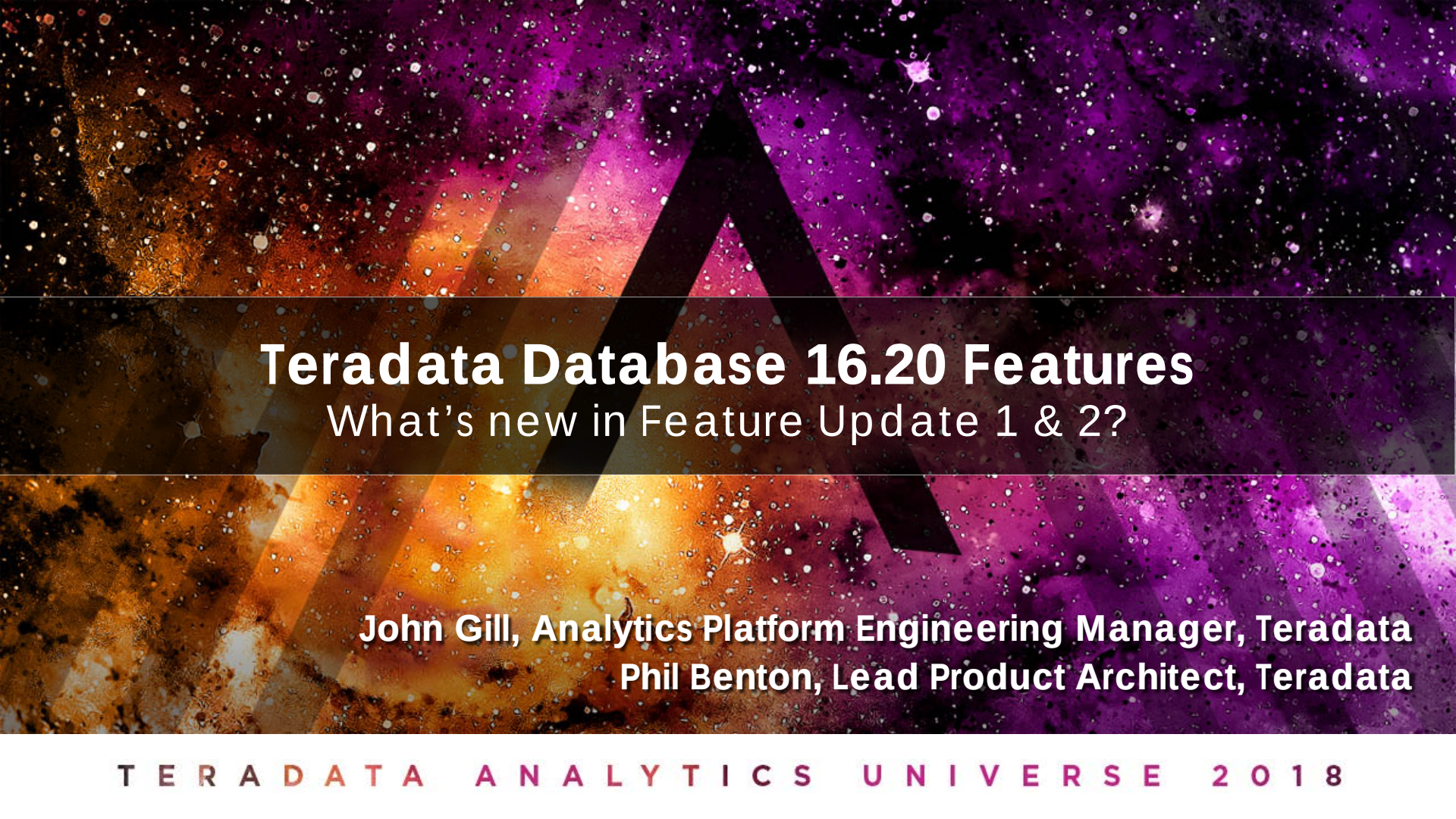


Teradata Database 16.20 Features

What's new in Feature Update 1 & 2?

John Gill, Analytics Platform Engineering Manager, Teradata
Phil Benton, Lead Product Architect, Teradata

Agenda

TERADATA
ANALYTICS UNIVERSE

- **DSA – Incremental Restore**
- **Native Object Storage**
- **Analytics Platform Architecture**

