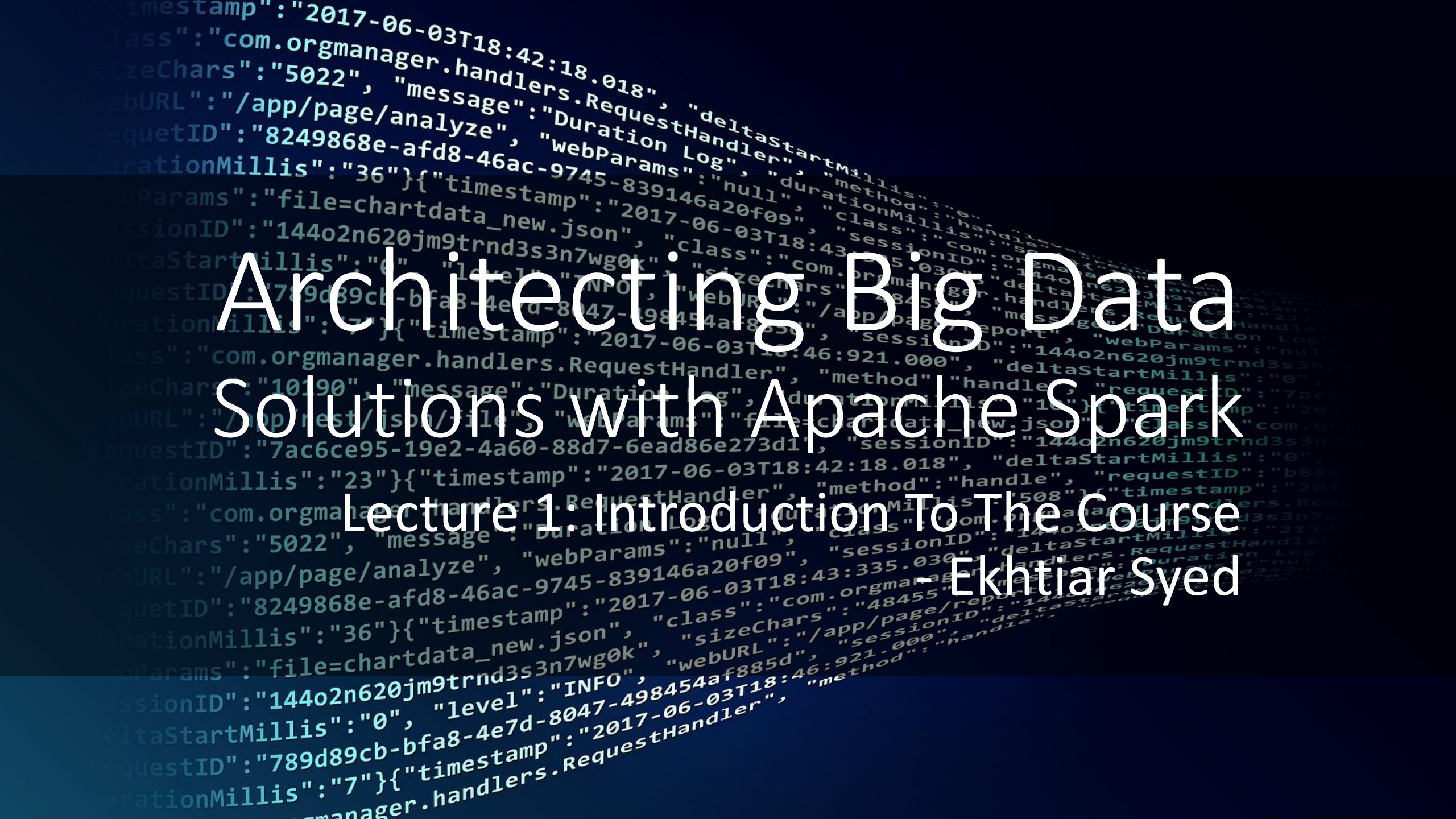


Architecting Big Data Solutions with Apache Spark

Lecture 1: Introduction To The Course

- Ekhtiar Syed

Course Objective

- In this course we will learn how to build Big Data Solutions with Apache Spark.
- This is mostly a notebook lab-oriented course with a few slides to cover the theory part. However, there are more theories inside the notebook labs themselves.
- You can find the latest version of the course in our GitHub repository: https://github.com/open-dse/architect_big_data_solutions_spark under our open data science and engineering education initiative.
- We will use Databricks as our infrastructure to run our notebooks on. Databricks provides you a single node spark cluster for free.

