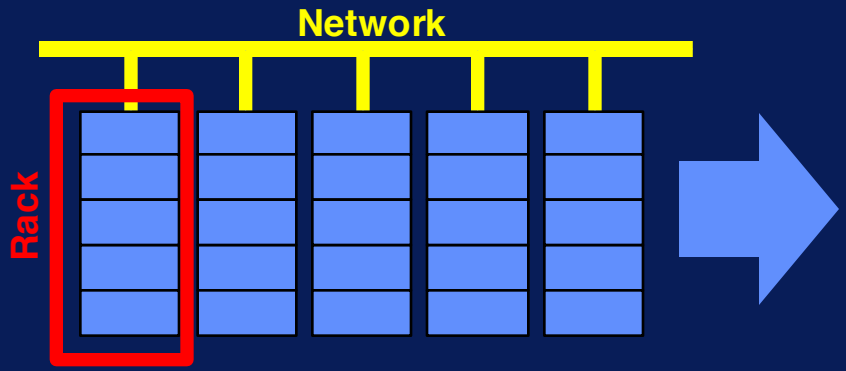
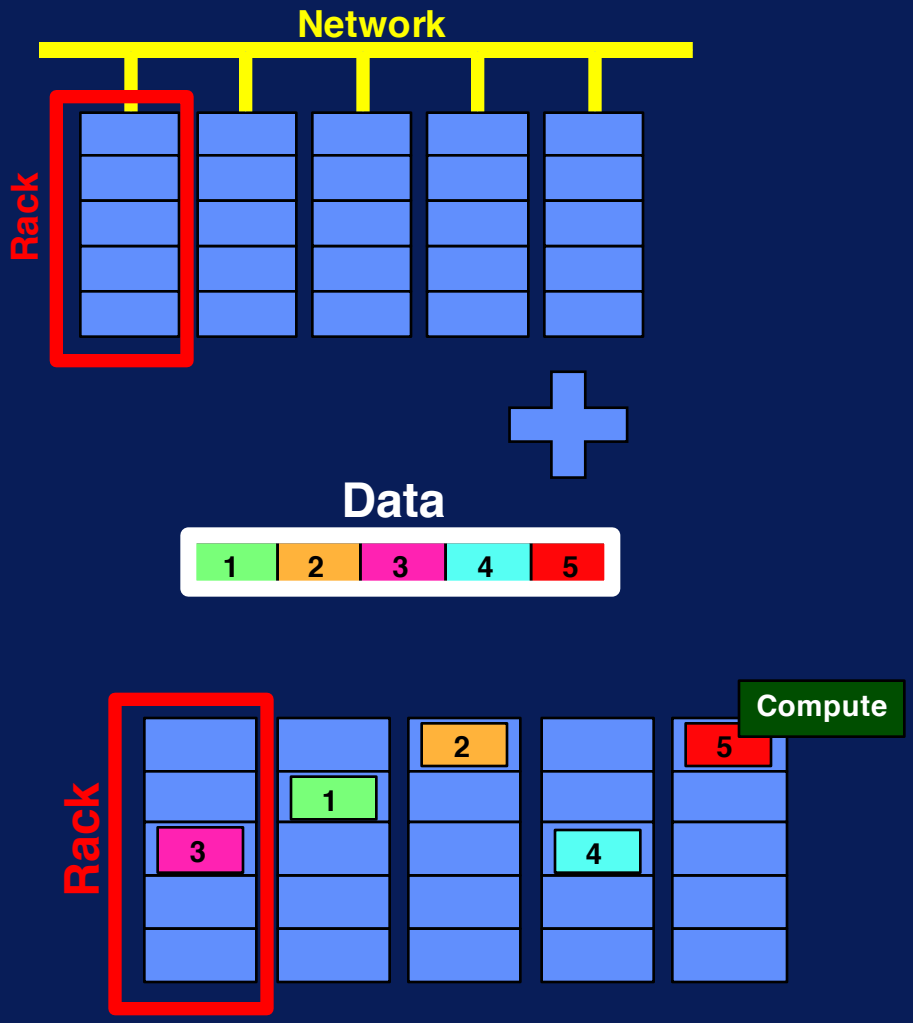
