IBM Software Information Management

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### **1** Introduction

IBM InfoSphere BigInsights is a software platform consisting of various IBM and open-source tools designed to help companies discover and analyze information within data that is too large and complex to process using traditional tools. Planning the layout of the installation and ensuring there are enough resources for all components are essential to proper functionality of the BigInsights software, as well as ease of future administration.

IBM's InfoSphere BigInsights Enterprise Edition enables firms to store, process, and analyze large volumes of various types of data. In this lab, you'll see how you can work with its Web console to administer your system, launch jobs (applications), monitor the status of jobs, and perform other functions. For further details on the Web console or BigInsights, visit the Info Center at <u>s</u>.

### 2 About this Lab

In this lab, we will explore various tools within the BigInsights Web Console, which help to administer and work with a BigInsights cluster.

# 3 Objective

After completing this hands-on lab, you'll be able to:

- 1. Launch the BigInsights Web console (Web console).
- 2. Work with popular resources accessible through the Welcome page.
- 3. Administer BigInsights by inspecting the status of your cluster, starting and stopping components, and accessing administrative tools available for open source components provided with BigInsights.
- 4. Work with the distributed file system. In particular, you'll explore the HDFS directory structure, create subdirectories, and upload files to HDFS.
- 5. Launch applications (jobs) and inspect their status. You'll also learn how to view the output of one job in BigSheets, a spreadsheet-like tool.

# 4 Environment Setup Requirements

To complete this lab you will need the following:

- 1. IBM InfoSphere BigInsights Bootcamp VMware® image
- 2. VMware Player 2.x or VMware Workstation 5.x or later

# 5 Preparing for the lab

- 1. Start the VMware image by clicking the Power On button in VMware Workstation if it is not already on.
- 2. Log in to the VMware virtual machine using the following information:
  - User: biadmin
  - Password: password
- 3. Open a terminal window by right-clicking on the Desktop area and choose the "Open in Terminal" item.

📄 Create <u>F</u> older
Create L <u>a</u> uncher
Create <u>D</u> ocument
Den in T <u>e</u> rminal
Clean <u>U</u> p by Name
✓ Keep Aligned
Paste
Change Deskton Background
enange besitep <u>D</u> ackground
Figure 1

4. Start the BigInsights services by executing the following command:

```
start-all.sh
```

5. Verify all services have started successfully by checking the result of the above start command. There should not be any failed components:

```
[INFO] DeployManager - Start; SUCCEEDED components: [zookeeper, hadoop, derby, h
ive, hbase, bigsql, oozie, orchestrator, console, httpfs, monitoring]; Consumes
: 252804ms
```

# 6 BigInsights Installation

IBM InfoSphere BigInsights has been pre-installed on the virtual image you have been provided with. The installation has been deployed in a pseudo-distributed mode in a single node configuration. The installation directory has been kept as default in **/opt/ibm/biginsights** and is easily identifiable via the **\$BIGINSIGHTS\_HOME** environment variable.

# 7 Launching the BigInsights Web Console

1. Launching the web console is done by entering a URL into a web browser. The format for the URL is:

```
http://<host>:<port> or http://<host>:<port>/data/html/index.html
```

The default is:

http://localhost:8080/data/html/index.html

For convenience, there is a shortcut on the biadmin's user Desktop, which will launch the web console when doubleclicked.

- 2. Security has been configured with security disabled. So you will not be prompted to enter a user ID and password.
- 3. Verify that the BigInsights Web Console looks like this:



Figure 2 - InfoSphere BigInsights Web Console

# 8 Working with the Welcome page

This section introduces you to the Web console's main page accessible from the **Welcome** tab. The Welcome page features links to common tasks, many of which can also be launched from other areas of the console. In addition, the Welcome page includes links to popular external resources, such as the BigInsights Information Center (product documentation) and community forum. You'll have a chance to work with several important aspects of this page.

1. Verify that the Welcome tab at the upper left corner is active (or highlighted). If necessary, click it to change focus to it.

IBM InfoSphere BigInsights Quick Start Edition (for Non-Production Environment)	About   Information Center
Welcome         Dashboard         Cluster Status         Files         Applications         Application Status         BigSheets	
Understand IBM big data tools: Explore before doing	Quick Links
Understand the tools for analyzing data at rest and gaining business insights.	Access secure cluster servers
Tasks	Tun big sét évenes
Accelerate machine log, social, and telecommunications analytics           Hyou have installed one of the IBM accelerators, you can run applications to jump-startyour big data analytics.           Create a dashboard	Enable your Eclipse development environment for BigInsights application development  Download applications (Eclipse projects)
Create a dashockrist to montor your application Chain (or link) applications Chain together several applications to run in a predefined sequence.	Accelerator demos and documentation
Explore and update data using sheets Explore your data setto discover, analyze, and visualize your data.	Infosphere Biginsights Information Center     Infosphere Streams Information Center
Run an application Run an application once. Immediately:	Communities and forums
Figure	3

- 2. Inspect the Tasks pane at left and use its vertical scroll bar (if necessary) to become familiar with the various tasks you can launch from this area. Each task button provided here (1) executes a function accessible through one of the Web console's tabs at top and (2) displays context-sensitive help information. Later in this lab, you'll work directly with various Web console functions. For now, you'll only launch one.
- 3. Click the View, start, or stop a service button towards the end of the Tasks list.



Figure 4

4. Verify that a list of services appears at left.

Welcome Dashboard Cluster Status

Nodes	⊘1	
Map/Reduce	Running	Nodes
HDFS	Running	Add nodes Remove nodes
Big SQL	Running	Host
Catalog	Running	No filter applied
HBase	Running	imtebi1.imte.com
Hive	Running	
HttpFS	Bunning	
Monitoring	CRunning	
Oozie	Running	
Zookeeper	Running	

- 5. Click the **Welcome** tab to return back to the main page.
- 6. Inspect the Quick Links pane at top right and use its vertical scroll bar (if necessary) to become familiar with the various resources accessible through this pane. The first several links simply activate different tabs in the Web console, while subsequent links enable you to perform set-up functions, such as adding BigInsights plug-ins to your Eclipse development environment.

