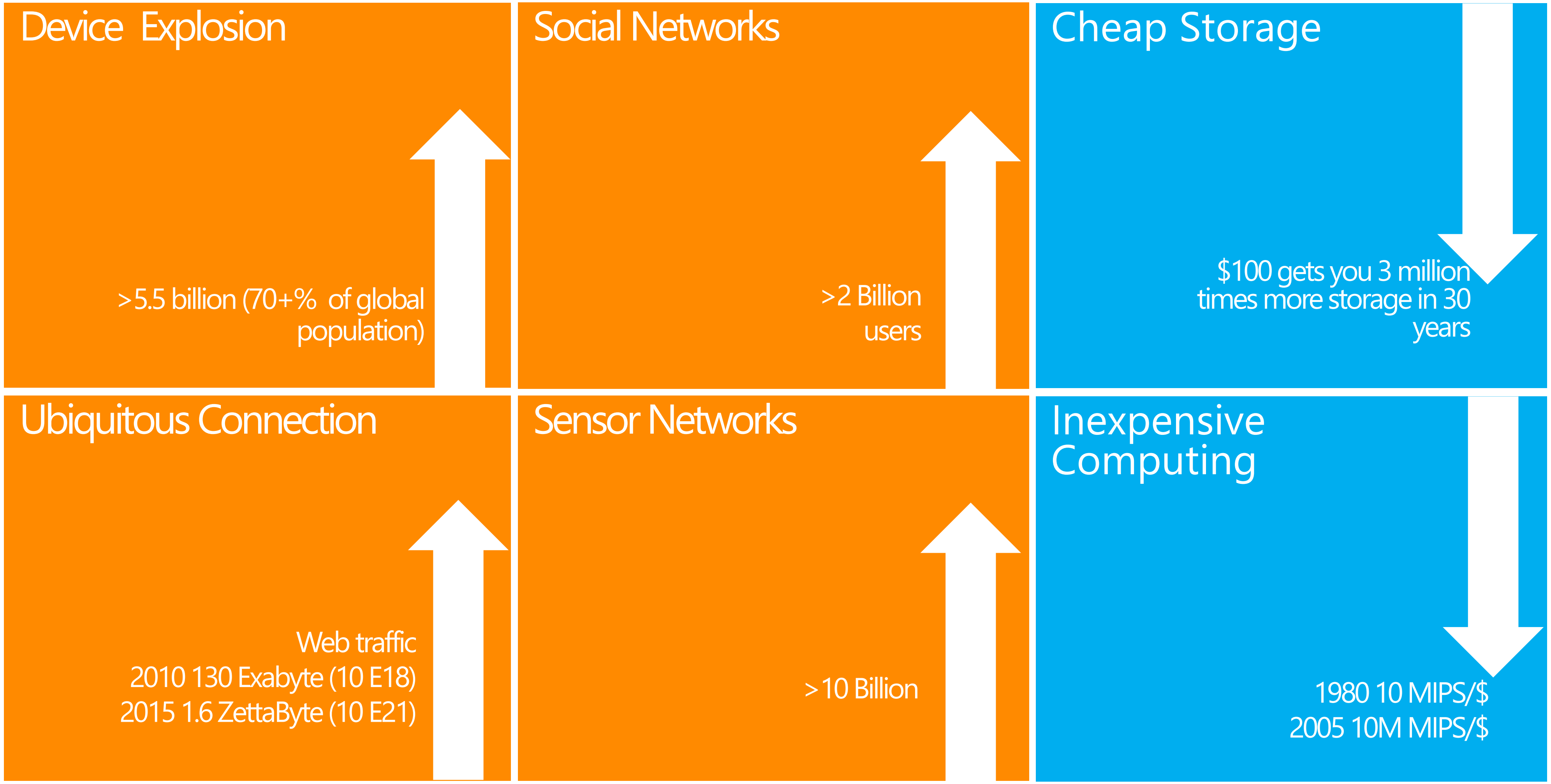
Microsoft Azure

Big-Data Analytics with Azure HDInsight

Microsoft Research

Big Data



Device Explosion

>5.5 billion (70+% of global population)

