



CloudTech

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Introducing Microsoft Azure Big Data Platform

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Agenda:

Big Data overview

Azure HDInsight

Demo

Hands-on Lab

Big Data overview

What is Big Data?

➔ Many definitions:

- ➔ Big data is high **volume**, high **velocity**, and/or high **variety** information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization Gartner 2012
- ➔
- ➔ Big Data happens when the data you have to process is bigger than what you can process in the given time with current technologies Silicon Angle

➔ Big Data is often described using 3/4/5 V

Volume

⇒ Refer to the large amount of data to be stored and analyzed

⇒ Traditional storage have upper memory limits



Velocity

- ➔ Refer to the speed at which new data are generated shared
- ➔ It needs technologies to analyze data in near real time or real time



Variety

➔ Refer to the different types of data we can process

Structured

CUSTOMER		
NAME	DATATYPE	NULLABLE?
CUSTOMER_ID	VARCHAR	NO
FIRST_NAME	VARCHAR	NO
LAST_NAME	VARCHAR	NO
BIRTH_DAY	TIMESTAMP	NO
ADDRESS	VARCHAR	NO
ADDRESS2	VARCHAR	YES
STATE	VARCHAR	NO
ZIP_CODE	INTEGER	NO

PRODUCT		
NAME	DATATYPE	NULLABLE?
PRODUCT_ID	VARCHAR	NO
CATEGORY	VARCHAR	NO
LIST_PRICE	DECIMAL	NO

Semi-structured

```
1 {"menu": {
2   "id": "file",
3   "value": "File",
4   "popup": {
5     "menuitem": [
6       {"value": "New", "onclick": "CreateNewDoc()"},
7       {"value": "Open", "onclick": "OpenDoc()"},
8       {"value": "Close", "onclick": "CloseDoc()"}
9     ]
10  }
11 }}
12 0123456789
```

Unstructured



... and

[Veracity]: refer to the **quality** of the data

[Value]: refer to the **business** decisions that can be taken at the end of big data processing

Data sources

- Conversations
- Social Media
- Application logs
- Photos
- Videos
- Text
- ...