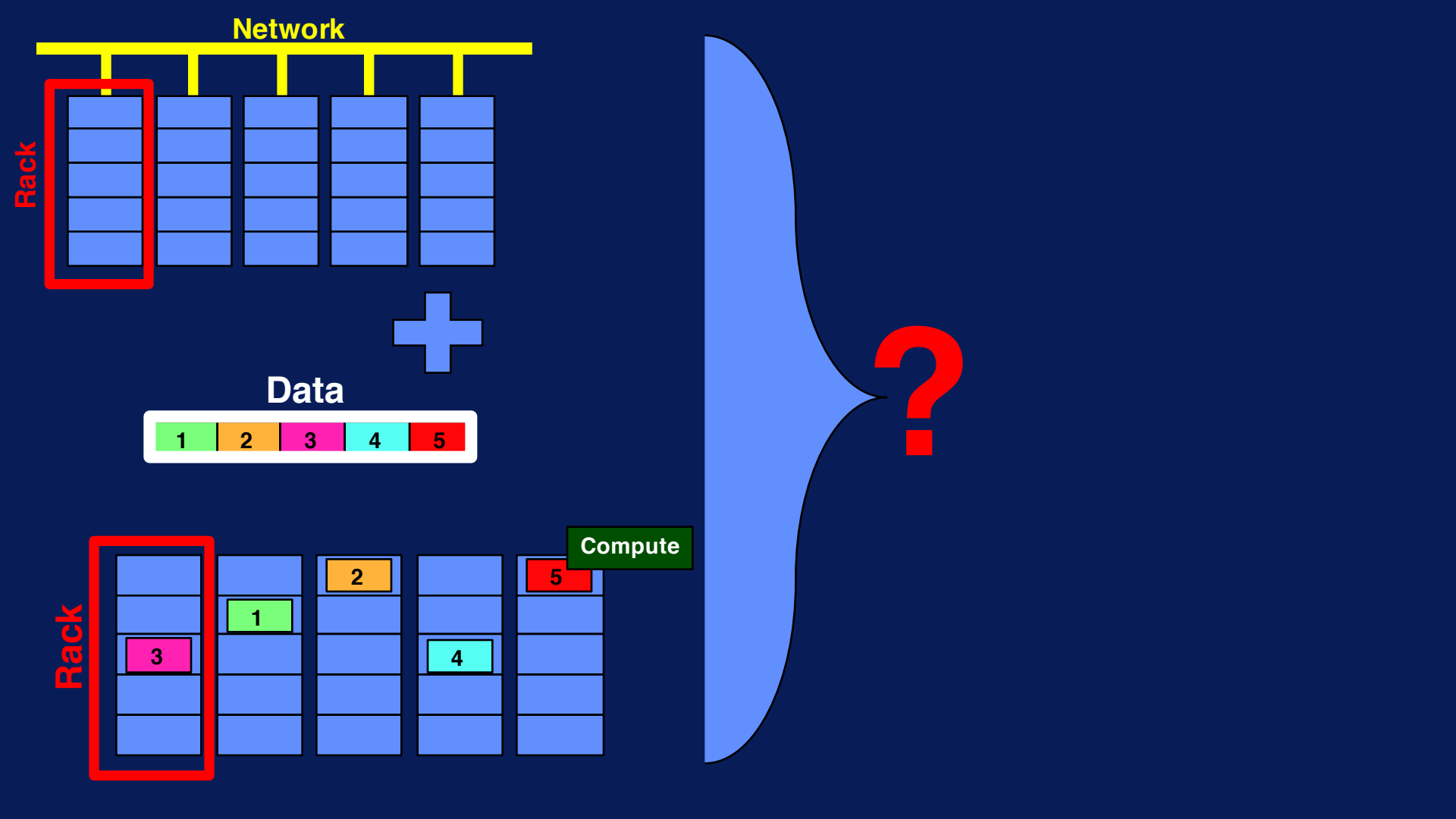
Programming Models for Big Data



