

Distributed architectures for big data processing and analytics

Teachers

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Office hours

- Class-time (break, end of lesson)
- Or send an e-mail for an appointment

Weekly schedule

- Lectures (62 hours)
 - Tuesday 14:30-17:30
 - Classroom 1P + Virtual Classroom
 - Wednesday 13:00-14:30
 - Virtual Classroom
- Practices (18 hours)
 - Friday 14:30-16:00 – Team #1
 - Virtual Classroom
 - Friday 16:00-17:30 – Team #2
 - Virtual Classroom

Practices

- We will also provide you a specific account on the BigData@Polito cluster
 - <http://bigdata.polito.it/>
- Detailed information will be provided before the first laboratory practice
 - We will send you an email with username and password

Topics

- Lectures
 - Introduction to Big data
 - Big data pipelines and lambda architecture
 - Hadoop
 - Architecture
 - MapReduce programming paradigm
 - Spark
 - Architecture
 - Spark programs based on RDDs (Resilient Distributed Data sets)
 - Spark SQL and DataFrames

Topics

- Data mining and Machine learning libraries for Big Data
 - MLlib (Apache Spark's scalable machine learning library)
 - GraphX and GraphFrame (Apache Spark's API for graphs)
- Data streaming analytics
 - Spark Streaming
 - Apache Flink, Storm, Kafka, ..

Topics

- Laboratory activities
 - Application development on Hadoop and Spark

Prerequisites / prior knowledge

- Programming skills (**mandatory**)
 - **Java language**
 - **Python language**
- and basic knowledge of database concepts (recommended)
 - Relational data model
 - SQL language

Material

- Web page
 - <https://dbdmg.polito.it/wordpress/teaching/distributed-architectures-for-big-data-processing-and-analytics-2020-2021>
 - Slides, exercises, tools
- Video lectures/Virtual classrooms
 - The video lectures are available on the Teaching portal
 - <https://didattica.polito.it>

Books and Readings

- Reference books:
 - Matei Zaharia, Bill Chambers. Spark: The Definitive Guide (Big Data Processing Made Simple). O'Reilly Media, 2018.
 - Advanced Analytics and Real-Time Data Processing in Apache Spark. Packt Publishing, 2018.
 - Matei Zaharia, Holden Karau, Andy Konwinski, Patrick Wendell. Learning Spark (Lightning-Fast Big Data Analytics). O'Reilly, 2015.
 - Tom White. Hadoop, The Definitive Guide. (Third edition). O'Reilly Media, 2015.
 - Donald Miner, Adam Shook . "MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems." O'Reilly, 2012

Exam rules

- Written exam
 - 2 programming exercises (max 27 points)
 - Design and develop programs based on the MapReduce programming paradigm and Spark APIs
 - 2 questions / theoretical exercises (max 4 points)
 - Topics
 - Technological characteristics and architecture of Hadoop and Spark
 - HDFS
 - MapReduce programming paradigm
 - Spark RDDs, transformations and actions
 - Spark SQL and DataFrames
 - Data mining and Machine learning libraries for Big data (Spark MLlib, GraphX/GraphFrame)
 - Data streaming analytics

Exam rules

- Written exam
 - 2 hours
 - **Closed book** exam
 - Exams + Respondus