DATA+AI SUMMIT 2022

Interactive Querying with Spark SQL

ORGANIZED BY databricks

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Pinterest

Querying

Extracting information from data using SQL.

Querying

What about querying metadata of data?

Querying

- Scheduled Query: Query NOT executed by a user.

Querying

- Scheduled Query: Query NOT executed by a user.
- Interactive Query: Query executed by a user.

Scheduled vs Interactive Querying

	Scheduled	Interactive
Predictability	High	None
Results	Based on SLAs	Immediate
Syntax/Analysis errors	Low	High
ROI on Tuning	High	Low
Resource Efficiency Importance	High	Low

Data Scale at Pinterest

- 700+ PB in AWS S3
- 150K+ Data Compute Jobs per day (not including metadata only operations)
- ~20K Hadoop Nodes
- 1000+ Presto Workers
- 300K+ Hive Tables
- Everything in Cloud (AWS)

Query Engines at Pinterest

- Spark SQL
- Presto
- Flink SQL

Learn more about our Hive to Spark SQL migration

Advanced Migrations: From Hive to Spark SQL

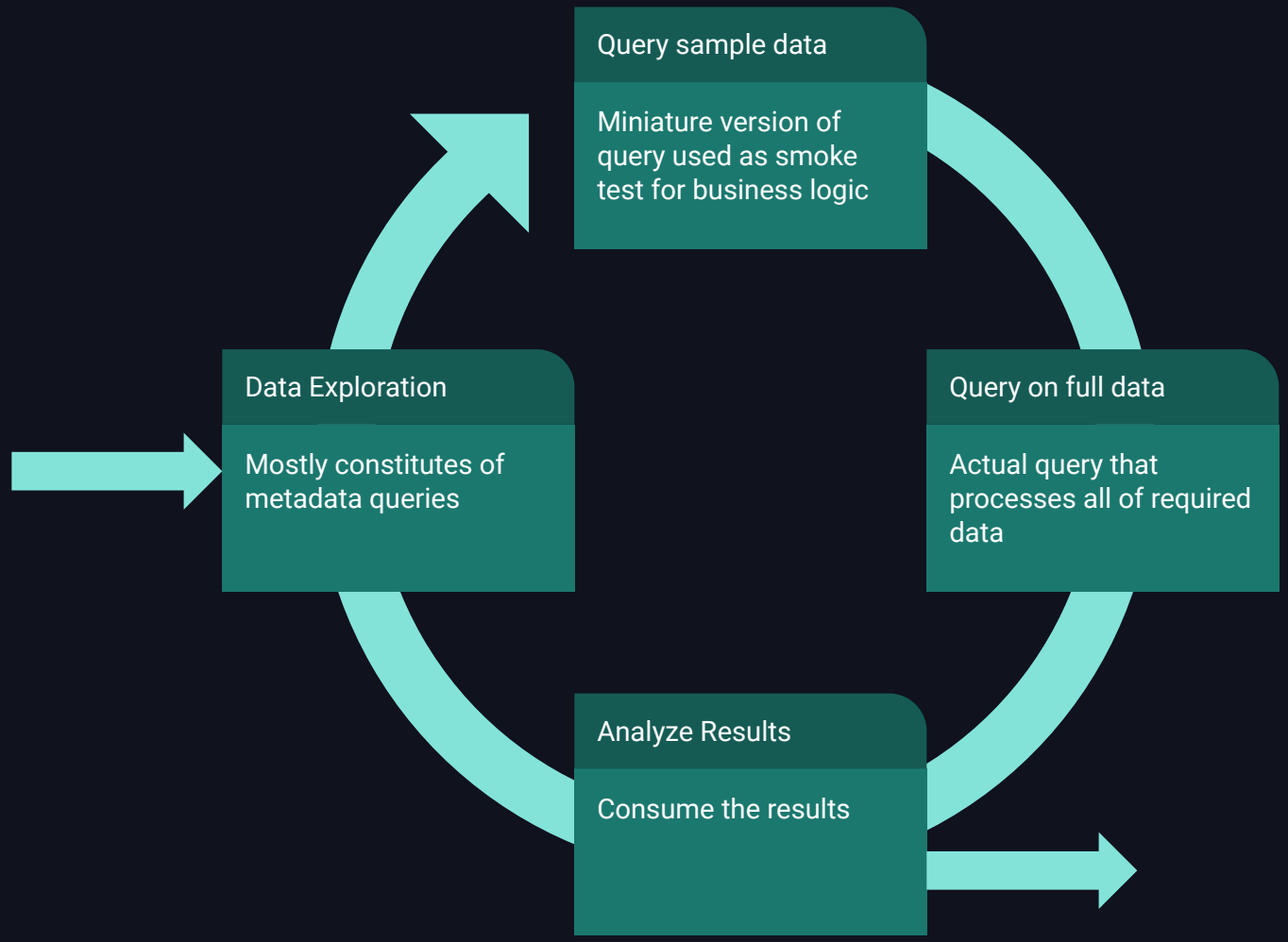
Wednesday, June 29 @4:45 PM

MOSCONE SOUTH | UPPER MEZZANINE | 211

By Zaheen Aziz

Interactive Querying

Usage pattern

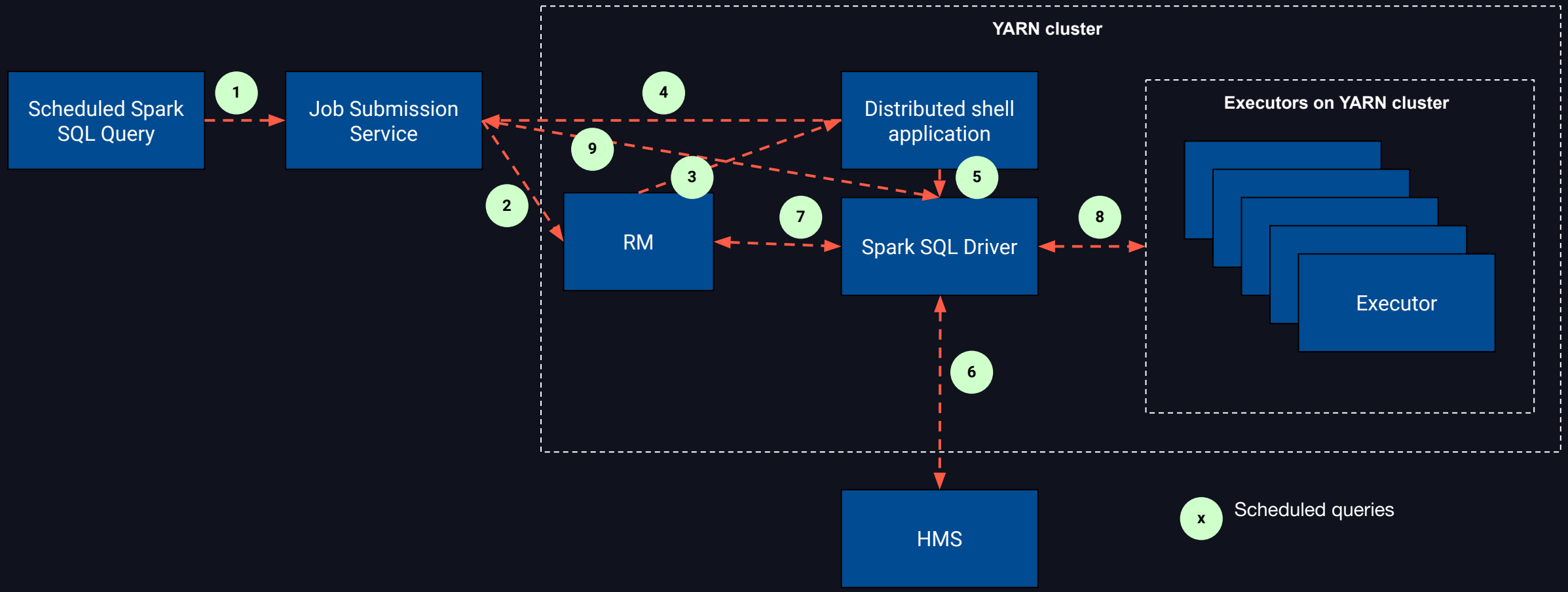


Interactive Querying

Requirements

- Seamless query submission
- Fast metadata queries
- Fail fast
- Easy access to results
- Error handling and tuning suggestions
- Auto error handling and retries

Scheduled Querying With Spark SQL



Interactive Querying

Requirements Check

- Seamless query submission ✖
- Fast metadata queries ✖
- Fail fast ✖
- Easy access to results ✖
- Error handling and tuning suggestions ✖
- Auto error handling and retries ✖

Architectural Choices

Distributed Shell Application

- Spark-sql CLI as dist shell application on YARN
- Waiting for container allocations
- Retrieving results is tricky
- Tracking statement-level progress is hard