Incremental Restore

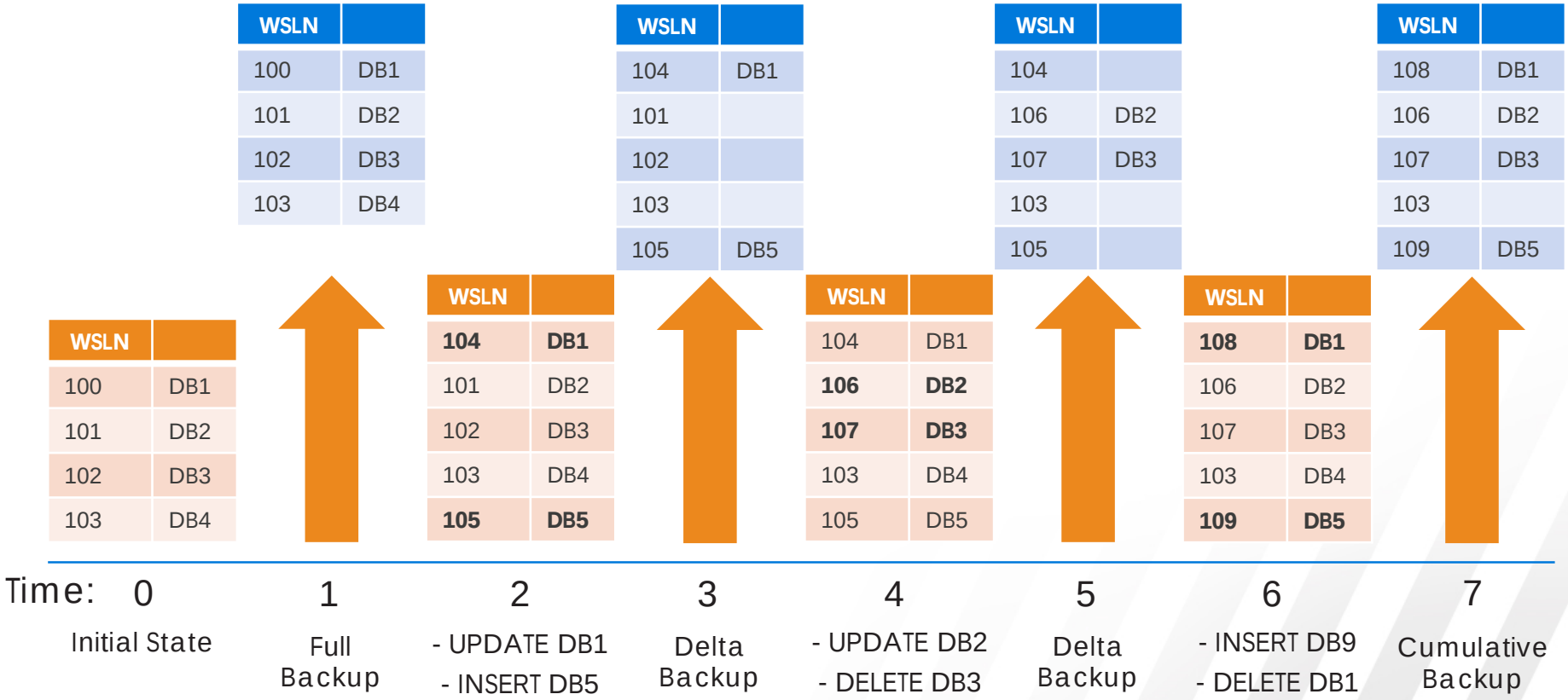
Incremental Restore (IR)

- **Completes second half of Change Block Backup (CBB) feature**
  - CBB Restore requires a rollback operation requiring a full restore
  - Incremental Restore allows rollforward operation allowing delta patches
- **To ensure source and DR stay in sync tables will be left in a read-only state**
- **When full read/write access to the data is needed, a new command is used to disable read-only access**

How Change Block Backup Works

- **Every data block on AMP has a unique number (WLSN)**
- **Full backup is required first**
  - All data blocks are backed up
  - Highest WLSN reported back to DSC as part of backup job
- **During a Change Block Backup, DSC tells DBS the highest WLSN**
  - For Delta, the WLSN is from the last backup
  - For Cumulative, the WLSN is from the last full backup
- **CBB only includes data in blocks that have WLSN higher than what DSC**
  - NOTE: All blocks are read to determine if they should be included in the backup

