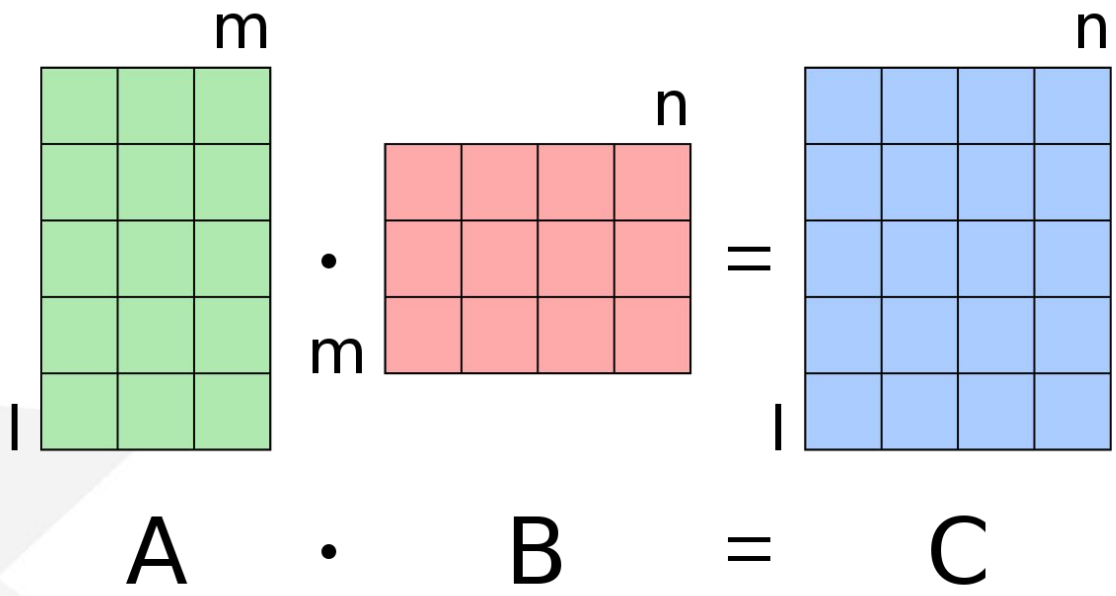
Matrix Multiplication

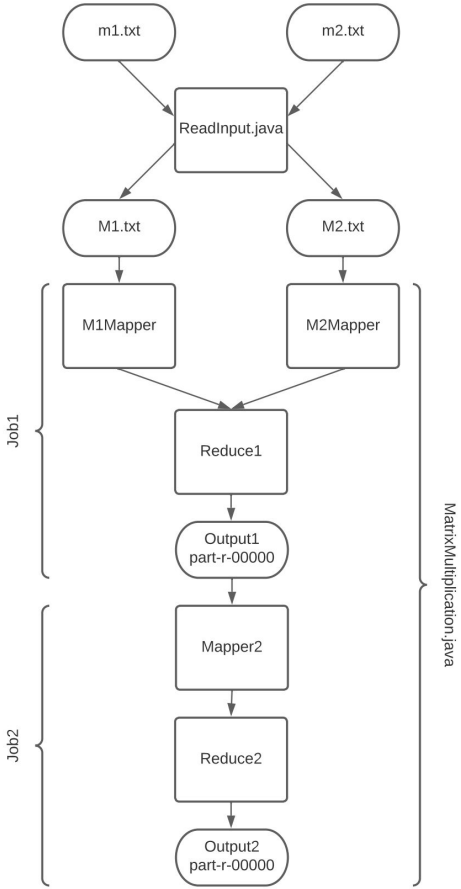
using Hadoop MapReduce

Problem Statement

Calculate the product of two matrices M1 and M2



Overview


m1.txt
m2.txt
ReadInput.java
M1.txt
M2.txt
M1Mapper
M2Mapper
Reduce1
Output1
part-r-00000
Mapper2
Reduce2
Output2
part-r-00000
Job1
Job2
MatrixMultiplication.java

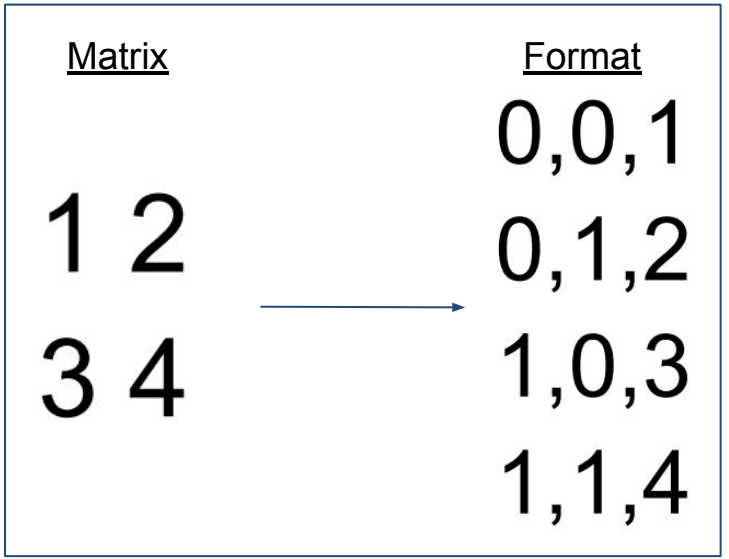
Input

- The two matrices are stored in two different files

- Format of the input file

  i^1 j^1 Matrix[i^1][j^1]
  …
  i^n j^n Matrix[i^n][j^n]

