Big Data Engineer Bootcamp

Code 3

Agenda

Dev Environment

- Work with Docker
- Work with Redis
- Work with Nodejs
- Work with Spark

Requirement

- Docker
- Virtualbox
- Docker-machine
    - 请一定要安装，不然会导致环境不一致
- wget, tar
    - 不一定需要，可以用手工下载代替
- Scala, SBT
- Python, Pip

Requirement

- Start a docker-machine virtual machine called: bigdata
- You can get the ip address of that virtual machine using
  - docker-machine ip bigdata
  - Memorize this address
  - In the following commands, we will use 192.168.99.100 as an example

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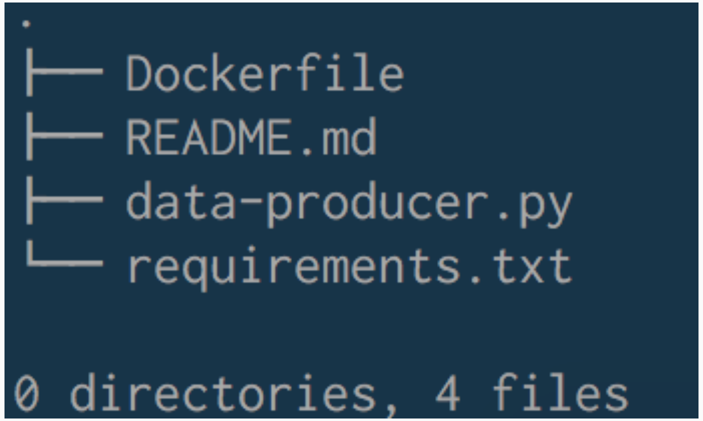
Convert Your Program to Docker Container

- We have implemented data-producer.py script
    - `python data-producer.py AAPL stock-analyzer 192.168.99.100:9092`
- Your user might have different pip, python versions

Create a Dockerfile

- Say you have your project file structure like this
- requirements.txt
    - Your python code dependencies
- data-producer.py
    - Your python code
- Dockerfile
    - You don't have it yet, we will create one



```
.
├── Dockerfile
├── README.md
├── data-producer.py
└── requirements.txt

0 directories, 4 files
```

Create a Dockerfile

```
FROM python:2.7.12-alpine        # based on python 2.7.12 image
ENV SYMBOL “AAPL”                # some environment variable settings, can be overridden
ENV TOPIC “stock-analyzer”       # more setting
ENV KAFKA_LOCATION “192.168.99.100:9092”    # - even more settings
ADD . /code                      # add your current building folder to /code folder in container
RUN pip install -r /code/requirements.txt   # run the following command in container
CMD python /code/data-producer.py ${SYMBOL} ${TOPIC} ${KAFKA_LOCATION}
```

- Make sure your terminal is connected to a docker-machine vm
- Dockerfile is a way to build a Docker image
- Dockerfile reference
    - https://docs.docker.com/engine/reference/builder/

Build a Docker Image

- `docker build -t unclebarney/data-producer .`
    - Build a image called unclebarney/data-producer
- `docker images`

Start the Docker Container

- `docker run unclebarney/data-producer`
    - This will start a container based on the image you built
- `docker run -e SYMBOL=GOOGL unclebarney/data-producer`
    - This will override your default SYMBOL environment variable