Quick Lin	20
	Access secure cluster servers
SQL	Run Big SQL Queries
	Enable your Eclipse development environment for BigInsights application development
	Download applications (Eclipse projects)
	Download the Big SQL Client drivers
	Download Hive JDBC package
Netezza	Download Netezza UDFs

#### Figure 6

7. Verify that the **Files** tab of the Web console is active and that information about the distributed file system is shown as illustrated below.

✓ Go	
n Owner	Group
biadmin	supergrou
X	x biadmin

Figure 7

- 8. Click the **Welcome** tab to return back to the main page.
- Inspect the Learn more pane at lower right. Links in this area access external Web resources that you may find useful, such as the BigInsights Information Center, a public discussion forum, IBM support, and IBM's BigInsights product site. If desired, click one or more of these links to see what's available to you.



# 9 Administering InfoSphere BigInsights

The Web console allows administrators to inspect the overall health of the system as well as perform basic functions, such as starting and stopping specific servers (or components), adding nodes to your cluster, and so on. You'll explore a subset of these capabilities here.

### 9.1 Inspecting the status of your cluster

1. Click the Cluster Status tab at the top of the page.





2. Inspect the overall status of your cluster. The figure below was taken on a single-node cluster that had several services running.

odes	©1			
ap/Reduce	© Running	Add nodes Remove nodes		
SQL	© Running	Host	Status	Roles
alog ase	<ul> <li>Running</li> <li>Running</li> </ul>	imtebil .imte.com	Host is running	hive-server, secondarynamenode, zookeeper-client-port, bigsql-server, hive-web-intertace, monitoring, hbase-regionserver, datanode, nameroc tasktracker, hbase-master, oozie-server, https-server, jobtracker
FS	Running			
itoring	Running			
ie	Running			
okeeper	Running			



3. Click the Hive service and note the detailed information provided for this service in the pane at right. For example, you can see the URL for Hive's Web interface and its process ID.

			Refrech Internal: 15
Nodes	<b>©</b> 1		Leureat the tarm 13 SeCONDS
Map/Reduce	Running	Hive Summary	
HDFS	Running	🕨 Start 📕 Stop	
Big SQL	Running	Hive Node:	imte bit .imte.com:10000
Catalog	Running	Hive Node Status:	Running
HBase	Bunning	Hive Node Process ID:	7493
10		Hive Web Interface:	imtebi1.imte.com:9999/hwi
Hive	GHunning	Hive Web Interface Status:	© Running
HttpFS	Running	Hive Web Interface Process ID:	7211
Monitoring	Running	JDBC URL:	jdbc:hive://imtebi1.imte.com:10000/default
Oozie	Running		
Zookeeper	@ Bunning		



4. Optionally, cut-and-paste the Hive URL into a new tab of your browser. You'll see an open source tool provided with Hive for administration purposes, as shown below. Close this tab and return to the **Cluster Status** section of the BigInsights Web console.

USER	Change User Info	
🕈 Home		
Authorize		
DATABASE	User	
Q Browse Schema		
SESSIONS	Groups	
L Create Session		
Q List Sessions	Submit	
DIAGNOSTICS	Coontr	
Diagnostics		

Figure 12

### 9.2 Starting and Stopping a Component

ŀ

The web console provides means for toggling the status of a component directly through the browser.

Alternatively, the command line can be used as well by executing start.sh or stop.sh followed by the component name via the Administration user, i.e. biadmin. For example, to stop Hive via the command-line, execute:

```
stop.sh hive
```

```
biadmin@imtebil:~> stop.sh hive
[INFO] Progress - Stop hive
[INFO] @imtebil.imte.com - hive-web-interface stopped
[INFO] @imtebil.imte.com - hive-server stopped
[INFO] Progress - 100%
[INFO] DeployManager - Stop; SUCCEEDED components: [hive]; FAILED components: []
biadmin@imtebil:~>
```

To start it once again, execute:

start.sh hive

```
biadmin@imtebil:~> start.sh hive
[INFO] Progress - Start hive
[INFO] @imtebil.imte.com - derby already running, pid 2377
[INFO] Progress - 10%
[INFO] @imtebil.imte.com - hive-web-interface started, pid 5380
[INFO] @imtebil.imte.com - hive-server started, pid 5652
[INFO] Progress - 100%
[INFO] DeployManager - Start; SUCCEEDED components: [hive]; FAILED components: [
]
biadmin@imtebil:~>
```

To perform the task via the web console, perform the following steps:

4	If we are service the live service to display its status	Hive Sunning	
1.	IT necessary. Click the Hive service to display its status.		1
	······································		

2. In the pane at right (which displays the Hive status), click the red Stop button to stop the service.

Hive Status		
Start Stop		
Hive Node:	imte bi1.imte.com:10000	
Hive Node Status:	Bunning	
Hive Node Process ID:	5652	
Hive Web Interface:	imte bi1.imte.com:9999/hwi	
Hive Web Interface Status:	Sunning	
Hive Web Interface Process ID:	5380	

Figure 13

 When prompted to confirm that you want to stop the Hive service, click OK and wait for the operation to complete. The right pane should appear similar to the following image. If nothing seems to happen after a few minutes, refresh your browser.

🕨 Start 🔳 Stop	
Hive Node:	imte bi1.imte.com:10000
Hive Node Status:	😵 U navailable
Hive Node Process ID:	
Hive Web Interface:	imtebi1.imte.com:9999/hwi
Hive Web Interface Status:	0 I navailable



4. Restart the Hive service by clicking the green arrow just beneath the Hive Status heading. (See figure in Step #2.) When the operation completes, the Web console will indicate that Hive is running again, likely under a process ID that differs from the earlier Hive process ID shown at the beginning of this lab module.