Social Networks

>2 Billion users

Cheap Storage

$100 gets you 3 million times more storage in 30 years

Ubiquitous Connection

Web traffic
2010 130 Exabyte (10 E18)
2015 1.6 ZettaByte (10 E21)

Sensor Networks

>10 Billion

Inexpensive Computing

1980 10 MIPS/$
2005 10M MIPS/$

Azure HDInsight

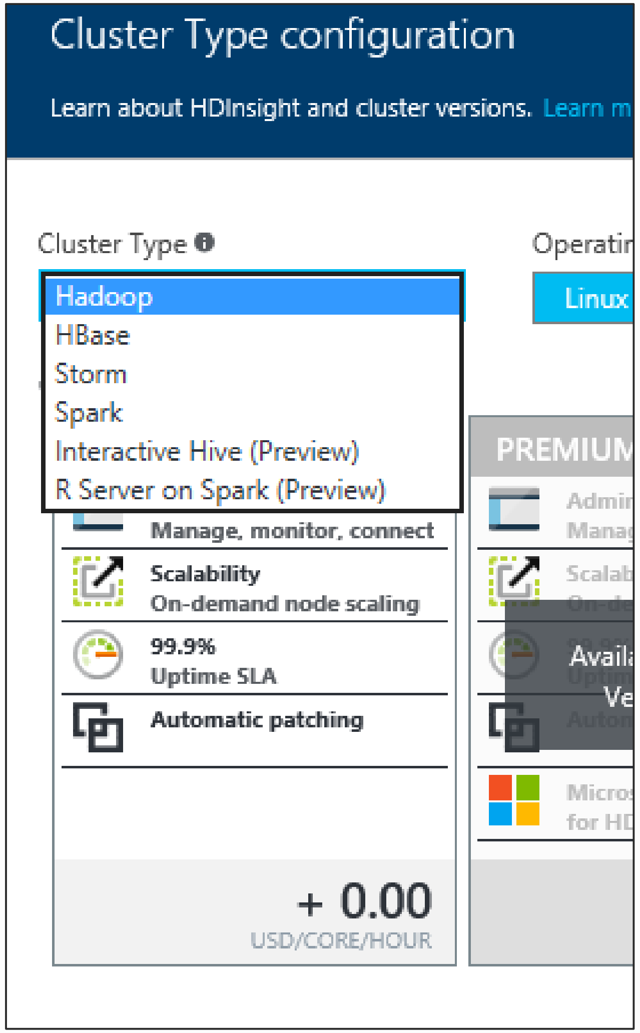
- Microsoft Azure's big-data solution using Hadoop
  - Open-source framework for storing and analyzing massive amounts of data on clusters built from commodity hardware
  - Uses Hadoop Distributed File System (HDFS) for storage
- Employs the open-source Hortonworks Data Platform implementation of Hadoop
  - Includes Hive, Pig, Storm, Spark, and more
- Integrates with popular BI tools
  - Includes Power BI, Excel, SSAS, SSRS, Tableau

Why Hadoop on Azure?

- Automatic cluster provisioning & configuration
  - Bypass an otherwise manual-intensive process
- Cluster scaling
  - Change number of nodes without deleting/re-creating the cluster
- High availability/reliability
  - Managed solution - 99.9% SLA
  - HDInsight includes a secondary head node
- Reliable and economical storage
  - HDFS mapped over Azure Blob Storage
  - Accessed through “wasb://” protocol prefix

HDInsight Cluster Types

- Hadoop: Query workloads
  - Reliable data storage, simple MapReduce
- HBase: NoSQL workloads
  - Distributed database offering random access to large amounts of data
- Apache Storm: Stream workloads
  - Real-time analysis of moving data streams
- Apache Spark: High-performance workloads
  - In-memory parallel processing