Apache Spark Thrift Server

- Similar to HiveServer2
- JDBC/ ODBC protocols
- No isolation between queries

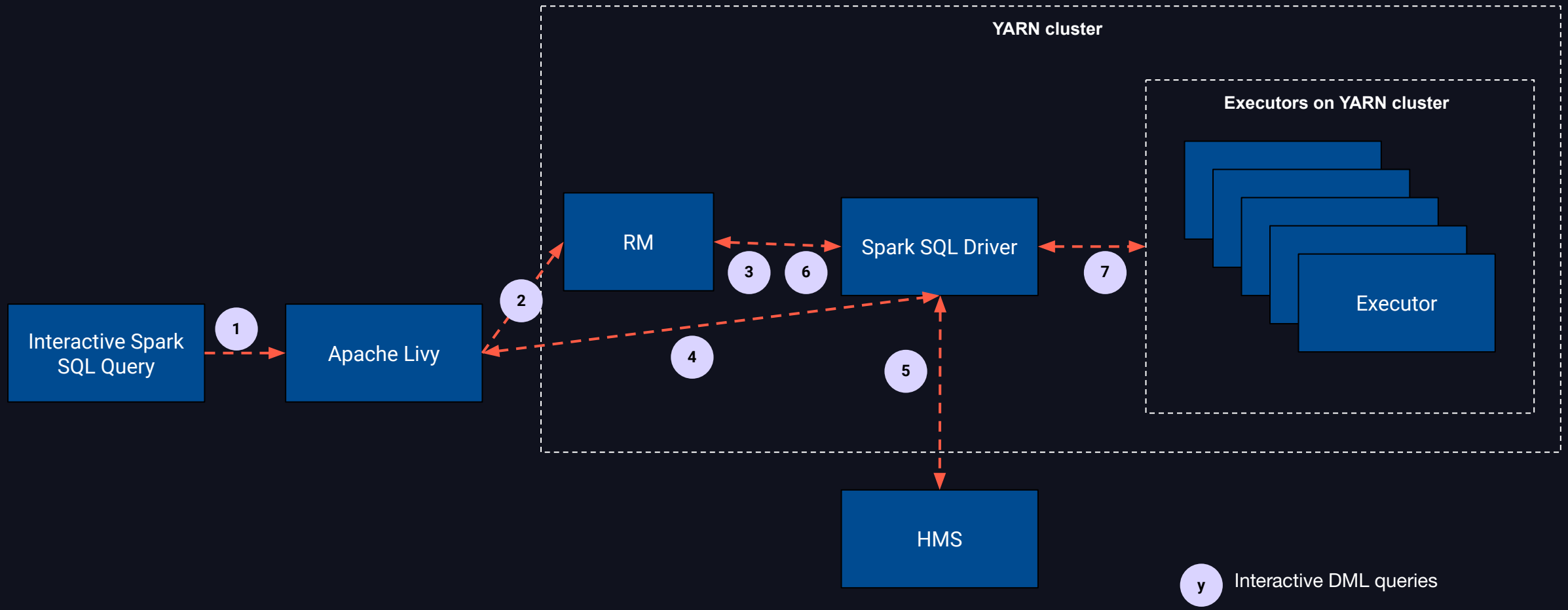
Apache Livy - Batch Sessions

- REST interface to Spark cluster
- Similar to spark-submit
- Multi-tenancy, high availability, and failure isolation

Apache Livy - Interactive Sessions

- Enables reusing sessions
- Multi-tenancy, high availability, and failure isolation

Querying With Spark SQL



Interactive Querying

Requirements Check

- Seamless query submission ✖
- Fast metadata queries ✖
- Fail fast ✖
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- Error handling and tuning suggestions ✖
- Auto error handling and retries ✖

Seamless Query Submission

From existing query clients like querybook, jupyter, etc

- Generic DB-API 2.0 compliant Python client on top of Livy's REST API

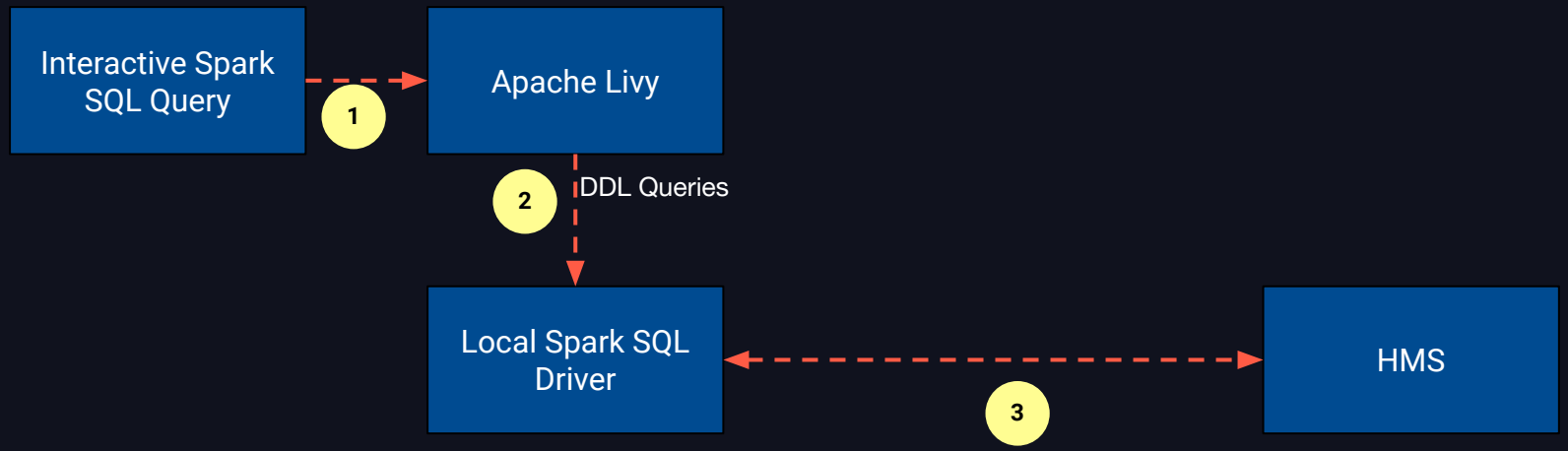
```
from bigpy.hive.livy.livy_client import Connection
from bigpy.hive.livy.livy_client import Cursor

cursor = Connection(livy_connection_urls='host1:port1').cursor()
cursor.execute('SELECT * FROM my_awesome_data LIMIT 10', async=True)

status = cursor.poll().operationState
while status == Cursor._STATE_RUNNING):
    logs = cursor.fetch_logs()
    for message in logs:
        print message
    status = cursor.poll().operationState

print cursor.fetchall()
```