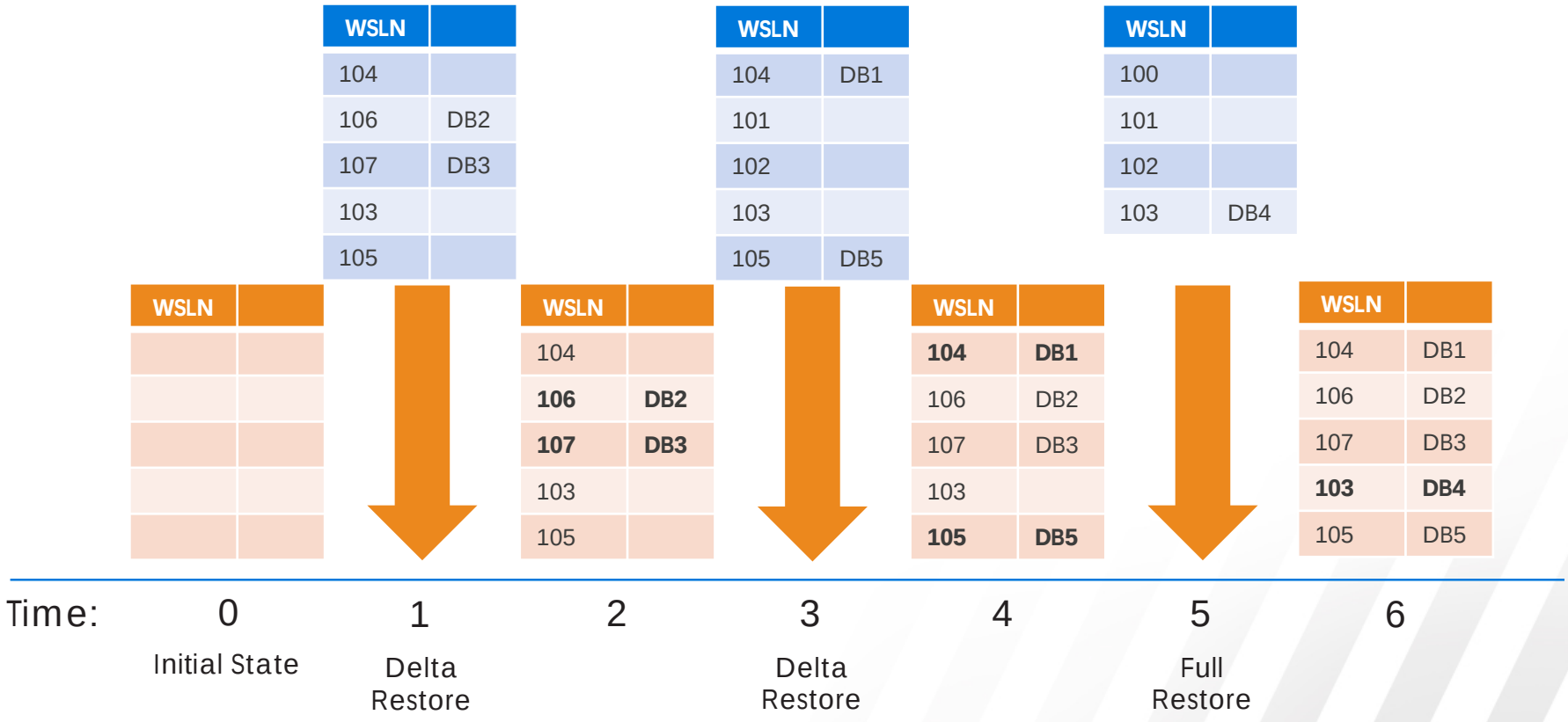
How Change Block Backup Works



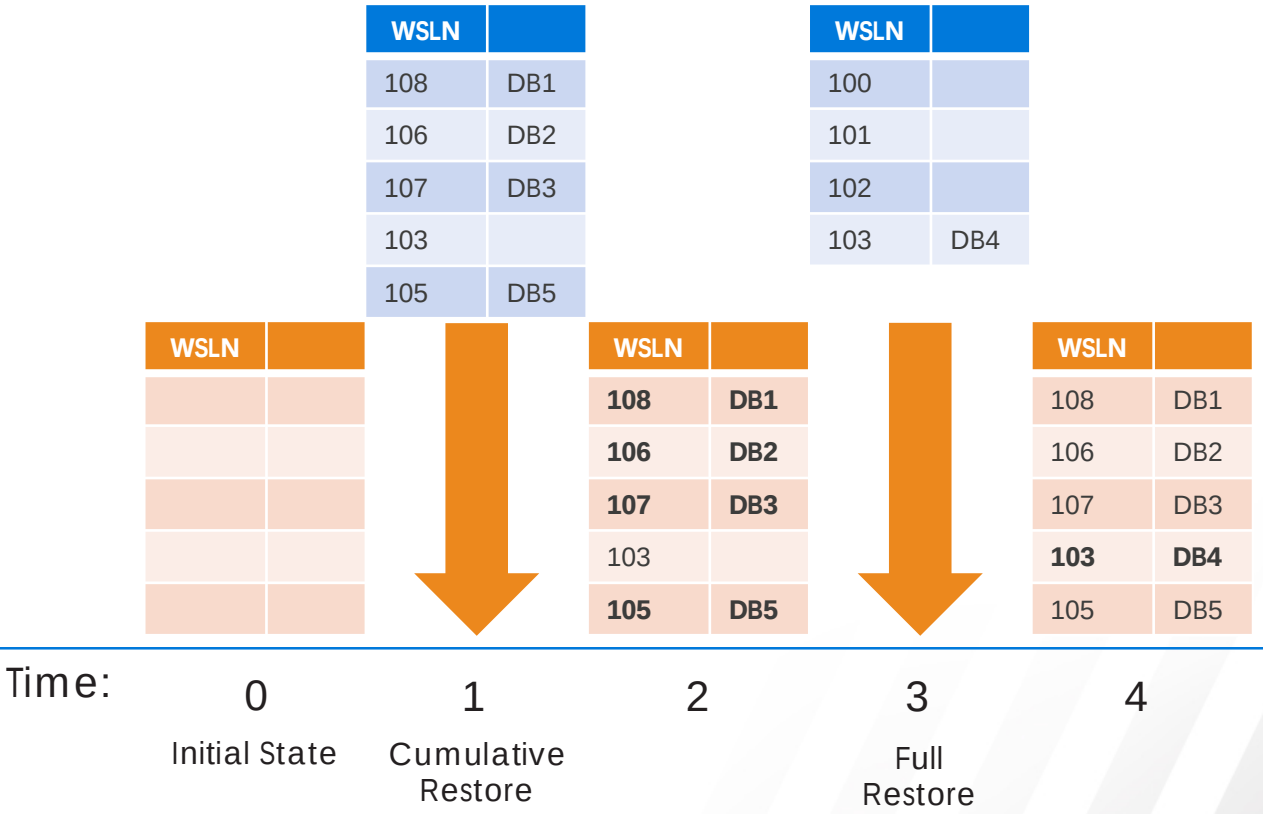
How CBB Restore Works Now

- **Only Full Restores are supported right now**
- **All the data is deleted from the table on the target system**
- **The restore will include a save set for each Change Block Backup and the last full backup**
  - The save sets will be restored in the opposite order they were archived
  - The save set from the last full backup is the last save set in the job plan

