Introduction to BigData – Spark – Processing

Part 2: OnPrem to Cloud Experience at SG

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Outline

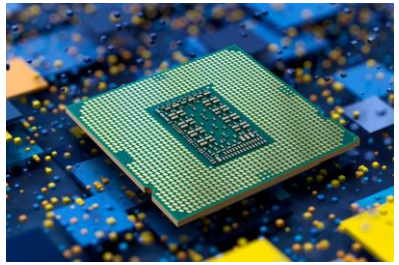
- What is BigData ?
  - Order of Magnitudes for « Big »
  - History
  - Evolution of Softwares, Spark
- Description of a Datalake
  - Content, data feeding
  - How it is organized
  - Who uses it
- Example of Data-Processing
  - RAW to LAKE, Reports
- Change Storage-Compute, Evolution to Cloud

Fundamental Resources TradeOffs

Network (Bandwith, Latency)

Horyzontal Scale

CPU (HOT, Watts)

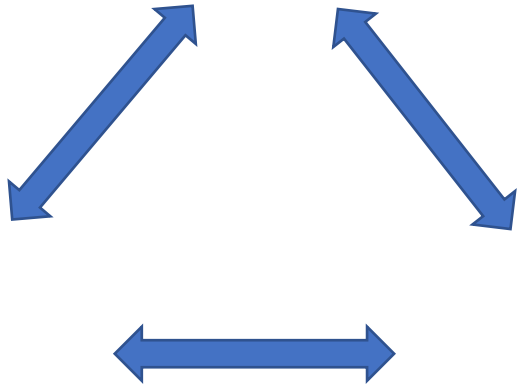


Development price / Run cost

€€€€€€$$$$$

Cold Storage (SLOW)

Storage (~Small)



RAM (FAST .. Expensive)

+ + + + + +

– – – – – –

Historical Needs
Data Locality

Resource WERE Collocated for Speed :

1 Blade = few Disks + few CPU + RAM

PROS:

- FAST local access
- OS Caching for re-using same files
- No need network shuffle when CO-LOCATING program on data
- Disk managed by softwares
- Easy plug

Software / Hardware Evolutions..

Hard Disks -> SSD Disks (not in OnPrem yet)

HDI,Sata… PCI. disk can now be fast

Example on Microsoft Azure: ONLY SSD Disks

Network bandwidth + Latency … now 1 Gb/s

=> Data Locality is NO MORE a requirement

Not Enough Disk
… Too much/too Expensive « CPU »

Example at SG:

- Cost reduction plans… to reduce datacenters
- But still HUGE requirement to increase disk !!

Projects pretends they NEVER have enough cpu

BUT in reality … too much CPU/RAM => Wasting is easier than Optimizing

Not even AWARE of consuming / wasting

Splitting Storage / Compute

Solutions already existed, but historically not used in BigData Hadoop

Unix Network NFS

Disk SAN

Example: Databases
For Oracle/PostgresQL/..

ObjectStorage
(Appliance / API)

Example: Scality

SCALITY

Cloud Storage

Example:

Azure Storage

Amazon S3

Historically lot of confidentiality constraints

… NOW used

Data Density

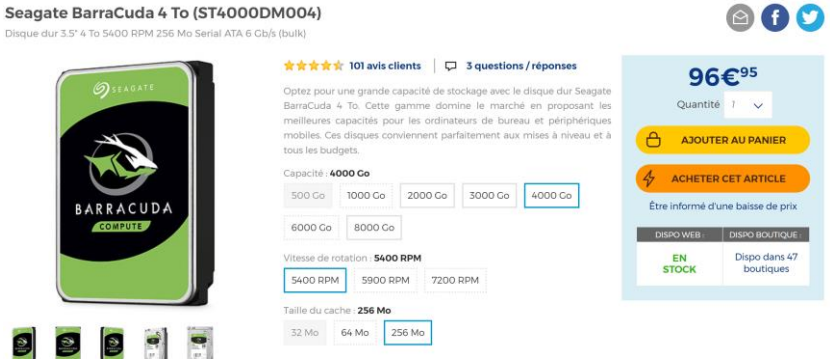
48 * HDD disks in 2U blade

32 * SSD (E.1 EDSFF) in 1U blade

… 500 Tera / 1 Peta !! … 200 000 euros

Storage Price

1 Disk 4To = 100 euros
x 10 … 40To
x 3 (replication) = 3000 euros
+ Plug + Maintenance + …



Appliance used …
License cost + Annual billing
.. Cost re-dispatched internally
= 17 000 euros for 40To/Year