Value

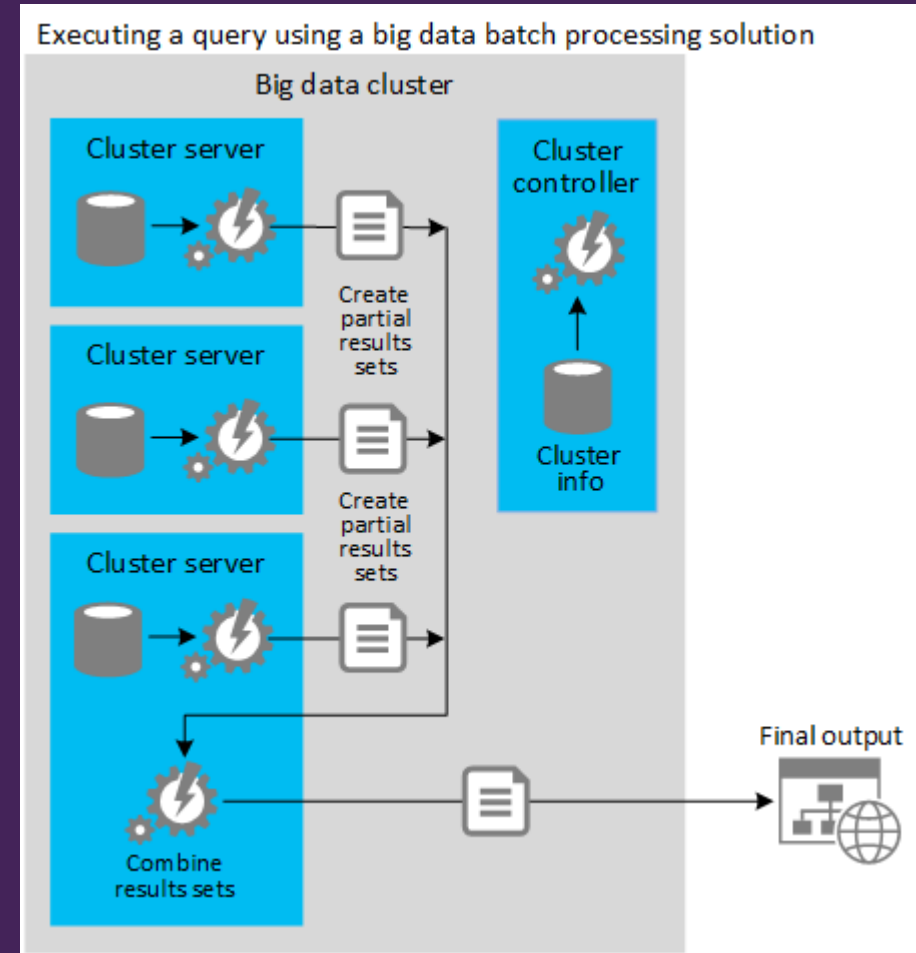
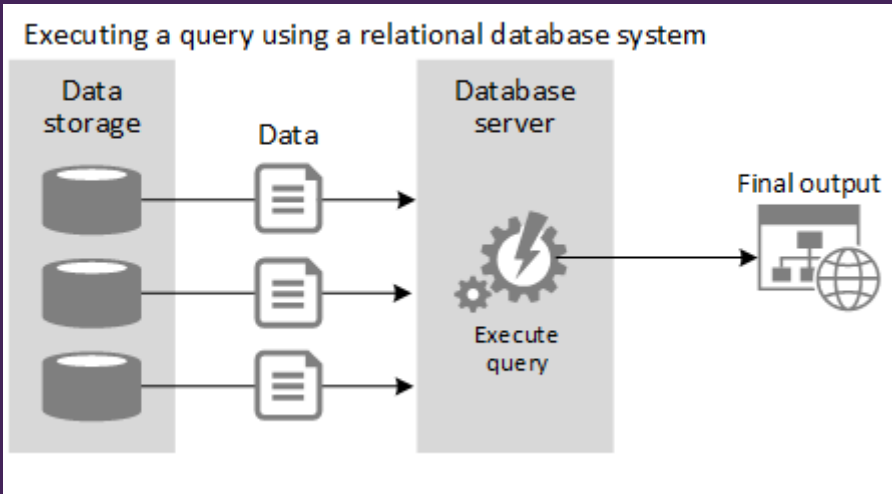
- ➞ Understand and target customers analyzing web search trends
- ➞ Disaster management analyzing social media
- ➞ Improve security analyzing conversation
- ➞ Internet of things: store and analyze data coming from a sensor network
- ➞ ...

Azure HDInsight

How do big data solutions work?

- ➞ Big data batch breaks up source data files into multiple blocks and replicates the blocks on a distributed cluster of nodes (servers). Data processing runs in parallel on each node, and the parallel processes are then combined into an aggregated result set.

RDBMS Query vs Big Data Processing



Hadoop

At the core of many big data implementations is an open source framework named Apache Hadoop