- Notice how your program runs a bit slower

Stop the Docker Container

- `docker stop [docker container id]`
- `docker kill [docker container id]`

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Start Redis Server

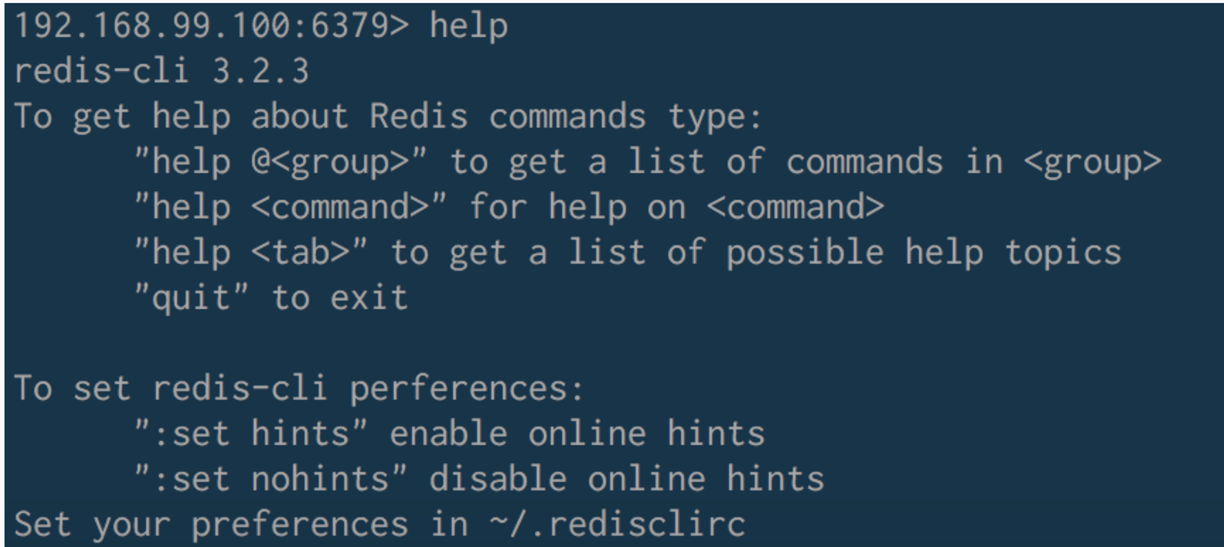
- `docker run -d -p 6379:6379 --name redis redis:alpine`
- `docker images`
  - You should see a new image being downloaded called redis:alpine
- `docker ps`
  - You should see a new redis container called redis

Get Redis CLI

- MacOS, Unix, Linux (build from source)
    - wget http://download.redis.io/release/redis-3.2.3.tar.gz
    - tar xzf redis-3.2.3.tar.gz
    - mv redis-3.2.3 redis
    - cd redis-3.2.3
    - make
    - Rm redis-3.2.3.tar.gz
- MacOS using brew
    - brew install redis
- Windows
    - http://redis.io/download

Connect to Redis Server

- Under your redis/src folder
- ./redis-cli -h 192.168.99.100
- help

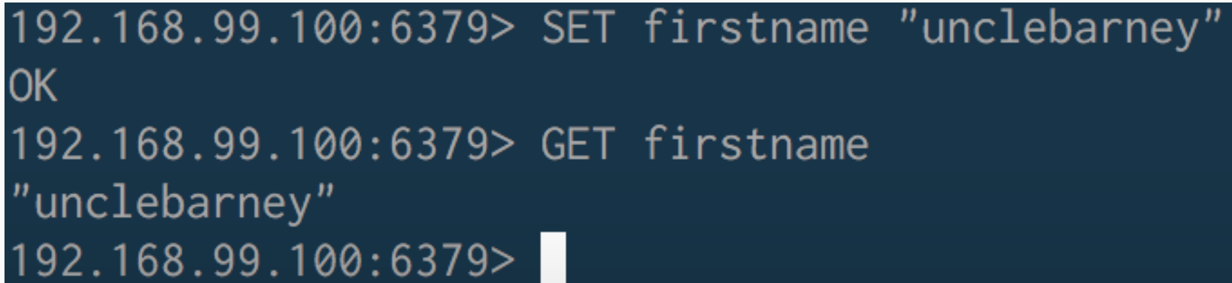


```
192.168.99.100:6379> help
redis-cli 3.2.3
To get help about Redis commands type:
      "help @<group>" to get a list of commands in <group>
      "help <command>" for help on <command>
      "help <tab>" to get a list of possible help topics
      "quit" to exit

To set redis-cli perferences:
      ":set hints" enable online hints
      ":set nohints" disable online hints
Set your preferences in ~/.redisclirc
```