Fast Metadata Queries

The problem..

- Waiting for container allocations
- Waiting for Spark Context to start up

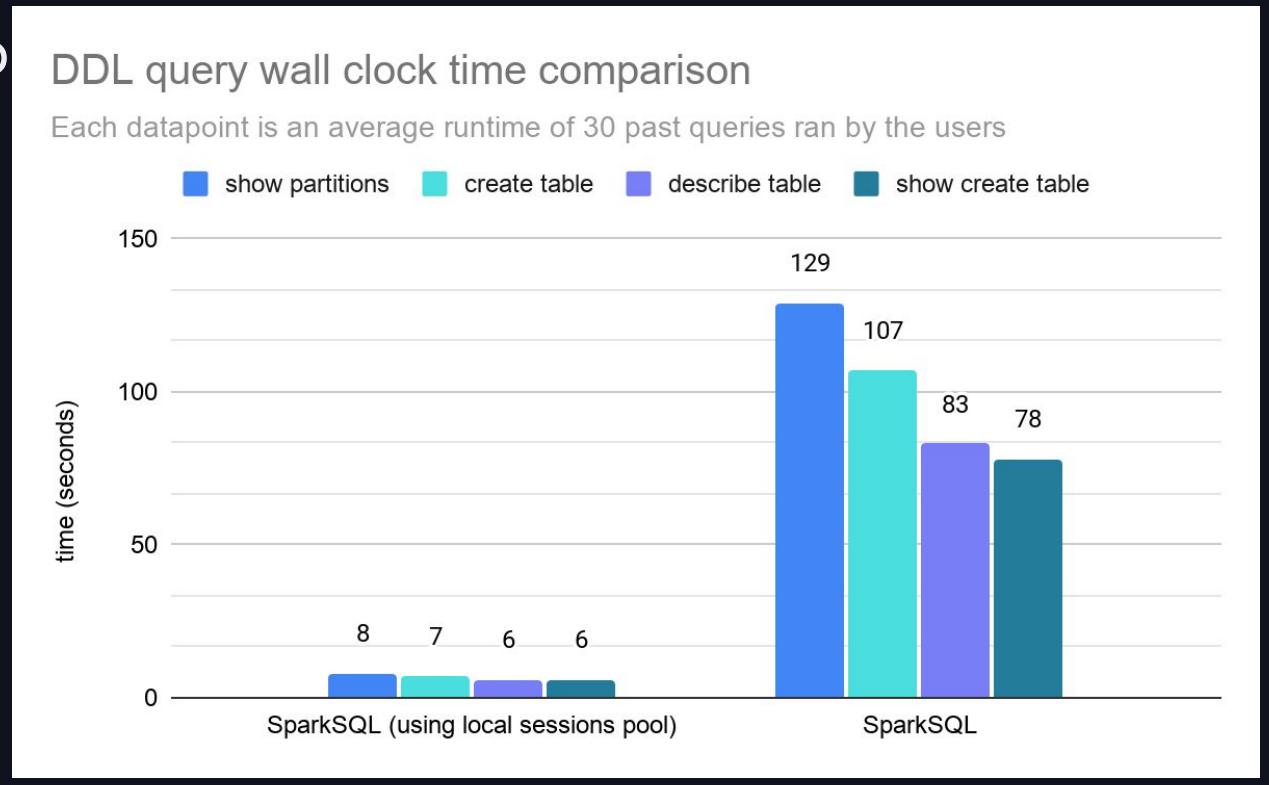
Fast Metadata Queries



z Interactive DDL queries

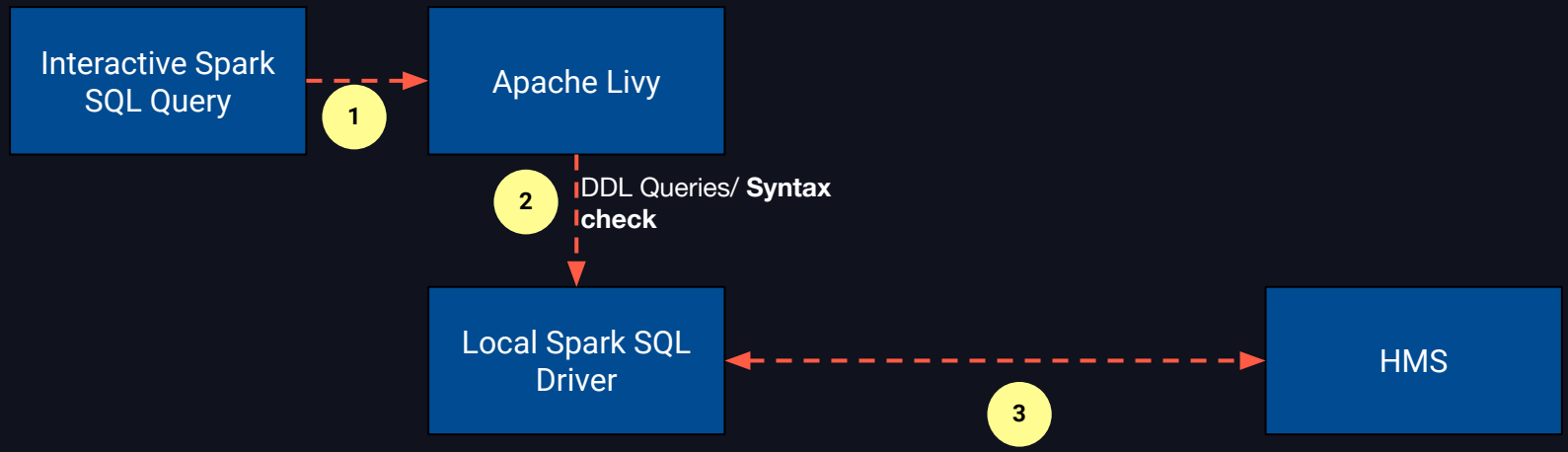
Fast Metadata Queries

- Pool is initialized on server startup
- Self-reliant, some of the features include:
  - Automatic garbage collection
  - Health monitoring
  - Asynchronous loading