Cluster Type configuration

Learn about HDInsight and cluster versions. Learn m

Cluster Type

Hadoop

Operatir

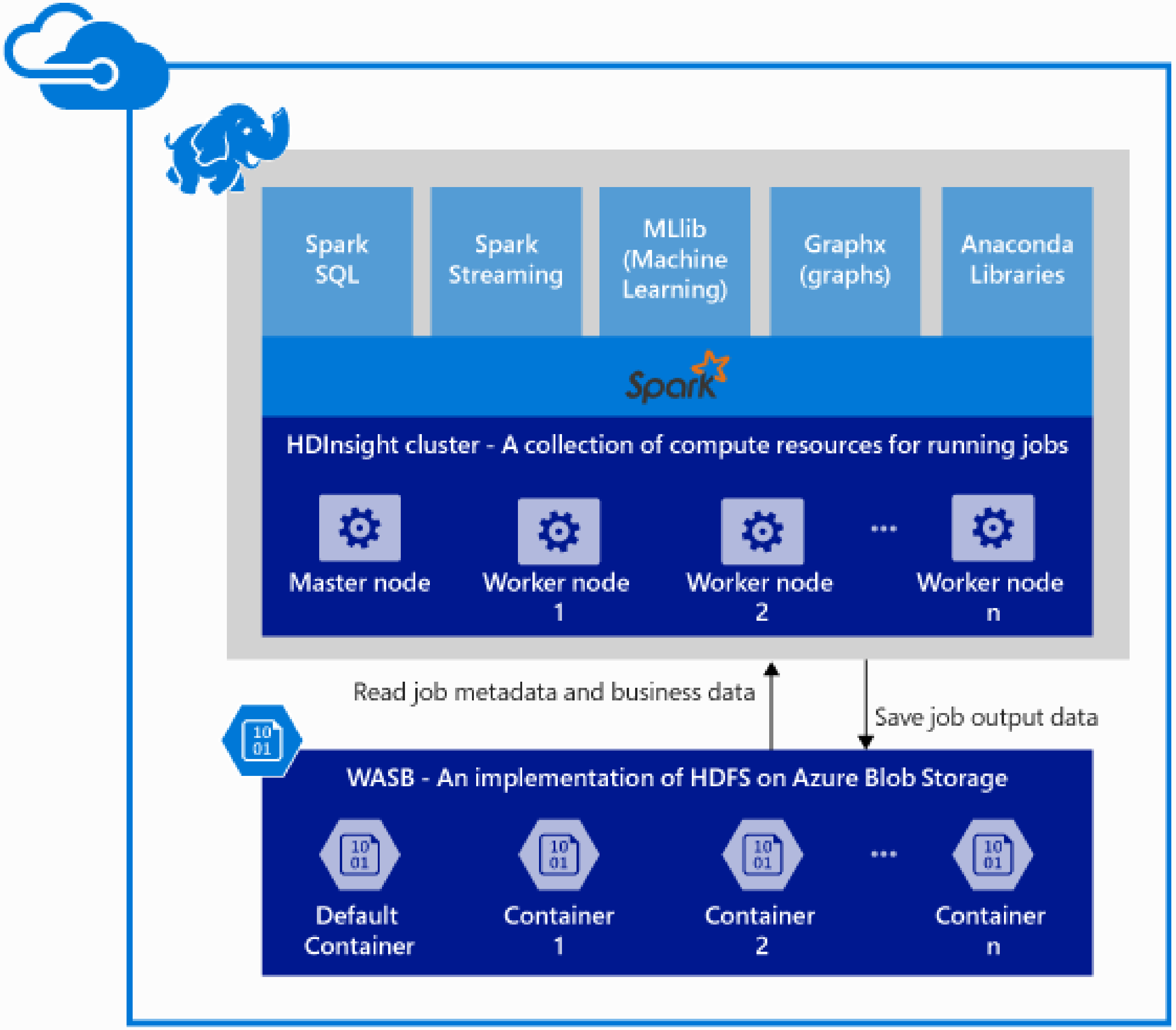
Linux

Apache Spark

- Interactive manipulation and visualization of data
  - Scala, Python, and R Interactive Shells
  - Jupyter Notebook with PySpark (Python) and Spark (Scala) kernels provide in-browser interaction
- Unified platform for processing multiple workloads
  - Real-time processing, Machine Learning, Stream Analytics, Interactive Querying, Graphing
- Leverages in-memory processing for really big data
  - Resilient distributed datasets (RDDs)
  - APIs for processing large datasets
  - Up to 100x faster than Hadoop