Create and Retrieve Record

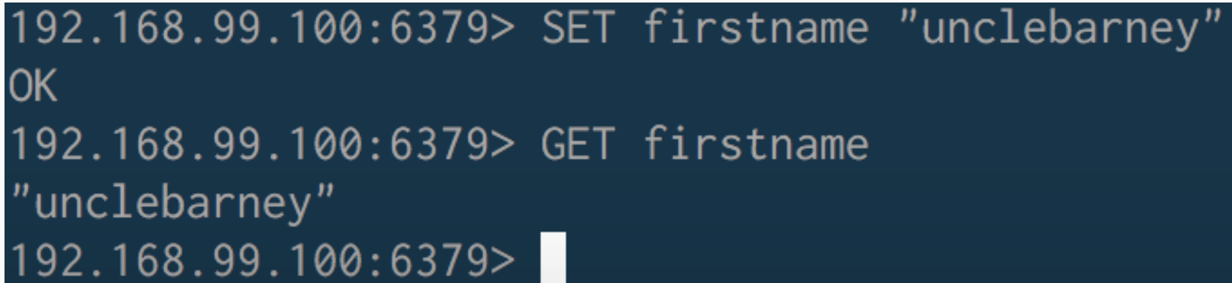
- Inside redis-cli
- SET firstname "unclebarney"
- GET firstname



```
192.168.99.100:6379> SET firstname "unclebarney"
OK
192.168.99.100:6379> GET firstname
"unclebarney"
192.168.99.100:6379> 
```

Basic Operations

- `Inside redis-cli`
- `SET firstname "unclebarney"`
- `GET firstname`
- `DEL firstname`



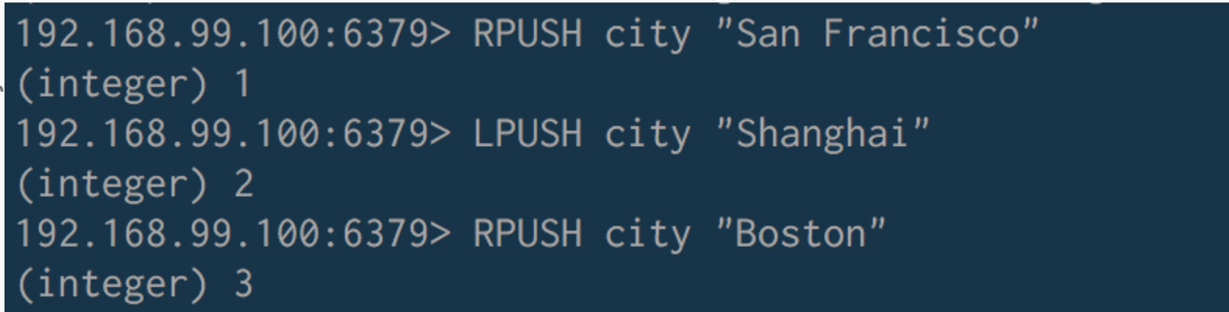
```
192.168.99.100:6379> SET firstname "unclebarney"
OK
192.168.99.100:6379> GET firstname
"unclebarney"
192.168.99.100:6379>
```

Time To Live

- `Inside redis-cli`
- `SET firstname "unclebarney"`
- `EXPIRE firstname 10`
    - `This record will be gone after 10 seconds`