Data-parallel scalability


Network
Rack
Data
1
2
3
4
5
Rack
3
1
2
4
5
Compute


Network
Rack
Data
1
2
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Rack
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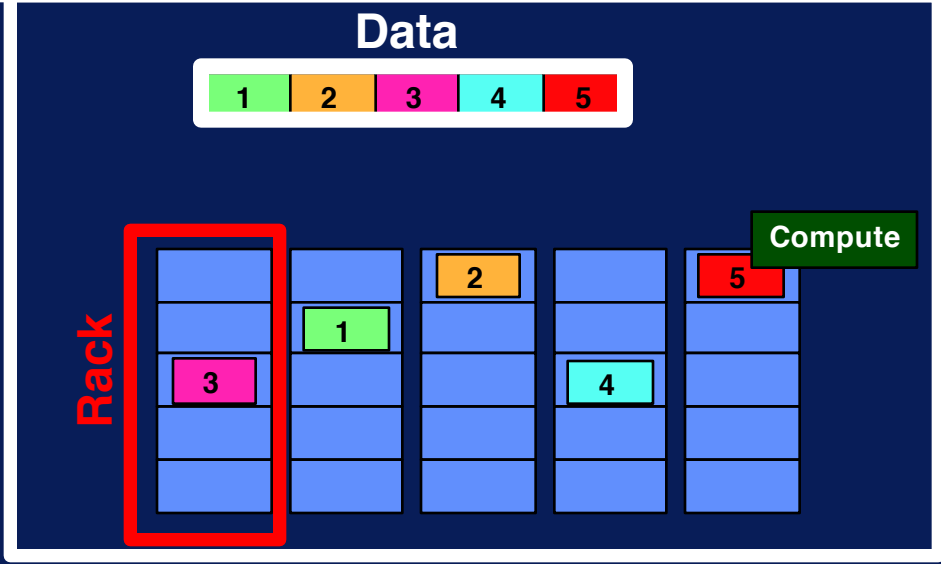
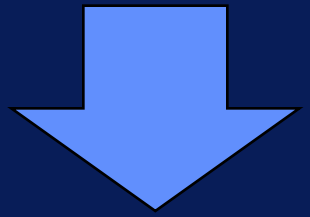
1
2
4
5
Compute
?