Hive Status	Operation succeeded
🕨 Start	
Hive Node:	imtebi1.imte.com:10000
Hive Node Status:	SRunning
Hive Node Process ID:	4132
Hive Web Interface:	imtebi1.imte.com:9999/hwi
Hive Web Interface Status:	SRunning
Hive Web Interface Process ID:	3888

Figure 15

### 9.3 Accessing Service-specific Web Tools

- 1. Click on the **Welcome** tab.
- 2. Click the **Access secure cluster servers** button in the **Quick Links** section at right. A pop-up window will appear. Make sure your browser is not blocking pop-ups from this server.



3. Inspect the list of server components for which there are additional Web-based tools. The BigInsights console displays the URLs you can use to access each of these Web sites directly.

URL	Alias
http://imtebi1.imte.com:9999/hwi	hive
http://imtebi1.imte.com:50030	jobtracker
http://imtebi1.imte.com:50060	tasktracker
http://imtebi1.imte.com:50070	namenode
http://imtebi1.imte.com:50075	datanode
http://imtebi1.imte.com:50090	secondarynamenode
http://imtebi1.imte.com:60010	hbase-master
http://imtebi1.imte.com:60030	hbase-regionserver
http://imtebi1.imte.com:60010 http://imtebi1.imte.com:60030	<u>hbase-master</u> hbase-regionserver

Figure 17

4. Click the **namenode** alias. Your browser will display the standard NameNode Web interface provided by Apache Hadoop.

#### **Cluster Summary**

525 files and directories, 373 blocks = 898 total. Heap Size is 62.59 MB / 2.02 GB (3%)

Configured Capacity	1	177.09 GB	
DFS Used	:	227.35 MB	
Non DFS Used	1	11.66 GB	
DFS Remaining	:	165.2 GB	
DFS Used%	1	0.13 %	
DFS Remaining%	:	93.29 %	
Live Nodes	:	1	
Dead Nodes	:	0	
Decommissioning Nodes	:	0	
Number of Under-Replicated Blocks	:	1	

#### NameNode Storage:

Storage Directory	Туре	State
/hadoop/hdfs/name	IMAGE_AND_EDITS	Active

This is Apache Hadoop release 1.1.1

Figure 18

5. If desired, return to the list of server components (shown in Step 3) and explore additional Web-based interfaces provided for these open source software components.

### 9.4 Working with Files

The **Files** tab of the console enables you to explore the contents of your file system, create new subdirectories, upload small files for test purposes, and perform other file-related functions. In this module, you'll learn how to perform such tasks against the Hadoop Distributed File System (HDFS) of BigInsights.

Examples in this section use the **biadmin** user which has a **/user/biadmin** directory in its distributed file system. If you're accessing a BigInsights cluster using a different user ID, adapt the instructions in this exercise to work with your home directory in HDFS.

1. Click the **Files** tab of the console to begin exploring the distributed file system.

BM InfoSphere BigInsights Quick Start Edition (for Non-Production Environment)					About   Information Center	
Welcome Dashboard Cluster Status Files	Applications Application Status	BigSheets				
1 + 1 🗳 1 🕸 🕸 🗶 1 🗷 2	Path: /			→ Go		
HDFS	Name	Size	Block Size	Permission	Owner	
+ 🗀 [hdfs://imtebi1.imte.com:9000/	hdts://imtebi1.imte.com:9000/	5 directories, 0 file		FWXI-XI-X	biadmin	
	1	-00				



Expand the directory tree shown in the pane at left. If files have been uploaded to HDFS before, you'll be able to
navigate through the directory to locate them. In our case, the figure below shows /user/biadmin containing default
subdirectories.



Figure 20

3. Become familiar with the functions provided through the icons at the top of this pane, as we'll refer to some of these in subsequent sections of this module. Simply hover your cursor over the icon to learn its function.

From left to right, the icons enable you to create a directory, upload a file to HDFS, download a file from HDFS to your local file system, delete a file from HDFS, open a command window to launch HDFS shell commands, and refresh the Web console page.



4. Position your cursor on the **user/biadmin** directory and click the **Create Directory** icon (at far left) to create a subdirectory for test purposes.



Figure 22

5. When a pop-up window appears prompting you for a directory name, enter **MyDirectory** and click **OK**.



6. Expand the directory hierarchy to verify that your new subdirectory was created.



#### Figure 24

7. Let's copy a sample file from the local file system to HDFS using the command line. Open a terminal window and issue the command:

hadoop fs -put /home/biadmin/bootcamp/input/lab02\_WebConsole/CHANGES.txt
MyDirectory/

8. Now go back to the Web Console and verify that CHANGES.txt file appears in the directory tree at left. Select the file. On the right, you should see a subset of the file's contents displayed in text format. You might have to refresh the view.

Do so by pressing

Э

Welcome Dashboard Cluster Status Files	Applications Application Status	BigSheets				
🗈 🕂   😂 🗈 🧟 🎽 🖏   🗷 🦻	Path: /user/biadmin/MyDirectory/Cl	HANGES.txt		+ Go		
HDFS	Name	Size	Block Size	Permission	Owner	
-	CHANGES.bt	439.7 KB	128.0 MB	rw-rr	biadmin	
+ Chase	G	- 10			N.	2
	Hadoop Change Log Release 1.0.0 - 2011.11.27 NEW FEATURES HDFS-2316. [umbrella] W accessing HDFS over HTT	ebHDFS: a complete P (szetszwa)	FileSystem impl	lementation for		-
<ul> <li>■ README</li> <li>● □ credstore</li> <li>■ googlebooks-1988.del</li> <li>● □ input</li> <li>● □ myTestDir</li> <li>● □ myTestDir2</li> <li>● □ oozie-biad</li> </ul>	HDFS-2539. Support doAs (szetszvo) IMPROVEMENTS HDFS-2427. Change the d check/validation for al HDFS-2501. Add version HADOOP-7728. Enable tas	and GETHOMEDIRECT afault permission : l parameters. (sz prefix and root me c memory management	DRY in WebHDFS. in WebHDFS to 75 etszvo) thods to WebHDFS t to be configur	55 and add range 5. (szetszwo) rable in hadono		

Figure 25

9. Let's now download the same file from HDFS to your local file system. Highlight the *CHANGES.txt* file in your *MyDirectory* directory and click the **Download** button. (This button is between the **Upload** and **Delete** buttons.)