Basic Operations with list

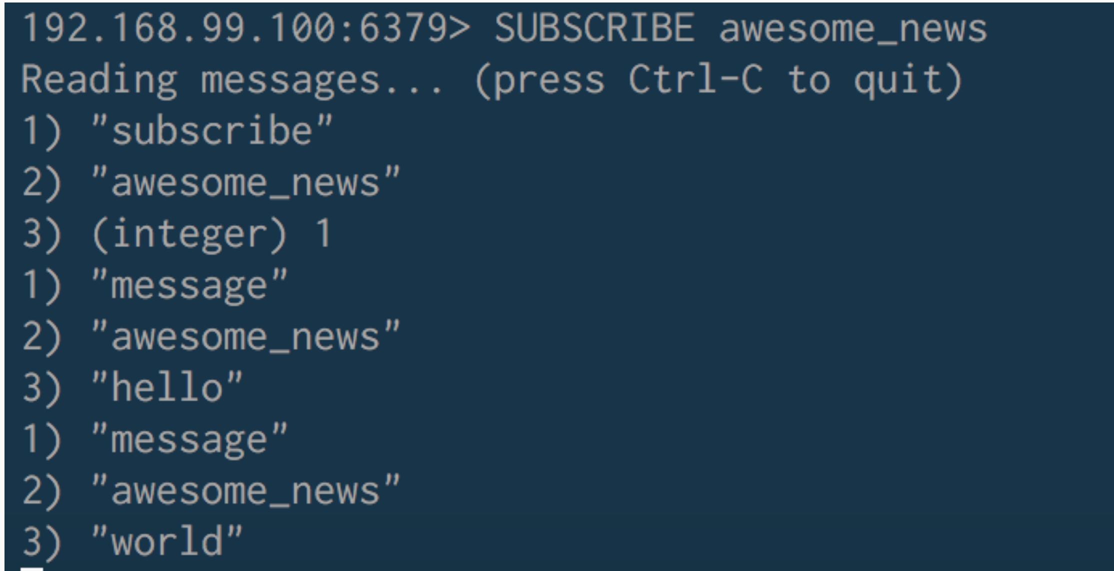
- Inside redis-cli
- RPUSH city "San Francisco"
- LPUSH city "Shanghai"
- RPUSH city "Boston"
- LRANGE city 0 -1
    - Use this command to pr



```
192.168.99.100:6379> RPUSH city "San Francisco"
(integer) 1
192.168.99.100:6379> LPUSH city "Shanghai"
(integer) 2
192.168.99.100:6379> RPUSH city "Boston"
(integer) 3
```

Publish and Subscribe

- Open two redis-cli terminal
- In one terminal
  - SUBSCRIBE awesome_news
- In another terminal
  - PUBLISH awesome_news hello
  - PUBLISH awesome_news world



```
192.168.99.100:6379> SUBSCRIBE awesome_news
Reading messages... (press Ctrl-C to quit)
1) "subscribe"
2) "awesome_news"
3) (integer) 1
1) "message"
2) "awesome_news"
3) "hello"
1) "message"
2) "awesome_news"
3) "world"
```

Further Reading

- Redis Data Types: http://redis.io/topics/data-types-intro
- The Little Redis Book: http://openmymind.net/redis.pdf

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- **Work with Nodejs**
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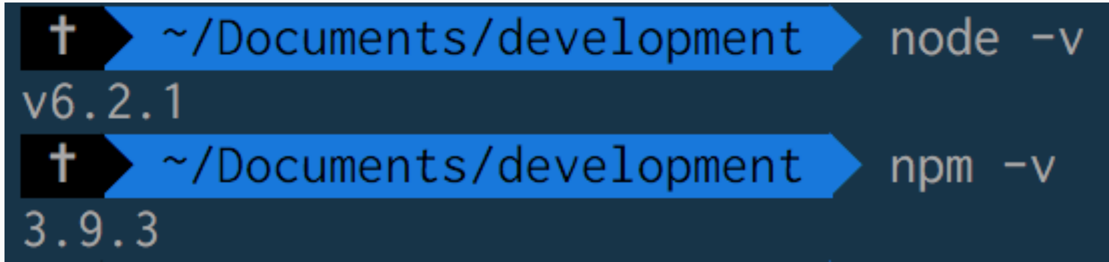
Get Nodejs and NPM

