Apache Hadoop Ecosystem for Big Data

technology basics for data scientists
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Jordi Torres, UPC - BSC
www.JordiTorres.eu
@JordiTorresBCN
Other tools:

- Lucene, text search system
- Tomcat, web server
- Hadoop, mapreduce platform

Source: Ricard Gavaldà. "Information Retrieval", Erasmus Mundus Master program on Data Mining and Knowledge Discovery
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Other tools:

Solr, text search on Lucene+hadoop
Can run as a Tomcat Servlet

ElasticSearch, text search on Lucene+hadoop

Source: Ricard Gavaldà. "Information Retrieval", Erasmus Mundus Master program on Data Mining and Knowledge Discovery
Other tools:

Pig, Hadoop scripting language

Hive, SQL-like language over Hadoop

Source: Ricard Gavaldà. "Information Retrieval", Erasmus Mundus Master program on Data Mining and Knowledge Discovery
Hive – SQL on top of Hadoop

- Map/Reduce is great but every one is not a Map/Reduce expert
  - I know SQL and I am a python and php expert
- A system for querying and managing structured data built on top of Map/Reduce and Hadoop
- We had:
  - Structured logs with rich data types (structs, lists and maps)
  - A user base wanting to access this data in the language of their choice
  - A lot of traditional SQL workloads on this data (filters, joins and aggregations)
  - Other non SQL workloads
Hive – SQL on top of Hadoop

- **Hive is a data warehouse framework built on top of Hadoop.**
  - Combine SQL and Map-Reduce
    - Rich data types (structs, lists and maps)
    - Efficient implementations of SQL filters, joins and group-by’s on top of map reduce
  - provides a table-based abstraction over HDFS and makes it easy to load structured data.
  - Hive provides a SQL-like query language to execute MapReduce jobs, described in the Query section below.

- **Hive is a natural starting point for more full-featured business intelligence systems, which offer a user-friendly interface for non-technical users.**
Other tools:

Nutch: crawler + web search system

“Relatively feature-rich crawler, polite (obeys robots.txt rules), robust, and highly scalable:
- you can run Nutch on a cluster of 100 machines
- you can bias the crawling to fetch “important” pages first”

Source: Ricard Gavaldà. "Information Retrieval", Erasmus Mundus Master program on Data Mining and Knowledge Discovery
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Other tools:

Mahout: scalable machine learning

Many algorithms parallelized on top of Hadoop

k-means, frequent pattern mining, random forests, collaborative filtering, latent Dirichlet allocation, regression, perceptron, SVM, boosting, EM, PCA, SVD, …

Source: Ricard Gavaldà. "Information Retrieval", Erasmus Mundus Master program on Data Mining and Knowledge Discovery
Other tools:

- **Sqoop**
  sqoop.apache.org

- **Flume**
  flume.apache.org
Open Source opportunities: Stack 2.0

- Storage (Apache Cassandra)
- Processing (Apache Hadoop)
- Query (Apache Hive or Pig)
- Analytics (Apache Mahout)
- Services