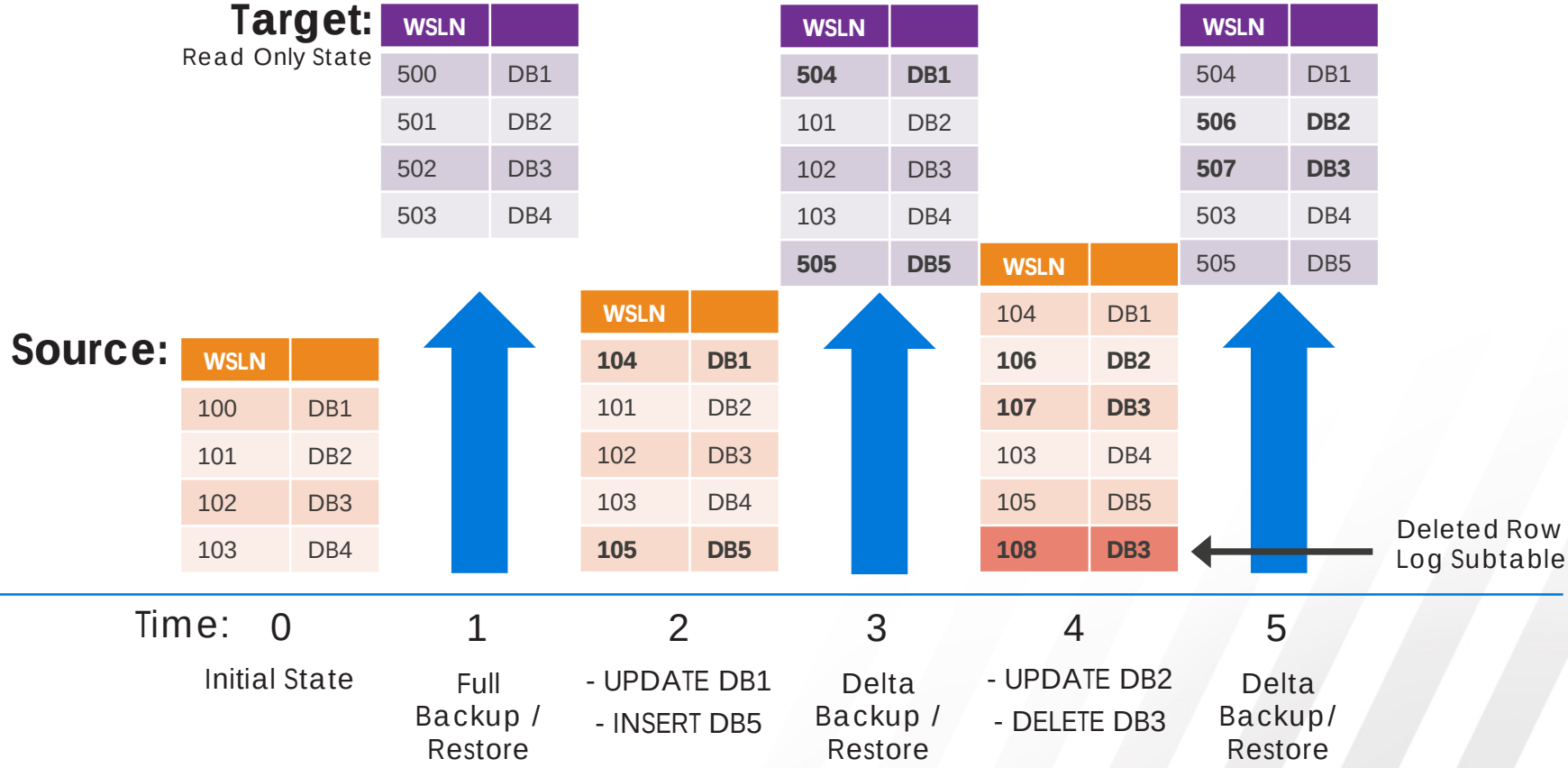
How Delta CBB Restore Works



How Cumulative CBB Restore Works



How Incremental Restore Works



DSA / ARC Parity

- **Option to Skip Archive and Restore of Statistics**
  - NOTE: No stats in Backup, then option on Restore is moot
- **Support for Down AMP in Backup and Restore**
  - No Fallback Tables will be Skipped
  - CBB jobs will still be rejected as we require WLSN from every AMP
- **Empty Table Restore Enhancements**
  - During Backup track empty tables, then during Restore skip Data and Build Phases
- **Allow tables to be compressed on restore**
  - Enforce System BLC settings on restore for tables