Figure 26

10. When prompted, click the **Save File** button. Then select Save.

🕹 Opening CHANGES.txt 🗙	Enter name of file to save to
You have chosen to open:	
CHANGES.txt	
which is a: plain text document	Save in <u>f</u> older: 📄 biadmin 🗘
from: http://imtebi1.imte.com:14000	
Would you like to save this file?	Erowse for other folders
Cancel Save File	Cancel Save

Figure 27

When prompted, identify the folder (directory) of your local file system where the file should be stored and click Save. Wait until the Web browser indicates that the file download is complete.

# **10 Working with Jobs or Applications**

The **Applications** and **Applications Status** tabs of the console enable you to launch deployed applications (including sample applications provided by IBM), inspect the status of applications and workflows, and review execution details. In this module, you'll use the data you uploaded in the prior section as input to a sample job. The job will invoke the WordCount application, a simple open source MapReduce application for Hadoop-based environments. WordCount reads text-based documents from a user-specified input directory and counts how often words occur. So, if your input directory contained 100 documents that each included the word "IBM" 5 times and "BigInsights" 3 times, WordCount would return a count of 500 for IBM and 300 for BigInsights. (Further details about the sample WordCount application are available from the Hadoop wiki at http://wiki.apache.org/hadoop/WordCount.)

After executing the WordCount job, you'll have the option to visualize its output as a collection displayed through the BigSheets tab. (BigInsights provides a spreadsheet-like analysis tool called "BigSheets". While details about this tool are beyond the scope of this Web console lab, you'll have a chance to launch it here and create a simple collection)

### 10.1 Preparing to launch a sample application (job)

 Click the **Applications** tab, then click the **Manage** link on the left side. An application catalog is displayed in the pane at left. In the image below, the catalog contains a collection of sample applications provided with BigInsights. (Administrators can upload and "publish" in-house or third-party applications as desired, as well as remove sample applications.)

come Deshboard Cluster Statu:	s Fles A	pplications	Application Status	BigSheets
Manage Link				
ategories	Applicat	ions		
Search 🧧 🧟 🧔				
Pig	Icon	Application	on Name 🔺	Categories
<ul> <li>Data Transformation</li> <li>Database</li> </ul>		Ad hoc I	Hive query	Query SQL
Ci Export		Adhor	Indi duani	Outer SOL
Calimport Monitoring		Au not .	padi direta	Query SQL
C Query	1	Ad hoc	Pig query	Query
SOL	b.	Ad hoc	R Script	R
Ca Web	-			
172-011		BigShe	etsExport	Export, Pig
	æ	Boan	dreader	Web import

Figure 28

2. Inspect the status of each displayed application icon. An icon showing 'Not deployed' in the status column indicates that the application isn't ready for immediate use because it hasn't been deployed on the cluster. An icon with the status 'Deployed' has been deployed and is ready for use. When you first install BigInsights, you'll need to deploy any sample applications you wish to use. Scroll down and click the WordCount application. Click the Deploy button, and Deploy again when the popup appears.

Run   <u>Manage</u>   Link						
Categories	Applicatio	y X Delete				
🗄 😂 Pig	Icon	Application Name 🔺	Categories	Status	Created By	Configuration
Data Transformation     Database     Database	<b>1</b>	Database import	Database.import	NOT DEPLOYED	samples	
Files	-	Distributed File Copy	Files, import, Export	NOT DEPLOYED	samples	
+ C Manitoring	Lo	DownSampling	Monitoring	NOT DEPLOYED	samples	
F Ca SOL	-	HBase	Database,Export	NOT DEPLOYED	samples	
🗄 🔄 Web	Lo	LogCollection	Moniforing	NOT DEPLOYED	samples	
	-	TeraGen-TeraSort	Test	NOT DEPLOYED	samples	
	<b>1</b>	Web Crawler	Web.Import	NOT DEPLOYED	samples	
	ę	Web REST Import	Web.Import	NOT DEPLOYED	samples	
		Word Count	Test	NOT DEPLOYED	samples	

Figure 29

Provide a constraint of the second se	Description	-
	The Word Count application reads text files and determines the frequency with which certain words occur.	
- Deployment	Parameters	
+ Categories_		
lest		
+ Security		
• Buntime De	nandanciae	

	Deploy Cancel
Figure 30	

3. Click the **Configure** button in the same row as the **WordCount** application.

😺 Under	ploy				
icon	Application Name	Categories	Status	Created By	Configuration
*	HBase	Database,Export	NOT DEPLOYED	samples	
-	TeraGen-TeraSort	Test	NOT DEPLOYED	samples	
	Web Crawler	Web,Import	NOT DEPLOYED	samples	
2	Web REST Import	Web,Import	NOT DEPLOYED	samples	
- 08	Word Count	Test	DEPLOYED	samples	9

Figure 31

4. In the pop-up window, since security has been disabled in this BigInsights installation, the Security section cannot be expanded. Had security been enabled, this section would show check boxes for both the **supergroup** and **users** boxes. When checked, once the application has been deployed, this will cause the application's icon to be visible to members of either group when they visit the Applications page of the Web console. Furthermore, members of either group will be able to launch the application. Since you're working on a BigInsights cluster that was configured without security, anyone who accesses the Web console will be able to see and launch any deployed application. Close the window by pressing Cancel.