With this design, we reduced query latency from 70 seconds to an average of 10 seconds (~6.3x improvement)

Fail Fast



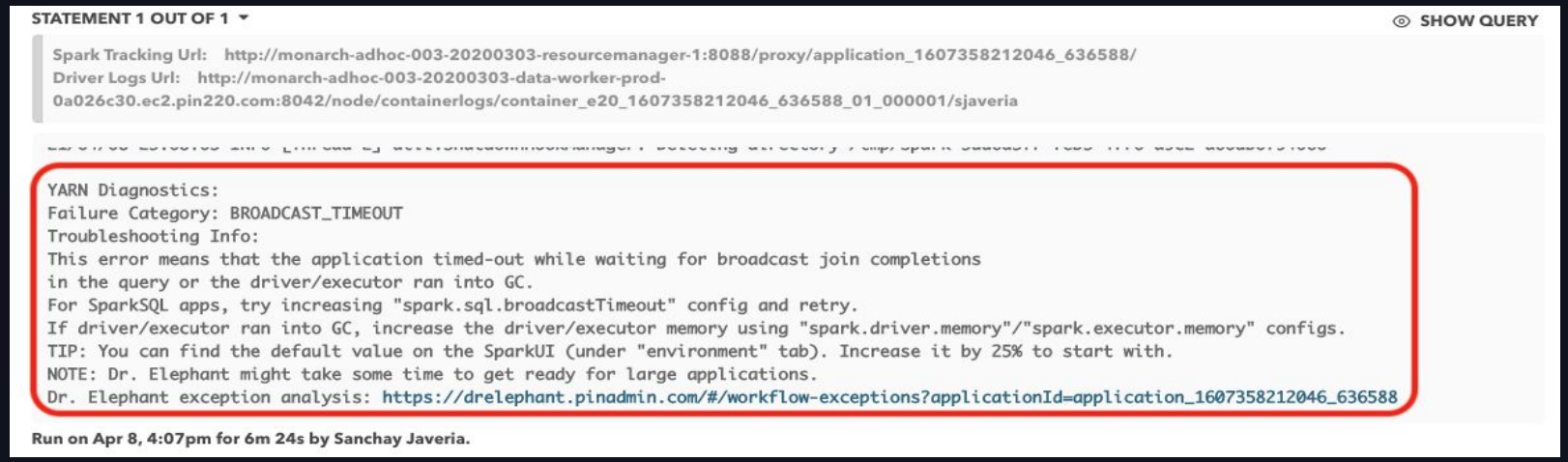
z Interactive DDL queries

Easy Access to Results

- Livy limits the number of rows a query can return
- Needed to avoid Livy from choking on memory
- For large results, we redirect results to AWS S3
- Clients read results from S3 on query completion