SCALITY

Azure Cloud Storage
« Pay as You Go »
+ discount for reservations
= 7000 euros for 40To/Year
  + Costs per Read/Write Operations
  + Network Bandwidth

Azure Storage

Migration to Cloud
Azure - AWS - Google

Goals:

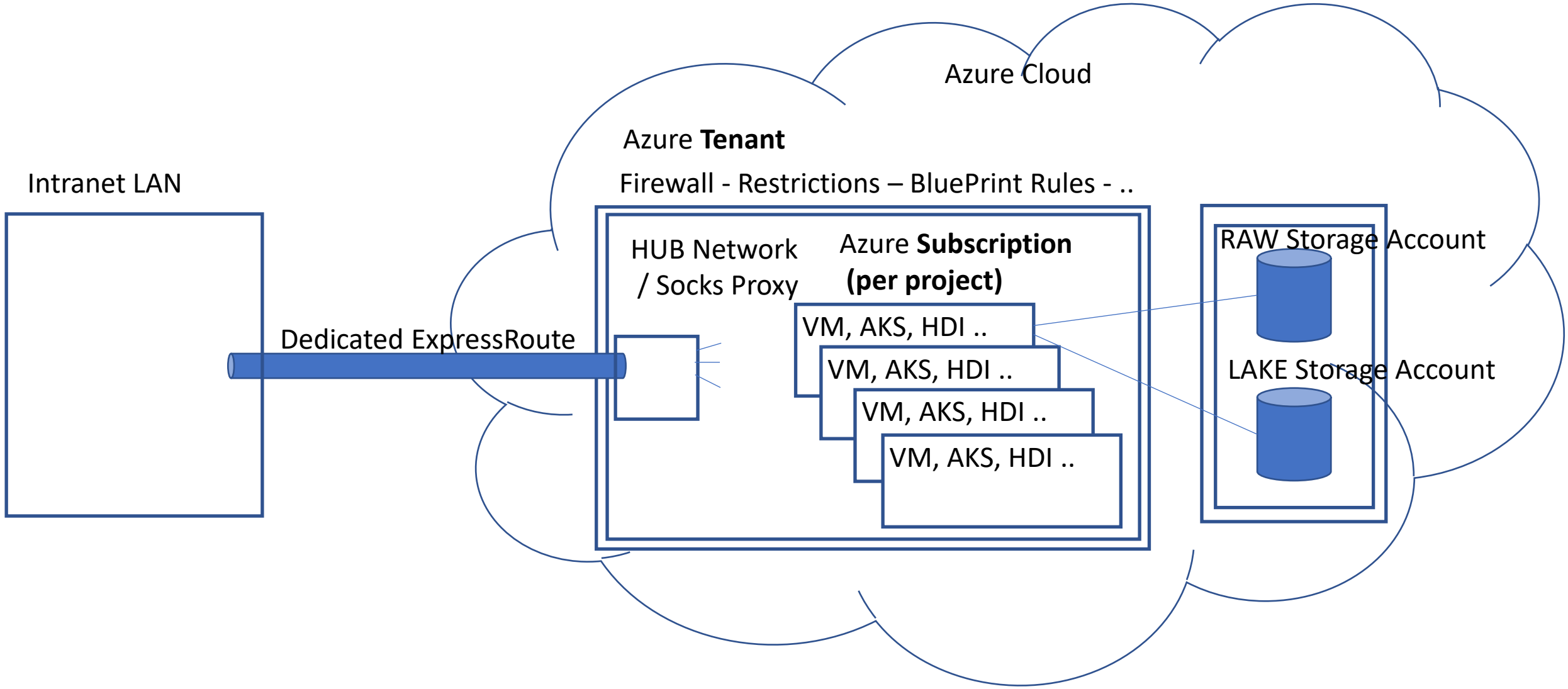
- Elasticity of Storage
  (No more fear of HDFS FileSystem Full)
- Elasticity of Compute
  (adapt CPU to workload… Pay only what you use)

