugin
Create/ Alter Table with storage location reference	Apache Ranger + ADLS Gen 2 ACL's
Spark SQL access with Hive Metastore	Apache Ranger: Hive Plugin
HBase Access Policies	Apache Ranger/ HBase plugin
Kafka Access Policies	Apache ranger/ Kafka Plugin
Access Azure Data Lake Storage Gen2 using the Spark DataFrame API	ADLS Gen 2 ACLs
Access Azure Data Lake Storage Gen2 using the RDD API	ADLS Gen 2 ACLs
HDFS operations: Mkdir, ls, put, copyFromLocal, get, cat, mv, cp etc	ADLS Gen 2 ACLs
Running Map Reduce jobs	ADLS Gen 2 ACLs

AUTO SCALE

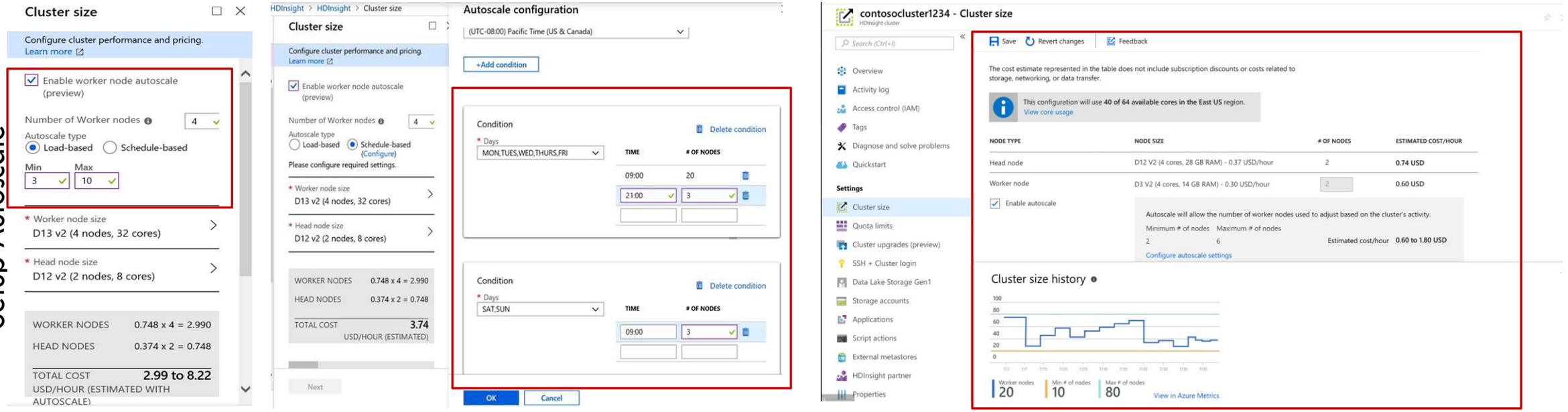
Customize to your own scenario

Pay for **ONLY** what you need

Monitoring scaling history easily

Graceful Scale Down

Setup Autoscale



DR OPTIONS BY WORKLOADS

Workload	DR Option
Spark / Hive	Manual, Partner solution
HBase	HBase replication, Snapshot export, Import Export, Copy Tables
Kafka	Mirror Maker

Resources:

- Spark/Hive HA & DR https://github.com/anagha-microsoft/hdi-spark-dr
- Kafka HA & DR https://github.com/anagha-microsoft/hdi-kafka-dr
- HBase Backup, Replication https://docs.microsoft.com/en-us/azure/hdinsight/hbase/apache-hbase-backup-replication

HDINSIGHT MONITORING OPTIONS

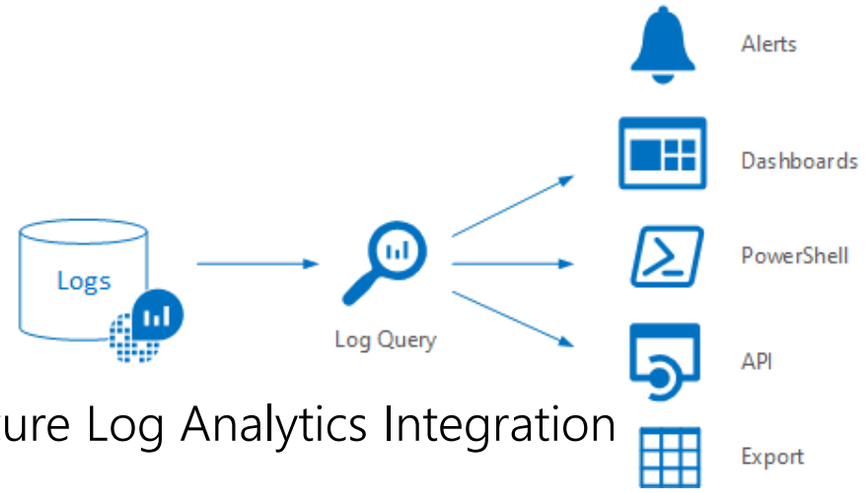
Apache Ambari

- View cluster metrics like CPU, memory, and disk usage at a glance in real time
- Identify malfunctioning components with Ambari alerts
- Monitor queue capacities, jobs, and view associated OSS logs

HDInsight Cluster Metrics

- See gateway requests to monitor cluster stress and cluster size to monitor costs
- Apply filters and chart splitting to extract important data
- Set up alert rules to receive notifications and trigger actions for key metrics

Azure Log Analytics Integration



- Organizes cluster metrics and OSS log records into queryable tables
- Create custom dashboards to surface all the metrics you need from multiple clusters on a single pane of glass

DEMO TIME

GRACIAS. . .!!!

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