Error Handling Recommendations

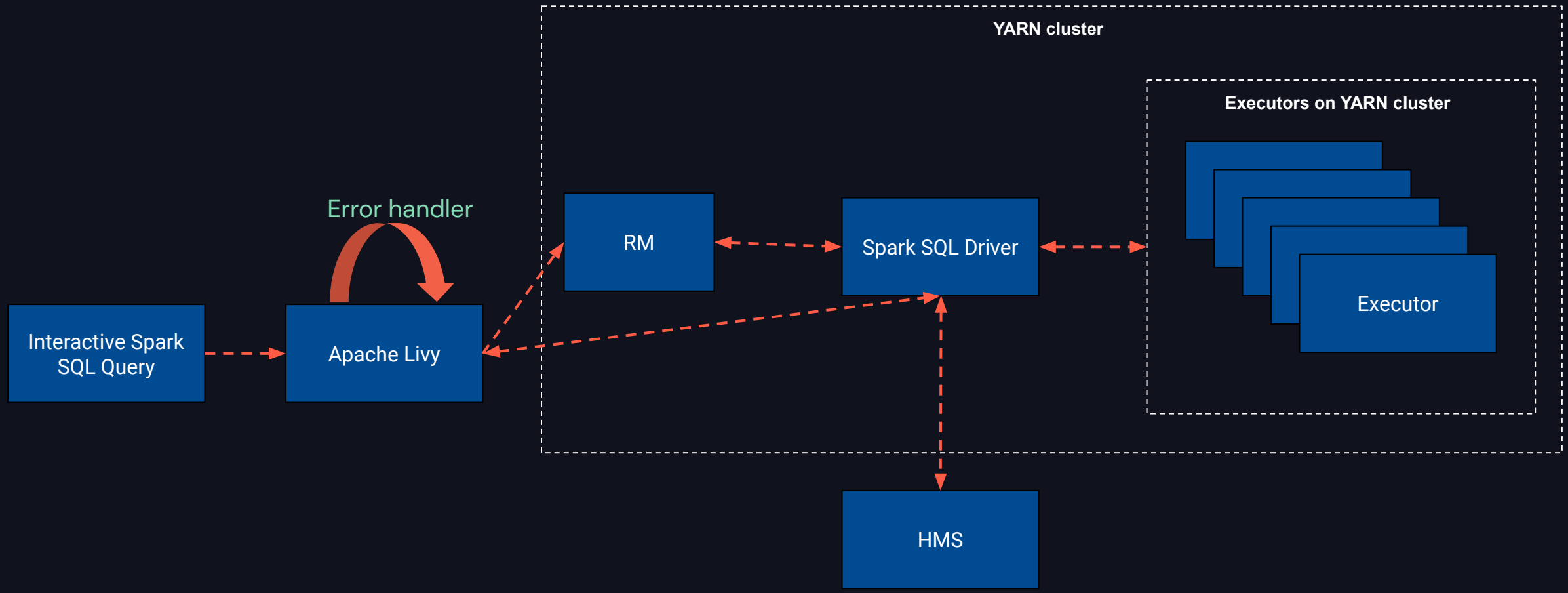
- Utilize YARN diagnostic and Spark error messages
- Fail YARN application based on last query's execution status
- Added an error classifier/ troubleshooting information to Dr. Elephant
- Clients retrieve troubleshooting information from Dr. Elephant APIs



Resource Tuning Suggestions

- User applications are often too generous with memory
- Provide visibility into over/ under memory consumption

