CS 378 – Big Data Programming

Lecture 3

Anatomy of a Hadoop

Map-Reduce Program

Assignment 1 Update

- Running the example on AWS
  - Log files: controller, syslog

- Other Questions?

Map-Reduce Code

- `main()` and `run()` methods
- `Job` object - Collects up all the specs for the job
  - Where is the JAR file to distribute?
  - Type of the output pair
  - `Mapper` and `Reducer` classes
  - Input and output file formats
  - Input file(s), output directory

- Configuration object – forwarded to `map()`, `reduce()`
  - Job level parameters communicated via this object

Map-Reduce Code

- MapClass
  - Extends `Mapper`, declaring the input and output pair types for the `map()` method

- `map()` method
  - Arguments:
    - Input key/value pair
    - `Context` object
  - Output done via the context object

Map-Reduce Code

- ReduceClass
  - Extends `Reducer`, declaring the input and output pair types for the `reduce()` method

- `reduce()` method
  - Arguments:
    - Input pair: key and value list
    - `Context` object
  - Output done via the context object

Map-Reduce Code

- `map()` and `reduce()` input pair and output pair types
- Implement the interface: `Writable`
  - `readFields(DataInput in)`
  - `write(DataOutput out)`

- `Text`, `IntWritable`, `LongWritable` all implement `Writable`
  - As do many other types, some of which we will use

- You can design a custom class that implements `Writable`

Map-Reduce Code

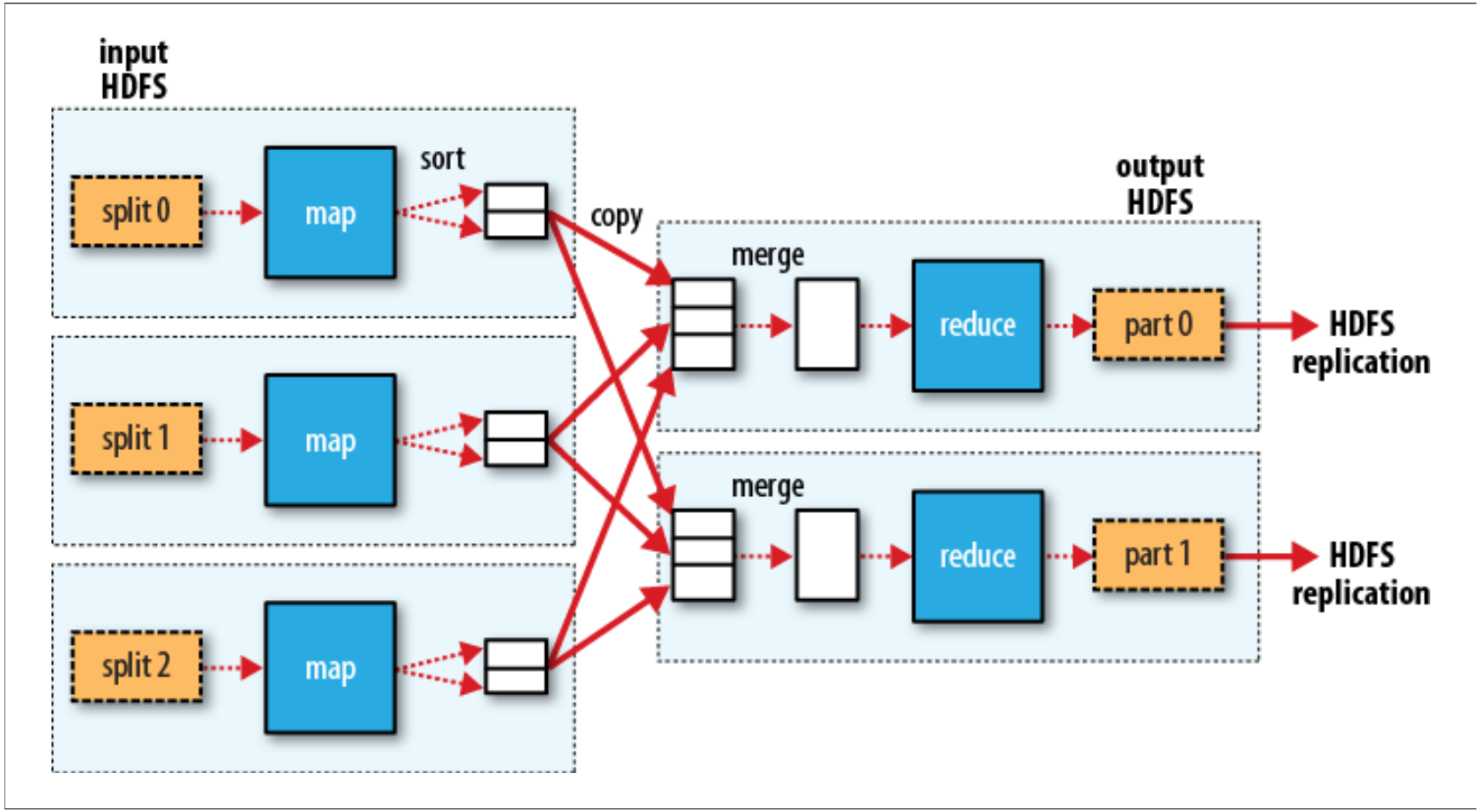
- Combiner – combines multiple outputs from a Mapper before shuffle

- Input and output pair types must be the same.
  - Why?

- When can a combiner be used?
  - Map output can be processed ("combined") even through we do not see all values associated with the key
  - Combiner output can be interpreted by reducer
  - Word count, and many other counting applications can use a combiner.

MapReduce in Hadoop

Figure 2.4, Hadoop - The Definitive Guide



MapReduce - Unit Test

- Would like a means for testing `map()` and `reduce()` methods locally
  - No need to upload to AWS or run on Hadoop
  - Support incremental development
    - Detect regression errors quickly

- `mrunit` and `mockito` support unit testing of Hadoop apps