Configure	
	- Description
	The Word Count application reads text files and determines the frequency with which certain words occu
• Categories	
Test	
• Security	
• Runtime Depende	ncies
	Save Can

Figure 32

5. Click the **Run** link, then select the **WordCount** application. Notice that your **WordCount** application has been deployed, and any applications deployed will show up in this area.

1 1 2 2 2

#### Figure 33

6. The Web console displays information about this application in the pane at right.

	<ul> <li>Description</li> </ul>		
- 68	The Word Count application reads text fil	les and determines the frequency with which certain w	vords occur.
Execution Name: Detaut	► Run		
• Parameters			
• Input path:		Browse	
• Output path:		Browse	

Figure 34

### 10.2 Launching the WordCount sample application

1. In the Execution Name box, enter ConsoleLabTest. Do NOT click the Run button yet.

▼ Execution		
Execution Name:	ConsoleLabTest	🕨 Run
	Figure 35	

2. Click on **Browse** button at the end of the input directory field. When a pop-up window appears, expand the HDFS directory tree to locate the **/user/biadmin/MyDirectory** directory. (As you'll recall, you created this directory in a previous section of this lab and uploaded a sample text file to it) Highlight the directory and click **OK**.

<ul> <li>bdfs://imtebi1.imte.com:9000/</li> <li>biginsights</li> <li>hadoop</li> </ul>	
🛨 🧀 biginsights 📧 🧀 hadoop	
📧 🧰 hadoop	
📧 🧰 hbase	
主 🧰 tmp	
🖃 🗁 user	
主 🧰 applications	
🖃 🗁 biadmin	
主 🧀 .staging	
🛨 🗀 MyDirectory	
主 🧰 oozie-biad	
OKCar	ncel

#### Figure 36

3. Verify that the Input path parameter is set to your target directory (/user/biadmin/MyDirectory in the figure below).

Input path:	/user/biadmin/MyDirectory	Browse	$\mathbf{Z}$

Figure 37

#### 4. For the Output path, specify /user/biadmin/MyDirectory\_WC

5. Verify that your WordCount settings are consistent with those shown below, and press the green **Run** button. This will cause a simple Oozie-based workflow to be generated for your application, and the application will begin to run.

- Execution		
Execution Name: Cons	oleLabTest 📔 🕨 Run	
✓ Parameters		
* Input path:	/user/biadmin/MyDirectory	Browse
* Output path:	/user/biadmin/MyDirectory_WC	Browse



While the application is running, monitor its progress in the bottom right pane (titled Application History). Note that you can stop the application by click the red Stop button in this pane. However, for this exercise, allow the job to run to completion.

Application Histo	Application History						
Status	Execution Name	Progress	Elapsed Time (sec)	Output	D		
No filter an	blied						
	ConsoleLabTest	0%	23	N/A			

Figure 39

7. Depending on your machine resources, this may take a few minutes. While it is running, you can also view the Application Status by selecting the tab from the top of the screen, if desired.

### 10.3 Inspecting the Output of your Application

Many applications, including WordCount, generate output when successfully executed.

- 1. In the **Application History** pane (where you monitored the execution status of your **ConsoleLabTest** application), click the file icon in the **Output** column of your job. Your console will switch to the **Files** view and display the directory you specified as the output path for your application (/user/biadmin/MyDirectory WC in our example).
- 2. Expand the contents of this directory until you reach the output file, which is named **part-r-00000**. Click this file, and the right pane will display a portion of its contents in text format.





- Because WordCount generates output in a tab-delimited format, you can easily view this data using BigInsight's spreadsheet-like tool.
- 4. In the right pane, change the reset the display style from **Text** to **Sheet** by clicking the **Sheet** button.

Path: /user/biadmin/MyDirectory_WC/	art-r-00000			Go			
Name	Size	Block Size	Time	Permission	Owner	Group	
part-r-00000	154.4 KB	128.0 MB	Oct 18, 2012 4:51:52 AM	rw-rr	biadmin	supergroup	
Viewing Size: 10KB - O Text	Sheet						



5. A "reader" translates your data format into the tabular format used by BigInsight's spreadsheet tool. By default, the Line Reader is used, but this can be changed by clicking on the *Edit collection reader* button.

	and the second s							
	Name		Size	Block Size	Time	Permission	Owner	Group
	part-r-0000	0	154.4 KB	128.0 MB	Oct 18, 2012 4:51:52 AM	rw-rr	biadmin	supergroup
liewi	ng Size: 10KB -	🔿 Text 💿 She	et					
hdf	s://imtebiLimte.c	om:9000/user/b	iadmin/MvDired	tory WC/part-r-0	000			
Line	Reader	e As New Collecti	an -	out the second				
	Ready							2 Refresh
-	Edit o	collection read	ler	1	leader			Contraction of the second
1	"*". 1							
2	"+".1	N						
3	*** 2	13						
4	"." 3							
5	"" 1							
6	"". 1							
7	".Trash" 1							
8	"1" 2							
	"/".2							
	"0.0.0.0" 1							
10								
10 11	")" L							
10 11 12	";" 1 "Bad 2							

Figure 42

6. Use the drop-down menu to specify **Tab Separated Value (TSV) Data** as your reader type, deselect the *Headers Included*? check box, then click the green check mark at the bottom to continue.