Auto Error Handling and Retries



Interactive Querying

Requirements Check

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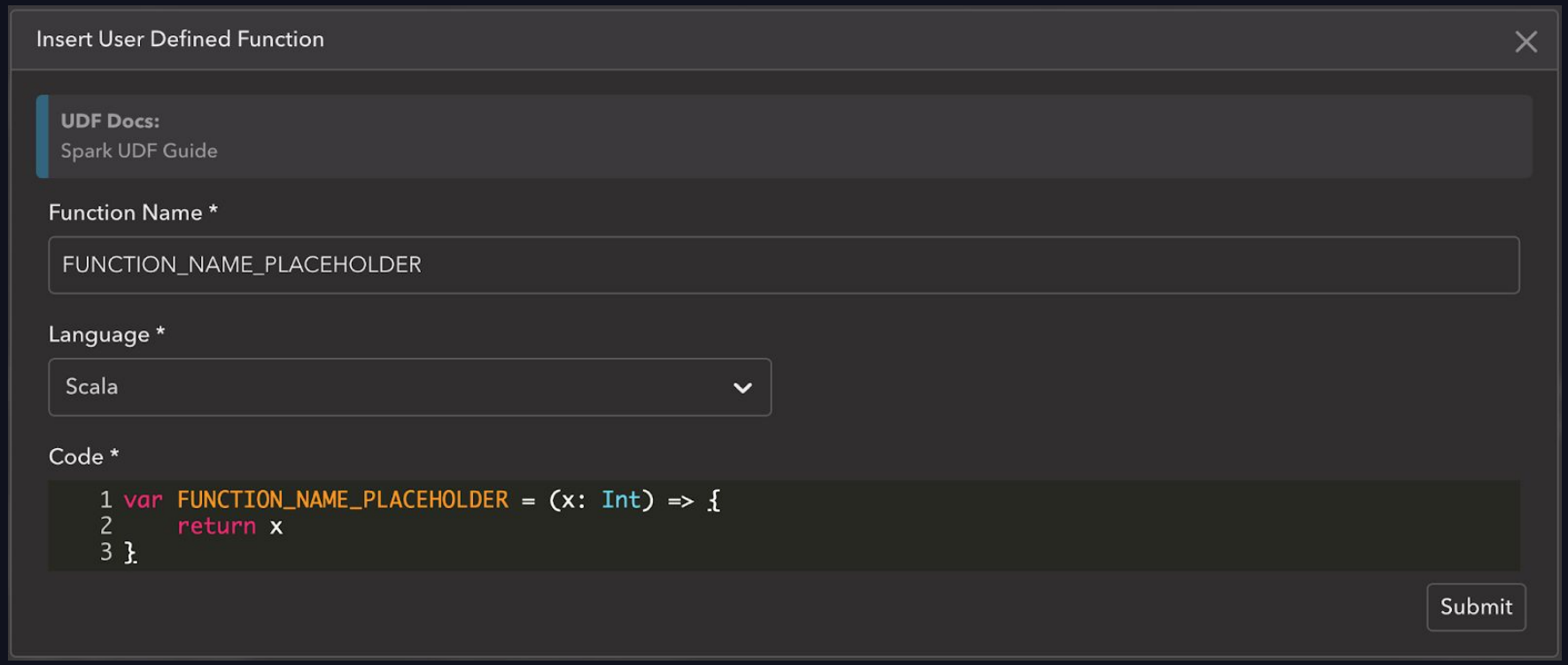
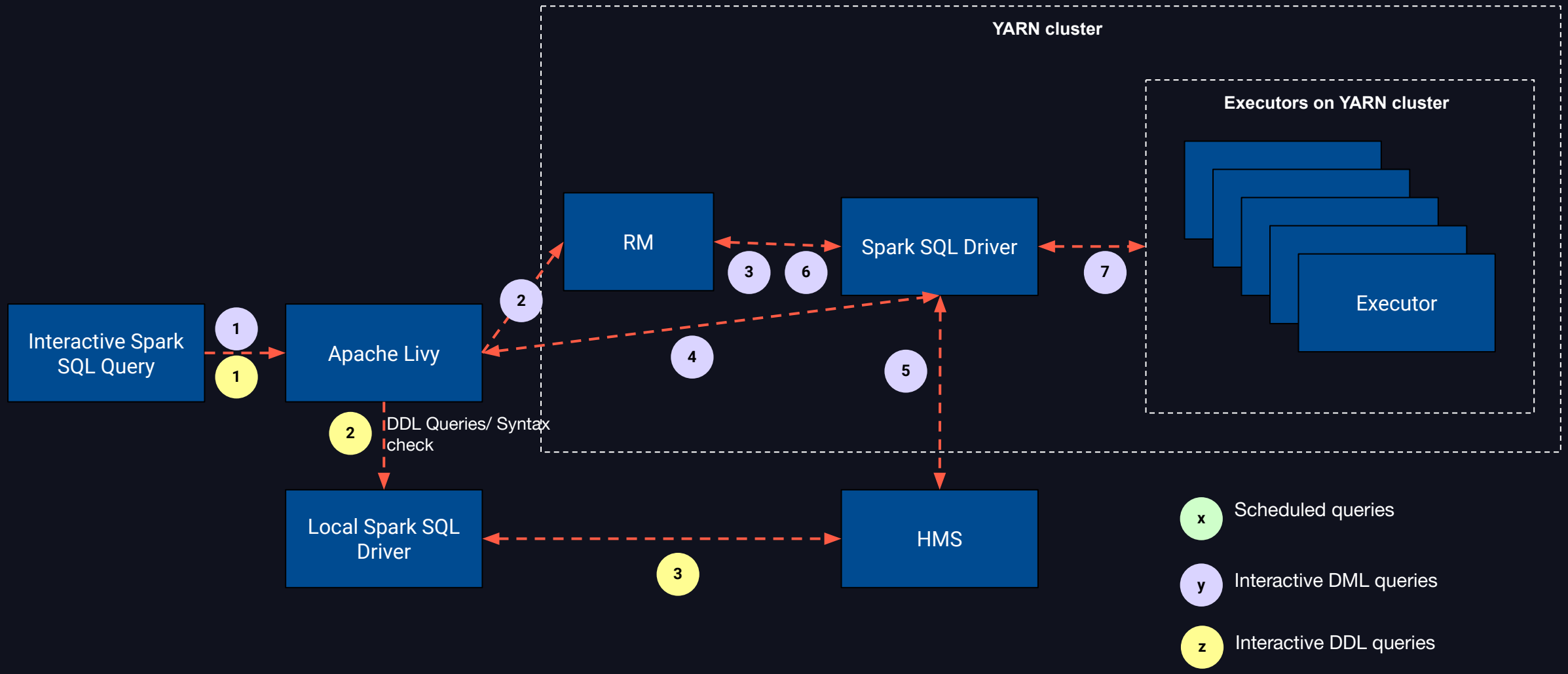
Interactive UDFs