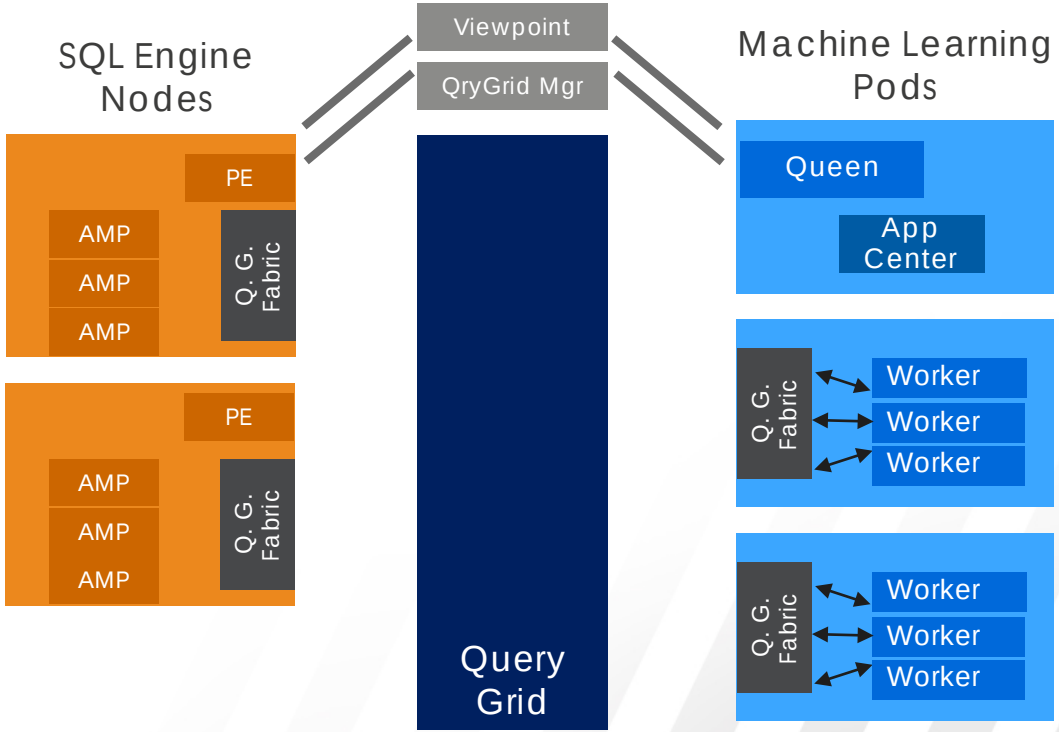
Native Object Storage

Analytic Platform Architecture

SQL / ML Engine Integration

New Machine Learning (MLE) coprocessor nodes are deployed via Stacki on top of Kubernetes

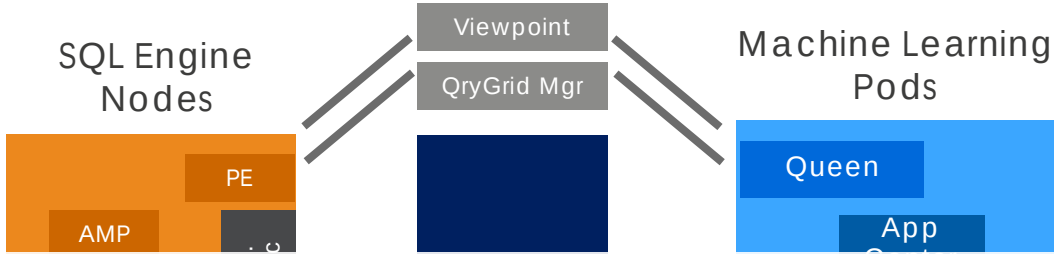
Querygrid is configured between the new MLE pods and the TD machine. MLE pods are defined as a foreign server on Teradata (SQL Engine)



SQL / ML Engine Integration

New Machine Learning (MLE) coprocessor nodes are deployed via Stacki on top of Kubernetes

Querygrid is configured between the new MLE pods and the TD machine. MLE pods are defined as a foreign server on Teradata (SQL Engine)



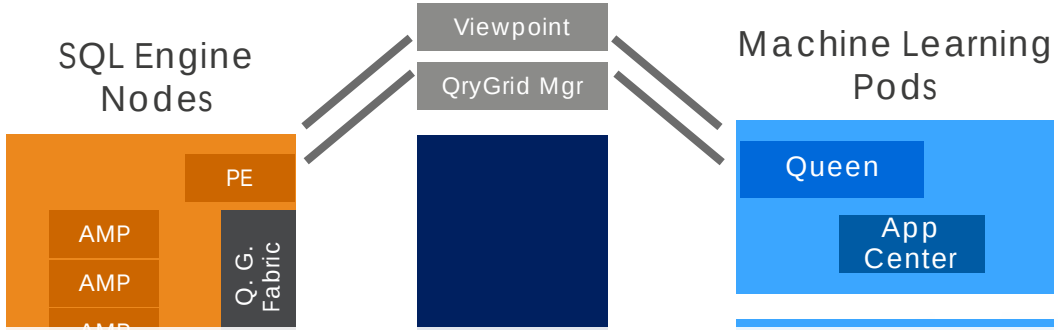

```
CREATE FOREIGN SERVER
      TD_SERVER_DB.coprocessor
EXTERNAL SECURITY DEFINER
      TRUSTED AUTH_531 USING
link  ('coprocessor_link')
version  ('active')
DO IMPORT WITH
      TD_SYSFNLIB.QGINITIATORIMPORT ,
DO EXPORT WITH
      TD_SYSFNLIB.QGINITIATOREXPORT ;
```

SQL / ML Engine Integration

New Machine Learning (MLE) coprocessor nodes are deployed via Stacki on top of Kubernetes

Querygrid is configured between the new MLE pods and the TD machine. MLE pods are defined as a foreign server on Teradata (SQL Engine)

New foreign functions are created on the SQL Engine nodes that map to functions on MLE