- We generated the matrices in this format using *ReadInput.java*



Mapper1

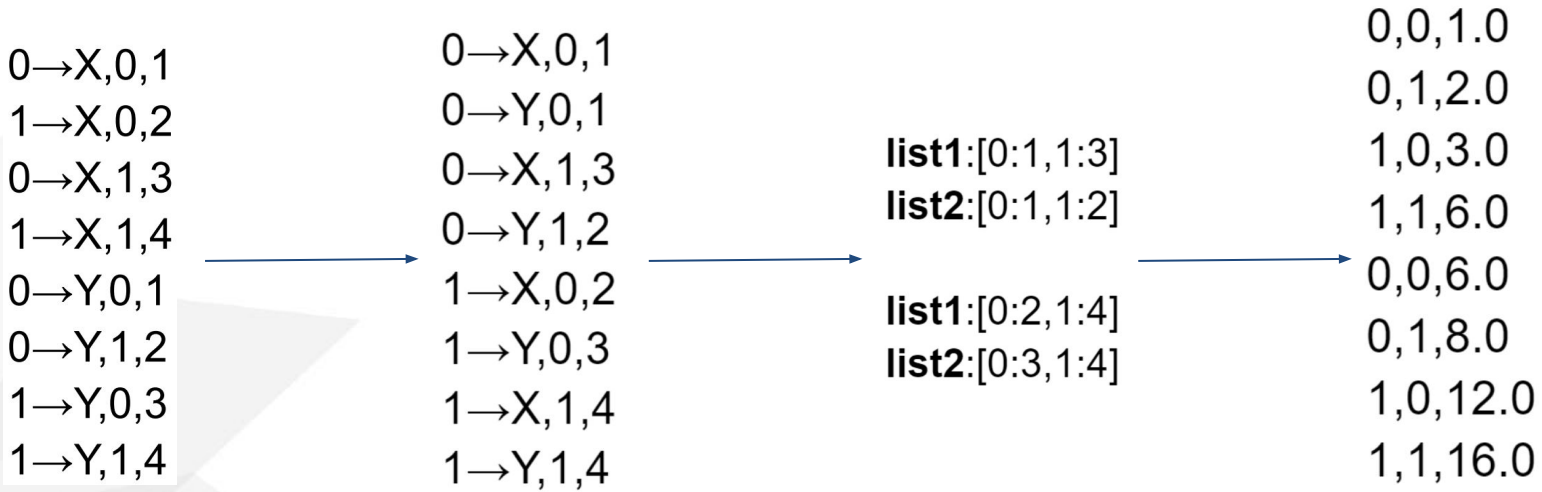
- The input is taken from both M1.txt and M2.txt files, so we used *MultipleInputs* class

- In M1Mapper, the key is j^{th} index, the value is " X, i^{th}, Matrix[i][j]"
  In M2Mapper, the key is i^{th} index, the value is " Y, j^{th}, Matrix[i][j]"

Input	M1Mapper Output	M2Mapper Output
0,0,1	0→X,0,1	0→Y,0,1
0,1,2	1→X,0,2	0→Y,1,2
1,0,3	0→X,1,3	1→Y,0,3
1,1,4	1→X,1,4	1→Y,1,4

Reduce1

- The role of Reduce1 is to multiply the elements of Matrix 1 and Matrix 2 whose Matrix 1's j^{th} index and Matrix 2's i^{th} index are equal.
- Output Format: i^{th} index, j^{th} index, computed_value



Mapper2

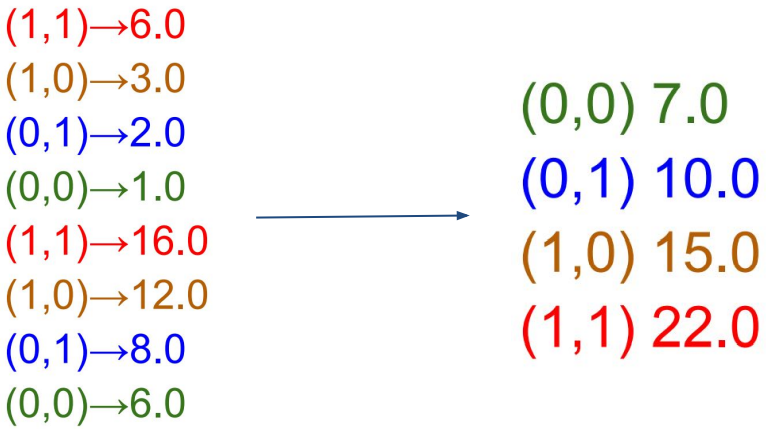
- The input for Mapper2 is the MapReduce1's output

- The key is (i, j) and the value is computed_value

1,1,6.0	(1,1)→6.0
1,0,3.0	(1,0)→3.0
0,1,2.0	(0,1)→2.0
0,0,1.0	(0,0)→1.0
1,1,16.0	(1,1)→16.0
1,0,12.0	(1,0)→12.0
0,1,8.0	(0,1)→8.0
0,0,6.0	(0,0)→6.0

Reduce2

- The role of Reduce2 is to add the elements with same key value.
- Output Format: (i^{th} index, j^{th} index) computed_value



Thank you