

## Exercises for Section 2.3

**Exercise 2.3.1:** Design map-reduce algorithms to take a very large file of integers and produce as output:

- (a) The largest integer.
- (b) The average of all the integers.
- (c) The same set of integers, but with each integer appearing only once.
- (d) The count of the number of distinct integers in the input.

(a) **The largest integer**

(b) 1- Map finds the largest chunk value and sends the results of all the chunks to the Reduce function

**2- Map reduce take the input and return (1 , Max value)**

**3- Reduce Function:**

Map Function send all inputs with key=1 thus Reduce Function need to only return Max value with key=1

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(b) The average of all the integers.

Map function:

take the input and puts key=1 & value = (w,a) w: weight a: average

Reduce Function:

Key is fixed thus:

$$\text{Average} = \sum_{k=0}^n (w \cdot a) / \sum_{k=0}^n (w)$$

Reduce ....

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(c) The same set of integers, but with each integer appearing only once.

**Map function take the input**

**Map Function: ( key=input , value= input)**

**Reduce Function:**

**The list of keys is the output**

**Example:**

**Input : integers {2,3,5,4,2,3,7}**

**Map: {(2,2), (3,3), (5,5), (4,4), (3,3), (7,7) (2,2)}**

**Reduce: {(2,2), (2,2), (3,3), (3,3), (4,4), (5,5), (7,7)}**

**Output the list of keys: {2,3,4,5,7} witch are the integers numbers witch no**