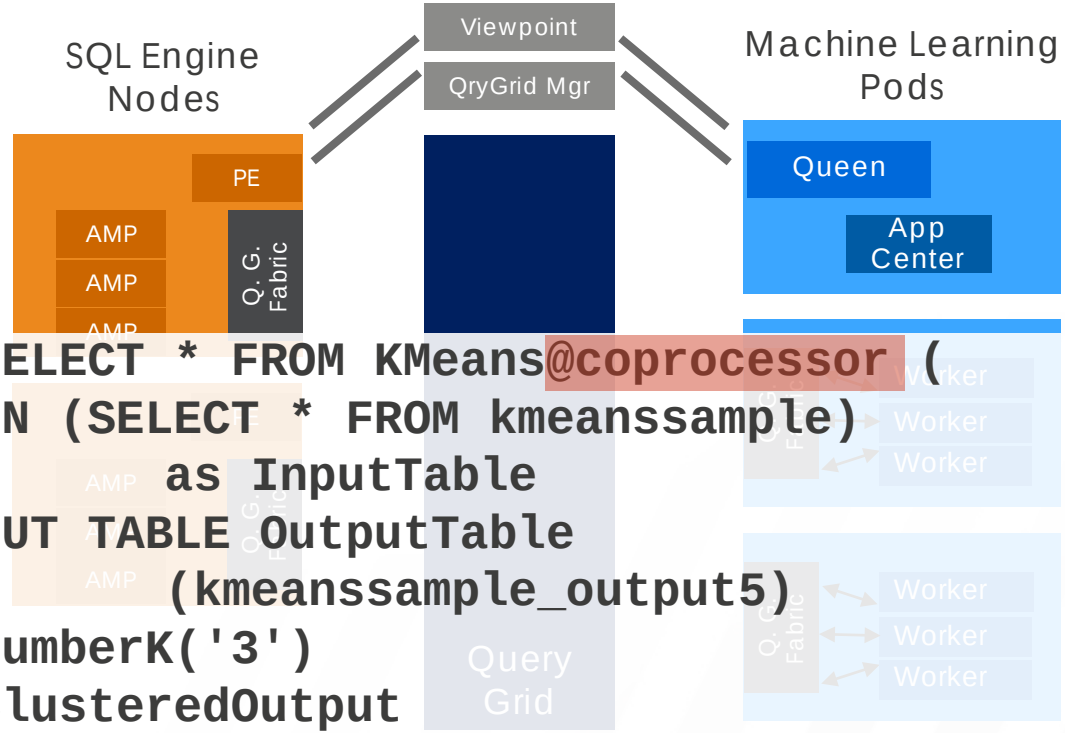

```
CREATE FUNCTION MAPPING syslib.KMeans
FOR KMeans SERVER coprocessor
USING
InputTable IN TABLE,
CentroidsTable IN TABLE,
OutputTable OUT TABLE,
ClusteredOutput OUT TABLE,
InitialSeeds,NumClusters,"Threshold",
MaxIterNum,UnpackColumns,Seed;
```

SQL / ML Engine Integration

New Machine Learning (MLE) coprocessor nodes are deployed via Stacki on top of Kubernetes

Querygrid is configured between the new MLE pods and the TD machine. MLE pods are defined as a foreign server on Teradata (SQL Engine)

New foreign functions are created on the SQL Engine nodes that map to functions on MLE



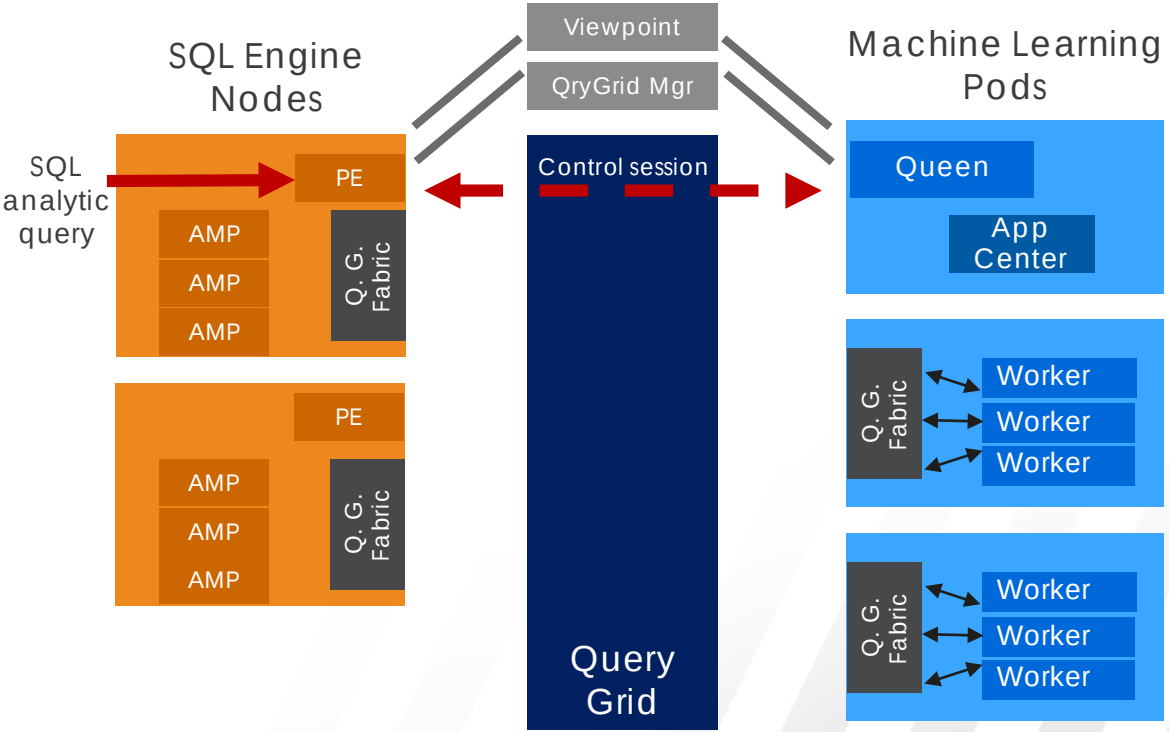

```
SELECT * FROM KMeans@coprocessor (
ON (SELECT * FROM kmeanssample)
    as InputTable
OUT TABLE OutputTable
    (kmeanssample_output5)
numberK('3')
ClusteredOutput
      (kmeanssample_clusteredoutput5)
) as kmeanstb;
```

SQL / ML Engine Integration

When the foreign function is called, the “contract phase” coordinates execution between the two engines.