→ Core modules

- **HDFS**

- **MapReduce**: framework to compute distributed processing

- Common utilities

- **YARN**: job scheduler and cluster manager

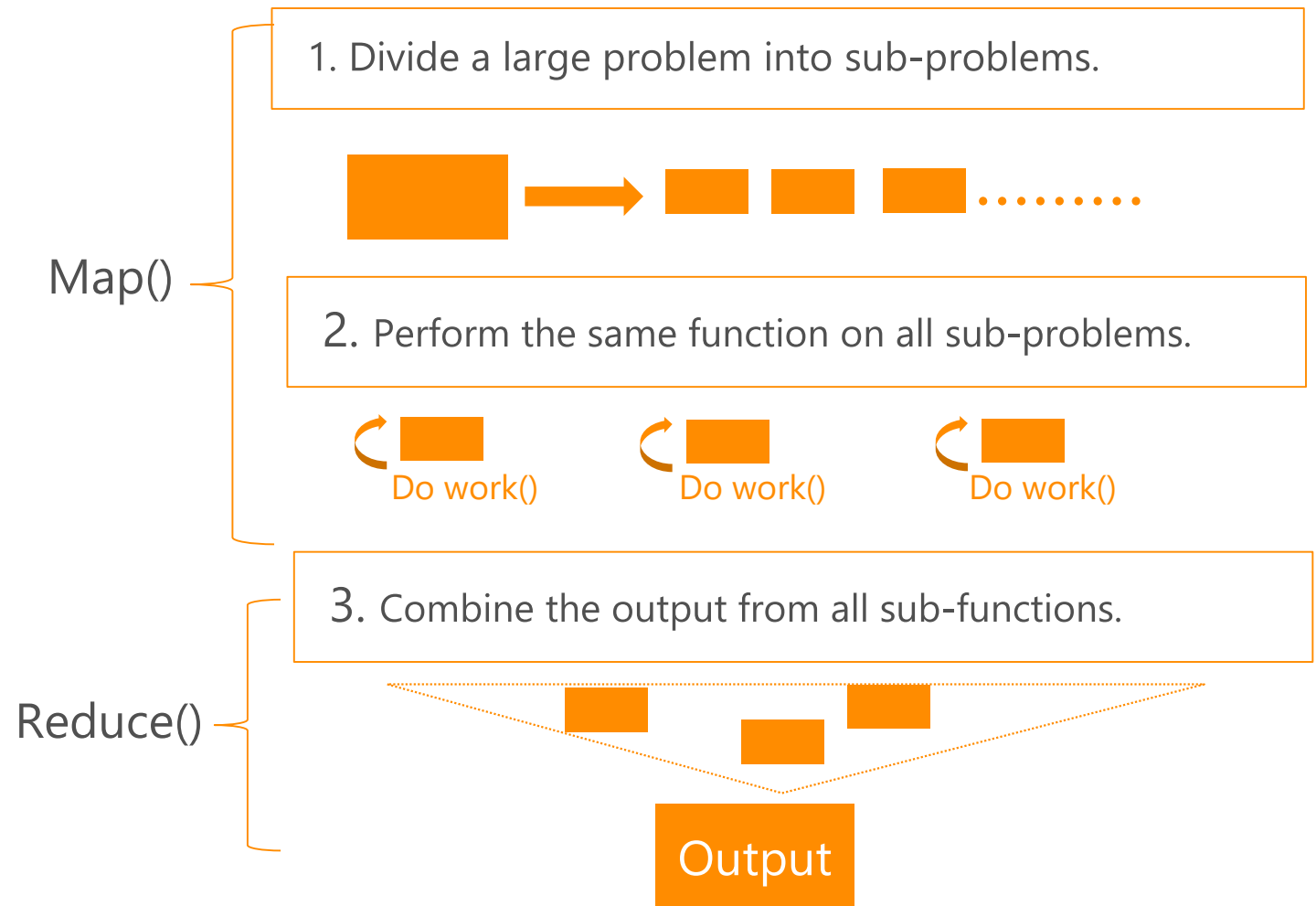
Hadoop

➞ Other modules

- ➞ **Ambari**: A web-based tool for provisioning, managing, and monitoring Apache Hadoop clusters
- ➞ **HBase**: NoSQL column family database for large tables
- ➞ **Hive**: A data warehouse infrastructure that provides data summarization and ad hoc querying
- ➞ **Mahout**: A scalable machine learning and data mining library
- ➞ **Pig**: A high-level data-flow language and execution framework for parallel computation
- ➞ **Spark**: A fast, general-use compute engine with a simple and expressive programming model
- ➞ **ZooKeeper**: A high-performance coordination service for distributed applications

Hadoop MapReduce

- Programming framework (library and runtime) for analyzing datasets stored in HDFS
- Composed of user-supplied Map and Reduce functions:
 - Map() - subdivide and conquer
 - Reduce() - combine and reduce cardinality

