15-440
Distributed Systems
Recitation 11

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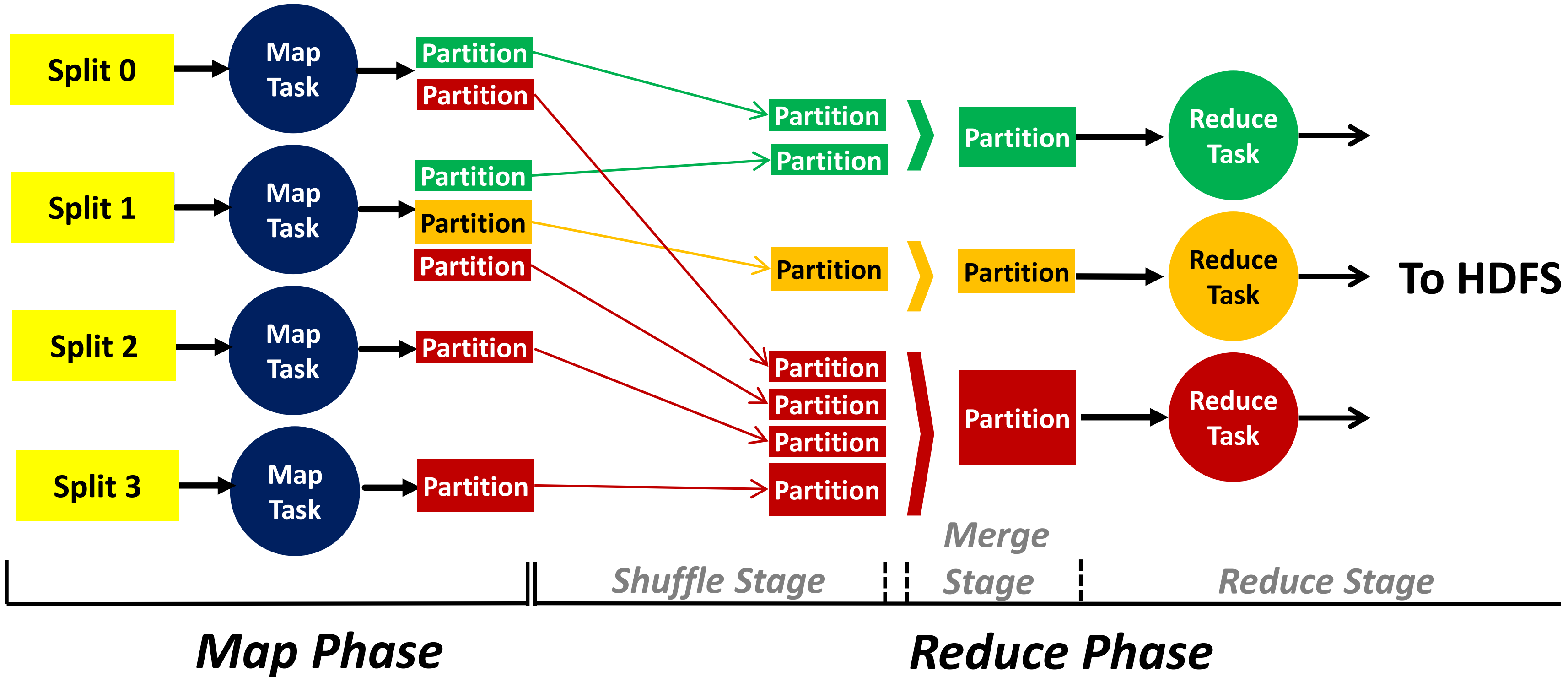
Project 4

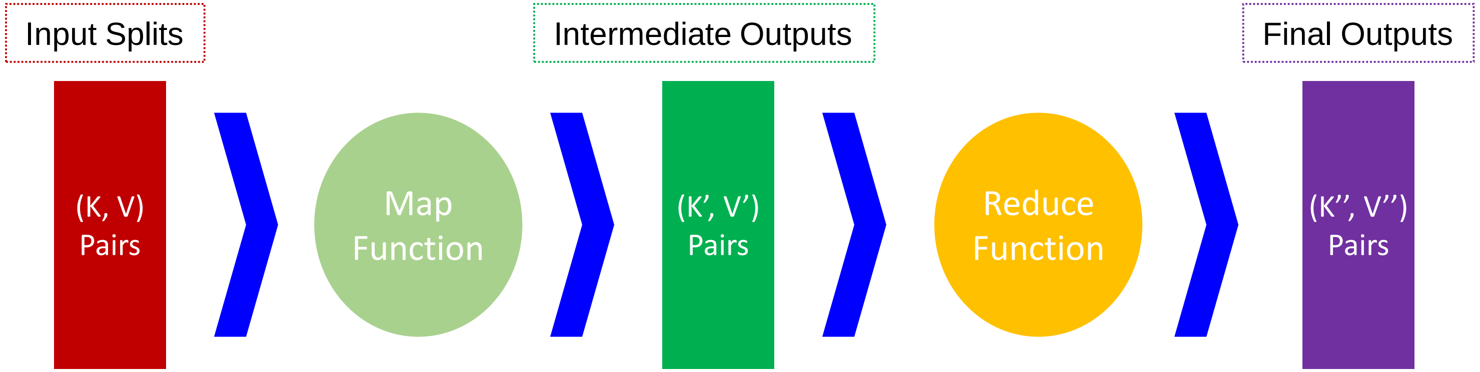
- Apply MapReduce to cluster analysis, using the **K-Means** algorithm
- Project 4 will be released next week! It'll be announced on Piazza, as usual.

