Resilient Distributed Datasets (RDDs)

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Primary abstraction that allow Spark to distribute data

- Fault tolerant – if they are destroyed they can be recreated by the driver and sent to a new worker
- Immutable – once created you cannot change them. Instead you perform transformations on them and create new RDDs.
- Unstructured and semi-structured data
- Many input sources : HDFS, S3, csv, json

Resilient Distributed Datasets (RDDs)

You can create an RDD in one of three ways:

- *Parallelizing* an existing collection in your driver program
- Referencing a dataset in an external storage system, such as a shared filesystem, HDFS, HBase, or any data source offering a Hadoop InputFormat
- By transformations on another RDD

Resilient Distributed Datasets (RDDs)

Parallelizing an existing collection in your driver program

```
>>>  data = [1, 2, 3, 4, 5]                    //Python List
>>>  distData = sc.parallelize(data)           // RDD
```

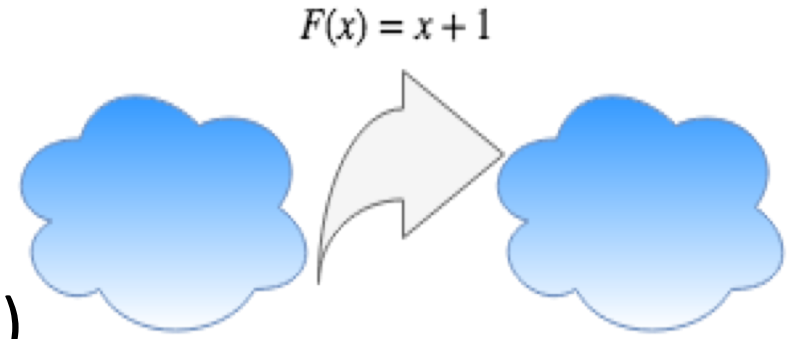
Referencing a dataset

```
>>> distFile = sc.textFile("data.txt")       //RDD
```

Resilient Distributed Datasets (RDDs)

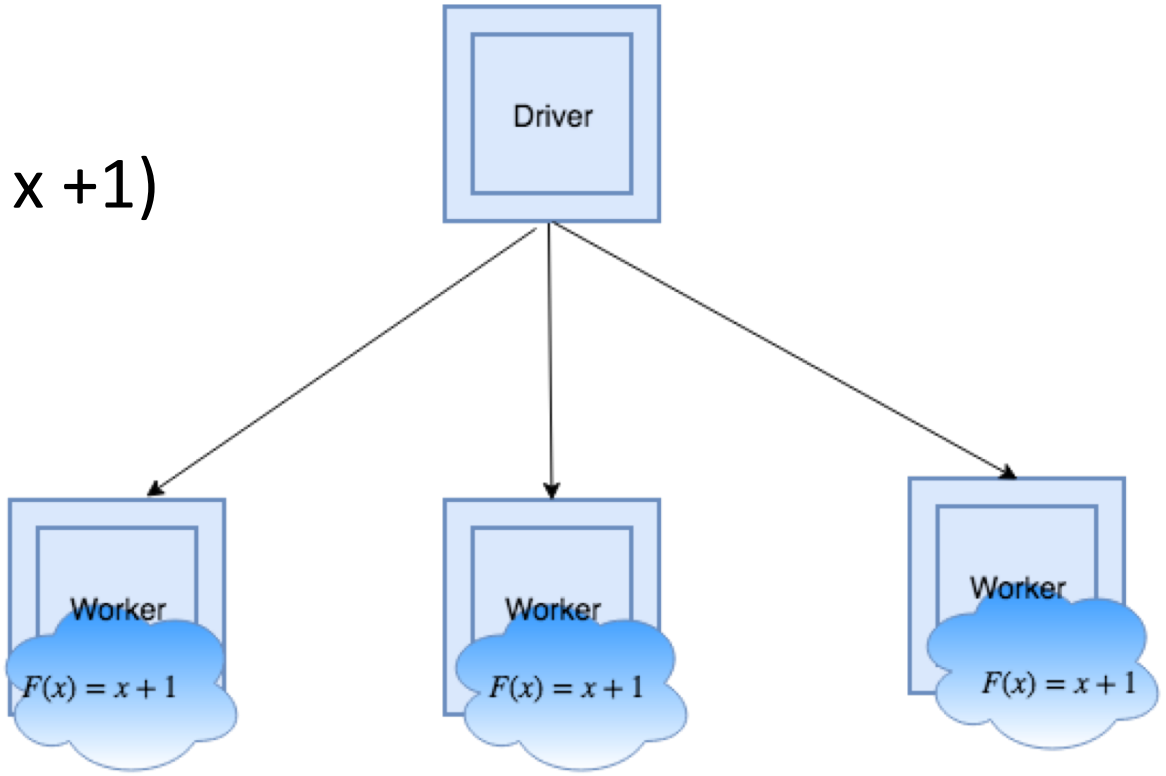
Given an RDD you can create a new RDD using ***transformations***.

```
>>>  data = [1, 2, 3, 4, 5]
>>>  rdd1 = sc.parallelize(data)
>>>  rdd2 = rdd1.map(lambda x : x + 1)
```



Resilient Distributed Datasets (RDDs)

rdd2 = rdd1.***map***(lambda x : x +1)



Resilient Distributed Datasets (RDDs)

Transformations on RDDs

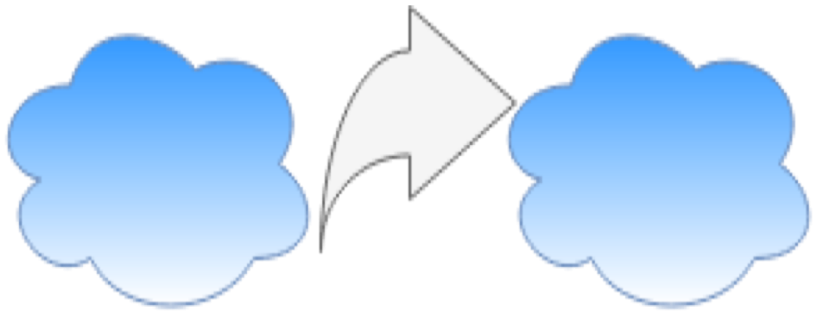
map

flatmap

filter

fold

aggregate



Resilient Distributed Datasets (RDDs)

- To get the results of a transformation back to the driver, you must issue an ***action***

```
>>> data = [1, 2, 3, 4, 5]
>>> rdd1 = sc.parallelize(data)
>>> rdd2 = rdd1.map(lambda x : x + 1)
>>> rdd2.collect()
```

Resilient Distributed Datasets (RDDs)

In [1]:
```
import pyspark
sc = pyspark.SparkContext('local[*]')
```

In [2]:
```
data = [1, 2, 3, 4, 5]
rdd1 = sc.parallelize(data)
rdd2 = rdd1.map(lambda x : x + 1)
print(type(rdd2))
```

```
<class 'pyspark.rdd.PipelinedRDD'>
```

In [3]:
```
mylist = rdd2.collect()
print(type(mylist))
```

```
<class 'list'>
```

In [5]:
```
print(mylist)
```

```
[2, 3, 4, 5, 6]
```

Resilient Distributed Datasets (RDDs)

- Actions
  - collect
  - count
  - reduce
  - take(n)

Reference : https://spark.apache.org/docs/latest/rdd-programming-guide.html - actions

Lazy Evaluation - An execution plan, a DAG (directed acyclic graph) of tasks is sent to the workers. It is not executed until an action is run