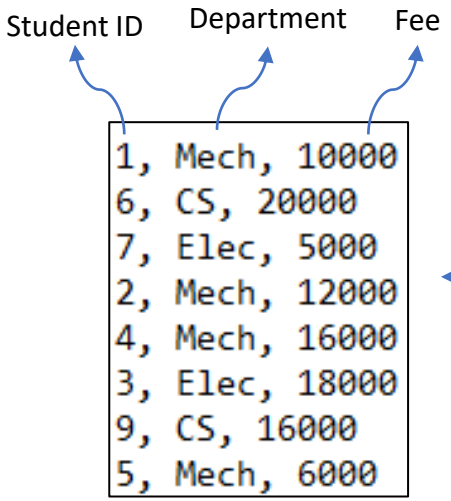
Map-Reduce

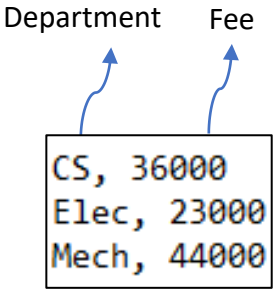
MIE1628 office hours

Objective: find out total fees collected by each department

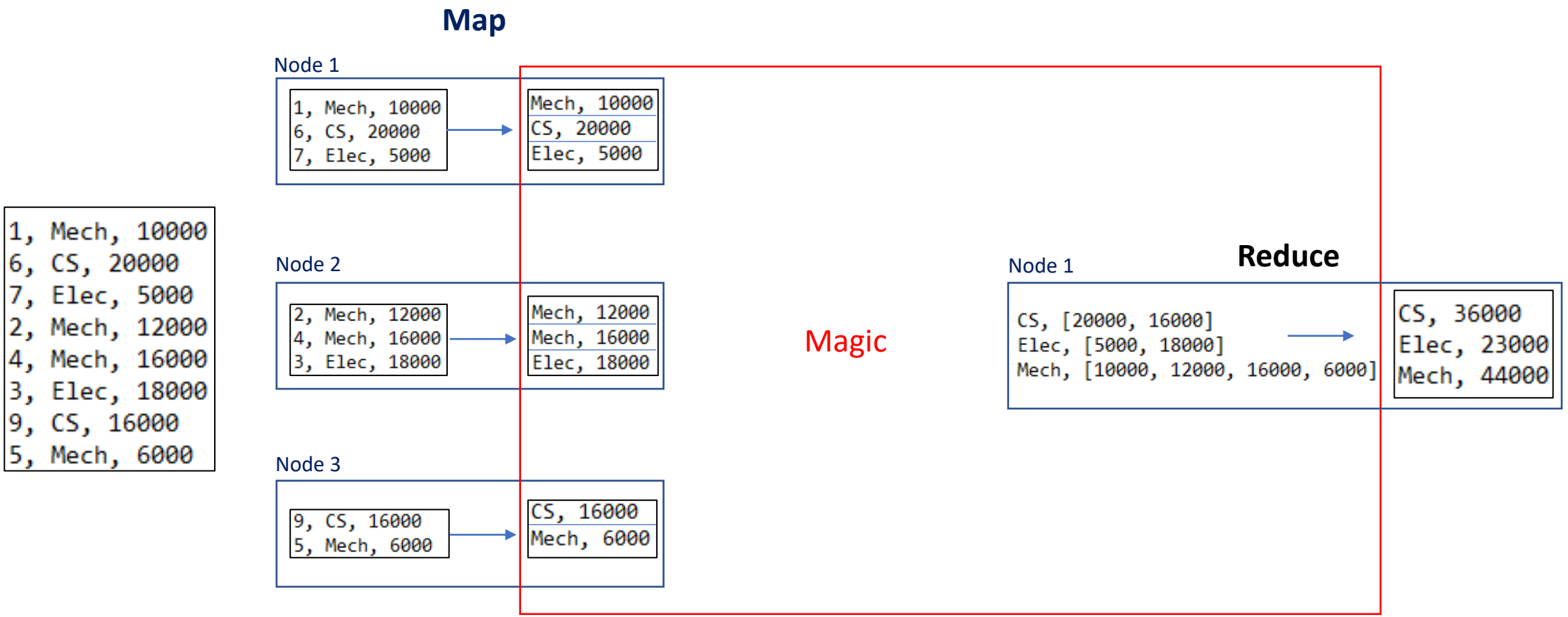


Input

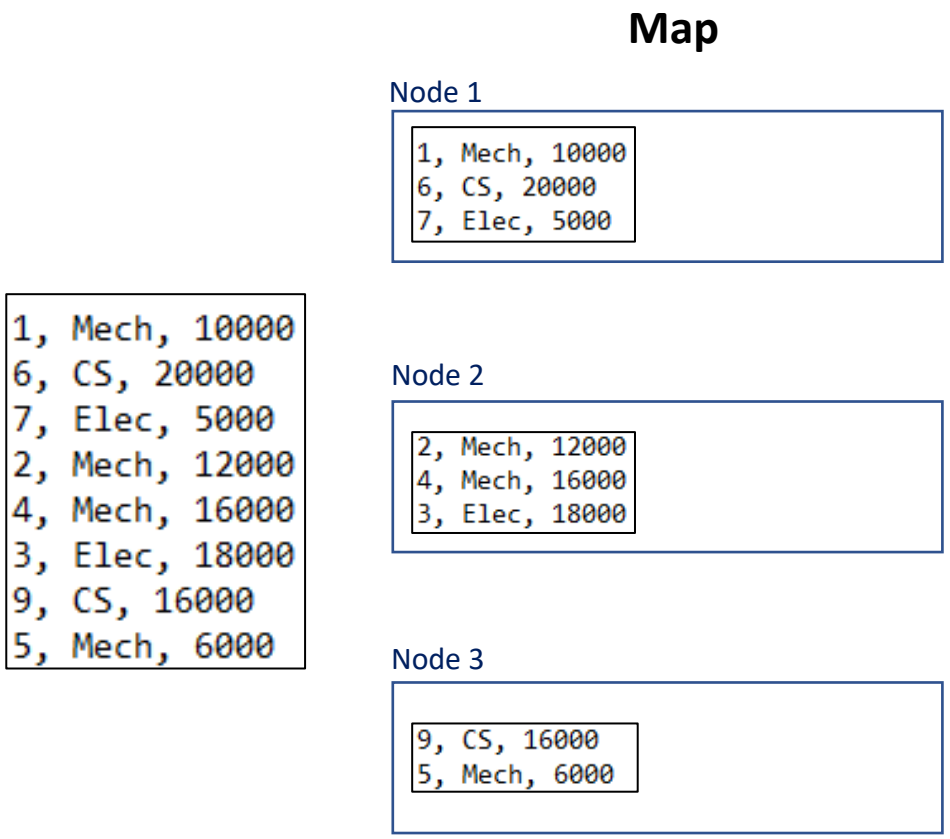
Output