Selectareader: Tab Separated Value (TSV) Data ▼	
PICALLS CALLS IN TIG VIOLINIAL	
Fillingerameters: Headers Included?	
	×

### Figure 43

7. Verify that your output appears in a spreadsheet-style format.

hdf	hdfs://imtebi1.imte.com:9000/user/biadmin/MyDirectory_WC/part-r-00000					
Tab	Separated Value (TSV) Data 🥒 🛛 Save As New Collection 🔻					
<b>V</b> R	eady .	🤁 Refresh 🔚				
	header1.	header2				
1	A	1				
2	+.	1				
3	-	2				
4		3				
5		1				
6		1				
7	.Trash	1				
8	1	2				
9	L.	2				
10	0.0.0.0	1				
11	1	1				
12	Bad 2	0				
13	Browse 1	0				
	[<					

Figure 44

8. Optionally, save your sheet for future work. Click the **Save as Master Workbook** button just above the displayed data. When prompted, specify **ConsoleLab\_Workbook** as the name for your new collection (or sheet), and provide a description of your choice. Click **Save**.

Save as Master W	orkbook 🔻	
Name:	ConsoleLab_Workbook	
Description:	sample workbook	
	Cancel Save	



9. When you save the output of your WordCount run as a sheet, BigInsights switches to the **Bigsheets** tab, which enables you to analyze and manipulate this data in various ways. An exploration of BigSheets technology is beyond the scope of this lab, so we won't investigate further options available through this tool.

BM InfoS	phere Bi	glns	sights Quick S	tart Edit	ion (for Non-Pro	duction Environm						Abou	t   Info	ormation Center	
							BigSheets								
		Wor	kbooks > View Res	ults									HE.		
	1	Con	soleLab Workbool	k /									•		
		×	Delete Add	chart - C	onsoleLab :	Build new workbook	1								
		R	leady					2 Refresh	Fit column(s)	₽∕ª Export as ▼	Run S	top 100%			
		-				header1		(	*		Second Second	h	ea(		
		1	¥.						1						
		2	<b>8</b> .1						1						
		3	5						2						
		4							3						
		5							1						
		6							1				=		
		7	Trash						1						
		8	1						2						
		9	L						2						
		10	0.0.00						1						
		11	2						1						
		12	Bad 2						0						
		13	Browse 1						0						
		14	DFS 1						0						
		15	Darwin						1						
		16	DistributedFSCheck						1						

Figure 46

### **10.4 Exploring the Details of your Application's Execution**

- 1. Return to the **Applications** tab.
- 2. If necessary, click the **WordCount** application icon in the left pane to refresh the contents of information displayed about this application at right.



Figure 47

3. Locate the status of your test application (**ConsoleLabTest**) in the **Application History** section and click the arrow in its **Details** column.

Application Histo	ory					87	3
Status	Execution Name	Progress	Start Time	<ul> <li>Elapsed Time (sec)</li> </ul>	Output	Deta	ils
🐲 No filter app	lied					_	-
	ConsoleLabTest	100%	Jun 20, 2012 11:39:55 AM	33	Q		I.
							2

Figure 48

4. When the console switches to the **Application Status** tab, inspect the summary displayed about your application's workflow. (The Web console initiates an Oozie workflow for each application you launch). Note that the workflow completed successfully, and information about its start time, end time, ID, and other data is displayed.

						Refresh Interval: 15 sec	onds - R
Workflow Config	guration 🛛 🐻 Workflow Log						
rkflow Informati	ion:						
status: SUCC	CEEDED Workflow ID: 00000	01-130710092913903-oozie-biad-W					
lame: map-r	reduce-wf Path: hdfs://	imtebi1.imte.com:9000/user/applications/f3	90316c-33ac-487b-aa40	-98d1d846c90c/workflow			
start Time: 2013-	-07-10 10:53 End Time: 2013-0	17-10 10:55					
reated: 2013-	07-10 10:53 Last Modified: 2013-0	17-10 10:55					
Status	Job Status	ID	Туре	Start Time	End Time	Job ID	Job Details
	SUCCEEDED	0000001-130710092913903-oozie- biad-W@wordcount	map-reduce	2013-07-10 10:53	2013-07-10 10:55	job_201307100926_0004	



5. Click on the **Workflow Configuration** button to inspect its contents. Note that important properties about your job are defined here, including the input and output paths you specified as invocation parameters earlier.

Workflow Configuration	ж
<pre><pre><pre><pre><pre>oname&gt;inputDir</pre></pre></pre></pre></pre>	^
<pre><pre><pre>chame&gt;group.name</pre></pre></pre>	=
<pre><pre><pre><pre>cname&gt;jobTracker <pre></pre> </pre> </pre> </pre> </pre> <pre>// ame&gt;outputDir</pre> <pre>// ame&gt;outputDir</pre> <pre>// ame&gt;outputDir</pre> <pre>// ame&gt;outputDir</pre>	<b>)</b>

Figure 50

6. Click on the **Workflow Log** button to inspect its contents. Had the job failed, you might locate useful information in this log. In this case, you can see entries indicating successful completion of an action and output generated by an action.