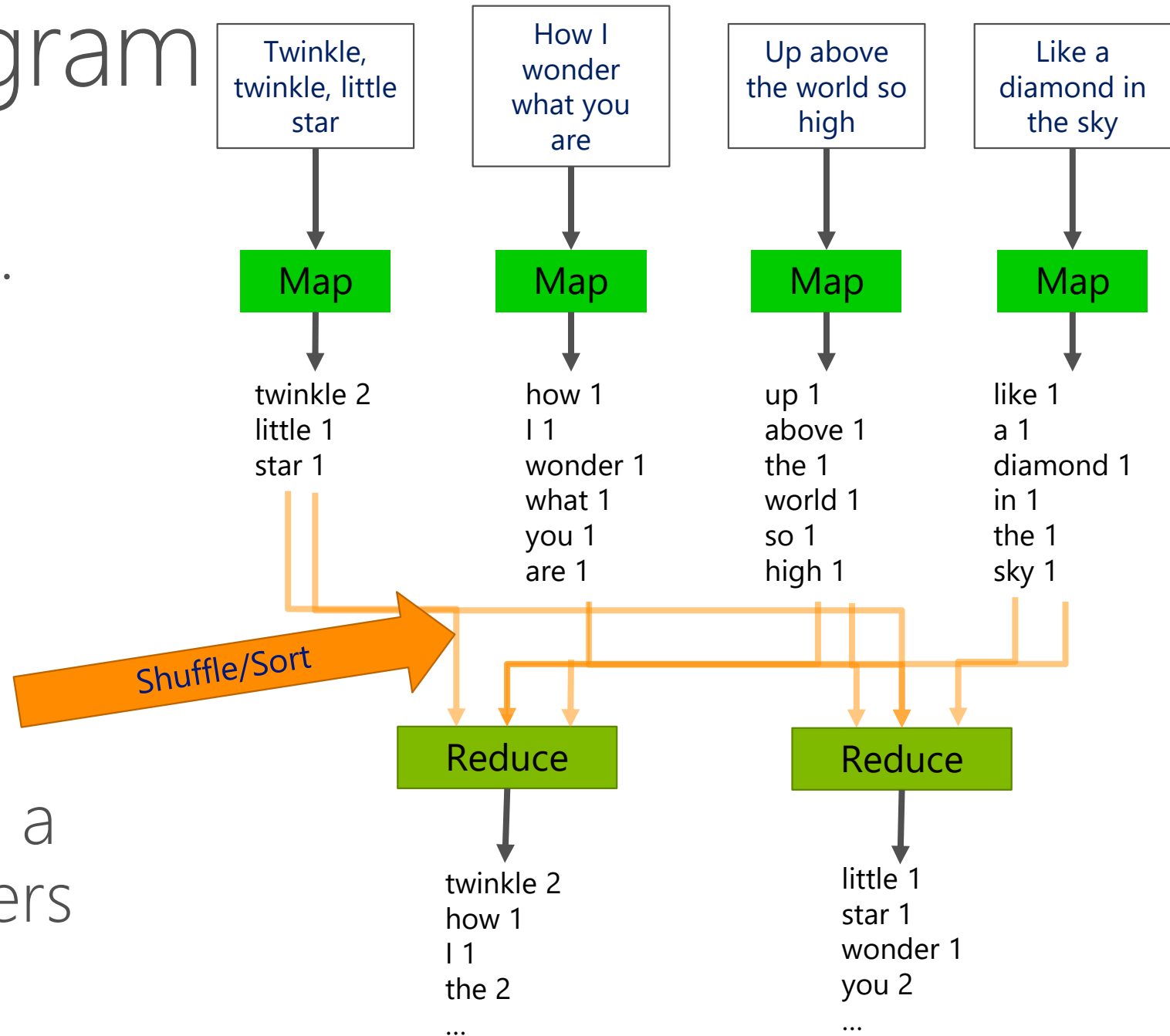


MapReduce program

Programs = Sequence of
"map" and "reduce" tasks.