New with Analytic Platform is idea of the Collaborative Optimizer, where we coordinate function characteristics between the two engines.

Having tighter integration This allows us to increase performance of the contract phase and optimize function execution.

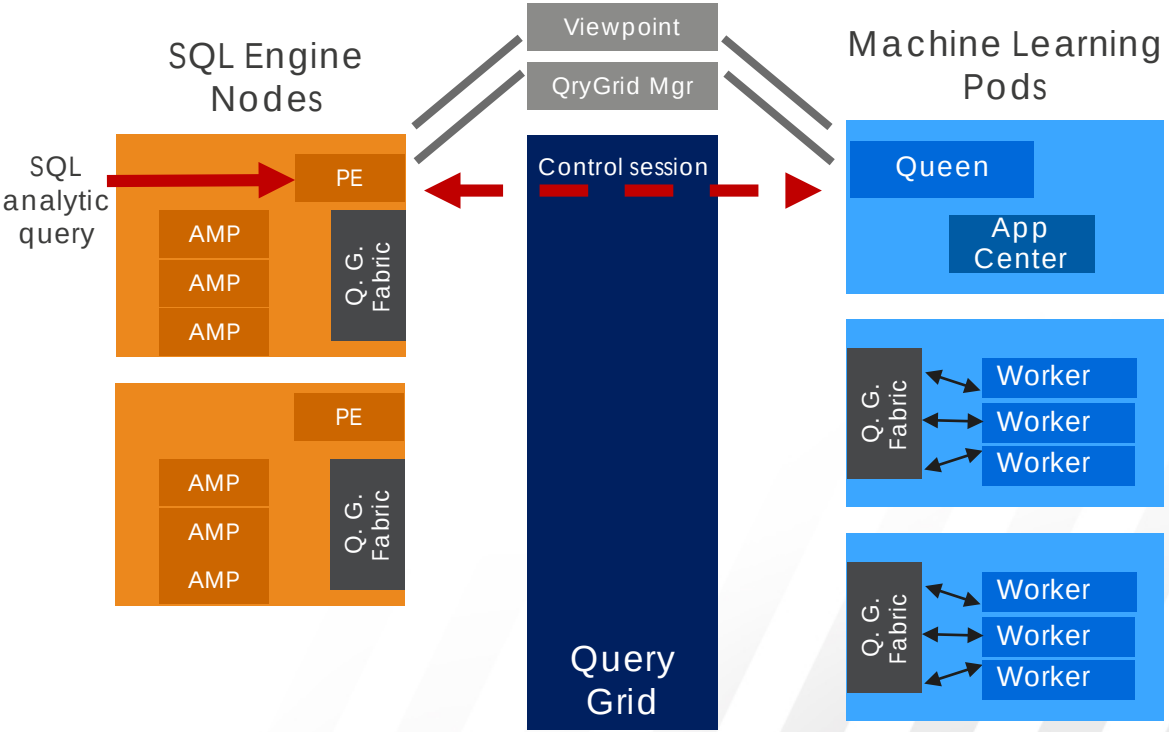


SQL / ML Engine Integration

When the foreign function is called, the “contract phase” coordinates execution between the two engines.

New with Analytic Platform is idea of the Collaborative Optimizer, where we coordinate function characteristics between the two engines.

Having tighter integration This allows us to increase performance of the contract phase and optimize function execution.