<pre>callback for action [0000001-121017050819938-cozie-biad-W@wordcount] 2012-10-18 04:51:29,541 INFO MapReduceActionExecutor:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[0000001-121017050819938-cozie-biad-W] ACTION[0000001-121017050819938- cozie-biad-W@wordcount] External ID swap, old ID [job_201210170506_0003] new ID [job_201210170506_0004] 2012-10-18 04:51:29,542 INFO MapReduceActionExecutor:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[0000001-121017050819938-cozie-biad-W] ACTION[0000001-121017050819938- cozie-biad-W] ACTION[0000001-121017050819938- cozie-biad-W] JOB[0000001-121017050819938-cozie-biad-W] ACTION[0000001-121017050819938- cozie-biad-W] ACTION[0000001-12101705081938- cozie-biad-W] ACTION[00000104] ACT</pre>	Workflow Log	х
<pre>Coll:10.18 04:51:55,292 HIPO CallbackServlet:84 - USER[-] GROUP[-] TOFEN[-] APP[-] JOB[0000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938-cosie-biad-%@wordcount] callback for action [0000001-121017050819938-cosie-biad-%@wordcount] 2012-10-18 04:51:55,402 HIPO MapReducaActionExecutor:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[0000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938- cosie-biad-%@wordcount] action completed] external ID [job_201210170506_0004] 2012-10-18 04:51:55,403 HIPO MapReducaActionExecutor:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[0000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938- cosie-biad-%@wordcount] action produced output 2012-10-18 04:51:55,595 HIPO CoordactionDynateCommand:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938- cosie-biad-%@wordcount] action produced output 2012-10-18 04:51:55,595 HIPO CoordactionDynateCommand:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938- cosie-biad-%@wordcount] STAPTED CoordactionUpdateCommand for wfId=0000001-121017050819938-cosie- biad-% 2012-10-18 04:51:55,595 HIPO CoordactionUpdateCommand:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOB[000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938- cosie-biad-%@wordcount] STAPTED CoordactionUpdateCommand:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map-reduce-wf] JOE[000001-121017050819938-cosie-biad-%] ACTION[0000001-121017050819938-cosie- biad-%</pre>	<pre>callback for action [0000001-121017050819938-cozi=-biad-W@wordcount] 2012-10-18 04:51:29,541 INFO MapReduceActionExecutor:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938- cozi=-biad-W@wordcount] External ID swap, old ID [job_201210170506_0003] new ID [job_201210170506_0004] 2012-10-18 04:51:29,542 INFO MapReduceActionExecutor:84 - USER[biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938- cozi=-biad-W@wordcount] checking action, external ID [job_201210170506_0004] status [RUIMING] 2012-10-18 04:51:55,292 INFO CallbackServ1=t:84 - USER[-] GROUP[-1] TOFEN[-] APP[-1] JOB[0000001-121017050819938-cozi=-biad-W] ACTION[000001-121017050819938-cozi=-biad-W@wordcount] callback for action [0000001-121017050819938-cozi=-biad-W] ACTION[000001-121017050819938- cozi=-biad-W@wordcount] action completed external ID [job_201210170506_0004] 2012-10-18 04:51:55,402 INFO MapReduceActionExecutor:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938- cozi=-biad-W@wordcount] action completed external ID [job_201210170506_0004] 2012-10-18 04:51:55,405 INFO MapReduceActionExecutor:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938- cozi=-biad-W@wordcount] action produced output 2012-10-18 04:51:55,595 INFO CoordactionUpdateCommand:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938- cozi=-biad-W@wordcount] STAPTED CoordactionUpdateCommand:84 - USER [biadmin] GROUP[users] TOFEN[] APP[map:reducewt] JOB[000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938-cozi=-biad-W] ACTION[0000001-121017050819938-cozi=-</pre>	

Figure 51

7. Scroll up to the top of the Application Status page and click the arrow in the Details column in the upper right corner.

cheduled Workflo	ows   Workflows   Jobs					Refresh Interval: 15 sec	onds 👻 🚺
Workflow Confi	guration 🛛 🐻 Workflow Log						
Status: SUC	CEEDED Workflow ID: 00000	01-130710092913903-pozie-biad-W					
Name: map Start Time: 2013 Created: 2013	-reduce-wf Path: hdfs:// I-07-10 10:53 End Time: 2013-0 I-07-10 10:53 Last Modified: 2013-0	/imtebi1.imte.com:9000/user/applications/f3 07-10 10:55 07-10 10:55	90316c-33ac-487b-aa40	98d1d846c90c/workflow			
Name: map Start Time: 2013 Created: 2013 Status	-reduce-wf Path: hdfs:// +07-10 10:53 End Time: 2013-0 +07-10 10:53 Last Modified: 2013-0 Job Status	imtebi1.imte.com:9000/user/applications/f3 37-10 10:55 37-10 10:55 ID	90316c-33ac-487b-aa40 Type	98d1d846c90c/workflow Start Time	End Time	Job ID	Job Detai

### Figure 52

8. Inspect the information displayed for the job(s) associated with your workflow. In this case, the workflow that BigInsights generated on your behalf invoked two jobs. Select a given job, and more detail will be displayed at the bottom of the window. Each job requires set up, Map, Reduce, and clean up tasks, just as you would expect from any Hadoop-based job.

Scheduled Wo	rkflows   Workflows   Jobs						Refresh Interval:	15 seconds 👻
Status	Name	Job ID	Map % Complete	Reducer % Complete	Start Time 👻	End Time	User Name	Priority
🤹 🕴 1 of 3 i	ems shown. Clear filter							
00 wf./	zie action:T=map-reduce:W=map-reduce- wordcount:ID=0000001-130710092913903- oozie-biad-W	job_201307100926_00	04 100%	100%	2013-07-10 10:54	2013-07-10 10:55	biadmin	NORMAL
I - 1 of 1 items	-		10   <b>25</b>   50   100   All					14 <b>4 1</b> 5
I - 1 of 1 items Job Counters	Job Configuration		10   <b>25</b>   50   100   All					R + <b>1</b> >
I - 1 of 1 items Jöb Counters I <b>II Tasks</b>	Tob Configuration		10   <b>25</b>   50   100   All					20 × 1 ×
I - 1 of 1 items Job Counters I <b>II Tasks</b> Type	Job Configuration	stul Tasks Fa	10   <b>25</b>   50   100   All Iled Tasks Killed	Tasks Punning Tas	iks Pending	asks Sta	art Time	e t t
I - 1 of 1 items Job Counters I <b>I Tasks</b> Type setup	Job Configuration Total Tasks Succes	stul Tasks Fa	10   <b>25</b>   50   100   All Iled Tasks Killed 0	Tasks Running Tat 1 0	iks Pending 0	asks Sta	art Time N/A :	End Time 2013-07-10 10:54
I - 1 of 1 items Job Counters I <b>II Tasks</b> Type setup map	Total Tasks Succes	sfulTasks Fa 1	10   25   50   100   All Iled Tasks Killed 0 0 0	Tasks Running Tat 1 0 0 0	iks Pending 0 0	asks Str 2013-6	art Time N/A : 07-10 10:54 :	End Time 2013-07-10 10:54 2013-07-10 10:54
I - 1 of 1 items Job Counters II Tasks Type setup map reduce	Total Tasks Succes 2 1	stul Tasks Fa 1 1 1 1	10   25   50   100   All Ided Tasks Killed 0 0 0	Tasks Running Tat 1 0 2 0 0 0	iks Pending 0 0 0 0 0	asks Str 2013-0 2013-0	att Time N/A : 07-10 10:54 : 07-10 10:54 :	End Time 2013-07-10 10:54 2013-07-10 10:55