Process large volumes of
data in parallel

Divides the work into
independent tasks across a
large number of computers



Demo: Wordcount

Hadoop on Azure = HDInsight

Windows or Linux clusters

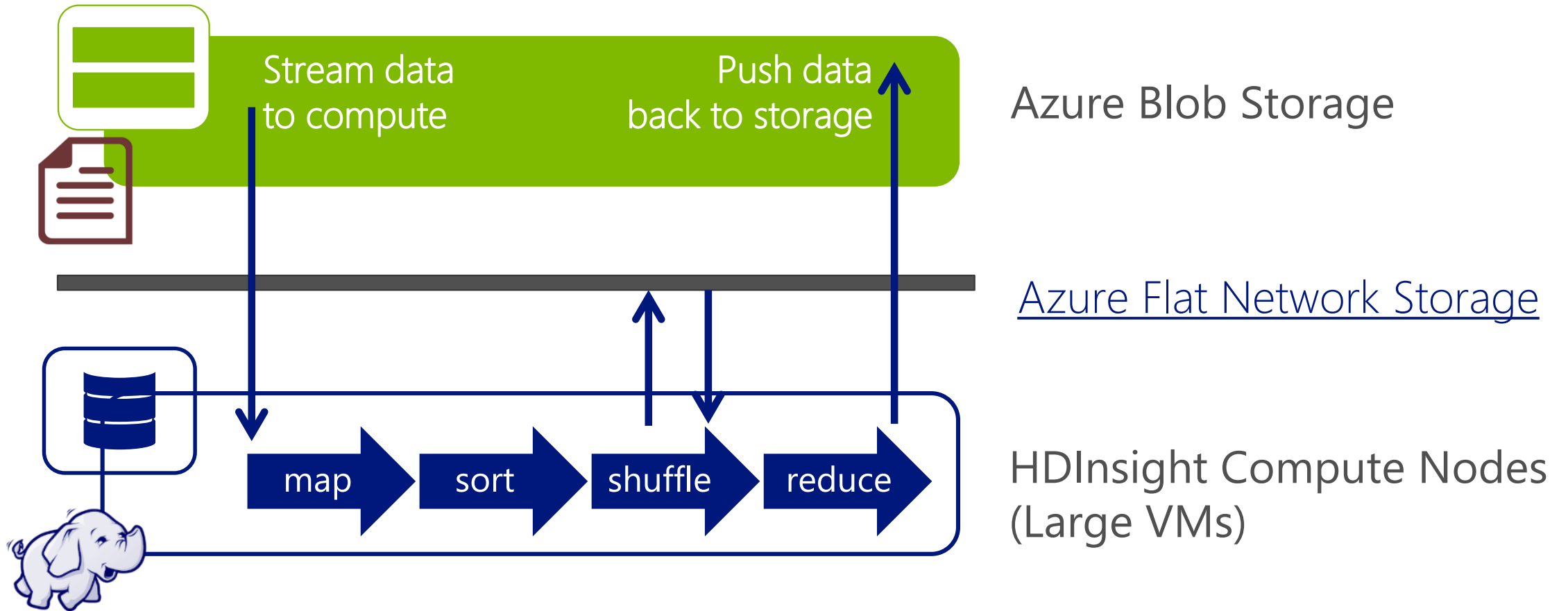
Supports customization through RDP/SSH and/or
Script Action