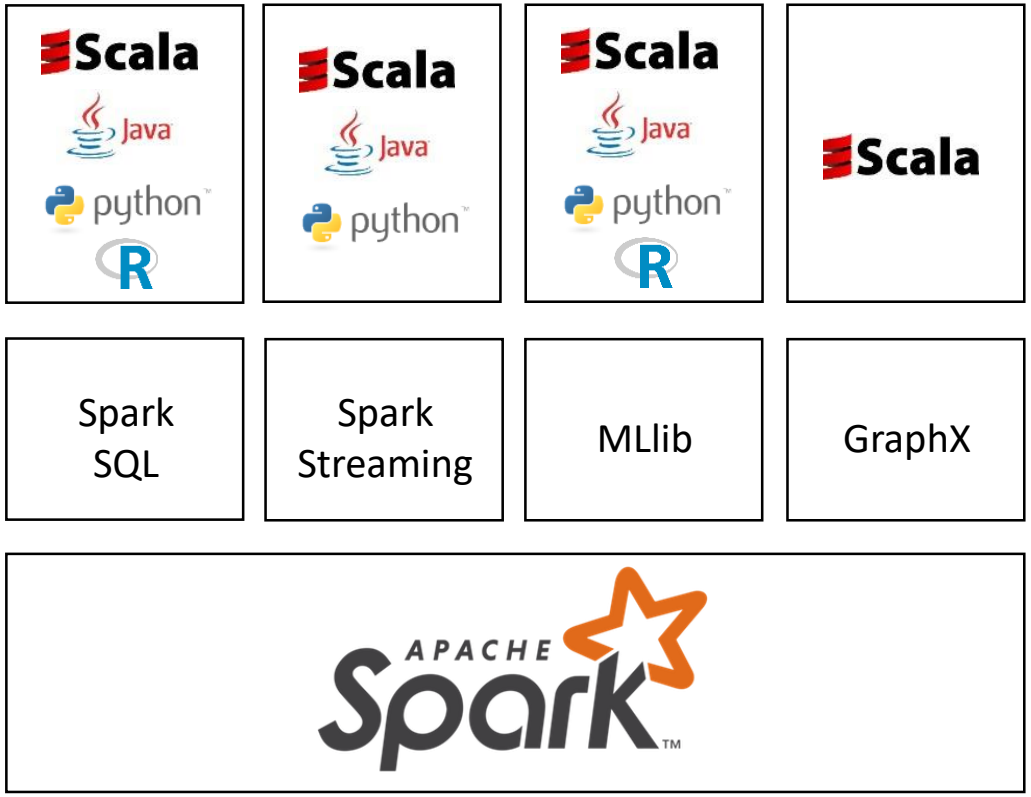
What Is Apache Spark?

spark.apache.org

- Spark is a fast and general engine for large-scale data processing.
- **Easy to Use:** Spark offers a rich application programming interface (API) for developing big data applications.
- **Fast:** Spark takes advantage of in-memory compute to provide fast data processing capabilities in a distributed environment.
- **General Purpose:** Spark provides a unified integrated platform for different types of data processing jobs.
- **Scalable:** The data processing capacity of a Spark cluster can be increased by just adding more nodes to a cluster.
- **Fault Tolerant:** Spark automatically handles the failure of a node in a cluster. Failure of a node may degrade performance, but will not crash an application.

Apache Spark Modules

Along with it's core modules, Spark mainly offers the following four modules:



Spark SQL: Enables the use of SQL statements or DataFrame API inside Spark applications.