Figure 53

9. At the bottom of the window, just above the *All Tasks* link, there are two buttons, Job Counters and Job Configuration. These buttons can be used to learn more about the statistics and configuration associated with this job.

1 - 1 of 1 items	
Job Counters	Job Configuration
All Tasks	
Туре	Total Tasks
setup	2
map	1

Figure 54

10. Click the Job Counters button to display details about the number of bytes read and written, the number of various types of input and output records produced by the MapReduce framework, and so on. Scroll through the pop-up window, if needed, to become familiar with the various statistical data collected. Click the x at the top of the Counters window when you're done.

Job Counters	
Job Counters	
Name	Value
DATA_LOCAL_MAPS	1
SLOTS_MILLIS_MAPS	7380
TOTAL_LAUNCHED_MAPS	1
FALLOW_SLOTS_MILLIS_REDUC	ES 0
FALLOW_SLOTS_MILLIS_MAPS	3 0
TOTAL_LAUNCHED_REDUCES	G 1
SLOTS_MILLIS_REDUCES	10781
File Input Format Counters	
Name Valu	e
BYTES_READ	450271
File Output Format Counters	
Name Va	alue
BYTES_WRITTEN	158081
FileSystemCounters	
Name	Value
FILE BYTES WRITTEN	462307
HDFS BYTES READ	450407
HDFS BYTES WRITTEN	158081
FILE_BYTES_READ	205863
Map-Reduce Framework	
Name	Value
VIRTUAL_MEMORY_BYTES	1624416256
REDUCE_INPUT_GROUPS	12162
COMBINE_OUTPUT_RECORDS	12162
MAP_OUTPUT_RECORDS	56571
CPU_MILLISECONDS	4670
MAP_INPUT_RECORDS	11032
REDUCE_SHUFFLE_BYTES	0
COMBINE INPUT RECORDS	56571
SPILLED_RECORDS	24324
	126

Figure 55

11. Next, click the **Job Configuration** button to display information about the configuration parameters associated with this job.

Job Counters	Job Configuration
All Tasks	
Туре	Total Tasks
setup	2
man	1

#### Figure 56

12. Inspect the window that appears, scrolling down as needed to review the information collected. You can also type on the *Search by Name* field at the top right corner a keyword to search, for example, type the word *input* and only the configuration information with this keyword will be displayed.

Job Configuration	input
Name	Value
mapred.job.shuffle.input.buffer.percen	t 0.70
mapreduce.input.num.files	1
mapred.input.dir	hdfs://imtebi1.imte.com:9000/user/biadmin /MyDirectory
mapreduce.reduce.input.limit	-1
mapred.line.input.format.linespermap	1
mapred.job.reduce.input.buffer.percen	it 0.0
mapred Job.reduce Input.buffer.percen	it 0.0

#### Figure 57

13. If desired, click one of the tasks under *All Tasks* at the bottom of the window to display further details. In many cases you can continue to drill down into further details by clicking an entry. For example, the next images below display information about the Reduce task for this job. Log information represents the final level of detail available for this task.

All Tasks								
Type	Total Tasks	Successful Tasks	Failed Tasks	Killed Tasks	Running Tasks	Pending Tasks	Start Time	End Ti
setup	2	1	0	1	0	0	N/A	Jun 20, 2012
map	1	1	0	0	0	0	Jun 20, 2012 11:40:11 AM	Jun 20, 2012
reduce n	1	1	0	0	0	0	Jun 20, 2012 11:40:15 AM	Jun 20, 2012
cleanup	2	1	0	1	0	0	N/A	Jun 20, 2012 1





Figure 59



Figure 60

All Tasks 🗘 Tas	sk Details[reduce]⇔Task Attempts⇔Attempt Log
syslog logs	
2012-06-20 11:4	40:16,632 INFO org.apache.hadoop.util.NativeCodeLoader: Loaded the native-hadoop library
2012-06-20 11:4	40:17,001 INFO org.apache.hadoop.util.ProcessTree: setsid exited with exit code 0
2012-06-20 11:4	40:17.006 INFO org.apache.hadoop.mapred.Task: Using ResourceCalculatorPlugin ; org.apache.hadoop.util.LinuxResourceCalculatorPlugin@54395439
2012-06-20 11:4	40:17.087 INFO org.apache.hadoop.mapred.ReduceTask; ShuffleRamManager; MemoryLimit=440401920, MaxSingleShuffleLimit=110100480
2012-06-20 11:4	40:17,095 INFO org.apache.hadoop.mapred.ReduceTask: attempt 201206192258 0002 r 000000 0 Need another 1 map output(s) where 0 is already in progress
2012-06-20 11:4	40:17.096 INFO org.apache.hadoop.mapred.ReduceTask: attempt 201206192258 0002 r 000000 0 Scheduled 0 outputs (0 slow hosts and0 dup hosts)
040 00 00 44.4	



# **11 Summary**

In this lab you have seen how you can work with BigInsights' Web console to administer your system, launch jobs (applications), monitor the status of jobs, and perform other functions. In next labs, you will learn how to work with unstructured text, perform data discovery, and more.

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# Lab 03: BigSheets

Hands-On Lab