Install Spark, R, Kafka, Solr, Giraffe

Separate Compute from Storage

Azure Blob Storage in lieu of traditional HDFS

HDInsight Storage Infrastructure



Refining Data in Hadoop



Data Preparation with Hive & Pig

Create structure over files

Process and refine data with SQL syntax

Generates/runs MapReduce

"Data Warehouse" focused



Process & shape data

Scripting language for ETL/ELT

Generates/runs MapReduce



Apache Hive

Project structure onto data

Schema on Read



Query data using a SQL-like language called HiveQL

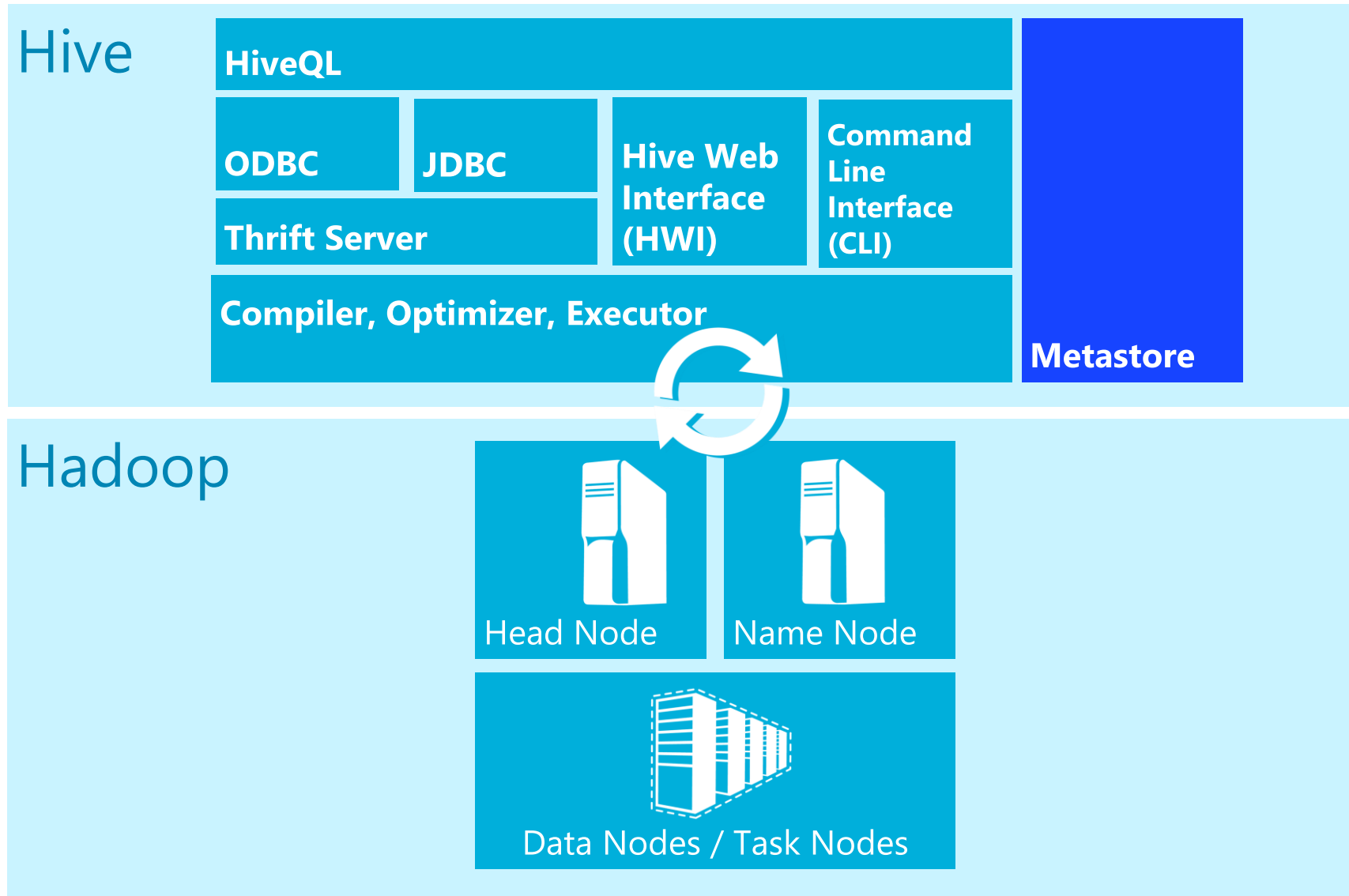
SQL-Like Interface

No Java Needed!

Ad-hoc queries via HiveQL
(translate into MapReduce)

Connect to Microsoft BI and Excel via Hive ODBC

Hive Architecture



Hive

SELECT

```
get_json_object(json_text, '$.sid') as sid,  
get_json_object(json_text, '$.inc') as inc,  
get_json_object(json_text, '$.status') as status,  
event
```

FROM bi.event_log

WHERE project='mobile-ios'

```
AND dt=20120530
```

```
AND get_json_object(json_text, '$.v') <> '1.5'
```

```
AND (event = 'api_error' OR event = 'api_timeout')
```

ORDER BY sid;



HDFS

Data Preparation with Hive

External and Internal Tables

```
CREATE EXTERNAL TABLE flights(...column definitions...)
  fields terminated by ','
  lines terminated by '\n'
  stored as textfile
  location 'wasb://cluster.blob.core.windows.net/flights_raw';
```



- Use EXTERNAL when

- Data used outside Hive
- You need data to be updatable in real time
- Data needed when you drop the cluster or the table
- Hive should not own data and control settings, dirs, etc.

- Use INTERNAL when

- You want Hive to manage the data and storage
- Short term usage
- Creating table based on existing table (AS SELECT)

Apache Pig

Apache Pig is a simple-to-understand data flow language used in the analysis of large data sets.

Load: Read data to be manipulated from the file system

Transform: Manipulate the data

Dump or store: Output data to the screen or store for processing

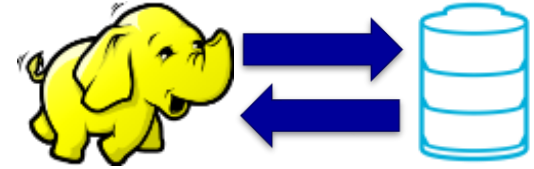


Scripting – No Java Needed!