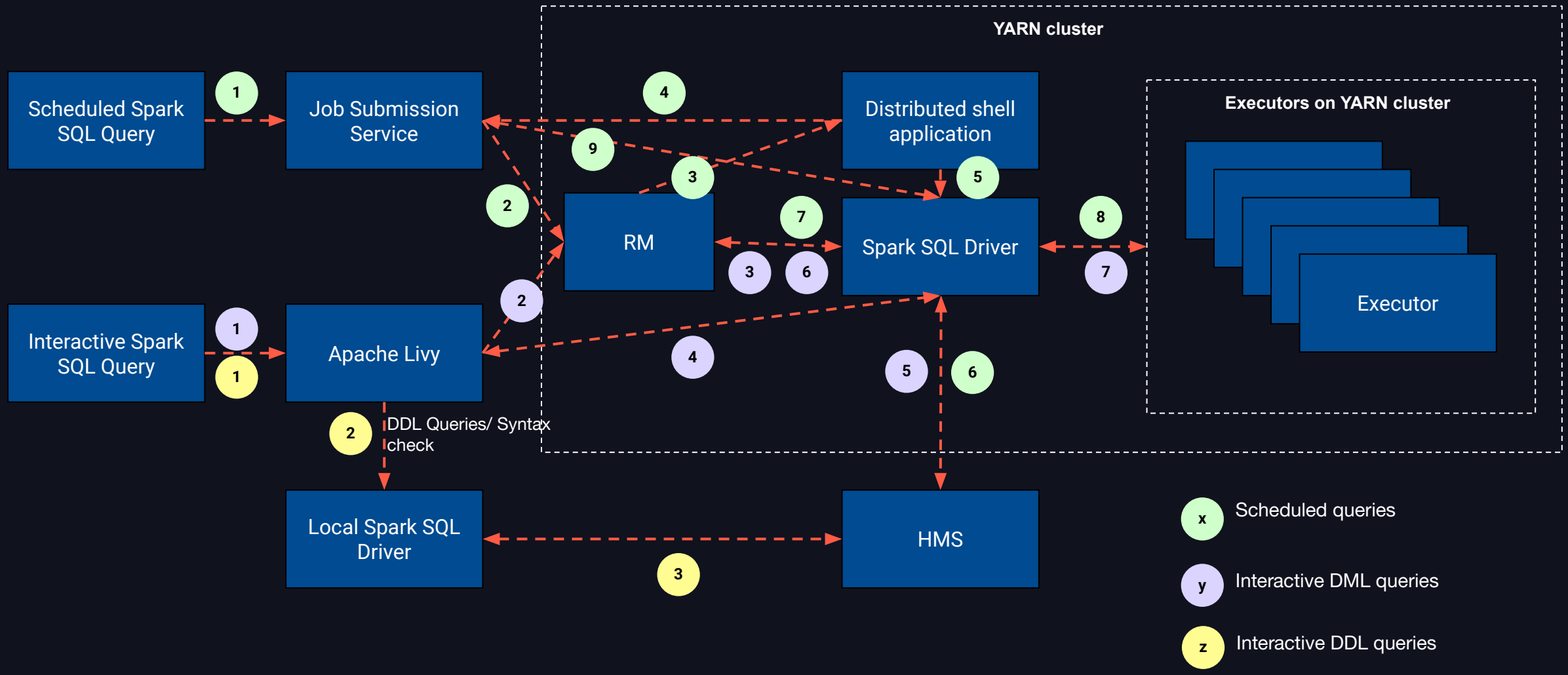
- Allow users to author UDFs along with queries.



Interactive Querying With Spark SQL



Querying With Spark SQL



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Thank you

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