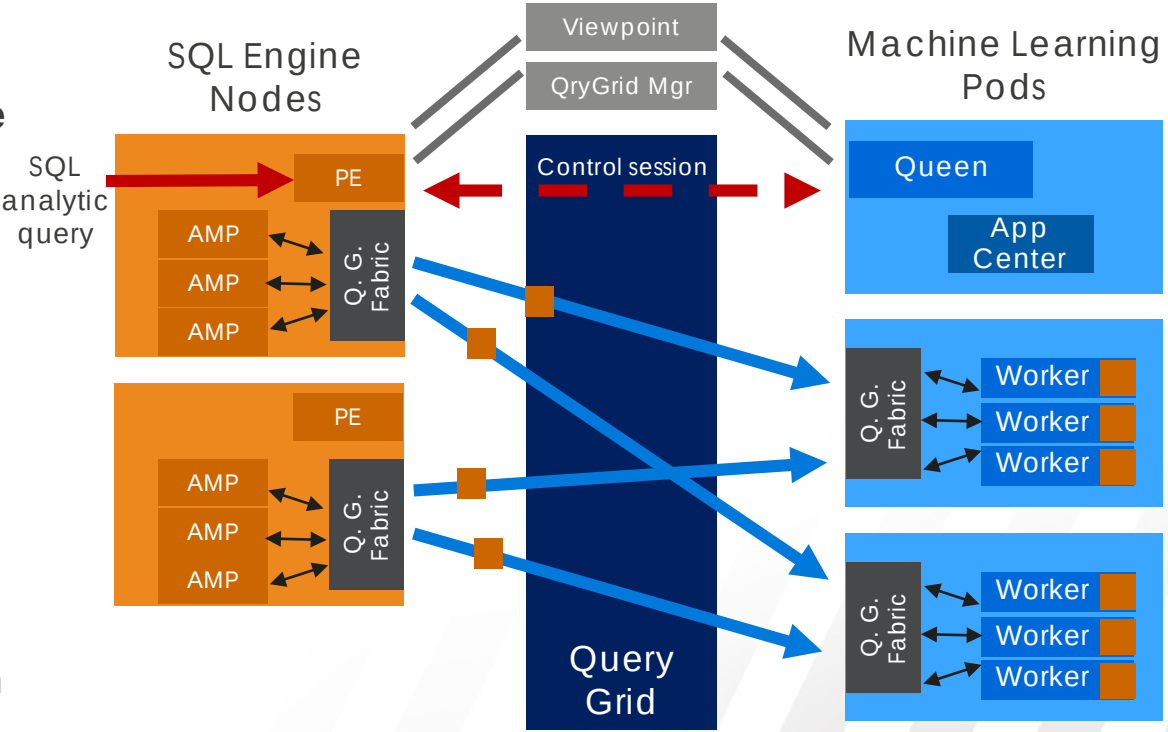
SQL / ML Engine Integration

During execution phase, the data is sent to MLE, the input data reduced by predicates that can be applied on the SQL engine side of things.

In-memory copies of the data is used for processing on MLE.

MLE workload management rules are mapped to TASM for a given request.

MLE workload management manages CPU & I/O prioritization as well as memory soft & hard limits and concurrency for a given workload.

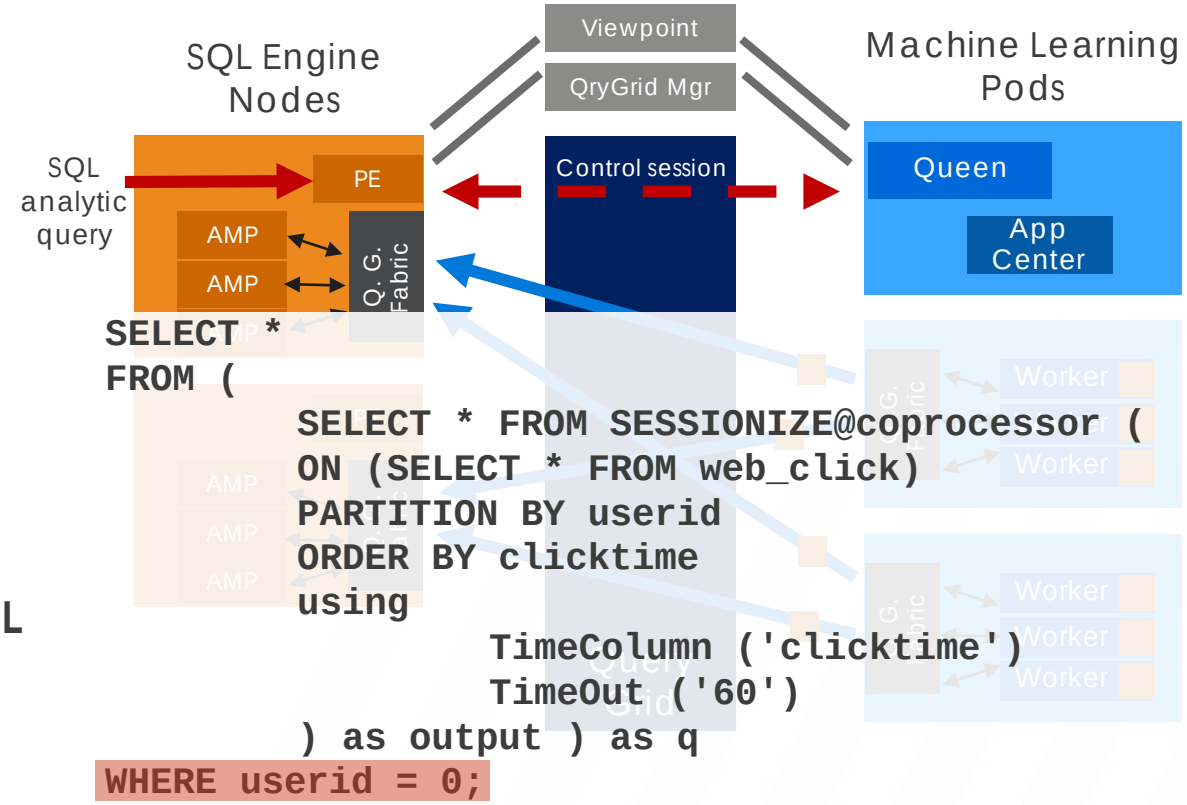


SQL / ML Engine Integration

Results from analytic query are sent back from MLE to the SQL engine.

Collaborative optimizer reduces data returned across the fabric via predicate pushdown.

Query and Server level information is captured in Teradata, aligned with DBQL & Resusage.



Want More?

TERADATA ANALYTICS UNIVERSE

Check out these other sessions for more information about these great Teradata Features.

Feature	Title	Day – Time	Location
DSA	Use DSA for Business Continuity of Mission Critical Teradata Systems	Monday – 3:30pm	Jasmine B
Native Object Storage	Data Lake Analytics with S3 and Azure BLOB storage	Monday – 4:05pm	Innovation Theater 2
Analytics Platform	The NEXT... Teradata Analytics Platform Architecture	Tuesday – 8:00am	South Seas J
Analytics Platform	Are You Losing Control? Managing Workloads on the Analytics Platform!	Wednesday – 11:30am	South Seas F
SQL Engine	The Power of Three - Time Series, Geospatial and Temporal	Thursday – 11am	South Seas D

Thank You!

Rate This Session # 1468 - Teradata 16.x Overview

with the Teradata Analytics Universe Mobile App

Follow Me

LinkedIn @**gilljohn**

Questions/Comments

Email: **John.Gill@Teradata.com**