- Clear visibility of cost per Projects / internal refacturation
- By-Pass internal IT department

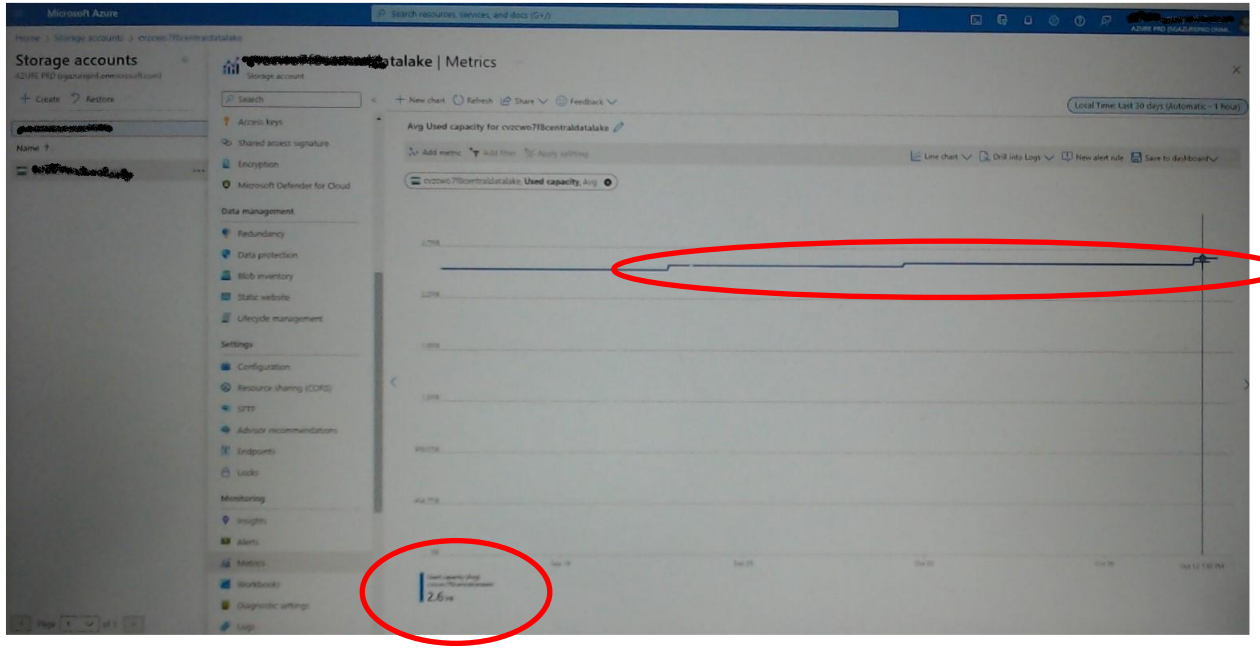
- Easier (?) Self-Service API for Provisionning
- No More Multi-tenant (no risk of 1 project crashing/consuming whole cluster)

