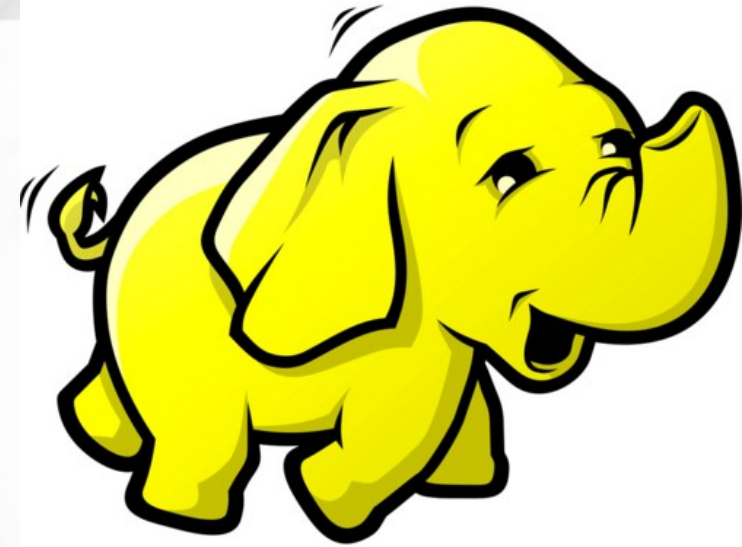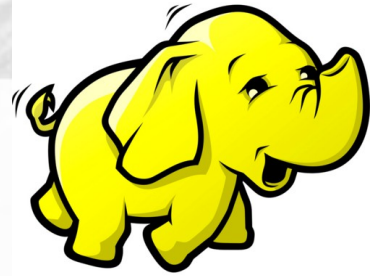# Hadoop

- Oracle -> Hadoop @CERN / Atlas
- Hadoop = HDFS + Map/Reduce
- API:
  - Native
  - Pig, Grunt, Hive
  - HBase
 - Web Service

Oracle->Hadoop @CERN

- Oracle:
  - Oracle doesn't seem to satisfy our performance requirements, needs a lot of tuning by highly experienced staff
  - Oracle is expensive (CERN+Tier1)
  - Our data are not table-like (SQL), but column-wise or unstructured (NoSQL)
- Some preliminary tests with Hadoop done last year in CERN & Atlas – with very positive results
- Hadoop training (5 days) organized
- Atlas seems to have decided to migrate its large SQL databases from Oracle to Hadoop
  - starts with TAG DB, may be followed by Conditions, Geometry, ...
  - during machine upgrade (2013)

Hadoop = HDFS + Map/Reduce
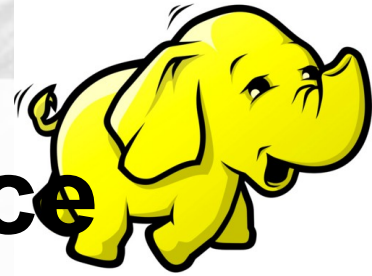
- **HDFS**:
  - Distributed file storage (each data component replicated, failover capability)
  - Transparent access from client
  - Many file formats supported, others can be added
- **Map/Reduce**:
  - Tasks are executed on servers carrying data
  - Results are recombined and consolidated
- Cheap hw
- Small tasks slow, big tasks fast
- Data represented by key+value pairs

Map/Reduce

Node
Input → Map → Partition

Node
Sort → Reduce → Output

HDFS
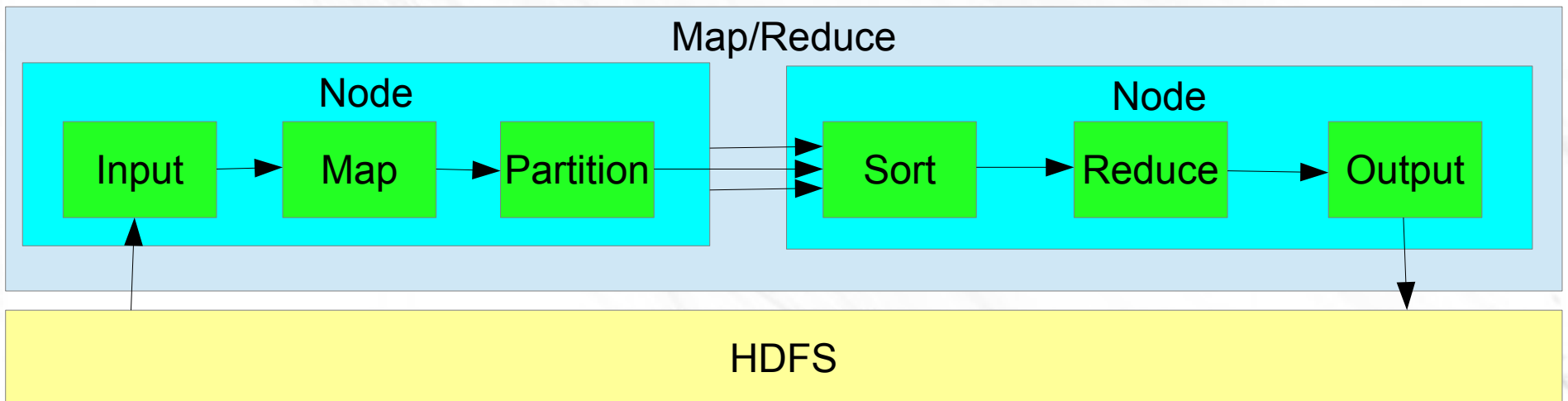
API
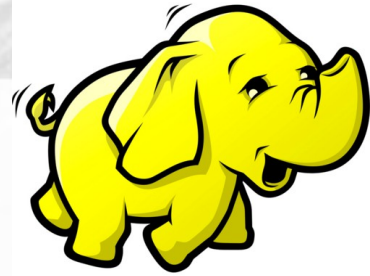
➢ Written in **Java** + **Ruby** scripting
  ➢ native API Java
  ➢ all **JVM** languages transparently supported (Python, Ruby, Groovy, Scala,...)
  ➢ more obscure language supported via opaque API or streaming API
➢ Special purpose languages (client translates job into JAR file and sends it for execution to Hadoop):
  ➢ **Pig**: Map/Reduce
  ➢ **Sqoop**: interface to SQL db
  ➢ **Hive**: SQL-like
➢ **Templeton**: HTTP REST Web Service

HBase
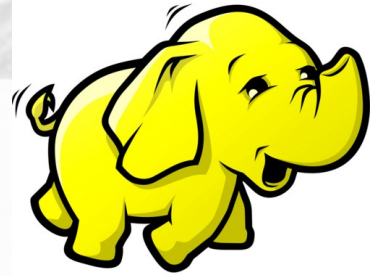
- NoSQL database
- Interactive
- Schema-free
- Three-dimensional: key-value-timestamp
- No transactions, not ACID
- Stores in HDFS

@ Atlas
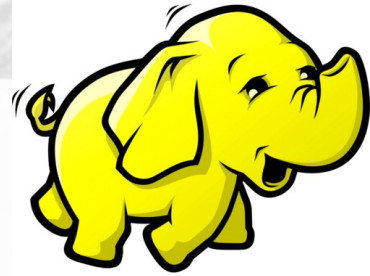
- **2012**:
  - ServiceCatalog implementation to test Hbase – nice API
  - Performance evaluation of HDFS (storing big Root files) – excellent performance
- **2013**:
  - New Hadoop cluster in CERN/IT (Linux)
    - (there is already a Sun cluster used by LHC machine)
  - TAG DB being replicated into HDFS using different ways
  - Evaluation of storage architecture
  - Workshop in 2 weeks