# CLOUD COMPUTING APPLICATIONS

## Motivation for Spark

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# Motivation

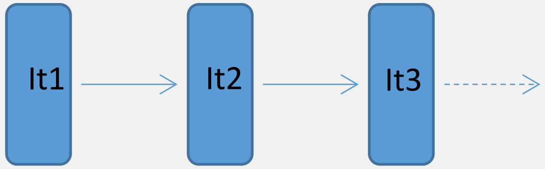
- Iterative algorithms and interactive data exploration are commonly used in many domains
- Traditional MapReduce and classical parallel runtimes cannot solve iterative algorithms efficiently
  - Hadoop: Repeated data access to HDFS, no optimization to data caching and data transfers
  - MPI: no natural support of fault tolerance and programming interface is complicated

# Retrofitting Iterations on MR

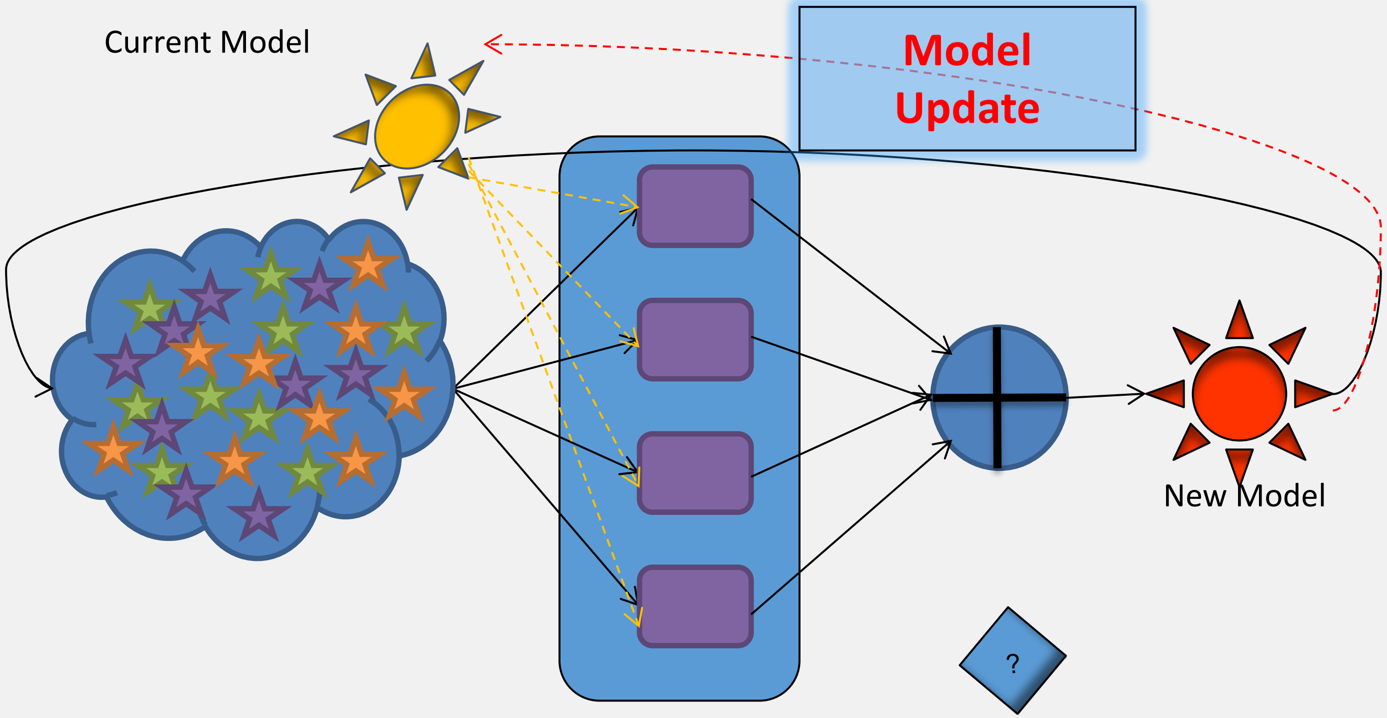
- MR does not support iteration out of the box
- But we still want Page Rank, clustering etc.
    - Mahout
    - Nutch
- The “obvious” solution: Split iteration into multiple MapReduce jobs. Write a driver program for orchestration.

# A MapReduce Implementation of I.C.

```
Iterate {
  Map: for (each) i = 1 to M
    Compute();
  Reduce();
} Until converged();
```



- Repeated reads of constant (input) data in each iteration
- Run-time overheads in each iteration
- Intermediate Communication resulting from model updates
- Model Update Traffic
- Granularity of parallelism limited by iteration


Current Model
Model Update
New Model
?