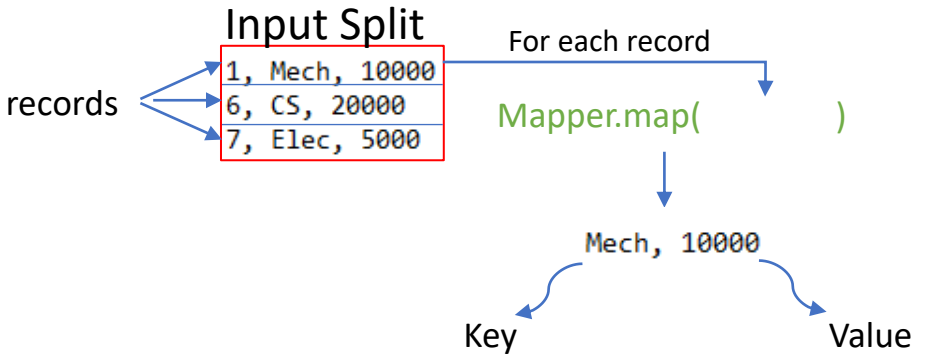


Map-Magic-Reduce



Map





For each input split, a mapper object is created by the Hadoop MR framework using the Mapper class you provide. The map method of that object is called for each record in the split. The map method should output a key-value pair.

