Hadoop MapReduce

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High Performance for Big Data Applications

Table of Contents

1. Hadoop
2. Examples

Table of Contents

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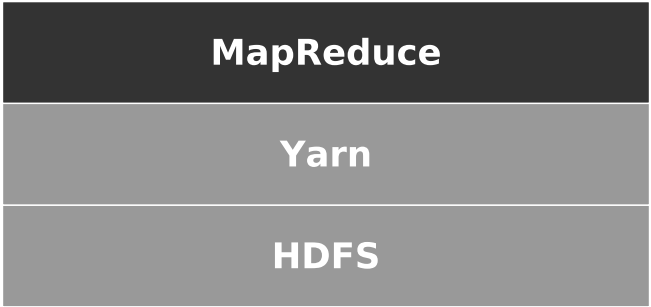
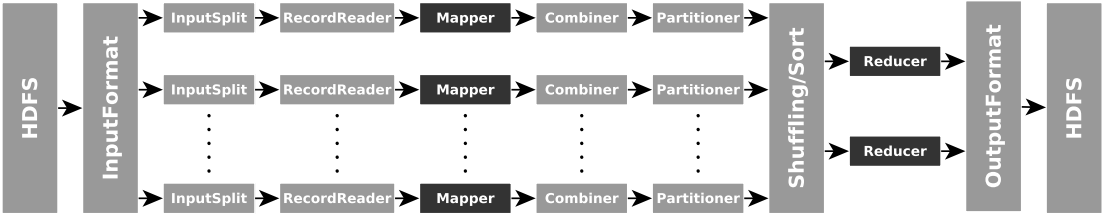
2. Examples

What we mean by Hadoop



https://data-flair.training/blogs/hadoop-ecosystem-components

MapReduce execution flow



https://data-flair.training/blogs/hadoop-ecosystem-components

Custom data types

- LongWritable = long;
- IntWritable = int;
- Text = String;
- Other data types (link);

```
public class IntWritable implements WritableComparable<IntWritable> {
  private int value;

  public IntWritable(int value) { set(value); }

  public void set(int value) { this.value = value; }

  public int get() { return value; }

  @Override
  public void readFields(DataInput in) throws IOException {
    value = in.readInt();
  }

  @Override
  public void write(DataOutput out) throws IOException {
    out.writeInt(value);
  }

  @Override
  public int compareTo(IntWritable o) {
    int thisValue = this.value;
    int thatValue = o.value;
    return (thisValue < thatValue ? -1 : (thisValue == thatValue ? 0 : 1));
  }
}
```

▸ Source

InputFormat

- TextInputFormat: <LongWritable, Text>
- KeyValueTextInputFormat: <Text, Text>
  - Key splitted by \t;
- NLineInputFormat: <LongWritable, Text>
  - `config.setInt("mapreduce.input.lineinputformat.linespermap", 10000);`
- Customs InputFormat must implement `getSplits` and `getRecordReader`;
  - https://hadoop.apache.org/docs/stable/api/org/apache/hadoop/mapred/InputFormat.html

InputSplit

- Defines the parallelism level;
- Usually splitted by the size of the block;
  - 10TB/128MB = 82000
- It is a logical division of the input data;
- Ways to change it:
  - `config.set(MRJobConfig.NUM_MAPS, 2);`
  - `mapreduce.job.maps` on `mapsite-site.xml`;

https://hadoop.apache.org/docs/current/hadoop-mapreduce-client/hadoop-mapreduce-client-core/MapReduceTutorial.html

RecordReader

- Split InputSplit into <key, value> pairs;
  - Custom implementations can read values from outside the InputSplit;
- Max record length:
  - `config.setInt(“mapreduce.input.linerecordreader.line.maxlength”, Integer.MAX_VALUE);`
- Vanilla example:

```
run(Context context) {
    while(context.nextKeyValue())
    {
        map(context.setCurrentKey(), context.getCurrentValue(), context)
    }
}
```

Mapper

- Maps <key1, value1> to <key2, value2>;

Combiner

- Reduces data transfer between mapper and reducer;
- Reduces the amount of data to be processed in the reducer;

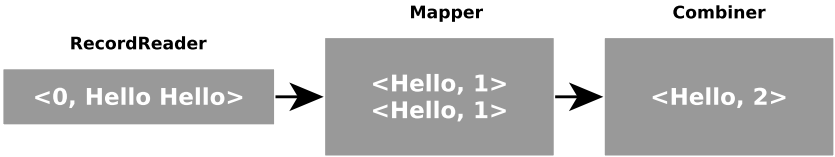


Table of Contents

1 Hadoop

2 Examples

- WordCount; - CountProductsSold; -

Sample frame title

In this slide, some important text will be highlighted because it's important. Please, don't abuse it.

Remark

Sample text

Important theorem

Sample text in red box

Examples

Sample text in green box. The title of the block is "Examples".

Two-column slide

This is a text in first column.

$$E = mc^2$$

- First item
- Second item

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