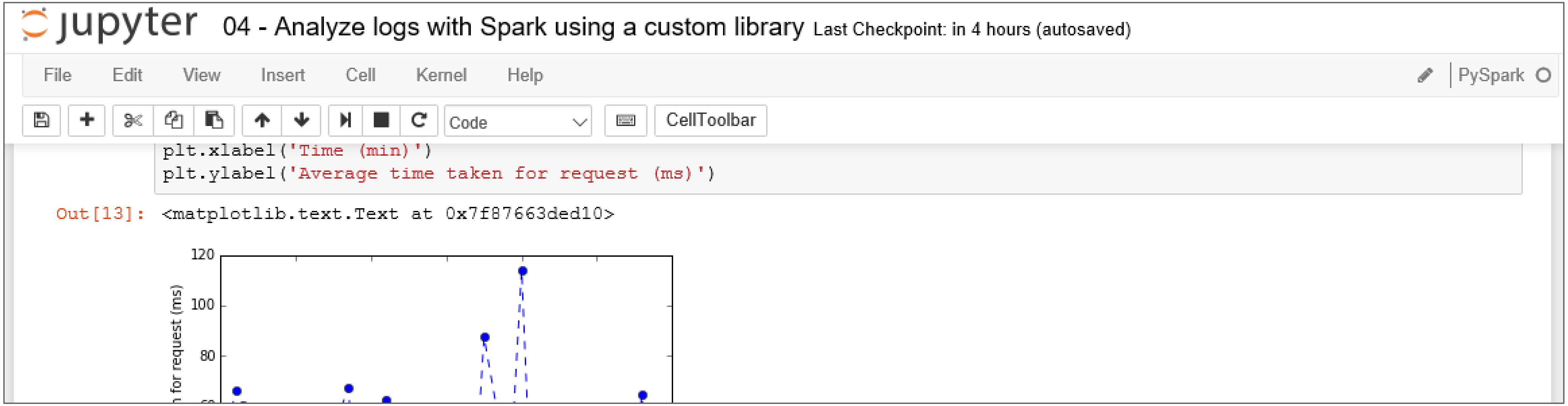
Spark Components on HDInsight

- Spark Core
  - Includes Spark SQL, Spark Streaming, GraphX, and MLlib
- Anaconda
- Livy
- Jupyter Notebooks
- ODBC Driver for connecting from BI tools (Power BI, Tableau)



Jupyter Notebooks on HDInsight

- Provide a browser-based interface for working with text, code, equations, plots, graphics, and interactive controls in a single document.
- Include preset Spark & Hive contexts (sc & sqlContext, respectively)


jupyter
04 - Analyze logs with Spark using a custom library Last Checkpoint: in 4 hours (autosaved)
File
Edit
View
Insert
Cell
Kernel
Help
PySpark
Code
CellToolbar
120
100
80
n for request (ms)

```
plt.xlabel('Time (min)')
plt.ylabel('Average time taken for request (ms)')
```

```
Out[13]: <matplotlib.text.Text at 0x7f87663ded10>
```

Microsoft Azure

Items of Note About HDInsight

- There is no “suspend” on HDInsight clusters
  - Provision the cluster, do work, then delete the cluster to avoid unnecessary charges
  - Storage can be decoupled from the cluster and reused across deployments
- Can deploy from the portal, but often scripted in practice
  - Easier/repeatable creation and deletion

Hands-On Lab

Azure HDInsight

HDInsight Spark HOL.html or HDInsight Hadoop HOL.html

Microsoft

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