Programming Model = abstractions

Runtime Libraries + Programming Languages



Programming Model for Big Data



Programmability
on top of
Distributed File Systems

Requirements for Big Data Programming Models

1. Support Big Data Operations

Split volumes of data

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Split volumes of data

Access data fast

1. Support Big Data Operations

Split volumes of data

Access data fast

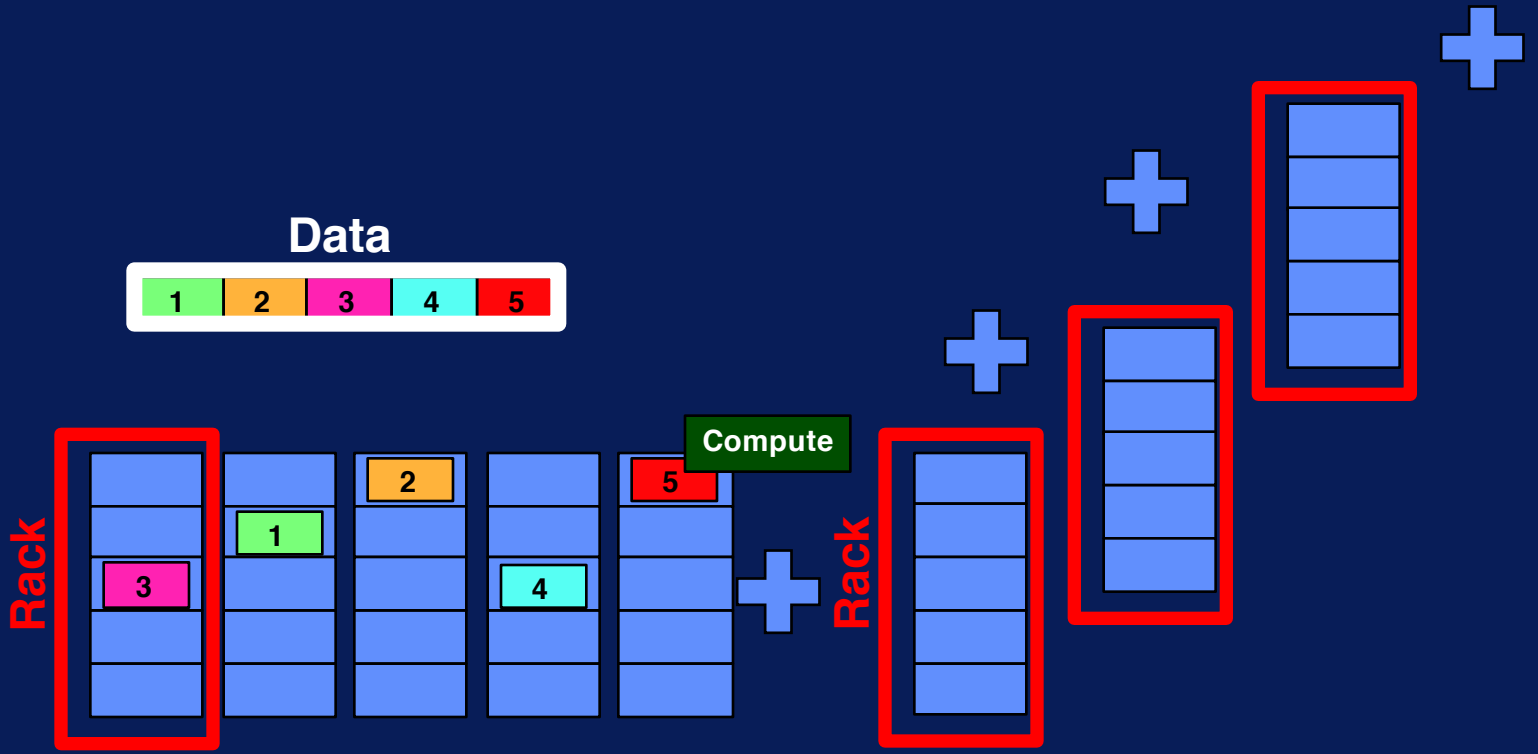
Distribute computations to nodes

2. Handle Fault Tolerance

Replicate data partitions

Recover files when needed