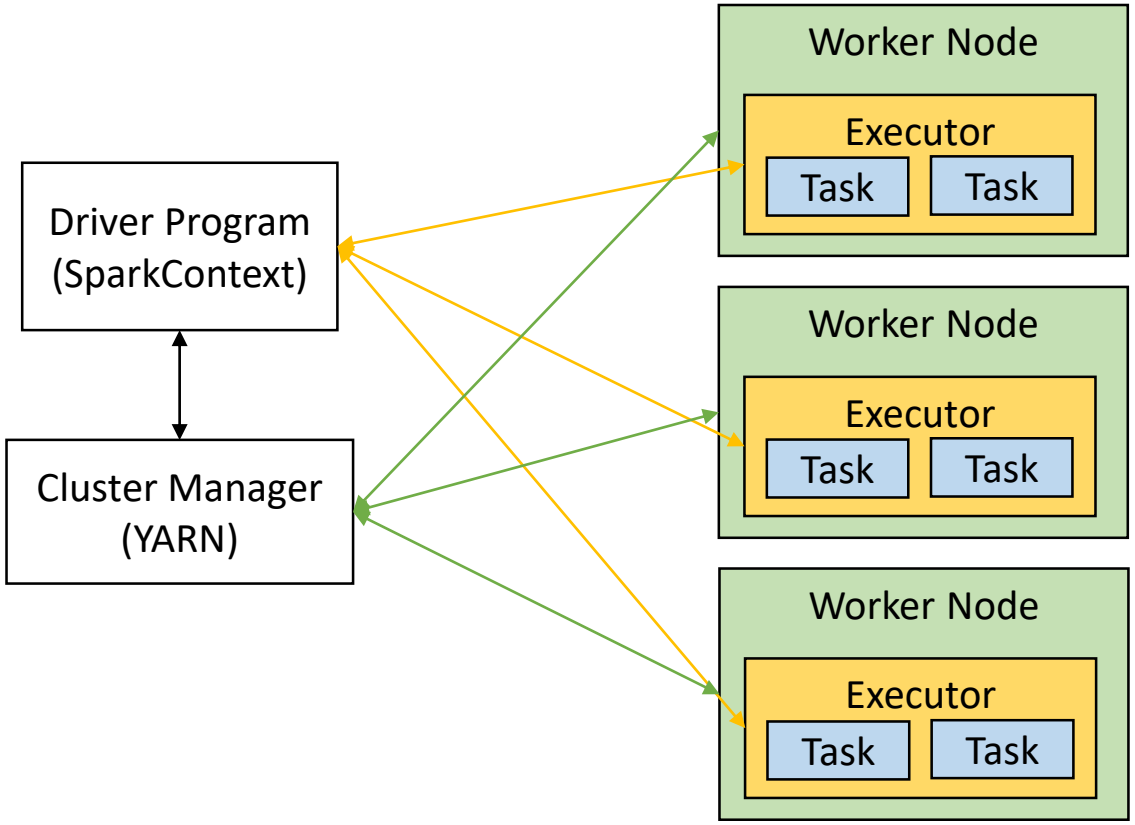
Spark Streaming: Enables processing of live data streams

Mlib: Enables development of machine learning applications

GraphX: Enables graph processing and supports a growing library of graph algorithms

Spark Under The Hood

Spark allows you to write code to process data in a distributed environment. You write the code on a driver node, and spark abstracts the difficult task of distributing the problem on multiple nodes in the following way:



- Spark has five key entities: driver program, cluster manager, workers, executors, and tasks.
- Worker nodes provide compute resources to a Spark application and runs as distributed process.
- Spark uses a cluster manager to acquire cluster resources for executing a job. Spark currently supports standalone, Mesos, and YARN.
- Driver program is an application that uses Spark as a library. A driver program can launch one or more jobs on a Spark cluster.
- An executor is a Java virtual machine process that Spark creates on each worker for an application.
- Task is the smallest unit of work that Spark sends to an executor.
- Driver node orchestrates worker nodes to execute the “graph of operations” in a lazy way.

Let’s Start The Practical Part!
Load Up Lab 1, 2, 3, 4