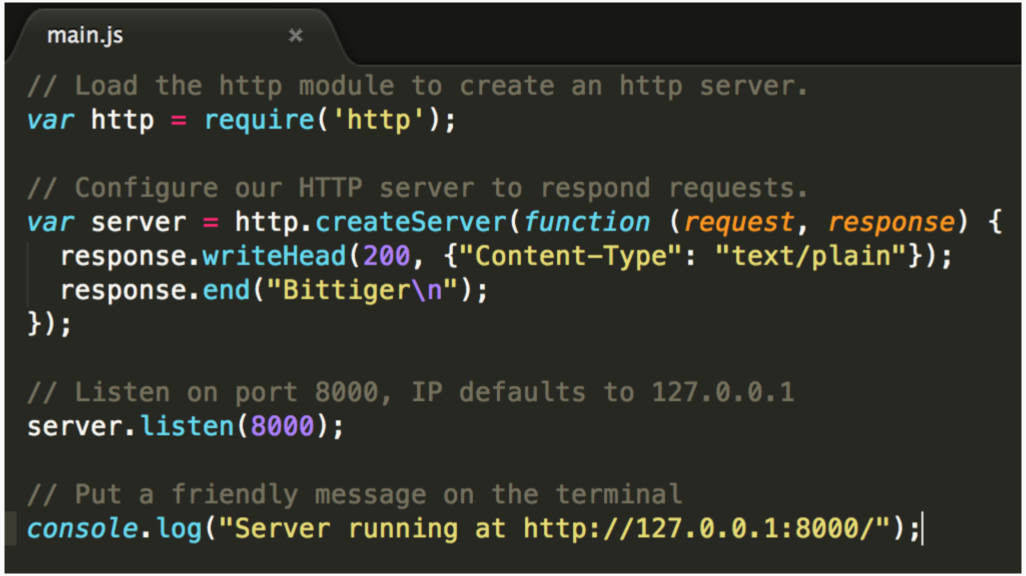
- Install Nodejs
  - https://nodejs.org/en/download/current/
  - `node -v`
  - `npm -v`



```
† ~/Documents/development  node -v
v6.2.1
† ~/Documents/development  npm -v
3.9.3
```

Build a Simple Server in 2mins

- Save the following code into a file called main.js


main.js

```
// Load the http module to create an http server.
var http = require('http');

// Configure our HTTP server to respond requests.
var server = http.createServer(function (request, response) {
  response.writeHead(200, {"Content-Type": "text/plain"});
  response.end("Bittiger\n");
});

// Listen on port 8000, IP defaults to 127.0.0.1
server.listen(8000);

// Put a friendly message on the terminal
console.log("Server running at http://127.0.0.1:8000/");
```

Build a Simple Server in 2 mins

- Under the same folder
  - `node main.js`
- Access http://localhost.8000 in your browser

Further Reading

- Nodejs Tutorial: http://www.tutorialspoint.com/nodejs/
- Socket.io: http://socket.io/docs/

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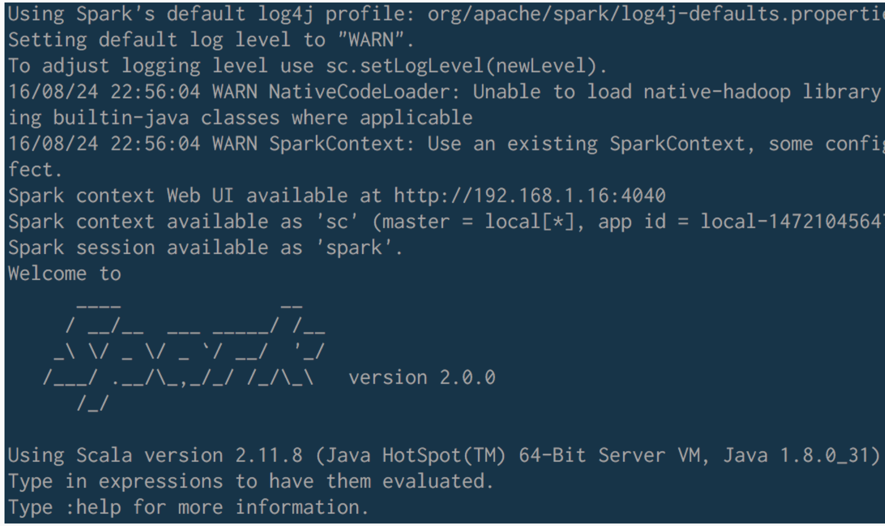
Get Spark CLI