Pig scripts are automatically converted into MapReduce jobs

Pig's language layer consists of a textual language called Pig Latin and a command shell Grunt

Sqoop



Data connector system for Hadoop and RDBMS

Importing RDBMS data to files (delimited or sequence) in HDFS, or tables in Hive

Importing RDBMS query results to files (delimited or sequence) in HDFS, or tables in Hive

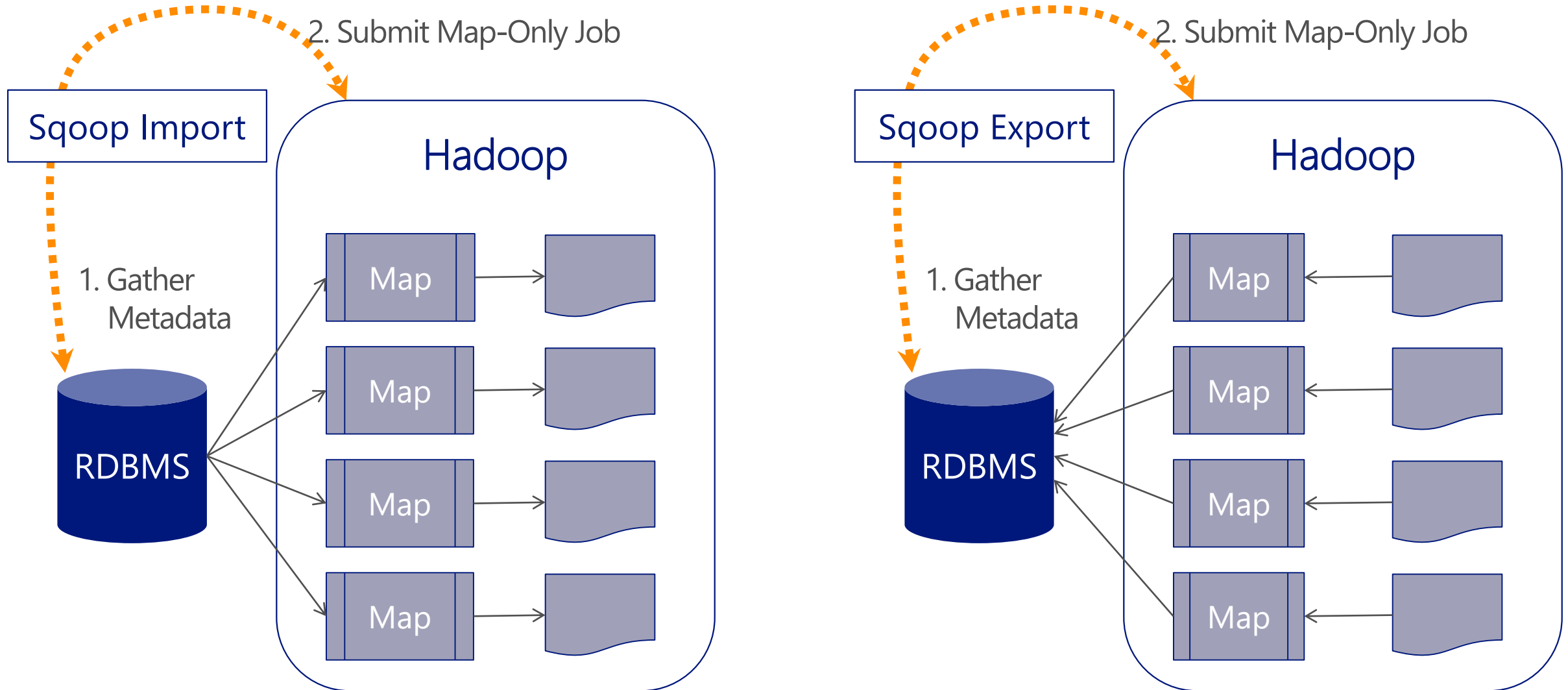
Exporting files and Hive tables to RDBMS tables

Executes MapReduce jobs to transfer data in parallel with fault tolerance

Download: Microsoft SQL Server Connector for Apache Hadoop from

<http://www.microsoft.com/en-us/download/details.aspx?id=27584>

Sqoop Import/Export



https://blogs.apache.org/sqoop/entry/apache_sqoop_overview

Online resources

➔ Lots of stuff: <https://github.com/Azure-Readiness>

➔ Free online training at Microsoft Virtual Academy

microsoftvirtualacademy.com

Demo: Hive

Hands-On Lab

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