In the light of the end of the Moore’s Law and Dennard scaling eras, which affect the evolution of CPUs and RAM capacity, existing Big Data solutions do not scale sustainably. Today’s distributed analytics frameworks optimize mainly for coding simplicity and make liberal use of cluster resources, as they were initially designed under the assumption that the main bottlenecks in distributed computing come from the network and storage. On the other hand, not only do dataset sizes grow exponentially, data processing algorithms also become too sophisticated to run efficiently in distributed infrastructures. Moreover, deployments at scale require the use of expensive infrastructures to run for days.

My work copes with all those challenges as follows: 1) We enable Apache Spark to become more memory efficient for iterative analytics workloads by trading RAM for Disk at no significant CPU overhead. 2) In the case of sophisticated data processing algorithms, we show how a more careful partitioning improves the scalability of large scale collaborative filtering. 3) And in the case of infrastructure costs, we enable the Kubernetes scheduler to automatically allocate resources to applications.

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