Map

```
1, Mech, 10000
6, CS, 20000
7, Elec, 5000
2, Mech, 12000
4, Mech, 16000
3, Elec, 18000
9, CS, 16000
5, Mech, 6000
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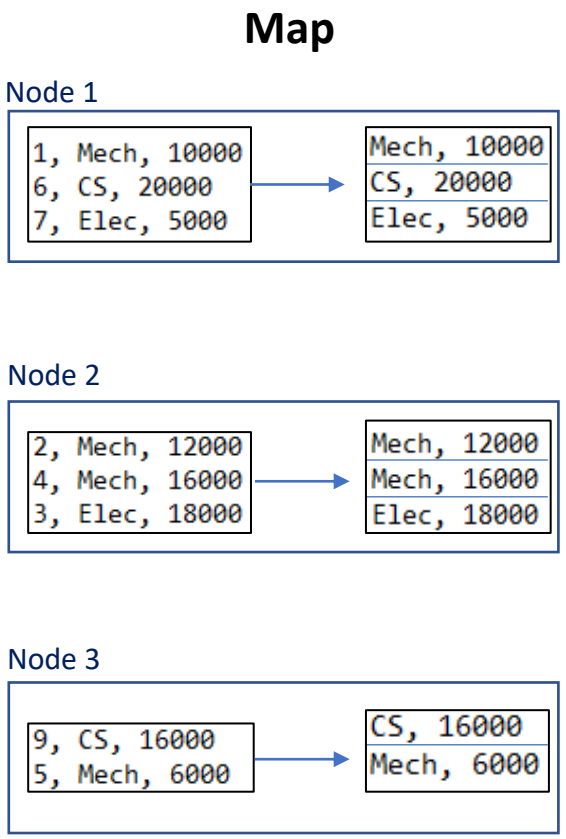


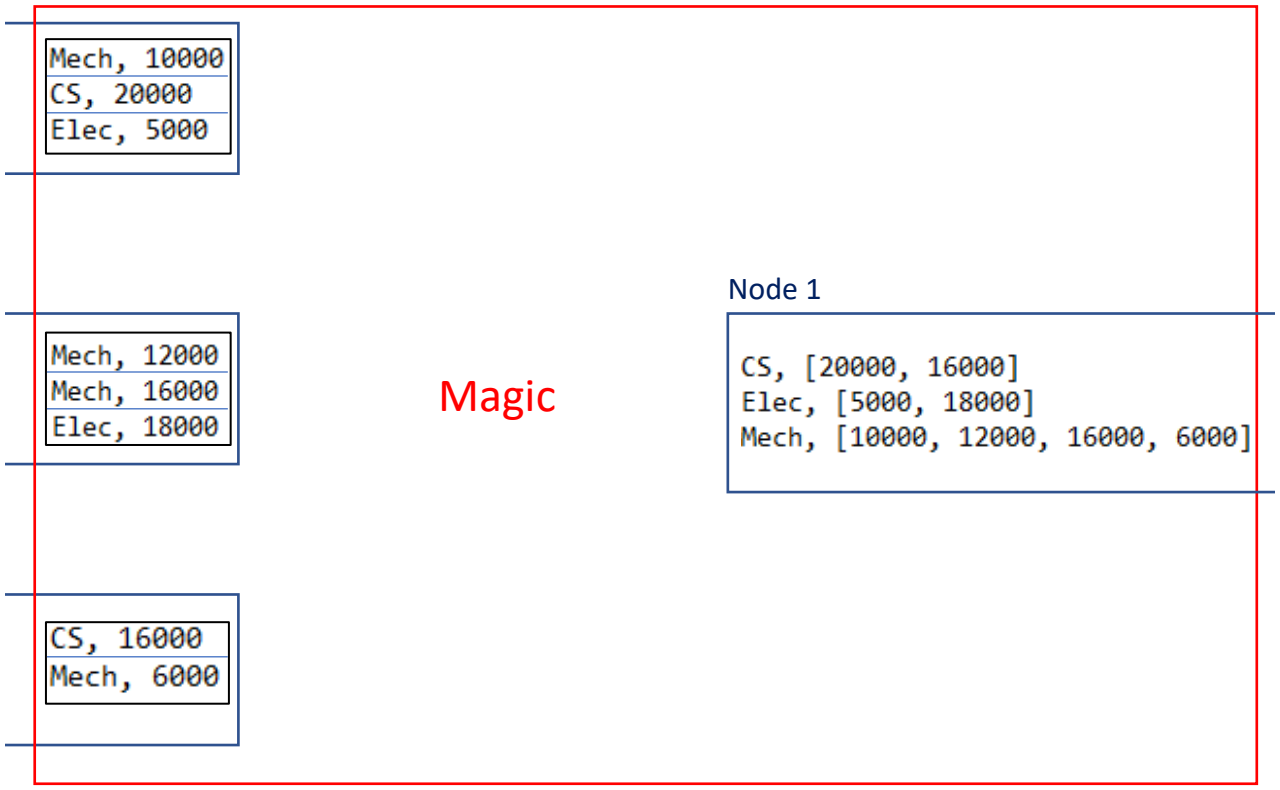
Magic

Between Map and Reduce, the Hadoop MR framework shuffles the output of Map (k-v pairs) across nodes. The pairs with the same key are transmitted to the same node. They are sorted by key and the values corresponding to each key are grouped into a list.

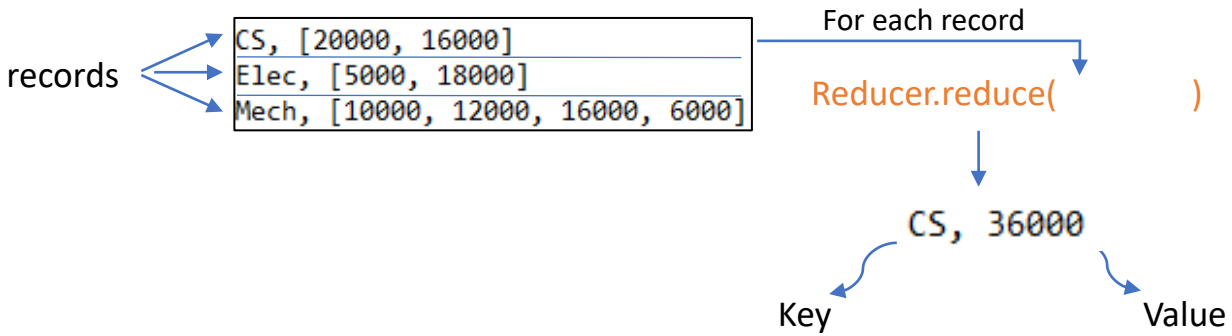
The sorting and grouping is carried out on both Mapper and Reducer sides for efficiency, and the actual process is much complex and opaque. The number of nodes used on the reducer side depends on the number of reducer used.

The programmers do not need to do anything. The framework takes care of everything. **Only note that the reducer's input will be a pair of a key and a list of corresponding values.**

Sometime, the combiner is used on the mapper side before shuffling. It acts like mini reducer, that is, it reduces a list of values into a value for each key. It helps in reducing the amount of data to be transmitted over the network. It also reduces the workload of reducer by performing the same operation.



Reduce



A reducer object is created by the Hadoop MR framework using the Reducer class you provide. The reduce method of that object is called for each record assigned to that reducer node. The reduce method should output a key-value pair.