3. Enable Adding More Racks



4. Optimized for specific data types

Document

Table

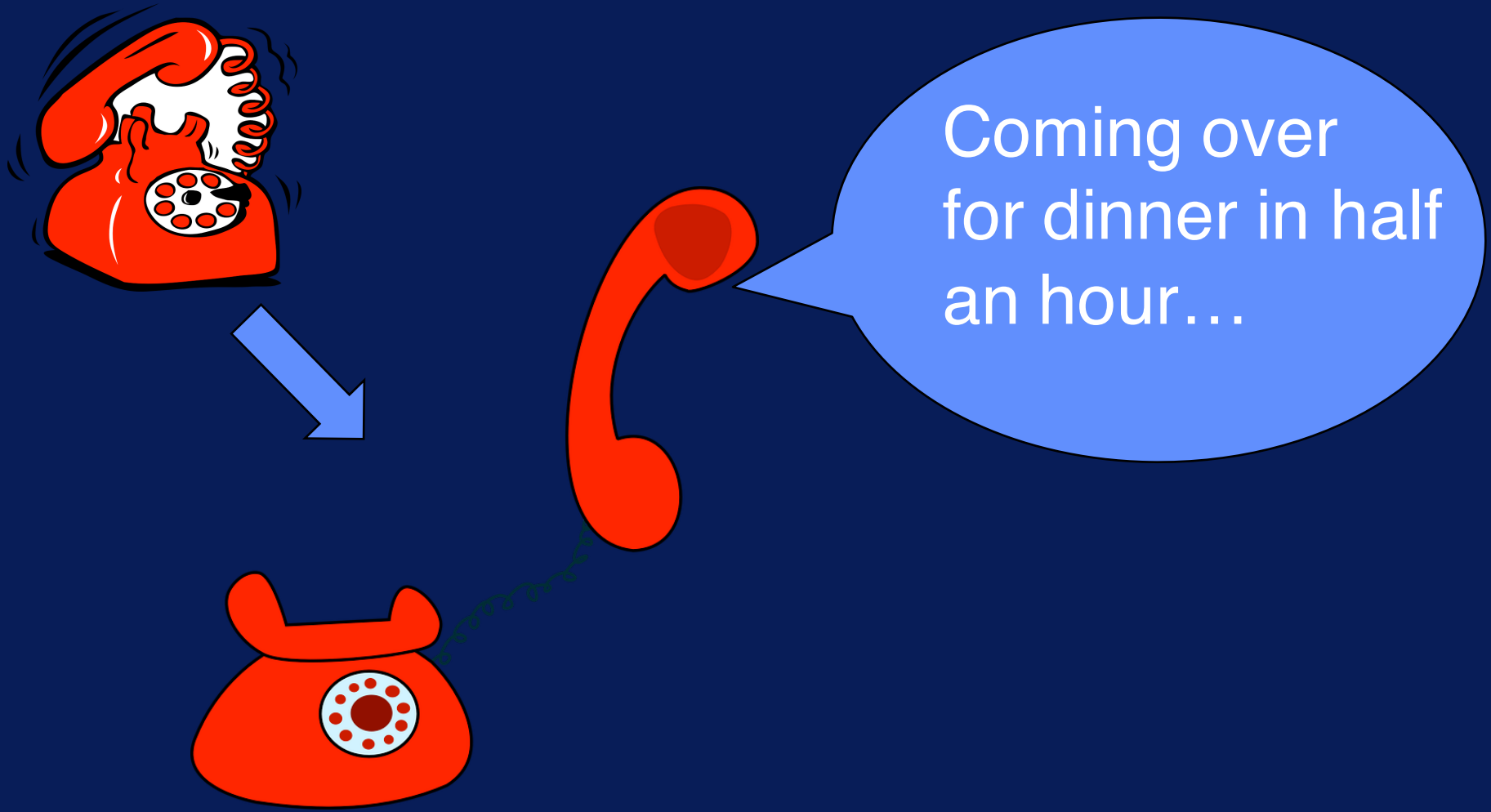
Graph

Key-value

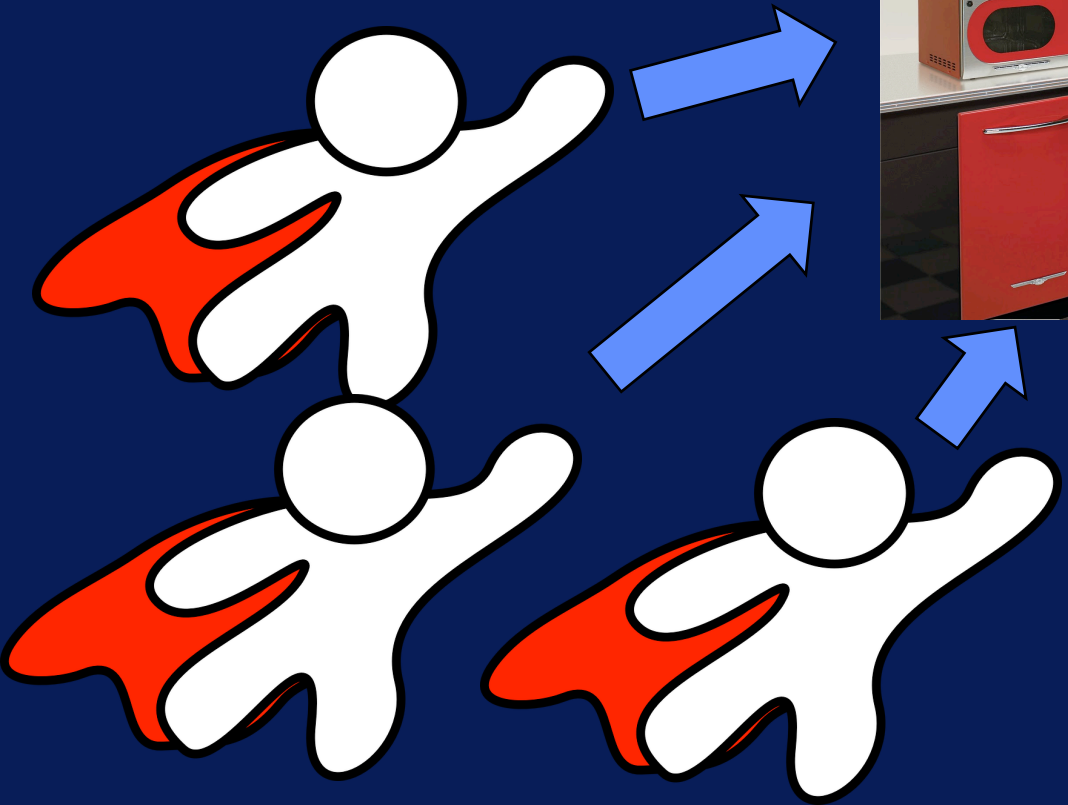
Stream

Multimedia

Natural model for independent parallel tasks over multiple resources!


Coming over for dinner in half an hour…

Helpers!



MapReduce

A programming model for Big Data

Many implementations

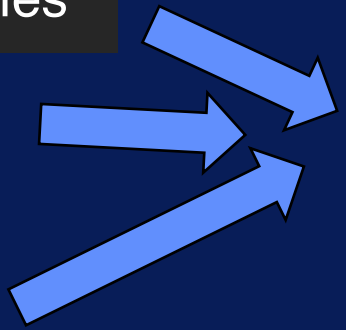
Programming Model = abstractions

Runtime Libraries + Programming Languages

Support large data volumes

Provide fault tolerance

Enable scale out



MapReduce