MapReduce: A Systems View

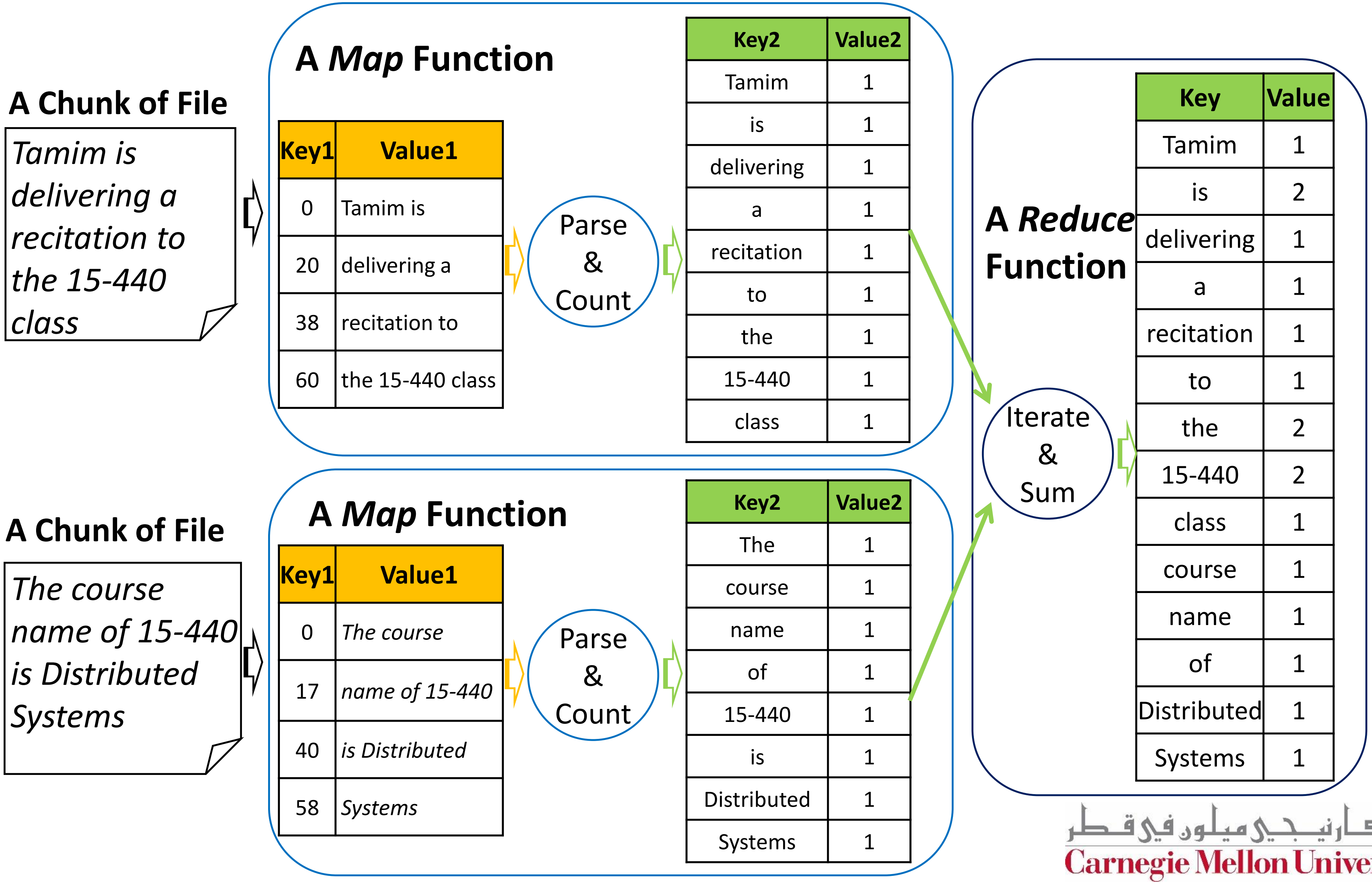


Data Structure: Keys and Values

- In a MapReduce program, the programmer has to specify two functions: the Map function and the Reduce function that implement the *Mapper* and the *Reducer*, respectively
- In MapReduce, data elements are always structured as key-value (i.e., (K, V)) pairs
- Therefore, the Map and Reduce functions *receive* and *emit* (K, V) pairs



MapReduce: An Application View



A Chunk of File

Tamim is delivering a recitation to the 15-440 class

A *Map* Function

Key1	Value1
0	Tamim is
20	delivering a
38	recitation to
60	the 15-440 class

Parse & Count

Key2	Value2
Tamim	1
is	1
delivering	1
a	1
recitation	1
to	1
the	1
15-440	1
class	1

A Chunk of File

The course name of 15-440 is Distributed Systems

A *Map* Function

Key1	Value1
0	*The course*
17	*name of 15-440*
40	*is Distributed*
58	*Systems*

Parse & Count

Key2	Value2
The	1
course	1
name	1
of	1
15-440	1
is	1
Distributed	1
Systems	1

A *Reduce* Function

Iterate & Sum

Key	Value
Tamim	1
is	2
delivering	1
a	1
recitation	1
to	1
the	2
15-440	2
class	1
course	1
name	1
of	1
Distributed	1
Systems	1