Since 2020 SGCIB is moving its Datalake to Azure

Architecture of Datalake on Clouds



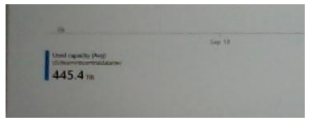
Screenshot Azure Storage

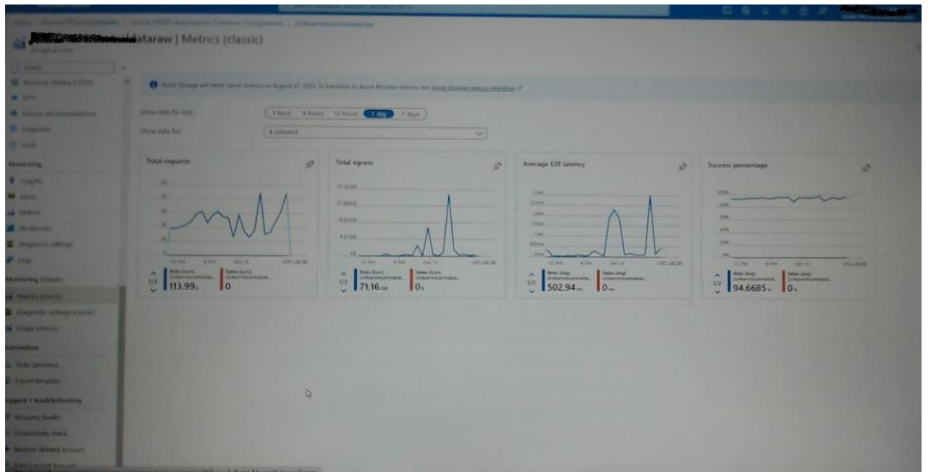


increasing
on last 30 days

2.6 Peta on LAKE …

+ 400 Tera on RAW + APP + …





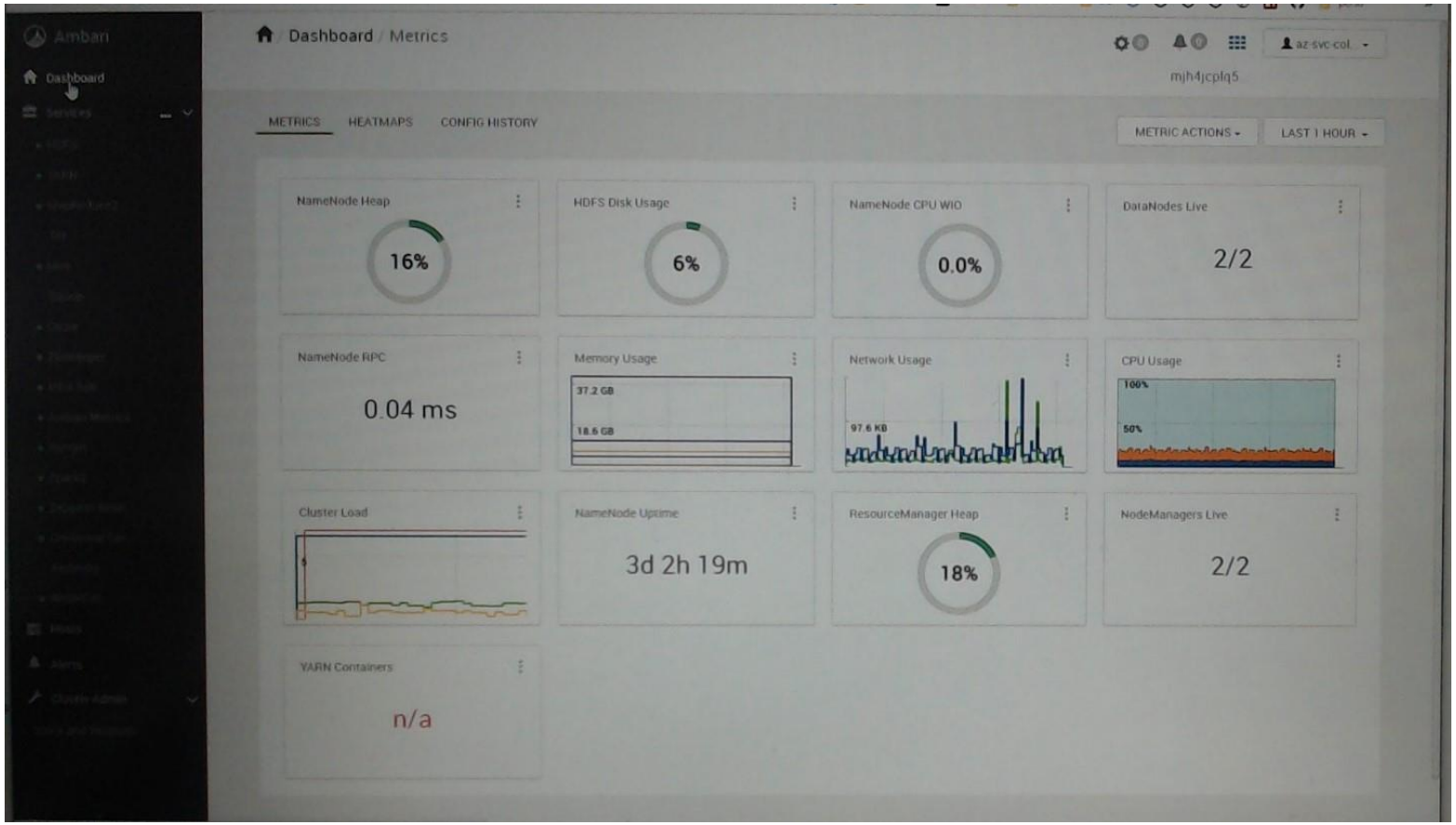
HDInsight …
= HDP (HortonWorks) on Azure