- Spark is hard to install, be patient
- Verify that Scala and SBT are installed
  - scala -version
  - sbt --version
- Download spark-2.0.0-bin-hadoop2.7
  - http://spark.apache.org/downloads.html
- tar xvf spark-2.0.0-bin-hadoop2.7
- mv spark-2.0.0-bin-hadoop2.7 spark
- rm spark-2.0.0-bin-hadoop2.7.tgz
- Under your spark/bin folder
  - Spark-shell (interactive shell in scala)
  - pyspark (interactive shell in python)
- Open up browser to checkout Spark UI
  - http://localhost:4040

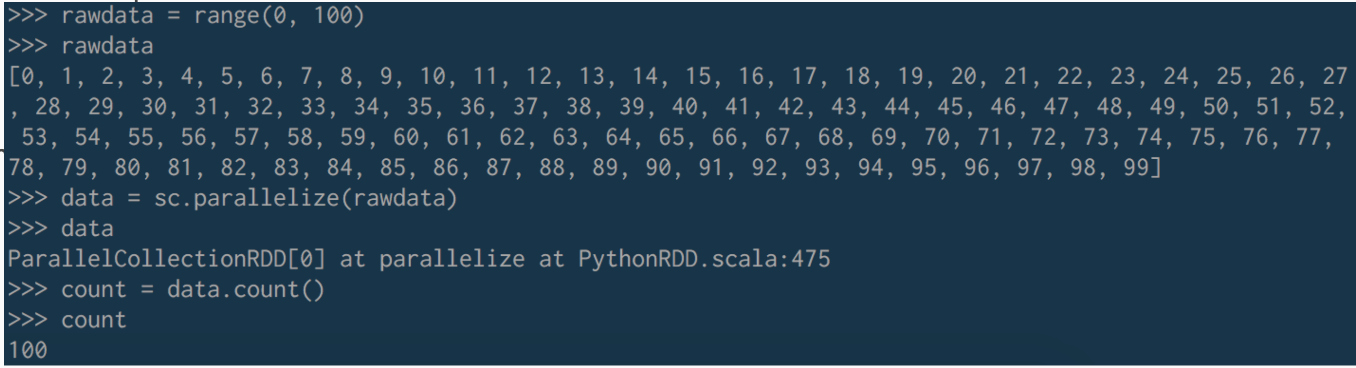


```
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properti
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel).
16/08/24 22:56:04 WARN NativeCodeLoader: Unable to load native-hadoop library
ing builtin-java classes where applicable
16/08/24 22:56:04 WARN SparkContext: Use an existing SparkContext, some confi
fect.
Spark context Web UI available at http://192.168.1.16:4040
Spark context available as 'sc' (master = local[*], app id = local-1472104564
Spark session available as 'spark'.
Welcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /___/ .__/\_,_/_/ /_/\_\   version 2.0.0
      /_/

Using Scala version 2.11.8 (Java HotSpot(TM) 64-Bit Server VM, Java 1.8.0_31)
Type in expressions to have them evaluated.
Type :help for more information.
```

Simple Example

- `rawdata = range(0, 100)`
    - Use python range to generate 100 numbers
- `data = sc.parallelize(rawdata)`
    - Convert rawdata into spark RDD
- `count = data.count()`
    - Spark will coun



```
>>> rawdata = range(0, 100)
>>> rawdata
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27
, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52,
 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77,
78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99]
>>> data = sc.parallelize(rawdata)
>>> data
ParallelCollectionRDD[0] at parallelize at PythonRDD.scala:475
>>> count = data.count()
>>> count
100
```

Further Reading

- Spark Quick Start: http://spark.apache.org/docs/latest/quick-start.html