Same HADOOP Ecosystem : Ambari, Yarn, Oozie, Spark, Zeppelin, …

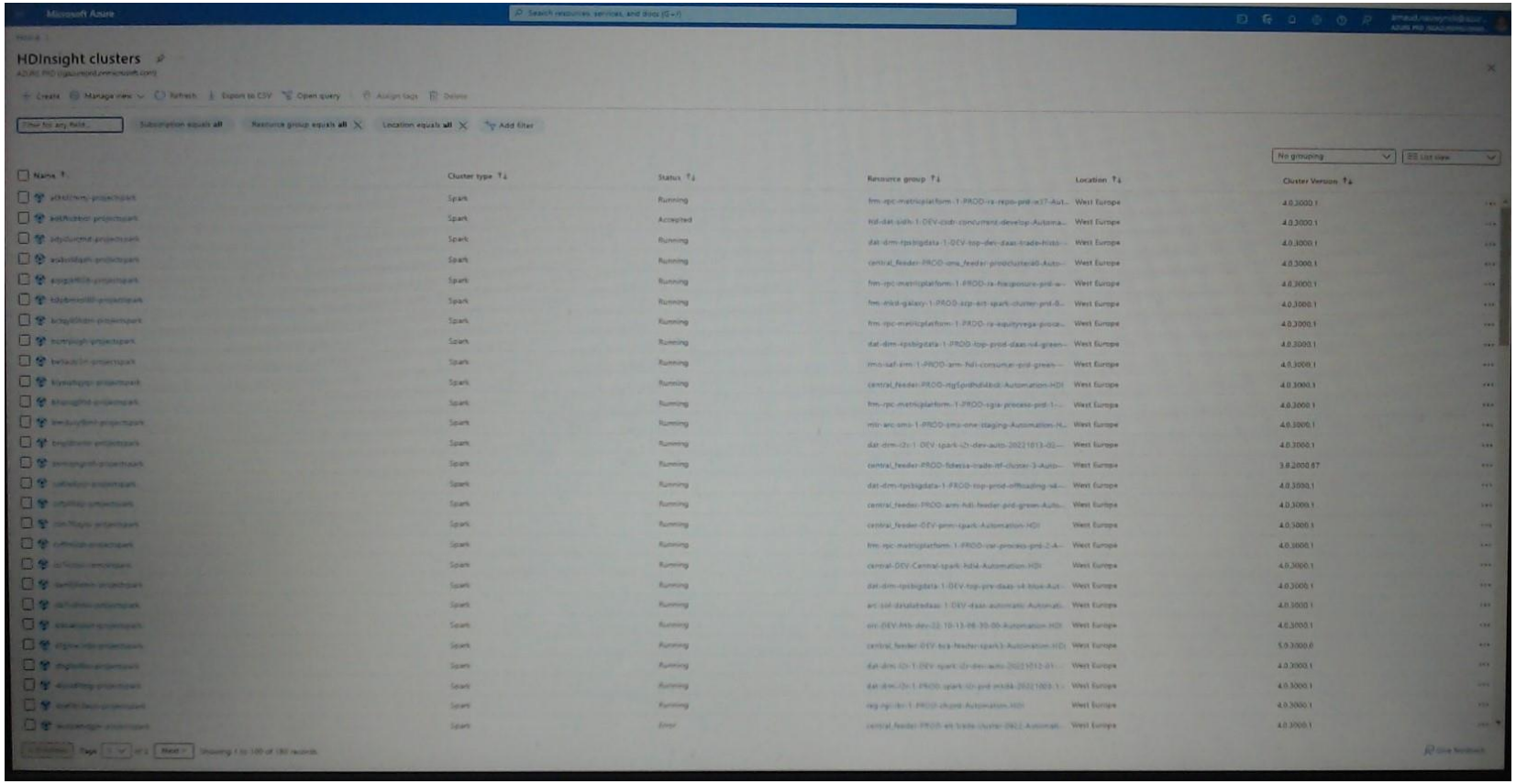
Kerberos security… with Azure integration (Azure AD)

No More HDFS: No more NameNode maintenance / errors
replaced by « Azure Storage »
Elastic storage - but no more Ranger for permission

Screenshot HDI Ambari … ~Like OnPrem



Screenshots
.. Hundreds of HDI



BigData Engineering
from OnPrem to Azure

Lot of User permissions/quota management
Development of custom Yarn/Oozie/Ranger tools

1 Huge cluster, used as Multi-tenant (several users)

Used at 100%

Almost Disk-Full
Many report on disk usage / data purges

Clear view of all Running workloads
(1 Ambari screen)

Lot of Network & Security
Development of Provisionning « sudo » tools

NO more multi-tenant system… but LOT of small clusters

Hundred of clusters, each used at 5% !!!
COST COST COST
Necessity to Optimize Performance
(batches too long… 100x slower / too expensive)

No more Disk worry
… data is growing (no more purges?)
NO admin central view
NO Orchestration of workloads

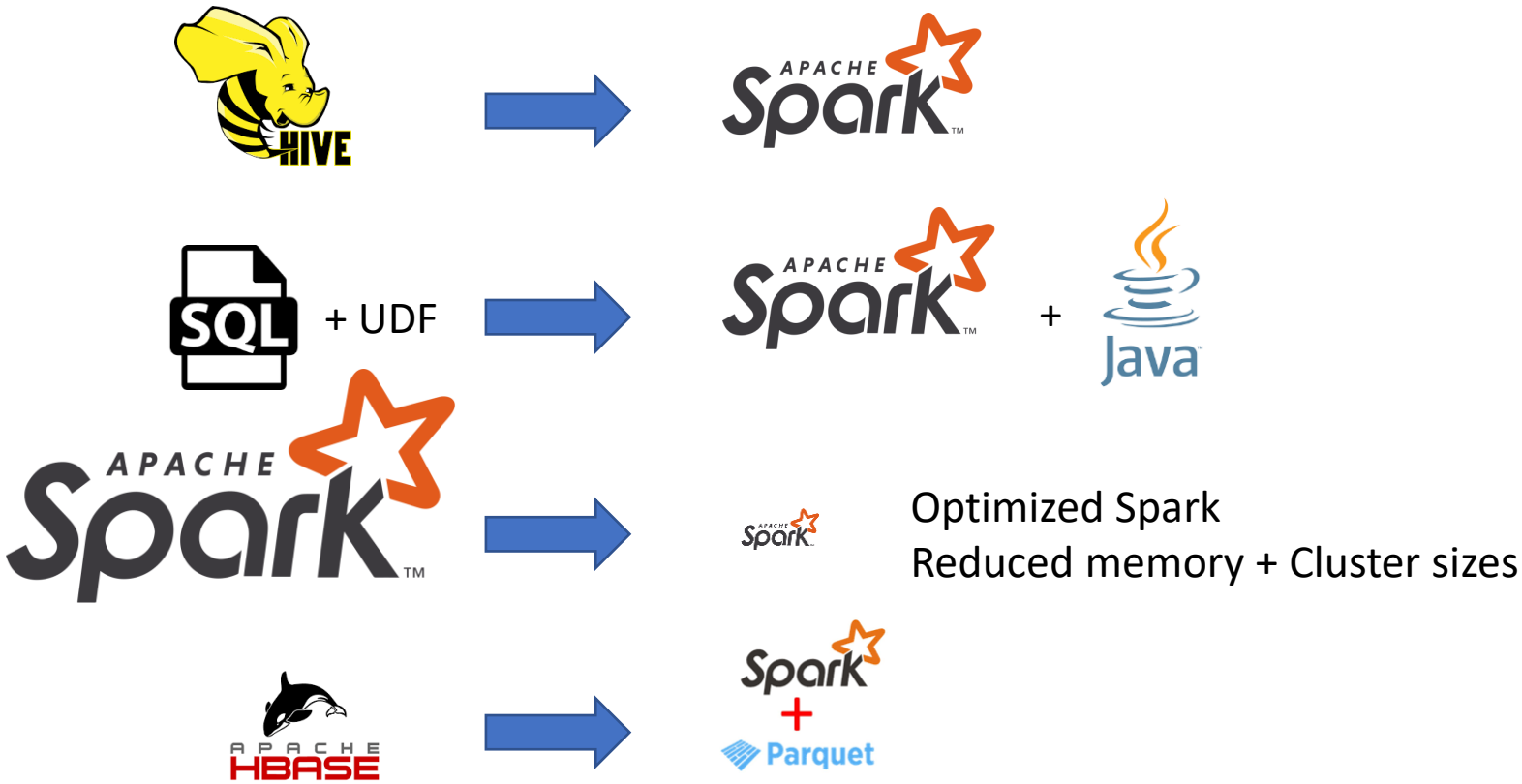
What About Spark in Azure Migration?

COST COST COST

Necessity to Optimize Performance

(batches too long… 100x slower / too expensive)

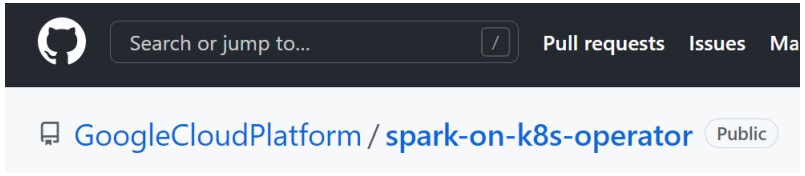
=> Many projects have migrated + optimized

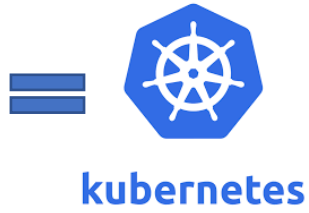


Managed Spark ?
Goals: Autoscaling / « serverless »

Managed by Azure :

Managed via Kubernetes





databricks

AWS : EMR

GCP : BigQuery

Questions?

Take Away

What is BigData ? Horyzontal Scaling
- compute: cluster with Tera of RAM used by Spark apps
- storage: Petas of Files, in parquet

What is Spark ?
- Simple unified Sql/Java engine
- for distributed compute (Yarn/Kube)
  - distributed storage (HDFS/cloud)

What is Processing ?
- mostly spark batches
- Feeding RAW
- Transforming RAW to LAKE
- Consuming SQL analytics

Hadoop ecosystem is complex, Spark brings simplicity
Ecosystem is evolving (Cloud, Kubernetes)